



Shire of Murchison

Shire of Murchison Biological Surveys

Biological Assessment

October 2017

Glossary of terms

BCE	Bamford Consulting Ecologists
BVA	Beard Vegetation Association
BoM	Bureau of Meteorology
DAFWA	Department of Agriculture and Food Western Australia
DBCA	Department of Biodiversity, Conservation and Attractions
DEE	Commonwealth Department of the Environment and Energy
DWER	Department of Water and Environmental Regulation
EPA	Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
GHD	GHD Pty Ltd
ha	Hectares
IBRA	Interim Biogeographic Regionalisation for Australia
km	Kilometres
LGA	Local Government Authority
mm	Millimetres
MNES	Matters of National Environmental Significance
MUR	Murchison IBRA
MUR02	Western Murchison Subregion IBRA
NVIS	National Vegetation Information System
PEC	Priority Ecological Community
Survey area 1	Beringarra-Byro Road Material Pit Extension
Survey area 2	Carnarvon-Mullewa Road (Curbur Station)
Survey area 3	SLK 24.568 -25.704 Beringarra-Byro Road
Survey area 4	SLK 26.262 – 27.416 Beringarra-Byro Road
TEC	Threatened Ecological Community
The Shire	Shire of Murchison
VT	Vegetation Type
WC Act	<i>Wildlife Conservation Act 1950</i>
WONS	Weeds of National Significance
YAL	Yalgoo IBRA
YAL02	Tallering Subregion IBRA

Executive summary

The Shire of Murchison (the Shire) seeking to realign two sections of the Beringarra-Byro Road and the Carnarvon-Mullewa Road, and a driveway to access the Curbur Homestead. In addition, the Shire plans to expand an existing gravel pit on Beringarra-Pindar Road in order to supply sufficient high-quality gravel for road construction.

The Shire commissioned GHD Pty Ltd (GHD) to undertake a single season vegetation, flora and fauna assessment of the Survey Areas. The purpose of this report is to provide supporting environmental assessment information relating to flora, fauna and vegetation for clearing permit applications.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.6 and the assumptions and qualifications contained throughout this report.

Key findings

Vegetation

- The current extents remaining of all vegetation associations are greater than 90 per cent (%) of their pre-European extents at all scales (e.g. State, IBRA Bioregion, IBRA Subregion and LGA)
- The desktop study revealed no Department of Biodiversity, Conservation and Attractions (DBCA)-managed conservation areas located within 10 km of the survey areas. Two Priority Ecological Communities (PECs) are present within the survey areas including:
 - Curbur calcrete (Priority 1) groundwater assemblage type on Gascoyne palaeodrainage on Curbur Station in Survey area 2
 - Byro central and Byro HS (Priority 1) calcrete groundwater assemblage types on Murchison palaeodrainage on Byro Station in Survey area 3 and 4.
- Fifteen vegetation types were identified within the survey areas. The total included one cleared and degraded, and rehabilitated vegetation type. The dominant vegetation types for each survey area were Survey area 1 – VT1 (*Acacia* tall shrubland), Survey area 2 – VT3 (*Eucalyptus victrix*, *Melaleuca stereophloia* on flats), and Survey area 3 and Survey area 4 – VT11 (*Acacia*, *Eremophila*, *Senna* Open Shrubland on Stony Plains).
- The vegetation condition within the survey areas was rated from Completely Degraded to Excellent in condition. Drought affected and overgrazing of vegetation was evident within all survey areas in particular Survey areas 3 and 4. In Survey areas 3 and 4 limited groundcover was recorded.
- One hundred and fifty-eight (158) flora taxa (including subspecies and varieties) representing 34 families and 87 genera were recorded from the survey areas during the field survey. This total comprises 155 native taxa and three introduced flora taxa. None of the introduced flora recorded are listed as Declared Pest or Weeds of National Significance.
- No *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), *Wildlife Conservation Act 1950* (WC Act) or DBCA Priority-listed flora were recorded within the Survey Areas.

Fauna

- The survey identified seven fauna habitat types (including highly disturbed) within the survey areas. The fauna habitats of the survey areas are located in a largely intact region of WA. The Beringarra-Pindar Road, Carnarvon-Mullewa Road and Beringarra-Byro Road

creates an artificial barrier for fauna moving between habitats. Overall, the fauna habitat present within the survey areas are well-represented in the broader area with high connectivity to the surrounds. The survey area primarily consists of Open Shrubland on plains. The overall value of the habitat was considered to be moderate due to the quality of habitat types (e.g. moderate structural diversity within each habitat type) and good connectivity with broader region.

- No conservation significant fauna were recorded from the survey areas. Four conservation significant species were considered likely to occur within the survey area, including:
 - Grey Falcon (*Falco hypoleucos*) – Listed as Vulnerable by the WC Act (Survey area 2)
 - Peregrine Falcon (*Falco peregrinus*) – Listed as other specially protected fauna by DBCA
 - Malleefowl (*Leipoa ocellata*) – Listed as Vulnerable by the EPBC Act and WC Act
 - Rainbow Bee-eater (*Merop ornatus*) – Listed under the International Agreement by the WC Act

Ten Clearing Principles

The assessment determined that clearing within the Survey area 2 is likely to be at variance to Principle f) – Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Table of contents

1.	Introduction	1
1.1	Project background	1
1.2	Project location	1
1.3	Purpose of the report	1
1.4	Scope of works	1
1.5	Relevant legislation, conservation codes and background information.....	2
1.6	Limitations and assumptions	2
2.	Methodology.....	4
2.1	Desktop assessment.....	4
2.2	Field survey.....	4
2.3	Limitations.....	3
3.	Desktop assessment.....	7
3.1	Previous survey results.....	7
3.2	Climate.....	7
3.3	Regional biogeography.....	8
3.4	Land systems, landforms and soils.....	8
3.5	Hydrology.....	10
3.6	Land use	10
3.7	Vegetation and flora.....	11
3.8	Fauna.....	14
4.	Field survey results	16
4.1	Vegetation and flora.....	16
4.2	Fauna.....	26
5.	Environmental approvals and referrals	35
5.1	Federal Government.....	35
5.2	Western Australian Government.....	36
6.	References.....	46

Table index

Table 1	Project location description.....	1
Table 2	Data collected during the flora and vegetation field survey.....	1
Table 3	Field survey limitations	4
Table 4	IBRA bioregions and subregions within the survey areas	8
Table 5	Land systems within the survey areas.....	9
Table 6	Hydrology aspects for the survey areas	10
Table 7	Drainage lines within the survey areas.....	10
Table 8	Broad scale vegetation associations (Beard 1976)	11
Table 9	Extents of vegetation associations mapped with the survey area (GoWA 2016).....	12
Table 10	PEC and TEC present with survey area (DBCA 2007–, DEE 2017a).....	13
Table 11	<i>NatureMap</i> flora search results (DBCA 2007–).....	13
Table 12	Conservation significant flora search results	14
Table 13	<i>NatureMap</i> fauna search results (DBCA 2007–).....	14
Table 14	Conservation significant fauna search results	14
Table 15	Recorded vegetation types.....	17
Table 16	Extent of vegetation condition ratings mapped within the Survey Areas.....	24
Table 17	Recorded flora diversity summary for each survey area	25
Table 18	Likelihood of occurrence assessment post field survey	25
Table 19	Recorded habitat types.....	26
Table 20	Fauna habitat type description recorded within the Survey Areas	27
Table 21	Recorded fauna counts.....	34
Table 22	Conservation significant fauna 'likely' to occur in 10 km of the Survey Areas.....	34
Table 23	Assessment of Matters of National Environmental Significance	35
Table 24	Assessment of the survey area against the ten clearing principles.....	37

Appendices

Appendix A – Figures

Appendix B – Relevant legislation, conservation codes and background information

Appendix C – Database searches

Appendix D – Flora data

Appendix E – Fauna data

1. Introduction

1.1 Project background

The Shire of Murchison (the Shire) seeking to realign two sections of the Beringarra-Byro Road and the Carnarvon-Mullewa Road, and install a driveway to access the Curbur Homestead. In addition, the Shire plans to expand an existing gravel pit on Beringarra-Pindar Road in order to supply sufficient high-quality gravel for road construction (Figure 1).

1.2 Project location

The project includes four separate areas as outlined in Table 1. The desktop-based searches of the assessment include a 10 km buffer of the survey areas (refer to Table 1).

Table 1 Project location description

Survey Area	Location	Project works description	Size (ha)
Survey Area 1	Berrigarra-Pindar Road Material Pit	Expansion of material pit	0.99 ha
Survey Area 2	Carnarvon-Mullewa Road (Curbur Station)	Road re-alignment and new driveway access to Curbur Homestead.	8.15 ha
Survey Area 3	SLK 24.568 -25.704 Beringarra-Byro Road	Road re-alignment and creek crossing.	2.22 ha
Survey Area 4	SLK 26.262 – 27.416 Beringarra-Byro Road	Road re-alignment.	2.33 ha

1.3 Purpose of the report

The purpose of this report is to provide supporting environmental assessment information relating to flora, fauna and vegetation for clearing permit applications (refer to Table 1).

1.4 Scope of works

The scope of works for the detailed flora and fauna survey included:

- A desktop review of publically available information and relevant reports commissioned by the Shire was completed to determine the environmental values of the survey areas.
- A single season biological survey of the survey area was undertaken during Spring 2017 to identify:
 - The presence or potential presence of any Threatened or Priority Flora
 - Vegetation community types present, including presence of any Threatened or Priority Ecological Communities (PECs or TECs).
 - Vegetation condition, including the location of any Weeds of National Significance (WONS) or Declared Weeds
 - Flora species recorded including introduced species
 - Vegetation growing in association with wetlands or watercourses
 - The presence or potential presence of any Threatened or Priority fauna
 - Fauna species recorded including introduced species
- Preparation of a biological survey report (this document) that:

- Documents the results of the desktop assessment and field survey, including mapping
 - Identifies and discusses potentially occurring significant flora, vegetation and fauna species and their habitat
 - Assesses the project clearing against the 10 Clearing Principles, as outlined in Schedule 5 of the *Environmental Protection Act 1986* (EP Act)
- Provision of spatial files in GIS format.

1.5 Relevant legislation, conservation codes and background information

In Western Australia (WA) significant communities, and flora and fauna are protected under both Federal and State Government legislation. In addition, regulatory bodies also provide a range of guidance and information on expected standards and protocols for environmental surveys.

An overview of key legislation and guidelines, conservation codes and background information relevant to this project are provided in Appendix B.

1.6 Limitations and assumptions

This report has been prepared by GHD for the Shire of Murchison and may only be used and relied on by the Shire for the purpose agreed between GHD and the Shire as set out in section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than the Shire arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by the Shire and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of infrastructure, access tracks and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

This report has assessed the flora and fauna values within the survey area, as shown in Figure 1, Appendix A. Should the Survey Areas change or be refined, further assessment may be required.

2. Methodology

2.1 Desktop assessment

The desktop assessment involved a review of:

- The Department of the Environment and Energy (DEE) Protected Matters Search Tool (PMST) to identify communities and species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) potentially occurring within 10 km of the Survey Area (DEE 2017a) (Appendix C)
- The DBCA *NatureMap* database for flora, fauna, PEC and TEC species previously recorded within 10 km of the Survey Area (DBCA 2007–) (Appendix C)
- Existing datasets including previous vegetation mapping of the Survey Area (Beard 1976), aerial photography, geology/soils and hydrology information to provide background information on the variability of the environment, likely vegetation units and fauna habitats and to identify areas with potential to contain TECs, PECs, and Threatened and Priority listed flora and fauna species.

The environmental constraints identified in the desktop assessment are mapped in Figure 2, Appendix A.

2.2 Field survey

2.2.1 Vegetation and flora

As part of the biological survey a single season reconnaissance vegetation and flora assessment of the Survey Areas was conducted by Earth Stewardship botanist (Joshua Foster, SL012114) from 12-15 September 2017. The field survey was undertaken to:

- Verify the results of the desktop assessment.
- Identify and describe the dominant vegetation units and assess vegetation condition.
- Identify and record vascular flora taxa present at the time of survey.

Searches for conservation significant or other significant ecological communities and flora taxa were also undertaken during the field survey.

The survey methodology employed by GHD was undertaken with reference to the Environmental Protection Authority (EPA) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a).

Data collection

Field survey methods involved a combination of sampling quadrats located in identified vegetation units and traversing the Survey Areas by foot. Seventeen non-permanent quadrats were described throughout the Survey Areas (refer to Figure 3, Appendix A).

Quadrats (measuring 20 m x 20 m – area of 400 m²) were located within each identified vegetation unit. A minimum of two quadrats were located within each identified vegetation unit, where possible. Field data at each quadrat was recorded on a pro-forma data sheet and included the parameters detailed in Table 2. Quadrat data is provided in Appendix D.

Table 2 Data collected during the flora and vegetation field survey

Aspect	Measurement
Collection attributes	Personnel/recorder; date, quadrat dimensions, photograph of the quadrat.
Physical features	Aspect, soil attributes, ground surface cover, leaf and wood litter.
Location	Coordinates recorded in GDA94 datum (Zone 50) using a hand-held Global Positioning System (GPS) tool to accuracy approximately ± 5 m.
Vegetation condition	Vegetation condition was assessed and mapped in accordance with the vegetation condition rating scale for the Eremaean and Northern Botanical Provinces or South West and Interzone Botanical Provinces (EPA 2016a).
Disturbance	Level and nature of disturbances (e.g. weed presence, fire and time since last fire, impacts from grazing, exploration activities).
Flora	List of dominant flora from each structural layer. List of all species within the quadrat including average height and cover (using NVIS).

A flora inventory was compiled from taxa listed in described quadrats and from opportunistic floristic records throughout the survey area.

Vegetation units

Vegetation units were identified and boundaries delineated using a combination of aerial photography, topographical features and field data/observations.

Vegetation units were described based on structure, dominant taxa and cover characteristics as defined by quadrat data and field observations. Vegetation unit descriptions follow the NVIS and are consistent with NVIS Level V (Association). At Level V, three (or more) taxa per stratum are used to describe the association (ESCAVI 2003).

Vegetation condition

The vegetation condition of the survey areas 2, 3 and 4 were assessed and mapped in accordance with the vegetation condition rating scale for the Eremaean and Northern Botanical Provinces. The vegetation condition for survey area 1 was assessed and mapped in accordance with the South West and Interzone Botanical Provinces (EPA 2016a). The scales recognise the intactness of vegetation and consists of six rating levels as outlined in Appendix B.

Flora identification and nomenclature

Species that were well known to the survey botanist were identified in the field; all other species were collected and assigned a unique collection number to facilitate tracking. All specimens collected during the field assessment were dried and processed in accordance with the requirements of the Geraldton Herbarium. Species were identified by the use of taxonomic literature, electronic keys and online electronic databases.

The conservation status of all recorded flora was compared against the current lists available on *FloraBase* (WA Herbarium 1998–) and the EPBC Act Threatened species database provided by DEE (2017b).

Nomenclature used in this report follows that used by the WA Herbarium as reported on *FloraBase* (WA Herbarium 1998–).

Surveys for conservation significant flora

Prior to the field survey, information obtained from the desktop assessments (e.g. aerial photography, geology, soils and topography data, EPBC Act PMST, *NatureMap* search results)

was reviewed to determine conservation significant flora taxa potentially present within 10 km of the Survey Area and locations. Additionally, ecological information (e.g. habitat, associated flora taxa and phenology) was sourced from *FloraBase* (WA Herbarium 1998–) and other relevant publications where available, to provide further details.

Potential habitats were searched for the presence of conservation significant flora. Locations within the survey areas with differing hydrology, fire or disturbance history to the surrounding areas were also searched where identified.

When any known or potential Threatened, Priority or significant flora was located, the following data was collected: GPS location, height, number of plants and corresponding area of population, reproductive state and plant condition.

2.2.2 Fauna

As part of the biological survey, ecologist (Steven Petts) undertook a single season fauna survey (reconnaissance survey) of the Survey Areas from 12-15 September 2017. The fauna assessment was undertaken concurrently with the vegetation and flora assessment and with reference to the EPA *Technical Guidance – Terrestrial Fauna Surveys* (EPA 2016b). The purpose of the reconnaissance survey was to verify the accuracy of the desktop study and to delineate, and characterise fauna assemblages present in the Survey Areas.

The majority of the survey areas were traversed on foot over four days to identify and describe the dominant fauna habitat types present and their condition, assess habitat connectivity, and identify and record fauna species within the survey areas. An assessment of the likelihood of conservation significant fauna and their habitats occurring within the survey areas was also undertaken.

In addition to the reconnaissance survey, a targeted survey for the Shield-backed Trapdoor Spider (*Idiosoma* sp.) and Malleefowl (*Leipoa ocellata*) was carried out across all Survey Areas.

Habitat assessment

A field data sheet was used to document the type and extent of habitats within the survey areas. The following information was collected from 11 relevés considered representative of the fauna habitat:

- Habitat structure (e.g. vegetation type, presence/absence of structural layers such as ground cover and mid storey)
- Presence/absence of refuge including: density of ground covers, fallen timber, hollow-bearing trees and rocks/boulder piles, and the type and extent of each refuge
- Location of the habitat within the survey areas in comparison to the habitat within the surrounding landscape
- Habitat connectivity and identification of wildlife corridors within and immediately adjacent to the survey areas
- Current land use and disturbance history
- Identification and evaluation of key habitat features and types identified during the desktop assessment relevant to fauna of conservation significance
- Evaluation of the Likelihood of Occurrence of conservation significant fauna within the habitat (based on presence of suitable habitat and observations)
- A representative photograph of each habitat type.

Opportunistic fauna searches

Opportunistic fauna searches were also conducted across the survey areas. The majority of opportunistic searches were undertaken at habitat assessment locations and focussed on the following:

- Searching the survey areas for tracks, scats, bones, diggings and feeding areas for both native and feral fauna
- Searching through microhabitats (i.e. racking dense leaf litter)
- Visual and aural surveys. The *Michael & Stewart Guide to Birds of Australia* – phone application (Morcombe and Steward 2016) and binoculars were used to assist visual observations. Pre-recorded calls from Morcombe and Steward (2016) were used to assist with aural identification of bird species.

Fauna species identification

Identification of fauna species was made in the field using available field guides and electronic guides (e.g. Morcombe 2004). Where identification was not possible, photographs of specimens were collected to be later identified.

Nomenclature used in this report follows that used by the WA Museum and the DBCA *NatureMap* database (DBCA 2007–) with the exception of birds, where by Christidis and Boles (2008) was used.

2.3 Limitations

2.3.1 Desktop limitations

The EPBC Act PMST is based on bioclimatic modelling for the potential presence of species. As such, this does not represent actual records of the species within the area. The records from the *NatureMap* searches of threatened flora and fauna provide more accurate information for the general area. However, some records of collections, sightings or trappings cannot be dated and often misrepresent the current range of threatened species.

2.3.2 Field survey limitations

The EPA (2016a) Technical Guide states that flora and fauna survey reports for environmental impact assessment in WA should contain a section describing the limitations of the survey methods used. The limitations and constraints associated with this field survey are discussed in Table 3. Based on this assessment, the present survey effort has not been subject to any constraints which affect the thoroughness of the assessment and the conclusions which have been formed.

Table 3 Field survey limitations

Aspect	Constraint	Comment
Sources of information and availability of contextual information.	Nil	Adequate information is available for the survey area, this includes: <ul style="list-style-type: none"> Broad scale (1:250,000) mapping by Beard (1976) and digitised by Shepherd <i>et al.</i> (2002) Regional biogeography (Desmond and Chant 2001 & Desmond <i>et al.</i> 2001).
Scope (what life forms were sampled etc.)	Nil	Vascular flora and terrestrial vertebrate fauna were sampled during the survey. Non-vascular flora, invertebrate and aquatic fauna were not surveyed.
Proportion of flora collected and identified (based on sampling, timing and intensity) Proportion of fauna identified, recorded and/or collected	Minor	<p>The vegetation and flora survey was undertaken over a single season, in Spring 2017. The flora recorded from the field survey is detailed in 4.1.5 and a full flora species list is provided in Appendix D. The portion of flora collected and identified was considered high. It is likely the survey under-recorded some grass species (Poaceae) and herbs due to poor flowering material during the field assessments. Grasses and annuals were observed during the spring assessment, however due to a lack of flowering and/or fruiting bodies were not identifiable and as such, are likely to be underrepresented in the flora collected.</p> <p>The fauna survey was undertaken in Spring 2017. The survey included a reconnaissance, targeted Shield-back Trapdoor Spider and targeted Malleefowl survey. The fauna assessment sampled those species that can be easily seen, heard or have distinctive signs, such as tracks, scats, diggings, etc. Many cryptic species would not have been identified during a reconnaissance survey and seasonal variation within species often requires targeted surveys at a particular time of the year. Of the fauna species recorded during the survey, all species were identified to species level.</p> <p>The fauna assessment was aimed at identifying habitat types and terrestrial vertebrate fauna utilising the survey area. No sampling for invertebrates or aquatic species occurred. The information available on the identification, distribution and conservation status of invertebrates is generally less extensive than that of vertebrate species.</p>
Flora determination	Minor	<p>Flora determination was undertaken by Joshua Foster in the field and at the Geraldton Herbarium. One herb could not be identified, one taxon could be identified to family level only and six taxa could be identified to genus level only due to lack of flowering and/or fruiting material required for identification. Some species, particularly grasses and herbs, may have been overlooked due to lack of material.</p> <p>The taxonomy and conservation status of the WA flora is dynamic. This report was prepared with reliance on taxonomy and conservation status current at the time report development, but it should be noted this may change in response to ongoing research and review of International Union for Conservation Nature criteria.</p>

Aspect	Constraint	Comment
Completeness and further work which might be needed (e.g. was the relevant area fully surveyed)	Minor	The Survey Areas were accessed on foot. Information gained from the survey was extrapolated across those sections of the survey areas not accessed on foot during the field survey to assist with determining the vegetation and habitat types for the entire survey area.
Mapping reliability	Minor	The vegetation was mapped at a scale of 1:2,500 using high-resolution ESRI aerial imagery obtained from Landgate, topographical features, previous broad scale mapping (Beard 1976) and field data. Data was recorded in the field using hand-held GPS tools (e.g. Garmin GPS). Certain atmospheric factors and other sources of error can affect the accuracy of GPS receivers. The Garmin GPS units used for this survey are accurate to within ± 5 metres on average. Therefore the data points consisting of coordinates recorded from the GPS may contain inaccuracies.
Timing/weather/season/cycle	Moderate	<p>The field surveys were conducted during spring (12-15 September 2017).</p> <p>In the three months prior to the spring survey (June - August), the Murchison weather recording station (No. 006099, Bureau of Meteorology (BoM) 2017) recorded a total of 25.7 mm of rainfall. This total is approximately 15% of the recorded long-term average for the same period (August - October; 164.5 mm) (BoM 2017). However eight months prior to the survey (January to August), the BoM station recorded 190 mm of rainfall. This is below the long-term average for the same period of 284 mm.</p> <p>The weather conditions during the spring field survey included:</p> <ul style="list-style-type: none"> • Daily maximum temperature ranging from 23.3 to 34.0 °C • Daily minimum temperature ranging from 11.6 to 13.7 °C • Daily rainfall 0 mm. <p>The weather conditions recorded during the survey periods are considered unlikely to have impacted upon the vegetation and flora survey. The lack of rainfall prior to the completion of the survey would have resulted in an under recording of grasses, herbs and annuals.</p> <p>The survey timings were considered appropriate for the flora and fauna field survey.</p>
Disturbances (e.g. fire, flood, accidental human intervention)	Nil	No disturbance were experienced during the survey.
Intensity (in retrospect, was the intensity adequate)	Nil	<p>The vascular flora of the survey areas were sampled in accordance with EPA (2016a) and terrestrial fauna sampled in accordance to EPA (2016b).</p> <p>The survey areas were sufficiently covered by the survey team during the survey.</p>
Resources	Nil	Adequate resources were employed during the field survey. Ten person days were spent undertaking the survey using one ecologist and botanist.
Access restrictions	Nil	No access problems were encountered during the survey.

Aspect	Constraint	Comment
Experience levels	Nil	The ecologist who executed the survey are practitioners suitably qualified and experienced in their respective fields. Steven Petts (ecologist) has over six years' experience undertaking fauna surveys within WA. Botanists Joshua Foster has over 18 years' experience undertaking flora surveys within WA.

3. Desktop assessment

3.1 Previous survey results

Bamford Consulting Ecologists conducted a field survey in October 2015, to identify the impacts to fauna from a road alignment upgrade project approximately 80 km from Survey Areas 2, 3 and 4 (BCE 2016).

BCE's survey identified 120 vertebrate fauna species including 92 birds, 16 reptiles and five mammal species in the survey area. Of these, six species were introduced. Four species of conservation significance were recorded (Shield-backed Trapdoor Spider, Western Spiny-Tailed Skink, Peregrine Falcon and Rainbow Bee-eater) along with evidence of Malleefowl presence.

3.2 Climate

The climate of the Survey Areas is classified as desert to semi-desert with a bimodal (summer and winter) rainfall pattern (Beard 1976). The BoM Murchison station (site number 006099) is the most central weather station to the Survey Areas that has reliable long-term data. Climatic data from this site indicates:

- Mean maximum temperature ranges from 21.1 °C in July to 39.3 °C in January
- Mean minimum temperature ranges from 6.4 °C in July to 23.3 °C in February
- Mean annual rainfall is 230.8 mm with an average of 44.2 rain days per year (BoM 2017).

Climate statistics for the region are summarised in Plate 1.

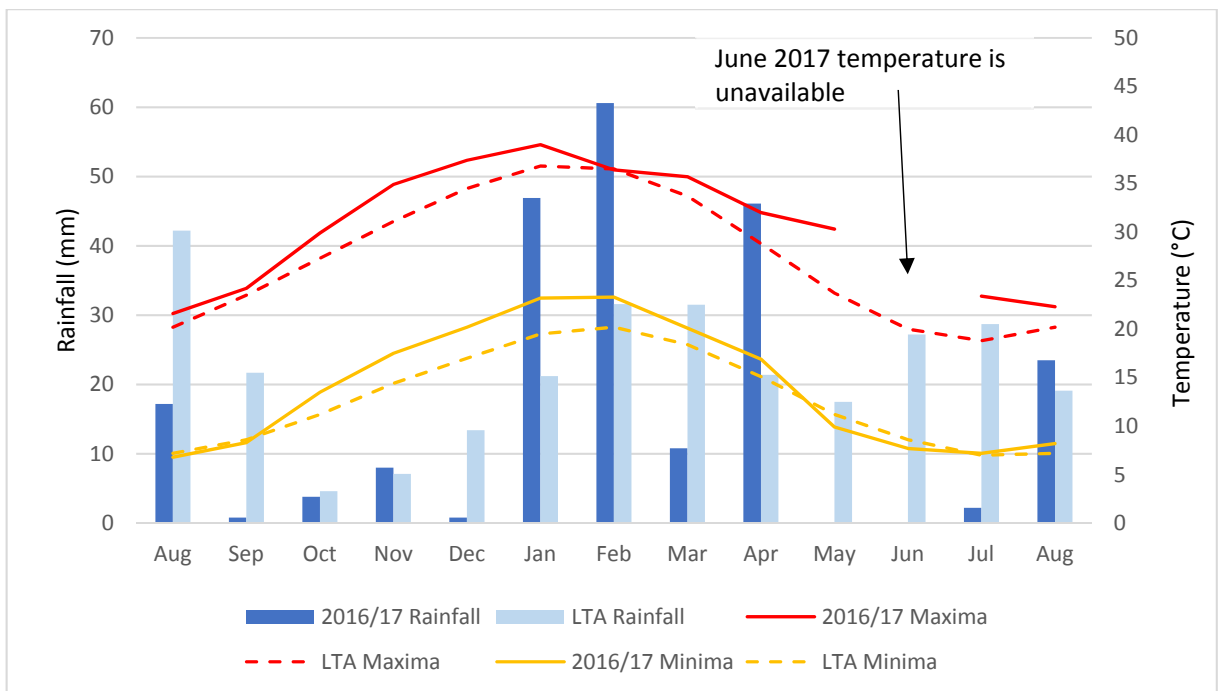


Plate 1 Mean climate statistics for Murchison (BoM 2017)

3.3 Regional biogeography

The survey areas occur in two different Interim Biogeographic Regionalisation of Australia (IBRA) bioregions and subregions (DEE 2017c) (Table 4).

Table 4 IBRA bioregions and subregions within the survey areas

Survey Area	Bioregion	Subregion
Survey Area 1	Yalgoo	Tallering
Survey Area 2	Murchison	Western Murchison
Survey Area 3	Murchison	Western Murchison
Survey Area 4	Murchison	Western Murchison

The Western Murchison subregion has terrains of the Yilgarn Craton and low mulga woodlands that are often rich in ephemerals (usually with bunch grasses) on outcrop and fine textured Quaternary alluvial and eluvial surfaces. Extensive hardpan washplains dominate and characterise the subregion with mantling granitic and greenstone strata in the northern part of the Yilgarn Craton. Surfaces associated with occluded drainage occur throughout with hummock grasslands on Quaternary sandplains, saltbush shrublands on calcareous soils and *Halosarcia* [*Tecticornia*] low shrublands on saline alluvia (Desmond *et al.* 2001).

The Yalgoo bioregion is characterised by low woodlands to open woodlands of *Eucalyptus*, *Acacia* and *Callitris* on red sandy plains of the Western Yilgarn Craton and Southern Carnarvon Basin. The Western Yilgarn Craton comprises mulga, *Callitris-E. salubris*, and Bowgada open woodlands and scrubs on earth to sandy-earth plains. The Southern Carnarvon Basin has a basement of Phanerozoic sediments. The subregion is particularly rich in ephemerals (Desmond & Chant 2001).

3.4 Land systems, landforms and soils

The survey areas are located within the Woodrarrug Hills and Plains soil landscape zone in the Murchison Province, which is described as “Sandplains and stony plains (with alluvial plains, hills and some salt lakes and hardpan wash plains) on sedimentary rocks of the Badgerabba Group. Red deep sands with stony soils, Red shallow loams, Red shallow sandy duplexes and Red deep sandy duplexes” (Tille 2006).

The Department of Agriculture and Food Western Australia (DAFWA) completed a survey of the Murchison region (Hennig *et al.* 1994). The condition and susceptibility report of land systems within the survey areas is summarised in Table 5.

Table 5 Land systems within the survey areas

Survey Area	Land system	Description	Land type	Susceptibility to erosion	Area
Survey Area 1	Nerramyne Land System	Undulating plains of sandy-surfaced laterite and weathered granite with low remnant plateaux, breakaways and rises supporting <i>Acacia</i> shrublands.	Stony plains with <i>Acacia</i> shrublands and halophytic shrublands	Slight susceptibility to accelerated erosion	848 km ²
	Joseph Land System	Undulating yellow sandplain supporting dense mixed shrublands with patchy Mallees.	Sandplains with <i>Acacia</i> , Mallees and heath	Not available	-
Survey Area 2	Breberle Land System	Level saline drainage plains adjacent to ephemeral lakes, claypans and swampy drainage foci with sandy margins and occasional sand dunes; supports tall acacia shrublands and other fringing shrublands with zonation of perennial grasses.	Sandplains and drainage floors with acacia and halophytic shrublands.	Not susceptible	115 km ²
	Yanganoo Land System	Almost flat hardpan wash plains, with or without small wanderrie banks and weak grooving; supporting mulga shrublands and wanderrie grasses on banks.	Wash plains and sandy banks on hardpan, with mulga shrublands and wanderrie grasses or spinifex	Slight susceptibility to accelerated erosion	12,433 km ²
Survey Area 3	Narryer Land System	Low hills and lateritised breakaways above very gently undulating stony slopes and plains on gneiss and granite with sparse acacia shrublands.	Mesas, breakaways and stony plains with <i>Acacia</i> or Eucalypt woodlands and halophytic shrublands.	Not susceptible	2,510 km ²
Survey Area 4					

3.5 Hydrology

A review of the Department of Water and Environmental Regulation (DWER) Hydrology data layers (Government of Western Australia 2017) indicates the Survey Areas are within the DWER Mid-West Gascoyne Region. A review for the survey areas is provided in Table 6.

Table 6 Hydrology aspects for the survey areas

Aspect	Details	Result
Groundwater area	Groundwater areas proclaimed under the <i>Rights in Water and Irrigation Act 1914</i> (RIWI Act).	Gascoyne Groundwater Area
Groundwater subareas	Groundwater subareas proclaimed under the RIWI Act.	None present
Surface water areas	Surface water areas proclaimed under the RIWI Act.	None present
Irrigation district	Irrigation Districts proclaimed under the RIWI Act.	None present
Rivers	Rivers proclaimed under the RIWI Act.	None present
Public Drinking Water Source Areas (PDWSA)	PDWSAs is a collective term used for the description of Water Reserves, Catchment Areas and Underground Pollution Control Areas declared (gazetted) under the provisions of the <i>Metropolitan Water Supply, Sewage and Drainage Act 1909</i> or the <i>Country Area Water Supply Act 1947</i> .	None present
Waterway Management Areas	Areas proclaimed under the <i>Waterway Conservation Act 1976</i> .	None present

3.5.1 Ephemeral drainage lines

No major watercourses intersect the survey areas. Ephemeral drainage lines intersect two of the survey areas (Table 7).

Table 7 Drainage lines within the survey areas

Survey Area	Drainage line
Survey Area 1	None present
Survey Area 2	None present
Survey Area 3	Present – intersects middle portion of survey area
Survey Area 4	Present – intersects middle portion of survey area

3.5.2 Wetlands

There are no wetlands within or in the vicinity of the Survey Areas.

3.6 Land use

3.6.1 DBCA managed lands

There are no DBCA managed lands within or within the vicinity of the Survey Areas.

3.6.2 Environmentally Sensitive Areas

There are no Environmentally Sensitive Areas (ESA) within or in the vicinity of the Survey Areas.

3.7 Vegetation and flora

3.7.1 Broad vegetation mapping and extents

Broad scale (1:1,000,000) pre-European vegetation mapping of the Murchison region was completed by Beard (1976) at an association level. The mapping indicates there are three vegetation associations present within the survey areas (Table 8).

Table 8 Broad scale vegetation associations (Beard 1976)

Survey Area	Vegetation association	Description	Location
Survey Area 1	419	Shrublands; bowgada, jam and <i>Melaleuca uncinata</i> thicket	Entire survey area
Survey Area 2	18	Low woodland; mulga (<i>Acacia aneura</i>)	Middle and southern portion
	300	Mosaic: Low woodland; mulga / Succulent steppe; saltbush & bluebush	Northern extent
Survey Area 3	18	Low woodland; mulga (<i>Acacia aneura</i>)	Entire survey area
Survey Area 4	18	Low woodland; mulga (<i>Acacia aneura</i>)	Entire survey area

3.7.1 Vegetation extent and status

The pre-European vegetation mapping has been adapted and digitised by Shepherd *et al.* (2002). The extents of the vegetation associations have been determined by the State-wide vegetation remaining extent calculations maintained by the DBCA (current as of October 2016 – Government of WA (GoWA) 2016). As shown in Table 9, the current extents remaining of all vegetation associations are greater than 90 per cent (%) of their pre-European extents at all scales (e.g. State, IBRA Bioregion, IBRA Subregion and Local Government Area (LGA)).

Table 9 Extents of vegetation associations mapped with the survey area (GoWA 2016)

Vegetation association	Scale	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	% Current extent in all DBCA managed lands
MUR IBRA bioregion		28,120,586.77	28,044,823.42	99.73	7.80
YAL IBRA bioregion		5,057,325.85	4,923,840.46	97.36	32.02
Murchison 2 IBRA sub-region		6,985,502.81	6,978,855.87	99.90	6.42
Tallering IBRA sub-region		3,498,943.53	3,387,092.96	96.80	25.07
18	State: WA	19,892,304.78	19,843,727.37	99.76	6.64
	IBRA bioregion: Murchison (MUR)	12,403,172.31	12,363,252.47	99.68	4.97
	IBRA sub-region: Western Murchison (MUR02)	2,133,275.86	2,128,414.26	99.77	4.20
	LGA: Shire of Murchison	858,952.19	858,952.19	100	2.77
300	State: WA	1,931.22	1,931.22	100	-
	IBRA bioregion: Murchison (MUR)	1,931.22	1,931.22	100	-
	IBRA sub-region: Western Murchison (MUR02)	1,931.22	1,931.22	100	-
	LGA: Shire of Murchison	1,931.22	1,931.22	100	-
419	State: WA	313,225.36	296,195.63	94.56	40.40
	IBRA bioregion: Yalgoo (YAL)	302,707.72	289,825.56	95.74	40.15
	IBRA sub-region: Tallering (YAL02)	302,707.72	289,825.56	95.74	40.15
	LGA: Shire of Murchison	20,917.57	20,917.57	100	-

3.7.1 Conservation significant ecological communities

MNES, EPBC Act or State-listed TECs have not been recorded in the Survey Areas; however two PECs were identified within the survey areas (refer to Table 10).

Table 10 PEC and TEC present with survey area (DBCA 2007–, DEE 2017a)

Survey Area	PEC	TEC
Survey Area 1	None present	None present
Survey Area 2	Present: Curbur calcrete (Priority 1) groundwater assemblage type on Gascoyne palaeodrainage on Curbur Station Approximately 8700 ha (DBCA 2007–)	None present
Survey Area 3	Present: Priority 1 - Byro central and Byro HS calcrete groundwater assemblage types on Murchison palaeodrainage on Byro Station. Approximately 9141 ha (DBCA 2007–)	None present
Survey Area 4		

3.7.2 Flora diversity

The *NatureMap* database search results within 10 km of each Survey Area is summarise in Table 11 and searches provided in Appendix C.

Table 11 *NatureMap* flora search results (DBCA 2007–)

Survey Area	Native flora total	Naturalised	Dominant families
Survey Area 1	99	2	Myrtaceae (18 taxa) Fabaceae (14 taxa) Asteraceae (12 taxa) Goodeniaceae (9 taxa) Proteaceae (8 taxa)
Survey Area 2	25	-	Fabaceae (4 taxa) Portulacaceae (4 taxa)
Survey Area 3	62	-	Fabaceae (11 taxa) Scrophulariaceae (8 taxa)
Survey Area 4	63	-	Fabaceae (11 taxa) Scrophulariaceae (8 taxa)

3.7.3 Conservation significant flora

Desktop searches of the EPBC Act PMST database and *NatureMap* database identified the presence/potential presence of conservation significant flora taxa within 10 km of the Survey Areas (Table 12 and Appendix C).

Table 12 Conservation significant flora search results

Survey Areas	EPBC Act/ WC Act Listed	DBCA Priority Listed
Survey Area 1	1 (Critically Endangered) 3 (Endangered)	4 (Priority 1) 6 (Priority 3)
Survey Area 2	None present	2 (Priority 1) 1 (Priority 2) 3 (Priority 3)
Survey Area 3	None present	1 (Priority 1) 1 Priority 3)
Survey Area 4	None present	1 (Priority 1) 1 (Priority 3)

3.8 Fauna

3.8.1 Fauna diversity

The *NatureMap* database search results for 10 km of Survey Areas are summarised in Table 13 and searches provided in Appendix C.

Table 13 *NatureMap* fauna search results (DBCA 2007-)

Survey Area	Birds	Mammals	Reptiles
Survey Area 1	30	4	5
Survey Area 2	21	-	5
Survey Area 3	13	-	-
Survey Area 4	12	-	-

3.8.2 Conservation significant fauna

The EPBC Act PMST and *NatureMap* database identified the presence or potential presence of conservation significant fauna species within 10 km of Survey Areas (Table 14 and Appendix C).

Table 14 Conservation significant fauna search results

Survey Area	EPBC Act/ WC Act Listed	DBCA Priority Listed
Survey Area 1	6 (Vulnerable) 2 (Endangered) 1 (Migratory) 8 (International Agreement) 1 (Schedule 7)	2 (Priority 4)
Survey Area 2	5 (Migratory) 2 (Endangered) 4 (Vulnerable) 8 (International Agreement) 1 (Schedule 7)	1 (Priority 4)
Survey Area 3	1 (Critically Endangered) 1 (Endangered) 4 (Vulnerable) 6 (Migratory) 8 (International Agreement) 1 (Schedule 7)	1 (Priority 4)

Survey Area	EPBC Act/ WC Act Listed	DBCA Priority Listed
Survey Area 4	1 (Critically Endangered) 4 (Vulnerable) 6 (Migratory) 8 (International Agreement) 1 (Schedule 7)	1 (Priority 4)

4. Field survey results

4.1 Vegetation and flora




4.1.1 Vegetation types




Fifteen vegetation types (VT) were identified and described for the survey areas (Table 15 and Figure 3, Appendix A). The total included one cleared and degraded, and rehabilitated vegetation type. The dominant vegetation types for each survey area were:




- Survey Area 1 – VT1 (*Acacia* tall shrubland)
- Survey Area 2 – VT3 (*Eucalyptus victrix*, *Melaleuca stereophloia* on flats)
- Survey Area 3 and Survey Area 4 – VT11 (*Acacia*, *Eremophila*, *Senna* Open Shrubland on Stony Plains).




The vegetation types identified within the survey area are considered to be well represented outside the survey areas, based on field observations and aerial photography. The vegetation is also consistent with vegetation associations identified for the area (Beard 1976), with one exception being association 419 (Shrublands; bowgada, jam and *Melaleuca uncinata* thicket). The results provided in Table 15 does not align with association 419. However, the results are considered similar to the vegetation type described for the Narramyne Land System.



Table 15 Recorded vegetation types


Type	Short Description	NVIS Level V Association Description	NVIS code	Photo	Location	Sample Sites	Vegetation Condition
1	Acacia Tall Shrubland	<i>Acacia coolgardiensis</i> with <i>Baekkea</i> sp. Wanarra tall shrubland over <i>Philotheca deserti</i> subsp. <i>deserti</i> sparse shrubland over <i>Amphipogon caricinus</i> , <i>Monachather paradoxus</i> sparse grassland with <i>Cheilanthes adiantoides</i> sparse low fernland with <i>Rhodanthe chlorocephala</i> , <i>Waitzia acuminata</i> , <i>Erodium</i> sp. sparse forbland on yellow orange sandy loams.	M+^Acacia coolgardiensis, Philotheca deserti subsp. deserti, Baekkea sp. Wanarra^shrub^4c; G^Amphipogon caricinus, Monachather paradoxus, Cheilanthes adiantoides^tussock grass, fern^1i		Survey Area 1	Q1, Q2	Excellent
2	Rehabilitation	<i>Seringa velutina</i> , <i>Ricinocarpos velutinus</i> , <i>Hannafordia bissillii</i> subsp. <i>latifolia</i> low shrubland over <i>Amphipogon caricinus</i> sparse grassland with <i>Waitzia acuminata</i> , <i>Trachymene ornata</i> sparse forbland on yellow orange sandy loams ripped soils.	M+^Seringa velutina, Ricinocarpos velutinus, Hannafordia bissillii subsp. latifolia^shrub^2c; G^Amphipogon caricinus, Waitzia acuminata, Trachymene ornata^tussock grass, forb^1r		Survey Area 1	R1	Completely Degraded
3	<i>Eucalyptus victrix</i> , <i>Melaleuca stereophloia</i> on flats	<i>Eucalyptus victrix</i> with <i>Acacia citrinoviridis</i> low open woodland to isolated trees over <i>Melaleuca stereophloia</i> , <i>A. tetragonophylla</i> tall sparse shrubland over <i>Sclerolaena diacantha</i> , <i>Frankenia laxiflora</i> , <i>Solanum lasiophyllum</i> low sparse shrubland with <i>Aristida contorta</i> low isolated tussock grasses with Herb sp. (juveniles) on flat sandy loams.	U^Eucalyptus victrix, Acacia citrinoviridis ^tree^6r; M+^Melaleuca stereophloia, A. tetragonophylla, Sclerolaena diacantha^shrubs^4i; G^Aristida contorta, Herb sp. (juvenile)^grass, forb^1r		Survey Area 2	Q9, Q17, R11	Good

Type	Short Description	NVIS Level V Association Description	NVIS code	Photo	Location	Sample Sites	Vegetation Condition
5	Acacia, Eremophila, Senna tall shrubland on sandy loams	Acacia aptaneura, A. pruinocarpa low woodland to low isolated trees over A. ramulosa var. linophylla, Eremophila fraseri, A. tetragonophylla tall sparse shrubland over E. forrestii, Maireana villosa, Solanum lasiophyllum open shrubland over Aristida contorta low sparse tussock grassland with Herb sp. (juvenile) low sparse forbland on sandy loams.	U+^Acacia aptaneura, A. pruinocarpa^tree\6i;M^ A. ramulosa var. linophylla, Eremophila forrestii, E. fraseri^shrub\2i; G^ Aristida contorta, Herb sp. (juvenile)^grass, forb\1r	 	Survey Area 2	Q12, R9	Good to Poor
6	Melaleuca stereophloia on sandy rise	Melaleuca stereophloia, Ptilotus obovatus, Frankenia laxiflora open to low open shrubland with emergent Acacia aptaneura isolated trees over *Cenchrus ciliaris sparse tussock grassland with Salsola australis, Atriplex semilunaris, *Brassica tournefortii low sparse forbland on low sandy rise.	M+ Melaleuca stereophloia, Ptilotus obovatus, Frankenia laxiflora^shrub\1i; G^ Cenchrus ciliaris, Salsola australis, Atriplex semilunaris^grass, forb\1r		Survey Area 2	Q13	Poor

Type	Short Description	NVIS Level V Association Description	NVIS code	Photo	Location	Sample Sites	Vegetation Condition
7	Mulga Grove	<i>Acacia incurvaneura</i> low woodland over <i>A. palustris</i> tall sparse shrubland over <i>Solanum lasiophyllum</i> , <i>Sida kingii</i> , <i>Enchylaena tomentosa</i> low open shrubland over <i>Eragrostis falcata</i> , * <i>Cenchrus ciliaris</i> , <i>E. dielsii</i> low open tussock grassland with <i>Marsilea hirsuta</i> , <i>Calandrinia ptychosperma</i> , Herb sp. (juvenile) low open forbland in mulga grove.	U+^ <i>Acacia incurvaneura</i> ^tree\6i;M^ <i>Solanum lasiophyllum</i> , <i>Sida kingii</i> , <i>Enchylaena tomentosa</i> \1i;G^ <i>Eragrostis falcata</i> , <i>Cenchrus ciliaris</i> , <i>Marsilea hirsuta</i> ^grass, forb\1i		Survey Area 2	Q14	Poor
8	Frankenia Flats	<i>Frankenia laxiflora</i> , <i>Atriplex vesicaria</i> , <i>Maireana ?trichoptera</i> low shrubland on seasonally wet flats.	M+^ <i>Frankenia laxiflora</i> , <i>Atriplex vesicaria</i> , <i>Maireana ?trichoptera</i> ^shrub\1c		Survey Area 2	Q16	Very Good
9	Chenopod Flats	<i>Sclerolaena diacantha</i> , <i>S. cuneata</i> , <i>Maireana triptera</i> low open chenopod shrubland with isolated emergent shrubs, with <i>Atriplex semilunaris</i> , <i>Salsola australis</i> , <i>Maireana carnososa</i> low open forbland with <i>Aristida contorta</i> low isolated grasses on seasonally damp flats.	M^ <i>Sclerolaena diacantha</i> , <i>S. cuneata</i> , <i>Maireana triptera</i> ^shrub\1i;G+^ <i>Atriplex semilunaris</i> , <i>M. carnososa</i> , <i>Salsola australis</i> ^forb\1i		Survey Area 2	Q10, R7	Poor

Type	Short Description	NVIS Level V Association Description	NVIS code	Photo	Location	Sample Sites	Vegetation Condition
10	Bare Areas	Naturally bare areas with isolated shrubs, herbs and grasses from adjacent vegetation. Occurs in low, seasonally wet locations.	n/a		Survey Area 2	n/a	Very Good
11	<i>Acacia</i> <i>Eremophila</i> <i>Senna</i> open shrublands on Stony Plains	<i>Acacia tetragonophylla</i> , <i>Senna artemisioides</i> subsp. x <i>petiolaris</i> , <i>Eremophila spathulata</i> sparse shrubland to isolated shrubs over <i>Sclerolaena diacantha</i> low sparse shrubs with over <i>Ptilotus roei</i> scattered low forbs with <i>Eragrostis eriopoda</i> , <i>Eriachne helmsii</i> subsp. <i>pulchella</i> scattered low tussock grasses on stony plains	M+^ <i>Acacia tetragonophylla</i> , <i>Senna artemisioides</i> subsp. x <i>petiolaris</i> , <i>Sclerolaena diacantha</i> ^shrub\3r;G^ <i>Ptilotus roei</i> , <i>Eragrostis eriopoda</i> , <i>Eriachne helmsii</i> subsp. <i>pulchella</i> ^forb, grass\1\bi		Survey Area 3 Survey Area 4	Q3, Q5, R2 Q6, Q8	Good to Poor
12	<i>Acacia</i> <i>Eremophila</i> <i>Senna</i> open shrublands on Drainage Lines	<i>Acacia xiphophylla</i> , <i>A. tetragonophylla</i> low open woodland to tall sparse shrubland over <i>Eremophila phyllopoda</i> subsp. <i>phyllopoda</i> , <i>E. eriocalyx</i> sparse shrubland over <i>Eriachne helmsii</i> subsp. <i>pulchella</i> low sparse tussock grassland with <i>Calandrinia</i> spp., <i>Portulaca oleracea</i> low sparse forbland and <i>Cheilanthes sieberi</i> low isolated ferns on episodic drainage line	U^ <i>Acacia xiphophylla</i> , <i>A. tetragonophylla</i> ^tree\6\;M^ <i>A. tetragonophylla</i> , <i>Eremophila phyllopoda</i> subsp. <i>phyllopoda</i> , <i>E. eriocalyx</i> ^shrub\3r;G+^ <i>Calandrinia</i> spp., <i>Portulaca oleracea</i> , <i>Cheilanthes sieberi</i> ^forb,fern\1\;r		Survey Area 3	Q4	Good

Type	Short Description	NVIS Level V Association Description	NVIS code	Photo	Location	Sample Sites	Vegetation Condition
13	Acacia Eremophila Senna woodlands on Drainage Lines	Acacia fuscaneura, A. burkittii, Psydrax rigidula low open forest, over A. ramulosa var. linophylla, A. cuthbertsonii subsp. linearis sparse shrubland, over A. ramulosa var. linophylla, Eremophila forrestii, Senna artemisioides subsp. helmsii sparse shrubland over Abutilon cryptopetalum low sparse shrubland, over Eriachne helmsii, *Cenchrus ciliaris, Aristida contorta tussock grassland, with Calandrinia spp., *Bidens bipinnata, Erodium sp. low sparse forbland on drainage line.	U+^Acacia fuscaneura, A. burkittii, Psydrax rigidula\^tree\6\c;M^ A. ramulosa var. linophylla, A. cuthbertsonii subsp. linearis, Eremophila forrestii\^shrub\3\i;G^ Cenchrus ciliaris, Bidens bipinnata, Calandrinia ptychosperma\^grass, forb\2\c		Survey Area 4	Q7	Poor
14	Acacia open shrubland on Sheetwash	Acacia ramulosa var. linophylla, A. tetragonophylla, A. xiphophylla tall sparse shrubland over Senna artemisioides subsp. helmsii, Eremophila forrestii, E. phyllopoda low isolated shrubs over Aristida contorta isolated hummock grasses on broad sheetwash.	M+^Acacia ramulosa var. linophylla, A. tetragonophylla, A. xiphophylla \^shrub\4\c;G^ Aristida contorta\^grass\1\bi		Survey Area 4	R3, R4	Poor to Degraded

Type	Short Description	NVIS Level V Association Description	NVIS code	Photo	Location	Sample Sites	Vegetation Condition
15	Cleared / Degraded Areas	Cleared areas with isolated shrubs, grasses and herbs from adjacent vegetation. Includes roads, grader turnaround points, and scour from overland flow events due to altered hydrological regime.	n/a	 <p>The top photograph shows a wide, flat area of red soil with a single, isolated, leafless tree in the center. The bottom photograph shows a similar area of red soil with sparse, low-lying vegetation and a road or path visible in the distance.</p>	Survey Areas 2, 3 and 4	n/a	Completely Degraded

4.1.2 Vegetation condition

The vegetation condition within the Survey Areas was rated from Completely Degraded to Excellent in condition. The extents of the vegetation condition ratings mapped within the survey areas are detailed in Table 16 and mapped in Figure 4, Appendix A. Drought affected and overgrazing of vegetation was evident within all Survey Areas in particular survey areas 3 and 4. In Survey Areas 3 and 4 limited groundcover was recorded.

The Degraded to Completely Degraded areas included the following:

- Rehabilitated areas in survey area 1
- Existing roads, tracks and historically cleared areas in Survey Area 2
- Areas of Mulga shadowing, roads, tracks and historically cleared areas in Survey Areas 3 and 4
- Areas where water induce soil erosion, which is evident immediately north of the drainage line in Survey Area 4.

Table 16 Extent of vegetation condition ratings mapped within the Survey Areas

Location	Rating	Area
Survey Area 1	Excellent	0.85 ha
	Completely Degraded	0.14 ha
Survey Area 2	Very Good	0.12 ha
	Good	3.41 ha
	Poor	2.90 ha
	Degraded	0.51 ha
	Completely Degraded	1.19 ha
Survey Area 3	Good	0.105 ha
	Poor	1.34 ha
	Degraded	0.19 ha
	Completely Degraded	0.58 ha
Survey Area 4	Good	0.87 ha
	Poor	0.73 ha
	Cleared	0.72 ha

4.1.3 Conservation significant ecological communities

No conservation significant ecological communities were recorded from the survey areas.

4.1.4 Other significant vegetation

No other significant vegetation was recorded from the Survey Areas.

4.1.5 Flora diversity

One hundred and fifty-eight (158) flora taxa (including subspecies and varieties) representing 34 families and 87 genera were recorded from the survey areas during the field survey. This total comprises 155 native taxa and three introduced flora taxa. The field survey results for each Survey Area is summarised in Table 17.

Table 17 Recorded flora diversity summary for each survey area

Location	Total	Native	Introduced	Family count	Dominant Families
Survey Area 1	26	26	-	19	Asteraceae (3 taxa) Myrtaceae (3 taxa)
Survey Area 2	98	95	3	29	Chenopodiaceae (17 taxa) Fabaceae (20 taxa) Scrophulariaceae (8 taxa) Poaceae (6 taxa) Asteraceae (6 taxa)
Survey Area 3	57	56	1	19	Fabaceae (18 taxa) Scrophulariaceae (6 taxa) Poaceae (5 taxa) Amaranthaceae (4 taxa)
Survey Area 4	44	44	-	17	Fabaceae (12 taxa) Chenopodiaceae (5 taxa) Portulacaceae (4 taxa)

4.1.6 Conservation significant flora

No EPBC Act or WC Act or DBCA Priority-listed flora were recorded within the survey areas.

Likelihood of occurrence

A likelihood of occurrence assessment was conducted post-field survey for all conservation significant flora taxa identified in the desktop assessment (Appendix D). This assessment took into account previous records, habitat requirements, intensity of the survey, flowering times and the cryptic nature of species.

The likelihood of occurrence assessment post-field survey concluded that three taxa are likely to occur, four taxa may possibly occur and the remaining 15 taxa are unlikely or highly unlikely to occur within the Survey Areas (Table 18).

Table 18 Likelihood of occurrence assessment post field survey

Taxon name	Status	Assessment
<i>Hemigenia</i> sp. Tallering (H. Pringle 3323)	Priority 1 – DBCA	Possible – habitat unknown and not recorded with survey area 1.
<i>Hemigenia tysonii</i>	Priority 1 – DBCA	Likely – Not recorded however, survey area 2 supports suitable habitat.
<i>Acacia</i> sp. Muggon (S. Patrick & D. Edinger SP 3235)	Priority 2 – DBCA	Possible – Not recorded however, survey area 2 supports suitable habitat.
<i>Grevillea globosa</i>	Priority 3 – DBCA	Likely – Not recorded however, survey area 1 supports suitable habitat.
<i>Prostanthera tysoniana</i>	Priority 3 – DBCA	Likely – Not recorded however, survey area 2 supports suitable habitat.
<i>Ptilotus beardii</i>	Priority 3 – DBCA	Possible – Not recorded however, Survey area 2 supports suitable habitat.
<i>Roebuckiella halophila</i>	Priority 3 – DBCA	Possible – habitat unknown and not recorded with survey area 1.

4.1.7 Introduced flora

Three introduced flora taxa were recorded in the survey areas. None of the species are listed as Declared Pests under the *Biosecurity and Management Act 2007* and/or as a WONS.

4.2 Fauna

4.2.1 Fauna habitats

The survey identified seven fauna habitat types (including highly disturbed) within the Survey Areas (Table 19 and Table 20) and these closely aligned to the vegetation types described in Section 4.1.1.

Table 19 Recorded habitat types

Location	Recorded habitat type
Survey Area 1	Tall Acacia Shrubland Highly Disturbed
Survey Area 2	Open Plain with Scattered Trees Frankenia Flats Tall Mixed Shrubland over Low Open Shrubland
Survey Area 3	Low Open Shrubland Drainage Line Highly Disturbed
Survey Area 4	Low Open Shrubland Drainage Line Highly Disturbed

Fauna habitat connectivity and disturbance

The fauna habitats of the survey areas are located in a largely intact region of WA. The Beringarra-Pindar Road, Carnarvon-Mullewa Road and Beringarra-Byro Road creates an artificial barrier for fauna moving between habitats. Overall, the fauna habitat present within the Survey Areas are well-represented in the broader area with high connectivity to the surrounds.

Disturbance


The habitats within the survey areas have been impacted to some degree by tracks, grazing livestock and feral animals. A portion of survey area 1, had been historically impacted by material extraction. There was no sign of fire impacts in the survey areas, being unburnt (<10 years).

Habitat value

The survey areas primarily consist of Open Shrubland on plains. The overall value of the habitat was considered to be moderate due to the quality of habitat types (e.g. moderate structural diversity within each habitat type) and good connectivity with broader region.

Following a review of aerial photography and corresponding native vegetation associations, the habitats of the survey areas are considered to be well represented within the greater area.

Table 20 Fauna habitat type description recorded within the Survey Areas

Habitat type	Indicative photograph
<p>Tall Acacia Shrubland This habitat incorporates vegetation type VT1. Location: Survey Area 1 This habitat type is dominated by <i>Acacia coolgardiensis</i> up to 5 metres in height (10-30% cover) in the over-storey. The mid-storey has 30-70% cover and comprises <i>A. coolgardiensis</i>, <i>A. ramulosa</i> and <i>Philotheca</i> spp. The understorey comprises scattered perennials. Bare ground is 60% comprising shallow pale brown sands. There is some leaf litter (25%) and wood litter present (10%); where present the litter was usually thin layer around the base of the shrubs. Areas of this habitat had evidence of grazing and feral animals (i.e. rabbits). As a result much of the habitat comprised very limited groundcover vegetation. In areas where the Acacia is denser, this vegetation would provide suitable habitat for a variety of fauna species, in particular foraging opportunities, breeding habitat and refuge for birds including Bushbirds and Honeyeaters. Conservation significant species: No conservation significant species were recorded. This habitat type provides moderate value to the conservation species; however, this is generally limited to the denser shrubs and where there is little evidence of disturbance. This habitat may provide dispersal habitat for the Vulnerable <i>Leipoa ocellata</i> (Malleefowl).</p>	

Habitat type

Low Open Shrubland

This habitat incorporates vegetation types VT11 and VT14

Location: Survey Area 3 and Survey Area 4

This habitat is characterised by scattered *Acacia ramulosa*, *A. pruinocarpa* (2-10%) in the over-storey. The mid-storey is 10% cover and comprises *A. tetragonophylla* and *A. grasbyi*. The understorey comprises scattered perennials and *Eremophila* spp. The ground cover consists of scattered native grasses and herbs. Bare-ground is 70%, with some surface rocks and gravel (15%) overlying shallow brown sandy loam.

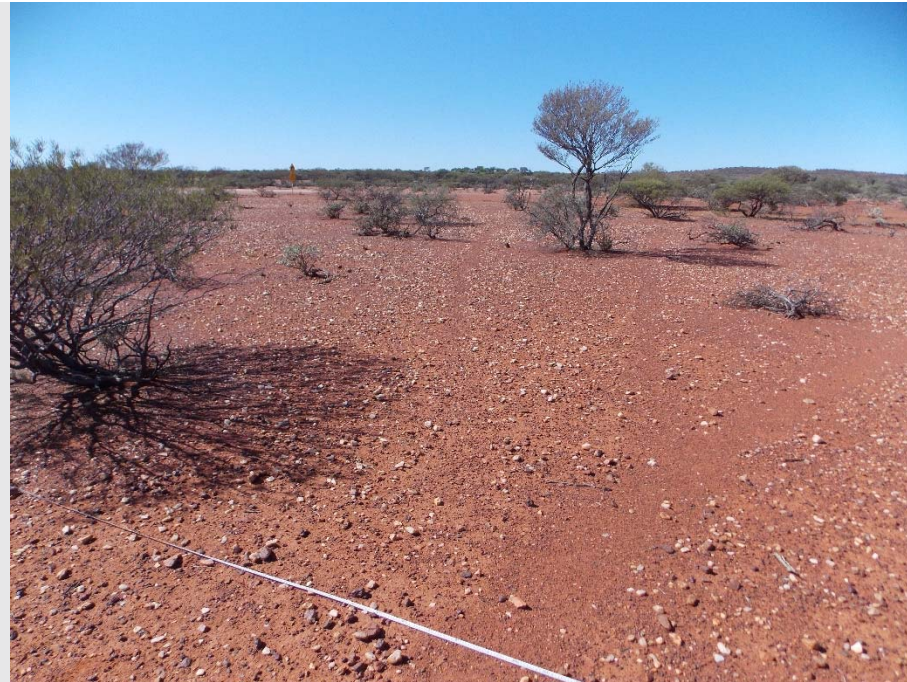
There is very limited leaf and wood litter present (<5%). The habitat has obvious signs of impacts from drought, grazing and feral animals (i.e. Donkey and Wild Dog).

The habitat is likely to provide a linkage to more structurally diverse habitat types within the local area. As such this habitat is likely to provide foraging opportunities for birds, reptiles and mammal, particularly those species with a large home range.

Conservation significant species

No conservation significant species were recorded. The habitat provides a low to moderate value to conservation significant species. As the habitat is part of a contiguous area of remnant vegetation extending through and beyond the survey areas, it is unlikely for conservation species to exclusively use habitat within the survey area.

Indicative photograph



Habitat type

Drainage line

This habitat incorporates vegetation types VT12 and VT13

Location: Survey Area 3 and Survey Area 4

This habitat type is located in the lower elevated areas of the survey areas. This habitat is characterised by *Acacia* spp. (10-30% cover) in the over-storey. The mid-storey and understorey comprises *Eremophila* spp. The groundcover consists of herbs and native grasses. Bare-ground is 60% with some surface gravel (10%) overlying shallow sandy loam with minor clay.

There is very limited leaf and wood litter present (<5%); where present the litter was usually thin layer around the base of the trees. The habitat type would flow following heavy and persistent rainfall, as a result prolonging the life of native grasses.

The habitat has obvious signs of impacts from grazing and feral animals (i.e. Donkey and Wild Dog).

Conservation significant species:

No conservation significant species were recorded. The habitat provides a moderate value to conservation significant species.

The presence of drainage line embankments within survey area 3 may provide breeding habitat for the Rainbow Bee-eater (*Merops ornatus*). As indicated in aerial photography, this habitat is also present in both the local and regional area.

Indicative photograph



Habitat type

Open plain with Scattered Trees

This habitat incorporates vegetation types VT3, VT9 and VT10

Location: Survey Area 2

This habitat type comprises scattered *Eucalyptus victrix* and *Acacia* spp. in the over-storey and mid-storey. The under-storey comprises scattered *Eremophila* spp. The groundcover comprises *Maireana* spp., *Sclerolaena* spp. and clumps of native grasses. There are large bare areas within this habitat type.

There is very limited leaf and wood litter present (<5%); where present the litter was usually thin layer around the base of the trees. There were some fallen trees and loose bark present. The loose bark provides habitat for Variegated Dtella (*Gehyra variegata*). The Soils were predominantly shallows sandy loam with occasional calcareous soil type.

Few fauna species were recorded in this habitat type however species that preferred open areas like Australasian Pipit and Nankeen Kestrel were recorded. There was evidence of grazing and vehicle tracks.

Conservation significant species:

No conservation significant species were recorded. The habitat provides a low to moderate value to conservation significant species. As the habitat is part of a contiguous area of remnant vegetation extending through and beyond the survey areas, it is unlikely for conservation species to exclusively use habitat within the survey area. This habitat may be used opportunistically by Grey Falcon (*Falco hypoleucos*) for hunting.

Indicative photograph



Habitat type

Frankenia flats

This habitat incorporates vegetation types VT08

Location: Survey Area 2

This habitat type forms part of an ephemeral wetland dominated by *Frankenia pauciflora*. As indicated in aerial photography, this habitat forms part of a broader wetland system.

Conservation significant species:

No conservation significant species were recorded. The habitat provides a moderate value to conservation significant species such as vagrant wetland bird species.

Indicative photograph



Habitat type

Tall Mixed Shrubland over Low Open Shrubland

This habitat incorporates vegetation types VT04, VT05, VT06 and VT07

Location: Survey Area 2

This habitat type is dominated by *Acacia ligulata*, *A. incurvaneura*, *Melaleuca stereophloia*, *A. aptaneura* up to 7 metres in height (10-30% cover) in the over-storey. The mid-storey is 30-70% cover and comprises *A. lasiophyllum*, *Senna* spp., *A. tetragonophylla*. The understorey comprises native grasses and perennials (<5%). Bare ground is 60% comprising shallow pale brown sands. There is limited leaf (15%) and wood litter present (10-30%); where present the litter was usually thick layer around the base of the shrubs. The leaf litter provides habitat to the Unpattered Robust Slider (*Lerista fuscicep*) and the Common Dwarf Skink (*Menetia greyii*).

Areas of this habitat had evidence of grazing and feral animals (i.e. rabbits). As a result much of the habitat comprises very limited groundcover vegetation.

In areas where the Acacia is denser, this vegetation would provide suitable habitat for a variety of fauna species, in particular foraging opportunities, breeding habitat and refuge for birds including Bushbirds and Honeyeaters.

Conservation significant species:

No species of conservation significance were recorded in this habitat type. This habitat provides moderate value to conservation species. This habitat also may be used opportunistically by Grey Falcon (*Falco hypoleucos*) for hunting.

Indicative photograph



Habitat type

Highly Disturbed

Location: All Survey Areas

This habitat incorporates Cleared/Degraded and Rehabilitated areas.

Highly disturbed areas provide very little to fauna species but can be used by common insectivorous bird species for foraging and by avian and ground dwelling species as corridors.

Indicative photograph



4.2.2 Fauna diversity

The fauna surveys recorded 63 vertebrate fauna including one amphibian, 41 birds, 12 mammals and nine reptiles. The fauna count for each survey area is provided in Table 21 and a full list of the fauna recorded during the field survey is presented in Appendix E.

Table 21 Recorded fauna counts

Location	Amphibian	Birds	Mammals	Reptiles
Survey Area 1	-	12	8	1
Survey Area 2	-	29	6	5
Survey Area 3	1	6	4	3
Survey Area 4	-	18	6	2

4.2.3 Introduced fauna

Seven introduced species were recorded during the field survey, including European Cattle (*Bos taurus*), Goat (*Capra hircus*), Red Fox (*Vulpes vulpes*), Dog (*Canis lupis*), Donkey (*Equus asinus*), Cat (*Felis catus*) and Rabbit (*Ocyctolagus cuniculus*). All seven species are known from the region.

4.2.4 Conservation significant fauna

No fauna species of conservation significance were recorded during the field survey.

Likelihood of Occurrence

Searches of the EPBC Act PMST and *NatureMap* database identified the presence/potential presence of 22 conservation significant fauna species. This total includes species identified by the database searches, as a result of a review of the species listed under Schedules 1-4 of the WC Act (revised February 2017). An assessment of the Likelihood of Occurrence for conservation significant fauna in the survey area was conducted (Appendix E). This assessment was based on species biology, habitat requirements, the quality and availability of suitable habitat and records of the species in the survey and surrounding areas (e.g. DBCA 2007–).

The assessment identified the likely presence of three additional species of conservation significance that were not recorded during the field survey (Table 22).

Table 22 Conservation significant fauna 'likely' to occur in 10 km of the Survey Areas

Fauna species	Status		Likelihood of occurrence
	EPBC Act	WC Act	
Grey Falcon (<i>Falco hypoleucos</i>)		Vulnerable	Likely, the nearest record is 12 km north of Survey area 2.
Malleefowl (<i>Leipoa ocellata</i>)	Vulnerable	Vulnerable	Likely, there are two historical records 2 km north of Survey area 1.
Rainbow Bee-eater (<i>Merop ornatus</i>)		International Agreement	Likely, there is suitable foraging habitat in all survey areas. The creekline within Survey areas 3 provides suitable breeding habitat.

5. Environmental approvals and referrals

This section provides advice on potential environmental approvals and referrals required, based on the ecological values identified within the survey area. Should the final project alignment and disturbance footprint be altered, this advice may need to be revisited.

5.1 Federal Government

Referral to DEE under the EPBC Act is triggered if a proposed action has or potentially has a significant impact on any Matters of National Environmental Significance (MNES). MNES are factors that require legislated protection in order to conserve biodiversity, protect world and national heritage places, and comply with international treaties. Table 23 shows an assessment of this Project against MNES.

Table 23 Assessment of Matters of National Environmental Significance

Matter of National Environmental Significance	Present	Need for referral to DEE under EPBC Act
World Heritage Properties	None	Not required
National Heritage Places	None	Not required
Wetlands of International Significance	None	Not required
Listed Threatened Species and Ecological Communities	The assessment identified the likely presence of two EPBC listed threatened fauna species within the survey area based on known records nearby the survey area and the presence of potential habitat, Malleefowl (<i>Leipoa ocellata</i>) – Vulnerable	Referral is unlikely – No nest mounds or other evidence of Malleefowl were recorded during the field surveys. The habitats present within Survey Area 1 (i.e. Tall Acacia Shrublands) may provide dispersal habitat. The assessment determined that the fauna habitats present within the Survey Areas are well represented with high connectivity in the local and regional area. Given Survey Area 1 is part of an existing material pit (i.e. is an existing barrier to movement), and the small area to be cleared as part of this project, the project is unlikely to have a significant impact to an important population of the species.
Migratory Species	None	Not required
Commonwealth Marine Areas	None	Not required
Great Barrier Reef Marine Park	None	Not required
Nuclear Actions (including uranium mines)	None	Not required
A Water Resource (in relation to coal seam gas development and large coal mining development)	None	Not required

5.2 Western Australian Government

5.2.1 Environmental Protection Authority

Significant proposals must be referred to the EPA under Section 38 of the *Environmental Protection Act 1986* (EP Act). In deciding whether a proposal will be subject to the formal environmental impact assessment process, the EPA takes into account the environmental significance of any potential impacts that may result from the implementation of the scheme or proposal.

In the absence of a broader environmental assessment, the majority of the potential biological impacts associated with the survey area are linked to native vegetation clearing and loss of fauna habitat. The potential impacts from the loss of native vegetation and loss of fauna habitat may be effectively assessed through the Environmental Protection (Clearing of Native Vegetation) Regulations 2004. Therefore, with consideration of the biological values discussed in this report, it is considered unlikely that the project would require referral to the EPA under Section 38 of the EP Act based solely on biological considerations.

5.2.2 Department of Water and Environmental Regulation

Clearing of native vegetation is regulated by the DWER and requires a clearing permit under Part V of the EP Act, except when a project is assessed under Schedule 6 of the Act or is prescribed by regulation in the Environmental Protection (Clearing Native Vegetation) Regulations 2004 and not in an ESA.

When preparing a native vegetation clearing application an assessment of the survey area against the “Ten Clearing Principles” should be undertaken to determine whether the Project is likely to be at variance to the Principles. The Ten Clearing Principles aim to ensure that potential impacts resulting from removal of native vegetation can be assessed in an integrated way. An assessment of the survey area against the Ten Clearing Principles was undertaken (Table 24). The assessment determined that clearing within the Survey Area 2 is likely to be at variance to:

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

Table 24 Assessment of the survey area against the ten clearing principles

Principle	Assessment	Outcome	Data sources
a) – Native vegetation should not be cleared if it comprises a high level of biological diversity.	<p>Survey Area 1</p> <p>The Survey Area is situated within the Yalgoo IBRA bioregion and Tallering subregion. Two vegetation types were identified from the survey area. These vegetation types included, Acacia Tall Shrubland (VT1) and Rehabilitation (VT2).</p> <p>The vegetation condition ranged from Excellent to Completely Degraded, Excellent accounted for 85% (0.84 ha) of the overall survey area.</p> <p>The survey area located in a region where vegetation is largely intact and BVA 419 current extent remaining is greater than 95% of the pre-European extents in the local and broader region. The survey area does not contain areas of native vegetation that are in better condition, or offer a higher floristic value than the surrounding environment.</p> <p>Desktop searches did not identify TECs or PECs within 10 km of the survey area.</p> <p>The field survey recorded 26 flora taxa representing 19 families. This total comprised 26 native flora and no weeds were recorded.</p> <p>Desktop searches identified the presence/potential presence of 14 conservation significant flora taxa within 10 km of the survey area. No EPBC Act or WC Act or DBCA listed flora taxa were recorded within the survey area. A likelihood of occurrence assessment conducted post-field survey concluded that one taxon is likely to occur, one taxon may possibly occur and the remaining 12 taxa identified are considered unlikely or highly unlikely to occur in the survey area.</p> <p>Two fauna habitat types were recorded from the survey area including highly disturbed area.</p> <p>The fauna survey recorded 21 vertebrate fauna species including 12 birds, eight mammals and one reptile. No conservation significant fauna species were recorded.</p>	Unlikely to be at variance to this Principle	Beard (1976) DEE (2017a) DBCA (2007–) WA Herbarium (1998–)
	<p>Survey Area 2</p> <p>The Survey Area is situated within the Murchison IBRA bioregion and Western Murchison subregion. Nine vegetation types (including cleared/degraded) were identified from the survey area.</p> <p>The vegetation condition ranged from Very Good to Completely Degraded, Good accounted for 42% (3.42 ha) of the overall survey area.</p> <p>The survey area located in a region where vegetation is largely intact and BVAs' current extents remaining extent are greater than 90 % of the pre-European extents in the local and broader region.</p> <p>The field survey recorded 97 flora taxa representing 29 families. This total comprised 94 native flora and three weeds.</p>	Unlikely to be at variance to this Principle	

Principle	Assessment	Outcome	Data sources
	<p>Desktop searches identified the presence/potential presence of six conservation significant flora taxa within 10 km of the survey area. No EPBC Act or WC Act or DBCA listed flora taxa were recorded within the survey area. A likelihood of occurrence assessment conducted post-field survey concluded that two taxa are likely to occur, two taxa may possibly occur and the remaining four taxa identified are considered unlikely or highly unlikely to occur in the survey area.</p> <p>Four fauna habitat types were recorded from the survey area including highly disturbed area. The fauna survey recorded 40 vertebrate fauna species including 29 birds, six mammals and five reptiles. No conservation significant fauna species were recorded.</p> <p>One Priority 1 - PEC (Curbur Calcrete Groundwater Assemblages) was mapped within the survey area. Given the linear nature of the proposed clearing area, the extent of vegetation within the local area and the size of the PEC (~8,700 ha), the proposed clearing is not likely to result in significant impacts to the PEC.</p> <p>Survey Area 3</p> <p>The Survey Area is situated within the Murchison IBRA bioregion and Western Murchison subregion. Three vegetation types (including cleared/degraded) were identified from the survey area.</p> <p>The vegetation condition ranged from Good to Completely Degraded, Poor accounted for 1.34 ha of the overall survey area.</p> <p>The survey area located in a region where vegetation is largely intact and BVAs' current extents remaining extent are greater than 90 % of the pre-European extents in the local and broader region.</p> <p>Desktop searches did not identify TECs or PECs within 10 km of the survey area.</p> <p>The field survey recorded 57 flora taxa representing 19 families. This total comprised 56 native flora and one weed.</p> <p>Desktop searches identified the presence/potential presence of two conservation significant flora taxa within 10 km of the survey area. No EPBC Act or WC Act or DBCA listed flora taxa were recorded within the survey area.</p> <p>A likelihood of occurrence assessment conducted post-field survey concluded that one taxon is likely to occur and other taxon identified in desktop searches are considered unlikely to occur in the survey area.</p> <p>Three fauna habitat types were recorded from the survey area including highly disturbed areas. The fauna survey recorded 14 vertebrate fauna species including one amphibian, six birds, four mammals and three reptiles. No conservation significant fauna species were recorded.</p> <p>One Priority 1 - PEC (Byro central and Byro HS Groundwater Assemblages) was mapped within the survey area. Given the linear nature of the clearing area, extent of vegetation within</p>	<p>Unlikely to be at variance to this Principle</p>	

Principle	Assessment	Outcome	Data sources
	<p>the local area and the size of the PEC (~9,141 ha), the proposed clearing is not likely to result in significant impacts to the PEC.</p> <p>Survey Area 4 The Survey Area is situated within the Murchison IBRA bioregion and Western Murchison subregion. Four vegetation types (including cleared/degraded) were identified from the survey area. Vegetation was rated Good to Completely Degraded, Good accounted for 0.84 ha of the overall survey area. The survey area located in a region where vegetation is largely intact and BVAs' current extents remaining extent are greater than 90 % of the pre-European extents in the local and broader region. Desktop searches did not identify TECs or PECs within 10 km of the survey area. The field survey recorded 44 flora taxa representing 17 families. This total comprised 44 native flora. Desktop searches identified the presence/potential presence of two conservation significant flora taxa within 10 km of the survey area. No EPBC Act or WC Act or DBCA listed flora taxa were recorded within the survey area. A likelihood of occurrence assessment conducted post-field survey concluded that one taxon is likely to occur and other taxon identified in desktop searches are considered unlikely to occur in the survey area. Two fauna habitat types were recorded from the survey area including highly disturbed areas. The fauna survey recorded 26 vertebrate fauna species including 18 birds, six mammals and two reptiles. No conservation significant fauna species were recorded. One Priority 1 - PEC (Byro central and Byro HS Groundwater Assemblages) was mapped within the survey area. Given the linear nature of propose clearing extent of vegetation with the local area and the size of the PEC (~9,141 ha), the proposed clearing is not likely to result in significant impacts to the PEC.</p>	Unlikely to be at variance to this Principle	
b) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat	<p>Survey Area 1 Two broad fauna habitats were recorded within the Survey Area, including: Tall Acacia Shrubland and Highly Disturbed. The Tall Acacia Shrubland habitat type is well represented at a local and regional scale and overall the Survey Area retains relatively high local, and regional connectivity. The field surveys recorded 21 vertebrate fauna species, including 12 birds, eight reptiles and one mammal. No conservation significant fauna species were recorded. Two conservation significant species were assessed as likely to occur within the survey area, including:</p>	Unlikely to be at variance to this Principle	DEE (2017a) DBCA (2007–) Beard (1976)

Principle	Assessment	Outcome	Data sources
for fauna indigenous to WA	<ul style="list-style-type: none"> Peregrine Falcon (<i>Falco peregrinus</i>) – Listed as other specially protected fauna by WC Act Malleefowl (<i>Leipoa ocellata</i>) – Listed as Vulnerable under the EPBC Act and WC Act <p>No nest mounds or other evidence of Malleefowl were recorded during the field surveys. The habitats present within Survey area 1 (i.e. Tall Acacia Shrublands) may provide dispersal habitat for the Malleefowl. Given survey area 1 is part of an existing material pit (i.e. is an existing barrier to movement), and the small area to be cleared as part of this project, the project is unlikely to have a significant impact to an important population of the species.</p>		
	<p>Survey Area 2</p> <p>Four broad fauna habitats were recorded within the Survey Area, including: Open plain with scattered trees, <i>Frankenia</i> Flats, Tall Mixed Shrubland over Low Open Shrubland and Highly Disturbed. All of the habitat types are well represented at a local and regional scale, and overall the survey area retains relatively high local and regional connectivity.</p> <p>The field surveys recorded 40 vertebrate fauna species, including 29 birds, six reptiles and five mammal. No conservation significant fauna species were recorded.</p> <p>Three conservation significant species were assessed as likely to occur within the survey area, including:</p> <ul style="list-style-type: none"> Peregrine Falcon (<i>Falco peregrinus</i>) – Listed as other specially protected fauna by WC Act Grey Falcon (<i>Falco hypoleucos</i>) – Listed as Vulnerable under the WC Act Rainbow Bee-eater (<i>Merops ornatus</i>) – Listed under the International Agreement by WC Act. 	Unlikely to be at variance to this Principle	
	<p>Survey Area 3</p> <p>Three broad fauna habitats were recorded within the Survey Area, including: Low Open Shrubland, Drainage line and Highly Disturbed. All of the habitat types are well represented at a local and regional scale, and overall the survey area retains relatively high local and regional connectivity.</p> <p>The field surveys recorded 14 vertebrate fauna species, including one amphibian, 6 birds, four reptiles and three mammal. No conservation significant fauna species were recorded.</p> <p>One conservation significant species was assessed as likely to occur within the survey area, the Rainbow Bee-eater (<i>Merops ornatus</i>) – Listed under the International Agreement by WC Act.</p>	Unlikely to be at variance to this Principle	
	<p>Survey Area 4</p> <p>Three broad fauna habitats were recorded within the Survey Area, including: Low Open Shrubland, Drainage line and Highly Disturbed. All of the habitat types are well represented at a local and regional scale, and overall the survey area retains relatively high local and regional connectivity.</p>	Unlikely to be at variance to this Principle	

Principle	Assessment	Outcome	Data sources
	<p>The field surveys recorded 21 vertebrate fauna species, including 12 birds, eight reptiles and one mammal. No conservation significant fauna species were recorded.</p> <p>One conservation significant species was assessed as likely to occur within the survey area, the Rainbow Bee-eater (<i>Merops ornatus</i>) – Listed under the International Agreement by WC Act.</p>		
(c) – Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	<p>All Survey Areas</p> <p>Desktop searches identified the presence/potential presence of five EPBC Act and/or WC Act listed flora taxa within 10 km of the Survey Area. A likelihood of occurrence assessment, which takes into account the habitats present, known species distribution and previous records and intensity of field surveys and season, was completed for the Threatened flora taxa identified in desktop searches. This assessment determined that the Threatened taxa were unlikely or highly unlikely to occur within the survey areas.</p> <p>Searches for conservation significant flora taxa were undertaken during the field survey. No Threatened flora taxa were recorded from the survey area during the field surveys.</p>	Unlikely to be at variance to this Principle.	DEE (2017a) DBCA (2007–) WA Herbarium (1998–)
d) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.	<p>All Survey Areas</p> <p>There are no known TECs within 10 km of the survey areas.</p>	Unlikely to be at variance to this Principle.	DEE (2017a) DBCA (2007–)
(e) – Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	<p>Survey Area 1</p> <p>The vegetation within the survey area has been mapped as BVA 419; there is greater than 94.56% of the pre-European extent remaining at all levels (state, IBRA bioregion, IBRA subregion and LGA).</p>	Unlikely to be at variance to this Principle	Beard (1976) Shepherd <i>et al.</i> (2002) GoWA (2016)
	<p>Survey Area 2</p> <p>The vegetation within the survey area has been mapped as BVA 18 and BVA 300. There is greater than 99% of the pre-European extent remaining at all levels (state, IBRA bioregion, IBRA subregion and LGA).</p>	Unlikely to be at variance to this Principle	
	<p>Survey Area 3</p>	Unlikely to be at variance to this Principle	

Principle	Assessment	Outcome	Data sources
	The vegetation within the survey area has been mapped as BVA 18; there is greater than 99% of the pre-European extent remaining at all levels (state, IBRA bioregion, IBRA subregion and LGA).		
	Survey Area 4 The vegetation within the survey area has been mapped as BVA 18 there is greater than 99% of the pre-European extent remaining at all levels (state, IBRA bioregion, IBRA subregion and LGA).	Unlikely to be at variance to this Principle	
(f) – Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	Survey Area 1 No watercourses or drainage lines or wetlands were recorded within this survey area.	Unlikely to be at variance to this Principle.	DEE (2017a) GoWA (2017)
	Survey Area 2 The proposed road alignment intersects a minor non-perennial wetland. As such, part of the vegetation <i>Frankenia</i> vegetation type are growing in association with this wetland. The clearing is likely to be at variance with to this principle. However given the small linear area of the proposed clearing, it is not likely to have a significant impact on this wetland.	Likely to be at variance to this Principle.	
	Survey area 3 The proposed clearing area intersects a minor non-perennial drainage line. This drainage line supports an increased density of vegetation, however does not support specific riparian vegetation.	Unlikely to be at variance to this Principle.	
	Survey Area 4 The proposed road alignment will use the existing creek crossing and is already cleared.	Unlikely to be at variance to this Principle.	
(g) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	Survey Area 1 The survey area is located in the Nerramyne and Joseph Land Systems. The Nerramyne is described as stony plains with <i>Acacia</i> shrublands and halophytic shrublands. The Joseph is described as sandplains with <i>Acacia</i> , Mallees and Heath. The Nerramyne system has a slight susceptibility to accelerated erosion. Given the size of the clearing area (0.99 ha) and that clearing will be temporary, it is unlikely to cause appreciable land degradation via wind erosion. The proposed clearing is not likely to cause appreciable land degradation via salinity or eutrophication. Given the size of the clearing area, it is likely the survey area is a risk to water erosion.	Unlikely to be at variance to this Principle.	DAFWA (2007) Hennig <i>et. al.</i> (1994) GoWA (2017)

Principle	Assessment	Outcome	Data sources
	<p>Survey Area 2</p> <p>The Survey Area is located within the Breberie and Yanganoo Land System. The Breberie is as Sandplains and drainage floors with <i>Acacia</i> and halophytic shrublands. The Yanganoo is described as wash plains and sandy banks on hardpan, with mulga shrublands and wanderrie grasses or spinifex. The Breberie is not susceptible to erosion and the Yanganoo has a slight susceptibility to accelerated erosion. Due to the presence of sparse vegetation (i.e. Bare areas) and mapped soil type, some waterlogging may naturally occur following heavy rainfall in some areas of the Survey Area</p> <p>The clearing may cause some short term wind and water erosion issues however, due to the long and linear nature of the native vegetation to be cleared, clearing for the Project is unlikely to cause substantial land degradation.</p> <p>The proposed clearing is not likely to cause appreciable land degradation via salinity or eutrophication.</p> <p>Given the linear nature of the proposed clearing area, it is unlikely the survey area is a risk to water erosion.</p>	Unlikely to be at variance to this Principle.	
	<p>Survey Area 3</p> <p>The Survey Area is located within Narryer Land System. The Narryer is described as Mesas, breakaways and stony plains with <i>Acacia</i> or <i>Eucalypt</i> woodlands and halophytic shrublands. This land system is not susceptible to erosion. Due to the presence of sparse vegetation (i.e. degraded areas) and soil type, some waterlogging may naturally occur following heavy rainfall in some areas of the survey area.</p> <p>Soil erosion was prevalent at the northern side of the drainage line likely caused indirectly by existing road infrastructure altering overland flow patterns and subsequent loss of vegetation resulting from mulga shadowing. Evidence of overgrazing and drought has also likely contributed to the loss of vegetation. The clearing may cause some short term wind and water erosion issues however, due to the long and linear nature of the native vegetation to be cleared, clearing for the Project is unlikely to cause substantial land degradation.</p>	Unlikely to be at variance to this Principle.	
	<p>Survey Area 4</p> <p>The survey area is located within Narryer Land System. The Narryer is described as Mesas, breakaways and stony plains with <i>Acacia</i> or <i>Eucalypt</i> woodlands and halophytic shrublands. This land system is not susceptible to erosion. Due to the presence of sparse vegetation (i.e. degraded areas) and soil type, some waterlogging may naturally occur following heavy rainfall in some areas of the survey area.</p> <p>The clearing may cause some short term wind and water erosion issues however, due to the long and linear nature of the native vegetation to be cleared, clearing for the Project is unlikely to cause substantial land degradation.</p>	Unlikely to be at variance to this Principle.	

Principle	Assessment	Outcome	Data sources
	<p>The proposed clearing is not likely to cause appreciable land degradation via salinity or eutrophication.</p> <p>The proposed road alignment will use an existing creek crossing and it is unlikely the survey area is a risk to water erosion.</p>		
(h) – Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	<p>All Survey Areas</p> <p>No reserves, conservation areas or other DBCA-managed estates are located within or in the vicinity of the survey areas. The closest DBCA-managed conservation area is ex-Muggon Pastoral Station, located south-west of the Survey Area 2. As discussed in Principle (e), the survey area is located within a region where more than 90% of the pre-European extent of BVA remains.</p>	Unlikely to be at variance to this Principle.	DEE (2017a) DBCA (2007–)
(i) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	<p>Survey Area 1</p> <p>No rivers or surface water bodies listed under the RIWI Act were identified within the survey area. There are no drainage lines, lakes or wetlands in the Survey Area. The clearing will be temporary and it is unlikely that the proposed works will disturb or interrupt any natural drainage and surface run-off patterns due to the sandy soils present in the area.</p>	Unlikely to be at variance to this Principle.	GoWA (2017)
	<p>Survey Area 2</p> <p>No rivers or surface water bodies listed under the RIWI Act were identified within the survey area. As discussed in Principle (f) the Survey Area intersects a minor non-perennial wetland and the proposed clearing has the potential to lead to water erosion. However, due to the linear nature of the proposed clearing area, it is unlikely that the clearing of native vegetation will cause significant deterioration in the quality of surface water or groundwater within the local area.</p> <p>The non-perennial wetland in the region are likely to contain an existing level of sedimentation. It is unlikely the increase in sedimentation as a result of proposed clearing.</p>	Unlikely to be at variance to this Principle.	
	<p>Survey Area 3</p> <p>No rivers or surface water bodies listed under the RIWI Act were identified within the survey area. As discussed in Principle (f) the survey area intersects a minor non-perennial drainage line and the proposed clearing has the potential to lead to water erosion.</p> <p>The non-perennial drainage line in the region are likely to contain an existing level of sedimentation. It is unlikely the increase in sedimentation as a result of proposed clearing.</p>	Unlikely to be at variance to this Principle.	

Principle	Assessment	Outcome	Data sources
	<p>Survey Area 4 As discussed in Principle (f) the survey area intersects a minor non-perennial, however, the proposed alignment will use an existing creek crossing.</p>	Unlikely to be at variance to this Principle.	
(j) – Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding	<p>Survey area 1 The soils of the Survey Area are sandy and porous and the area is generally well-drained. No wetlands, watercourses or areas subject to inundation are located within the survey area. It is unlikely that the removal of vegetation proposed for this project would cause or exacerbate the incidence or intensity of flooding in the local area. The survey area is unlikely to be susceptible to waterlogging due to the highly porous nature of the soils in the area and clearing is unlikely to cause or exacerbate waterlogging within the survey area.</p>	Unlikely to be at variance to this Principle.	
	<p>Survey Area 2 The Survey Area may likely experience pre-existing seasonal waterlogging resulting from heavy rainfall. As such the proposed clearing is unlikely to cause or exacerbate waterlogging within the survey area.</p>	Unlikely to be at variance to this Principle.	
	<p>Survey Area 3 The Survey Area may likely experience pre-existing seasonal waterlogging resulting from heavy rainfall. As such the proposed clearing is unlikely to cause or exacerbate waterlogging within the survey area.</p>	Unlikely to be at variance to this Principle.	
	<p>Survey Area 4 The Survey Area may likely experience pre-existing seasonal waterlogging resulting from heavy rainfall. As such the proposed clearing is unlikely to cause or exacerbate waterlogging within the survey area.</p>	Unlikely to be at variance to this Principle.	

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Appendices

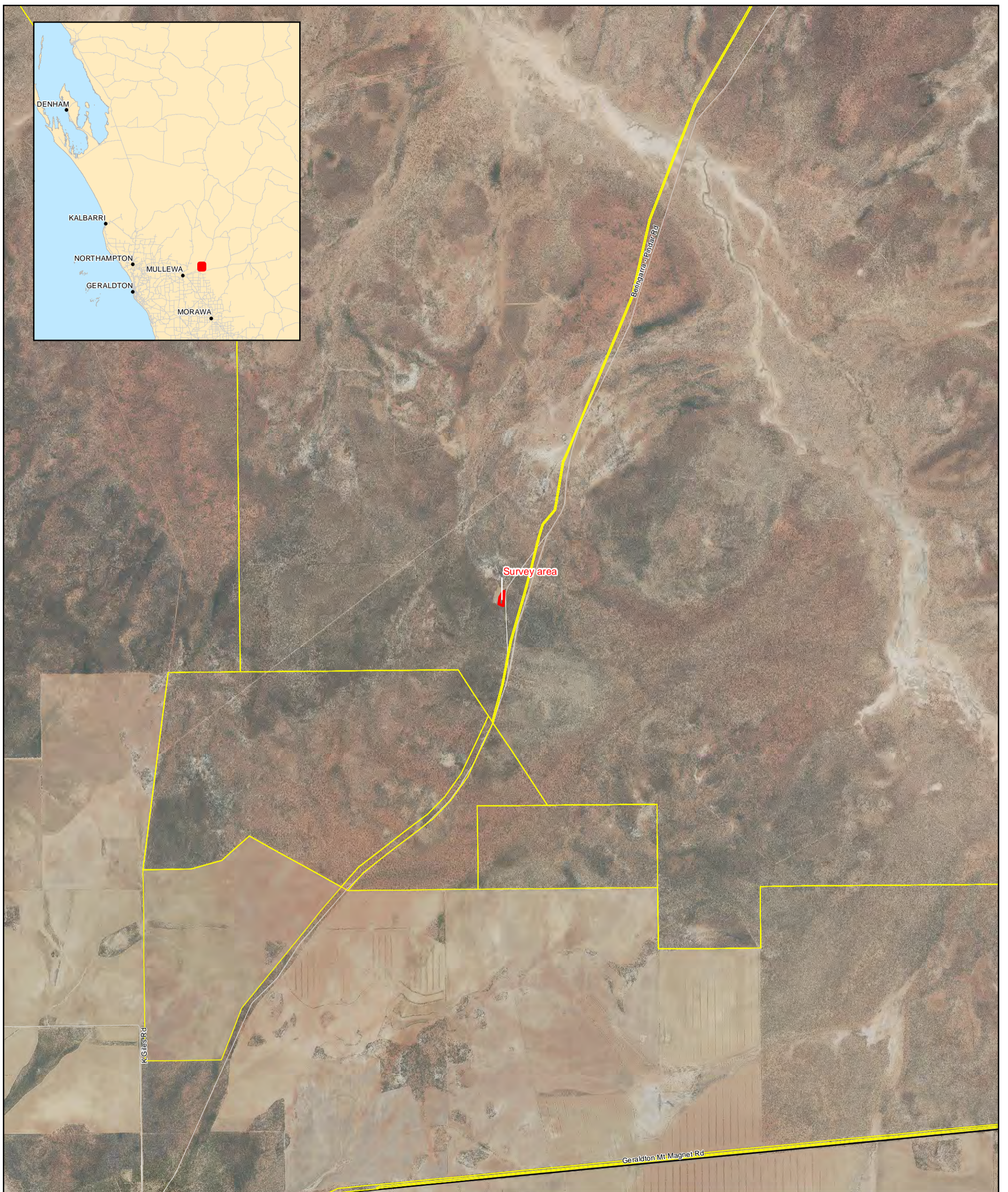
Appendix A – Figures

Figure 1 Project location

Figure 2 Environmental constraints

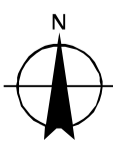
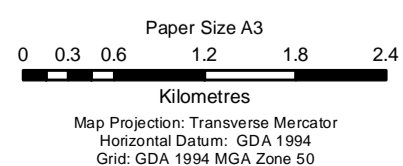
Figure 3 Vegetation types and quadrat locations

Figure 4 Vegetation condition



LEGEND

- Survey area
- Local road
- Cadastral boundary
- State road

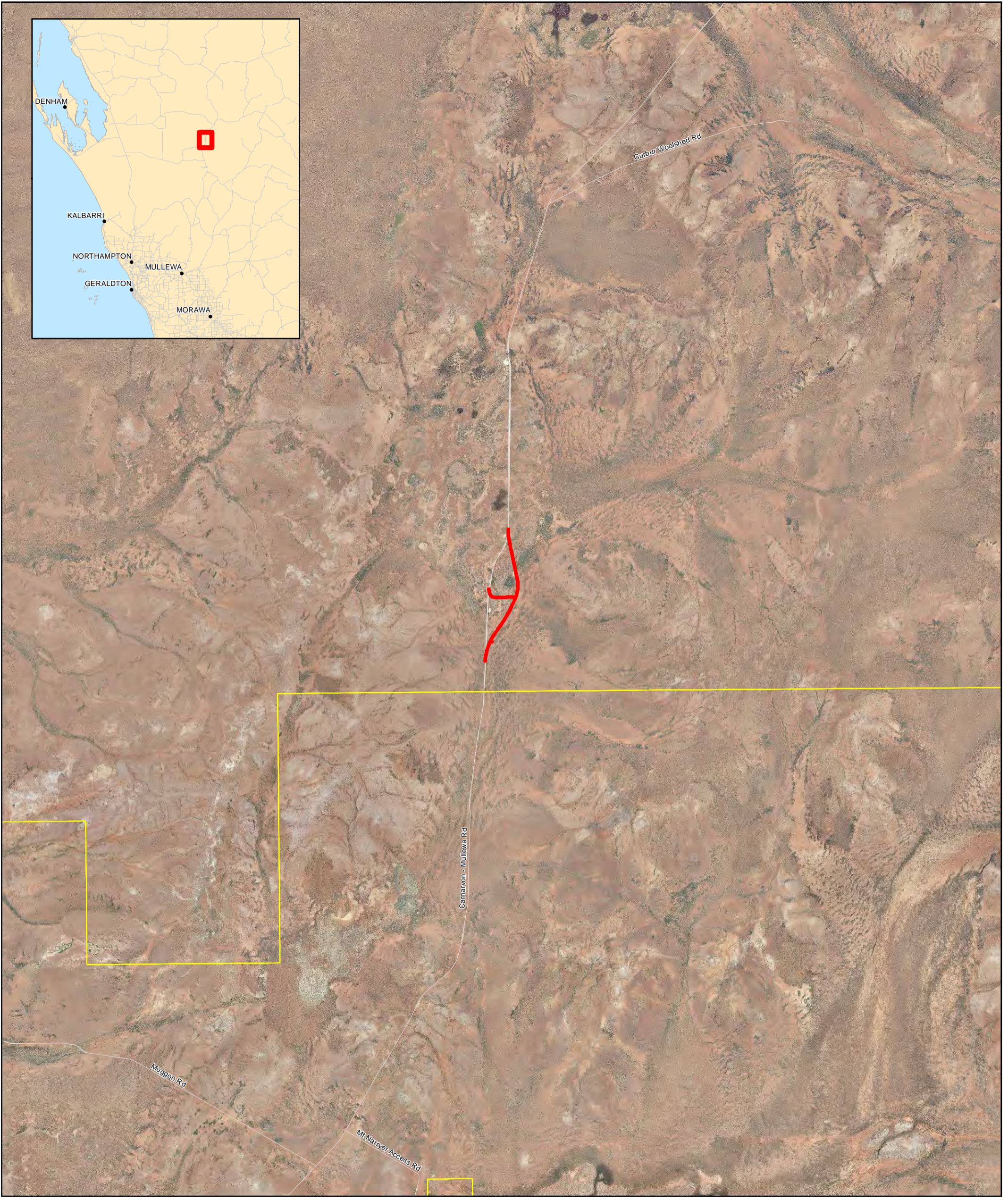


Shire of Murchison
Biological Survey 2017

Job Number	61-35378
Revision	0
Date	05 Oct 2017

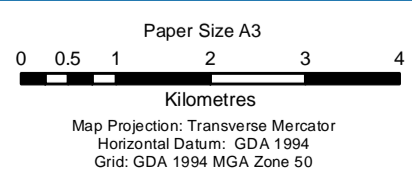
Locality Map -
Pindar Pit

Figure 1a



LEGEND

- Survey area
- Local road
- Cadastral boundary

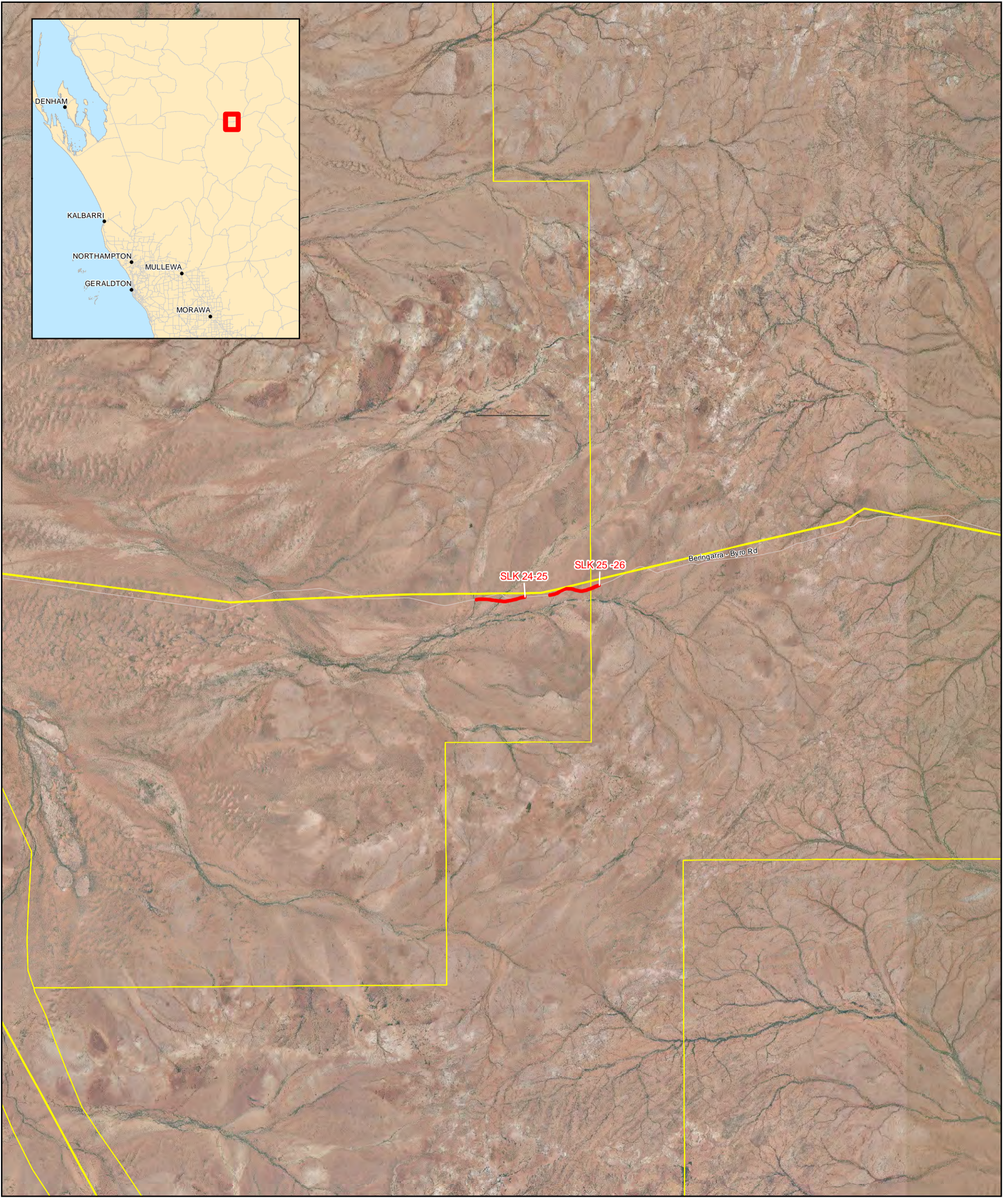


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Job Number	61-35378
Revision	0
Date	05 Oct 2017

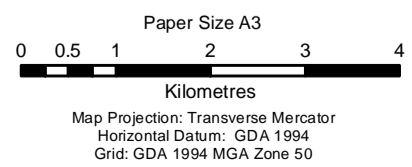
**Locality Map -
Curbur HSD Bypass**

Figure 1b



LEGEND

- Survey area
- Local road
- Cadastral boundary



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 Locality Map -
 Beringarra Byro Road SLK 24-25
 and SLK 25-26

Job Number	61-35378
Revision	0
Date	05 Oct 2017

Figure 1c



LEGEND

- Local road
- State road
- Watercourses
- ▭ Survey area
- ▨ Environmentally Sensitive Areas
- ▨ Registered Site

Paper Size A3
 0 0.5 1 2 3 4
 Kilometres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



Shire of Murchison
 Biological Survey 2017

Job Number | 61-35378
 Revision | 0
 Date | 05 Oct 2017

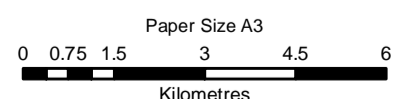
Environmental Constraints - Pindar Pit

Figure 2a



LEGEND

- Local road
- Survey area
- Environmentally Sensitive Areas
- Watercourses



Map Projection: Transverse Mercator
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 Grid: GDA 1994 MGA Zone 50

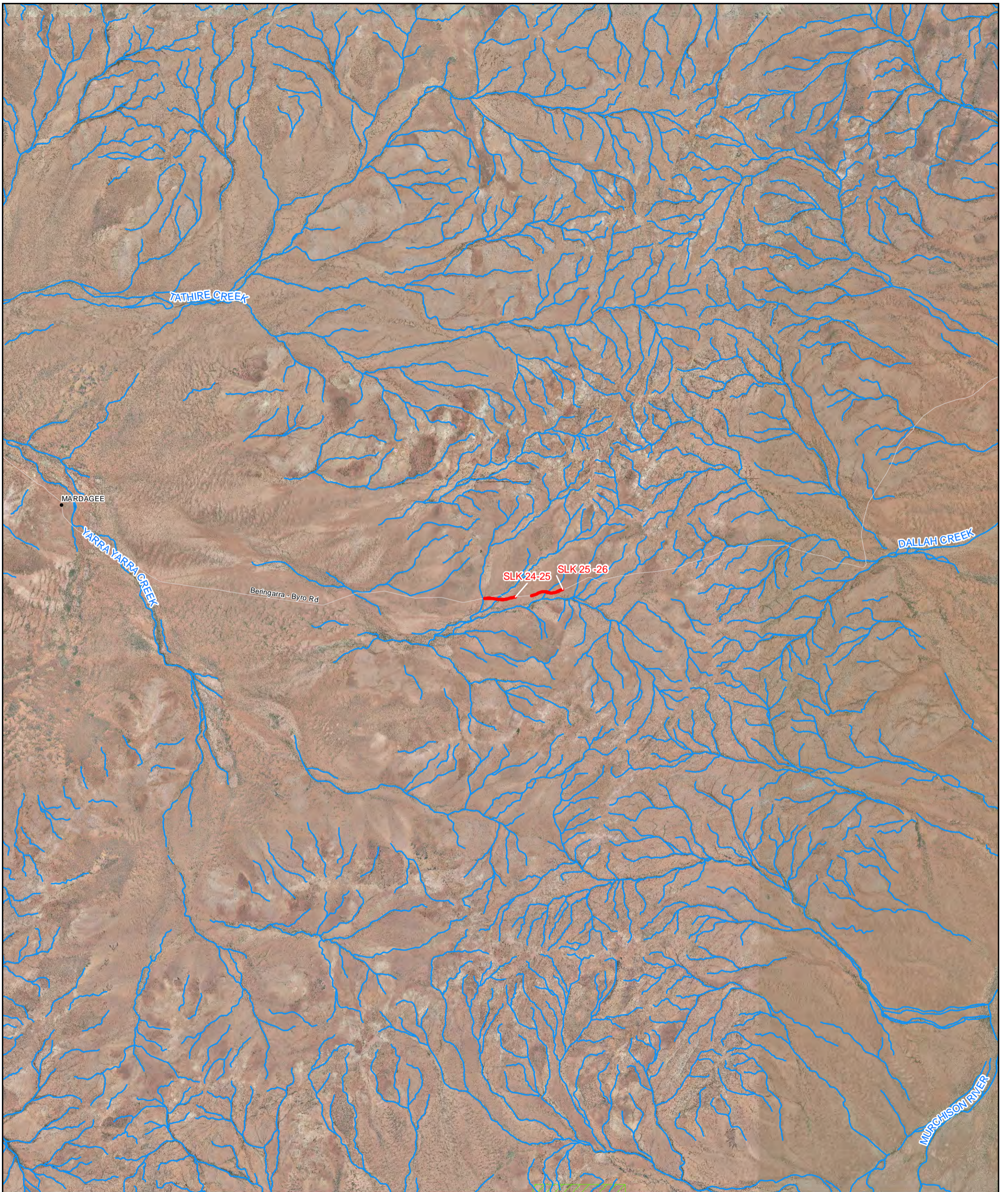


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Job Number | 61-35378
 Revision | 0
 Date | 05 Oct 2017

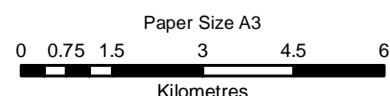
**Environmental Constraints -
 Curbur HSD Bypass**

Figure 2b



LEGEND

-  Local road
-  Survey area
-  Environmentally Sensitive Areas
-  Watercourses
-  Aboriginal Heritage Site Status
-  Lodged



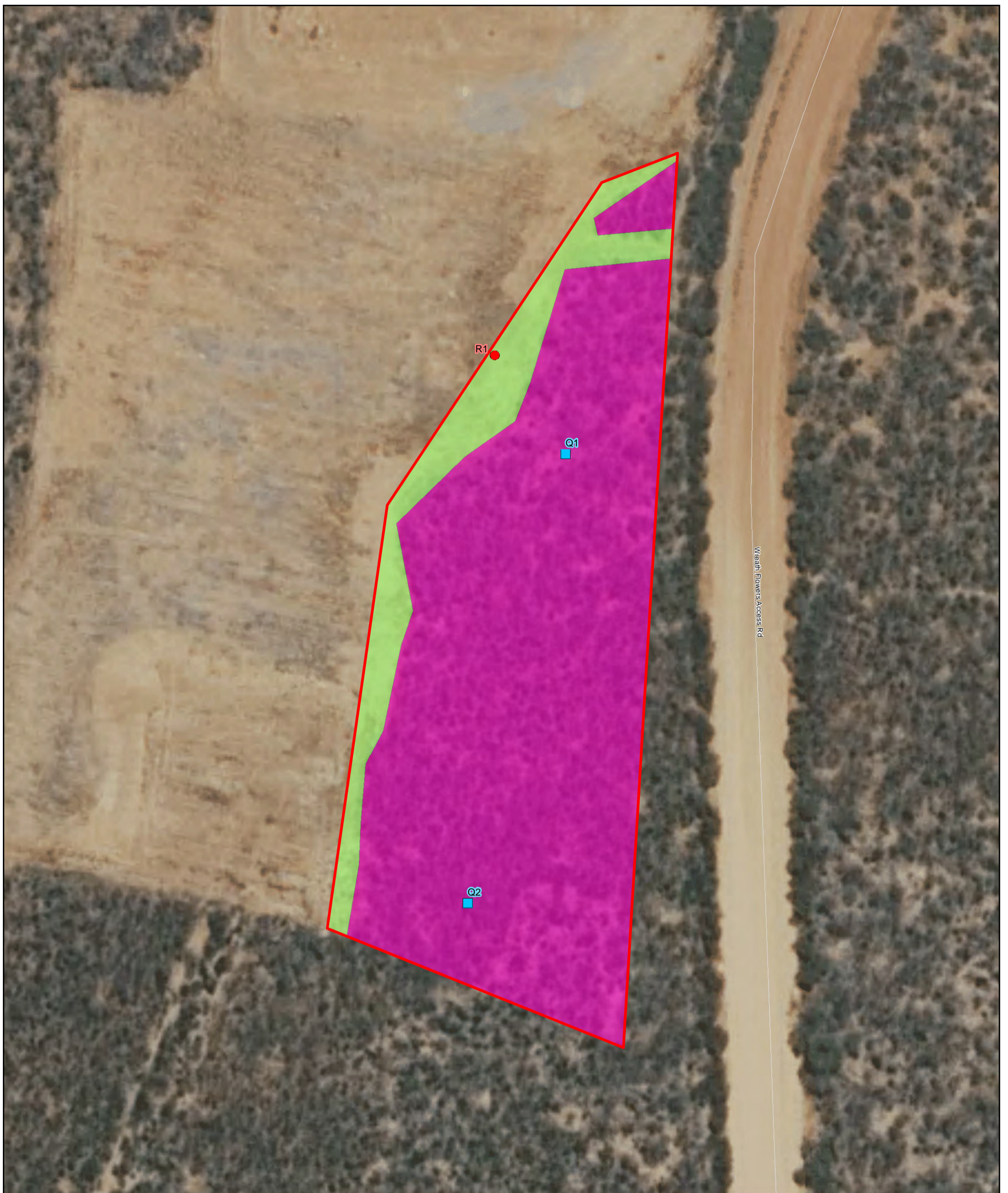
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 Environmental Constraints -
 Beringarra Byro Road SLK 24-25
 and SLK 25-26

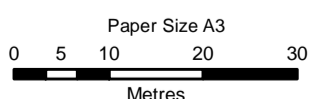
Job Number | 61-35378
 Revision | 0
 Date | 05 Oct 2017

Figure 2c



LEGEND

- Quadrat location
- Relevé location
- Survey area
- Vegetation type
- Acacia tall shrubland
- Rehabilitation
- Local road



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
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Shire of Murchison
Biological Survey 2017









Job Number | 61-35378
Revision | 0
Date | 05 Oct 2017

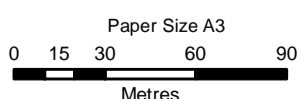
Vegetation Types -
Pindar Pit

Figure 3a



LEGEND

- | | | | | |
|--|--|--|--|--|
|  Quadrat location |  <i>Acacia, Eremophila, Senna</i> on calcareous soils |  <i>Acacia, Eremophila, Senna</i> tall shrubland on sandy loams |  Cleared / Degraded |  Local road |
|  Relevé location |  Chenopod Flats | | | |
|  Survey area | | | | |



Map Projection: Transverse Mercator
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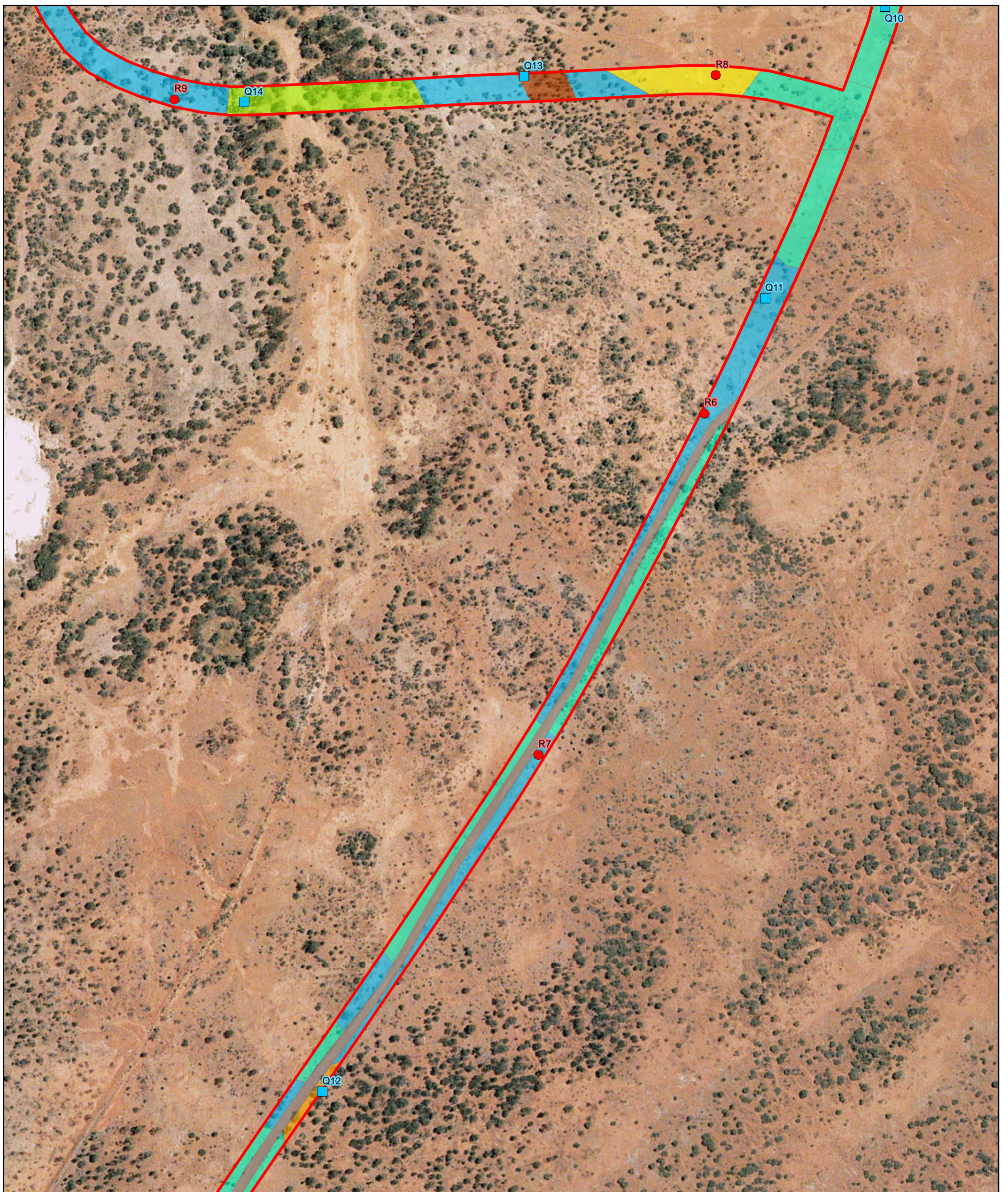


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Job Number | 61-35378
Revision | 0
Date | 05 Oct 2017

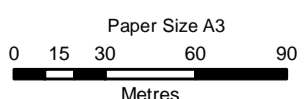
Vegetation Types -
Curbur HSD Bypass

Figure 3b



LEGEND

- | | | | |
|--|--|--|--|
| ■ Quadrat location | Vegetation type | ■ <i>Melaleuca stereophloia</i> on sandy rise | ■ Mulga Grove |
| ● Relevé location | ■ <i>Acacia, Eremophila, Senna</i> on calcareous soils | ■ Bare Areas | ■ Cleared / Degraded |
| Survey area | ■ <i>Acacia, Eremophila, Senna</i> tall shrubland on sandy loams | ■ Chenopod Flats | |



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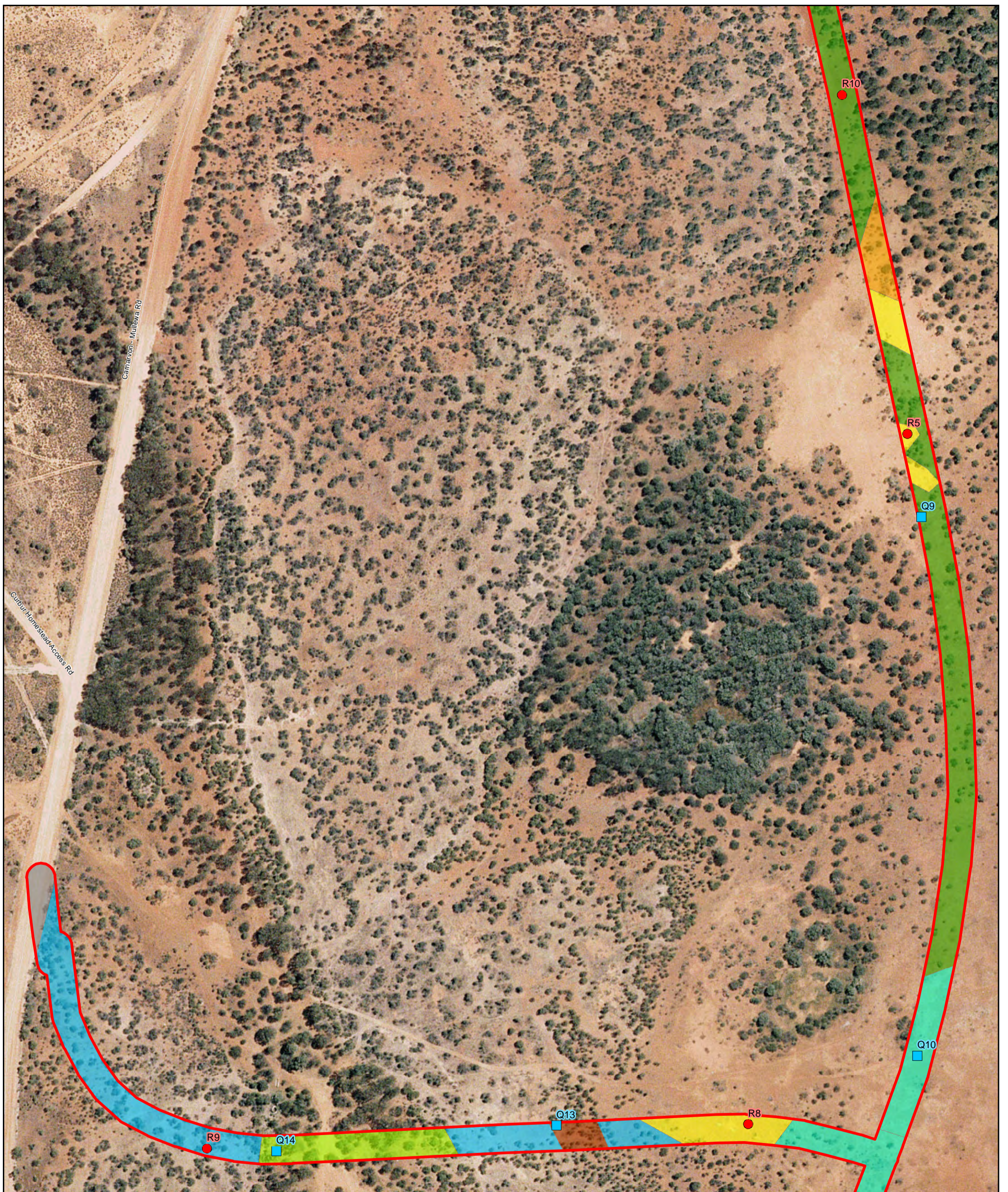


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Job Number | 61-35378
Revision | 0
Date | 05 Oct 2017

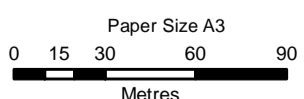
Vegetation Types -
Curbur HSD Bypass

Figure 3c



LEGEND

- | | | | | |
|--|--|--|--|--|
|  Quadrat location | Vegetation type |  <i>Eucalyptus victrix, Melaleuca stereophloia</i> on flats |  Chenopod Flats |  Local road |
|  Relevé location |  <i>Acacia, Eremophila, Senna</i> on calcareous soils |  <i>Melaleuca stereophloia</i> on sandy rise |  Mulga Grove |  |
|  Survey area |  <i>Acacia, Eremophila, Senna</i> tall shrubland on sandy loams |  Bare |  Cleared / Degraded | |



Map Projection: Transverse Mercator
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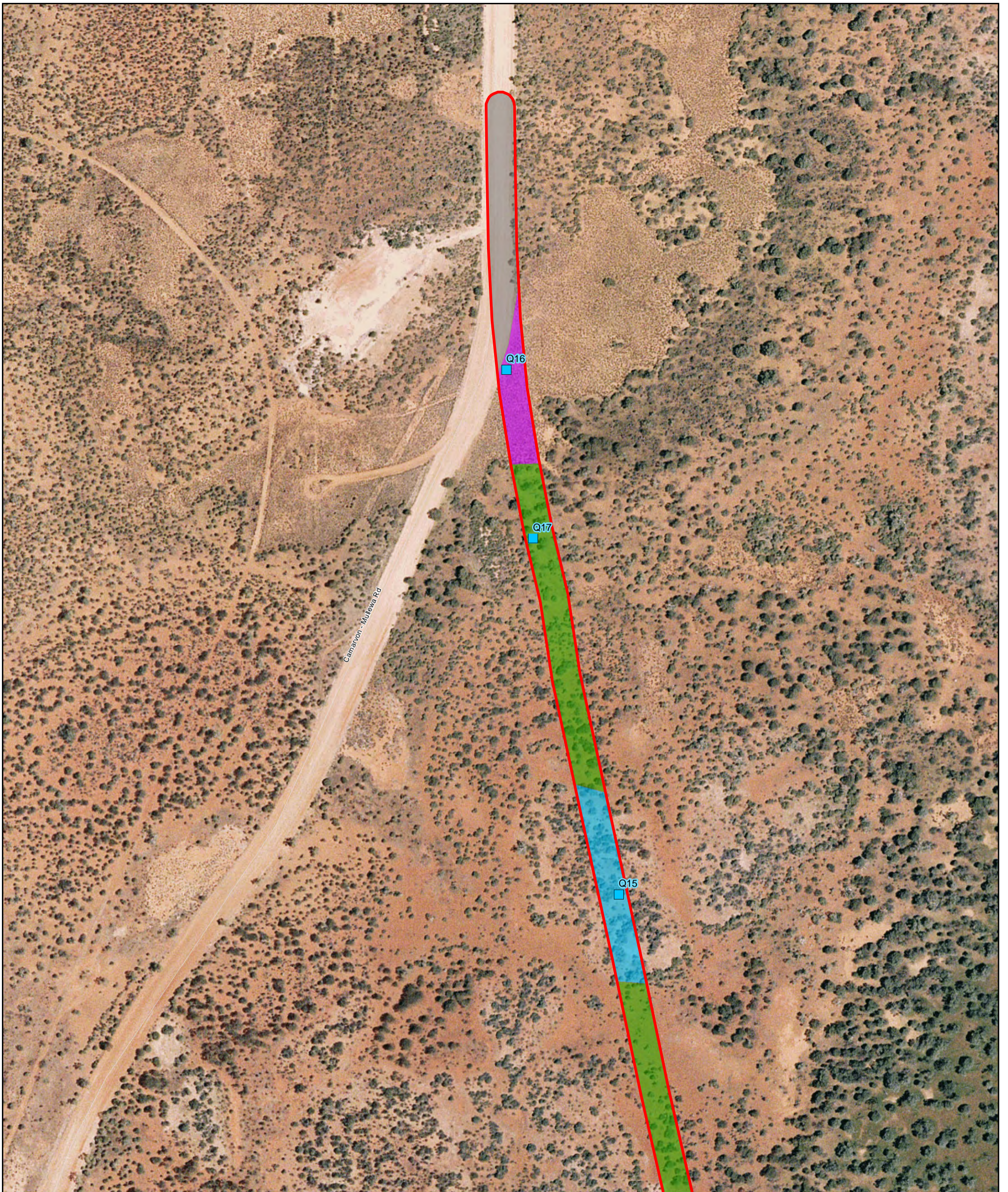


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Job Number | 61-35378
Revision | 0
Date | 05 Oct 2017

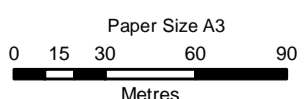
Vegetation Types -
Curbur HSD Bypass

Figure 3d



LEGEND

- | | | | | |
|--|--|---|--|------------|
| ■ Quadrat location | Vegetation type | ■ <i>Eucalyptus victrix, Melaleuca stereophloia</i> on flats | ■ Cleared / Degraded | Local road |
| ● Relevé location | ■ <i>Acacia, Eremophila, Senna</i> on calcareous soils | ■ <i>Frankenia</i> Flats | | |
| Survey area | | | | |



Map Projection: Transverse Mercator
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Grid: GDA 1994 MGA Zone 50

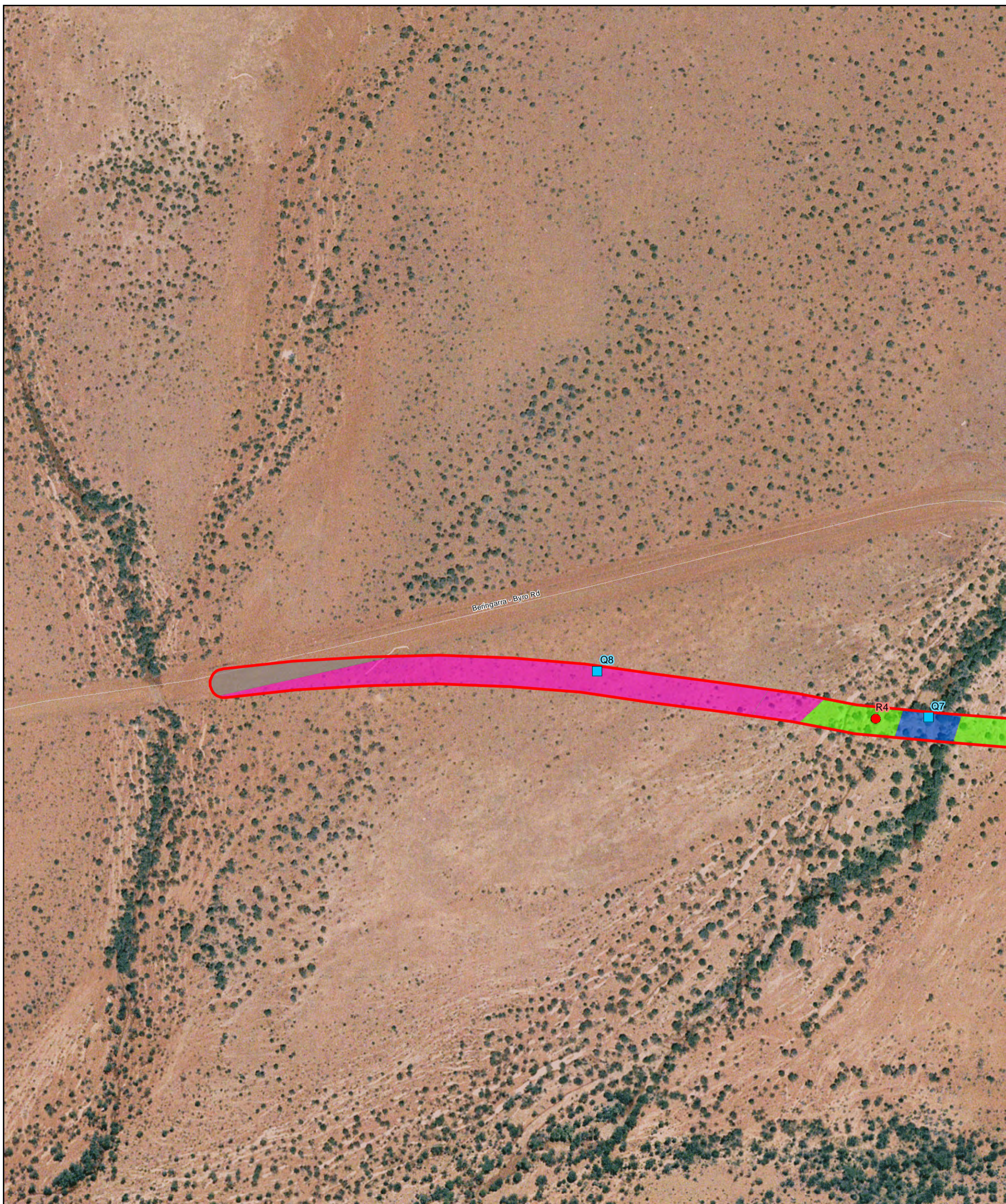


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Biological Survey 2017









Job Number | 61-35378
Revision | 0
Date | 05 Oct 2017

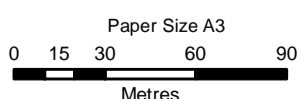
Vegetation Types -
Curbur HSD Bypass

Figure 3e



LEGEND

- | | | | | | | |
|---|------------------|---|---|---|---|------------|
|  | Quadrat location | Vegetation type |  | Acacia open shrubland on Sheetwash |  | Local road |
|  | Relevé location |  | <i>Acacia Eremophila Senna</i> open shrublands on Stony Plains |  | Cleared / Degraded | |
|  | Survey area |  | <i>Acacia Eremophila Senna</i> woodlands on Drainage Lines | | | |



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50












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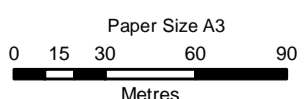
Job Number | 61-35378
Revision | 0
Date | 05 Oct 2017

Vegetation Types -
Beringarra Byro Road SLK 24-25 **Figure 3f**



LEGEND

- | | | | | | | | |
|---|------------------|---|--|---|------------------------------------|---|------------|
|  | Quadrat location |  | Vegetation type |  | Acacia open shrubland on Sheetwash |  | Local road |
|  | Relevé location |  | <i>Acacia Eremophila Senna</i> open shrublands on Stony Plains |  | Cleared / Degraded | | |
|  | Survey area |  | <i>Acacia Eremophila Senna</i> woodlands on Drainage Lines | | | | |



Map Projection: Transverse Mercator
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Grid: GDA 1994 MGA Zone 50











Shire of Murchison
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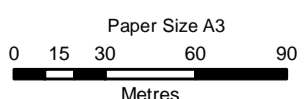
Job Number | 61-35378
Revision | 0
Date | 05 Oct 2017

Vegetation Types -
Beringarra Byro Road SLK 24-25 Figure 3g



LEGEND

- | | | | | | |
|---|------------------|---|--|---|--|
|  | Quadrat location |  | Vegetation type |  | Local road |
|  | Relevé location |  | <i>Acacia Eremophila Senna</i> open shrublands on Drainage Lines |  | <i>Acacia Eremophila Senna</i> open shrublands on Stony Plains |
|  | Survey area |  | Cleared / Degraded | | |



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50











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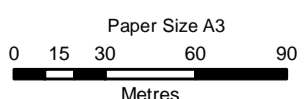
Job Number	61-35378
Revision	0
Date	05 Oct 2017

Vegetation Types -
Beringarra Byro Road SLK 25-26 **Figure 3h**



LEGEND

- | | | | | | |
|---|------------------|---|--|---|--|
|  | Quadrat location |  | Vegetation type |  | Local road |
|  | Relevé location |  | <i>Acacia Eremophila Senna</i> open shrublands on Drainage Lines |  | <i>Acacia Eremophila Senna</i> open shrublands on Stony Plains |
|  | Survey area |  | Cleared / Degraded | | |



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



Shire of Murchison
Biological Survey 2017

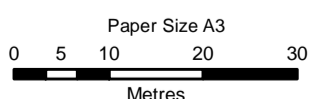
Job Number | 61-35378
Revision | 0
Date | 05 Oct 2017

Vegetation Types -
Beringarra Byro Road SLK 25-26 **Figure 3i**



LEGEND

- Survey area
- Completely Degraded
- Excellent
- Local road



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



Shire of Murchison
 Biological Survey 2017

Job Number | 61-35378
 Revision | 0
 Date | 05 Oct 2017

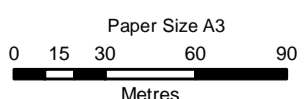
Vegetation Condition -
 Pindar Pit

Figure 4a



LEGEND

- Survey area
- Poor
- Good
- Local road
- Completely Degraded



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



Shire of Murchison
Biological Survey 2017

Job Number | 61-35378
Revision | 0
Date | 05 Oct 2017

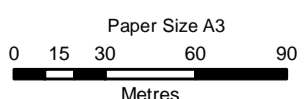
Vegetation Condition -
Curbur HSD Bypass

Figure 4b



LEGEND

- Survey area
- Poor
- Degraded
- Good
- Completely Degraded



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



Shire of Murchison
Biological Survey 2017

Job Number | 61-35378
Revision | 0
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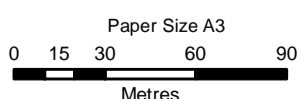
Vegetation Condition -
Curbur HSD Bypass

Figure 4c



LEGEND

- Survey area
- Good
- Completely Degraded
- Vegetation condition
- Poor
- Degraded
- Very Good
- Local road



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

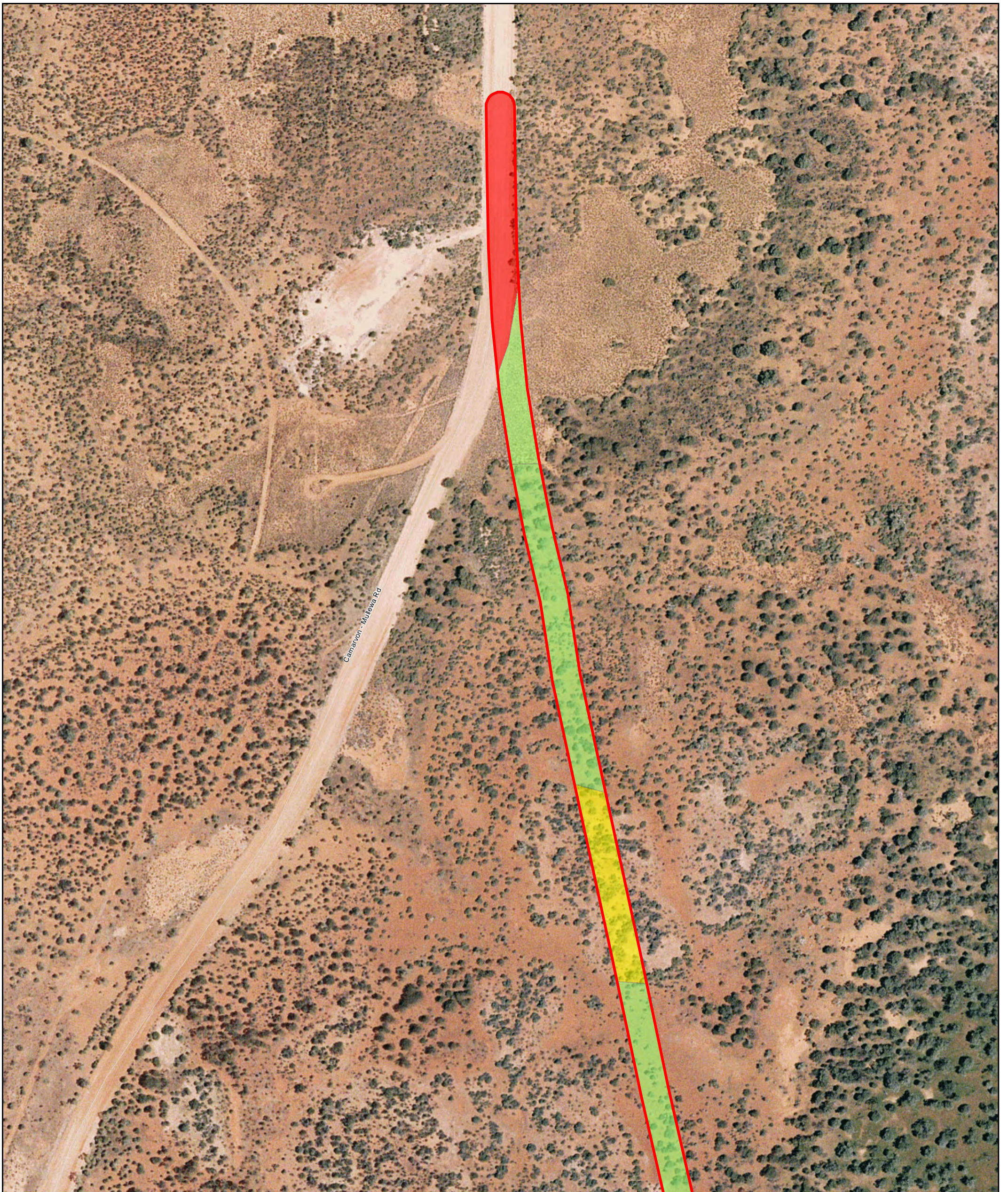


Shire of Murchison
Biological Survey 2017

Job Number | 61-35378
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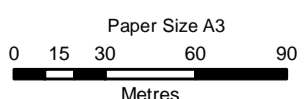
Vegetation Condition -
Curbur HSD Bypass

Figure 4d



LEGEND

- Survey area
- Poor
- Good
- Local road
- Completely Degraded



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



Shire of Murchison
Biological Survey 2017

Job Number | 61-35378
Revision | 0
Date | 05 Oct 2017

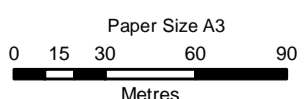
Vegetation Condition -
Curbur HSD Bypass

Figure 4e



LEGEND

- Survey area
- Degraded
- Completely Degraded
- Poor
- Local road



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



Shire of Murchison
Biological Survey 2017

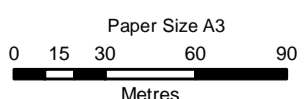
Job Number | 61-35378
Revision | 0
Date | 05 Oct 2017

Vegetation Condition -
Beringarra Byro Road SLK 24-25 **Figure 4f**



LEGEND

- Survey area
- Poor
- Vegetation condition
- Completely Degraded
- Good
- Local road



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



Shire of Murchison
Biological Survey 2017

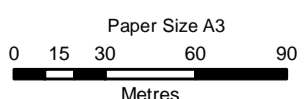
Job Number	61-35378
Revision	0
Date	05 Oct 2017

Vegetation Condition -
Beringarra Byro Road SLK 24-25 **Figure 4g**



LEGEND

- Survey area
- Poor
- Vegetation condition
- Completely Degraded
- Good
- Local road



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



Shire of Murchison
Biological Survey 2017

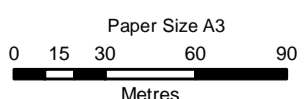
Job Number	61-35378
Revision	0
Date	05 Oct 2017

Vegetation Condition -
Beringarra Byro Road SLK 25-26 **Figure 4h**



LEGEND

- Survey area
- Completely Degraded
- Vegetation condition
- Good
- Local road



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



Shire of Murchison
Biological Survey 2017

Job Number	61-35378
Revision	0
Date	05 Oct 2017

Vegetation Condition -
Beringarra Byro Road SLK 25-26 **Figure 4i**

Appendix B – Relevant legislation, conservation codes and background information

Relevant legislation

Federal Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Federal Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as Matters of National Environmental Significance (MNES).

The biological aspects listed as MNES include:

- Nationally threatened flora and fauna species and ecological communities
- Migratory species.

A person must not undertake an action that has, will have, or is likely to have a significant impact (direct or indirect) on MNES, without approval from the Federal Minister for the Environment.

The EPBC Act is administered by the Department of the Environment and Energy (DEE).

State Environmental Protection Act 1986

The *Environmental Protection Act 1986* (EP Act) is the primary legislative Act dealing with the protection of the environment in Western Australia. The Act allows the Environmental Protection Authority (EPA), to prevent, control and abate pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing. Part IV of the EP Act is administered by the EPA and makes provisions for the EPA to undertake environmental impact assessment of significant proposals, strategic proposals and land use planning schemes.

The Department of Water and Environment Regulation (DWER) is responsible for administering the clearing provisions of the EP Act (Part V). Clearing of native vegetation in Western Australia requires a permit from the DWER, unless exemptions apply. Applications for clearing permits are assessed by the Department and decisions are made to grant or refuse the application in accordance with the Act. When making a decision the assessment considers clearing against the ten clearing principles as specified in Schedule 5 of the EP Act:

- a. Native vegetation should not be cleared if it comprises a high level of biodiversity.
- b. Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a significance habitat for fauna indigenous to Western Australia.
- c. Native vegetation should not be cleared if it includes, or is necessary, for the continued existence of rare flora.
- d. Native vegetation should not be cleared if it comprises the whole or part of native vegetation in an area that has been extensively cleared.
- e. Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.
- f. Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.
- g. Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

- h. Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.
- i. Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.
- j. Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

Exemptions for clearing include clearing that is a requirement of a written law or authorised under certain statutory processes (listed in Schedule 6 of the EP Act) and exemptions for prescribed low impact day-to-day activities (prescribed in the Environmental Protection (Clearing of Native Vegetation) Regulations 2004); these exemptions do not apply in environmentally sensitive areas (ESAs).

State Biodiversity and Conservation Act 2016

The Biodiversity Conservation Bill 2015 was introduced to State Parliament in November 2015, and passed in September 2016. The Bill became the *Biodiversity Conservation Act 2016* (BC Act) upon receiving Assent on 21 September 2016. The BC Act will eventually fully replace both the *Wildlife Conservation Act 1950* (WC Act) and the *Sandalwood Act 1929* (Sandalwood Act).

Several parts of the BC Act were proclaimed by the State Governor in the Government Gazette and came into effect on 3 December 2016. However, provisions that replace those existing under the WC Act and Sandalwood Act (including threatened species listings and controls over the taking and keeping of native species) and their associated Regulations cannot be brought into effect until the necessary Biodiversity Conservation Regulations have been made. It is hoped the new Regulations will be completed and ready to commence by late 2017.

State Wildlife Conservation Act 1950

The WC Act provides for the conservation and protection of wildlife. It is administered by the Department of Biodiversity, Conservation and Attractions (DBCA) and applies to both flora and fauna. Any person wanting to capture, collect, disturb or study fauna requires a permit to do so. A permit is required under the WC Act if removal of threatened species is required.

State Biosecurity and Agriculture Management Act 2007

The *Biosecurity and Agriculture Management Act 2007* (BAM Act) and associated regulations are administered by the Department of Primary Industries and Regional Development (DPIRD) and replace the repealed *Agriculture and Related Resources Protection Act 1976*. The main purposes of the BAM Act and its regulations are to:

- Prevent new animal and plant pests (vermin and weeds) and diseases from entering WA
- Manage the impact and spread of those pests already present in the state
- Safely manage the use of agricultural and veterinary chemicals
- Increased control over the sale of agricultural products that contain violative chemical residues

The Western Australian Organism List (WAOL) provides the status of organisms which have been categorised under the BAM Act. A Declared Pest is a prohibited organism or an organism for which a declaration under Section 22(2) of the Act is in force. Declared Pests may be assigned a control category including: C1 (exclusion), C2 (eradication) and C3 (management). The category may apply to the whole of the State, LGAs, districts, individual properties or even paddocks, and all landholders are obliged to comply with the specific category of control. Categories of control are defined below.

Table B1 Categories for Declared Pests under the BAM Act

Control class code	Description
C1 (Exclusion)	Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2 (Eradication)	Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
C3 (Management)	Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

Background information

Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are declared by the Minister for Environment under Section 51B of the EP Act. The Table below outlines the aspects of areas declared as ESA in the Environmental Protection (Environmentally Sensitive Areas) Notice 2005.

Table B2 Aspects of ESAs

Aspects of Environmentally Sensitive Areas
A declared World Heritage property as defined in Section 13 of the EPBC Act.
An area that is included on the Register of the National Estate (RNE), because of its natural values, under the Australian Heritage Commission Act 1975 of the Commonwealth (the RNE was closed in 2007 and is no longer a statutory list – all references to the RNE were removed from the EPBC Act on 19 February 2012).
A defined wetland and the area within 50 m of the wetland. Defined wetlands include Ramsar wetlands, conservation category wetlands and nationally important wetlands.
The area covered by vegetation within 50 m of rare flora, to the extent to which the vegetation is continuous with the vegetation in which the rare flora is located.
The area covered by a Threatened Ecological Community.
A Bush Forever Site listed in “Bush Forever” Volumes 1 and 2 (2000), published by the Western Australia Planning Commission, except to the extent to which the site is approved to be developed by the Western Australia Planning Commission.
The areas covered by the Environmental Protection (Gnangara Mound Crown Land) Policy 1992.
The areas covered by the Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002.
The areas covered by the lakes to which the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 (EPP Lakes) applies.
Protected wetlands as defined in the Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998.

Reserves and conservation areas

Department of Biodiversity, Conservation and Attractions managed lands and waters

DBCA manages lands and waters throughout Western Australia to conserve ecosystems and species, and to provide for recreation and appreciation of the natural environment. DBCA managed lands and waters include national parks, conservation parks and reserves, marine

parks and reserves, regional parks, nature reserves, State forest and timber reserves. DBCA managed conservation estate, is vested with the Conservation Commission of Western Australia. Access to, or through, some areas of DBCA managed lands may require a permit or could be restricted due to management activities. Proposed land use changes and development proposals that abut DBCA managed lands will generally be referred to DBCA throughout the assessment process.

Wetlands

Wetlands include not only lakes with open water, but areas of seasonally, intermittently or permanently waterlogged soil.

Ramsar Listed Wetlands

The Convention of Wetlands of International Importance was signed in 1971 at the Iranian town of Ramsar. The Convention has since been referred to as the Ramsar Convention. Ramsar Listed wetlands are “sites containing representative, rare or unique wetlands, or wetlands that are important for conserving biological diversity ... because of their ecological, botanical, zoological, limnological or hydrological importance” (DoEE 2017b). Once a Ramsar Listed Wetland is designated, the country agrees to manage its conservation and ensure its wise use. Under the Convention, wise use is broadly defined as “maintaining the ecological character of a wetland” (DoEE 2017b).

Nationally important wetlands

Wetlands of national significance are listed under the Directory of Important Wetlands in Australia. Nationally important wetlands are wetlands which meet at least one of the following criteria (DEE 2017a):

- It is a good example of a wetland type occurring within a biogeographic region in Australia
- It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex
- It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail
- The wetland supports one percent or more of the national populations of any native plant or animal taxa
- The wetland supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level
- The wetland is of outstanding historical or cultural significance

Vegetation extent and status

The National Objectives and Targets for Biodiversity Conservation 2001–2005 (Commonwealth of Australia 2001) recognise that the retention of 30 percent or more of the pre-clearing extent of each ecological community is necessary if Australia’s biological diversity is to be protected. This is the threshold level below which species loss appears to accelerate exponentially and loss below this level should not be permitted. This level of recognition is in keeping with the targets recommended in the review of the National Strategy for the Conservation of Australia’s Biological Diversity (ANZECC 2000).

The extent of remnant native vegetation in WA has been assessed by Shepherd et al. (2002) and the GoWA (2016), based on broadscale vegetation association mapping by Beard (various publications). The GoWA produces Statewide Vegetation Statistics Reports that are used for a

number of purposes including conservation planning, land use planning and when assessing development applications. The reports are updated at least every two years.

Vegetation condition

The vegetation condition can be assessed in accordance with the vegetation condition rating scale for the South West and Interzone, and the Eremaean and Northern Botanical Provinces (EPA 2016A). The scale recognises the intactness of vegetation and consists of six rating levels as outlined below.

Table B3 Vegetation condition rating scale for the South West and Interzone Botanical Provinces

Condition	South West and Interzone Botanical Provinces description
Pristine	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
Completely Degraded	The structure of vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Table B4 Vegetation condition rating scale for the Eremaean and Northern Botanical Provinces

Condition	Eremaean and Northern Botanical Provinces description
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
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.
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
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..
Degraded	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.

Condition	Eremaean and Northern Botanical Provinces description
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.

Conservation codes

Species of significant flora, fauna and communities are protected under both Federal and State Acts. The Federal EPBC Act provides a legal framework to protect and manage nationally important flora and communities. The State WC Act is the primary wildlife conservation legislation in Western Australia. Information on the conservation codes is summarised in the following sections.

Ecological communities

Conservation significant communities

Ecological communities are defined as naturally occurring biological assemblages that occur in a particular type of habitat (English and Blyth 1997). Federally listed Threatened Ecological Communities (TECs) are protected under the EPBC Act. The DBCA also maintains a list of TECs for Western Australia; some of which are also protected under the EPBC Act. TECs are ecological communities that have been assessed and assigned to one of four categories related to the status of the threat to the community, i.e. Presumed Totally Destroyed, Critically Endangered, Endangered and Vulnerable.

Possible TECs that do not meet survey criteria are added to the DBCA Priority Ecological Community (PEC) List under Priorities 1, 2 and 3. These are ecological communities that are adequately known; are rare but not threatened, or meet criteria for Near Threatened. PECs that have been recently removed from the threatened list are placed in Priority 4. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in Priority 5. PECs are not listed under any formal Federal or State legislation, however, may be listed as TECs under the EPBC Act.

Table B5 Conservation codes and definitions for TECs listed under the EPBC Act or endorsed by the WA Minister for the Environment

Categories	Definition
Federal Government Conservation Categories (EPBC Act)	
Critically Endangered (CR)	An ecological community if, at that time, is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000)
Endangered (EN)	An ecological community if, at that time: is not critically endangered; and is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000)
Vulnerable (VU)	An ecological community if, at that time: is not critically endangered or endangered; and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000)
Western Australia Conservation Categories	
Presumed Totally Destroyed (PD)	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range

Categories	Definition
	that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

Table B6 Conservation categories and definitions for PECS as listed by the DBCA

Category	Description
Priority 1	<p>Poorly known ecological communities.</p> <p>Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤ 5 occurrences or a total area of ≤ 100 ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.</p>
Priority 2	<p>Poorly known ecological communities.</p> <p>Communities that are known from few occurrences with a restricted distribution (generally ≤ 10 occurrences or a total area of ≤ 200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.</p>
Priority 3	<p>Poorly known ecological communities.</p> <p>Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <ul style="list-style-type: none"> communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. <p>Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are</p>

Category	Description
	not well defined, and known threatening processes exist that could affect them.
Priority 4	<p>Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p> <p>Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.</p> <p>Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>Ecological communities that have been removed from the list of threatened communities during the past five years.</p>
Priority 5	<p>Conservation Dependent ecological communities.</p> <p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>

Other significant vegetation

Vegetation may be significant for a range of reasons other than a statutory listing. The EPA (2016a) states that significant vegetation may include vegetation that includes the following:

- Restricted distribution
- Degree of historical impact from threatening processes
- Local endemism in restricted habitats
- Novel combinations of taxa
- A role as a refuge
- A role as a key habitat for Threatened species or large population representing a significant proportion of the local to regional total population of a species
- Being representative of a vegetation unit in 'pristine' condition in a highly cleared landscape, recently discovered range extensions, or isolated outliers of the main range)
- Being poorly reserved

This may apply at a number of levels, so the unit may be significant when considered at the fine-scale (intra-locality), intermediate-scale (locality or inter-locality) or broad-scale (local to region).

Flora and fauna

Conservation significant flora and fauna

Species of significant flora are protected under both Federal and State legislation. Any activities that are deemed to have a significant impact on species that are recognised by the EPBC Act, and/or the WC Act can warrant referral to the DEE and/or the EPA.

The Federal conservation level of flora and fauna species and their significance status is assessed under the EPBC Act. The significance levels for fauna used in the EPBC Act are those recommended by the International Union for Conservation of Nature (IUCN).

The EPBC Act also protects land and migratory species that are listed under International Agreements. The list of migratory species established under section 209 of the EPBC Act comprises:

- Migratory species which are native to Australia and are included in the appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II)
- Migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China–Australia Migratory Bird Agreement (CAMBA)
- Native, migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the republic of Korea–Australia Migratory Bird Agreement (ROKAMBA)

The State conservation level of Threatened flora and fauna has been published as Specially Protected under the WC Act, and listed under Schedules 1 to 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2015 for Threatened Fauna and under Schedules 1 to 4 of the Wildlife Conservation (Rare Flora) Notice 2015 for Threatened (Declared Rare) Flora. The schedules align with the categories of the EPBC Act Threatened Fauna and Threatened Flora Lists. Threatened species are those are species which have been adequately searched for and are deemed to be, in the wild, either rare, under identifiable threat of extinction, or otherwise in need of special protection, and have been gazetted as such.

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

For the purposes of this assessment, all species listed under the EPBC Act, WC Act and DBCA Priority species are considered conservation significant.

Table B7 Conservation categories and definitions for EPBC Act listed flora and fauna species

Conservation category	Definition
Extinct	There is no reasonable doubt that the last member of the species has died.
Extinct in the Wild	A species known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or A species that has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered	A species facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000).
Endangered	A species not critically endangered; and

Conservation category	Definition
	A species facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	A species not critically endangered or endangered; and A species facing a high risk of extinction in the wild in the medium-term, as determined in accordance with the prescribed criteria.
Conservation Dependent	The species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or The following subparagraphs are satisfied: the species is a species of fish; the species is the focus of a plan of management that Section 180 provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Table B8 Conservation codes and descriptions for WC Act listed flora and fauna species

Conservation category	Schedule and definition
Threatened species (T)	Published as Specially Protected under the WC Act, and listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora. Threatened fauna is that subset of 'Specially Protected Fauna' declared to be 'likely to become extinct' pursuant to section 14(4) of the WC Act. Threatened flora is flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F(2) of the WC Act.
Critically Endangered (CR)	Schedule 1: Threatened species considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	Schedule 2: Threatened species considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	Schedule 3: Threatened species considered to be facing a high risk of extinction in the wild.
Presumed Extinct (EX)	Schedule 4: Species which have been adequately searched for and there is no reasonable doubt that the last individual has died.
International Agreement (IA)	Schedule 5: Migratory birds protected under an international agreement
Conservation Dependent (CD)	Schedule 6: Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Other Specially Protected (OS)	Schedule 7: Fauna otherwise in need of special protection to ensure their conservation.

Table B9 Conservation codes for DBCA listed Priority flora and fauna

Priority category	Definition
Priority 1	<p>Poorly-known taxa</p> <p>Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.</p>
Priority 2	<p>Poorly-known taxa</p> <p>Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.</p>
Priority 3	<p>Poorly-known taxa</p> <p>Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.</p>
Priority 4	<p>Rare, Near Threatened and other taxa in need of monitoring</p> <p>Rare: Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.</p> <p>Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>Taxa that have been removed from the list of threatened taxa during the past five years for reasons other than taxonomy.</p>

Other significant flora

Flora species, subspecies, varieties, hybrids and ecotypes may be significant for a range of reasons, other than a statutory listing. The EPA (2016b) states that significant flora may include taxa that have:

- A keystone role in a particular habitat for threatened or Priority flora or fauna species, or large populations representing a considerable proportion of the local or regional total population of a species
- Relictual status, being representation of taxonomic or physiognomic groups that no longer occur widely in the broader landscape
- Anomalous features that indicate a potential new discovery
- Being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)

- The presence of restricted subspecies, varieties, or naturally occurring hybrids
- Local endemism (a restricted distribution) or association with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems)
- Being poorly reserved

Other significant fauna

Fauna species may be significant for a range of reasons other than those protected by international agreement or treaty, Specially Protected or Priority Fauna. Significant fauna may include short-range endemic species, species that have declining populations or declining distributions, species at the extremes of their range, or isolated outlying populations, or species which may be undescribed (EPA 2010).

Introduced plants (weeds)

Declared Pests

Information on species considered to be Declared Pests is provided under *State Biosecurity and Agriculture Management Act 2007*.

Weeds of National Significance

The spread of weeds across a range of land uses or ecosystems is important in the context of socio-economic and environmental values. The assessment of Weeds of National Significance (WoNS) is based on four major criteria:

- Invasiveness
- Impacts
- Potential for spread
- Socio-economic and environmental values

Australian state and territory governments have identified thirty-two Weeds of National Significance (WoNS); a list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012.

References

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- EPA 2016a, Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment, EPA, Perth, WA.
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Appendix C – Database searches

EPBC Act PMST Report

NatureMap Flora Report

NatureMap Fauna Report



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: 06/09/17 18:41:41

[Summary](#)

[Details](#)

[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

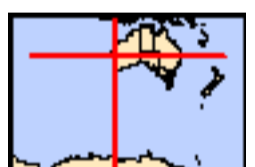
[Acknowledgements](#)



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

[Coordinates](#)

[Buffer: 10.0Km](#)



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](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	11
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

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

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

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

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

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	12
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities

[\[Resource Information \]](#)

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.

Name	Status	Type of Presence
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	Community may occur within area

Listed Threatened Species

[\[Resource Information \]](#)

Name	Status	Type of Presence
------	--------	------------------

Birds

Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
---	-----------------------	--

Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
---	------------	--

Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
--	------------	--

Mammals

Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
---	------------	--

Other

Idiosoma nigrum Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat likely to occur within area
--	------------	--

Plants

Dasymalla axillaris Native Foxglove [38829]	Critically Endangered	Species or species habitat may occur within area
--	-----------------------	--

Eremophila nivea Silky Eremophila [14431]	Endangered	Species or species habitat may occur within area
--	------------	--

Eremophila viscida Varnish Bush [2394]	Endangered	Species or species habitat likely to occur within area
---	------------	--

Gyrostemon reticulatus Net-veined Gyrostemon [8491]	Critically Endangered	Species or species habitat likely to occur within area
--	-----------------------	--

Roycea pycnophylloides Saltmat [21161]	Endangered	Species or species habitat likely to occur
---	------------	--

Name	Status	Type of Presence within area
Reptiles		
Egernia stokesii badia		
Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat likely to occur within area
Listed Migratory Species [Resource Information]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Other Matters Protected by the EPBC Act		
Listed Marine Species [Resource Information]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within

Name	Threatened	Type of Presence area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area

Extra Information

Invasive Species [\[Resource Information \]](#)

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

Name	Status	Type of Presence
Birds		
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		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
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species

Name	Status	Type of Presence
Plants		
Carrichtera annua Ward's Weed [9511]		habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-28.396519 115.842935,-28.398331 115.842592,-28.398142 115.841862,-28.397048 115.84242,-28.396557 115.842849,-28.396519 115.842935,-28.396519 115.842935

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.

NatureMap Fauna Report (10 km buffer)

Created By Guest user on 06/09/2017

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Vertices 28° 23' 47" S, 115° 50' 33" E 28° 23' 54" S, 115° 50' 32" E
Group By Species Group

Species Group	Species	Records
Bird	32	58
Invertebrate	1	1
Mammal	4	6
Reptile	5	6
TOTAL	42	71

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Bird				
1.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
2.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
3.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
4.	25528 <i>Aphelocephala leucopsis</i> (Southern Whiteface)			
5.	<i>Barnardius zonarius</i>			
6.	25717 <i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
7.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
8.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
9.	25592 <i>Corvus coronoides</i> (Australian Raven)			
10.	25593 <i>Corvus orru</i> (Torresian Crow)			
11.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
12.	<i>Eolophus roseicapillus</i>			
13.	24570 <i>Epthianura tricolor</i> (Crimson Chat)			
14.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
15.	24557 <i>Leipoa ocellata</i> (Malleefowl)		T	
16.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
17.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
18.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
19.	24742 <i>Nymphicus hollandicus</i> (Cockatiel)			
20.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
21.	24618 <i>Oreoica gutturalis</i> (Crested Bellbird)			
22.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
23.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
24.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
25.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
26.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
27.	24683 <i>Pomatostomus superciliosus</i> (White-browed Babbler)			
28.	25706 <i>Pomatostomus temporalis</i> (Grey-crowned Babbler)			
29.	48096 <i>Rhipidura albiscapa</i> (Grey Fantail)			
30.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
31.	30948 <i>Smicrornis brevirostris</i> (Weebill)			
32.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
Invertebrate				
33.	<i>Megalopsalis leptekes</i>			
Mammal				
34.	24136 <i>Macropus rufus</i> (Red Kangaroo, Marlu)			
35.	24224 <i>Notomys alexis</i> (Spinifex Hopping-mouse)			
36.	24108 <i>Sminthopsis crassicaudata</i> (Fat-tailed Dunnart)			
37.	24109 <i>Sminthopsis dolichura</i> (Little long-tailed Dunnart)			
Reptile				
38.	25092 <i>Egernia depressa</i> (Southern Pygmy Spiny-tailed Skink)			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
39.	24961	<i>Heteronotia binoei</i> (Bynoe's Gecko)			
40.	42416	<i>Pseudonaja mengdeni</i> (Western Brown Snake)			
41.	24946	<i>Strophurus strophurus</i>			
42.	25269	<i>Suta fasciata</i> (Rosen's Snake)			

Conservation Codes

- T - Rare or likely to become extinct
- X - Presumed extinct
- IA - Protected under international agreement
- S - Other specially protected fauna
- 1 - Priority 1
- 2 - Priority 2
- 3 - Priority 3
- 4 - Priority 4
- 5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap Flora Report (10 km buffer)

Created By Guest user on 06/09/2017

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Vertices 28° 23' 47" S, 115° 50' 33" E 28° 23' 53" S, 115° 50' 32" E
Group By Family

Family	Species	Records
Amaranthaceae	1	1
Asparagaceae	1	1
Asteraceae	12	17
Boraginaceae	1	1
Campanulaceae	1	1
Casuarinaceae	1	1
Celastraceae	1	1
Chenopodiaceae	1	1
Cupressaceae	1	1
Cyperaceae	1	1
Dilleniaceae	2	2
Ericaceae	1	1
Euphorbiaceae	1	3
Fabaceae	14	20
Frankeniaceae	1	1
Goodeniaceae	9	12
Haloragaceae	1	1
Lamiaceae	7	14
Loganiaceae	1	1
Malvaceae	2	2
Myrtaceae	18	28
Pittosporaceae	1	1
Plumbaginaceae	1	1
Poaceae	1	1
Proteaceae	8	8
Rutaceae	3	3
Sapindaceae	2	2
Scrophulariaceae	1	1
Solanaceae	2	4
Stylidiaceae	1	1
Thymelaeaceae	1	1
TOTAL	99	134

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
Amaranthaceae				
1.	2751 <i>Ptilotus polystachyus</i> (Prince of Wales Feather)			
Asparagaceae				
2.	1338 <i>Thysanotus manglesianus</i> (Fringed Lily)			
Asteraceae				
3.	7831 <i>Angianthus micropodioides</i>		P3	
4.	7988 <i>Gnephosis arachnoidea</i> (Cobwebby-headed Gnephosis)			
5.	8116 <i>Myriocephalus guerinae</i>			
6.	17925 <i>Myriocephalus oldfieldii</i>			
7.	12734 <i>Olearia humilis</i>			
8.	44401 <i>Olearia</i> sp. <i>Eremicola</i> (Diels & Pritzel s.n. PERTH 00449628)			
9.	8176 <i>Podolepis kendallii</i>			
10.	8184 <i>Podotrochea gnaphalioides</i> (Golden Long-heads)			
11.	45138 <i>Roebuckiella halophila</i>		P3	
12.	8200 <i>Schoenia cassiniana</i> (<i>Schoenia</i>)			
13.	48226 <i>Trichanthodium exilis</i>			
14.	13331 <i>Waitzia acuminata</i> var. <i>acuminata</i>			
Boraginaceae				
15.	17485 <i>Halgania anagaloides</i>			
Campanulaceae				
16.	36863 <i>Lobelia heterophylla</i> subsp. <i>heterophylla</i>			
Casuarinaceae				

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
17.	13904 <i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>			
Celastraceae				
18.	19913 <i>Psammomoya implexa</i>		P3	
Chenopodiaceae				
19.	46513 <i>Tecticornia doliiformis</i>			
Cupressaceae				
20.	8466 <i>Callitris columellaris</i> (White Cypress Pine)			
Cyperaceae				
21.	1002 <i>Schoenus nanus</i> (Tiny Bog Rush)			
Dilleniaceae				
22.	19779 <i>Hibbertia glomerosa</i> var. <i>glomerosa</i>			
23.	19683 <i>Hibbertia stenophylla</i>			
Ericaceae				
24.	19517 <i>Leucopogon</i> sp. <i>outer wheatbelt</i> (M. Hislop 30)			
Euphorbiaceae				
25.	4704 <i>Ricinocarpos velutinus</i>			
Fabaceae				
26.	3199 <i>Acacia acuaría</i>			
27.	12247 <i>Acacia anthochaera</i>			
28.	3248 <i>Acacia burkittii</i> (Sandhill Wattle)			
29.	3265 <i>Acacia comans</i>			
30.	3269 <i>Acacia coolgardiensis</i> (Spinifex Wattle)			
31.	32118 <i>Acacia effusifolia</i>			
32.	3321 <i>Acacia eremaea</i>			
33.	32116 <i>Acacia latior</i>			
34.	3426 <i>Acacia longispinea</i>			
35.	16142 <i>Acacia puncticulata</i>			
36.	19499 <i>Acacia ramulosa</i> var. <i>ramulosa</i>			
37.	13078 <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>			
38.	3545 <i>Acacia sibina</i>			
39.	4089 <i>Mirbelia depressa</i>			
Frankeniaceae				
40.	12831 <i>Frankenia pulverulenta</i>	Y		
Goodeniaceae				
41.	7472 <i>Dampiera salahae</i>			
42.	7477 <i>Dampiera stenostachya</i> (Narrow-spiked Dampiera)			
43.	7486 <i>Dampiera wellsiana</i> (Wells' Dampiera)			
44.	7495 <i>Goodenia berardiana</i>			
45.	12523 <i>Goodenia helmsii</i>			
46.	12551 <i>Goodenia micrantha</i>			
47.	7583 <i>Lechenaultia macrantha</i> (Wreath Leschenaultia)			
48.	7661 <i>Velleia hispida</i> (Hispid Velleia)			
49.	7664 <i>Velleia rosea</i> (Pink Velleia)			
Haloragaceae				
50.	6180 <i>Haloragis trigonocarpa</i>			
Lamiaceae				
51.	33778 <i>Hemigenia botryphylla</i>			
52.	19388 <i>Hemigenia</i> sp. <i>Tallering</i> (H. Pringle 3323)		P1	Y
53.	33779 <i>Hemigenia tomentosa</i>			
54.	6915 <i>Prostanthera eckersleyana</i> (Crinkly Mintbush)			
55.	6919 <i>Prostanthera magnifica</i> (Magnificent Prostanthera)			
56.	6921 <i>Prostanthera pedicellata</i>		P1	
57.	41650 <i>Prostanthera prostantheroides</i>			
Loganiaceae				
58.	46313 <i>Orianthera flaviflora</i>			
Malvaceae				
59.	4954 <i>Lawrencia diffusa</i>			
60.	46824 <i>Seringia velutina</i> (Velvet firebush)			
Myrtaceae				
61.	36063 <i>Baeckea</i> sp. <i>Wanarra</i> (M.E. Trudgen MET 5376)			
62.	5468 <i>Calytrix oldfieldii</i>			
63.	34809 <i>Cheyneana microphylla</i> (Bush Pomegranate)			
64.	16028 <i>Darwinia</i> sp. <i>Morawa</i> (C.A. Gardner 2662)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
65.	20738 <i>Enekbatus dualis</i>		P3	
66.	18057 <i>Eucalyptus gypsophila</i>		P1	
67.	5685 <i>Eucalyptus kochii</i> (Oil Mallee)			
68.	13057 <i>Eucalyptus leptopoda</i> subsp. <i>arctata</i>			
69.	5702 <i>Eucalyptus loxophleba</i> (York Gum, Dwoda)			
70.	13038 <i>Eucalyptus loxophleba</i> subsp. <i>supralaevis</i>			
71.	5761 <i>Eucalyptus rigidula</i> (Stiff-leaved Mallee)			
72.	5866 <i>Malleostemon tuberculatus</i>			
73.	20284 <i>Melaleuca atroviridis</i>			
74.	5925 <i>Melaleuca lateriflora</i> (Gorada)			
75.	9183 <i>Melaleuca nematophylla</i> (Wiry Honey-myrtle)			
76.	19449 <i>Melaleuca stereophloia</i>			
77.	12403 <i>Verticordia chrysostachys</i> var. <i>pallida</i>		P3	
78.	10822 <i>Verticordia nobilis</i>			
Pittosporaceae				
79.	31768 <i>Cheiranthra simplicifolia</i>			
Plumbaginaceae				
80.	6488 <i>Limonium lobatum</i>	Y		
Poaceae				
81.	17254 <i>Austrostipa tenuifolia</i>			
Proteaceae				
82.	2004 <i>Grevillea extorris</i>			
83.	2011 <i>Grevillea globosa</i>		P3	
84.	15981 <i>Grevillea obliquistigma</i> subsp. <i>obliquistigma</i>			
85.	2068 <i>Grevillea pityophylla</i>			
86.	2098 <i>Grevillea stenostachya</i>			
87.	13448 <i>Grevillea vestita</i> subsp. <i>isopogoides</i>			
88.	17557 <i>Hakea recurva</i> subsp. <i>recurva</i>			
89.	31779 <i>Persoonia manotricha</i>			
Rutaceae				
90.	4414 <i>Boronia cymosa</i> (Granite Boronia)			
91.	18385 <i>Philothea deserti</i> subsp. <i>deserti</i>			
92.	18508 <i>Philothea sericea</i>			
Sapindaceae				
93.	4752 <i>Dodonaea adenophora</i>			
94.	11247 <i>Dodonaea viscosa</i> subsp. <i>angustissima</i>			
Scrophulariaceae				
95.	17576 <i>Eremophila latrobei</i> subsp. <i>latrobei</i>			
Solanaceae				
96.	6952 <i>Anthotroche pannosa</i> (Felted Anthotroche)			
97.	7018 <i>Solanum lasiophyllum</i> (Flannel Bush, Mindjulu)			
Stylidiaceae				
98.	7770 <i>Stylidium pendulum</i>		P1	
Thymelaeaceae				
99.	11185 <i>Pimelea microcephala</i> subsp. <i>microcephala</i>			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap Fauna Report (10 km buffer)

Created By Guest user on 06/09/2017

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Vertices 26° 27' 17" S, 115° 56' 42" E 26° 27' 25" S, 115° 56' 42" E 26° 27' 35" S, 115° 56' 34" E 26° 27' 45" S, 115° 56' 29" E 26° 27' 54" S, 115° 56' 26" E 26° 28' 59" S, 115° 56' 22" E
Group By Species Group

Species Group	Species	Records
Bird	21	23
Reptile	5	5
TOTAL	26	28

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Bird				
1.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
2.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
3.	24264 <i>Acanthiza robustirostris</i> (Slaty-backed Thornbill)			
4.	24265 <i>Acanthiza uropygialis</i> (Chestnut-rumped Thornbill)			
5.	25528 <i>Aphelocephala leucopsis</i> (Southern Whiteface)			
6.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
7.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
8.	25593 <i>Corvus orru</i> (Torresian Crow)			
9.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
10.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
11.	24401 <i>Geopelia cuneata</i> (Diamond Dove)			
12.	25652 <i>Malurus leucopterus</i> (White-winged Fairy-wren)			
13.	24736 <i>Melopsittacus undulatus</i> (Budgerigar)			
14.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
15.	24618 <i>Oreoica gutturalis</i> (Crested Bellbird)			
16.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
17.	25706 <i>Pomatostomus temporalis</i> (Grey-crowned Babbler)			
18.	24278 <i>Pyrrholaemus brunneus</i> (Redthroat)			
19.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
20.	30870 <i>Taeniopygia guttata</i> (Zebra Finch)			
21.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
Reptile				
22.	24886 <i>Ctenophorus reticulatus</i> (Western Netted Dragon)			
23.	24889 <i>Ctenophorus scutulatus</i> (Lozenge-marked Dragon)			
24.	25080 <i>Ctenotus uber subsp. uber</i> (Spotted Ctenotus)			
25.	25109 <i>Eremiascincus richardsonii</i> (Broad-banded Sand Swimmer)			
26.	24968 <i>Nephruurus levis subsp. occidentalis</i>			

Conservation Codes
T - Rare or likely to become extinct
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S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap Flora Report (10 km buffer)

Created By Guest user on 06/09/2017

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Vertices 26° 27' 15" S, 115° 56' 42" E 26° 27' 23" S, 115° 56' 42" E 26° 27' 39" S, 115° 56' 31" E 26° 27' 52" S, 115° 56' 28" E 26° 28' 12" S, 115° 56' 25" E 26° 29' 06" S, 115° 56' 22" E
Group By Family

Family	Species	Records
Amaranthaceae	1	1
Asteraceae	2	2
Elatinaceae	1	1
Fabaceae	4	4
Goodeniaceae	1	1
Lamiaceae	2	3
Myrtaceae	3	3
Portulacaceae	4	4
Proteaceae	1	1
Rubiaceae	1	1
Rutaceae	2	10
Scrophulariaceae	3	3
TOTAL	25	34

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
Amaranthaceae				
1.	2700 <i>Ptilotus beardii</i> (Low Mulla Mulla)		P3	
Asteraceae				
2.	12624 <i>Gnephosis angianthoides</i>			
3.	12628 <i>Lemooria burkittii</i>			
Elatinaceae				
4.	11726 <i>Bergia perennis</i> subsp. <i>exigua</i>			
Fabaceae				
5.	3305 <i>Acacia distans</i>			
6.	32117 <i>Acacia incognita</i>			
7.	20332 <i>Acacia</i> sp. Muggon Station (S. Patrick & D. Edinger SP 3235)		P2	
8.	13114 <i>Chorizema racemosum</i>			
Goodeniaceae				
9.	12530 <i>Goodenia macroplectra</i>			
Lamiaceae				
10.	6873 <i>Hemigenia tysonii</i>		P3	
11.	12948 <i>Prostanthera tysoniana</i>		P3	
Myrtaceae				
12.	17095 <i>Corymbia lenziana</i>			
13.	6003 <i>Micromyrtus sulphurea</i>			
14.	6054 <i>Thryptomene decussata</i>			
Portulacaceae				
15.	44184 <i>Calandrinia baccata</i>			
16.	44479 <i>Calandrinia butcherensis</i>		P1	
17.	2852 <i>Calandrinia disperma</i>			
18.	31132 <i>Calandrinia</i> sp. <i>Truncate capsules</i> (A. Markey & S. Dillon 3474)			
Proteaceae				
19.	1986 <i>Grevillea deflexa</i>			
Rubiaceae				
20.	18210 <i>Psydrax rigidula</i>			
Rutaceae				
21.	18540 <i>Philotheca brucei</i> subsp. <i>cinerea</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
22.	13080 <i>Philothea citrina</i>		P1	
Scrophulariaceae				
23.	17155 <i>Eremophila compacta subsp. fecunda</i>			
24.	7216 <i>Eremophila glutinosa</i>			
25.	17576 <i>Eremophila latrobei subsp. latrobei</i>			

Conservation Codes
T - Rare or likely to become extinct
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S - Other specially protected fauna
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4 - Priority 4
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¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.



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: 06/09/17 18:08:40

[Summary](#)

[Details](#)

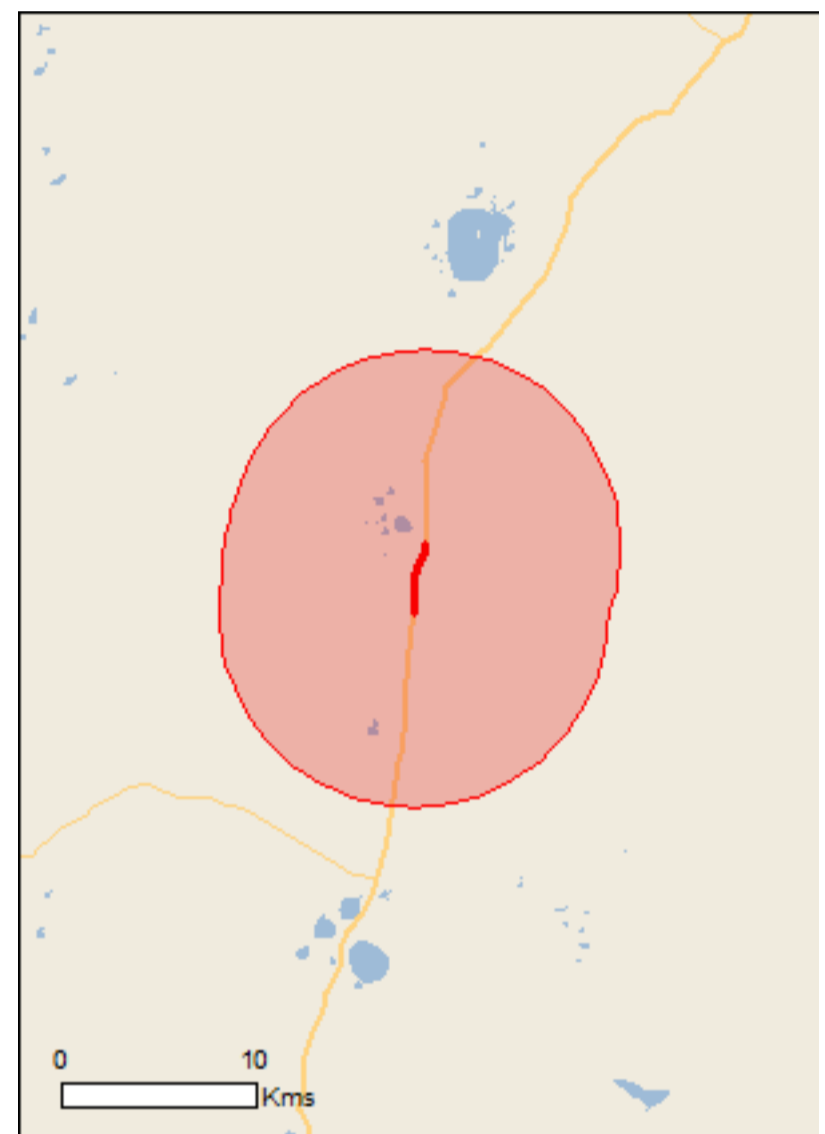
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

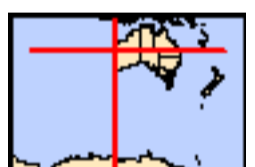
[Acknowledgements](#)



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

[Coordinates](#)

Buffer: 10.0Km



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](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	3
Listed Migratory Species:	5

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	7
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	8
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

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

Name	Status	Type of Presence
------	--------	------------------

Birds

[Calidris ferruginea](#)

Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
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Other

[Idiosoma nigrum](#)

Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat likely to occur within area
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Reptiles

[Egernia stokesii badia](#)

Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat may occur within area
--	------------	--

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

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
------	------------	------------------

Migratory Terrestrial Species

[Motacilla cinerea](#)

Grey Wagtail [642]		Species or species habitat may occur within area
--------------------	--	--

Migratory Wetlands Species

[Actitis hypoleucos](#)

Common Sandpiper [59309]		Species or species habitat may occur within area
--------------------------	--	--

[Calidris acuminata](#)

Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
------------------------------	--	--

[Calidris ferruginea](#)

Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
------------------------	-----------------------	--

[Calidris melanotos](#)

Pectoral Sandpiper [858]		Species or species habitat may occur within area
--------------------------	--	--

Other Matters Protected by the EPBC Act

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

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area

Extra Information

Invasive Species [\[Resource Information \]](#)

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

Name	Status	Type of Presence
Birds		
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Capra hircus Goat [2]		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
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

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

-26.453284 115.945307,-26.456358 115.945222,-26.459508 115.943677,-26.461122 115.942303,-26.467576 115.940673,-26.481559 115.939814

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.

NatureMap Flora Report (10 km buffer)

Created By Guest user on 06/09/2017

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Vertices 26° 11' 20" S, 116° 23' 33" E 26° 11' 17" S, 116° 23' 51" E 26° 11' 20" S, 116° 23' 53" E 26° 11' 18" S, 116° 24' 15" E 26° 11' 18" S, 116° 24' 15" E 26° 11' 18" S, 116° 24' 14" E 26° 11' 18" S, 116° 24' 15" E
Group By Family

Family	Species	Records
Amaranthaceae	4	12
Asparagaceae	2	3
Asteraceae	2	4
Aytoniaceae	1	2
Brassicaceae	2	7
Celastraceae	2	3
Chenopodiaceae	4	6
Colchicaceae	2	8
Cyperaceae	1	1
Droseraceae	1	1
Fabaceae	11	21
Geraniaceae	1	5
Goodeniaceae	1	4
Hydrocharitaceae	1	2
Malvaceae	2	4
Marsileaceae	1	1
Myrtaceae	2	3
Poaceae	2	3
Portulacaceae	3	3
Proteaceae	1	2
Pteridaceae	2	7
Ricciaceae	1	1
Rubiaceae	1	2
Rutaceae	1	2
Sapindaceae	1	1
Scrophulariaceae	8	21
Solanaceae	1	4
Zygophyllaceae	1	2
TOTAL	62	135

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Amaranthaceae				
1.	2729 <i>Ptilotus grandiflorus</i>			
2.	2747 <i>Ptilotus obovatus</i> (Cotton Bush)			
3.	2754 <i>Ptilotus roei</i>			
4.	2757 <i>Ptilotus schwartzii</i>			
Asparagaceae				
5.	1338 <i>Thysanotus manglesianus</i> (Fringed Lily)			
6.	1352 <i>Thysanotus speckii</i>			
Asteraceae				
7.	8045 <i>Helipterum craspedioides</i> (Yellow Billy Buttons)			
8.	13238 <i>Rhodanthe maryonii</i>			
Aytoniaceae				
9.	<i>Plagiochasma rupestre</i>			
Brassicaceae				
10.	3074 <i>Stenopetalum anfractum</i>			
11.	3076 <i>Stenopetalum filifolium</i>			
Celastraceae				
12.	4734 <i>Stackhousia muricata</i>			
13.	19555 <i>Stackhousia muricata</i> subsp. <i>annual</i> (W.R. Barker 2172)			
Chenopodiaceae				
14.	11890 <i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
15.	2552 <i>Maireana murrayana</i>		P3	
16.	2569 <i>Maireana triptera</i> (Threewinged Bluebush)			
17.	8877 <i>Sclerolaena gardneri</i>			
Colchicaceae				
18.	1391 <i>Wurmbea densiflora</i>			
19.	1397 <i>Wurmbea inframediana</i>			
Cyperaceae				
20.	952 <i>Lipocarpha microcephala</i>			
Droseraceae				
21.	14298 <i>Drosera macrantha</i> subsp. <i>macrantha</i>			
Fabaceae				
22.	3217 <i>Acacia aneura</i> (Mulga, Wanari)			
23.	16112 <i>Acacia aulacophylla</i>			
24.	3260 <i>Acacia citrinoviridis</i>			
25.	14088 <i>Acacia cyperophylla</i> var. <i>cyperophylla</i>			
26.	17743 <i>Acacia demissa</i>			
27.	3507 <i>Acacia quadrimarginea</i>			
28.	3577 <i>Acacia tetragonophylla</i> (Kurara, Wakalpuka)			
29.	4111 <i>Muelleranthus trifoliolatus</i>			
30.	12279 <i>Senna artemisioides</i> subsp. <i>helmsii</i>			
31.	18449 <i>Senna glaucifolia</i>			
32.	14577 <i>Senna</i> sp. <i>Meekatharra</i> (E. Bailey 1-26)			
Geraniaceae				
33.	4335 <i>Erodium cygnorum</i> (Blue Heronsbill)			
Goodeniaceae				
34.	7644 <i>Scaevola spinescens</i> (Currant Bush, Maroon)			
Hydrocharitaceae				
35.	139 <i>Najas tenuifolia</i> (Water Nymph)			
Malvaceae				
36.	43022 <i>Hibiscus</i> sp. <i>Gardneri</i> (A.L. Payne PRP 1435)			
37.	19712 <i>Sida</i> sp. <i>dark green fruits</i> (S. van Leeuwen 2260)			
Marsileaceae				
38.	77 <i>Marsilea mutica</i>			
Myrtaceae				
39.	6054 <i>Thryptomene decussata</i>			
40.	12436 <i>Verticordia interioris</i>			
Poaceae				
41.	413 <i>Eriachne mucronata</i> (Mountain Wanderie Grass)			
42.	494 <i>Neurachne minor</i>			
Portulacaceae				
43.	36500 <i>Calandrinia creethiae</i>			
44.	41985 <i>Calandrinia hortiorum</i>			
45.	31073 <i>Calandrinia</i> sp. <i>The Pink Hills</i> (F. Obbens FO 19/06)			
Proteaceae				
46.	2196 <i>Hakea preissii</i> (Needle Tree, Dandjin)			
Pteridaceae				
47.	32 <i>Cheilanthes brownii</i>			
48.	12818 <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>			
Ricciaceae				
49.	<i>Riccia crystallina</i>			
Rubiaceae				
50.	18155 <i>Psydrax suaveolens</i>			
Rutaceae				
51.	13080 <i>Philotheca citrina</i>		P1	
Sapindaceae				
52.	11674 <i>Dodonaea viscosa</i> subsp. <i>mucronata</i>			
Scrophulariaceae				
53.	29532 <i>Eremophila galeata</i>			
54.	7216 <i>Eremophila glutinosa</i>			
55.	17518 <i>Eremophila jucunda</i>			
56.	17171 <i>Eremophila jucunda</i> subsp. <i>jucunda</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
57.	17576 <i>Eremophila latrobei</i> subsp. <i>latrobei</i>			
58.	7236 <i>Eremophila macmillaniana</i> (Grey Turpentine Bush)			
59.	17167 <i>Eremophila phyllopoda</i> subsp. <i>phyllopoda</i>			
60.	7270 <i>Eremophila spathulata</i> (Spoon-leaved Eremophila)			

Solanaceae

61.	7018 <i>Solanum lasiophyllum</i> (Flannel Bush, Mindjulu)			
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Zygophyllaceae

62.	18072 <i>Tribulus suberosus</i>			
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Conservation Codes

- T - Rare or likely to become extinct
- X - Presumed extinct
- IA - Protected under international agreement
- S - Other specially protected fauna
- 1 - Priority 1
- 2 - Priority 2
- 3 - Priority 3
- 4 - Priority 4
- 5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap Fauna Report (10 km buffer)

Created By Guest user on 06/09/2017

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Vertices 26° 11' 21" S, 116° 23' 29" E 26° 11' 17" S, 116° 23' 51" E 26° 11' 20" S, 116° 23' 54" E 26° 11' 18" S, 116° 24' 17" E
Group By Species Group

Species Group	Species	Records
Bird	13	14
TOTAL	13	14

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Bird				
1.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
2.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
3.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
4.	25581 <i>Climacteris affinis</i> (White-browed Treecreeper)			
5.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
6.	<i>Eolophus roseicapillus</i>			
7.	24401 <i>Geopelia cuneata</i> (Diamond Dove)			
8.	47997 <i>Melanodryas cucullata</i> (Hooded Robin)			
9.	24618 <i>Oreoica gutturalis</i> (Crested Bellbird)			
10.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
11.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
12.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
13.	30870 <i>Taeniopygia guttata</i> (Zebra Finch)			

Conservation Codes
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EPBC Act Protected Matters Report

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Report created: 06/09/17 17:48:10

[Summary](#)

[Details](#)

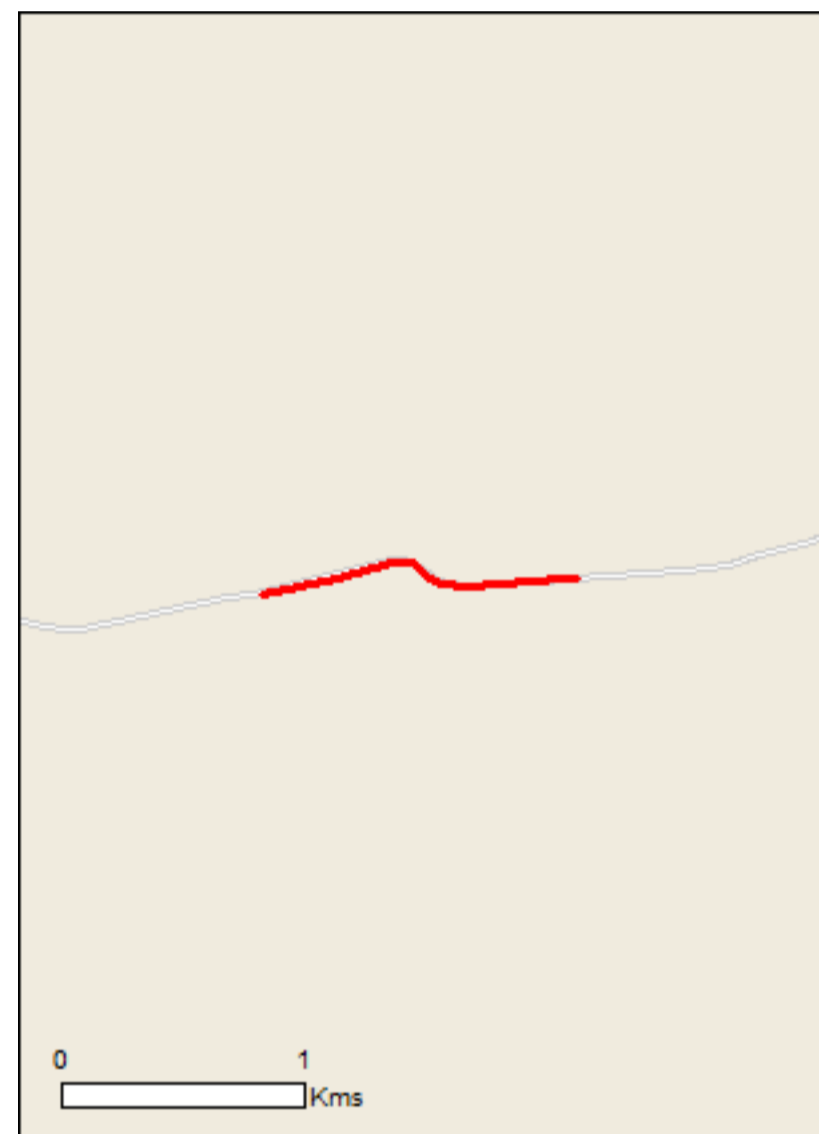
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

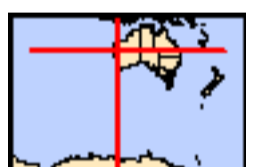
[Acknowledgements](#)



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

[Coordinates](#)

Buffer: 10.0Km



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](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	2
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

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

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

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

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

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	6
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

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

Name	Status	Type of Presence
------	--------	------------------

Birds

[Calidris ferruginea](#)

Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
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Other

[Idiosoma nigrum](#)

Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat likely to occur within area
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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 Terrestrial Species

[Motacilla cinerea](#)

Grey Wagtail [642]		Species or species habitat may occur within area
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[Motacilla flava](#)

Yellow Wagtail [644]		Species or species habitat may occur within area
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Migratory Wetlands Species

[Actitis hypoleucos](#)

Common Sandpiper [59309]		Species or species habitat may occur within area
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[Calidris acuminata](#)

Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
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[Calidris ferruginea](#)

Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
------------------------	-----------------------	--

[Calidris melanotos](#)

Pectoral Sandpiper [858]		Species or species habitat may occur within area
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Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area

Extra Information

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Mammals		
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species

Name	Status	Type of Presence
Felis catus Cat, House Cat, Domestic Cat [19]		habitat likely to occur within area 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

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

-26.189331 116.391498,-26.188792 116.394331,-26.18833 116.396391,-26.18833 116.397034,-26.188831 116.397807,-26.189023 116.398193,-26.189062 116.399137,-26.188869 116.402742,-26.188869 116.403257

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](#)
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- [-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.



EPBC Act Protected Matters Report

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Report created: 06/09/17 16:23:54

[Summary](#)

[Details](#)

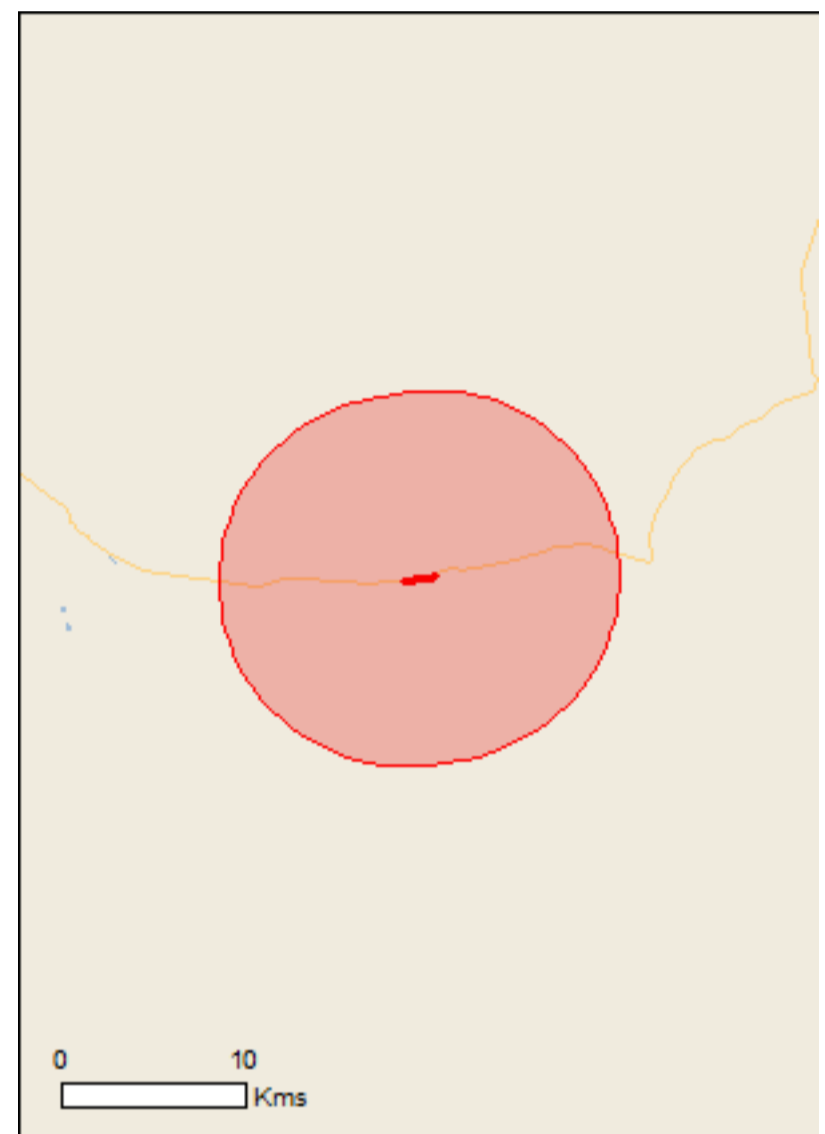
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

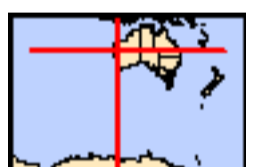
[Acknowledgements](#)



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

[Coordinates](#)

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

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World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	2
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

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

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	6
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

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

Name	Status	Type of Presence
------	--------	------------------

Birds

[Calidris ferruginea](#)

Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
------------------------	-----------------------	--

Other

[Idiosoma nigrum](#)

Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat likely to occur within area
---	------------	--

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

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
------	------------	------------------

Migratory Terrestrial Species

[Motacilla cinerea](#)

Grey Wagtail [642]		Species or species habitat may occur within area
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[Motacilla flava](#)

Yellow Wagtail [644]		Species or species habitat may occur within area
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Migratory Wetlands Species

[Actitis hypoleucos](#)

Common Sandpiper [59309]		Species or species habitat may occur within area
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[Calidris acuminata](#)

Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
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[Calidris ferruginea](#)

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[Calidris melanotos](#)

Pectoral Sandpiper [858]		Species or species habitat may occur within area
--------------------------	--	--

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Name	Status	Type of Presence
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- 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

-26.188638 116.405532,-26.188561 116.407935,-26.188369 116.409094,-26.187444 116.412527,-26.187406 116.413171,-26.187598 116.414115,-26.186982 116.417677,-26.186327 116.419908

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.

NatureMap Fauna Report (10 km buffer)

Created By Guest user on 06/09/2017

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Vertices 26° 11' 18" S,116° 24' 17" E 26° 11' 18" S,116° 24' 29" E 26° 11' 17" S,116° 24' 34" E 26° 11' 17" S,116° 24' 46" E 26° 11' 14" S,116° 24' 51" E 26° 11' 14" S,116° 25' 00" E 26° 11' 09" S,116° 25' 14" E
Group By Species Group

Species Group	Species	Records
Bird	13	14
TOTAL	13	14

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Bird				
1.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
2.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
3.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
4.	25581 <i>Climacteris affinis</i> (White-browed Treecreeper)			
5.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
6.	<i>Eolophus roseicapillus</i>			
7.	24401 <i>Geopelia cuneata</i> (Diamond Dove)			
8.	47997 <i>Melanodryas cucullata</i> (Hooded Robin)			
9.	24618 <i>Oreoica gutturalis</i> (Crested Bellbird)			
10.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
11.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
12.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
13.	30870 <i>Taeniopygia guttata</i> (Zebra Finch)			

Conservation Codes

T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap Flora Report (10 km buffer)

Created By Guest user on 06/09/2017

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Vertices 26° 11' 18" S,116° 24' 18" E 26° 11' 18" S,116° 24' 29" E 26° 11' 16" S,116° 24' 37" E 26° 11' 13" S,116° 24' 45" E 26° 11' 13" S,116° 24' 52" E 26° 11' 14" S,116° 25' 00" E 26° 11' 11" S,116° 25' 10" E
Group By Family

Family	Species	Records
Amaranthaceae	5	13
Asparagaceae	2	3
Asteraceae	2	4
Aytoniaceae	1	2
Brassicaceae	2	7
Celastraceae	2	3
Chenopodiaceae	4	6
Colchicaceae	2	8
Cyperaceae	1	1
Droseraceae	1	1
Fabaceae	11	21
Geraniaceae	1	5
Goodeniaceae	1	4
Hydrocharitaceae	1	2
Malvaceae	2	4
Marsileaceae	1	1
Myrtaceae	2	3
Poaceae	2	3
Portulacaceae	3	3
Proteaceae	1	2
Pteridaceae	2	7
Ricciaceae	1	1
Rubiaceae	1	2
Rutaceae	1	2
Sapindaceae	1	1
Scrophulariaceae	8	21
Solanaceae	1	4
Zygophyllaceae	1	2
TOTAL	63	136

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
Amaranthaceae				
1.	2708 <i>Ptilotus chamaecladus</i>			
2.	2729 <i>Ptilotus grandiflorus</i>			
3.	2747 <i>Ptilotus obovatus</i> (Cotton Bush)			
4.	2754 <i>Ptilotus roei</i>			
5.	2757 <i>Ptilotus schwartzii</i>			
Asparagaceae				
6.	1338 <i>Thysanotus manglesianus</i> (Fringed Lily)			
7.	1352 <i>Thysanotus speckii</i>			
Asteraceae				
8.	8045 <i>Helipterum craspedioides</i> (Yellow Billy Buttons)			
9.	13238 <i>Rhodanthe maryonii</i>			
Aytoniaceae				
10.	<i>Plagiochasma rupestre</i>			
Brassicaceae				
11.	3074 <i>Stenopetalum anfractum</i>			
12.	3076 <i>Stenopetalum filifolium</i>			
Celastraceae				
13.	4734 <i>Stackhousia muricata</i>			
14.	19555 <i>Stackhousia muricata</i> subsp. <i>annual</i> (W.R. Barker 2172)			
Chenopodiaceae				

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
15.	11890 <i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>			
16.	2552 <i>Maireana murrayana</i>		P3	
17.	2569 <i>Maireana triptera</i> (Threewinged Bluebush)			
18.	8877 <i>Sclerolaena gardneri</i>			
Colchicaceae				
19.	1391 <i>Wurmbea densiflora</i>			
20.	1397 <i>Wurmbea inframediana</i>			
Cyperaceae				
21.	952 <i>Lipocarpus microcephalus</i>			
Droseraceae				
22.	14298 <i>Drosera macrantha</i> subsp. <i>macrantha</i>			
Fabaceae				
23.	3217 <i>Acacia aneura</i> (Mulga, Wanari)			
24.	16112 <i>Acacia aulacophylla</i>			
25.	3260 <i>Acacia citrinoviridis</i>			
26.	14088 <i>Acacia cyperophylla</i> var. <i>cyperophylla</i>			
27.	17743 <i>Acacia demissa</i>			
28.	3507 <i>Acacia quadrimarginea</i>			
29.	3577 <i>Acacia tetragonophylla</i> (Kurara, Wakalpuka)			
30.	4111 <i>Muelleranthus trifoliolatus</i>			
31.	12279 <i>Senna artemisioides</i> subsp. <i>helmsii</i>			
32.	18449 <i>Senna glaucifolia</i>			
33.	14577 <i>Senna</i> sp. <i>Meekatharra</i> (E. Bailey 1-26)			
Geraniaceae				
34.	4335 <i>Erodium cygnorum</i> (Blue Heronsbill)			
Goodeniaceae				
35.	7644 <i>Scaevola spinescens</i> (Currant Bush, Maroon)			
Hydrocharitaceae				
36.	139 <i>Najas tenuifolia</i> (Water Nymph)			
Malvaceae				
37.	43022 <i>Hibiscus</i> sp. <i>Gardneri</i> (A.L. Payne PRP 1435)			
38.	19712 <i>Sida</i> sp. <i>dark green fruits</i> (S. van Leeuwen 2260)			
Marsileaceae				
39.	77 <i>Marsilea mutica</i>			
Myrtaceae				
40.	6054 <i>Thryptomene decussata</i>			
41.	12436 <i>Verticordia interioris</i>			
Poaceae				
42.	413 <i>Eriachne mucronata</i> (Mountain Wanderrie Grass)			
43.	494 <i>Neurachne minor</i>			
Portulacaceae				
44.	36500 <i>Calandrinia creethiae</i>			
45.	41985 <i>Calandrinia hortiorum</i>			
46.	31073 <i>Calandrinia</i> sp. <i>The Pink Hills</i> (F. Obbens FO 19/06)			
Proteaceae				
47.	2196 <i>Hakea preissii</i> (Needle Tree, Dandjin)			
Pteridaceae				
48.	32 <i>Cheilanthes brownii</i>			
49.	12818 <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>			
Ricciaceae				
50.	<i>Riccia crystallina</i>			
Rubiaceae				
51.	18155 <i>Psydrax suaveolens</i>			
Rutaceae				
52.	13080 <i>Philotheca citrina</i>		P1	
Sapindaceae				
53.	11674 <i>Dodonaea viscosa</i> subsp. <i>mucronata</i>			
Scrophulariaceae				
54.	29532 <i>Eremophila galeata</i>			
55.	7216 <i>Eremophila glutinosa</i>			
56.	17518 <i>Eremophila jucunda</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
57.	17171 <i>Eremophila jucunda</i> subsp. <i>jucunda</i>			
58.	17576 <i>Eremophila latrobei</i> subsp. <i>latrobei</i>			
59.	7236 <i>Eremophila macmillaniana</i> (Grey Turpentine Bush)			
60.	17167 <i>Eremophila phyllopoda</i> subsp. <i>phyllopoda</i>			
61.	7270 <i>Eremophila spathulata</i> (Spoon-leaved Eremophila)			

Solanaceae

62.	7018 <i>Solanum lasiophyllum</i> (Flannel Bush, Mindjulu)			
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Zygophyllaceae

63.	18072 <i>Tribulus suberosus</i>			
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Conservation Codes

- T - Rare or likely to become extinct
- X - Presumed extinct
- IA - Protected under international agreement
- S - Other specially protected fauna
- 1 - Priority 1
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¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Appendix D – Flora data

Flora species list

Quadrat Data

Flora likelihood of occurrence assessment guidelines

Flora likelihood of occurrence assessment

Flora species recorded in the survey areas during the field survey

Family	Genus	Species	Status	Survey Area 1	Survey Area 2	Survey Area 3	Survey Area 4
Adiantaceae	<i>Cheilanthes</i>	<i>sieberi</i>			X	X	X
Amaranthaceae	<i>Alternanthera</i>	<i>nodiflora</i>			X		
Amaranthaceae	<i>Ptilotus</i>	<i>aeroides</i>			X		
Amaranthaceae	<i>Ptilotus</i>	<i>macrocephalus</i>			X	X	
Amaranthaceae	<i>Ptilotus</i>	<i>nobilis</i>			X		X
Amaranthaceae	<i>Ptilotus</i>	<i>obovatus</i>			X	X	X
Amaranthaceae	<i>Ptilotus</i>	<i>ornata</i>		X			
Amaranthaceae	<i>Ptilotus</i>	<i>roei</i>				X	X
Apiaceae	<i>Trachymene</i>	<i>schwartzii</i>				X	
Apocynaceae	<i>Marsdenia</i>	<i>australis</i>			X		
Apocynaceae	<i>Rhyncharrhena</i>	<i>linearis</i>			X	X	
Asphodelaceae	<i>Asphodelus</i>	<i>fistulosus</i>	*		X		
Asteraceae	<i>Actinobole</i>	<i>uliginosum</i>					X
Asteraceae	Asteraceae sp. (juvenile)	sp. (insufficient material)			X		
Asteraceae	<i>Bidens</i>	<i>bipinnata</i>				X	
Asteraceae	<i>Centipeda</i>	<i>thespidioides</i>			X		
Asteraceae	<i>Gilberta</i>	<i>tenuifolia</i>		X			
Asteraceae	<i>Lemooria</i>	<i>burkittii</i>			X		
Asteraceae	<i>Pluchea</i>	<i>dentex</i>				X	
Asteraceae	<i>Pluchea</i>	<i>dunlopii</i>			X		
Asteraceae	<i>Podolepis</i>	<i>capillaris</i>			X		
Asteraceae	<i>Rhodanthe</i>	<i>chlorocephala</i>		X			
Asteraceae	<i>Streptoglossa</i>	<i>cylindriceps</i>			X		X
Asteraceae	<i>Waitzia</i>	<i>acuminata</i>		X			
Boryaceae	<i>Borya</i>	<i>sphaerocephala</i>		X			
Brassicaceae	<i>Brassica</i>	<i>tournefortii</i>	*		X		

Family	Genus	Species	Status	Survey Area 1	Survey Area 2	Survey Area 3	Survey Area 4
Brassicaceae	<i>Lepidium</i>	sp. (insufficient material)			x		
Brassicaceae	<i>Stenopetalum</i>	<i>filifolium</i>			x		x
Chenopodiaceae	<i>Enchylaena</i>	<i>tomentosa</i>		x			
Chenopodiaceae	<i>Atriplex</i>	<i>codonocarpa</i>			x		
Chenopodiaceae	<i>Atriplex</i>	<i>semilunaris</i>			x		
Chenopodiaceae	<i>Atriplex</i>	<i>vesicaria</i>			x		
Chenopodiaceae	<i>Chenopodium</i>	<i>gaudichaudianum</i>			x		
Chenopodiaceae	<i>Dysphania</i>	<i>rhadinostachya</i> subsp. <i>rhadinostachya</i>			x		
Chenopodiaceae	<i>Dysphania</i>	<i>melanocoma</i>				x	x
Chenopodiaceae	<i>Enchylaena</i>	<i>tomentosa</i>			x	x	
Chenopodiaceae	<i>Maireana</i>	<i>carcosa</i>			x		
Chenopodiaceae	<i>Maireana</i>	<i>convexa</i>			x		
Chenopodiaceae	<i>Maireana</i>	<i>trichoptera</i>			x		x
Chenopodiaceae	<i>Maireana</i>	<i>triptera</i>			x		
Chenopodiaceae	<i>Maireana</i>	<i>villosa</i>			x		
Chenopodiaceae	<i>Rhagodia</i>	<i>eremaea</i>			x		
Chenopodiaceae	<i>Rhagodia</i>	<i>spinescens</i>					x
Chenopodiaceae	<i>Salsola</i>	<i>australis</i>			x		
Chenopodiaceae	<i>Salsola</i>	<i>australis</i>					x
Chenopodiaceae	<i>Sclerolaena</i>	<i>cuneata</i>			x		
Chenopodiaceae	<i>Sclerolaena</i>	<i>densiflora</i>			x	x	
Chenopodiaceae	<i>Sclerolaena</i>	<i>diacantha</i>			x		x
Chenopodiaceae	<i>Tecticornia</i>	<i>indica</i> subsp. <i>bidens</i>			x		
Dilleniaceae	<i>Hibbertia</i>	<i>glomerosa</i>		x			
Euphorbiaceae	<i>Ricinocarpos</i>	<i>velutinus</i>		x			
Euphorbiaceae	<i>Euphorbia</i>	<i>drummondii</i>			x		
Euphorbiaceae	<i>Euphorbia</i>	<i>tannensis</i>			x	x	x

Family	Genus	Species	Status	Survey Area 1	Survey Area 2	Survey Area 3	Survey Area 4
Euphorbiaceae	<i>Euphorbia</i>	<i>australis</i>					x
Fabaceae	<i>Acacia</i>	<i>aptaneura</i>			x		x
Fabaceae	<i>Acacia</i>	<i>burkittii</i>				x	
Fabaceae	<i>Acacia</i>	<i>caesaneura</i>			x	x	
Fabaceae	<i>Acacia</i>	<i>citrinoviridis</i>			x		
Fabaceae	<i>Acacia</i>	<i>coolgardiensis</i>		x			
Fabaceae	<i>Acacia</i>	<i>cuthbertsonii</i> subsp. <i>linearis</i>				x	
Fabaceae	<i>Acacia</i>	<i>fuscaneura</i>				x	
Fabaceae	<i>Acacia</i>	<i>grasbyi</i>			x		x
Fabaceae	<i>Acacia</i>	<i>incurvaneura</i>			x	x	
Fabaceae	<i>Acacia</i>	<i>kempeana</i>				x	x
Fabaceae	<i>Acacia</i>	<i>ligulata</i>			x		
Fabaceae	<i>Acacia</i>	<i>palustris</i>			x		
Fabaceae	<i>Acacia</i>	<i>pruinocarpa</i>			x		
Fabaceae	<i>Acacia</i>	<i>pteraneura</i>					x
Fabaceae	<i>Acacia</i>	<i>ramulosa</i> var. <i>linophylla</i>			x	x	
Fabaceae	<i>Acacia</i>	<i>sclerosperma</i> subsp. <i>sclerosperma</i>				x	x
Fabaceae	<i>Acacia</i>	<i>synchronicia</i>			x	x	x
Fabaceae	<i>Acacia</i>	<i>tetragonophylla</i>				x	x
Fabaceae	<i>Acacia</i>	<i>xiphophylla</i>			x	x	x
Fabaceae	<i>Chorizema</i>	<i>racemosum</i>			x		
Fabaceae	<i>Glycine</i>	<i>canescens</i>				x	
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>helmsii</i>			x	x	x
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>oligophylla</i>			x	x	
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>x artemisioides</i>			x		
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>x petiolaris</i>			x	x	x
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>x stricta</i>				x	
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>x sturtii</i>			x		

Family	Genus	Species	Status	Survey Area 1	Survey Area 2	Survey Area 3	Survey Area 4
Fabaceae	<i>Senna</i>	<i>glutinosa</i> subsp. <i>x luerssenii</i>			x	x	x
Fabaceae	<i>Senna</i>	sp. Meekatharra (E. Bailey 1-26)			x	x	x
Fabaceae	<i>Swainsona</i>	<i>affinis</i>			x		
Frankeniaceae	<i>Frankenia</i>	<i>laxiflora</i>			x		
Geraniaceae	<i>Erodium</i>	sp. (insufficient material)		x	x	x	
Goodeniaceae	<i>Brunonia</i>	<i>australis</i>		x			
Goodeniaceae	<i>Goodenia</i>	sp. (insufficient material)			x		
Goodeniaceae	<i>Scaevola</i>	<i>spinescens</i>			x		
Goodeniaceae	<i>Scaevola</i>	<i>tomentosa</i>			x		
Hemerocallidaceae	<i>Dianella</i>	<i>revoluta</i>		x			
Herb sp. (juveniles)	Herb sp. (juveniles)	sp. (insufficient material)			x		
Lamiaceae	<i>Dasymalla</i>	<i>terminals</i>		x			
Lamiaceae	<i>Prostanthera</i>	<i>campbellii</i>				x	
Lamiaceae	<i>Spartothamnella</i>	<i>teucriflora</i>			x	x	
Loranthaceae	<i>Lysinema</i>	<i>murrayi</i>			x		
Loranthaceae	<i>Amyema</i>	<i>sanguinea</i>					x
Malvaceae	<i>Abutilon</i>	<i>cryptopetalum</i>			x	x	
Malvaceae	<i>Hannafordia</i>	<i>bissillii</i> subsp. <i>latifolia</i>		x			
Malvaceae	<i>Hibiscus</i>	sp. Gardneri (A.L. Payne PRP 1435)				x	x
Malvaceae	<i>Seringa</i>	<i>velutina</i>		x			
Malvaceae	<i>Sida</i>	<i>calyxhymania</i>			x	x	x
Malvaceae	<i>Sida</i>	<i>kingii</i>			x		x
Marsileaceae	<i>Marsilea</i>	<i>hirsuta</i>			x		
Myrtaceae	<i>Aluta</i>	<i>aspera</i> subsp. <i>hesperia</i>		x			
Myrtaceae	<i>Baeckea</i>	sp. Wanarra (M.E. Trudgen MET 5376)		x			
Myrtaceae	<i>Eucalyptus</i>	<i>victrix</i>			x		

Family	Genus	Species	Status	Survey Area 1	Survey Area 2	Survey Area 3	Survey Area 4
Myrtaceae	<i>Melaleuca</i>	<i>stereophloia</i>			x		
Nyctaginaceae	<i>Boerhavia</i>	<i>coccinea</i>			x	x	x
Phrymaceae	<i>Peplidium</i>	<i>aithocheilum</i>					x
Phrymaceae	<i>Peplidium</i>	sp. C Evol. Fl. Fauna Arid Aust. (N.T. Burbidge & A. Kanis 8158)					x
Pittosporaceae	<i>Cheiranthra</i>	<i>simplicifolia</i>		x			
Poaceae	<i>Amphipogon</i>	<i>caricinus</i>		x			
Poaceae	<i>Aristida</i>	<i>contorta</i>			x	x	
Poaceae	<i>Cenchrus</i>	<i>ciliaris</i>	*		x	x	
Poaceae	<i>Diplachne</i>	<i>fusca</i> subsp. <i>muelleri</i>				x	x
Poaceae	<i>Enneapogon</i>	<i>caerulescens</i>			x		
Poaceae	<i>Eragrostis</i>	<i>dielsii</i>			x		
Poaceae	<i>Eragrostis</i>	<i>falcata</i>			x	x	
Poaceae	<i>Eriachne</i>	<i>helmsii</i>			x	x	
Poaceae	<i>Eriachne</i>	<i>helmsii</i> subsp. <i>pulchella</i>					x
Poaceae	<i>Monachather</i>	<i>paradoxus</i>		x			
Montiaceae	<i>Calandrinia</i>	<i>ptychosperma</i>			x	x	
Montiaceae	<i>Calandrinia</i>	sp. (insufficient material)				x	
Montiaceae	<i>Calandrinia</i>	<i>ptychosperma</i>					x
Montiaceae	<i>Calandrinia</i>	<i>schistorhiza</i>					x
Montiaceae	<i>Calandrinia</i>	sp. (insufficient material)					x
Portulacaceae	<i>Portulaca</i>	<i>oleracea</i>			x	x	x
Proteaceae	<i>Grevillea</i>	<i>deflexa</i>			x		
Proteaceae	<i>Hakea</i>	<i>francisiana</i>		x			
Proteaceae	<i>Hakea</i>	<i>recurva</i> subsp. <i>arida</i>			x		
Proteaceae	<i>Hakea</i>	<i>preissii</i>				x	x
Pteridaceae	<i>Cheilanthes</i>	<i>adiantoides</i>		x			
Rubiaceae	<i>Psydrax</i>	<i>latifolia</i>				x	
Rubiaceae	Psydrax	rigidula			x	x	

Family	Genus	Species	Status	Survey Area 1	Survey Area 2	Survey Area 3	Survey Area 4
Rubiaceae	<i>Synaptantha</i>	<i>tillaeacea</i>					x
Rutaceae	<i>Philotheca</i>	<i>deserti</i> subsp. <i>deserti</i>		x			
Rutaceae	<i>Philotheca</i>	<i>tomentella</i>		x			
Santalaceae	<i>Santalum</i>	<i>lanceolatum</i>			x		
Scrophulariaceae	<i>Eremophila</i>	<i>brevifolia</i> subsp. <i>maculata</i>			x		
Scrophulariaceae	<i>Eremophila</i>	<i>ericalyx</i>					x
Scrophulariaceae	<i>Eremophila</i>	<i>forrestii</i>			x	x	
Scrophulariaceae	<i>Eremophila</i>	<i>fraseri</i>			x		
Scrophulariaceae	<i>Eremophila</i>	<i>glutinosa</i>				x	
Scrophulariaceae	<i>Eremophila</i>	<i>latrobei</i>			x		
Scrophulariaceae	<i>Eremophila</i>	<i>longifolia</i>			x		
Scrophulariaceae	<i>Eremophila</i>	<i>macmillaniana</i>			x		
Scrophulariaceae	<i>Eremophila</i>	<i>phyllopoda</i> subsp. <i>phyllopoda</i>				x	x
Scrophulariaceae	<i>Eremophila</i>	<i>platycalyx</i> subsp. <i>platycalyx</i>				x	
Scrophulariaceae	<i>Eremophila</i>	<i>pteroarpa</i>			x		
Scrophulariaceae	<i>Eremophila</i>	<i>spathulata</i>			x	x	x
Solanaceae	<i>Lawrenzia</i>	<i>densiflora</i>			x		
Solanaceae	<i>Nicotiana</i>	sp. (insufficient material)			x		
Solanaceae	<i>Nicotiana</i>	sp. (insufficient material)				x	
Solanaceae	<i>Solanum</i>	<i>cleistogamum</i>		x			
Solanaceae	<i>Solanum</i>	<i>lasiophyllum</i>		x	x	x	
Thymelaeaceae	<i>Pimelea</i>	<i>microcephala</i>			x		
Zygophyllaceae	<i>Tribulus</i>	<i>astrocarpus</i>			x	x	
Zygophyllaceae	<i>Zygophyllum</i>	<i>aurantiacum</i>			x		

* denotes an introduced species

Vegetation Site Sheet: habitat information				Date:	12/09/2017	Site#:	Q1
Survey:	Murchison 2017-008						
Observers:	JF SP						
Location:	Pindar	gda94 utm					
MGA Zone:	50	Eastings:	386596	Northings:	6858255	wp P 1	
Site Type:	Quadrat	Dimensions:		Camera:	p0481	From:	rw
Site Disturbance	Frequency	Water or Wind Erosion Evidence		Field Vegetation Type			
Gravel Pit	Current Disturbance	adjacent	No	Acacia tall shrubland			
Mining/Infrastructure	Current Disturbance	road adjacent					
Animal	Current Disturbance	grazing		Climate	Vegetation Condition	Litter	
				Dry, plants not stress	Very Good		
				Site Drainage		Leaf Litter:	
				Good Drain		Plentiful	
				Fire Frequency	Fire Intensity	Wood Litter:	
				Nil	Not applicable	Moderate	



Surface Components	Cover (if needed)	Soil	Landform					
Loose Soil	10	Major Component	Plain					
Humus/Litter	60	Loam						
Cracked Clay	0							
Fine Rocks (2-6mm)	20	Minor	Slope					
Medium gravel/pebbles (6-20mm)	10	Sandy	Negligible					
Coarse gravel/pebbles (20-60mm)								
Cobbly Cobbles (60-200mm)		Soil Colour	Slope Aspect					
Stony/stones (200-600mm)		Orange	South					
Surface Plates/boulders (>600mm)		Yellow						
Growth Form Table								
Tree >10m	Tree 2-10m	Tree <2m	Tree Mallee					
Palm	Shrub >2m	Shrub 1-2m	M2 Shrub >1m M3					
Cycads	Tussock Grass	Hummock Grass	Sedge					
Vine	Herbs	Other	Mallee Shrub					
Heath Shrub	Samphire Shrub	Chenopod	Rush					
Grass Tree	Other							
Stratum	U1	U2	U3	M1	M2	M3	G1	G2
%Cover				30-70%	2-10%	<2%	2-10%	2-10%
Ht range (m)				2-6	1-2	0.4-1	0.05-0.4	0.01-0.15
Av ht (m)					5.5	1.3	0.5	0.2 0.02

Collection Number	Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo
	Fabaceae	Acacia	coolgardiensis		M1		5.5 30-70%	
	Rutaceae	Phllothea	deserti subsp. deserti		M2		1.6 2-10%	
	Fabaceae	Acacia	coolgardiensis		M3		0.4 <2% Few than 10	
	Fabaceae	Acacia	coolgardiensis		M2		1.8 <2% Few than 10	
	Rutaceae	Phllothea	deserti subsp. deserti		M3		0.8 <2% Few than 10	
	Asteraceae	Waitzia	acuminata		G2		0.01 <2% Numerous	
	Poaceae	Amphipogon	carcinus		G1		0.25 2-10%	
	Pteridaceae	Cheilanthes	adiantoides		G2		0.02 2-10%	
	Pittosporaceae	Cheiranthra	simplicifolia		G2	climber	<2% Few than 10	
	Geraniaceae	Erodium	sp. (insufficient material)		G2		0.05 <2% Numerous	
	Asteraceae	Rhodanthe	chlorocephala		G2		0.2 2-10%	
	Poaceae	Monachather	paradoxus		G1		0.05 2-10%	
	Hemerocallidaceae	Dianella	revoluta		G1		0.15 <2% Few than 10	
	Chenopodiaceae	Enchylaena	tomentosa		M3		0.1 <2% Few than 10	
	Boryaceae	Borya	sphaerocephala		G1		0.1 <2% Few than 10	
	Goodeniaceae	Brunonia	australis		G2		0.15 <2% Numerous	
	Solanaceae	Solanum	cleistogamum		M3		0.15 <2% Few than 10	
	Apiaceae	Trachymene	ornata		G2		0.05 <2% Numerous	
	Malvaceae	Sesingia	velutina		M3		0.08 <2% Few than 10	
	Dilleniaceae	Hibbertia	glomerosa		M3		0.15 <2% Few than 10	

Incidentals								
Collection Number	Family	Genus	Species	Status	Photo	WP	Count	Notes
	Euphorbiaceae	Ricinocarpus	velutinus					
	Lamiaceae	Dasymalla	terminalis					
	Myrtaceae	Baeckea	sp. Wanarra (M.E. Trudgen MET 5376)					
	Solanaceae	Solanum	lasiophyllum					
	Malvaceae	Hannafordia	bissilli subsp. latifolia					
	Proteaceae	Hakea	francisciana					
	Asteraceae	Gilberta	tenuifolia					
	Dilleniaceae	Hibbertia	glomerosa					
	Rutaceae	Phllothea	tomentella					

Vegetation Site Sheet: habitat information				Date:	12/09/2017	Site#:	Q2
Survey:	Murchison 2017-008						
Observers:	JF SP						
Location:	Pindar	gda94 utm					
MGA Zone:	50	Easting:	386574	Northing:	6858154	wp P 2	
Site Type:	Quadrat	Dimensions:	20x20	Camera:	phone	From:	rw
Site Disturbance	Frequency	Water or Wind Erosion Evidence		Field Vegetation Type			
Gravel Pit	Current Disturbance	adjacent	No	acacia tall shrubland			
Mining/Infrastructure	Current Disturbance	road adjacent					
Animal	Current Disturbance	grazing					
			Climate	Vegetation Condition		Litter	
			Dry, plants not stress	Very Good			
			Site Drainage			Leaf Litter:	
			Good Drain			Plentiful	
			Fire Frequency	Fire Intensity		Wood Litter:	
			Nil	Not applicable		Moderate	



Surface Components	Cover (if needed)	Soil	Landform
Loose Soil	10	Major Component	Plain
Humus/Litter	60	Loam	
Cracked Clay			
Fine Rocks (2-6mm)	20	Minor	Slope
Medium gravel/pebbles (6-20mm)	10	Sandy	Negligible
Coarse gravel/pebbles (20-60mm)			
Cobbly Cobbles (60-200mm)		Soil Colour	Slope Aspect
Stony/stones (200-600mm)		Orange	South
Surface Plates/boulders (>600mm)		Yellow	

Growth Form Table			
Tree >10m	Tree 2-10m		Tree <2m
Palm	Shrub >2m	M1	Shrub 1-2m
Cycads	Tussock Grass	G1	Hummock Grass
Vine	Herbs	G2	Other
Heath Shrub	Samphire Shrub		Chenopod
Grass Tree	Other		

Stratum	U1	U2	U3	M1	M2	M3	G1	G2
%Cover				10-30%	2-10%	<2%	2-10%	2-10%
Ht range (m)				2-6	1-2	0.4-1	0.05-0.4	0.01-0.15
Av ht (m)					5.5	1.3	0.5	0.2
								0.02

Collection Number	Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo
	Fabaceae	Acacia	coolgardiensis		M1		5.5 10-30%	
	Myrtaceae	Baeckea	sp. Wanarra (M.E. Trudgen MET 5376		M1		5 <2% Few than 10	
	Myrtaceae	Baeckea	sp. Wanarra (M.E. Trudgen MET 5376		M3		0.3 <2% Few than 10	
	Rutaceae	Phlotoeca	deserti subsp. deserti		M1		2.2 <2% Few than 10	
	Rutaceae	Phlotoeca	deserti subsp. deserti		M2		1.6 2-10%	
	Fabaceae	Acacia	coolgardiensis		M3		0.4 <2% Few than 10	
	Fabaceae	Acacia	coolgardiensis		M2		1.8 <2% Few than 10	
	Rutaceae	Phlotoeca	deserti subsp. deserti		M3		0.8 <2% Few than 10	
	Asteraceae	Waitzia	acuminata		G2		0.01 <2% Numerous	
	Poaceae	Amphipogon	caerinus		G1		0.25 2-10%	
	Pteridaceae	Cheilanthes	adiantoides		G2		0.02 2-10%	
	Geraniaceae	Erodium	sp. (insufficient material)		G2		0.05 <2% Numerous	
	Asteraceae	Rhodanthe	chlorocephala		G2		0.2 2-10%	
	Poaceae	Monachather	paradoxus		G1		0.05 <2% Numerous	
	Hamorocallidaceae	Dianella	revoluta		G1		0.95 <2% Few than 10	
	Chenopodiaceae	Enchylaena	tomentosa		M3		0.1 <2% Few than 10	
	Goodeniaceae	Brunonia	australis		G2		0.15 <2% Numerous	
	Solanaceae	Solanum	cleistogamum		M3		0.15 <2% Few than 10	
	Apiaceae	Trachymene	ornata		G2		0.05 <2% Numerous	
	Dilleniaceae	Hibbertia	glomerosa		M3		0.3 <2% Few than 10	
	Euphorbiaceae	Ricinocarpos	velutinus		M2		1.2 <2% Few than 10	
	Lamiaceae	Dasymalla	terminalis		M3		0.2 <2% Few than 10	
	Asteraceae	Gilberta	tenuifolia		G2		0.05 <2% Numerous	
	Pittosporaceae	Cheiranthra	simplicifolia		G2	climber	<2% Few than 10	

Incidentals								
Collection Number	Family	Genus	Species	Status	Photo	WP	Count	Notes
	Myrtaceae	Aluta	aspera subsp. hesperia					

Vegetation Site Sheet: habitat information					Date:	13/09/2017	Site#:	Q3
Survey:	Murchison 2017-008							
Observers:	JF SP							
Location:	BB east	gda94 utm						
MGA Zone:	50	Easting:	441764		Northing:	7103455	wp BB1	
Site Type:	Quadrat	Dimensions:	20x20	Camera:	p0013	From:	nw	
Site Disturbance	Frequency	road adjacent, culverts		Water or Wind Erosion Evidence		Field Vegetation Type	open acacia eremophila senna on stony plain	
Mining/Infrastructure	Current Disturbance							
Flood	Few recent 1-10yr							
				Climate		Vegetation Condition	Litter	
				Dry, plants not stress		Good		
				Site Drainage			Leaf Litter:	
				Good Drain			Negligible	
				Fire Frequency		Fire Intensity	Wood Litter:	
				Nil		Not applicable	Negligible	



Surface Components		Cover (if needed)		Soil		Landform		
Loose Soil		30		Major Component		Plain		
Humus/Litter		5		Loam				
Cracked Clay								
Fine Rocks (2-6mm)		20		Minor		Slope		
Medium gravel/pebbles (6-20mm)		20		Sandy		Gentle		
Coarse gravel/pebbles (20-60mm)		20						
Cobbly Cobbles (60-200mm)		5		Soil Colour		Slope Aspect		
Stony/stones (200-600mm)				Red		South		
Surface Plates/boulders (>600mm)				Orange				
Growth Form Table								
Tree >10m		Tree 2-10m		Tree <2m			Tree Mallee	
Palm		Shrub >2m	M1	Shrub 1-2m		M2	Shrub >1m	M3
Cycads		Tussock Grass	G1	Hummock Grass			Sedge	
Vine		Herbs	G2	Other			Mallee Shrub	
Heath Shrub		Samphire Shrub		Chenopod			Rush	
Grass Tree		Other						
Stratum	U1	U2	U3	M1	M2	M3	G1	G2
%Cover				<2%	2-10%	<2%	<2%	<2%
Ht range (m)				2-3.5	1-2	0.4-1	0.05-0.4	0.01-0.15
Av ht (m)					3	1.2	0.5	0.2
								0.02

Collection Number	Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo
	Fabaceae	Senna	artemisioides subsp. x petiolaris		M2	1.1	<2% Few than 10	
	Fabaceae	Acacia	tetragonophylla		M1	3.5	<2% Few than 10	
	Fabaceae	Acacia	tetragonophylla		M2	1.8	<2% Few than 10	
	Scrophulariaceae	Eremophila	spathulata		M2	1.1	<2% Few than 10	
	Amaranthaceae	Ptilotus	roei		G2	0.05	<2% Few than 10	
	Poaceae	Eragrostis	eriopoda		G1	0.15	<2% Few than 10	
	Amaranthaceae	Ptilotus	schwartzii		M3	0.2	<2% Few than 10	
	Amaranthaceae	Ptilotus	obovatus		M3	0.4	<2% Few than 10	
	Chenopodiaceae	Sclerolaena	diacantha		M3	0.1	<2% Numerous	
	Malvaceae	Sida	calyxhymania		M3	0.5	<2% Few than 10	
	Fabaceae	Senna	artemisioides subsp. helmsii		M2	1.1	<2% Few than 10	

Collection Number	Family	Genus	Species	Status	Photo	WP	Count	Notes
	Fabaceae	Senna	artemisioides subsp. helmsii					
	Fabaceae	Acacia	pruinocarpa					
	Fabaceae	Acacia	tetragonophylla					
	Scrophulariaceae	Eremophila	spathulata					
	Amaranthaceae	Ptilotus	roei					
	Poaceae	Eragrostis	eriopoda					
	Amaranthaceae	Ptilotus	schwartzii					
	Amaranthaceae	Ptilotus	obovatus					
	Malvaceae	Sida	calyxhymania					
	Chenopodiaceae	Maireana	thesioides					
	Fabaceae	Senna	artemisioides subsp. x sturtii					
	Solanaceae	Solanum	lasiophyllum					
	Fabaceae	Acacia	xiphophylla					
	Scrophulariaceae	Eremophila	phyllopoda subsp. phyllopoda					
	Scrophulariaceae	Eremophila	ericocalyx					
	Apocynaceae	Marsdenia	australis					
	Portulacaceae	Calandrinia	sp. (insufficient material)					
	Goodeniaceae	Scaevola	spinescens					
	Fabaceae	Acacia	aptaneura					
	Fabaceae	Acacia	eremaea					
	Chenopodiaceae	Maireana	trichoptera					
	Portulacaceae	Portulaca	oleracea					
	Zygophyllaceae	Tribulus	astrocarpus					
	Chenopodiaceae	Sclerolaena	densiflora					
	Goodeniaceae	Goodenia	sp. (insufficient material)					
	Fabaceae	Senna	sp. Meekatharra (E. Bailey 1-26)					
	Poaceae	Eriachne	helmsii subsp. pulchella					
	Chenopodiaceae	Salsola	australis					

Vegetation Site Sheet: habitat information				Date:	13/09/2017	Site#:	Q4
Survey:	Murchison 2017-008						
Observers:	JF SP						
Location:	BB east	gda94 utm					
MGA Zone:	50	Easting:	441422	Northing:	7103454	wp BB2	
Site Type:	Quadrat	Dimensions:	20x20	Camera:	p0020	From:	nw
Site Disturbance	Frequency	Water or Wind Erosion Evidence		Field Vegetation Type			
Mining/Infrastructure	Current Disturbance	road adjacent, culverts	Yes Water			drainage line no riparian veg	
Flood	Few recent 1-10yr						
Animal	Current Disturbance	grazing		Climate		Vegetation Condition	Litter
				Dry, plants not stress		Good	
				Site Drainage			Leaf Litter:
				Good Drain			Negligible
				Fire Frequency		Fire Intensity	Wood Litter:
				Nil		Not applicable	Negligible



Surface Components	Cover (if needed)	Soil	Landform					
Loose Soil	30	Major Component	Creepline					
Humus/Litter	5	Loam						
Cracked Clay								
Fine Rocks (2-6mm)	20	Minor	Slope					
Medium gravel/pebbles (6-20mm)	20	Sandy	Gentle					
Coarse gravel/pebbles (20-60mm)	20							
Cobbly Cobbles (60-200mm)	5	Soil Colour	Slope Aspect					
Stony/stones (200-600mm)		Red	South					
Surface Plates/boulders (>600mm)		Orange						
Growth Form Table								
Tree >10m	Tree 2-10m		Tree <2m		Tree Mallee			
Palm	Shrub >2m	M1	Shrub 1-2m	M2	Shrub >1m M3			
Cycads	Tussock Grass		Hummock Grass	G1	Sedge			
Vine	Herbs	G2	Other		Mallee Shrub			
Heath Shrub	Samphire Shrub		Chenopod		Rush			
Grass Tree	Other							
Stratum	U1	U2	U3	M1	M2	M3	G1	G2
%Cover	2-10%			2-10%	2-10%	<2%	2-10%	2-10%
Ht range (m)	4-7			2-5	1-2	0.4-1	0.05-0.4	0.01-0.15
Av ht (m)	4.5			3	1.2	0.5		0.2

Collection Number	Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo
	Fabaceae	Senna	artemisioides subsp. x petiolaris		M2	1.1	<2% Few than 10	
	Fabaceae	Acacia	tetragonophylla		U1	4	2-10%	
	Fabaceae	Acacia	tetragonophylla		M1	2.5	<2% Few than 10	
	Malvaceae	Sida	calyxhymenia		M3	0.5	<2% Few than 10	
	Fabaceae	Senna	artemisioides subsp. helmsii		M3	0.9	<2% Few than 10	
	Fabaceae	Acacia	xiphophylla		U1	3.5	2-10%	
	Portulacaceae	Calandrinia	sp. (insufficient material)		G2	0.05	2-10%	
	Scrophulariaceae	Eremophila	phyllopoda subsp. phyllopoda		M2	1.3	2-10%	
	Fabaceae	Acacia	xiphophylla		M3	0.4	<2% Few than 10	
	Fabaceae	Senna	glutinosa subsp. x luerssenii		M2	1.3	<2% Few than 10	
	Proteaceae	Hakea	preissii		M1	3	<2% Few than 10	
	Proteaceae	Hakea	preissii		M2	1.9	<2% Few than 10	
	Malvaceae	Hibiscus	sp. Gardneri (A.L. Payne PRP 1435)		M2	1.1	<2% Few than 10	
	Fabaceae	Senna	sp. Meekatharra (E. Bailey 1-26)		M3	0.6	<2% Few than 10	
	Chenopodiaceae	Maireana	trichoptera		M3	0.4	<2% Few than 10	
	Proteaceae	Hakea	preissii		M3	0.4	<2% Few than 10	
	Poaceae	Eriachne	helmsii subsp. pulchella		G1	0.15	2-10%	
	Portulacaceae	Portulaca	oleracea		G2	0.02	<2% Numerous	
	Fabaceae	Acacia	aptaneura		M1	3	<2% Few than 10	
	Poaceae	Diplachne	fusca subsp. muelleri		G1	0.3	<2% Numerous	
	Portulacaceae	Calandrinia	ptychosperma		G2	0.02	<2% Numerous	
	Scrophulariaceae	Eremophila	ericalyx		M2	1.8	2-10%	
	Adiantaceae	Cheilanthes	seiberi		G2	0.2	<2% Numerous	
	Scrophulariaceae	Eremophila	ericalyx		M3	0.4	<2% Few than 10	
	Fabaceae	Acacia	sclerosperma subsp. sclerosperma		M2	1.9	<2% Few than 10	
	Chenopodiaceae	Salsola	australis		M3	0.2	<2% Few than 10	
	Chenopodiaceae	Sclerolaena	diacantha		M3	0.15	<2% Few than 10	
	Amaranthaceae	Ptilotus	nobilis		G2	0.1	<2% Few than 10	
	Amaranthaceae	Ptilotus	obovatus		M3	0.5	<2% Few than 10	
	Fabaceae	Senna	sp. Meekatharra (E. Bailey 1-26)		M2	1.4	<2% Few than 10	

Incidentals								
Collection Number	Family	Genus	Species	Status	Photo	WP	Count	Notes
	Fabaceae	Acacia	xiphophylla					
	Chenopodiaceae	Dysphania	melanocoma					
	Fabaceae	Acacia	grasbyii					

1			Date:	13/09/2017	Site#:	Q5
3						
	gda94 utm					
	Easting:	441177	Northing:	7103440	wp BB3	
	Dimensions:	20x20	Camera:	p0024	From: nw	
					Field Vegetation Type	
	road adjacent, culverts	Water or Wind Erosion Evidence			open acacia eremophila senna on stony plain	
		Climate		Vegetation Condition	Litter	
		Dry, plants not stress		Poor		
		Site Drainage			Leaf Litter:	
		Good Drain			Negligible	
		Fire Frequency		Fire Intensity	Wood Litter:	
		Nil		Not applicable	Negligible	



Cover (if needed)		Soil		Landform		
30		Major Component		Plain		
5		Loam				
20		Minor		Slope		
20		Sandy		Gentle		
20						
5		Soil Colour		Slope Aspect		
		Red		South		
		Orange				
Tree 2-10m		Tree <2m			Tree Mallee	
Shrub >2m	M1	Shrub 1-2m		M2	Shrub >1m	M3
Tussock Grass		Hummock Grass		G1	Sedge	
Herbs	G2	Other			Mallee Shrub	
Samphire Shrub		Chenopod			Rush	
Other						
U2	U3	M1	M2	M3	G1	G2
		<2%	2-10%	<2%	<2%	<2%
		4	1-2	0.4-1	0.01	0.01-0.15
			4	1.5	0.5	0.01
						0.02
Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo
Acacia	grasbyi		M2	1.4	<2% Few than 10	
Acacia	pteraneura		M1	3.5	<2% Few than 10	
Acacia	tetragonophylla		M2	1.4	2-10%	
Eremophila	spathulata		M2	1.1	<2% Few than 10	
Eremophila	spathulata		M3	0.6	<2% Few than 10	
Ptilotus	roei		G2	0.05	<2% Few than 10	
Senna	glutinosa subsp. x luerssenii		M3	0.35	<2% Few than 10	
Sclerolaena	diacantha		M3	0.1	<2% Few than 10	
Stenopetalum	filifolium		G2	0.2	<2% Few than 10	
Actinobole	uliginosum		G2	0.02	<2% Few than 10	
Eriachne	helmsii subsp. pulchella		G1	0.01	<2% Numerous	
Genus	Species	Status	Photo	WP	Count	Notes
Acacia	kempeana					
Acacia	synchronicia					
Amyema	sanguinea					
Sida	kingii					
Rhagodia	spinescens					
Boerhavia	coccinea					
Euphorbia	australis					
Peplidium	aithocheilum					
Calandrinia	schistorhiza					
Streptoglossa	cylindriceps					
Peplidium	sp. C Evol. Fl. Fauna Arid Aust. (N.T. Burbidge & A. Kanis 8158)					
Synaptantha	tileacea					
Tribulus	astrocarpus					

Vegetation Site Sheet: habitat information				Date:	13/09/2017	Site#:	Q6
Survey:	Murchison 2017-008						
Observers:	JF SP						
Location:	BB west	gda94 utm					
MGA Zone:	50	Easting:	440131	Northing:	7103230	wp BB4	
Site Type:	Quadrat	Dimensions:	20x20	Camera:	p0040	From:	nw
Site Disturbance	Frequency	Water or Wind Erosion Evidence		Field Vegetation Type			
Mining/Infrastructure	Current Disturbance	road adjacent, culverts		open acacia eremophila senna on stony plain			
Flood	Few recent 1-10yr						
		mulga shadow	Climate	Vegetation Condition		Litter	
Clearing	Disturbs >10yr	fence posts	Dry, plants not stress	Poor			
			Site Drainage			Leaf Litter:	
			Good Drain			Negligible	
			Fire Frequency	Fire Intensity		Wood Litter:	
			Nil	Not applicable		Negligible	



Surface Components	Cover (if needed)	Soil	Landform					
Loose Soil	30	Major Component	Plain					
Humus/Litter	5	Loam						
Cracked Clay								
Fine Rocks (2-6mm)	20	Minor	Slope					
Medium gravel/pebbles (6-20mm)	20	Sandy	Gentle					
Coarse gravel/pebbles (20-60mm)	20							
Cobbly Cobbles (60-200mm)	5	Soil Colour	Slope Aspect					
Stony/stones (200-600mm)		Red	South					
Surface Plates/boulders (>600mm)		Orange						
Growth Form Table								
Tree >10m	Tree 2-10m	Tree <2m	Tree Mallee					
Palm	Shrub >2m	Shrub 1-2m	M2 Shrub >1m M3					
Cycads	Tussock Grass	Hummock Grass	G1 Sedge					
Vine	Herbs	Other	Mallee Shrub					
Heath Shrub	Samphire Shrub	Chenopod	Rush					
Grass Tree	Other							
Stratum	U1	U2	U3	M1	M2	M3	G1	G2
%Cover				<2%	2-10%	<2%	<2%	<2%
Ht range (m)				2.5	1-2	0.4-1	0.1	0.02-0.2
Av ht (m)					2.5	1.1	0.4	0.1

Collection Number	Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo
	Fabaceae	Acacia	tetragonophylla		M1	2.5	<2% Few than 10	
	Fabaceae	Acacia	tetragonophylla		M2	1.8	<2% Few than 10	
	Scrophulariaceae	Eremophila	spathulata		M2	1.1	<2% Few than 10	
	Scrophulariaceae	Eremophila	spathulata		M3	0.4	<2% Few than 10	
	Chenopodiaceae	Enchylaena	tomentosa		M3	0.6	<2% Few than 10	
	Chenopodiaceae	Sclerolaena	diacantha		M3	0.1	<2% Numerous	
	Fabaceae	Senna	artemisioides subsp. x petiolaris		M2	1.2	<2% Few than 10	
	Amaranthaceae	Ptilotus	obovatus		M3	0.5	<2% Few than 10	
	Euphorbiaceae	Euphorbia	tannensis		G2	0.2	<2% Few than 10	
	Fabaceae	Senna	artemisioides subsp. helmsii		M3	0.9	<2% Few than 10	
	Portulacaceae	Portulaca	oleracea		G2	0.01	<2% Few than 10	
	Amaranthaceae	Ptilotus	roei		G2	0.05	<2% Few than 10	
	Malvaceae	Hibiscus	sp. Gardneri (A.L. Payne PRP 1435)		M3	0.5	<2% Few than 10	
	Poaceae	Aristida	contorta		G1	0.1	<2% Few than 10	
	Nyctaginaceae	Boerhavia	coccinea		G2	0.1	<2% Few than 10	
	Fabaceae	Acacia	incurvaneura		M3	0.5	<2% Few than 10	

Collection Number	Family	Genus	Species	Status	Photo	WP	Count	Notes
	Fabaceae	Acacia	ceasaneura					
	Fabaceae	Acacia	incurvaneura					
	Fabaceae	Acacia	fuscaneura					
	Euphorbiaceae	Euphorbia	tannensis					
	Chenopodiaceae	Sclerolaena	diacantha					
	Chenopodiaceae	Sclerolaena	densiflora					
	Solanaceae	Solanum	lasiophyllum					
	Fabaceae	Senna	glutinosa subsp. x luerssenii					
	Fabaceae	Senna	artemisioides subsp. helmsii					
	Amaranthaceae	Ptilotus	obovatus					
	Poaceae	Aristida	contorta					
	Fabaceae	Senna	sp. Meekatharra (E. Bailey 1-26)					
	Fabaceae	Acacia	xiphophylla					
	Fabaceae	Acacia	kempeana					
	Fabaceae	Acacia	synchronicia					
	Scrophulariaceae	Eremophila	phyllopoda subsp. phyllopoda					
	Proteaceae	Hakea	preissii					
	Scrophulariaceae	Eremophila	spathulata					
	Amaranthaceae	Ptilotus	roei					
	Fabaceae	Acacia	tetragonophylla					
	Portulacaceae	Portulaca	oleracea					
	Chenopodiaceae	Dysphania	melanocoma					
	Fabaceae	Senna	artemisioides subsp. x stricta					
	Amaranthaceae	Ptilotus	schwartzii					
	Zygophyllaceae	Tribulus	astrocarpus					
	Fabaceae	Acacia	burkittii					
	Fabaceae	Acacia	xiphophylla					

Vegetation Site Sheet: habitat information			Date:	13/09/2017	Site#:	Q7
Survey:	Murchison 2017-008					
Observers:	JF SP					
Location:	BB west	gda94 utm				
MGA Zone:	50	Easting:	439686	Northing:	7103195	wp BB5
Site Type:	Quadrat	Dimensions:	20x20	Camera:	p0044	From: nw
Site Disturbance	Frequency	Water or Wind Erosion Evidence		Field Vegetation Type		
Mining/Infrastructure	Current Disturbance	road adjacent, culverts	Yes Water		drainage line no riparian veg	
Flood	Few recent 1-10yr					
Animal	Current Disturbance	grazing	Climate	Vegetation Condition	Litter	
			Dry, plants not stress	Poor		
			Site Drainage		Leaf Litter:	
			Good Drain		Negligible	
			Fire Frequency	Fire Intensity	Wood Litter:	
			Nil	Not applicable	Negligible	



Surface Components	Cover (if needed)	Soil	Landform
Loose Soil	40	Major Component	Creepline
Humus/Litter	15	Sand	
Cracked Clay			
Fine Rocks (2-6mm)	20	Minor	Slope
Medium gravel/pebbles (6-20mm)	15	Loamy	Gentle
Coarse gravel/pebbles (20-60mm)	5		
Cobbly Cobbles (60-200mm)	5	Soil Colour	Slope Aspect
Stony/stones (200-600mm)		Red	South
Surface Plates/boulders (>600mm)		Orange	

Growth Form Table		U1	U2	U3	M1	M2	M3	G1	G2
Tree >10m	Tree 2-10m	U1			Tree <2m			Tree Mallee	
Palm	Shrub >2m	M1			Shrub 1-2m		M2	Shrub >1m	M3
Cycads	Tussock Grass				Hummock Grass		G1	Sedge	
Vine	Herbs	G2			Other			Mallee Shrub	
Heath Shrub	Samphire Shrub				Chenopod			Rush	
Grass Tree	Other								
Stratum	U1	U2	U3	M1	M2	M3	G1	G2	
%Cover	30-70%			2-10%	2-10%	2-10%	30-70%	2-10%	
Ht range (m)	4-8			2-5	1-2	0.4-1	0.05-0.6	0.01-0.5	
Av ht (m)	7				3	1.2	0.5	0.4	0.02

Collection Number	Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo
	Fabaceae	Acacia	fuscaneura		U1		8 10-30%	
	Fabaceae	Acacia	burkittii		U1		7 2-10%	
	Rubiaceae	Psydrax	rigidula		U1		5.5 <2% Few than 10	
	Malvaceae	Sida	calyxthymenia		M3		0.8 <2% Few than 10	
	Scrophulariaceae	Eremophila	forrestii		M1		2.5 <2% Few than 10	
	Scrophulariaceae	Eremophila	forrestii		M2		1.8 <2% Few than 10	
	Portulacaceae	Calandrinia	ptychosperma		G2		0.02 2-10%	
	Solanaceae	Nicotiana	sp. (insufficient material)		G2		0.5 <2% Few than 10	
	Scrophulariaceae	Eremophila	glutinosa		M3		0.8 <2% Few than 10	
	Portulacaceae	Calandrinia	sp. (insufficient material)		G2		0.05 2-10%	
	Poaceae	Diplachne	fusca subsp. muelleri		G1		0.3 <2% Numerous	
	Poaceae	Cenchrus	ciliaris	*	G1		0.9 2-10%	
	Asteraceae	Bidens	bipinnata	*	G2		0.5 2-10%	
	Fabaceae	Acacia	ramulosa var. linophylla		M1		5 2-10%	
	Poaceae	Eragrostis	falcata		G2		0.25 2-10%	
	Fabaceae	Acacia	cuthbertstonii subsp. linearis		M1		4.5 2-10%	
	Fabaceae	Acacia	cuthbertstonii subsp. linearis		M2		1.1 <2% Few than 10	
	Malvaceae	Abutilon	cryptopetalum		M3		0.5 2-10%	
	Fabaceae	Senna	artemisioides subsp. oligophylla		M3		0.8 <2% Few than 10	
	Solanaceae	Solanum	lasiophyllum		M3		0.4 <2% Few than 10	
	Poaceae	Eriachne	helmsii		G1		0.9 2-10%	
	Amaranthaceae	Ptilotus	obovatus		M3		0.9 <2% Few than 10	
	Fabaceae	Acacia	tetragonophylla		M2		1.2 <2% Few than 10	
	Scrophulariaceae	Eremophila	platycalyx subsp. platycalyx		M3		1 <2% Few than 10	
	Fabaceae	Glycine	canscens		G2	climber	<2% Few than 10	
	Apocynaceae	Rhyncharrhena	linearis		G2	climber	<2% Few than 10	
	Fabaceae	Senna	artemisioides subsp. helmsii		M2		1.8 <2% Few than 10	
	Fabaceae	Acacia	fuscaneura		M2		1.1 <2% Few than 10	
	Geraniaceae	Erodium	sp. (insufficient material)		G2		0.01 <2% Numerous	
	Adiantaceae	Cheilanthes	seiberi		G2		0.2 <2% Numerous	
	Fabaceae	Senna	glutinosa subsp. x luerssenii		M2		1.4 <2% Few than 10	
	Fabaceae	Acacia	sclerosperma subsp. sclerosperma		M2		1.9 <2% Few than 10	
	Amaranthaceae	Ptilotus	macrocephalus		G2		0.2 <2% Few than 10	
	Solanaceae	Nicotiana	sp. (insufficient material)		G2		0.15 <2% Few than 10	
	Poaceae	Aristida	contorta		G1		0.15 <2% Numerous	
	Asteraceae	Pluchea	dentex		M3		0.2 <2% Few than 10	

Collection Number	Family	Genus	Species	Status	Photo	WP	Count	Notes
	Rubiaceae	Psydrax	latifolia					
	Lamiaceae	Spartothamnella	teucriflora					
	Lamiaceae	Prostanthera	campbellii					
	Fabaceae	Acacia	xiphophylla					
	Scrophulariaceae	Eremophila	phyllopoda subsp. phyllopoda					
	Fabaceae	Acacia	kempeana					

Vegetation Site Sheet: habitat information				Date:	13/09/2017	Site#:	Q8
Survey:	Murchison 2017-008						
Observers:	JF SP						
Location:	BB west	gda94 utm					
MGA Zone:	50	Easting:	439450	Northing:	7103214	wp BB6	
Site Type:	Quadrat	Dimensions:	20x20	Camera:	p0057	From:	nw
Site Disturbance	Frequency	Water or Wind Erosion Evidence		Field Vegetation Type			
Mining/Infrastructure	Current Disturbance	road adjacent, culverts		open acacia eremophila senna on stony plain			
Flood	Few recent 1-10yr						
Clearing	Disturbs >10yr	mulga shadow fence posts	Climate	Vegetation Condition		Litter	
			Dry, plants not stress	Poor			
			Site Drainage			Leaf Litter:	
			Good Drain			Negligible	
			Fire Frequency	Fire Intensity	Wood Litter:		
			Nil	Not applicable	Negligible		



Surface Components		Cover (if needed)		Soil		Landform		
Loose Soil		30		Major Component		Plain		
Humus/Litter		5		Loam				
Cracked Clay								
Fine Rocks (2-6mm)		20		Minor		Slope		
Medium gravel/pebbles (6-20mm)		20		Sandy		Gentle		
Coarse gravel/pebbles (20-60mm)		20						
Cobbly Cobbles (60-200mm)		5		Soil Colour		Slope Aspect		
Stony/stones (200-600mm)				Red		South		
Surface Plates/boulders (>600mm)				Orange				
Growth Form Table								
Tree >10m		Tree 2-10m		Tree <2m			Tree Mallee	
Palm		Shrub >2m		Shrub 1-2m	M1		Shrub >1m M2	
Cycads		Tussock Grass		Hummock Grass			Sedge	
Vine		Herbs	G1	Other			Mallee Shrub	
Heath Shrub		Samphire Shrub		Chenopod			Rush	
Grass Tree		Other						
Stratum	U1	U2	U3	M1	M2	M3	G1	G2
%Cover				<2%	<2%		<2%	
Ht range (m)				1.3	0.1-0.8		0.01	
Av ht (m)					1.3	0.8		0.01
Collection Number	Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo
	Scrophulariaceae	Eremophila	spathulata		M1	1.3	<2% Few than 10	
	Scrophulariaceae	Eremophila	spathulata		M2	0.8	<2% Few than 10	
	Fabaceae	Senna	artemisioides subsp. helmsii		M2	0.9	<2% Few than 10	
	Scrophulariaceae	Eremophila	phyllopoda subsp. phyllopoda		M1	1.1	<2% Few than 10	
	Chenopodiaceae	Sclerolaena	diacantha		M2	0.1	<2% Numerous	
	Portulacaceae	Portulaca	oleracea		G1	0.01	<2% Few than 10	
	Nyctaginaceae	Boerhavia	coccinea		G1	0.01	<2% Few than 10	
Incidentals								
Collection Number	Family	Genus	Species	Status	Photo	WP	Count	Notes
	Fabaceae	Senna	artemisioides subsp. x petiolaris					

Vegetation Site Sheet: habitat information				Date:	14/09/2017	Site#:	Q10
Survey:	Murchison 2017-008						
Observers:	JF SP						
Location:	Curbur	gda94 utm					
MGA Zone:	50	Easting:	395024	Northing:	7072053	wp C02	
Site Type:	Quadrat	Dimensions:	20x20	Camera:	p0089	From:	nw
Site Disturbance	Frequency	Water or Wind Erosion Evidence					
Mining/Infrastructure	Current Disturbance	old tracks adjacent	Yes Water			Chenopod flats	
Flood	Few recent 1-10yr						
Other	Current Disturbance	Drought	Climate		Vegetation Condition	Litter	
Clearing	Disturbs >10yr	fence posts	Recent rain, no impact on veg		Poor		
Animal	Current Disturbance	Grazing - cattle rabbits	Site Drainage		Good	Leaf Litter:	
			Seasonal Wet			Negligible	
			Fire Frequency		Fire Intensity	Wood Litter:	
			Nil		Not applicable	Negligible	



Surface Components	Cover (if needed)	Soil	Landform
Loose Soil	50	Major Component	Plain
Humus/Litter		Loam	
Cracked Clay			
Fine Rocks (2-6mm)	20	Minor	Slope
Medium gravel/pebbles (6-20mm)	20	Sandy	Negligible
Coarse gravel/pebbles (20-60mm)	10		
Cobbly Cobbles (60-200mm)		Soil Colour	Slope Aspect
Stony/stones (200-600mm)		Red	South
Surface Plates/boulders (>600mm)		Orange	
Growth Form Table			
Tree >10m	Tree 2-10m	Tree <2m	Tree Mallee
Palm	Shrub >2m	Shrub 1-2m	M1 Shrub >1m M2
Cycads	Tussock Grass	Hummock Grass	G1 Sedge
Vine	Herbs G2	Other	Mallee Shrub
Heath Shrub	Samphire Shrub	Chenopod	Rush
Grass Tree	Other		
Stratum	U1	U2	U3
%Cover			
Ht range (m)			
Av ht (m)		1.4	0.25
			0.1
			0.25

Collection Number	Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo
	Fabaceae	Acacia	synchronicia		M1	1.4	<2% Few than 10	
	Chenopodiaceae	Sclerolaena	diacantha		M2	0.2	2-10%	
	Chenopodiaceae	Atriplex	semilunaris		G2	0.3	10-30%	
	Chenopodiaceae	Salsola	australis		G2	0.4	<2% Few than 10	
	Chenopodiaceae	Maireana	carcosa		G2	0.15	2-10%	
	Chenopodiaceae	Maireana	triptera		M2	0.2	2-10%	
	Chenopodiaceae	Atriplex	codonocarpa		G2	0.2	<2% Numerous	
	Amaranthaceae	Ptilotus	obovatus		M2	0.25	<2% Few than 10	
	Asteraceae	Lemooria	burkittii		G2	0.01	<2% Numerous	
	Chenopodiaceae	Sclerolaena	cuneata		M2	0.2	2-10%	
	Portulacaceae	Portulaca	oleracea		G2	0.1	<2% Few than 10	
	Solanaceae	Solanum	lasiophyllum		M2	0.2	<2% Few than 10	
	Poaceae	Aristida	contorta		G1	0.1	<2% Few than 10	
	Chenopodiaceae	Sclerolaena	densiflora		M2	0.2	<2% Numerous	

Collection Number	Family	Genus	Species	Status	Photo	WP	Count	Notes
	Myrtaceae	Melaleuca	stereophloia					
	Goodeniaceae	Scaevola	spinescens					
	Amaranthaceae	Ptilotus	nobilis					
	Fabaceae	Senna	artemisioides subsp. oligophylla					
	Fabaceae	Senna	sp. Meekatharra (E. Bailey 1-26)					
	Poaceae	Eragrostis	dielsii					
	Scrophulariaceae	Eremophila	spathulata					
	Fabaceae	Acacia	pruinocarpa					
	Zygophyllaceae	Tribulus	astrocarpus					
	Brassicaceae	Lepidium	sp. (insufficient material)					

Vegetation Site Sheet: habitat information					Date:	14/09/2017	Site#:	Q11
Survey:	Murchison 2017-008							
Observers:	JF SP							
Location:	Curbur	gda94 utm						
MGA Zone:	50	Easting:	394928		Northing:	7071854	wp C03	
Site Type:	Quadrat	Dimensions:	20x20	Camera:	p0092	From:	nw	
Site Disturbance	Frequency		Water or Wind Erosion Evidence					
Mining/Infrastructure	Current Disturbance	old tracks adjacent				Calcareous rise		
Flood	Few recent 1-10yr							
Other	Current Disturbance	Drought	Climate		Vegetation Condition		Litter	
Clearing	Disturbs >10yr	fence posts	Recent rain, no impact on veg		Good			
Animal	Current Disturbance	Grazing - cattle rabbits	Site Drainage		Good		Leaf Litter:	
			Good Drain				Sparse	
			Fire Frequency		Fire Intensity		Wood Litter:	
			Nil		Not applicable		Negligible	



Surface Components		Cover (if needed)		Soil		Landform		
Loose Soil		60		Major Component		Plain		
Humus/Litter				Sand				
Cracked Clay								
Fine Rocks (2-6mm)		20		Minor		Slope		
Medium gravel/pebbles (6-20mm)		10		Loamy		Gentle		
Coarse gravel/pebbles (20-60mm)		10						
Cobbly Cobbles (60-200mm)				Soil Colour		Slope Aspect		
Stony/stones (200-600mm)				Red		North		
Surface Plates/boulders (>600mm)				Orange				
Growth Form Table								
Tree >10m		Tree 2-10m	U1	Tree <2m		Tree Mallee		
Palm		Shrub >2m	M1	Shrub 1-2m	M2	Shrub >1m	M3	
Cycads		Tussock Grass		Hummock Grass	G1	Sedge		
Vine		Herbs	G2	Other		Mallee Shrub		
Heath Shrub		Samphire Shrub		Chenopod		Rush		
Grass Tree		Other						
Stratum	U1	U2	U3	M1	M2	M3	G1	G2
%Cover	<2%			<2%	10-30%	2-10%	<2%	2-10%
Ht range (m)	4.5			4	1-2	0.1-1	0.1-0.9	0.01-0.4
Av ht (m)		4.5			4	1.9	0.7	0.1

Collection Number	Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo
	Fabaceae	Acacia	aptaneura		U1	4.5	<2% Few than 10	
	Fabaceae	Acacia	tetragonophylla		M1	4	<2% Few than 10	
	Scrophulariaceae	Eremophila	macmillaniana		M1	4	<2% Few than 10	
	Fabaceae	Senna	artemisioides subsp. x artemisioides		M2	1.8	10-30%	
	Fabaceae	Senna	artemisioides subsp. helmsii		M2	1.4	<2% Few than 10	
	Fabaceae	Acacia	tetragonophylla		M2	1.9	<2% Few than 10	
	Amaranthaceae	Ptilotus	obovatus		M3	0.8	<2% Few than 10	
	Rubiaceae	Psyrax	rigidula		M3	0.6	<2% Few than 10	
	Myrtaceae	Melaleuca	stereophloia		M3	0.7	<2% Numerous	
	Goodeniaceae	Scaevola	spinescens		M2	1.5	<2% Few than 10	
	Goodeniaceae	Scaevola	spinescens		M3	0.9	<2% Few than 10	
	Scrophulariaceae	Eremophila	macmillaniana		M2	1.1	<2% Few than 10	
	Scrophulariaceae	Eremophila	macmillaniana		M3	0.7	<2% Few than 10	
	Solanaceae	Solanum	lasiophyllum		M3	0.4	<2% Few than 10	
	Geraniaceae	Erodium	sp. (insufficient material)		G2	0.05	<2% Numerous	
	Chenopodiaceae	Sclerolaena	diacantha		M3	0.15	2-10%	
	Zygophyllaceae	Tribulus	astrocarpus		G2	0.02	<2% Few than 10	
	Amaranthaceae	Ptilotus	macrocephalus		G2	0.6	<2% Few than 10	
	Poaceae	Cenchrus	ciliaris		G1	0.9	<2% Few than 10	
	Poaceae	Aristida	contorta		G1	0.05	<2% Numerous	
	Chenopodiaceae	Chenopodium	gaudichaudianum		M3	0.4	<2% Few than 10	
	Chenopodiaceae	Enchylaena	tomentosa		M3	0.4	<2% Few than 10	
	Fabaceae	Chorizema	racemosum		M2	1.1	<2% Few than 10	
	Chenopodiaceae	Salsola	australis		G2	0.2	<2% Numerous	
	Zygophyllaceae	Zygophyllum	aurantiacum		G2	0.02	<2% Numerous	
	Goodeniaceae	Goodenia	sp. (insufficient material)		G2	0.2	<2% Few than 10	
	Euphorbiaceae	Euphorbia	tannensis		G2	0.2	<2% Few than 10	
	Chenopodiaceae	Rhagodia	eremaea		M2	1.7	<2% Few than 10	
	Apocynaceae	Marsdenia	australis		G2	climber	<2% Few than 10	
	Brassicaceae	Lepidium	sp. (insufficient material)		G2	0.2	<2% Numerous	

Collection Number	Family	Genus	Species	Status	Photo	WP	Count	Notes
	Fabaceae	Acacia	ligulata					
	Goodeniaceae	Scaevola	tomentosa					
	Solanaceae	Lawrenzia	densiflora					
	Fabaceae	Swainsona	affinis					
	Fabaceae	Senna	glutinosa subsp. x luerssenii					
	Chenopodiaceae	Maireana	convexa					
	Euphorbiaceae	Euphorbia	drummondii					
	Thymeleaceae	Pimelea	microcephala					
	Brassicaceae	Brassica	toumefortii					
	Scrophulariaceae	Eremophila	pterocharpa					
	Nyctaginaceae	Boerhavia	coccinea					
	Poaceae	Enneapogon	caerulescens					
	Amaranthaceae	Ptilotus	aerovoides					
	Fabaceae	Senna	artemisioides subsp. x petiolaris					
	Fabaceae	Acacia	pruinocarpa					
	Fabaceae	Acacia	grasby					
	Scrophulariaceae	Eremophila	forrestii					
	Chenopodiaceae	Maireana	villosa					
	Fabaceae	Acacia	ramulosa var. linophylla					
	Scrophulariaceae	Eremophila	latrobei					
	Malvaceae	Abutilon	cryptopetalum					
	Malvaceae	Sida	calyxymenia					

Vegetation Site Sheet: habitat information				Date:	14/09/2017	Site#:	Q12
Survey:	Murchison 2017-008						
Observers:	JF SP						
Location:	Curbur	gda94 utm					
MGA Zone:	50	Easting:	394628	Northing:	7071290	wp C04	
Site Type:	Quadrat	Dimensions:	20x20	Camera:	p109	From:	nw
Site Disturbance	Frequency			Water or Wind Erosion Evidence			
Mining/Infrastructure	Current Disturbance	old tracks adjacent		Yes Water		Mixed Acacia/Eremophila open woodland/shrubland	
Flood	Few recent 1-10yr						
Other	Current Disturbance	Drought		Climate		Vegetation Condition	Litter
Clearing	Disturbs >10yr	fence posts		Recent rain, no impact on veg		Good	
Animal	Current Disturbance	Grazing - cattle rabbits		Site Drainage			Leaf Litter:
				Good Drain			Moderate
				Fire Frequency		Fire Intensity	Wood Litter:
				Nil		Not applicable	Negligible



Surface Components	Cover (if needed)	Soil	Landform
Loose Soil	50	Major Component	Plain
Humus/Litter	15	Loam	
Cracked Clay			
Fine Rocks (2-6mm)	20	Minor	Slope
Medium gravel/pebbles (6-20mm)	10	Sandy	Gentle
Coarse gravel/pebbles (20-60mm)	5		
Cobbly Cobbles (60-200mm)		Soil Colour	Slope Aspect
Stony/stones (200-600mm)		Red	North
Surface Plates/boulders (>600mm)		Orange	

Growth Form Table		U1	U2	U3	M1	M2	M3	G1	G2
Tree >10m	Tree 2-10m	U1			Tree <2m			Tree Mallee	
Palm	Shrub >2m	M1			Shrub 1-2m		M2	Shrub >1m	M3
Cycads	Tussock Grass				Hummock Grass		G1	Sedge	
Vine	Herbs	G2			Other			Mallee Shrub	
Heath Shrub	Samphire Shrub				Chenopod			Rush	
Grass Tree	Other								
Stratum	U1	U2	U3	M1	M2	M3	G1	G2	
%Cover	10-30%			2-10%	2-10%	10-30%	2-10%	2-10%	
Ht range (m)	6			2-4	1-2	0.2-1	0.01-0.1	0.01-0.2	
Av ht (m)	6			3.5	1.2	0.7	0.1	0.15	

Collection Number	Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo
	Fabaceae	Acacia	aptaneura		U1		6 10-30%	
	Fabaceae	Acacia	pruinocarpa		U1		6 <2% Few than 10	
	Fabaceae	Acacia	ramulosa var. linophylla		M1		3.5 <2% Few than 10	
	Scrophulariaceae	Eremophila	fraseri		M1		3 <2% Few than 10	
	Scrophulariaceae	Eremophila	forrestii		M2		1.4 <2% Few than 10	
	Scrophulariaceae	Eremophila	forrestii		M3		0.9 10-30%	
	Lamiaceae	Spartothamnella	teucrifolia		M2		1.2 <2% Few than 10	
	Poaceae	Aristida	contorta		G1		0.25 2-10%	
	Brassicaceae	Stenopetalum	filifolium		G2		0.15 <2% Numerous	
	Herb sp. (juveniles)	Herb sp. (juveniles)	sp. (insufficient material)		G2		0.01 2-10%	
	Chenopodiaceae	Maireana	villosa		M3		0.95 <2% Numerous	
	Fabaceae	Acacia	ramulosa var. linophylla		M2		1.2 <2% Few than 10	
	Geraniaceae	Erodium	sp. (insufficient material)		G2		0.01 <2% Numerous	
	Solanaceae	Solanum	lasiophyllum		M3		0.8 <2% Few than 10	
	Apocynaceae	Ryncharthena	linearis		G2	climber	<2% Few than 10	
	Fabaceae	Senna	artemisioides subsp. x sturtii		M2		1.2 <2% Few than 10	
	Scrophulariaceae	Eremophila	latrobei		M2		1.6 <2% Few than 10	
	Malvaceae	Sida	calyxthymenia		M3		0.8 <2% Few than 10	
	Poaceae	Eriachne	helmsii		G1		0.4 <2% Numerous	
	Scrophulariaceae	Eremophila	latrobei		M3		0.5 <2% Few than 10	
	Malvaceae	Sida	kingii		M3		0.4 <2% Few than 10	
	Fabaceae	Acacia	tetragonophylla		M1		2.1 <2% Few than 10	
	Amaranthaceae	Ptilotus	macrocephalus		G2		0.4 <2% Numerous	
	Fabaceae	Acacia	aptaneura		M2		1.7 <2% Few than 10	
	Chenopodiaceae	Sclerolaena	diacantha		M3		0.2 <2% Numerous	
	Fabaceae	Senna	artemisioides subsp. helmsii		M3		0.4 <2% Few than 10	
	Scrophulariaceae	Eremophila	fraseri		M3		0.2 <2% Few than 10	

Incidentals								
Collection Number	Family	Genus	Species	Status	Photo	WP	Count	Notes
	Fabaceae	Acacia	palustris					
	Poaceae	Eragrostis	falcata					
	Fabaceae	Acacia	caesaneura					
	Proteaceae	Grevillea	deflexa					
	Chenopodiaceae	Atriplex	semilunaris					
	Chenopodiaceae	Atriplex	codonocarpa					
	Chenopodiaceae	Sclerolaena	diacantha					
	Chenopodiaceae	Salsola	australis					
	Solanaceae	Solanum	lasiophyllum					
	Myrtaceae	Melaleuca	stereophloia					

Vegetation Site Sheet: habitat information				Date:	14/09/2017	Site#:	Q13
Survey:	Murchison 2017-008						
Observers:	JF SP						
Location:	Curbur	gda94 utm					
MGA Zone:	50	Easting:	394770	Northing:	7072004	wp CR4	
Site Type:	Quadrat	Dimensions:	20x20	Camera:	p120	From:	nw
Site Disturbance	Frequency	Water or Wind Erosion Evidence					
Mining/Infrastructure	Current Disturbance	old tracks adjacent				Melaleuca stereophloia on low sandy rise	
Flood	Few recent 1-10yr						
Other	Current Disturbance	Drought	Climate	Vegetation Condition		Litter	
Clearing	Disturbs >10yr	fence posts	Recent rain, no impact on veg	Poor			
Animal	Current Disturbance	Grazing - cattle rabbits	Site Drainage	Poor		Leaf Litter:	
			Good Drain			Negligible	
			Fire Frequency	Fire Intensity		Wood Litter:	
			Nil	Not applicable		Negligible	



Surface Components	Cover (if needed)		Soil	Landform				
Loose Soil		60	Major Component	Plain				
Humus/Litter		15	Sand					
Cracked Clay								
Fine Rocks (2-6mm)		5	Minor	Slope				
Medium gravel/pebbles (6-20mm)		10	Loamy	Gentle				
Coarse gravel/pebbles (20-60mm)		10						
Cobbly Cobbles (60-200mm)			Soil Colour	Slope Aspect				
Stony/stones (200-600mm)			Red	North				
Surface Plates/boulders (>600mm)			Orange	West				
Growth Form Table								
Tree >10m	Tree 2-10m	U1	Tree <2m		Tree Mallee			
Palm	Shrub >2m	M1	Shrub 1-2m	M2	Shrub >1m	M3		
Cycads	Tussock Grass		Hummock Grass	G1	Sedge			
Vine	Herbs	G2	Other		Mallee Shrub			
Heath Shrub	Samphire Shrub		Chenopod		Rush			
Grass Tree	Other							
Stratum	U1	U2	U3	M1	M2	M3	G1	
%Cover	<2%			2-10%	2-10%	10-30%	2-10%	
Ht range (m)	5			2-4	1-2	0.2-1	0.6	
Av ht (m)		5			3.5	1.8	0.7	
							0.6	
							0.15	
Collection Number	Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo
	Fabaceae	Acacia	aptaneura		U1	5	<2% Few than 10	
	Myrtaceae	Melaleuca	stereophloia		M1	3.5	2-10%	
	Myrtaceae	Melaleuca	stereophloia		M2	1.8	2-10%	
	Myrtaceae	Melaleuca	stereophloia		M3	0.7	10-30%	
	Fabaceae	Senna	artemisioides subsp. helmsii		M3	0.8	<2% Few than 10	
	Chenopodiaceae	Salsola	australis		G2	0.4	2-10%	
	Solanaceae	Solanum	lasiophyllum		M3	0.4	<2% Few than 10	
	Poaceae	Cenchrus	ciliaris	*	G1	0.6	2-10%	
	Geraniaceae	Erodium	sp. (insufficient material)		G2	0.02	<2% Few than 10	
	Amaranthaceae	Ptilotus	obovatus		M3	0.6	<2% Numerous	
	Chenopodiaceae	Enchylaeana	tomentosa		M3	0.2	<2% Few than 10	
	Scrophulariaceae	Eremophila	brevifolia subsp. maculata		M3	0.2	<2% Few than 10	
	Chenopodiaceae	Chenopodium	gaudichaudianum		M3	0.4	<2% Few than 10	
	Brassicaceae	Brassica	tournefortii	*	G2	0.4	<2% Few than 10	
	Euphorbiaceae	Euphorbia	tannensis		G2	0.2	<2% Few than 10	
	Zygophyllaceae	Tribulus	astrocarpus		G2	0.02	<2% Few than 10	
	Chenopodiaceae	Atriplex	semilunaris		G2	0.15	<2% Few than 10	
	Frankeniaceae	Frankenia	laxiflora		M3	0.35	<2% Few than 10	
	Fabaceae	Senna	artemisioides subsp. x artemisioides		M3	0.95	<2% Few than 10	
Incidentals								
Collection Number	Family	Genus	Species	Status	Photo	WP	Count	Notes
	Fabaceae	Acacia	ligulata					
	Myrtaceae	Eucalyptus	victrix					
	Asteraceae	Streptoglossa	cyindriceps					

Vegetation Site Sheet: habitat information				Date:	14/09/2017	Site#:	Q14
Survey:	Murchison 2017-008						
Observers:	JF SP						
Location:	Curbur	gda94 utm					
MGA Zone:	50	Eastings:	394573	Northing:	7071986	wp CR4	
Site Type:	Quadrat	Dimensions:	20x20	Camera:	p122	From:	nw
Site Disturbance	Frequency		Water or Wind Erosion Evidence				
Mining/Infrastructure	Current Disturbance	tracks adjacent	Yes Water			Mulga Grove	
Flood	Few recent 1-10yr						
Other	Current Disturbance	Drought	Climate	Vegetation Condition		Litter	
Clearing	Disturbs >10yr	fence posts	Recent rain, no impact on veg	Poor			
Animal	Current Disturbance	Grazing - cattle rabbits	Site Drainage	Poor		Leaf Litter:	
Mining/Infrastructure	Current Disturbance	old fence adjacent	Seasonal Wet			Negligible	
			Fire Frequency	Fire Intensity		Wood Litter:	
			Nil	Not applicable		Negligible	



Surface Components	Cover (if needed)		Soil	Landform					
Loose Soil		10	Major Component	Plain					
Humus/Litter		75	Loam						
Cracked Clay									
Fine Rocks (2-6mm)			Minor	Slope					
Medium gravel/pebbles (6-20mm)		10	Sandy	Negligible					
Coarse gravel/pebbles (20-60mm)		5							
Cobbly Cobbles (60-200mm)			Soil Colour	Slope Aspect					
Stony/stones (200-600mm)			Red						
Surface Plates/boulders (>600mm)									
Growth Form Table									
Tree >10m		Tree 2-10m	U1	Tree <2m		Tree Mallee			
Palm		Shrub >2m	M1	Shrub 1-2m	M2	Shrub >1m	M3		
Cycads		Tussock Grass		Hummock Grass	G1	Sedge			
Vine		Herbs	G2	Other		Mallee Shrub			
Heath Shrub		Samphire Shrub		Chenopod		Rush			
Grass Tree		Other							
Stratum	U1	U2	U3	M1	M2	M3	G1	G2	
%Cover	10-30%			2-10%	<2%	10-30%	10-30%	10-30%	
Ht range (m)	6-8			2-6	1.1	0.01-1.0	0.25	0.01-01.0	
Av ht (m)		8			6	1.1	0.5	0.25	0.02
Collection Number	Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo	
	Fabaceae	Acacia	incurvaneura		U1	8	10-30%		
	Fabaceae	Acacia	palustris		M1	3.5	2-10%		
	Solanaceae	Solanum	lasiophyllum		M3	0.5	2-10%		
	Malvaceae	Sida	kingii		M3	0.15	2-10%		
	Poaceae	Cenchrus	ciliaris	*	G1	0.25	2-10%		
	Amaranthaceae	Ptilotus	nobilis		G2	0.4	<2% Numerous		
	Brassicaceae	Stenopetalum	filifolium		G2	0.6	<2% Numerous		
	Chenopodiaceae	Enchylaeana	tomentosa		M3	0.5	2-10%		
	Herb sp. (juveniles)	Herb sp. (juveniles)	sp. (insufficient material)		G2	0.02	2-10%		
	Portulacaceae	Portulaca	oleracea		G2	0.15	2-10%		
	Portulacaceae	Calandrinia	ptychosperma		G2	0.05	<2% Numerous		
	Marsileaceae	Marsilea	hirsuta		G2	0.05	2-10%		
	Brassicaceae	Lepidium	sp. (insufficient material)		G2	0.15	<2% Numerous		
	Goodeniaceae	Goodenia	sp. (insufficient material)		G2	0.4	<2% Numerous		
	Fabaceae	Senna	artemisioides subsp. helmsii		M3	0.35	<2% Few than 10		
	Poaceae	Eragrostis	falcata		G1	0.2	10-30%		
	Malvaceae	Sida	calyxhymenia		M2	1.1	<2% Few than 10		
	Amaranthaceae	Alternanthera	nodiflora		G2	0.3	<2% Numerous		
	Chenopodiaceae	Chenopodium	gaudichaudianum		M3	0.8	<2% Few than 10		
	Portulacaceae	Calandrinia	stagnensis		G2	0.05	<2% Numerous		
	Malvaceae	Abutilon	cryptopetalum		M3	0.6	<2% Few than 10		
	Chenopodiaceae	Maireana	triptera		M3	0.2	<2% Few than 10		
	Chenopodiaceae	Dysphania	rhadinostachya subsp. rhadinostachya		G2	0.2	<2% Numerous		
	Solanaceae	Nicotiana	sp. (insufficient material)		G2	0.35	<2% Numerous		
	Chenopodiaceae	Rhagodia	eremaea		M2	1.1	<2% Few than 10		
	Chenopodiaceae	Enchylaeana	tomentosa		M2	1.1	<2% Few than 10		
	Euphorbiaceae	Euphorbia	tannensis		G2	0.4	<2% Few than 10		
	Poaceae	Eragrostis	dielsii		G1	0.05	<2% Numerous		
	Adiantaceae	Chielanthes	sieberi		G2	0.15	<2% Few than 10		
	Asteraceae	Podolepis	capillaris		G2	0.2	<2% Numerous		
Incidentals									
Collection Number	Family	Genus	Species	Status	Photo	WP	Count	Notes	
	Fabaceae	Acacia	ligulata						
	Myrtaceae	Eucalyptus	victrix						
	Asteraceae	Streptoglossa	cylindriceps						
	Santalaceae	Santalum	lanceolatum						
	Zygophyllaceae	Zygophyllum	aurantiacum						
	Scrophulariaceae	Eremophila	longifolia						
	Asteraceae	Pluchea	dunlopia						
	Proteaceae	Hakea	recurva subsp. arida						
	Frankeniaceae	Frankenia	laxiflora						
	Chenopodiaceae	Atriplex	vesicaria						

Vegetation Site Sheet: habitat information				Date:	14/09/2017	Site#:	Q15
Survey:	Murchison 2017-008						
Observers:	JF SP						
Location:	Curbur	gda94 utm					
MGA Zone:	50	Easting:	394924	Northing:	7072966	C06	
Site Type:	Quadrat	Dimensions:	20x20	Camera:	p132	From:	nw
Site Disturbance	Frequency	Water or Wind Erosion Evidence					
Mining/Infrastructure	Current Disturbance	tracks adjacent	Yes Water			Calcareous rise - Acacia ligulata shrubland	
Flood	Few recent 1-10yr						
Other	Current Disturbance	Drought	Climate	Vegetation Condition		Litter	
			Recent rain, no impact on veg	Poor			
Animal	Current Disturbance	Grazing - cattle rabbits	Site Drainage	Poor		Leaf Litter:	
Mining/Infrastructure	Current Disturbance	old fence adjacent	Good Drain			Moderate	
			Fire Frequency	Fire Intensity	Wood Litter:		
			Nil	Not applicable	Moderate		



Surface Components	Cover (if needed)		Soil	Landform				
Loose Soil		65	Major Component	Plain				
Humus/Litter			Sand					
Cracked Clay								
Fine Rocks (2-6mm)		20	Minor	Slope				
Medium gravel/pebbles (6-20mm)		10	Loamy	Gentle				
Coarse gravel/pebbles (20-60mm)		5						
Cobbly Cobbles (60-200mm)			Soil Colour	Slope Aspect				
Stony/stones (200-600mm)			Red	north				
Surface Plates/boulders (>600mm)			Orange	south				
Growth Form Table								
Tree >10m		Tree 2-10m		Tree <2m		Tree Mallee		
Palm		Shrub >2m	M1	Shrub 1-2m	M2	Shrub >1m	M3	
Cycads		Tussock Grass		Hummock Grass	G1	Sedge		
Vine		Herbs	G2	Other		Mallee Shrub		
Heath Shrub		Samphire Shrub		Chenopod		Rush		
Grass Tree		Other						
Stratum	U1	U2	U3	M1	M2	M3	G1	G2
%Cover				10-30%	10-30%	10-30%	2-10%	10-30%
Ht range (m)				2-5	1-2	0.01-1.0	0.01-0.3	0.01-0.03
Av ht (m)				4	1.5	0.3	0.15	0.2
Collection Number	Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo
	Fabaceae	Acacia	ligulata		M1	4.5	10-30%	
	Fabaceae	Acacia	ligulata		M2	1.8	2-10%	
	Fabaceae	Senna	artemisioides subsp. x artemisioides		M2	1.3	2-10%	
	Fabaceae	Senna	artemisioides subsp. x artemisioides		M3	0.7	<2% Few than 10	
	Asteraceae	Asteraceae sp. (juvenile)	sp. (insufficient material)		G2	0.2	10-30%	
	Chenopodiaceae	Salsola	australis		G2	0.25	10-30%	
	Chenopodiaceae	Maireana	?trichoptera		M3	0.25	2-10%	
	Solanaceae	Solanum	lasiophyllum		M3	0.3	<2% Few than 10	
	Solanaceae	Nicotiana	sp. (insufficient material)		G2	0.3	<2% Numerous	
	Chenopodiaceae	Enchylaeana	tomentosa		M3	0.8	2-10%	
	Goodeniaceae	Scaevola	tomentosa		M3	0.8	<2% Numerous	
	Chenopodiaceae	Chenopodium	gaudichaudianum		M2	1.8	<2% Few than 10	
	Fabaceae	Acacia	tetragonophylla		M3	0.9	<2% Few than 10	
	Amaranthaceae	Ptilotus	obovatus		M3	0.5	<2% Few than 10	
	Goodeniaceae	Scaevola	tomentosa		M2	1.1	<2% Numerous	
	Poaceae	Cenchrus	ciliaris	*	G1	0.4	<2% Few than 10	
	Brassicaceae	Brassica	tournefortii	*	G2	0.8	2-10%	
	Chenopodiaceae	Enchylaeana	tomentosa		M2	1.2	<2% Few than 10	
	Chenopodiaceae	Atriplex	semilunaris		G2	0.5	<2% Few than 10	
	Fabaceae	Senna	artemisioides subsp. x petiolaris		M3	0.8	<2% Few than 10	
	Frankeniaceae	Frankenia	laxiflora		M3	0.3	<2% Few than 10	
	Solanaceae	Lawrenca	densiflora		G2	0.2	<2% Few than 10	
	Fabaceae	Acacia	ligulata		M3	0.6	<2% Few than 10	
	Brassicaceae	Lepidium	sp. (insufficient material)		G2	0.3	<2% Few than 10	
Incidentals								
Collection Number	Family	Genus	Species	Status	Photo	WP	Count	Notes
	Scrophulariaceae	Eremophila	macmillaniana					
	Myrtaceae	Eucalyptus	victrix					
	Asteraceae	Centipeda	thespidioides					

Vegetation Site Sheet: habitat information				Date:	14/09/2017	Site#:	Q16
Survey:	Murchison 2017-008						
Observers:	JF SP						
Location:	Curbur	gda94 utm					
MGA Zone:	50	Eastings:	394845	Northing:	7073335	C07	
Site Type:	Quadrat	Dimensions:	20x20	Camera:	p134	From:	nw
Site Disturbance	Frequency	Water or Wind Erosion Evidence					
Mining/Infrastructure	Current Disturbance	road adjacent	Yes Water			Frankenia flats	
Flood	Few recent 1-10yr						
Other	Current Disturbance	Drought					
Mining/Infrastructure	Few recent 1-10yr	track through	Recent rain, no impact on veg			Very Good	
Animal	Current Disturbance	Grazing - cattle rabbits	Site Drainage				Leaf Litter:
			Seasonal Wet				Negligible
			Fire Frequency			Fire Intensity	Wood Litter:
			Nil			Not applicable	Negligible



Surface Components		Cover (if needed)		Soil		Landform		
Loose Soil		83		Major Component		Drainage		
Humus/Litter				Loam		Depression		
Cracked Clay		15						
Fine Rocks (2-6mm)				Minor		Slope		
Medium gravel/pebbles (6-20mm)				Sandy		Negligible		
Coarse gravel/pebbles (20-60mm)		<2						
Cobbly Cobbles (60-200mm)				Soil Colour		Slope Aspect		
Stony/stones (200-600mm)				Red				
Surface Plates/boulders (>600mm)				Orange				
Growth Form Table								
Tree >10m		Tree 2-10m		Tree <2m			Tree Mallee	
Palm		Shrub >2m		Shrub 1-2m			Shrub <1 m	M1
Cycads		Tussock Grass		Hummock Grass			Sedge	
Vine		Herbs		Other			Mallee Shrub	
Heath Shrub		Samphire Shrub		Chenopod			Rush	
Grass Tree		Other						
Stratum	U1	U2	U3	M1	M2	M3	G1	G2
%Cover				30-70%				
Ht range (m)				0.2-0.8				
Av ht (m)					0.4			
Collection Number	Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo
	Frankeniaceae	Frankenia	laxiflora		M1		0.4 30-70%	
	Chenopodiaceae	Maireana	?trichoptera		M1		0.4 2-10%	
	Chenopodiaceae	Atriplex	vesicaria		M1		0.8 2-10%	
	Chenopodiaceae	Tecticornia	indica subsp. bidens		M1		0.5 <2% Few than 10	
	Chenopodiaceae	Sclerolaena	cuneata		M1		0.2 <2% Few than 10	
	Chenopodiaceae	Maireana	triptera		M1		0.3 <2% Few than 10	
Incidentals								
Collection Number	Family	Genus	Species	Status	Photo	WP	Count	Notes
	Asphodelaceae	Asphodelus	fistulosus	*				
	Brassicaceae	Brassica	tournefortii	*				
	Fabaceae	Acacia	citrinoviridis					
	Solanaceae	Lawrenca	densiflora					

Vegetation Site Sheet: habitat information				Date:	14/09/2017	Site#:	Q17
Survey:	Murchison 2017-008						
Observers:	JF SP						
Location:	Curbur	gda94 utm					
MGA Zone:	50	Easting:	394847	Northing:	7073208	C08	
Site Type:	Quadrat	Dimensions:	20x20	Camera:	p137	From:	nw
Site Disturbance	Frequency	Water or Wind Erosion Evidence					
Mining/Infrastructure	Current Disturbance	tracks adjacent	Yes Water			Eucalyptus victrix with Melaleuca stereophloia group	
Flood	Few recent 1-10yr						
Other	Current Disturbance	Drought	Climate		Vegetation Condition	Litter	
Animal	Current Disturbance	Grazing - cattle rabbits	Recent rain, no impact on veg		Good		
			Site Drainage			Leaf Litter:	
			Good Drain			Moderate	
			Fire Frequency		Fire Intensity	Wood Litter:	
			Nil		Not applicable	Sparse	



Surface Components	Cover (if needed)	Soil	Landform
Loose Soil	65	Major Component	Plain
Humus/Litter		Loam	
Cracked Clay			
Fine Rocks (2-6mm)	20	Minor	Slope
Medium gravel/pebbles (6-20mm)	10	Sandy	Negligible
Coarse gravel/pebbles (20-60mm)	5		
Cobbly Cobbles (60-200mm)		Soil Colour	Slope Aspect
Stony/stones (200-600mm)		Red	east
Surface Plates/boulders (>600mm)		Orange	

Growth Form Table									
Stratum	U1	U2	U3	M1	M2	M3	G1	G2	
Tree >10m		Tree 2-10m	U1	Tree <2m			Tree Mallee		
Palm		Shrub >2m	M1	Shrub 1-2m	M2		Shrub <1 m	M3	
Cycads		Tussock Grass	G1	Hummock Grass			Sedge		
Vine		Herbs	G2	Other			Mallee Shrub		
Heath Shrub		Samphire Shrub		Chenopod			Rush		
Grass Tree		Other							
Stratum	U1	U2	U3	M1	M2	M3	G1	G2	
%Cover	<2%			2-10%	10-30%	2-10%	2-10%	2-10%	
Ht range (m)	3.5-6			2-3	1-2	0.2-1.0	0.1	0.01-0.15	
Av ht (m)	5			3	1.8	0.4	0.1	0.1	0.1

Family	Genus	Species	Status	Stratum	Height (m)	Cover (%)	Photo	Count
Myrtaceae	Eucalyptus	victrix		U1	4	<2% Few than 10		
Fabaceae	Acacia	citrinoviridis		U1	6	<2% Few than 10		
Myrtaceae	Melaleuca	stereophloia		M1	3.1	2-10%		
Myrtaceae	Melaleuca	stereophloia		M2	1.8	10-30%		
Myrtaceae	Melaleuca	stereophloia		M3	0.5	2-10%		
Fabaceae	Chorizema	racemosum		M3	0.5	<2% Few than 10		
Frankeniaceae	Frankenia	laxiflora		M3	0.4	10-30%		
Goodeniaceae	Goodenia	sp. (insufficient material)		G2	0.2	<2% Numerous		
Poaceae	Aristida	contorta		G1	0.1	2-10%		
Solanaceae	Solanum	lasiophyllum		M3	0.1	<2% Few than 10		
Chenopodiaceae	Maireana	?trichoptera		M3	0.15	<2% Few than 10		
Asteraceae	Centipeda	thespidioides		G2	0.2	<2% Few than 10		
Fabaceae	Senna	artemisioides subsp. oligophylla		M3	0.3	<2% Few than 10		
Amaranthaceae	Ptilotus	macrocephalus		G2	0.1	<2% Few than 10		
Herb sp. (juvenile)	Herb sp. (juvenile)	sp. (insufficient material)		G2	0.01	<2% Numerous		
Fabaceae	Acacia	citrinoviridis		M1	3	<2% Few than 10		

Incidentals							
Family	Genus	Species	Status	Photo	WP	Count	Notes
Loranthaceae	Lysinema	murrayi					

Flora likelihood of occurrence assessment guidelines

Likelihood of occurrence	Guideline
Known	Species recorded within 10 km of the Survey Area from field survey results.
Likely	Species previously recorded within 2 km and large areas of suitable habitat occur within 10 km of the Survey Area.
Possible	Species previously recorded within 2 km and areas of suitable habitat occur/may occur within 10 km of the Survey Area.
Unlikely	Species previously recorded within 2 km, but suitable habitat does not occur within 10 km of the Survey Area.
Highly unlikely	Species not previously recorded within 2 km, suitable habitat does not occur within 10 km of the Survey Area and/or the Survey Area is outside the natural distribution of the species.
Other considerations	Intensity of survey, availability of access, growth form type, recorded flowering times, cryptic nature of species

Source information - desktop searches

DBCA – DBCA (2007–) records of threatened flora, database search within the Survey Area (accessed September 2017)

NM – DBCA *NatureMap* (accessed September 2017)

PMST – DotEE Protected Matters Search Tool (PMST) to identify flora listed under the EPBC Act potentially occurring within 10 km of the Survey Area (accessed September 2017)

Definitions

Term	Description
survey area	the area subject to the current survey
locality	the area within an approximate 20 km radius of the survey area

Flora likelihood of occurrence assessment for conservation significant flora

Family	Taxon	Status		Description and closest record information (if available) (WA Herbarium 1998–, DBCA 2017)	Likelihood of occurrence	Source
		WC Act/ DBCA	EPBC Act			
Amaranthaceae	<i>Ptilotus beardii</i>	P3		Compact, perennial shrub, 0.15-0.5 m high, leaves linear, 2-10 mm long, 0.5-3 mm wide; spike pink, hemispherical, 15-30 mm long, 20-40 mm wide, 5-8 -flowered; tepals 14-17 mm long; 2 fertile stamens, staminodes 3; ovary glabrous; style slightly curved, 9.9-11.1 mm long, eccentrically fixed to ovary. Fl. pink-red, Aug to Oct. Clayey soils. Saline flats, low breakaways.	Possible – Not recorded however, Survey Area 2 supports suitable habitat.	NM
Asteraceae	<i>Angianthus micropodioides</i>	P3		Erect or decumbent annual, herb, 0.03-0.15 m high. Fl. yellow-white, Nov to Dec or Jan to Feb. Saline sandy soils. River edges, saline depressions, claypans.	High unlikely – outside known range.	NM
Asteraceae	<i>Roebuckiella halophila</i>	P3			Possible – habitat unknown and not recorded with Survey Area 1.	NM
Celastraceae	<i>Psammomoya implexa</i>	P3		Large, spreading, much-branched shrub, to 1 m high. Fl. white, Aug to Oct. Stony rises.	Unlikely – within known range, Survey Area 1 does not support suitable habitat.	NM
Chenopodiaceae	<i>Maireana murrayana</i>	P3		Erect shrub, ca 0.3 m high. Red clayey sand, dissected sandstone.	Likely – Not recorded within known range, Survey Areas 3 and 4 does support suitable habitat.	NM
Chenopodiaceae	<i>Roycea pycnophylloides</i>	Vu	En	Perennial, herb, forming densely branched, silvery mats to 1 m wide. Fl. Sep. Sandy soils, clay. Saline flats.	High unlikely – outside known range	EPBC
Fabaceae	<i>Acacia</i> sp. Muggon Station (S. Patrick & D. Edinger SP 3235)	P2		Flat topped, low shrub, to 1 m high, bark dark, smooth, finely furrowed; phyllodes erect, 3-nerved. Red-brown	Possible – Not recorded however, Survey Area 2 supports suitable habitat.	NM

Family	Taxon	Status		Description and closest record information (if available) (WA Herbarium 1998–, DBCA 2017)	Likelihood of occurrence	Source
		WC Act/ DBCA	EPBC Act			
				loam, brown clay loam, sandstone, quartz. High rocky ridges.		
Gyrostemonaceae	<i>Gyrostemon reticulatus</i>	Cr	Cr	Shrub, ca 1 m high, presumed extinct.	High unlikely – outside known range	EPBC
Lamiaceae	<i>Dasymalla axillaris</i>	Cr	Cr	Shrub.	High unlikely – outside known range	EPBC
Lamiaceae	<i>Hemigenia</i> sp. Talling (H. Pringle 3323)	P1		Erect shrub, 1 m high. Fl. purple, Oct. Scrub.	Possible – habitat unknown and not recorded with Survey Area 1.	NM
Lamiaceae	<i>Hemigenia tysonii</i>	P3		Upright shrub, to 0.5 m high. Fl. purple-blue-pink/white, May or Jul to Dec. Red sand, sandy clay, lateritic sand. Flats, sand dunes, hills.	Likely – Not recorded however, Survey Area 2 supports suitable habitat.	NM
Lamiaceae	<i>Prostanthera pedicellata</i>	P1		Shrub, 0.1-1 m high. Fl. pink-red, Aug to Nov. Loam & ironstone gravel. Plains.	Unlikely - Survey area 1 does not support suitable habitat.	NM
Lamiaceae	<i>Prostanthera tysoniana</i>	P3		Erect shrub, 0.2-0.5 m high. Fl. white-cream, Sep. Red sandy soils.	Likely – Not recorded however, Survey Area 2 supports suitable habitat.	NM
Myrtaceae	<i>Darwinia</i> sp. Morawa (C.A. Gardner 2662)	P3		Shrub, to 0.3 m high, to 2 m wide. Fl. red-purple, Oct. Clay over granite, yellow/brown clayey sand. Flat, small hill.	Unlikely - Survey Area 1 does not support suitable habitat.	NM
Myrtaceae	<i>Enekbatus dualis</i>	P1		Shrub, to 0.75 m high. Fl. pink, Sep. Orange-brown silty sand, brown clayey sand, granite. Low hills, gentle mid to upper slopes, rock outcrops.	Unlikely - Survey Area 1 does not support suitable habitat.	NM
Myrtaceae	<i>Verticordia chrysostachys</i> var. <i>pallida</i>	P3		Erect to spreading shrub, 0.6-2 m high. Fl. yellow/cream, Sep to Dec or Jan. Yellow sand. Sandplains, sand dunes.	High unlikely – outside known range	NM
Montiaceae	<i>Calandrinia butcherensis</i>	P1		Annual herb, semi-erect to erect. Undulating sandplain, slopes of small dunes in red sand or red sandy loam. Often associated with Open	Unlikely – not recorded, Survey Area 2 does not support suitable habitat.	NM

Family	Taxon	Status		Description and closest record information (if available) (WA Herbarium 1998–, DBCA 2017)	Likelihood of occurrence	Source
		WC Act/ DBCA	EPBC Act			
				shrubland over open shrubs and herbs.		
Proteaceae	<i>Grevillea globosa</i>	P3		Spreading, non-lignotuberous shrub, 1-3 m high. Fl. cream & white & green/red-brown, Jan or Jun or Nov. Red loam, yellow sand.	Likely - – Not recorded however, Survey Area 1 supports suitable habitat.	NM
Rutaceae	<i>Philotheca citrina</i>	P1		Erect, much-branched shrub, 0.6-1.3 m high. Fl. green-yellow, May to Aug. Clay. Granite breakaways.	Unlikely – Survey Area 2 does not support suitable habitat.	NM
Scrophulariaceae	<i>Eremophila nivea</i>	Cr	En	White/grey, tomentose shrub, 1-2 m high. Fl. blue-purple-violet, Aug to Oct. Sandy clay, clay loam. Undulating plains, roadverges.	High unlikely – outside known range	EPBC
Scrophulariaceae	<i>Eremophila viscida</i>	En	En	Shrub, 1.2-4 m high. Fl. green-white-yellow, Sep to Nov. Granitic soils, sandy loam. Stony gullies, sandplains.	High unlikely – outside known range	EPBC
Stylidiaceae	<i>Stylidium pendulum</i>	P1		Caespitose perennial, herb, 0.09-0.35 m high, Leaves tufted, broadly linear to narrowly oblanceolate, 3-14 cm long, 0.5-2 mm wide, apex mucronate, margin minutely toothed, glabrous. Scape glandular throughout. Inflorescence racemose. Fl. yellow-orange, Sep to Oct. Clayey sand or sandy loam, granite. Upper slopes, often near rock outcrops. Shrubland or open mallee woodland.	Unlikely – Survey Area 2 does not support suitable habitat.	NM

Appendix E – Fauna data

Fauna species list

Fauna likelihood of occurrence guidelines

Fauna likelihood of occurrence assessment

Fauna species recorded in the survey area during the field survey

Family	Genus	Species	Common Name	Status	Survey Area 1	Survey Area 2	Survey Area 3	Survey Area 4
Amphibians								
Hylidae	<i>Litoria</i>	<i>rubella</i>	Desert Tree Frog				X	
Birds								
Acanthizidae	<i>Acanthiza</i>	<i>apicalis</i>	Inland Thornbill			X		
Acanthizidae	<i>Aphelocephala</i>	<i>leucopsis</i>	Southern Whiteface			X	X	X
Acanthizidae	<i>Pyrrholaemus</i>	<i>brunneus</i>	Redthroat					X
Acanthizidae	<i>Smicromnis</i>	<i>brevirostris</i>	Weebill		X	X	X	X
Acciptridae	<i>Aquila</i>	<i>audax</i>	Wedge-tailed Eagle					X
Acciptridae	<i>Haliastur</i>	<i>sphenurus</i>	Whistling Kite			X		
Aegothelidae	<i>Aegotheles</i>	<i>cristatus</i>	Australian Nightjar-owlet			X		
Artamidae	<i>Artamus</i>	<i>personatus</i>	Masked Woodswallow			X		
Cacatuidae	<i>Cacatua</i>	<i>roseicapilla</i>	Galah		X	X		X
Cacatuidae	<i>Nymphicus</i>	<i>hollandicus</i>	Cockateil			X		
Campephagidae	<i>Coracina</i>	<i>novaehollandiae</i>	Black-faced Cuckoo-shrike					X
Campephagidae	<i>Lalage</i>	<i>tricolor</i>	White-winged Triller			X		X
Columbidae	<i>Geopelia</i>	<i>strita placida</i>	Peaceful Dove			X		
Columbidae	<i>Ocyphaps</i>	<i>lophotes</i>	Crested Pigeon		X	X	X	X
Columbidae	<i>Phaps</i>	<i>chalcoptera</i>	Common Bronzewing			X		
Corvidae	<i>Corvus</i>	<i>coronoides</i>	Australian Raven		X			
Corvidae	<i>Corvus</i>	<i>orru</i>	Torresian Crow			X		X
Craticidae	<i>Cracticus</i>	<i>nigrogularis</i>	Pied Butcherbird			X	X	X
Craticidae	<i>Cracticus</i>	<i>tibicen</i>	Australian Magpie					X
Dromaiidae	<i>Dromaius</i>	<i>novaehollandiae</i>	Emu		X			
Falconidae	<i>Falco</i>	<i>berigora</i>	Brown Falcon			X		
Maluridae	<i>Malurus</i>	<i>splendens</i>	Splendid Fairy-wren			X		
Meliphagidae	<i>Acanthagenys</i>	<i>rufogularis</i>	Spiny-cheeked Honeyeater		X	X	X	X

Family	Genus	Species	Common Name	Status	Survey Area 1	Survey Area 2	Survey Area 3	Survey Area 4
Meliphagidae	<i>Epthianura</i>	<i>tricolor</i>	Crimson Chat		X			
Meliphagidae	<i>Gavicalis</i>	<i>virescens</i>	Singing Honeyeater			X		X
Meliphagidae	<i>Lichmera</i>	<i>indistincta</i>	Brown Honeyeater			X		
Meliphagidae	<i>Manorina</i>	<i>flavigula</i>	Yellow-throated Miner			X		
Monarchidae	<i>Grallina</i>	<i>cyanoleuca</i>	Magpie-lark		X	X		X
Motacillidae	<i>Anthus</i>	<i>australis</i>	Australian Pipit			X		
Oreoicidae	<i>Oreoica</i>	<i>gutturalis</i>	Crested Bellbird			X		
Pachycephalidae	<i>Colluricincla</i>	<i>harmonica</i>	Grey Shrike-thrush			X	X	
Petroicidae	<i>Eopsaltria</i>	<i>australis</i>	Yellow Robin					X
Petroicidae	<i>Microeca</i>	<i>fascinans</i>	Jacky Winter		X			
Pomatostomidae	<i>Pomatostomus</i>	<i>superciliosus</i>	White-browed Babblers					X
Pomatostomidae	<i>Pomatostomus</i>	<i>temporalis</i>	Grey-crowned Babbler			X		
Psittacidae	<i>Neophema</i>	<i>bourkii</i>	Bourke's Parrot		X			
Psittacidae	<i>Platycercus</i>	<i>zonarius</i>	Australian Ringneck		X			
Psittacidae	<i>Platycercus</i>	<i>varius</i>	Mulga Parrot			X		X
Psophodidae	<i>Psophodes</i>	<i>occidentalis</i>	Chiming Wedgebill			X		
Pterocidae	<i>Petroica</i>	<i>goodenovii</i>	Red-capped Robin		X	X		X
Rhipiduridae	<i>Rhipidura</i>	<i>leucophrys</i>	Willie Wagtail			X		
Mammals								
Bovidae	<i>Bos</i>	<i>taurus</i>	European Cattle	*	X	X	X	X
Bovidae	<i>Capra</i>	<i>hircus</i>	Goat	*	X	X		
Canidae	<i>Vulpes</i>	<i>vulpes</i>	Red Fox	*	X			
Canidae	<i>Canis</i>	<i>lupis</i>	Dog	*				X
Equidae	<i>Equus</i>	<i>asinus</i>	Donkey	*		X	X	X
Felidae	<i>Catus</i>	<i>felis</i>	Cat	*	X	X		
Leporidae	<i>Ocyctolagus</i>	<i>cuniculus</i>	Rabbit	*	X		X	X
Macropodidae	<i>Macropus</i>	<i>robustus</i>	Euro	*	X	X	X	X

Family	Genus	Species	Common Name	Status	Survey Area 1	Survey Area 2	Survey Area 3	Survey Area 4
Macropodidae	<i>Macropus</i>	<i>rufus</i>	Red Roo		X			
Muridae	<i>Notomys</i>	<i>alexis</i>	Spinifex Hopping Mouse			X		
Tachyglossidae	<i>Tachyglossus</i>	<i>aculeatus</i>	Short-beaked Echidna		X			X
Vespertilionidae	<i>Chalinolobus</i>	<i>gouldii</i>	Gould's Wattle Bat					
Reptiles								
Agamidae	<i>Ctenophorus</i>	<i>caudicinctus</i>	Ring-tailed Dragon				X	
Agamidae	<i>Ctenophorus</i>	<i>scutulatus</i>	Lozenge-marked Dragon			X		
Agamidae	<i>Diporiphora</i>	<i>amphiboluroides</i>	Mulga Dragon					
Agamidae	<i>Pogona</i>	<i>minor</i>	Western Bearded Dragon			X		
Gekkonidae	<i>Gehyra</i>	<i>variegata</i>	Variegated Dtella					X
Gekkonidae	<i>Heteronotia</i>	<i>binoei</i>	Bynoe's Gecko			X		
Scincidae	<i>Lerista</i>	<i>macropisthopus</i> subsp. <i>fuscicep</i>	Unpatterned Robust Slider			X	X	
Scincidae	<i>Menetia</i>	<i>greyii</i>	Common Dwarf Skink			X		
Varanidae	<i>Varanus</i>	<i>gouldii</i>	Gould's Goanna		X		X	X

* – Introduced species to WA.

Parameters of fauna likelihood of occurrence assessment

Assessment outcome	Description
Present	Species recorded during the field survey or from recent, reliable records from within or close proximity to the survey area.
Likely	Species are likely to occur in the survey area where there is suitable habitat within the survey area and there are recent records of occurrence of the species in close proximity to the survey area. OR Species known distribution overlaps with the survey area and there is suitable habitat within the survey area.
Unlikely	Species assessed as unlikely include those species previously recorded within 10 km of the survey area however: <ul style="list-style-type: none"> • There is limited (i.e. the type, quality and quantity of the habitat is generally poor or restricted) habitat in the survey area. • The suitable habitat within the survey area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the survey area. OR Those species that have a known distribution overlapping with the survey area however: <ul style="list-style-type: none"> • There is limited habitat in the survey area (i.e. the type, quality and quantity of the habitat is generally poor or restricted). • The suitable habitat within the survey area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the survey area.
Highly unlikely	Species that are considered highly unlikely to occur in the survey area include: <ul style="list-style-type: none"> • Those species that have no suitable habitat within the survey area. • Those species that have become locally extinct, or are not known to have ever been present in the region of the survey area.

Source information - desktop searches

NM – DBCA *NatureMap* (accessed September 2017)

PMST – DotEE Protected Matters Search Tool (PMST) to identify fauna listed under the EPBC Act potentially occurring within 10 km of the Survey Area (accessed September 2017)

DBCA – DBCA (2007–) records of threatened fauna from a database search within the Midwest DBCA region (accessed September 2017)

Other – Results from *Square Kilometre Array (SKA) Main Roads Upgrade Fauna Assessment* by Bamford Consulting Ecologists (BCE) (2016)

Definitions

Term	Description
survey area	the area subject to the current survey
locality	the area within an approximate 20 km radius of the survey area

Fauna likelihood of occurrence assessment

Species Name	Status		Desktop search				Description and habitat requirements	Likelihood of occurrence
	EPBC Act	WC Act	NM	PMST	DBCA	Other		
Birds								
<i>Ardea alba</i> (Great Egret)	Ma	IA		X	X		The eastern Great Egret has been reported in a wide range of wetland habitats, including swamps and marshes; margins of rivers and lakes; damp or flooded grasslands, pastures or agricultural lands; reservoirs; sewage treatment ponds; drainage channels; salt pans and salt lakes; salt marshes; estuarine mudflats, tidal streams; mangrove swamps; coastal lagoons; and offshore reefs. Minor breeding sites are widely scattered across the species' distribution. Non-breeding birds have been recorded across much of Australia, but avoid the driest regions of the western and central deserts (DotE 2016).	Unlikely - Irregular Visitor Habitat - There is no suitable habitat within the Survey Areas.
<i>Ardea ibis</i> (Cattle Egret)	Ma	IA		X	X		The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It has occasionally been seen in arid and semi-arid regions. This inland spread is believed to be due to the construction of artificial waterways. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures. It has been recorded on earthen dam walls and ploughed fields. It is commonly associated with the habitats of farm animals, particularly cattle, but also pigs, sheep, horses and deer. The Cattle Egret is known to follow earth-moving machinery and has been located at rubbish tips. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. They have sometimes been observed in swamps with tall emergent vegetation. In Western Australia and the Northern Territory, the Cattle Egret is located from Wyndham to Arnhem Land (DotE 2016).	Unlikely - Irregular Visitor Habitat - There is no suitable habitat within the Survey Areas. Records – Nearest record 85 km south-east of Survey Area 2.

Species Name	Status		Desktop search				Description and habitat requirements	Likelihood of occurrence
	EPBC Act	WC Act	NM	PMST	DBCA	Other		
<i>Calidris acuminata</i> (Sharp-Tailed Sandpiper)	MM	IA		X	X		In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. Sometimes they occur on rocky shores. They are widespread from Cape Arid to Carnarvon, around coastal and subcoastal plains of Pilbara Region to south-west and east Kimberley Division. Inland records indicate the species is widespread and scattered from Newman, east to Lake Cohen, south to Boulder and west to Meekatharra (DotE 2016).	Unlikely - Irregular Visitor Habitat - There is no suitable habitat within the Survey Areas. Records – Nearest record 93 km south of Survey Area 1.
<i>Calidris subminuta</i> (Long-Toed Stint)	MM	IA			X		In Australia, the Long-toed Stint occurs in a variety of terrestrial wetlands. They prefer shallow freshwater or brackish wetlands including lakes, swamps, river floodplains, streams, lagoons and sewage ponds. The species is also fond of areas of muddy shoreline, growths of short grass, weeds, sedges, low or floating aquatic vegetation, reeds, rushes and occasionally stunted samphire. It has been observed at open, less vegetated shores of larger lakes and ponds and is common on muddy fringes of drying ephemeral lakes and swamps, and frequents permanent wetlands such as reservoirs and artificial lakes. The species has occasionally been recorded in the Gascoyne Region, around Lake Wooleen, Meeberrie Station and McNeill Claypan. Inland records include Lake Brown, Hannan Lake, Lake Biolet, Newman Sewage Farm and Lake Gregory (DotE 2016).	Unlikely - Irregular Visitor Habitat - There is no suitable habitat within the Survey Areas. Records - 44 km south of Survey Area 2.

Species Name	Status		Desktop search				Description and habitat requirements	Likelihood of occurrence
	EPBC Act	WC Act	NM	PMST	DBCA	Other		
<i>Thinornis rubricollis</i> (Hooded Plover)		P4		X	X		The Hooded Plover can be found on inland and coastal salt lakes as well as coastal beaches, with a preference for wide sandy beaches with large amounts of seaweed and backed by extensive open dunes. After breeding, many migrate to larger salt lakes like Lake Clifton south of Mandurah, or Lake Gore and Warden in the Esperance region. Their distribution extends from Horrocks to Eyre on the Nullarbor, with their largest numbers on the Esperance lakes, as well as inland on some of the smaller ephemeral salt lakes, particularly in the Salmon Gum woodlands north of Esperance and those north west of Hyden and between Hyden and Norseman (Morcombe 2004; Nevill 2013).	Highly unlikely Habitat – there is no suitable habitat. Records – Nearest record is 130 km south of Survey Area 1.
<i>Elanus scriptus</i> (Letter-Winged Kite)		P4			X		The Letter-Winged Kite inhabits open or sparsely wooded country and rests in <i>Eucalyptus coolabah</i> during the day. They nest in the cooler months when the rats often reach their peak, with nesting peaking in July. The nest is an open platform of sticks from herbage and shrubs. The Letter-Winged Kite occurs in the eastern arid zone of Australia but occasionally irrupts to all parts of the continent. Population cycles appear to be linked to those of the principal prey, the plague rat <i>Rattus villosimus</i> , which has population explosions following high rainfall (IUCN Redlist 2016).	Unlikely – irregular visitor Habitat – there is no suitable habitat. Records - Nearest record 52 km west of Survey Area 1.
<i>Falco hypoleucos</i> (Grey Falcon)		Vu			X		The Grey Falcon inhabits lightly timbered country, especially stony, inland plains and Acacia scrub, gibber deserts, sandridges, pastoral lands, and timbered watercourses, but seldom in driest deserts. Its distribution is centred on inland drainage systems. It also hunts in treeless areas and frequents tussock grassland and open woodland, especially in winter (Morcombe 2004; Pizzey & Knight 2012). It can mostly be seen on the northwest coast from Shark Bay to east Kimberley, and in the Pibara and desert regions (Nevill 2013; Pizzey & Knight 2012).	Likely - Irregular Visitor Habitat - The Grey Falcon may utilise the survey areas for dispersal and hunting. Open shrubland habitat type recorded from the Survey Areas. Records – Nearest record 12 km north of Survey Area 2.

Species Name	Status		Desktop search				Description and habitat requirements	Likelihood of occurrence
	EPBC Act	WC Act	NM	PMST	DBCA	Other		
<i>Falco peregrinus</i> (Peregrine Falcon)		OS			X	X	The Peregrine Falcon is found on and near cliffs, gorges, timbered watercourses, riverine environments, wetlands, plains, open woodlands, and pylons and spires of buildings, though less frequently in desert regions (Morcombe 2004; Pizzey & Knight 2012). They are not common but can be found almost anywhere throughout WA and in the southwest, including particularly at Fitzgerald River, Stirling Range, Porongurup National Parks, Kondinin, and Peak Charles, with many more locations north of Perth (Nevill 2013).	Unlikely Habitat – This species occupies a diverse range of habitats particularly open plains, it is likely to occur within the survey area. However, there are no breeding opportunities present within the survey areas. Records – The nearest record is 35 km south of Survey Areas 1 and 2.
<i>Leipoa ocellata</i> (Malleefowl)	Vu	Vu	X	X	X	X	The Malleefowl generally occurs in semi-arid areas of WA, in shrublands and low woodlands that are dominated by mallee vegetation, as well as native pine <i>Callitris</i> woodlands, <i>Acacia</i> shrublands, paperbark, skheoak, Broombush <i>Melaleuca uncinata</i> vegetation, eucalypt woodlands, or coastal heathlands. Mostly they are found where there are sandy or gravel soils. The nest is a large mound of sand or soil and organic matter (Jones & Goth 2008; Morcombe 2004; Nevill 2013). In WA they are found from the southwest Nullarbor to Albany, north, and then west from Moore River up to Shark Bay, past Cue, across to Wiluna and east to the northern Victoria Desert south of the Blackstone Ranges (Nevill 2013; Pizzey & Knight 2012).	Likely Habitat – There is suitable habitat for this species within survey area 1. No evidence of this species presence (i.e. mounds or tracks) were recorded during this survey. The Survey Area may provide dispersal habitat for the Malleefowl. Records – there are two historical records (y. 1970) within 2 km of the Survey Area 1
<i>Merops ornatus</i> (Rainbow Bee-eater)	Ma	IA		X	X	X	The Rainbow Bee-eater is found throughout the state except in desert regions, particularly in open forests and woodlands, with sandy, loamy soil, but also sandridges, sandpits, riverbanks, mangroves, rainforest shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. They also inhabit sand dune systems in coastal areas and at inland sites that are in close proximity to water (Morcombe 2004; Pizzey & Knight 2012). They dig out nests in open areas where there is relatively soft but firm sands, either on flat ground or in the side of a sandy bank (Nevill 2013).	Likely Habitat – There is suitable foraging habitat within all survey areas. The drainage line within the survey areas 3 and 4 may provide suitable nesting opportunities for the species. The drainage line does however, form part of broader drainage system that

Species Name	Status		Desktop search				Description and habitat requirements	Likelihood of occurrence
	EPBC Act	WC Act	NM	PMST	DBCA	Other		
								also provides suitable nesting habitat. Records – There records within 2 km of all Survey Areas.
<i>Motacilla cinerea</i> (Grey Wagtail)	MM	IA		X			The Grey Wagtail is an opportunistic migrant to Australia. The species typically migrates to Indonesia occasionally landing in Australia. Most records for the species are from Northern Australia and South Australia (Morcombe 2004). The non-breeding habitat only of the Grey Wagtail has a strong association with water, particularly rocky substrates along water courses but also lakes and marshes (DotE 2016). It can be found mainly in banks and rocks in fast-running freshwater habitats: rivers, creeks, streams, and around waterfalls, both in forest and open country; but occurs almost anywhere during migration (Johnstone & Storr 2004).	Highly Unlikely - Geographically restricted to Northern Australia in particular the Kimberley Region.
<i>Motacilla flava</i> (Yellow Wagtail)	MM	IA		X			The Yellow Wagtail occupies a range of damp or wet habitats with low vegetation, from damp meadows, marshes, waterside pastures, sewage farms and bogs to damp steppe and grassy tundra (IUCN Redlist 2016). In Australia, the Yellow Wagtail is a very uncommon except in the Broome region. They can often be found in northern towns wherever there are well watered grass areas (DotEE 2017).	Highly Unlikely - Geographically restricted to Northern Australia in particular the Pilbara Region.
<i>Pezoporus occidentalis</i> (Night Parrot)	En	Cr		X			The Night Parrot is a highly elusive nocturnal ground dwelling parrot found in arid and semi-arid areas that are characterised by having dense, low vegetation. Based on accepted records, the habitat of the Night Parrot consists of <i>Triodia</i> grasslands in stony or sandy environments and of samphire and chenopod shrublands, including genera such as <i>Atriplex</i> , <i>Bassia</i> and <i>Maireana</i> , on floodplains and claypans and on the margins of saltlakes, creeks or other sources of water (Parker 1980). It has also been observed to enter dense <i>Muehlenbecki</i> growth when flushed from a more typical habitat (DotEE 2017).	Highly Unlikely - Locally extinct.
<i>Plegadis falcinellus</i> (Glossy Ibis)	MM	IA			X		The Glossy Ibis' preferred habitat for foraging and breeding are shallow, grassy, fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, and cultivated areas under irrigation. The species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes and coastal lagoons, and in wooded swamps, artificial wetlands (such as irrigated fields), and in mangroves. It may retreat	Unlikely – irregular visitor Habitat – there is no suitable habitat. Records – The nearest record is 3 km east of Survey Area 1.

Species Name	Status		Desktop search				Description and habitat requirements	Likelihood of occurrence
	EPBC Act	WC Act	NM	PMST	DBCA	Other		
							to permanent wetlands and/or coastal areas (including tidal wetlands) during drought. Within Australia, the Glossy Ibis is generally located east of the Kimberley in WA and Eyre Peninsula in SA. The species is also known to be patchily distributed in the rest of WA (DotE 2016).	
Mammals								
<i>Dasyurus geoffroii</i> (Chuditch, Western Quoll)	Vu	Vu		X	X		The Chuditch inhabits eucalypt forest (especially Jarrah, <i>E. marginata</i>), dry woodland, mallee shrublands, heaths, and desert, particularly in the south coast of WA. They also occur at lower densities in drier woodland and mallee shrubland in the goldfields and wheatbelt, as well as in Kalbarri National Park (translocated). Chuditch require adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) to survive (DEC 2012). In Jarrah forest, Chuditch populations occur in both moist, densely vegetated, steeply sloping forest and drier, open, gently sloping forest (Van Dyck & Strahan 2008). The species can travel large distances, and for this reason requires habitats that are of a suitable size and not excessively fragmented (DEC 2012).	Highly Unlikely Records – The nearest record is 130 km west of Survey Area 1.
<i>Petrogale lateralis</i> subsp. <i>lateralis</i> (Black-Flanked Rock-Wallaby, Warru)	Vu	En			X		Current known Black-flanked Rock-wallaby populations remain restricted to suitable habitat in the Little Sandy Desert, Cape and Calvert Ranges, with seven populations in the Wheatbelt region, Barrow and Salisbury Islands, and Ningaloo Station. Populations have been re-established via translocation to a number of sites in the Avon Valley and Cape le Grand National Parks and Paruna Sanctuary. The habitat varies between colonies but always involves grassland feeding habitat for feeding in close proximity to cliff, rock-pile, talus or escarpment refuge habitat. Rock cliffs or other steep substrates with adequate shelter and refuge are essential for breeding (Van Dyck & Strahan 2008).	Unlikely Habitat – There is no suitable habitat within the survey areas. Record – There is a historical record 62 km south-east from Survey Area 2.
<i>Sminthopsis longicaudata</i> (Long-Tailed Dunnart)		P4			X	X	The Long-tailed Dunnart occurs throughout the Gibson Desert, Murchison, southern Canarvon Basin and the Pilbara. Its habitat includes rugged, rocky areas with hummock grasses, shrubs and tall open shrublands and woodlands (Van Dyck & Strahan 2008).	Unlikely Habitat – There is no suitable habitat within the survey areas. Record – There is a historical record 65 km south-east from Survey Area 3 and 4.

Species Name	Status		Desktop search				Description and habitat requirements	Likelihood of occurrence
	EPBC Act	WC Act	NM	PMST	DBCA	Other		
Reptiles								
<i>Cyclodomorphus branchialis</i> (Gilled Slender Bluetongue)		Vu			X	X	The Gilled Slender Blue-tongue occurs across the southern and western area of the Murchison bioregion with the species distribution fragmented due to the lack of suitable habitat. This species is a nocturnal ground-dwelling skink which shelters in spinifex, leaf litter and fall timber. Fauna survey conducted at Blue Hills have found the species to occur on the ridges of the BIFs and it was not found in the surrounding area (DBCA, 2007).	Unlikely Habitat – There is limited suitable habitat within Survey Area 1 (nearest record). This Survey Area lacks suitable leaf and wood litter cover. Record – There nearest record in 48 km east of Survey Area 1.
<i>Egernia stokesii</i> subsp. <i>badia</i> (Western Spiny-Tailed Skink, black form)	En	Vu		X	X	X	The Western Spiny-tailed Skink (black form) was originally known from a limited number of sites on Austin Downs Station, east of Cue (e.g. Walga, Wurrah and Woolgerong Rocks). They were restricted to massive granite exposures ('whalebacks') with a variable cover of loose boulders and pockets of soil and low shrubland vegetation. These outcrops are separated by open low woodland and shrubland. The skinks live in narrow crevices and boulders and are observed most readily when they bask close to their refugia. Hollow logs are used as refuge sites in woodland habitat. Preferred refuges consist of piles of several, overlapping, hollow logs providing a combination of basking and shelter sites. An increasing number of skinks are being located in altered habitat under piles of wood, scrap metal or under buildings on private property (DotE 2016). Surveys between 2006 and 2009 identified over 70 new locations in the Murchison region (ecologia Environment 2010).	Unlikely Habitat – There is no suitable habitat within the Survey Areas. Record – the nearest recorded in 51 km south-east of Survey Area 2.

Species Name	Status		Desktop search				Description and habitat requirements	Likelihood of occurrence
	EPBC Act	WC Act	NM	PMST	DBCA	Other		
Invertebrates								
<i>Idiosoma nigrum</i> (Shield-backed Trapdoor Spider)	Vu	Vu		X	X	X	The Shield-backed Trapdoor Spider is endemic to semi-arid south-west Western Australia. It occurs in a number of severely fragmented populations in the central and northern Wheatbelt (e.g. Minnivale and East Yorkrakine). Further north, the species occurs in more arid areas in the Midwest (e.g. large isolated ranges at Jack Hills, Weld Range and Blue Hills) and coastal areas of the Midwest (e.g. Zuytdorp Station north of the Murchison River and Nanga Station south of Shark Bay). The arid Midwest populations are naturally fragmented or isolated because they persist only on ranges, but the Wheatbelt and coastal Midwest populations are all severely fragmented as a result of land clearing (DotEE 2017).	Unlikely – not recorded Habitat – There is suitable habitat with Survey Area 1 however, this was not recorded from targeted searches. Record – The nearest record is 76 km east of Survey Areas 3 and 4.

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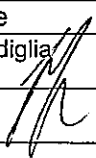
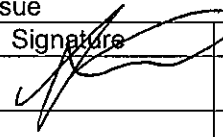
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