Brand Highway, Regans Ford
Biological Survey
September 2016

Prepared for
Main Roads Western Australia

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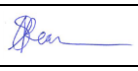
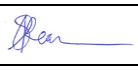
A	10/11/2016	E. Fitzgerald	S. Pearse	
0	23/11/2016	E. Fitzgerald	S. Pearse	

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Abbreviations

Abbreviation	Definition
Astron	Astron Environmental Services Pty Ltd
BAM Act	*Biosecurity and Agriculture Management Act 2007*
cm	Centimetre
DAFWA	Department of Agriculture and Food Western Australia
DBH	Diameter at Breast Height
DEC	Department of Environment and Conservation
DotEE	Department of the Environment and Energy
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Area
FCT	Floristic community type
GDA94	Geocentric Datum of Australia 1994
GPS	Global Positioning System
ha	Hectares
IBRA	Interim Biogeographic Regionalisation for Australia
km	Kilometre
m	Metre
mm	Millimetre
Main Roads	Main Roads Western Australia
MGA50	Map Grid of Australia
MNES	Matters of National Environmental Significance
P	Priority
Parks and Wildlife	Department of Parks and Wildlife
PEC	Priority Ecological Community
PMST	Protected Matters Search Tool
SCP	Swan Coastal Plain
SLK	Straight line kilometre
sp.	Species (singular)
subsp.	Subspecies
T	Threatened
TEC	Threatened Ecological Community
TPFL	Threatened and Priority Flora Database (administered by Parks and Wildlife)
TP List	Threatened and Priority Flora List (administered by Parks and Wildlife)
WA Herb	Western Australian Herbarium
WC Act	*Wildlife Conservation Act 1950*
WoNS	Weeds of National Significance
UFI	Unique Feature Identifier

Executive Summary

Astron was engaged to undertake a biological survey for the proposed road formation and seal widening of the Brand Highway in the vicinity of Regans Ford. The survey area is 109.2 ha and consists of three sections:

- SLK 65.1 to 66.57 (8.8 ha)
- SLK 71.4 to 74.18 (49.1 ha)
- SLK 82.11 to 86.0 (51.2 ha).

The 65.1 to 66.57 SLK section of the survey area occurs along the eastern boundary of the Moore River National Park. The survey area partially overlaps three 'resource enhancement' wetlands. A further wetland, not assessed as part of the geomorphic wetlands of the Swan Coastal Plain, is located at the northern end of the survey area. Two of the wetlands were inundated at the time of the survey.

The survey area includes 91 ha of native vegetation and 18.2 ha of cleared vegetation. More than half the survey area is in 'excellent' condition. In general, weed proliferation was immediately adjacent to cleared tracks, roads and agricultural areas, with little incursion into remnant vegetation.

Two vegetation types have affinity with the State-listed priority ecological community 'Swan Coastal Plain *Banksia attenuata – Banksia menziesii* woodlands'. This vegetation is also likely to represent the recently listed *Environment Protection and Biodiversity Conservation Act 1999* Endangered threatened ecological community 'Banksia Woodlands of the Swan Coastal Plain'. These vegetation types represent 70.1 ha (64%) of the survey area, and are located in each of the three sections of survey area.

No Threatened flora was recorded within the survey area. *Haemodorum loratum* P3 was recorded from two locations. Forty-five weed species were recorded, none of which are listed as a weed of national significance or listed as declared pest plants in Western Australian under the *Biosecurity and Agriculture Management Act 2007*.

The survey area contains 80 ha of foraging habitat for Carnaby's black-cockatoos, and 21 flora species that are known foraging resources. In addition, the survey area contains 7.8 ha of breeding habitat including five *Corymbia calophylla* trees that have a diameter at breast height over 50 cm, classified as mature trees and potential roost sites according the referral guidelines. Four of these mature trees contain suitable nest hollows for breeding, however, none of the trees or hollows showed signs of current or historic breeding/roosting.

Regans Ford is a known breeding site for Carnaby's black-cockatoos and breeding and roosting sites have been recorded in the native vegetation surrounding the survey area, the closest sites occurring within 1 km. The survey recorded one conservation significant species, the Carnaby's black-cockatoo. In addition a further eight conservation significant species have been classified as having a 'high' likelihood of occurring in the survey area; eastern great egret, glossy ibis, common greenshank, wood sandpiper, red-necked stint, ruff, rainbow bee-eater and western quoll.

Although seven migratory shorebirds and waders are considered to have a high likelihood of occurrence in the survey area, the Ephemeral Wetlands habitat is considered marginal compared with larger and better suited habitats found at nearby lakes, including at Beermullah Lake, Doopiter Swamp, Matilda Lake and Karakin Lake. As such, the conservation significant fauna recorded or considered likely to occur in the survey area are unlikely to be reliant upon the habitats present.

Two Matters of National Environmental Significance occur in the survey area and are likely to require Commonwealth referral. The 'Banksia Woodlands of the Swan Coastal Plain' threatened ecological community meets key diagnostic characteristics, has a condition of 'good' or greater, and is greater than the minimum patch size threshold. Greater than the 1 ha threshold of quality foraging habitat for Carnaby's black-cockatoos occurs and as such the proposed clearing may result in a 'high risk of significant impact'.

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1 Introduction

1.1 Project Background

Astron Environmental Services Pty Ltd (Astron) was engaged by Main Roads Western Australia (Main Roads) to undertake a biological assessment and survey for the proposed road formation and seal widening of three sections of the Brand Highway in the vicinity of Regans Ford (Figure 1). The survey area was both sides of Brand Highway, was 109.2 hectares (ha) and consisted of three sections:

- Straight Line Kilometre (SLK) 65.1 to 66.57 (8.8 ha)
- SLK 71.4 to 74.18 (49.1 ha)
- SLK 82.11 to 86.0 (51.2 ha).

1.2 Scope and Objectives

The scope of work was to conduct a biological assessment and survey in accordance with the Main Roads Biological Survey Environmental Brief and relevant Environmental Protection Authority (EPA) and Department of Parks and Wildlife (Parks and Wildlife) technical and regulatory guidance (Environmental Protection Authority 2002; Environmental Protection Authority and Department of Parks and Wildlife 2015; Environmental Protection Authority 2004a, 2004b; Environmental Protection Authority and Department of Environment and Conservation 2010; Department of Sustainability Environment Water Population and Communities 2012).

Specifically, the scope of works was to undertake:

- desktop assessment within a 20 kilometre (km) radius of the project area, including database searches and literature review of available resources
- vegetation and flora assessment, including:
    - verification of the desktop assessment
    - compose a species list including recording locations of Threatened (Declared Rare) and Priority flora, and introduced flora
    - vegetation type and condition mapping, with supporting photographs of each vegetation type
    - discussion of conservation significant vegetation or flora recorded within the survey area
- fauna and fauna habitat assessment, including:
    - compiling a species list based on opportunistic recordings, and their conservation significance or pest status
    - fauna habitat mapping
    - a targeted Carnaby's black-cockatoo assessment including foraging habitat and the recording of trees suitable for roosting and breeding
- preparation of a final report which addresses the tasks outlined above, relevant contextual information, methodology, timing and limitations.

Main Roads Western Australia

Brand Highway, Regans Ford Biological Survey

Figure 1: Brand Highway Survey Area Location

Author: D. Roocke	Date: 17-11-2016
Drawn: W. An	8208-16-BIDR-1Rev0_161117_Fig01_BrandHwy

Datum: GDA 1994 - Projection: MGA Zone 50

0 5 10 15 20 Km

N

2 Environmental Context

2.1 Geology

The surface geology of the survey area is comprised of four units. The Bassendean Sand unit is represented in all three sections of the survey area, while the other geological units occur in one section each (Table 1).

Table 1: Geological units of the survey area.

Geological name (Stewart et al. 2008)	Label	Extent within survey area (ha)
Bassendean Sand	Qdcb	45.6
Ferruginous Duricrust 38498	Czl	4.4
Guildford Formation	Qag	15.1
Sand Plain 38499	Czs	44.1

2.2 Surface Water and Hydrology

The survey area occurs within the Moore River catchment, with the 71.4 to 74.18 SLK section situated 1.3 km south-east of the Moore River. The Red Gully Creek and Whitfield Brook are in the vicinity of the 65.1 to 66.57 SLK section. Four unnamed ephemeral geomorphic wetlands occur within the survey area, and numerous others are mapped in the region. No Conservation category wetlands occur within the survey area, although a number occur in the vicinity; two of which occur within 100 metres (m) of the survey area (Department of Parks and Wildlife 2016a). Details of the four wetlands that occur in the survey area are provided in Table 2. Geomorphic wetland mapping is provided in Appendix A.

Table 2: Mapped wetlands within the survey area (Department of Parks and Wildlife 2016a).

Wetland details	Total mapped area (ha)	Area within survey area (ha)	General description of the geomorphic classification
Unique Feature Identifier (UFI) 11813 (not assessed)	9.2	0.6	-
Resource Enhancement sumpland (UFI 9923)	2.1	0.2	Wetlands which may have been modified or degraded, but still support substantial attributes and functions.
Resource Enhancement sumpland (UFI 10065)	1.7	1.0	
Resource Enhancement sumpland (UFI 9919)	13.6	3.5	

2.3 Biological Environment

2.3.1 Interim Biogeographic Regionalisation of Australia

The Interim Biogeographic Regionalisation for Australia (IBRA version 7) divides the Australian continent into 89 bioregions and 419 subregions (Department of the Environment and Energy 2016c). The IBRA regions represent a landscape-based approach to classifying the land surface, including attributes of climate, geomorphology, landform, lithology, and characteristic flora and fauna. The survey area occurs in the Swan Coastal Plain Bioregion, of which 10.8% is represented in the national reserve system (Department of the Environment and Energy 2016d) and is described as:

Swan Coastal Plain SWA02 – a low lying coastal plain, mainly covered with woodlands, dominated by Banksia or Tuart on sandy soils, *Casuarina obesa* on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments (Mitchell, Williams, and Desmond 2002).

2.3.2 Land Systems

Land systems of the Western Australian rangelands have been mapped by the Department of Agriculture (now the Department of Agriculture and Food Western Australia (DAFWA)) with comprehensive descriptions of biophysical resources, including soil and vegetation condition. The survey area occurs within five land systems; Bassendean, Dandaragan, Capitella, Moore River and Rowes. These five land systems are described as:

- Bassendean – Swan Coastal Plain from Busselton to Jurien. Sand dunes and sandplains with pale deep sand, semi-wet and wet soil. Banksia-paperbark woodlands and mixed heaths.
- Dandaragan – Subdued dissected lateritic plateau, undulating low hills and rises with narrow alluvial plains. Variable deep sands and sandy gravels plus minor earths, duplexes and clays. Marri woodlands and shrublands.
- Capitella – subdued stripped lateritic plateau, undulating to gently undulating low rises with gently undulating plain including dunes; pale and yellow deep sands, sandy gravels, some duplex; from sandstones plus alluvial and aeolian deposits.
- Moore River – Alluvial flats; Swan Coastal Plain west of Gingin; wet soil, semi-wet soil, pale and yellow deep sands; Woodlands and heaths.
- Rowes – subdued partly dissected lateritic plateau, gently undulating plains and gently undulating to undulating rises; yellow and pale sand, sandy earth and sandy gravel; weathered sandstone.

The total area of these land systems within the survey area and the Swan Coastal Plain bioregion is presented in Table 3.

Table 3: Distribution of land systems within the survey area and Swan Coastal Plain bioregion.

Land system	Total area within bioregion (ha)	Total area within survey area (ha)	Proportion within survey area (%)
Bassendean	36,7219.2	56.9	<0.1
Dandaragan	7,667.5	5.1	<0.1
Capitella	10,351.3	1.7	<0.1
Moore River	11,110.8	15.6	0.1
Rowes	3,711.6	29.9	0.8

2.3.3 Pre-European Vegetation

J.S. Beard (1979) completed broad scale pre-European vegetation mapping at an association level. Five pre-European vegetation units are present within the survey area:

1. Swan Coastal Plain 4: Medium woodland; marri and wandoo.
2. Swan Coastal Plain 949: Low woodland; *Banksia*.
3. Swan Coastal Plain 1015: Mosaic: Mixed scrub-heath/Shrublands; *Dryandra* thicket.

4. Swan Coastal Plain 1030: Low woodland; *Banksia attenuata* and *Banksia menziesii.*
5. Swan Coastal Plain 1031: Mosaic: Shrubland; *Hakea* scrub-heath/Shrublands; *Dryandra* heath.

Table 4 summarises the current and pre-European extent of these five vegetation units in the bioregion and survey area.

Table 4: Extent of pre-European vegetation in the survey area (Government of Western Australia 2014).

Vegetation association	Mapping unit (Beard 1979)	Extent in survey area (ha)	Current extent in bioregion (ha)	Pre-European extent (ha)	Proportion of pre-European extent remaining (%)
4	E3,5Mi	9.4	3,012.74	15,897.08	18.95
949	bLi	46.8	120,237.01	209,983.26	57.26
1015	x14SZc/dZc	1.8	6,648.85	19,556.98	34.00
1030	b1,2Li	25.8	86,061.30	134.788.56	63.85
1031	hSZc/dZc	25.4	5,352.64	27,729.97	19.30

2.3.4 Vegetation Complexes

Heddle et al. (1980) undertook vegetation complex mapping across the Swan Coastal Plain (SCP) and the extent of these complexes remaining on the SCP was assessed as part of the Local Biodiversity Program in 2013 (Western Australian Local Government Association (Perth Biodiversity Project)). Two parts of the survey area, SLK 65.1 to 66.57 and SLK 71.4 to 74.18, occur within the vegetation complex mapping area, with two vegetation complexes, Coonambidgee and Bassendean-North occurring within the survey area (Table 5).

Table 5: Vegetation complexes within the survey area (Heddle, Loneragan, and Havell 1980; Western Australian Local Government Association (Perth Biodiversity Project) 2013).

Vegetation complex	Description	Area within survey area (ha)	Pre-European extent on the Swan Coastal Plain (ha)	2013 extent on the SCP	Proportion remaining in 2013 (%)
Coonambidgee	Low open forest and low woodland of *Eucalyptus todtiana – Banksia attenuata - B. menziesii - B. ilicifolia* with localised admixtures of *B prionotes* to an open woodland of *E. calophylla - Banksia* sp.	8.9	6,272.27	2,859.50	45.6
Bassendean-North	Vegetation ranges from a low open forest and low open woodland of *Banksia* species, *Eucalyptus todtiana* to low woodland of *Melaleuca* species and sedgelands which occupy the moister sites	49.1	74,133.62	53,518.48	72.2

2.3.5 State and Commonwealth Conservation Categories and Management

Commonwealth and State regulatory authorities maintain databases of the locations and conservation status of significant flora, fauna and ecological communities in Western Australia.

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage Matters of National Environmental Significance (MNES) including listed flora, fauna and ecological communities. These listed flora, fauna and ecological communities are allocated a conservation category, which are outlined in Tables B.1 and B.2 (Appendix B).

Ecological communities may be subject to processes that threaten to destroy or significantly modify it across much of its range. These communities are identified as threatened ecological communities (TECs) and are listed at both Commonwealth level under the EPBC Act and State level by the Western Australian Minister for Environment (Table B.3, Appendix B). Parks and Wildlife maintains a list of priority ecological communities (PECs), which may also be under threat and are assigned one of four Priority rankings according to the criteria outlined in Table B.4 (Appendix B).

Under Western Australian legislation, all native flora is protected and it is an offence to 'take' protected flora. The *Wildlife Conservation Act 1950* (WC Act) also provides for native plant species to be specially protected when they are under identifiable threat of extinction, are rare, or otherwise in need of special protection (Department of Parks and Wildlife 2015). Such specially protected flora is considered under the WC Act to be 'declared rare' (Threatened) (Table B.5, Appendix B). In addition, due to the diversity of Western Australia's flora, many species are known from only a few collections or locations, but have not been adequately surveyed. Such flora may be rare or threatened, but cannot be considered for declaration as Threatened flora until adequate surveys have been undertaken. These flora species are included on a supplementary conservation list managed by Parks and Wildlife called the *Priority Flora List*. Priority flora are categorised according to level of threat and other information; the conservation categories are described in Appendix B.

2.4 Introduced Flora (Weeds)

Significant weed species are identified at both the state and national level. The Australian Weeds Strategy (Australian Weeds Committee 2012) identifies 'Weeds of National Significance' (WoNS) which have the potential to impact primary industry and/or environmental and social values. The management of weeds in Western Australia is primarily regulated through the *Biosecurity and Agriculture Management Act 2007* (BAM Act). Species listed under this act are allocated one of three declared pest categories which define the required level of management (Department of Agriculture and Food Western Australia 2016). Declared pest categories and listed weed species' priority ratings are presented in Appendix B.

2.5 Conservation Reserves

The Brand Highway forms the eastern boundary of the Moore River National Park, and the 65.1 to 66.57 SLK section of the survey area is adjacent to the National Park. The Namming Nature Reserve is located west of the Brand Highway, and 1 km south of the 82.11 to 86 SLK section at its closest point. Other regional conservation reserves include the Bundarra, Moochamulla and Quins Hill Nature Reserves which are east of the Brand Highway. Locations of conservation reserves in the vicinity of the survey area are presented in Appendix A.

3 Methodology

3.1 Desktop Assessment

3.1.1 Database Searches

A search for Environmentally Sensitive Areas (ESAs) in the vicinity of the survey area was conducted using Western Australian government datasets (Department of Environment Regulation 2016) and Register of the National Estate dataset (Australian Government 2008).

In addition, database searches were conducted to identify listed conservation significant flora, fauna and ecological communities within, or in close proximity to, the survey area. Search details are summarised in Table 6, with results presented in Appendix C. Conservation categories for ecological communities, flora and fauna are presented in Appendix B. Introduced flora species were compared to the DAFWA list, to determine if any have been listed as declared pests (Department of Agriculture and Food Western Australia 2016), and the WoNS list (Australian Weeds Committee 2012). Introduced flora categories are also presented in Appendix B.

Table 6: Database searches undertaken.

Database	Date search results received	Search focus	Search area
Department of Environment and Energy Protected Matters Search Tool (Department of the Environment and Energy 2016e)	3/10/2016	MNES	20 km buffer around an area defined by the coordinates -30.914025 115.647174,-30.982336 115.703135,-31.02986 115.725795
NatureMap (Department of Parks and Wildlife 2016b)	24/08/2016	Flora of conservation significance	5 km buffer around an area defined by the coordinates 115°45'02"E, 115°39'38"E; 31°04'28"S, 30°54'37"S
	30/09/2016	Fauna of conservation significance	
Threatened and Priority Ecological Communities Database (Department of Parks and Wildlife 2016c)	17/10/2016	Listed threatened and priority ecological communities	20 km radius around shapefiles provided
Threatened and Priority Flora database (TPFL) (Department of Parks and Wildlife 2016e)	12/10/2016	Listed threatened and priority ecological flora	10 km radius^ around shapefiles provided
Threatened and Priority Flora List (TP List) (Department of Parks and Wildlife 2016f)			

Database	Date search results received	Search focus	Search area
Western Australia Herbarium Flora database (WA Herb) (Department of Parks and Wildlife 2016g)			
Threatened and Priority Fauna database (Department of Parks and Wildlife 2016d)	27/09/16	Threatened and priority fauna	20 km radius around project area shapefiles provided
Birdlife Australia (Birdlife Australia 2016)	03/10/2016	All avian species	Approximate 20 km radius around the survey area.

^Due to the high number of records a 20 km search area was not possible for the Threatened and Priority flora searches.

The 24 TECs and 31 PECs listed by Parks and Wildlife for the Swan region (Department of Parks and Wildlife 2016c) were reviewed to determine if any were analogous with ecological communities recorded in the survey area.

3.1.2 Literature Review

Three biological assessments have been previously conducted in the vicinity of the survey area, for Main Roads, and were reviewed as part of the desktop assessment:

- GHD (2016a) Brand Highway Upgrade SLK 51.3 to SKJ 65, Biological Survey, unpublished report to Main Roads WA Midwest Region
- GHD (2016b) Brand Highway Upgrade SLK 51.3 to SLK 65, Biological Survey, unpublished report to Main Roads WA Midwest Region
- GHD (2016c) Brand Highway, Western Australia - Various Sections: SLK 74 to 150, Biological Survey, unpublished report to Main Roads Western Australia.

The flora, vegetation, fauna and other environmental values identified from these reports were reviewed to put the current survey into a local biological context.

3.1.3 Likelihood of Occurrence Assessment

Prior to conducting the field survey, aerial imagery was interpreted to identify potential habitat types. The conservation significant flora species returned from the literature review and database searches were then categorised according to the criteria in Table 7 for potential occurrence within the survey area.

Table 7: Pre-survey criteria used to assess the likely presence of conservation significant flora in the survey area.

Likelihood of occurrence	Pre-survey
Likely	Species previously recorded within the survey area or within 2 km of the survey area and suitable habitat appears to be present in the survey area.
Potential	Species previously recorded within 2 km to 10 km of the survey area and/or suitable habitat appears to be present in the survey area.
Unlikely	No suitable habitat appears to be present in the survey area.

Following the survey, the conservation significant flora species identified during the desktop assessment as having the highest potential to occur within the survey area, but not recorded during the current survey, were again assessed to determine their likelihood of occurrence within the survey area. Post-field survey likelihood was primarily based on validating the presence (and thorough inspection) of suitable habitats within the survey area, combined with life form, habitat and flowering information for each flora species.

Conservation listed vertebrate fauna species returned from the database searches were also categorised for likelihood of occurrence within the survey area according to the criteria listed in Table 8.

Table 8: Criteria used to define likelihood of occurrence of conservation significant fauna species.

Likelihood of occurrence	Criteria
Recorded	Species or evidence of species recorded during survey.
High	Core or preferred habitats present in the survey area which are abundant and/or high quality condition OR Species is known to be cryptic and may not have been detected despite adequate survey effort and suitable habitat present within the survey area OR Species or evidence of species recorded within the survey area however doubt remains over the taxonomic identification, validity of record.
Moderate	Core or highly suitable habitats present in the survey area, however, non-cryptic species that was not detected despite adequate survey effort OR Core or preferred habitats present in the survey area are mainly in poor or modified condition.
Low	Species has not been recorded in the survey area despite adequate survey effort OR Species dependent on specific habitats that do not occur in the survey area OR Species considered locally extinct.

3.2 Field Survey

3.2.1 Weather

Daily weather observations recorded from Lake Nammen (9210) and the Gingin Aero (9178) weather stations were used to describe local rainfall and temperatures respectively, in the 12 months preceding the survey (Figure 2). A total of 658 millimetres (mm) of rain was recorded; 84.2 mm above the long term mean of 573.8 mm. Mean maximum temperatures for September 2016 were 2°C below average.

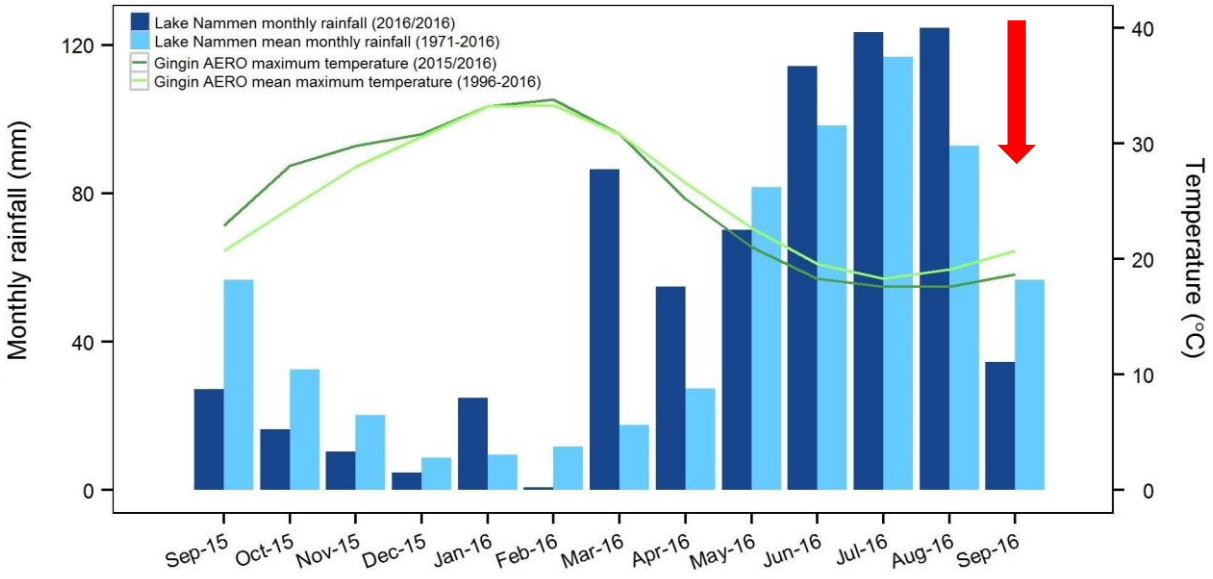


Figure 2: Mean monthly total recorded rainfall (mm) and mean monthly maximum temperatures (°C) and recorded daily maximum temperatures (September 2015 to September 2016) (Lake Nammen and Gingin Aero stations (Bureau of Meteorology 2016)). Red arrow indicates survey timing.

3.2.2 Flora and Vegetation Survey

The biological survey was conducted by Astron Senior Environmental Scientist Janelle Atkinson (Flora Permit SL011617; DRF Permit 141-1415) and Environmental Scientist Daniel Roocke (Flora Permit SL011627; DRF Permit 131-1516) from 18 to 23 September 2016. The survey was undertaken in accordance with the requirements outlined in the Scope of Works provided, dated 26 July 2016. The Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment (Environmental Protection Authority and Department of Parks and Wildlife 2015), EPA Position Statement 3 (Environmental Protection Authority 2002) and EPA Guidance Statement 51 (Environmental Protection Authority 2004b) were also consulted to ensure consistency with recognised botanical survey guidance in Western Australia.

Information acquired during the desktop assessment assisted in the design of the field survey. Pre-survey planning involved the examination of 1:5,000 scale aerial photography to identify potentially different landforms, habitat and vegetation types.

In the field, the following information was collected for each quadrat:

- Location – coordinates measured using a handheld Global Position Systems (GPS) (Map Grid of Australia (MGA) 50, Geocentric Datum of Australia (GDA) 94). One set of coordinates was taken from the north-west corner of each quadrat.
- Recorder and date – personnel involved in sampling that location and the survey date.
- Species – vascular plant species present, including weed species. Species that were not confidently identified during the field survey were collected for later identification in the Astron herbarium, or at the Western Australian Herbarium (WA Herb).
- Foliar cover – the estimated percentage cover for each flora species.

- Vegetation description – vegetation types were described according to level five of the National Vegetation Information System (Department of the Environment and Energy 2016b) (Appendix D). At this level, vegetation is described to 'association' where up to three dominant genera for each of the upper, mid and ground strata are categorised based on dominant growth form, cover and height.
- Vegetation condition – assessed according to the vegetation condition classification of Keighery (1994), as adapted in Environmental Protection Authority and Department of Parks and Wildlife (2015) (Appendix D).
- Habitat – a broad description of the surrounding landscape based on landform, topography and soil.
- Disturbance – records of any obvious disturbances such as fire, tracks, weed infestation, or grazing.
- Photographs – a photograph was taken of each quadrat.

Quadrat locations are illustrated on the vegetation type mapping figure (Appendix E).

Vegetation types were described and mapped using data collected from quadrats. Vegetation condition was mapped using vegetation type boundaries throughout the survey area, a combination of quadrat data, opportunistic observations and the mean condition rating for each vegetation type.

Previously recorded conservation significant flora records and associated habitat preference information assisted in identifying vegetation types and habitat within the survey area that have potential to support conservation significant flora (Department of Parks and Wildlife 2016b, 2016e, 2016f, 2016g; GHD 2016a, 2016b, 2016c). Habitats and vegetation types in the survey area considered to have the potential to support conservation significant flora were targeted in the field to record the presence or absence of conservation significant flora.

3.2.3 Terrestrial Fauna Survey

The fauna survey was undertaken concurrently with the flora and vegetation component, in accordance with the requirements of EPA Guidance Statement No. 56 (Environmental Protection Authority 2004a), EPA and Department of Environment and Conservation (DEC) Technical Guide (Environmental Protection Authority and Department of Environment and Conservation 2010) and Department of the Environment and Energy's Referral Guidelines for Three Threatened Black Cockatoo Species (Department of Sustainability Environment Water Population and Communities 2012).

Six vertebrate fauna habitat assessments were conducted within the fauna habitat types present in the survey area. The following information was collected at each site:

- Location – coordinates measured using a handheld GPS (GDA94).
- Recorder and date – personnel involved in undertaking the fauna habitat assessment and the survey date.
- Habitat/landform – position in the landscape. Major fauna habitat types were described based on the landform and vegetation.
- Vegetation type – a broad description of the vegetation type and structure.
- Soils – a brief description of soil type.

- Microhabitat – presence of specific microhabitat features, for example leaf litter, logs, burrows, rocky outcrops, rock crevices, hollows, permanent or semi-permanent water.
- Condition – habitat condition was assessed based on the presence of anthropogenic (human-induced) disturbances, and using the condition ratings suggested by Thompson and Thompson (2010) (Appendix D).
- Disturbance – any disturbance such as clearing, fire, weeds, flooding, vehicular, machinery, tracks or grazing.
- Photographs – a representative photograph was taken at each habitat assessment site.

The information derived from the fauna habitat assessments was used to delineate fauna habitats throughout the survey area, which were then mapped accordingly.

Based upon the current distributions for the three threatened species of Black Cockatoo, only the Carnaby's black-cockatoo (*Calyptorhynchus latirostris*) (EN; S2) occurs within the vicinity of the survey area. Targeted searches for breeding, roosting and foraging habitat were conducted for Carnaby's black-cockatoo in accordance with the referral guidelines (Department of Sustainability Environment Water Population and Communities 2012).

To determine if the site was foraging habitat for black cockatoos, potential foraging plants were identified and recorded, and the ground was searched for any evidence of black cockatoo foraging, for example the chewed fruits of the marri or the severed heads and seed cones of proteaceous plants found in the *Banksia*, *Hakea* and *Dryandra* genera.

To determine the breeding habitat classification of the site in accordance with the referral guidelines (Department of Sustainability Environment Water Population and Communities 2012), a habitat assessment was undertaken. Native trees greater than 30 centimetre (cm) or 50 cm diameter at breast height (DBH) depending on the species, are classified as mature trees with potential for breeding hollows to develop (Department of Sustainability Environment Water Population and Communities 2012). The species, height of tree, GPS coordinate and number of potential hollows and photographs were recorded. To determine if trees had potential breeding hollows, the following criteria were assessed for each mature tree where possible, based on Gibbons and Lindenmayer (2002):

- height of the potential hollow in the tree
- minimum entrance width of a potential hollow
- diameter of the branch on which the potential hollow occurred
- whether the branch was living, part dead or dead
- whether the tree has multiple potential hollows.

3.3 Limitations

Following completion of the desktop assessment and field surveys, a review of any limitations that may have affected a complete assessment of the data collected was conducted. The limitations listed in Table 9 are based on those suggested as considerations in Guidance Statements 51 and 56 (Environmental Protection Authority 2004a, 2004b).

Table 9: Statement of limitations.

Potential limitation	Statement regarding potential limitation
(i) Sources of information and availability of contextual information Is the region well documented?	Previous biological surveys have been conducted in the broader area, and broad-scale information is available from Beard (1979) and Mitchell et al. (2002). Contextual information is therefore not a limiting factor for this survey.
(ii) Scope The level of survey and detail required to undertake the survey. Was there adequate time to complete the survey to the desired standard?	There was adequate time to complete the flora, vegetation and fauna surveys, complete vegetation and fauna habitat mapping, assess trees for black cockatoo roosting and breeding potential and conduct targeted searches for threatened and priority flora and fauna within specific portions of the survey area. Time was not considered a limiting factor.
(iii) Proportion of flora and fauna identified, recorded and/or collected Was the survey sampling, timing and intensity considered adequate? Was the survey conducted at what was considered an appropriate time of the year for plant identification? Were any taxonomic groups considered to be under-represented?	The field survey was conducted during September, following above average winter rainfall. As such a high diversity of annual and herbaceous species was present. The survey was a single season flora and vegetation survey but due to timing and favourable preceding winter rainfall, the flora was adequately sampled. All flora taxonomic groups recorded within the survey area were considered well represented. The fauna recorded are biased towards species that are readily identifiable and conspicuous such as birds. The fauna survey was a low intensity, Level 1 survey and was focussed on conservation significant fauna habitat and potential habitat, rather than a census of the faunal assemblage present.
(iv) Completeness Is there further work which may be required i.e. was the relevant area fully surveyed?	The survey area was considered adequately surveyed to compile a representative list of species, (including Priority and introduced flora species), as well as describe and map vegetation at a level appropriate for management decisions. Due to inundation, only the fringing vegetation of the two largest wetlands in the survey area could be surveyed and targeted for conservation significant flora. One wetland vegetation type, W01, was considered unique and due to its relatively small size, replication of three quadrats was not possible. Similarly, as only one polygon of vegetation type PI02 was recorded, three replicate quadrats could not be achieved. The Level 1 fauna survey was considered complete and adequately surveyed for this level of assessment.
(v) Mapping reliability Were the aerial photographs, satellite images and site maps available considered adequate to fully understand the area surveyed? Was the mapping generated considered to have a high degree of reliability?	Colour aerial photography at a scale of 1:5,000 was used to locate the survey area and to assist in navigation and delineation of vegetation boundaries. The aerial photography was of good resolution and, in general, accurately represented ground conditions. The extent of surface water associated with wetlands in the survey area, however, was not accurately reflected on the aerial photographs, with a higher volume of water present at the time of survey, owing to the above average rainfall and wet seasonal conditions.

Potential limitation	Statement regarding potential limitation
(vi) Timing When was the survey conducted in terms of season, rainfall, severe weather events etc.? Was the survey conducted at an appropriate time for access, observation of the optimal suite of species and for identification of flowering and fruiting species?	Seasonal conditions were considered ideal, with average rainfall recorded in the 12 weeks preceding the survey. As such, good quality specimens were able to be collected and the diversity of species was considered high. Due to the late rain and below average maximum temperatures preceding and during the survey, a number of geophytes and annual species were immature during the survey and did not have flowering material available for confident identification.
(vii) Disturbance Had the survey area been impacted by any disturbance which may have limited the survey, i.e. fire, flood, accidental human intervention etc.?	The presence of rubbish and weeds were evident immediately adjacent to the Brand Highway within the survey area. Small sections of the survey area exhibited evidence of historical fire, however no fires have been recorded in the survey area within the last two years (Landgate 2016). None of these disturbances limited the outcomes of this survey.
(viii) Intensity In retrospect, was the intensity considered to be adequate?	The intensity of the survey was considered adequate to compile representative species lists, map the vegetation of the survey area to association level and conduct targeted surveys for Priority flora in potential habitat.
(ix) Resources Were the appropriate tools and materials available to complete the task effectively?	Resources were adequate to complete the survey and all appropriate tools and materials required to complete the task were available.
(x) Access Were there any factors limiting access to the survey area?	The survey area was able to be accessed by vehicle; areas that were unable to be reached by vehicle were accessed and traversed by foot. Wetlands within the survey area had higher water lines than would be expected in dryer seasons.
(xi) Experience Were personnel undertaking the field survey and plant identification trained and/or experienced in undertaking the required tasks?	The scientists responsible for undertaking the field survey have considerable experience in conducting vegetation and flora surveys, and fauna assessments. The team leader, Janelle Atkinson, is experienced in conducting surveys on the Swan Coastal Plain. The identification of specimens brought back from the field was conducted by the field botanist. Fauna observations were verified by a zoologist.

4 Results

4.1 Desktop Assessment

4.1.1 Flora and Vegetation

Three EPBC Act listed MNES TECs and two State-listed PECs have been previously recorded within 20 km of the survey area (Table 10). The TEC nearest to the survey area, 'Herb rich saline shrublands in clay pans', is approximately 11 km south-east of the southern end of the survey area at its nearest point. The nearest PEC, 'Swan Coastal Plain *Banksia attenuata* – *Banksia menziesii* woodland' has five occurrences within 1.5 km of the survey area, the nearest of which is located approximately 320 m from the survey area. The location of TECs and PECs in the vicinity of the survey area are mapped in Appendix A.

Table 10: Threatened and priority ecological communities previously recorded within 20 km of the survey area.

Ecological community description	Floristic community type (Gibson et al. 1994)	State conservation category	EPBC Act	Distance from survey area (km)
Threatened Ecological Communities				
Dense shrublands on clay flats	-	Vulnerable	Critically Endangered	14.3
Herb rich saline shrublands in clay pans	-	Vulnerable	Critically Endangered	11.3
Shrublands and woodlands on Muchea Limestone	-	Endangered	Endangered	14.3
Priority Ecological Communities				
Banksia ilicifolia woodlands	SCP22	Priority 3	-	16.0
Swan Coastal Plain *Banksia attenuata – Banksia menziesii* woodlands	SCP23b	*Priority 3	-	0.3

*SCP23b was listed as a PEC in the database search results, however this community is now considered to represent the 'Banksia Woodlands of the Swan Coastal Plain' TEC that was formally recognised as Endangered under the EPBC Act on 16 September 2016.

Approximately 58 ha of vegetation with affinity to the 'Swan Coastal Plain *Banksia attenuata* – *Banksia menziesii* woodlands' PEC was recorded immediately south of the southern end of the survey area (GHD 2016b). A further 7.5 ha of vegetation considered analogous to the same PEC was recorded halfway between SLK 71.4 to 74.18 and SLK 82.11 to 86.0 (2016c).

Database search results identified 49 conservation significant flora species within a 10 km radius of the survey area. This includes 10 Threatened (T) species, all of which are listed MNES under the EPBC Act. Two Priority (P) 1, seven P2, 18 P3 and 12 P4 species have also been previously recorded within the vicinity of the survey area. The locations of Threatened and Priority flora listed in the database search results are mapped in Appendix A.

In previous surveys, no Threatened or Priority flora species were recorded during the surveys conducted south of the survey area, between SLK 51.3 to 65 (GHD 2016a). Thirteen Priority flora species were recorded to the north of the survey area between SLK 74 to 150 SLK (GHD 2016c), including: *Onychosepalum microcarpum* (P2), *Allocasuarina ramosissima* (P3), *Grevillea makinsonii* (P3), *Hypocalymma serrulatum* (P3), *Phlebocarya pilosissima* subsp. *pilosissima* (P3), *Stylidium hymenocraspedum* (P3), *Tetratheca angulata* (P3), *Conostephium magnum* (P4), *Desmocladus*

elongatus (P4), *Eucalyptus macrocarpa* subsp. *elachantha* (P4), *Grevillea rudis* (P4), *Hypolaena robusta* (P4) and *Schoenus griffinianus* (P4).

Of the Priority flora species identified from the desktop assessment, six are considered likely and 37 are considered to have potential to occur in the survey area, based on pre-survey assessment of previous location and preferred habitat information. The database search results are presented in Appendix C and likelihood of occurrence assessments are provided in Table F.1, Appendix F.

4.1.2 Terrestrial Fauna

The database searches and literature review results indicate that 178 vertebrate fauna have been previously recorded within 40 km of the survey area, including four amphibian species, 13 reptile species, 145 bird species (including three introduced bird species) and 16 mammal species (including seven introduced mammal species) (Table G.1 to G.4, Appendix G). This list includes 26 species that are of conservation significance, including one reptile species, 22 bird species and three mammal species. Of these, nine species were considered to have a 'high' likelihood (inclusive of those previously recorded within or adjacent to the survey area), eight species were considered to have a 'moderate' likelihood and nine were considered to have a 'low' likelihood of occurrence in the survey area (Table F.2, Appendix F). This is based on their respective ecology, habitats considered likely to be present and any previous records from historic survey and database records.

4.1.3 Black Cockatoos

The database searches and literature review for Carnaby's black-cockatoos returned 33 known roost sites and 129 nesting locations in the vicinity of the survey area. Known roost sites occur in Regans Ford, Nilgen, Mimegarra and Wanerie with numbers recorded varying between 1 to 2,000 individuals (Department of Parks and Wildlife 2016d). Breeding has been recorded from sites ranging within 1 km of the survey area to 40 km north near Dandaragan. Breeding sites have been recorded close to the survey area at the following localities; Regans Ford, Cataby, Wanerie, Dandaragan and Red Gully. No current or historic roosting or breeding records exist within the survey area (Department of Parks and Wildlife 2016d).

4.1.4 Environmentally Sensitive Areas

Five ESAs intersect the survey area. The southern-most ESA marks the boundary of the Moore River National Park, and extends the length of the survey area at SLK 65.1 to 66.5 (Department of Environment Regulation 2016). No details are available for the four ESAs that intersect the survey area between SLK 71.4 to 74.1, however they are of similar shape and area to the Geomorphic Wetland Mapping in that area (Department of Parks and Wildlife 2016a) and are likely to be related to the wetlands.

4.2 Flora and Vegetation Survey

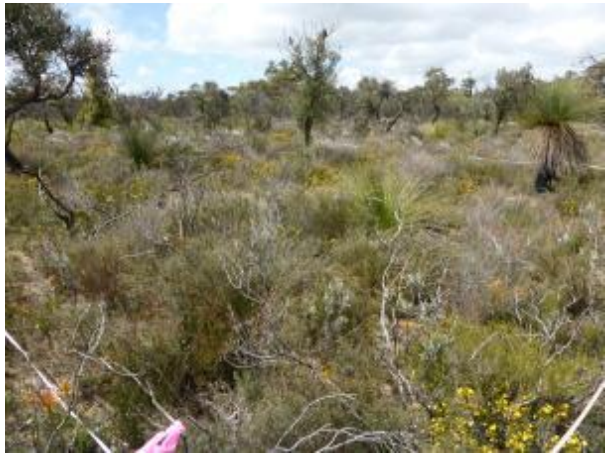
4.2.1 Vegetation

Seven vegetation types were recorded in the survey area and account for 91 ha of remnant vegetation. Together, vegetation types Pl01 and Pl04, which are characterised by Banksia woodlands, comprise 71 ha (64%) of the survey area. Wetland vegetation (vegetation types W01 and W02) account for 5.6 ha (5%). Approximately 18.2 ha (16.7%) of the survey area has been mapped as 'cleared' as remnant vegetation has been removed. Descriptions and representative photographs for vegetation types are presented in Table 11. Vegetation type mapping is provided in Appendix E and the data collected from each quadrat is presented in Appendix H.

Table 11: Vegetation types described for the survey area.

Vegetation type code and description	Sites(s)	Vegetation condition	Total area (ha) (proportion of survey area (%))	Representative photograph
Pl01: *Banksia attenuata* and *Banksia menziesii* low woodland over *Adenanthos cygnorum* subsp. *cygnorum* and *Eremaea pauciflora* var. *pauciflora* open shrubland over *Stirlingia latifolia* low open shrubland over *Mesomelaena pseudostygia* very open sedgeland. **Associated species:** *Alexgeorgea nitens, Amphipogon turbinatus, Andersonia heterophylla, Astroloma xerophyllum, Blancoa canescens, Bossiaea eriocarpa, Burchardia congesta, Cassytha glabella* forma *casuarinae, Chordifex microcodon, C. sinuosus, Conospermum acerosum* subsp. *acerosum, Conostylis aurea, Hensmania turbinata, Hibbertia ovata, H. spicata* subsp. *spicata, Jacksonia floribunda, Leptospermum spinescens, Lyginia barbata, Petrophile linearis, P. macrostachya, Schoenus curvifolius, Scholtzia involucrata, Synaphea spinulosa* subsp. *spinulosa.*	BH01 BH16 BH17	Excellent	36.3 (33.2)	 **Plate 1: Vegetation type Pl01.**

Vegetation type code and description	Sites(s)	Vegetation condition	Total area (ha) (proportion of survey area (%))	Representative photograph
Pl02: *Grevillea eriostachya* and *Allocasuarina humilis* tall open shrubland over *Xanthorrhoea preissii* and *Eremaea pauciflora* var. *pauciflora* open shrubland over *Austrostipa elegantissima* and *Amphipogon turbinatus* very open tussock grassland over *Mesomelaena pseudostygia* very open sedgeland. **Associated species:** *Allocasuarina microstachya, *Arctotheca calendula, Banksia shuttleworthiana, Burchardia congesta, Caladenia flava* subsp. *flava, Calandrinia corrigioloides, Conospermum stoechadis* subsp. *stoechadis, Crassula colorata, Drosera menziesii, Hakea incrassata, Hibbertia crassifolia, Lepidobolus preissianus, Leptospermum spinescens, Neurachne alopecuroidea, Podotheca gnaphalioides, Verticordia pennigera*.	BH03 BH08	Very good	2.6 (2.4)	 **Plate 2: Vegetation type Pl02.**
Pl03: *Calothamnus quadrifidus* subsp. *quadrifidus*, *Allocasuarina humilis* and *Jacksonia floribunda* tall shrubland over *Eremaea pauciflora* var. *pauciflora* and *Xanthorrhoea preissii* shrubland over *Hibbertia crassifolia* low open shrubland over *Tetraria octandra*, *Mesomelaena pseudostygia* open sedgeland. **Associated species:** *Adenanthos cygnorum* subsp. *cygnorum, Austrostipa elegantissima, Banksia shuttleworthiana, Baumea rubiginosa, Bossiaea eriocarpa, Burchardia congesta, Caustis dioica, Conostylis aurea, Crassula colorata, Daviesia nudiflora, Eremaea pauciflora* var. *pauciflora, Galium murale, Gastrolobium linearifolium, Hibbertia huegelii, Patersonia occidentalis, Petrophile macrostachya* and *Xanthorrhoea preissii.*	BH04 BH07 BH09	Excellent – Very good	4.9 (4.5)	 **Plate 3: Vegetation type Pl03.**

Vegetation type code and description	Sites(s)	Vegetation condition	Total area (ha) (proportion of survey area (%))	Representative photograph
Pl04: *Eucalyptus todtiana*, *Banksia attenuata* and *Banksia menziesii* low open woodland over *Xanthorrhoea preissii* open shrubland over *Hibbertia crassifolia*, *Eremaea pauciflora* var. *pauciflora* and *Allocasuarina humilis* low shrubland over *Mesomelaena pseudostygia* and *Tetraria octandra* very open sedgeland. **Associated species:** *Acacia pulchella* var. *glaberrima, Alexgeorgea nitens, Amphipogon turbinatus, Anigozanthos humilis, Burchardia congesta, Caustis dioica, Conospermum stoechadis* subsp. *stoechadis, Conostylis aurea, C. teretifolia* subsp. *teretifolia, Drosera menziesii, Gyrostemon subnudus, Hibbertia crassifolia, H huegelii, Lepidobolus preissianus, Neurachne alopecuroidea, Orianthera spermacocea, Stylidium repens, Thysanotus dichotomus, T. triandrus, Xanthorrhoea preissii* and *Xanthosia huegelii.*	BH05 BH06 BH18 BH19	Excellent	33.8 (31.0)	 **Plate 4: Vegetation type Pl04.**
Pl05: *Corymbia calophylla* low open forest over *Xanthorrhoea preissii* and *Hakea trifurcata* open shrubland over *Bossiaea eriocarpa* and *Jacksonia sternbergiana* low shrubland over *Mesomelaena pseudostygia* and *Caustis dioica* open sedgeland. **Associated species:** *Acacia pulchella* var. *glaberrima, A. stenoptera, Adenanthos cygnorum* subsp. *cygnorum, Alexgeorgea nitens, Banksia dallanneyi* var. *dallanneyi, * Briza maxima, Caladenia flava* subsp. *flava, Conostephium pendulum, Conostylis aculeata* subsp. *aculeata, Daviesia angulata, Hakea trifurcata, Hibbertia crassifolia, Isotropis cuneifolia* subsp. *cuneifolia, Lomandra caespitosa, L. preissii, Patersonia occidentalis* and *Xanthorrhoea preissii.*	BH11 BH12 BH13	Excellent – Very good	7.8 (7.2)	 **Plate 5: Vegetation type Pl05.**

Vegetation type code and description	Sites(s)	Vegetation condition	Total area (ha) (proportion of survey area (%))	Representative photograph
W01: *Banksia prionotes* and *Melaleuca rhaphiophylla* tall shrubland over *Acacia saligna* subsp. *saligna* open shrubland over *Juncus kraussii* subsp. *australiensis* low open shrubland over **Ehrharta calycina* very open tussock grassland. **Associated species:** *Caladenia longicauda* subsp. *albella, Casuarina obesa, *Eragrostis curvula, *Galium murale, *Hypochaeris radicata, *Sonchus asper* and *Wahlenbergia capensis.*	BH10	Very good	1.6 (1.5)	 **Plate 6: Vegetation type W01.**
W02: *Melaleuca preissiana*, *Melaleuca cuticularis* and *Melaleuca incana* subsp. *incana* low open woodland over *Hypocalymma angustifolium* and *Astartea scoparia* open shrubland over *Baumea juncea* very open sedgeland. **Associated species:** **Arctotheca calendula, Banksia sphaerocarpa* var. *sphaerocarpa, Lepidosperma apricola, Lobelia rhombifolia, Melaleuca teretifolia, M. viminea* subsp. *viminea, Podotheca gnaphalioides, Schoenus subfascicularis, Trachymene pilosa* and *Ursinia anthemoides.*	BH02 BH14 BH15	Excellent	3.9 (3.6)	 **Plate 7: Vegetation type W02.**

4.2.1.1 Vegetation Condition

Vegetation in the survey area ranged from 'excellent' to 'completely degraded' condition (Table 12; Appendix I). Nearly half of the survey area was rated as 'excellent' condition, with no evidence of disturbance other than some non-aggressive weeds.

Vegetation cleared for agricultural purposes, roads, tracks and fencing throughout the survey area were mapped as completely degraded. Other disturbances noted in the survey area include weeds and rubbish.

Table 12: Vegetation condition recorded for the survey area.

Vegetation condition	Total mapped area within the survey area (ha)	Proportion of survey area (%)
Excellent	62.0	56.7
Very Good	21.6	19.8
Good	5.8	5.3
Degraded	1.6	1.5
Completely Degraded	18.2	16.7

Locations of previously cleared ground typically, such as roads, tracks, fence lines and firebreaks exhibited a high density of weed cover and abundance (Plates 8 and 9). Dominant weed species to infest these disturbed areas included **Raphanus raphanistrum,* **Ehrharta calycina*, **Eragrostis curvula,* **Arctotheca calendula* and **Lupinus cosentinii*. There was generally very little weed proliferation in the areas of undisturbed native vegetation.

Plate 8: Weed incursion adjacent to the road verge.

Plate 9: Weed incursion adjacent to agricultural land.

4.2.1.2 Conservation Significance of Vegetation

Two vegetation types recorded in the survey area, Pl01 and Pl04, have affinity with floristic community type (FCT) 23b: 'Northern *Banksia attenuata – Banksia menziesii* woodlands' of the SCP (Gibson et al. 1994). SCP 23b is listed as one of the FCTs related to the EPBC Act listed 'Banksia Woodlands of the Swan Coastal Plain' TEC (herein referred to as the 'Banksia Woodlands TEC'). The Banksia Woodlands TEC is characterised by a prominent tree layer of *Banksia* species, with scattered eucalypts and other tree species often present among or emerging above the *Banksia* canopy. The understorey consists of a mix of sclerophyllous shrubs, grasses and forbs. The Banksia Woodlands

TEC is listed as endangered. The vegetation types analogous to this ecological community in the survey area are described in Table 13.

Table 13: Vegetation types with affinity to the Banksia Woodlands of the Swan Coastal Plain TEC in the survey area.

Vegetation type	Number of indicator species recorded (Gibson et al. 1994; Department of the Environment and Energy 2016a)	Mean species richness in survey area	Total area in survey area (ha)
Pl01: *Banksia attenuata* and *Banksia menziesii* low woodland over *Adenanthos cygnorum* subsp. *cygnorum* and *Eremaea pauciflora* var. *pauciflora* open shrubland over *Stirlingia latifolia* low open shrubland over *Mesomelaena pseudostygia* very open sedgeland.	26	44	36.3
Pl04: *Eucalyptus todtiana*, *Banksia attenuata* and *Banksia menziesii* low open woodland over *Xanthorrhoea preissii* open shrubland over *Hibbertia crassifolia*, *Eremaea pauciflora* var. *pauciflora* and *Allocasuarina humilis* low shrubland over *Mesomelaena pseudostygia* and *Tetraria octandra* very open sedgeland.	31	51	33.8

4.2.2 Flora

A total of 234 confirmed vascular flora species, from 53 families and 150 genera, were recorded in the survey area (Appendix J). A further 19 records were made that could not be identified to species level, of which some are likely to represent additional taxa for the survey area. The dominant plant family was Myrtaceae, with 28 species represented. *Melaleuca* was the most frequently recorded genus (Table 14). Approximately 82% of the flora recorded were native taxa.

Table 14: Taxa most frequently recorded in the survey area.

Family	Number of species
Myrtaceae	28
Fabaceae	26
Proteaceae	25
Cyperaceae	15
Genus	**Number of species**
Melaleuca	8
Banksia	7
Schoenus	6
Hibbertia	5

The floristic diversity and species richness are similar to what has been previously recorded for similar surveys in adjacent areas (GHD 2016a, 2016b, 2016c).The dominant families and genera are consistent with what would be expected in the northern parts of the SCP.

4.2.2.1 Conservation Significant Flora

No Threatened flora was recorded in the survey area. One individual of the P3 species *Haemodorum loratum* was recorded at two locations within the survey area. *Haemodorum loratum* P3 occurred within both *Corymbia calophylla* forest (Pl05) and *Eucalyptus todtiana-Banksia* woodland (Pl04) vegetation types, both of which have grey sandy soils. Locations of this species are mapped in Figure K.3 (Appendix K).

Following the field survey and with better understanding of the habitats that occur, 19 of the species listed in the database search results (Department of Parks and Wildlife 2016b, 2016e, 2016f, 2016g) were still considered to have potential to occur, including three Threatened, four P2, six P3 and six P4 flora species. The majority of these species are low-growing and/or herbaceous species that may have been difficult to observe should they occur.

4.2.2.2 Introduced Flora (Weeds)

Weed diversity was considered high, with 45 weed species recorded. Weed density and diversity was highest on the edge of the Brand Highway and growing along cleared tracks and fence lines.

None of the weed species recorded are listed as a WoNS (Australian Weeds Committee 2012), or listed as declared pest plants in Western Australian under the BAM Act (Department of Agriculture and Food Western Australia 2016). Photographs and a description of weeds within the survey area are presented in Table K.3 (Appendix K). Indicative weed locations are mapped on Figure K.1 to K.5 (Appendix K), however weed distribution is much higher than indicated, particularly along disturbed areas.

4.3 Terrestrial Fauna Survey

4.3.1 Fauna Habitat

Four broad fauna habitats, based upon the vegetation types and landforms present, were recorded in the survey area (Figure L.1 to L.3, Appendix L). The habitats were:

- Banksia Woodland – Banksia species over mixed shrubs and sedgelands. Approximately 77.6 ha of this habitat type occurs in the survey area.
- Eucalypt Woodland –Eucalyptus/Corymbia woodland over Banksia species and mixed shrubs over open sedgeland. Approximately 7.8 ha of this habitat type occurs in the survey area.
- Ephemeral Wetland – Melaleuca species over open shrubland and sedgelands or open tussock grasslands. Approximately 5.6 ha of this habitat type occurs in the survey area.
- Cleared – Areas of disturbed vegetation where the natural vegetation has been cleared, offering little in the way of fauna habitat. Approximately 18.2 ha of this habitat type occurs in the survey area.

4.3.1.1 Banksia Woodland

The Banksia Woodland is dominated by proteaceous shrubs that provide foraging habitat for a range of nectarivorous birds and the fruiting bodies provide foraging resources for the conservation listed Carnaby's black-cockatoo. The Banksia Woodland habitat is classified as ranging from very good to good habitat condition. Disturbances include anthropogenic impacts such as weeds, roads, fencing and fragmentation.

4.3.1.2 Eucalypt Woodland

The Eucalypt Woodland contains a dominant overstorey of *Eucalyptus todtiana* or *Corymbia calophylla*. The dense canopy foliage and tree hollows provide suitable habitat for a range of birds, including pardalotes and parrot species that nest in the tree hollows. The abundant leaf litter and fallen logs produce refuge for ground dwelling fauna. The Eucalypt Woodland habitat is classified as ranging from high quality to very good habitat condition. Disturbances include anthropogenic impacts such as weeds, roads and fragmentation.

4.3.1.3 Ephemeral Wetlands

The Ephemeral Wetlands are seasonally inundated depressions that increase or contract in size depending on the season and previous rainfall experienced. Due to the high rainfall experienced prior to the survey these wetlands contained large amounts of surface water providing habitat for amphibians and waterfowl. The shallow water margins of this habitat provide foraging habitat for migratory shorebirds, with the common greenshank previously recorded at the northern wetland (Department of Parks and Wildlife 2016d). Due to the transitory nature of this habitat, the Ephemeral Wetlands only support migratory shorebirds and waders when surface water is present during the peak migratory period (typically November to March). The Ephemeral Wetland habitat is classified as ranging from very good to good habitat condition. Disturbances include anthropogenic impacts such as weeds and roads.

4.3.2 Black Cockatoo Habitat

The survey area contains 21 known foraging resources for the Carnaby's black-cockatoo (Valentine and Stock 2008; Groom 2011) (Table 15). The Banksia species (spp.), *Corymbia calophylla* and *Eucalyptus todtiana* of the survey area were mature and producing nuts and cones. Fauna habitats that contain known foraging resources for Carnaby's black-cockatoos as the dominant vegetation are classified as quality foraging habitat. As such approximately 80 ha can be classified as quality foraging habitat (Figures M.1 to M.3, Appendix M).

Table 15: Carnaby's black-cockatoo foraging resources recorded in the survey area.

Foraging Species		
Acacia saligna	*Corymbia calophylla*	*Hakea trifurcata*
Banksia attenuata	*Erodium botrys*	*Lupinus cosentinii*
Banksia dallanneyi	*Eucalyptus todtiana*	*Mesomelaena pseudostygia*
Banksia grandis	*Hakea costata*	*Pinus radiata*
Banksia menziesii	*Hakea incrassata*	*Raphanus raphanistrum*
Banksia prionotes	*Hakea psilorrhyncha*	*Romulea rosea*
Callitris pyramidalis	*Hakea ruscifolia*	*Xanthorrhoea preissii*

The Eucalypt Woodland habitat contains five *C. calophylla* trees with a DBH over 50 cm, classified in the referral guidelines as mature trees (Table M.1 and Figure M.2, Appendix M) (Department of Sustainability Environment Water Population and Communities 2012). The referral guidelines state "In a woodland stand with trees of suitable diameter at breast height, all trees of all ages and size are potentially important for maintaining breeding in the long term through maintaining the integrity of the habitat and allowing for recruitment of trees to provide future nest hollows.". Of the flora species recorded in the survey area, the Carnaby's black-cockatoos have only been recorded breeding in *C. calophylla*. As such, only areas of Eucalypt Woodland that contains stands of *C. calophylla* are classified as breeding habitat. A total of 7.8 ha of breeding habitat occurs in the

survey area (Figure M.2, Appendix M). Tree hollows must be a minimum of 13 cm in diameter to be used by Carnaby's black-cockatoos as a nest site (Groom 2010). As such, four of the mature trees in the survey area contain suitable nest hollows for breeding, however, none of the tree hollows showed signs of current or historic breeding.

Based on the referral guidelines night roosts for Carnaby's black-cockatoos occur in the tallest trees of an area, usually close to an important water source and quality foraging habitat. Carnaby's black-cockatoos are known to exhibit roost site fidelity with some night roosts being used in most years (Department of Sustainability Environment Water Population and Communities 2012). The five mature trees are therefore classified as potential roost sites for Carnaby's black-cockatoos, however, none of the trees showed signs of current or historic use as roost sites.

4.3.3 Fauna Species

During the field survey, 32 vertebrate species were opportunistically recorded in the survey area (Table 16). These comprised two species of amphibian, 27 species of bird and three species of mammal (including two introduced species). One fauna species of conservation significance was recorded in the survey area, the Carnaby's black-cockatoo listed as Endangered under the EPBC Act and Schedule 2 under the WC Act. The Carnaby's black-cockatoo was recorded foraging in the Eucalypt Woodland habitat of the survey area.

Table 16: Terrestrial fauna species recorded opportunistically during the survey.

Scientific name	Common name	Record type
Amphibian		
Crinia insignifera	Squelching froglet	Individuals
Limnodynastes dorsalis	Western banjo frog	Individuals, calls
Birds		
Anas gracilis	Grey teal	Individuals
Anas superciliosa	Pacific black duck	Individuals
Barnardius zonarius	Australian ringneck	Individuals, calls
Cacatua sanguinea	Little corella	Individuals
Calyptorhynchus latirostris	Carnaby's black-cockatoo	Individuals, calls
Chenonetta jubata	Australian wood duck	Individuals
Coracina novaehollandiae	Black-faced cuckoo-shrike	Individuals
Corvus coronoides	Australian raven	Individuals, calls
Cracticus nigrogularis	Pied butcherbird	Individuals
Cracticus tibicen	Australian magpie	Individuals, calls
Dacelo novaeguineae	Laughing kookaburra	Individuals, calls
Eolophus roseicapillus	Galah	Individuals
Falco cenchroides	Nankeen kestrel	Individuals
Fulica atra	Eurasian coot	Individuals
Grallina cyanoleuca	Magpie-lark	Individuals
Hieraaetus morphnoides	Little eagle	Individuals
Hirundo neoxena	Welcome swallow	Individuals
Lichenostomus virescens	Singing honeyeater	Individuals, calls
Lichmera indistincta	Brown honeyeater	Individuals, calls

Scientific name	Common name	Record type
Phalacrocorax varius	Pied cormorant	Individuals
Phaps chalcoptera	Common bronzewing	Individuals
Phylidonyris niger	White-cheeked honeyeater	Individuals, calls
Phylidonyris novaehollandiae	New holland honeyeater	Individuals, calls
Poliocephalus poliocephalus	Hoary-headed grebe	Individuals
Rhipidura leucophrys	Willie wagtail	Individuals, calls
Smicrornis brevirostris	Weebill	Individuals, calls
Zosterops lateralis	Silvereye	Individuals
Mammals		
Canis lupus familiaris	Dog	Scats, tracks
Macropus fuliginosus	Western grey kangaroo	Individuals
Oryctolagus cuniculus	Rabbit	Burrows, scats

4.3.4 Conservation Significant Fauna

Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*)

The Carnaby's black-cockatoo (EN; S2) is endemic to the south west of Western Australia, and occurs from Kalbarri to Esperance (Department of Sustainability Environment Water Population and Communities 2012). This species undergoes a yearly movement, typically breeding in the Wheatbelt and northern SCP, returning to coastal and near coastal areas from late December to July (Shah 2006). Numerous records exist for this species around the survey area (Department of Parks and Wildlife 2016d) and five individuals were recorded foraging in the survey area during the survey.

As discussed previously the Banksia Woodland and Eucalypt Woodland provide quality foraging habitat for this species and the Eucalypt Woodland provides potential breeding habitat.

4.3.4.1 Conservation Listed Fauna Potentially Occurring in the Survey Area

Nine species of conservation significance were considered to have a 'high' likelihood of occurrence in the survey area based on previous records and the habitats present in the survey area (inclusive of the Carnaby's black-cockatoo that was recorded in the survey area) (Appendix F).

Eastern Great Egret (*Ardea modesta*)

The eastern great egret (Mi; S5) is an inland wetland specialist often seen wading in a range of wetlands from lakes, rivers and swamps to estuaries (Johnstone and Storr 1998). This species has been recorded in the vicinity of the survey area at Beermullah Lake, Doopiter Swamp and Matilda Lake (Department of Parks and Wildlife 2016d). The eastern great egret is likely to inhabit the Ephemeral Wetland habitat during times of inundation.

Glossy Ibis (*Plegadis falcinellus*)

The glossy ibis (Mi; S5) inhabits the shallows and adjacent flats of freshwater lakes and swamps, also occurring in river pools, flooded samphires and sewerage ponds (Johnstone and Storr 1998). A few records of this species exist in the vicinity of the survey area, one record exists approximately 2 km south of the survey area along side of the Brand Highway and the other at Karakin Lake (Department

of Parks and Wildlife 2016d). Although moderately scarce on the SCP this species may occur along the margins of the Ephemeral Wetland in particular during times of inundation.

Common Greenshank (*Tringa nebularia*), Wood Sandpiper (*Tringa glareola*), Red-necked Stint (*Calidris ruficollis*) and Ruff (*Philomachus pugnax*)

These four species of migratory shorebirds inhabit freshwater wetlands similar to those found in the survey area. These migratory shorebirds breed in the northern hemisphere and migrate to wetlands across Australia from November to March to forage over our summer. These species are protected under a number of international agreements and classified as Migratory under the EPBC Act and Schedule 5 under the WC Act. The common greenshank has been previously recorded foraging at the northern Ephemeral Wetland and the remaining species have all been recorded at wetlands in the vicinity of the survey area (Department of Parks and Wildlife 2016d). In the local region surrounding the survey area a number of larger wetlands ideally suited to migratory shorebirds are located, including Beermullah Lake, Doopiter Swamp and Karakin Lake. Although these species might periodically occur in the Ephemeral Wetland habitat of the survey area, they are unlikely to be reliant upon them instead residing at the aforementioned wetlands.

Rainbow Bee-eater (*Merops ornatus*)

The rainbow bee-eater (S5) is one of the most common and widespread birds in Australia and was a commonly recorded species (Burbidge, Johnstone, and Pearson 2010). The species winters from the Gascoyne north to Indonesia, moving south mainly in late September and early October and north from February to April (Johnstone and Storr 1998). Rainbow bee-eaters tend to prefer lightly wooded, preferably sandy country near water (Johnstone and Storr 1998). Numerous records of this species occur in close proximity to the survey area (Department of Parks and Wildlife 2016d) and the rainbow bee-eater is expected to occur across all habitat types of the survey area.

Western quoll (*Dasyurus geoffroii*)

The western quoll (VU; S3) primarily occurs in the Jarrah forest and woodlands of the south-west of Western Australia (Van Dyck and Strahan 2008). The western quoll has large home ranges of 400 ha or more (Van Dyck and Strahan 2008) and disperse widely across their range (Soderquist and Serena 2000). Two recent records of this species exist in the vicinity of the survey area including one record occurring in between the two northern portions of the survey area (Department of Parks and Wildlife 2016d). Although the Eucalypt Woodland provides suitable habitat, the western quoll is unlikely to reside in the survey area and these records likely represent dispersing individuals transiting through the survey area between the better suited habitats of Moore River National Park, Namming and Boonanarring Nature Reserves.

5 Conclusions

5.1 Vegetation and Flora

The survey area is a narrow linear corridor that occurs across undulating sandy plains, with chains of wetlands that intersect at two locations. Banksia woodlands dominate the remnant vegetation of the survey area, with patches of marri woodlands and wetland vegetation also present. Agricultural land surrounds the northern half of survey area. The Brand Highway forms the eastern boundary of the Moore River National Park along the 65.1 to 66.57 SLK section of the survey area.

Two of the pre-European vegetation associations recorded in the survey area, 4 and 1031, have less than 20% of their pre-European extent remaining (Government of Western Australia 2015). Vegetation association 4 is characterised by *Banksia attenuata* and *B. menziesii* low woodlands which are prevalent in the survey area, however vegetation association 1031 has limited affinity with any of the vegetation types recorded. Approximately 46% of the total extent of the Coonambidgee and 72% of the Bassendean North vegetation complexes were estimated to remain in 2013 (Western Australian Local Government Association (Perth Biodiversity Project) 2013).

The survey area includes 91 ha of native vegetation. Approximately 18 ha has been cleared for roads and tracks, and is rated as 'completely degraded'. More than half of the survey area is rated as 'excellent', with no evidence of disturbance other than the presence of some non-aggressive weed species. Weeds, rubbish and vegetation clearing were the main disturbances noted in other parts of the survey area.

The survey area partially overlaps three 'resource enhancement' wetlands (Department of Parks and Wildlife 2016a). A further wetland, not assessed as part of the geomorphic wetlands of the SCP, is located at the northern end of the survey area. Two of the wetlands were inundated at the time of the survey and only the fringing *Melaleuca* spp. dominated vegetation could be surveyed and searched for conservation significant flora. Approximately 5.6 ha (5%) of the survey area consists of wetland vegetation.

Vegetation inferred to have affinity with FCT SCP23b (Gibson et al. 1994) was recorded in the survey area, and described as vegetation types Pl01 and Pl04. FCT SCP23b defines the State-listed PEC 'Swan Coastal Plain *Banksia attenuata – Banksia menziesii* woodlands' which has previously been recorded in the vicinity of the survey area (Department of Parks and Wildlife 2016c; GHD 2016b, 2016c). FCT SCP 23b is one of a number of Banksia-dominated vegetation units that is considered to represent the recently listed MNES Endangered TEC 'Banksia Woodlands of the Swan Coastal Plain'. In the survey area vegetation types Pl01 and Pl04 were dominated by *B. attenuata* and *B. menziesii* woodlands and supported a number of the TEC indicator species (Department of the Environment and Energy 2016a). Forty-four and 51 species were recorded from Pl01 and Pl04 respectively. This is in line with the mean species richness of 47 for FCT SCP23b(Department of the Environment and Energy 2016a). Together, these vegetation types represent 70.1 ha (64%) of the survey area, and are located in each of the three sections of survey area. As vegetation inferred to represent the Banksia woodlands TEC meets key diagnostic characteristics, has a condition of 'good' or greater, and is greater than the minimum patch size threshold (Department of the Environment and Energy 2016a) it should be referred to the Commonwealth Department of the Environment and Energy (DotEE) .

No Threatened flora was recorded within the survey area. *Haemodorum loratum* P3 was recorded from two locations, both of which occur between SLK 71.4 to 74.18. *H. loratum* P3 was associated with vegetation types Pl01 and Pl04 in the survey area. Following the survey 19 flora species were still considered to have potential to occur. Many of these species are typically small or cryptic in nature and may not have been readily visible at the time of the survey should they occur. At least

five of these species are associated with wetlands and may occur in areas that were inundated at the time of the survey and unable to be fully searched.

None of the weed species recorded are listed as a WoNS (Australian Weeds Committee 2012), or listed as declared pest plants in Western Australian under the BAM Act (Department of Agriculture and Food Western Australia 2016).

5.2 Vertebrate Fauna

The survey area contains 78 ha of foraging habitat, including 21 species that are known foraging resources for Carnaby's black-cockatoos. In addition, the survey area contains 7.8 ha of breeding habitat including five *Corymbia calophylla* trees that have a DBH over 50 cm, classified as mature trees and potential roost sites according the referral guidelines (Department of Sustainability Environment Water Population and Communities 2012). Four of these mature trees contain suitable nest hollows for breeding, however, none of the trees or hollows showed signs of current or historic breeding/roosting.

Regans Ford is a known breeding site for Carnaby's black-cockatoos (Johnstone, Johnstone, and Kirkby 2011) and breeding and roosting sites have been recorded in the native vegetation surrounding the survey area, the closest sites occurring within 1 km (Department of Parks and Wildlife 2016d). The proposed clearing is considered 'high risk of significant impact' as greater than the 1 ha threshold of quality foraging habitat for Carnaby's black-cockatoos occurs (Department of Sustainability Environment Water Population and Communities 2012). As such, referral to the DotEE is recommended.

The survey recorded one conservation significant species, the Carnaby's black-cockatoo. In addition a further eight conservation significant species have been classified as having a 'high' likelihood of occurring in the survey area; eastern great egret, glossy ibis, common greenshank, wood sandpiper, red-necked stint, ruff, rainbow bee-eater and western quoll (Appendix F).

The Banksia Woodland and Eucalypt Woodland habitat present in the survey area is unlikely to support populations of conservation significant species such as the western quoll or rainbow bee-eater due to its close proximity to the roadside and the disturbances associated. Although some suitable habitat is present in the survey area, individuals of these species are only likely to transit through as far more suitable habitats exist nearby, including at Moore River National Park, Namming and Boonanarring Nature Reserves.

Although seven migratory shorebirds and waders are considered to have a high likelihood of occurrence in the survey area, the Ephemeral Wetlands habitat is considered marginal compared with larger and better suited habitats found at nearby lakes, including Beermullah Lake, Doopiter Swamp, Matilda Lake and Karakin Lake.

As such, the conservation significant fauna recorded or considered likely to occur in the survey area are unlikely to be reliant upon the habitats present.

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Appendix A: Environmental Constraints Mapping

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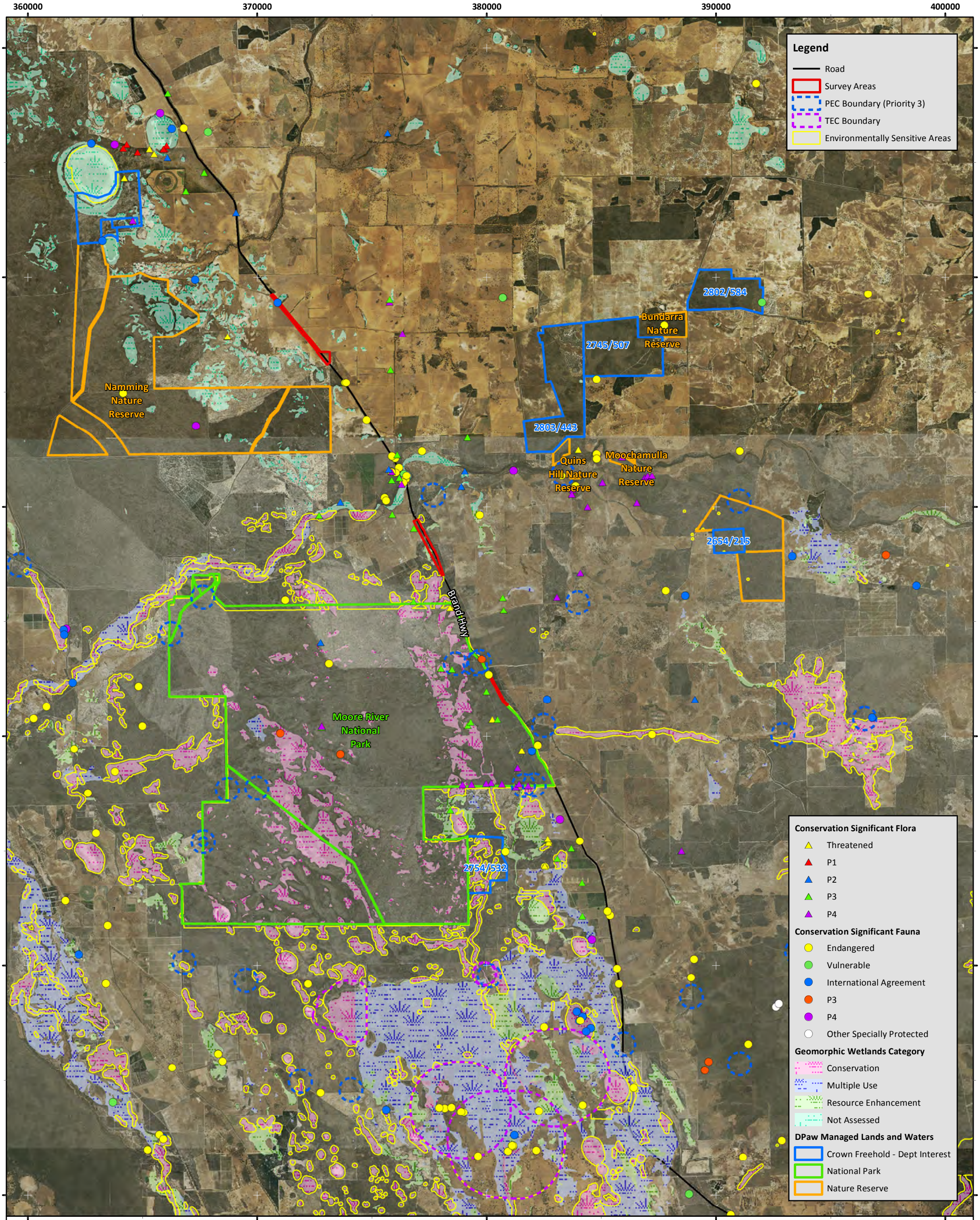

Main Roads Western Australia

Brand Highway, Regans Ford Biological Survey

Figure A.1: Environmental Constraints

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Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureA1_Conservation_Constraint

Coordinate System: GDA 1994 MGA Zone 50

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Appendix B: Conservation Categories for Flora, Fauna and Ecological Communities, and Categories for Introduced Flora

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Table B.1: Categories and definitions for threatened flora and fauna species listed under the *Environment Protection and Biodiversity Conservation Act 1999.*

Conservation category	Definition
Extinct	Taxa with no reasonable doubt that the last member of the species has died.
Extinct in the wild	Taxa known to survive only in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriated seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically endangered (CR)	Taxa facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered (E)	Taxa are not critically endangered; and are facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable (V)	Taxa are not critically endangered or endangered; and are facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Conservation dependent (CD)	Taxa are 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: i) the taxa is a species of fish; ii) the taxa is the focus of a management plan that provides management actions necessary to stop the decline of, and support the recovery of, the taxa so that its chances of long term survival in nature are maximized; iii) the management plan is in force under a law of the Commonwealth or of a State or Territory; iv) Cessation of the management plan would adversely affect the conservation status of the taxa Fish includes all taxa of bony fish, sharks, rays, crustaceans, molluscs and other marine organisms, but does not include marine mammals/reptiles.

Table B.2: Definitions and criteria for threatened ecological communities under the *Environment Protection and Biodiversity Conservation Act 1999.*

Categories of ecological communities	
Critically endangered	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	If, at that time, it 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.
Vulnerable	If, at that time, it 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.

Table B.3: Categories of Threatened Ecological Communities (Department of Parks and Wildlife 2016c).

PD: Presumed Totally Destroyed
An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant **and either** of the following applies (A or B): A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats **or** B) All occurrences recorded within the last 50 years have since been destroyed.
CR : Critically Endangered
An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. An ecological community will be listed as **Critically Endangered** when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting **any one or more of** the following criteria (A, B or C): A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% **and either or both** of the following apply (i or ii): i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years); ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated. B) Current distribution is limited, **and one or more** of the following apply (i, ii or iii): i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years); ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes; iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes. C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).

En: Endangered

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

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

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

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

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

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

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

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

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

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

VU: Vulnerable

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

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

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

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

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

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

Table B.4: Definitions and criteria for Priority Ecological Communities (Department of Parks and Wildlife 2016c).

P1: Priority One – Poorly-known ecological communities
Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
P2: Priority Two – Poorly-known ecological communities
Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat 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.
P3: Priority Three – Poorly-known ecological communities
(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) communities made up of large, and/or widespread occurrences, that may or 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. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
P4: Priority Four
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. (i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands. (ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (iii) Ecological communities that have been removed from the list of threatened communities during the past five years.
P5: Priority Five – Conservation dependent ecological communities
Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Table B.5: Conservation codes for Western Australian flora and fauna under the *Wildlife Conservation Act 1950*.

Code	Conservation category	Definition
S1	Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice and Wildlife Conservation (Rare Flora) Notice under the Wildlife Conservation Act 1950.	Taxa that is rare or likely to become extinct, as critically endangered taxa.
S2	Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice and Wildlife Conservation (Rare Flora) Notice under the Wildlife Conservation Act 1950.	Taxa that is rare or likely to become extinct, as endangered taxa.
S3	Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice and Wildlife Conservation (Rare Flora) Notice under the Wildlife Conservation Act 1950.	Taxa that is rare or likely to become extinct, as vulnerable taxa.
S4	Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice and Wildlife Conservation (Rare Flora) Notice under the Wildlife Conservation Act 1950.	Taxa that is presumed to be extinct.
S5	Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice under the Wildlife Conservation Act 1950.	Birds that are subject to international agreements relating to the protection of migratory birds.
S6	Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice under the Wildlife Conservation Act 1950.	Fauna that are of special conservation need being species dependent on ongoing conservation intervention.
S7	Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice under the Wildlife Conservation Act 1950.	Declared to be fauna that is in need of special protection, otherwise than for the reasons mentioned.

Note: Schedules 5, 6, and 7 are only related to conservation significant fauna.

Taxa that have not yet been adequately surveyed to be listed under Schedule 1 or 2 are added to the Priority Flora and Priority Fauna 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. Taxa that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list for other than taxonomic reasons, are placed in Priority 4. These taxa require regular monitoring. Conservation dependent species are placed in Priority 5.

Table B.6: Priority species under *Western Australian Wildlife Conservation Act 1950*

P1: Priority One – Poorly known taxa
Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
P2: Priority Two – Poorly known taxa
Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
P3: Priority Three – Poorly known taxa
Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
P4: Priority Four: Rare, near threatened and other taxa in need of monitoring
(a) 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. (b) 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. (c) Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
P5: Priority Five: Conservation dependent taxa
Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxa becoming threatened within five years.

The management of introduced flora species in Western Australia is now regulated through the Biosecurity and Agriculture Management Act 2007 (BAM Act). A list of declared pests, including 'pest' plants is provided under the BAM Act, which has been updated to incorporate a number of other Acts that are administered by Department of Agriculture and Food Western Australia (Department of Agriculture and Food Western Australia 2016). Declared pests can fall into two categories: one that relates to the prevention of introducing the species or eradicating it; and the other relates to managing the species and whether it can be kept (i.e. for scientific purposes, education or other purpose).

The threat and risk posed to site-specific biodiversity values, influences to rehabilitation success, primary production, infrastructure assets or human health will differ depending on the unique characteristics of each site and the associated land management practice or operation. Therefore site or project specific weed assessments and priorities should be reviewed for each project.

As per introduced flora species, the BAM Act seeks to establish a modern biosecurity regulatory scheme to prevent serious animal pests from entering the State and becoming established, and to minimise the spread and impact of any that are already present within the State. Declared animal pests fall into three categories as Gazetted under the *Biosecurity and Agriculture Management Regulations 2013*. These categories are outlined in Table B.7.

Table B.7: Declared pests control categories as gazetted under the *Biosecurity and Agriculture Management Regulations 2013*.

Category	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.

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Appendix C: Database Search Results

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Government of Western Australia
Department of Parks and Wildlife

Your Ref: **8208-16**
Our Ref: **14-1016FL**
Enquiries: Steven Martin
Phone: (08) 9219 9522
Email: flora.data@dpaw.wa.gov.au

Astron Environmental Services
129 Royal Street
East Perth WA 6004

Attention: Daniel Roocke

Dear Daniel Roocke,

REQUEST FOR THREATENED AND PRIORITY FLORA INFORMATION

I refer to your request on 15 September 2016 for Threatened (Declared Rare) and Priority Flora information in the Brand highway area. The search was conducted within the area of the shapefile you submitted with an additional 10km buffer.

A search was undertaken for this area of **(1)** the Department's *Threatened (Declared Rare) and Priority Flora* database (for results, see "TPFL" – coordinates are GDA94), **(2)** the *Western Australian Herbarium Specimen* database for Threatened and Priority flora species opportunistically collected in the area of interest (for results, see "WAHERB"- coordinates are GDA94 – see condition number 4 in the attached 'Conditions in Respect of Supply') and **(3)**, the Department's *Threatened and Priority Flora List* [this list is searched using 'place names'. This list, which may also be used as a species target list, contains species that are declared rare (Conservation Code R or X for those presumed to be extinct), poorly known (Conservation Codes 1, 2 or 3), or require monitoring (Conservation Code 4) – for results, *if any*, see "TP List"]. The results are attached electronically to this email.

Attached also are the conditions under which this information has been supplied. Your attention is specifically drawn to the ninth point, which refers to the requirement to undertake field investigations for the accurate determination of Threatened and Priority flora occurrence at a site. *The information supplied should be regarded as an indication only of the Threatened and Priority flora that may be present and may be used as a target list in any surveys undertaken.*

The information provided does not preclude you from obtaining and complying with, where necessary, land clearing approvals from other agencies.

An invoice for $ 300 (plus GST) to supply this information will be forwarded.

It would be appreciated if any populations of Threatened and Priority flora you encounter in the area could be reported to this Department to ensure their ongoing management.

If you require any further details, or wish to discuss Threatened and Priority flora management, please contact Dr Ken Atkins, Manager, Species and Communities Branch, on (08) 9219 9511.

Yours faithfully

Steven Martin
.....
THREATENED FLORA DATABASE OFFICER
for the Director General

12 October 2016

Species and Communities Branch
17 Dick Perry Avenue, Technology Park, Kensington
Phone: (08) 9219 9511
Postal Address: Locked Bag 104, Bentley Delivery Centre, Western Australia 6983
www.dpaw.wa.gov.au

Government of **Western Australia**
Department of **Parks and Wildlife**

THREATENED AND PRIORITY FLORA INFORMATION

Conditions with Respect to the Supply of Information

- The data supplied may not be provided to any other organisations, nor be used for any purpose other than for the project for which it has been originally provided for; without the prior consent of the Executive Director, Department of Parks and Wildlife.
- Specific locality information for threatened flora is regarded as confidential, and should be treated as such by receiving organisations. Specific locality information for threatened flora may not be used in reports without the written permission of the Executive Director, Department of Parks and Wildlife. Reports may only show generalised locations at a low resolution or, where necessary, show specific locations without identifying species. Species and Communities Branch is to be contacted for guidance on the presentation of threatened flora information.
- The Department of Parks and Wildlife respects the privacy of private landowners who may have threatened and priority flora on their property. Threatened and priority flora locations identified in the data as being on private property should be treated in confidence, and contact with property owners must only be made through the Department of Parks and Wildlife.
- The development of the Perth Herbarium database was not originally intended for electronic mapping (eg. GIS ArcView). The latitude and longitude coordinates for each entry are not verified prior to being data based. It is only in recent times that collections have been submitted with GPS coordinates. Therefore, be aware when using this data in ArcView that some records may not plot to the locality description given with each collection.
- Acknowledgment of the Department of Parks and Wildlife as the source of data is to be made in any published material and cited as Parks and Wildlife (2015) Threatened and Priority Flora Database Search for [search area] accessed on the [date of search]. Prepared by the Species and Communities Branch for [Requesters name and company] for [purpose of search].
- Copies of all such publications are to be forwarded to the Department of Parks and Wildlife, Attention; the Manager, Species and Communities Branch.

Disclaimers with Respect to the Supply of Information

- Receiving organisations should note that while every effort has been made to prevent errors and omissions in the data, they may be present. The Department of Parks and Wildlife accepts no responsibility for this.
- Receiving organisations must also recognise that the database is subject to continual updating and amendment, and such considerations should be taken into account by the user.
- It should be noted that the supplied data does not necessarily represent a comprehensive listing of the threatened flora of the area in question. Its comprehensiveness is dependent on the amount of surveys carried out within a specified area. The receiving organisation should consider engaging a botanist, if required, to undertake a survey of the area under consideration.

Species and Communities Branch
17 Dick Perry Avenue, Technology Park, Kensington
Phone: (08) 9219 9511
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Department of Parks and Wildlife

ABBREVIATIONS USED IN THREATENED AND PRIORITY FLORA DATABASE

VESTING

AAP	Aboriginal Planning Authority
AGR	Chief Executive, Dep. of Agriculture
ALT	Aboriginal Land Trust
APB	Agricultural Protection Board of WA
BGP	Botanical Gardens & Parks Authority
BSA	Boy Scouts Association
CC	Conservation Commission – NPNCA - LFC
CGT	Crown Grant in Trust
COM	Commonwealth of Australia
CRO	Crown Freehold-Govt Ownership
CRW	Crown
DAG	Dep. of Agriculture
DOW	Dep. of Water
DPI	Dep. of Planning
EXD	Exec Direc CALM
FES	Fire and Emergency Services Aust.
HOW	Dep. of Housing/State Housing Commission
ILD	Industrial Lands Develop. Auth
LAC	LandCorp
LGA	Shire/LGA
MAG	Minister for Agriculture
MCB	Metropolitan Cemeteries Board
MED	Ministry of Education
MHE	Minister for Health
MIN	Minister for Mines
MPL	Ministry for Planning
MPR	Minister for Prisons
MRD	Main Roads WA
MTR	Minister for Transport
MWA	Minister for Water Resources
MWO	Minister for Works
NAT	Natural Trust of Australia WA
NON	Not Vested
PLB	Pastoral Lands Board
PRI	Private/Freehold
RAI	Public Transport Authority
REL	Religious Organisation
SPC	State Planning Commission
SYN	Synergy (ex Western Power)
SWA	State of Western Australia
TEL	Telstra
UNK	Unknown
WAT	Water Corporation
WEL	Minister Community Welfare
WRC	Water & Rivers Commission
XPL	Ex-Pastoral Lease

PURPOSES

ABR	Aboriginal Reserve
ACC	Access Track
AER	Aerodrome
AIR	Airport
ARS	Agricultural Research Station
BAP	Baptist Union of WA
CAM	Camping
CAR	Caravan park
CEM	Cemetery
CFA	Conservation of Fauna
CFF	Conservation Of Flora & Fauna
CFL	Conservation of Flora
CHU	Church
CMN	Communications
COM	Common
CON	Conservation Park
CPK	Car Park
CRM	Conservation & Resource Management
DEF	Defence
DRA	Drain
EDE	Educational Endowment
EDU	Educational purposes
UWA	
ENE	Enjoyment of Natural Environ.
EPL	Ex-pastoral Lease (Sect 33(2) CALM Act)
EPS	Explosives
EXC	Excepted from sale
EXL	Exploration Lease
EXP	Experimental Farm
FIR	Firing Range
FOR	State Forest
FP	Foreshore Purposes
GE	General Lease
GHA	Grain Handling
GOL	Golf
GRA	Gravel Pit
GVT	Government Requirements
HAR	Harbour Purposes
HEP	Heritage Purposes
HER	Heritage trail
HOS	Hospital
KEN	Kennels
LGA	LGA/Shire Requirements
LPR	Landscape Protection
MIN	Mining lease
MUN	Municipal Purposes
NPK	National Park
NRE	Nature Reserve
OTH	Other
PAR	Parkland (& Recreation)
PAS	Pastoral lease
PCR	Proposed for Conservation
PFF	Protection of Flora & Fauna
PFL	Protection of Flora
PIC	Picnic ground
PLA	Plantation
PMC	Protection of Meteorite Crater
POS	Public Open Space
PPA	Public parkland
PRS	Prison site
PUR	Purchase Lease
PUT	Public Utility
QUA	Quarry
RAC	Racecourse
RAD	Radio Station
REC	Recreation
REH	Rehabilitation/Re-establish Native Plants
RRE	Railway Reserve
RUB	Rubbish
SAL	Saleyards
SAN	Sand
SCH	School-site
SET	Settlers requirements
SHO	Showgrounds
SNN	Sanitary
SOI	Soil Conservation
STO	Stopping place
STK	Stock Route
TIM	Timber
TOU	Tourism
TOW	Town-site
TRA	Training Ground
TRI	Trig station
UCL	Unallocated Crown Land
UNK	Unknown
VER	Road Verge
VPF	Vermin Proof Fence
WAT	Water
WLS	Wildlife Sanctuary
WOO	Firewood

ABBREVIATIONS USED IN THE WESTERN AUSTRALIAN HERBARIUM DATABASE

Geocode Method - The method that was used to record the latitude and longitude.

Auto - Indicates that the coordinate data in the record was created automatically (i.e. by software), usually by creating a coordinate from information provided in the Nearest Named Place or Locality textual description fields.

GAP - Acronym for "Generalised Arbitrary Point" as used in HISPID. GAP indicates that the coordinate data was obtained manually from the Nearest Named Place or Locality textual description fields.

GPS - Acronym for "Global Positioning System". GPS indicates that the coordinate data in the record was obtained from a GPS unit by the collector of the specimen.

MAN - Shorthand for manual. MAN indicates that the coordinate data was created by hand using some method not allowed for by one of the other manual Geocode Method values, in particular, TOPO, GAP, or GPS.

TOPO - Shorthand for topographic map. TOPO indicates that the coordinate data was obtained by plotting textual locality details against a topographic map.

None - Indicates that no coordinate data has been supplied by the collector.

Unknown - Indicates that there is no known method for determining the coordinate data. Should be used if the collector provided no indication of how they sampled the specimen's coordinate data.

PREC (Precision) - precision ratings for coordinates.

Precision 1: Absolutely precise (to nearest 100m or nearest second) and must be GPS determined. For example 35°26'42"S 123°40'26"E

Precision 2: Falling within a diameter of 3km (ca 2 minutes) or if no GPS mentioned in collecting notes. (The location must be able to be pinpointed on a 1:250 000 map, a spot locality. For example 35°26'42"S 123°40'26"E

Precision 3: Falling within a diameter of 10km (ca 7 minutes) or for degrees and minutes, where seconds have not been given. For example 35°26'_"S 123°40'_"E

Precision 4: Falling within a diameter of ca 50km (30 minutes). For example 35°26'_"S 123°40'_"E

Precision 5: Where a location is a prescribed large geographical area within a state or only the state is given. Diameter is greater than 50km. For example 35°_'_"S 123°_'_"E

Precision 6: used when localities are New Holland, Eastern Australia or Not given. Fields will be left blank.

Department of Parks and Wildlife

CONSERVATION CODES

For Western Australian Flora and Fauna

T Threatened species

Listed as Specially Protected under the *Wildlife Conservation Act 1950,* published under Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).

- Fauna that is rare or likely to become extinct are declared to be fauna that is in need of special protection
- Flora that are extant and considered likely to become extinct, or rare and therefore in need of special protection, are declared to be rare flora

Species* which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such.
The assessment of the conservation status of these species is based on their national extent.

X Presumed extinct species

Listed as Specially Protected under the *Wildlife Conservation Act 1950,* published under Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora (which may also be referred to as Declared Rare Flora).

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

IA Migratory birds protected under an international agreement

Listed as Specially Protected under the *Wildlife Conservation Act 1950,* listed under Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice.

Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), relating to the protection of migratory birds.

S Other specially protected fauna

Listed as Specially Protected under the *Wildlife Conservation Act 1950.* Fauna declared to be in need of special protection, otherwise than for the reasons mentioned for Schedules 1, 2 or 3, are published under Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice.

Threatened Fauna and Flora are ranked according to their level of threat using IUCN Red List categories and criteria. *For example:* Carnaby's Cockatoo (*Calyptorynchus latirostris*) is listed as 'Specially Protected' under the *Wildlife Conservation Act 1950,* published under Schedule 1, and referred to as a 'Threatened' species with a ranking of 'Endangered'.

CR Critically Endangered - considered to be facing an extremely high risk of extinction in the wild.

EN Endangered - considered to be facing a very high risk of extinction in the wild.

VU Vulnerable - considered to be facing a high risk of extinction in the wild.

A list of the current rankings can be downloaded from the Parks and Wildlife Threatened Species and Communities webpage at http://dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/

P Priority species

Species that maybe threatened or near threatened but are data deficient, have not yet been adequately surveyed to be listed under the Schedules of the Wildlife Conservation (Specially Protected Fauna) Notice or the Wildlife Conservation (Rare Flora) Notice, 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 list for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Conservation dependent species that are subject to a specific conservation program are placed in Priority 5.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1: Priority One: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2: Priority Two: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3: Priority Three: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4: Priority Four: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.
(b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

5: Priority Five: Conservation Dependent species

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

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

DEPARTMENT OF PARKS AND WILDLIFE

THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES INFORMATION

CONDITIONS IN RESPECT OF SUPPLY OF INFORMATION

1. All requests for data are to be made in writing to the Director General, Department of Parks and Wildlife Attention: Species and Communities Branch

2. The data supplied may not be supplied to other organisations, nor be used for any purpose other than for the project for which they have been provided, without the prior written consent of the data custodian (Val English), Species and Communities Branch.

3. Specific locality information for threatened and priority ecological communities (TECs/PECs) is regarded as confidential, and should be treated as such by receiving organisations. Specific locality information for TECs/PECs may not be used in public reports without the written permission of the Director General, Department of Parks and Wildlife. Publicly available reports may only show generalised locations (ie buffer locations). The TEC database manager is to be contacted for guidance on the presentation of TEC/PEC information.

4. Note that the Department of Parks and Wildlife respects the privacy of private landowners who may have threatened and priority ecological communities on their property. Locations of TECs/PECs identified in the data as being on private property should be treated in confidence, and contact with property owners made through the Department of Environment and Conservation.

5. Receiving organisations should note that while every effort has been made to prevent errors and omissions in the data provided, they may be present. The Department of Parks and Wildlife accepts no responsibility for this.

6. Receiving organisations must also recognise that the Threatened Ecological Communities database is subject to continual updating and amendment, and such considerations should be taken into account by the user.

7. It should be noted that the supplied data do not necessarily represent a comprehensive listing of the threatened and priority ecological communities of the area in question. Its comprehensiveness is dependant on the amount of survey carried out within the specified area. Private property has been relatively little surveyed. The receiving organisation should employ a consultant, if there is any likelihood of the presence of any threatened or priority ecological community, to undertake a survey of the area under consideration.

8. Acknowledgment of the Department of Parks and Wildlife as source of the data is to be made in any published material. Copies of all such publications are to be forwarded to the Department of Parks and Wildlife, Attention: Manager, Species and Communities Branch.

Threatened and Priority Ecological Community buffers in WA

UNDER NO CIRCUMSTANCES IS THIS DATA TO BE PROVIDED TO ANY THIRD PARTIES, for more details see conditions for the supply of this information.

Citation

Title: Threatened and Priority Ecological Community buffers in WA

Custodian: Department of Parks and Wildlife

Description

Abstract: Ecological communities throughout WA that are "Presumed Totally Destroyed", "Critically Endangered", "Endangered", "Vulnerable", "Priority 1-5", "Lower Risk" and "Not evaluated". Communities are based on various life-forms including plants, invertebrates and micro-organisms.

Geographical Bounding Box

North: -14.788854

South: -35.005719

East: 128.870214

West: 113.765525

Data Currency and Status

Beginning Date: 1/1/94

Ending Date: current

Maintenance/Update: As requested

Access

Stored Data Format: ESRI shapefile

Coordinate System: GCS_GDA_1994

Access Constraints: Digital data is only available with written permission of the custodian. In addition, some occurrence data eg. location of sites on private land, is password restricted.

Data Quality

Positional Accuracy: Point location data within occurrences usually from GPS fix, usually within 100 metres. Some digitized from hard copy.

Attribute Accuracy: Not documented.

Logical Consistency: Not documented.

Completeness: Information on specific communities was obtained from regional, subregional or specific habitat surveys of floristic communities, invertebrate communities, wetland assemblages and communities of micro-organisms.

Attributes List:

Name	Description
BDY_ID	Associated boundary polygon unique identifier
OCC_UNIQUE	Unique occurrence identifier
COM_ID	Shortened community name identifier
COM_NAME	Community name
CT_DESC	State listed Category of Threat
S_ID_COUNT	Number of Site IDs within a buffer
FIRST_S_ID	First site identifier
LAST_S_ID	Last site identifier
BUFFER	Buffer radius from site ID or boundary in metres

General Information:

buffers

- The buffer radius around each occurrence of a TEC or PEC is included to help ensure that developments with potential to impact groundwater or surface water are picked up.
- For wetland TEC or PECs we seek to include an area within the buffer zone that is intended to help protect groundwater and surface water. The area required to protect different types of wetlands from a variety of hydrological impacts will, of course, differ.
- For upland TEC or PECs that are believed not to be groundwater dependent, the buffer area radius encompasses the TEC or PEC site location recorded in the TEC database, and extends at least to the furthest point in the occurrence. This is to ensure that the 'buffer' area encompasses at least the entire TEC or PEC. This means that some linear occurrences may need a larger buffer radius to encompass the entire occurrence.
- Occurrences with a buffer distance of 0 are no longer extant.

Contact Information

Contact Organisation:	**Department of Parks and Wildlife**
Contact Position:	**TEC Ecologist, Species and Communities Branch**
Mail Address:	**Locked Bag 104, Bentley Delivery Centre**
Suburb/Locality:	**Kensington**
Country/State:	**WA**
Postcode:	**6983**
Telephone:	**(08) 9219 9157**
Email:	**communities.data@dpaw.wa.gov.au**

Metadata Information

Metadata Date: **current**

Australian Government
Department of the Environment and Energy

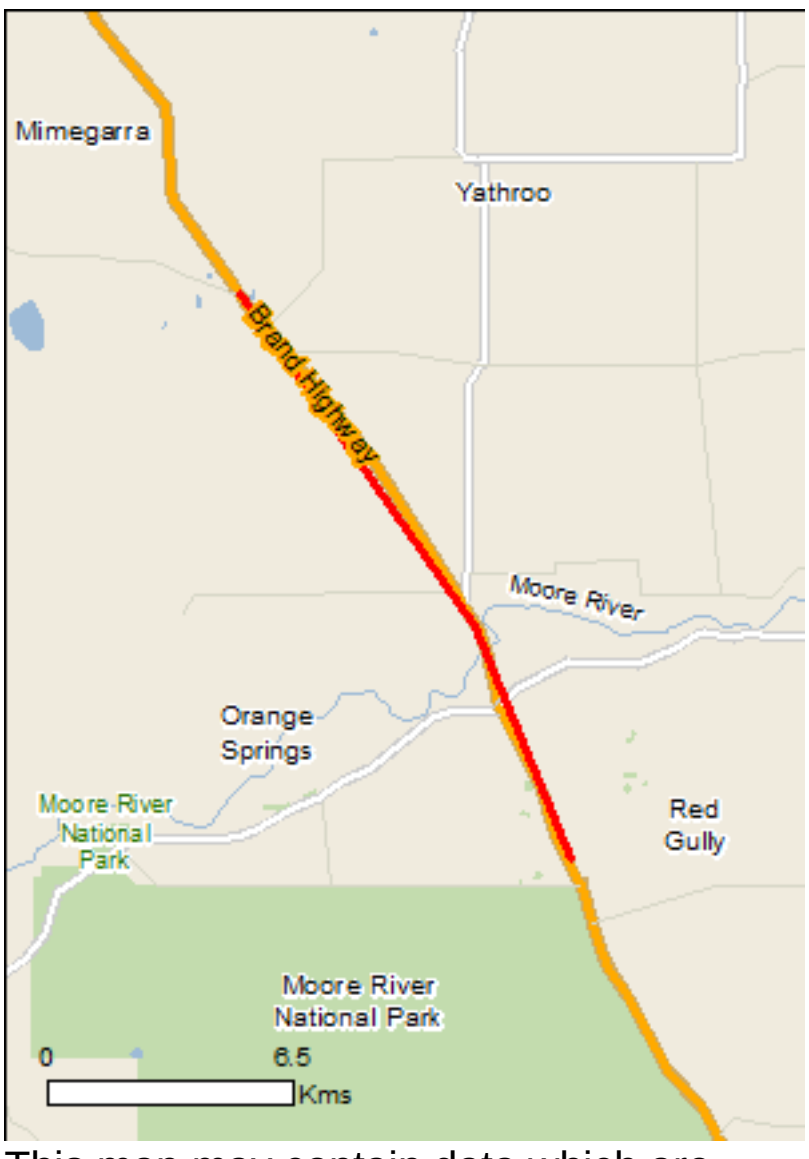
EPBC Act Protected Matters Report

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

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

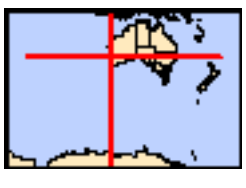
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 03/10/16 17:34:30



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

Coordinates
Buffer: 20.0Km



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:	34
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:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	12
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:	17
Regional Forest Agreements:	None
Invasive Species:	21
Nationally Important Wetlands:	1
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
Claypans of the Swan Coastal Plain	Critically Endangered	Community likely to 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
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		
Nannatherina balstoni Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Plants		
Acacia forrestiana Forest's Wattle [17235]	Vulnerable	Species or species habitat known to occur within area
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat likely to occur within area
Anigozanthos viridis subsp. terraspectans Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat known to occur

Name	Status	Type of Presence within area
Asterolasia nivea Bindoon Starbush [8225]	Vulnerable	Species or species habitat likely to occur within area
Banksia fuscobractea Dark-bract Banksia [83059]	Critically Endangered	Species or species habitat likely to occur within area
Banksia mimica Summer Honeypot [82765]	Endangered	Species or species habitat likely to occur within area
Banksia serratuloides subsp. serratuloides Southern Serrate Dryandra [82768]	Vulnerable	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat may occur within area
Chamelaucium sp. Cataby (G.J.Keighery 11009) Griffin's Waxflower [82509]	Vulnerable	Species or species habitat known to occur within area
Chamelaucium sp. Gingin (N.G.Marchant s.n., 4/11/1988) Gingin Wax [64649]	Endangered	Species or species habitat likely to occur within area
Conospermum densiflorum subsp. unicephalatum One-headed Smokebush [64871]	Endangered	Species or species habitat likely to occur within area
Darwinia acerosa Fine-leaved Darwinia [9004]	Endangered	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leafed Hammer-orchid, Praying Virgin [16753]	Endangered	Species or species habitat known to occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus absita Badgingarra Box [24260]	Endangered	Species or species habitat may occur within area
Eucalyptus balanites Cadda Road Mallee, Cadda Mallee [24264]	Endangered	Species or species habitat may occur within area
Eucalyptus dolorosa Dandaragan Mallee, Mount Misery Mallee [56709]	Endangered	Species or species habitat likely to occur within area
Eucalyptus impensa Eneabba Mallee [56711]	Endangered	Species or species habitat may occur within area
Eucalyptus leprophloia Scaly Butt Mallee, Scaly-butt Mallee [56712]	Endangered	Species or species habitat may occur within area
Eucalyptus recta Silver Mallet [56430]	Endangered	Species or species habitat likely to occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
[Hemiandra gardneri](#) Red Snakebush [7945]	Endangered	Species or species habitat may occur within area
[Leucopogon obtectus](#) Hidden Beard-heath [19614]	Endangered	Species or species habitat may occur within area
[Paracaleana dixonii](#) Sandplain Duck Orchid [86882]	Endangered	Species or species habitat known to occur within area
[Ptychosema pusillum](#) Dwarf Pea [11268]	Vulnerable	Species or species habitat likely to occur within area
[Thelymitra dedmaniarum](#) Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat likely to occur within area
[Thelymitra stellata](#) Star Sun-orchid [7060]	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 Marine Birds		
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat known to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land -

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

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to 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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Bartletts Well	WA
Boonanarring	WA
Bundarra	WA
Eneminga	WA
Moochamulla	WA
Moore River	WA
Moore River	WA
Namming	WA
Quins Hill	WA

Name	State
Sand Spring Well	WA
South Mimegarra	WA
Unnamed WA21164	WA
Unnamed WA25591	WA
Unnamed WA27993	WA
Unnamed WA39571	WA
Unnamed WA46899	WA
Unnamed WA47808	WA

Invasive Species

[Resource Information]

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

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		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
Rattus rattus Black Rat, Ship Rat [84]		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 habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax,		Species or species

Name	Status	Type of Presence
Florist's Smilax, Smilax Asparagus [22473]		habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may 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
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to 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

Nationally Important Wetlands

[Resource Information]

Name	State
Guraga Lake	WA

Caveat

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-30.914025 115.647174,-30.982336 115.703135,-31.02986 115.725795

Acknowledgements

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

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Parks and Wildlife Commission NT, Northern Territory Government
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

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

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

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NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 30/09/2016

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Species Group Birds
Method 'By Rectangle'
Extent 115° 38' 38" E, 115° 45' 02" E, 31° 04' 28" S, 30° 54' 37" S
Group By Family

Family	Species	Records
Acanthizidae	6	31
Accipitridae	1	3
Anatidae	6	26
Ardeidae	2	5
Artamidae	1	1
Cacatuidae	1	4
Campephagidae	1	5
Charadriidae	1	3
Corvidae	2	11
Cracticidae	3	12
Cuculidae	1	1
Dicruridae	3	10
Falconidae	1	1
Halcyonidae	2	9
Hirundinidae	1	10
Maluridae	2	11
Meliphagidae	7	29
Meropidae	1	1
Pachycephalidae	5	15
Pardalotidae	1	11
Petroicidae	1	1
Phalacrocoracidae	1	2
Podicipedidae	3	5
Psittacidae	8	45
Rallidae	1	2
Recurvirostridae	1	3
Scolopacidae	1	2
Sylviidae	2	2
Threskiornithidae	3	4
Zosteropidae	1	3
TOTAL	**70**	**268**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Acanthizidae					
1.		*Acanthiza (Geobasileus) chrysorrhoa*			
2.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
3.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
4.	24262	*Acanthiza inornata (Western Thornbill)*			
5.	25530	*Gerygone fusca (Western Gerygone)*			
6.	30948	*Smicrornis brevirostris (Weebill)*			
Accipitridae					
7.	24295	*Haliastur sphenurus (Whistling Kite)*			
Anatidae					
8.	24312	*Anas gracilis (Grey Teal)*			
9.	24315	*Anas rhynchotis (Australasian Shoveler)*			
10.	24316	*Anas superciliosa (Pacific Black Duck)*			
11.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
12.	24322	*Cygnus atratus (Black Swan)*			
13.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
Ardeidae					
14.	24340	*Ardea novaehollandiae (White-faced Heron)*			
15.		*Egretta novaehollandiae*			
Artamidae					
16.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
Cacatuidae					

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
17.		*Eolophus roseicapillus*			
Campephagidae					
18.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
Charadriidae					
19.		*Elseyornis melanops*			
Corvidae					
20.	25592	*Corvus coronoides (Australian Raven)*			
21.		*Corvus sp.*			
Cracticidae					
22.	25595	*Cracticus tibicen (Australian Magpie)*			
23.	24422	*Cracticus tibicen subsp. dorsalis (White-backed Magpie)*			
24.	25596	*Cracticus torquatus (Grey Butcherbird)*			
Cuculidae					
25.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
Dicruridae					
26.	24443	*Grallina cyanoleuca (Magpie-lark)*			
27.		*Rhipidura (Rhipidura) albiscapa subsp. albiscapa*			
28.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
Falconidae					
29.	25622	*Falco cenchroides (Australian Kestrel)*			
Halcyonidae					
30.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
31.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
Hirundinidae					
32.	24491	*Hirundo neoxena (Welcome Swallow)*			
Maluridae					
33.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
34.	25654	*Malurus splendens (Splendid Fairy-wren)*			
Meliphagidae					
35.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
36.	24561	*Anthochaera carunculata (Red Wattlebird)*			
37.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
38.	24567	*Epthianura albifrons (White-fronted Chat)*			
39.		*Lichmera (Lichmera) indistincta*			
40.	25661	*Lichmera indistincta (Brown Honeyeater)*			
41.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
Meropidae					
42.	24598	*Merops ornatus (Rainbow Bee-eater)*		IA	
Pachycephalidae					
43.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
44.		*Pachycephala (Alisterornis) rufiventris*			
45.		*Pachycephala (Pachycephala) pectoralis subsp. fuliginosa*			
46.	25679	*Pachycephala pectoralis (Golden Whistler)*			
47.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
Pardalotidae					
48.	25682	*Pardalotus striatus (Striated Pardalote)*			
Petroicidae					
49.		*Petroica (Petroica) boodang*			
Phalacrocoracidae					
50.		*Microcarbo melanoleucos*			
Podicipedidae					
51.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
52.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
53.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
Psittacidae					
54.		*Barnardius zonarius*			
55.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
56.	25716	*Cacatua sanguinea (Little Corella)*			
57.		*Cacatua sp.*			
58.		*Calyptorhynchus (Zanda) latirostris*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
59.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)*		T	
60.		*Calyptorhynchus sp.*			
61.		*Purpureicephalus spurius*			
Rallidae					
62.	25727	*Fulica atra (Eurasian Coot)*			
Recurvirostridae					
63.	25734	*Himantopus himantopus (Black-winged Stilt)*			
Scolopacidae					
64.	24808	*Tringa nebularia (Common Greenshank)*		IA	
Sylviidae					
65.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
66.	25758	*Megalurus gramineus (Little Grassbird)*			
Threskiornithidae					
67.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
68.	24844	*Threskiornis molucca (Australian White Ibis)*			
69.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
Zosteropidae					
70.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			

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 wholely 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
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 30/09/2016

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Species Group All Animals
Method 'By Rectangle'
Extent 115° 38' 38" E, 115° 45' 02" E, 31° 04' 28" S, 30° 54' 37" S
Group By Species Group

Species Group	Species	Records
Amphibian	3	7
Bird	70	268
Fish	7	12
Invertebrate	30	41
Mammal	7	9
Reptile	6	9
TOTAL	**123**	**346**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Amphibian					
1.	25400	*Crinia insignifera (Squelching Froglet)*			
2.	25388	*Litoria moorei (Motorbike Frog)*			
3.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
Bird					
4.		*Acanthiza (Geobasileus) chrysorrhoa*			
5.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
6.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
7.	24262	*Acanthiza inornata (Western Thornbill)*			
8.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
9.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
10.	24312	*Anas gracilis (Grey Teal)*			
11.	24315	*Anas rhynchotis (Australasian Shoveler)*			
12.	24316	*Anas superciliosa (Pacific Black Duck)*			
13.	24561	*Anthochaera carunculata (Red Wattlebird)*			
14.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
15.	24340	*Ardea novaehollandiae (White-faced Heron)*			
16.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
17.		*Barnardius zonarius*			
18.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
19.	25716	*Cacatua sanguinea (Little Corella)*			
20.		*Cacatua sp.*			
21.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
22.		*Calyptorhynchus (Zanda) latirostris*			
23.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)*		T	
24.		*Calyptorhynchus sp.*			
25.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
26.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
27.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
28.	25592	*Corvus coronoides (Australian Raven)*			
29.		*Corvus sp.*			
30.	25595	*Cracticus tibicen (Australian Magpie)*			
31.	24422	*Cracticus tibicen subsp. dorsalis (White-backed Magpie)*			
32.	25596	*Cracticus torquatus (Grey Butcherbird)*			
33.	24322	*Cygnus atratus (Black Swan)*			
34.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
35.		*Egretta novaehollandiae*			
36.		*Elseyornis melanops*			
37.		*Eolophus roseicapillus*			
38.	24567	*Epthianura albifrons (White-fronted Chat)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
39.	25622	*Falco cenchroides (Australian Kestrel)*			
40.	25727	*Fulica atra (Eurasian Coot)*			
41.	25530	*Gerygone fusca (Western Gerygone)*			
42.	24443	*Grallina cyanoleuca (Magpie-lark)*			
43.	24295	*Haliastur sphenurus (Whistling Kite)*			
44.	25734	*Himantopus himantopus (Black-winged Stilt)*			
45.	24491	*Hirundo neoxena (Welcome Swallow)*			
46.		*Lichmera (Lichmera) indistincta*			
47.	25661	*Lichmera indistincta (Brown Honeyeater)*			
48.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
49.	25654	*Malurus splendens (Splendid Fairy-wren)*			
50.	25758	*Megalurus gramineus (Little Grassbird)*			
51.	24598	*Merops ornatus (Rainbow Bee-eater)*		IA	
52.		*Microcarbo melanoleucos*			
53.		*Pachycephala (Alisterornis) rufiventris*			
54.		*Pachycephala (Pachycephala) pectoralis subsp. fuliginosa*			
55.	25679	*Pachycephala pectoralis (Golden Whistler)*			
56.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
57.	25682	*Pardalotus striatus (Striated Pardalote)*			
58.		*Petroica (Petroica) boodang*			
59.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
60.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
61.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
62.		*Purpureicephalus spurius*			
63.		*Rhipidura (Rhipidura) albiscapa subsp. albiscapa*			
64.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
65.	30948	*Smicrornis brevirostris (Weebill)*			
66.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
67.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
68.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
69.	24844	*Threskiornis molucca (Australian White Ibis)*			
70.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
71.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
72.	24808	*Tringa nebularia (Common Greenshank)*		IA	
73.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			
Fish					
74.		*Afurcagobius suppositus*			
75.		*Atherinosoma elongata*			
76.		*Bostockia porosa*			
77.	34028	*Galaxias occidentalis (Western Minnow)*			
78.		*Gambusia holbrooki*			
79.		*Pseudogobius olorum*			
80.		*Tandanus bostocki*			
Invertebrate					
81.		*Austracantha minax*			
82.		*Baiami volucripes*			
83.		*Beithynnus moorensis*			Y
84.		*Breda jovialis*			
85.		*Castiarina crocicolor*			
86.		*Castiarina decemguttata*			
87.		*Castiarina enigma*			Y
88.		*Castiarina rufipennis*			
89.		*Coccinella transversalis*			
90.		*Dexerra turpis*			
91.		*Eretes australis*			
92.		*Euryopis sp.*			
93.		*Hednota crypsichroa*			
94.		*Hednota longipalpella*			
95.		*Hednota pedionoma*			
96.		*Hemicordulia australiae*			
97.		*Heterotermes platycephalus*			
98.		*Hydrodroma australis*			Y
99.		*Julodimorpha bakewelli*			
100.		*Latrobiella guttatus*			
101.	33982	*Leioproctus contrarius (bee)*		P3	
102.		*Necrobia rufipes*			
103.		*Onthophagus ferox*			
104.		*Polyzosteria pulchra*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
105.		*Rosopaella galonda*			
106.		*Temognatha fusca*			
107.		*Thyene sp.*			Y
108.		*Troglochernes dewae*			
109.		*Urodacus hartmeyeri*			
110.	34113	*Westralunio carteri (Carter's Freshwater Mussel)*		T	
Mammal					
111.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
112.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
113.	24133	*Macropus irma (Western Brush Wallaby)*		P4	
114.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
115.	24230	*Pseudomys albocinereus (Ash-grey Mouse)*			
116.	24245	*Rattus rattus (Black Rat)*	Y		
117.	24207	*Tachyglossus aculeatus (Short-beaked Echidna)*			
Reptile					
118.	42380	*Brachyurophis fasciolatus subsp. fasciolatus (Narrow-banded Shovel-nosed Snake)*			
119.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
120.	25184	*Menetia greyii*			
121.	25253	*Parasuta gouldii*			
122.	25255	*Parasuta nigriceps*			
123.	24942	*Strophurus spinigerus subsp. spinigerus*			

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

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NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 24/08/2016

Method 'By Rectangle'
Extent 115° 38' 38" E, 115° 45' 02" E, 31° 04' 28" S, 30° 54' 37" S

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1.	3231	*Acacia auronitens*			
2.	15470	*Acacia barbinervis subsp. borealis*			
3.	15471	*Acacia brumalis*			
4.	3271	*Acacia costata*			
5.	20435	*Acacia daphnifolia*			
6.	3374	*Acacia huegelii*			
7.	15721	*Acacia lasiocarpa var. sedifolia*			
8.	3442	*Acacia microbotrya (Manna Wattle, Kalyang)*			
9.	3451	*Acacia multispicata*			
10.	15481	*Acacia pulchella var. glaberrima*			
11.	3525	*Acacia rostellifera (Summer-scented Wattle)*			
12.	3527	*Acacia saligna (Orange Wattle, Kudjong)*			
13.	30033	*Acacia saligna subsp. lindleyi*			
14.	15484	*Acacia sphacelata subsp. sphacelata*			
15.	15486	*Acacia sphacelata subsp. verticillata*			
16.	3557	*Acacia stenoptera (Narrow Winged Wattle)*			
17.	3591	*Acacia urophylla*			
18.	3184	*Acaena echinata (Sheep's Burr)*			
19.		*Acanthiza (Geobasileus) chrysorrhoa*			
20.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
21.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
22.	24262	*Acanthiza inornata (Western Thornbill)*			
23.	1205	*Acanthocarpus canaliculatus*			
24.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
25.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
26.	6205	*Actinotus leucocephalus (Flannel Flower)*			
27.	11837	*Adenanthos cygnorum subsp. cygnorum (Common Woollybush)*			
28.		*Afurcagobius suppositus*			
29.	1056	*Alexgeorgea nitens*			
30.	1732	*Allocasuarina humilis (Dwarf Sheoak)*			
31.	1734	*Allocasuarina microstachya*			
32.	4905	*Alyogyne hakeifolia*			
33.	38755	*Amanita ochroterrea*			
34.		*Amanita sp.*			
35.	38757	*Amanita xanthocephala*			
36.	200	*Amphipogon turbinatus*			
37.	1059	*Anarthria humilis*			
38.	24312	*Anas gracilis (Grey Teal)*			
39.	24315	*Anas rhynchotis (Australasian Shoveler)*			
40.	24316	*Anas superciliosa (Pacific Black Duck)*			
41.	6311	*Andersonia heterophylla*			
42.	6312	*Andersonia involucrata*			
43.	6314	*Andersonia lehmanniana*			
44.	41738	*Andersonia sp. Mysosma (E.A. Griffin 2213)*			
45.	7835	*Angianthus pygmaeus (Pygmy Angianthus)*			
46.	11957	*Anigozanthos humilis subsp. chrysanthus (Golden Catspaw)*		P4	
47.	11434	*Anigozanthos humilis subsp. humilis*			
48.	1414	*Anigozanthos pulcherrimus (Yellow Kangaroo Paw)*			
49.	24561	*Anthochaera carunculata (Red Wattlebird)*			
50.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
51.	3692	*Aotus procumbens*			
52.	12040	*Apium prostratum var. prostratum (Sea Celery)*			
53.	7838	*Arctotheca calendula (Cape Weed)*	Y		
54.	38969	*Arcyria minuta*			
55.	24340	*Ardea novaehollandiae (White-faced Heron)*			
56.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
57.	20283	*Astartea scoparia*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
58.	4399	*Asterolasia nivea (Bindoon Starbush)*		T	
59.	6328	*Astroloma glaucescens*			
60.	6337	*Astroloma stomarrhena (Red Swamp Cranberry)*			
61.	6339	*Astroloma xerophyllum*			
62.		*Atherinosoma elongata*			
63.		*Austracantha minax*			
64.	17244	*Austrostipa macalpinei*			
65.	36441	*Babingtonia camphorosmae (Camphor Myrtle)*			
66.	45416	*Babingtonia grandiflora (Large-flowered Babingtonia)*			
67.	45402	*Babingtonia urbana (Coastal Plain Babingtonia)*		P3	
68.	16815	*Baeckea sp. Mingenew (M.E. Trudgen 12029)*			
69.		*Baiami volucripes*			
70.	1800	*Banksia attenuata (Slender Banksia, Piara)*			
71.	1807	*Banksia burdettii (Burdett's Banksia)*			
72.	32623	*Banksia carlinoides (Pink Dryandra)*			
73.	32696	*Banksia dallanneyi subsp. pollosta*		P3	
74.	32580	*Banksia dallanneyi var. dallanneyi*			
75.	32556	*Banksia echinata*			
76.	32518	*Banksia hewardiana*			
77.	32215	*Banksia kippistiana var. kippistiana*			
78.	32216	*Banksia kippistiana var. paenepeccata*		P3	
79.	1826	*Banksia laricina (Rose Banksia)*			
80.	1834	*Banksia menziesii (Firewood Banksia)*			
81.	32203	*Banksia nivea subsp. nivea*			
82.	32200	*Banksia nobilis subsp. nobilis*			
83.	1842	*Banksia prionotes (Acorn Banksia)*			
84.	32074	*Banksia shuttleworthiana (Bearded Dryandra)*			
85.		*Banksia sp.*			
86.		*Barnardius zonarius*			
87.	741	*Baumea articulata (Jointed Rush)*			
88.	5382	*Beaufortia elegans*			
89.	5393	*Beaufortia squarrosa (Sand Bottlebrush, Puno)*			
90.		*Beithynnus moorensis*			Y
91.	1417	*Blancoa canescens (Winter Bell)*			
92.	7856	*Blennospora drummondii*			
93.	749	*Bolboschoenus caldwellii (Marsh Club-rush)*			
94.		*Boletus sp.*			
95.	11381	*Boronia ramosa subsp. anethifolia*			
96.	16639	*Boronia scabra subsp. scabra*			
97.	3710	*Bossiaea eriocarpa (Common Brown Pea)*			
98.		*Bostockia porosa*			
99.		*Brachyscome sp.*			
100.	42380	*Brachyurophis fasciolatus subsp. fasciolatus (Narrow-banded Shovel-nosed Snake)*			
101.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
102.		*Breda jovialis*			
103.	32328	*Bruchia brevipes*			
104.	1385	*Burchardia multiflora (Dwarf Burchardia)*			
105.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
106.	25716	*Cacatua sanguinea (Little Corella)*			
107.		*Cacatua sp.*			
108.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
109.	15348	*Caladenia flava subsp. flava*			
110.	15358	*Caladenia longicauda subsp. albella*			
111.	15369	*Caladenia lorea*			
112.	19309	*Calectasia narragara*			
113.	36600	*Callitris pyramidalis (Swamp Cypress)*			
114.	5411	*Calothamnus hirsutus*			
115.	5426	*Calothamnus quadrifidus (One-sided Bottlebrush, Kwowdjard)*			
116.	5429	*Calothamnus sanguineus (Silky-leaved Blood flower, Pindak)*			
117.		*Calyptorhynchus (Zanda) latirostris*			
118.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)*		T	
119.		*Calyptorhynchus sp.*			
120.	5439	*Calytrix angulata (Yellow Starflower)*			
121.	5458	*Calytrix flavescens (Summer Starflower)*			
122.	5465	*Calytrix leschenaultii*			
123.	5476	*Calytrix sapphirina*			
124.	5481	*Calytrix sylvana*			
125.	11351	*Cassytha aurea var. hirta*			
126.	2951	*Cassytha flava (Dodder Laurel)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
127.	2952	*Cassytha glabella (Tangled Dodder Laurel)*			
128.		*Castiarina crocicolor*			
129.		*Castiarina decemguttata*			
130.		*Castiarina enigma*			Y
131.		*Castiarina rufipennis*			
132.	760	*Caustis dioica*			
133.	1129	*Centrolepis glabra (Smooth Centrolepis)*			
134.	1133	*Centrolepis pilosa*			
135.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
136.	8788	*Chamaescilla versicolor*			
137.		*Cheilanthes sp.*			
138.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
139.	267	*Chloris gayana (Rhodes Grass)*	Y		
140.	17833	*Chordifex microcodon*			
141.	17706	*Chordifex sinuosus*			
142.		*Chordifex sp.*			
143.	17834	*Chordifex sphacelatus*			
144.		*Coccinella transversalis*			
145.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
146.	4551	*Comesperma ciliatum*			
147.	1857	*Conospermum acerosum (Needle-leaved Smokebush)*			
148.	15607	*Conospermum acerosum subsp. acerosum*			
149.	1859	*Conospermum brachyphyllum*			
150.	1874	*Conospermum glumaceum (Hooded Smokebush)*			
151.	1876	*Conospermum incurvum (Plume Smokebush)*			
152.	15520	*Conospermum stoechadis subsp. sclerophyllum*			
153.	1885	*Conospermum triplinervium (Tree Smokebush)*			
154.	6347	*Conostephium minus (Pink-tipped Pearl flower)*			
155.	6348	*Conostephium pendulum (Pearl Flower)*			
156.	1418	*Conostylis aculeata (Prickly Conostylis)*			
157.	11826	*Conostylis aculeata subsp. aculeata*			
158.	1420	*Conostylis androstemma (Trumpets)*			
159.	1421	*Conostylis angustifolia*			
160.	1423	*Conostylis aurea (Golden Conostylis)*			
161.	1427	*Conostylis candicans (Grey Cottonhead)*			
162.	11438	*Conostylis candicans subsp. candicans*			
163.	1435	*Conostylis hiemalis*			
164.	1436	*Conostylis juncea*			
165.	1437	*Conostylis latens*			
166.	1451	*Conostylis seminuda*			
167.	11870	*Conostylis teretifolia subsp. teretifolia*			
168.	1458	*Conostylis teretiuscula*			
169.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
170.	25592	*Corvus coronoides (Australian Raven)*			
171.		*Corvus sp.*			
172.	25595	*Cracticus tibicen (Australian Magpie)*			
173.	24422	*Cracticus tibicen subsp. dorsalis (White-backed Magpie)*			
174.	25596	*Cracticus torquatus (Grey Butcherbird)*			
175.	29054	*Crepis foetida subsp. foetida (Stinking Hawksbeard)*	Y		
176.	25400	*Crinia insignifera (Squelching Froglet)*			
177.	4809	*Cryptandra pungens*			
178.	40660	*Cycnogeton huegelii*			
179.	24322	*Cygnus atratus (Black Swan)*			
180.	283	*Cynodon dactylon (Couch)*	Y		
181.	794	*Cyperus gymnocaulos (Spiny Flat-sedge)*			
182.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
183.	7454	*Dampiera linearis (Common Dampiera)*			
184.		*Dampiera sp.*			
185.	7475	*Dampiera spicigera (Spiked Dampiera)*			
186.	7481	*Dampiera tephrea*		P2	
187.	7482	*Dampiera teres (Terete-leaved Dampiera)*			
188.	5504	*Darwinia acerosa (Fine-leaved Darwinia)*		T	
189.	5507	*Darwinia carnea (Mogumber Bell)*		T	
190.	5524	*Darwinia pinifolia*			
191.	1220	*Dasypogon obliquifolius*			
192.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
193.	3793	*Daviesia angulata*			
194.		*Daviesia brevifolia*			
195.	3805	*Daviesia decurrens (Prickly Bitter-pea)*			
196.	18560	*Daviesia divaricata subsp. divaricata*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
197.	15505	*Daviesia incrassata subsp. incrassata*			
198.	12329	*Daviesia nudiflora subsp. hirtella*			
199.	16585	*Daviesia nudiflora subsp. nudiflora*			
200.		*Daviesia sp.*			
201.	3845	*Daviesia triflora*			
202.	17663	*Desmocladus asper*			
203.	16593	*Desmocladus biformis*		P3	
204.	17662	*Desmocladus lateriticus*			
205.		*Dexerra turpis*			
206.	3863	*Dillwynia dillwynioides*		P3	
207.	1509	*Dioscorea hastifolia (Warrine, Wararn)*			
208.	7055	*Dischisma capitatum (Woolly-headed Dischisma)*	Y		
209.	1635	*Diuris longifolia (Common Donkey Orchid)*			
210.	44162	*Diuris tinkeri*			
211.	3090	*Drosera barbigera*			
212.	13381	*Drosera citrina*			
213.	13212	*Drosera erythrorhiza subsp. magna*			
214.	3101	*Drosera heterophylla (Swamp Rainbow)*			
215.	14298	*Drosera macrantha subsp. macrantha*			
216.	13216	*Drosera menziesii subsp. penicillaris*			
217.	3118	*Drosera pallida (Pale Rainbow)*			
218.	3119	*Drosera parvula (Small Sundew)*			
219.	3131	*Drosera stolonifera (Leafy Sundew)*			
220.	3133	*Drosera subhirtella (Sunny Rainbow)*			
221.	1066	*Ecdeiocolea monostachya*			
222.		*Egretta novaehollandiae*			
223.	822	*Eleocharis acuta (Common Spikerush)*			
224.		*Elseyornis melanops*			
225.	1643	*Elythranthera brunonis (Purple Enamel Orchid)*			
226.	1644	*Elythranthera emarginata (Pink Enamel Orchid)*			
227.	1067	*Empodisma gracillimum*			
228.		*Eolophus roseicapillus*			
229.	24567	*Epthianura albifrons (White-fronted Chat)*			
230.	13950	*Eremaea asterocarpa subsp. asterocarpa*			
231.	5540	*Eremaea fimbriata*			
232.	5541	*Eremaea pauciflora*			
233.	14103	*Eremaea pauciflora var. calyptra*			
234.	14104	*Eremaea pauciflora var. pauciflora*			
235.		*Eremaea sp.*			
236.		*Eretes australis*			
237.	45215	*Ericomyrtus tenuior*			
238.	15412	*Eriochilus dilatatus subsp. multiflorus*			
239.	13531	*Eucalyptus macrocarpa subsp. elachantha (Small-leaved Mottlecah)*		P4	
240.	5763	*Eucalyptus rudis (Flooded Gum, Kulurda)*			
241.	13511	*Eucalyptus rudis subsp. rudis*			
242.	5790	*Eucalyptus todtiana (Coastal Blackbutt)*			
243.	12905	*Eucalyptus wandoo subsp. pulverea*			
244.	12906	*Eucalyptus wandoo subsp. wandoo*			
245.	3872	*Euchilopsis linearis (Swamp Pea)*			
246.	16722	*Euryomyrtus maidenii*			
247.		*Euryopis sp.*			
248.	25622	*Falco cenchroides (Australian Kestrel)*			
249.	25727	*Fulica atra (Eurasian Coot)*			
250.	34028	*Galaxias occidentalis (Western Minnow)*			
251.	7321	*Galium divaricatum*	Y		
252.		*Gambusia holbrooki*			
253.	20515	*Gastrolobium axillare*			
254.	20505	*Gastrolobium celsianum*			
255.	20483	*Gastrolobium linearifolium*			
256.	3910	*Gastrolobium obovatum (Boat-leaved Poison)*			
257.	3912	*Gastrolobium oxylobioides (Champion Bay Poison)*			
258.	3915	*Gastrolobium plicatum*			
259.	3933	*Gastrolobium villosum (Crinkle-leaved Poison)*			
260.	25530	*Gerygone fusca (Western Gerygone)*			
261.	3945	*Gompholobium aristatum*			
262.	3950	*Gompholobium knightianum*			
263.	11083	*Gompholobium scabrum*			
264.	3956	*Gompholobium shuttleworthii*			
265.	3957	*Gompholobium tomentosum (Hairy Yellow Pea)*			
266.	6161	*Gonocarpus pithyoides*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
267.	7488	*Goodenia affinis (Silver Goodenia)*			
268.	29362	*Goodenia coerulea*			
269.	12516	*Goodenia convexa*			
270.	12522	*Goodenia glareicola*			
271.	7513	*Goodenia hassallii*			
272.	7538	*Goodenia pulchella*			
273.	19286	*Goodenia pulchella subsp. Coastal Plain A (M. Hislop 634)*			
274.	24443	*Grallina cyanoleuca (Magpie-lark)*			
275.	7394	*Grammatotheca bergiana*	Y		
276.	15763	*Grevillea biformis subsp. biformis*			
277.	1997	*Grevillea endlicheriana (Spindly Grevillea)*			
278.	15839	*Grevillea preissii subsp. preissii*			
279.	2115	*Grevillea umbellulata*			
280.	5013	*Guichenotia micrantha (Small Flowered Guichenotia)*			
281.	2783	*Gyrostemon racemiger*			
282.	2788	*Gyrostemon subnudus*			
283.	1469	*Haemodorum loratum*		P3	
284.	1470	*Haemodorum paniculatum (Mardja)*			
285.	1472	*Haemodorum simplex*			
286.	1475	*Haemodorum spicatum (Mardja)*			
287.	1476	*Haemodorum venosum*			
288.	2131	*Hakea auriculata*			
289.	2143	*Hakea conchifolia (Shell-leaved Hakea)*			
290.	2146	*Hakea costata (Ribbed Hakea)*			
291.	2166	*Hakea incrassata (Marble Hakea)*			
292.	2175	*Hakea lissocarpha (Honey Bush)*			
293.	13335	*Hakea obliqua subsp. obliqua*			
294.	13336	*Hakea obliqua subsp. parviflora*			
295.	12233	*Hakea psilorrhyncha*			
296.	2203	*Hakea ruscifolia (Candle Hakea)*			
297.	2205	*Hakea smilacifolia*			
298.	2206	*Hakea stenocarpa (Narrow-fruited Hakea)*			
299.	2214	*Hakea trifurcata (Two-leaf Hakea)*			
300.	24295	*Haliastur sphenurus (Whistling Kite)*			
301.	3961	*Hardenbergia comptoniana (Native Wisteria)*			
302.		*Hednota crypsichroa*			
303.		*Hednota longipalpella*			
304.		*Hednota pedionoma*			
305.	6838	*Hemiandra linearis (Speckled Snakebush)*			
306.	6839	*Hemiandra pungens (Snakebush)*			
307.		*Hemicordulia australiae*			
308.	6842	*Hemigenia barbata*			
309.	6849	*Hemigenia diplanthera*			
310.	41020	*Hemiphora bartlingii (Woolly Dragon)*			
311.	1292	*Hensmania stoniella*		P3	
312.	1293	*Hensmania turbinata*			
313.		*Heterotermes platycephalus*			
314.	5108	*Hibbertia acerosa (Needle Leaved Guinea Flower)*			
315.	5112	*Hibbertia aurea*			
316.	5116	*Hibbertia crassifolia*			
317.	20059	*Hibbertia hemignosta*			
318.	5134	*Hibbertia huegelii*			
319.	5135	*Hibbertia hypericoides (Yellow Buttercups)*			
320.	45534	*Hibbertia hypericoides subsp. hypericoides*			
321.		*Hibbertia sp. Bankstown (R.T.Miller & C.P.Gibson s.n. 18/10/06)*			
322.	5173	*Hibbertia subvaginata*			
323.	25734	*Himantopus himantopus (Black-winged Stilt)*			
324.	24491	*Hirundo neoxena (Welcome Swallow)*			
325.	6222	*Homalosciadium homalocarpum*			
326.	3967	*Hovea stricta*			
327.	3968	*Hovea trisperma (Common Hovea)*			
328.		*Hydrodroma australis*			Y
329.	452	*Hyparrhenia hirta (Tambookie Grass)*	Y		
330.	5817	*Hypocalymma angustifolium (White Myrtle, Kudjid)*			
331.	35074	*Hypocalymma angustifolium subsp. Dandaragan plateau (S. Patrick 702A)*			
332.	35070	*Hypocalymma angustifolium subsp. Swan Coastal Plain (G.J. Keighery 16777)*			
333.	14080	*Hypocalymma serrulatum*		P3	
334.	5828	*Hypocalymma tetrapterum*		P3	
335.	5829	*Hypocalymma xanthopetalum*			
336.	1070	*Hypolaena exsulca*			

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337.	2219	*Isopogon adenanthoides (Spider Coneflower)*			
338.	2227	*Isopogon divergens (Spreading Coneflower)*			
339.	2229	*Isopogon dubius (Pincushion Coneflower)*			
340.	2232	*Isopogon linearis*			
341.	14439	*Isopogon teretifolius subsp. teretifolius (Nodding Coneflower)*			
342.	19700	*Isotropis cuneifolia subsp. cuneifolia*			
343.	3995	*Isotropis juncea (Slender Lamb Poison)*			
344.	4010	*Jacksonia floribunda (Holly Pea)*			
345.	14778	*Jacksonia nutans*			
346.	4025	*Jacksonia restioides*			
347.	4029	*Jacksonia sternbergiana (Stinkwood, Kapur)*			
348.		*Julodimorpha bakewelli*			
349.	1179	*Juncus caespiticius (Grassy Rush)*			
350.	11922	*Juncus kraussii subsp. australiensis*			
351.	1188	*Juncus pallidus (Pale Rush)*			
352.	4044	*Kennedia prostrata (Scarlet Runner)*			
353.	5835	*Kunzea micrantha*			
354.	15528	*Lambertia multiflora var. multiflora*			
355.	5036	*Lasiopetalum lineare*			
356.		*Latrobiella guttatus*			
357.	1307	*Laxmannia ramosa (Branching Lily)*			
358.	11464	*Laxmannia sessiliflora subsp. australis*			
359.	11732	*Laxmannia sessiliflora subsp. sessiliflora*			
360.	7568	*Lechenaultia biloba (Blue Leschenaultia)*			
361.	7574	*Lechenaultia floribunda (Free-flowering Leschenaultia)*			
362.	7580	*Lechenaultia linarioides (Yellow Leschenaultia)*			
363.		*Lechenaultia sp.*			
364.	7586	*Lechenaultia stenosepala (Narrow-sepaled Leschenaultia)*			
365.	33982	*Leioproctus contrarius (bee)*		P3	
366.	18074	*Lepidobolus preissianus subsp. preissianus*			
367.		*Lepidobolus quadratus MS*			
368.	944	*Lepidosperma scabrum*			
369.	2344	*Leptomeria empetriformis*			
370.	5847	*Leptospermum erubescens (Roadside Teatree)*			
371.	5857	*Leptospermum spinescens*			
372.	19241	*Lepyrodia curvescens*		P2	
373.		*Lepyrodia curvescens MS*			
374.	6361	*Leucopogon blepharolepis*		P4	
375.	6370	*Leucopogon cochlearifolius*			
376.	6374	*Leucopogon conostephioides*			
377.	6416	*Leucopogon nutans (Drooping Leucopogon)*			
378.	6419	*Leucopogon obtusatus*			
379.	6421	*Leucopogon oliganthus*			
380.	6434	*Leucopogon polymorphus*			
381.	6435	*Leucopogon polystachyus*			
382.		*Leucopogon sp.*			
383.	19412	*Leucopogon sp. Moore River (M. Hislop 1695)*			
384.	20086	*Leucopogon sp. Northern Scarp (M. Hislop 2233)*			
385.	6444	*Leucopogon sprengelioides*			
386.	6445	*Leucopogon squarrosus*			
387.	40804	*Leucopogon squarrosus subsp. trigynus*		P2	
388.		*Lichmera (Lichmera) indistincta*			
389.	25661	*Lichmera indistincta (Brown Honeyeater)*			
390.	38808	*Limacella pitereka*			
391.	25388	*Litoria moorei (Motorbike Frog)*			
392.	9289	*Lobelia anceps (Angled Lobelia)*			
393.	7403	*Lobelia heterophylla (Wing-seeded Lobelia)*			
394.	7406	*Lobelia rhombifolia (Tufted Lobelia)*			
395.	6512	*Logania spermacocea*			
396.	14542	*Lomandra micrantha subsp. micrantha*			
397.	1239	*Lomandra preissii*			
398.	1246	*Lomandra suaveolens*			
399.	4066	*Lupinus cosentinii*	Y		
400.	10900	*Lycopersicon esculentum*	Y		
401.	1097	*Lyginia barbata*			
402.	18049	*Lyginia imberbis*			
403.	6456	*Lysinema ciliatum (Curry Flower)*			
404.	6458	*Lysinema elegans*			
405.	34736	*Lysinema pentapetalum*			
406.	2838	*Macarthuria apetala*			

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407.	2839	*Macarthuria australis*			
408.	24133	*Macropus irma (Western Brush Wallaby)*		P4	
409.	18119	*Macrozamia fraseri*			
410.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
411.	25654	*Malurus splendens (Splendid Fairy-wren)*			
412.	19421	*Marianthus bicolor (Painted Marianthus)*			
413.	17683	*Meeboldina cana*			
414.	25758	*Megalurus gramineus (Little Grassbird)*			
415.	37580	*Melaleuca acutifolia*			
416.	5888	*Melaleuca ciliosa*			
417.	19387	*Melaleuca clavifolia*			
418.	5893	*Melaleuca concreta*			
419.	5900	*Melaleuca cuticularis (Saltwater Paperbark)*			
420.	13271	*Melaleuca huegelii subsp. huegelii*			
421.	13273	*Melaleuca incana subsp. incana*			
422.	5926	*Melaleuca lateritia (Robin Redbreast Bush)*			
423.	5961	*Melaleuca scabra (Rough Honeymyrtle, Wurru Bush)*			
424.	5978	*Melaleuca teretifolia (Banbar)*			
425.	5981	*Melaleuca thyoides*			
426.	5983	*Melaleuca trichophylla*			
427.	25184	*Menetia greyii*			
428.	24598	*Merops ornatus (Rainbow Bee-eater)*		IA	
429.	955	*Mesomelaena pseudostygia*			
430.	11473	*Mesomelaena stygia subsp. stygia*			
431.	957	*Mesomelaena tetragona (Semaphore Sedge)*			
432.		*Microcarbo melanoleucos*			
433.	10954	*Microtis media (Tall Mignonette Orchid)*			
434.	15419	*Microtis media subsp. media*			
435.	8105	*Millotia myosotidifolia*			
436.	4091	*Mirbelia floribunda (Purple Mirbelia)*			
437.	2415	*Muehlenbeckia polybotrya*			
438.		*Necrobia rufipes*			
439.	492	*Neurachne alopecuroidea (Foxtail Mulga Grass)*			
440.		*Neurachne alopecuroides*			
441.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
442.	32716	*Olearia lehmanniana*			
443.	42024	*Olearia sp. Kennedy Range (G. Byrne 66)*			
444.		*Onthophagus ferox*			
445.	18256	*Opercularia spermacocea*			
446.	18255	*Opercularia vaginata (Dog Weed)*			
447.	4113	*Ornithopus compressus (Yellow Serradella)*	Y		
448.	11749	*Orthrosanthus laxus var. laxus (Morning Iris)*			
449.		*Pachycephala (Alisterornis) rufiventris*			
450.		*Pachycephala (Pachycephala) pectoralis subsp. fuliginosa*			
451.	25679	*Pachycephala pectoralis (Golden Whistler)*			
452.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
453.	13867	*Paracaleana dixonii*		T	
454.	25253	*Parasuta gouldii*			
455.	25255	*Parasuta nigriceps*			
456.	25682	*Pardalotus striatus (Striated Pardalote)*			
457.	1546	*Patersonia juncea (Rush Leaved Patersonia)*			
458.	1550	*Patersonia occidentalis (Purple Flag, Koma)*			
459.	6006	*Pericalymma ellipticum (Swamp Teatree)*			
460.	16478	*Pericalymma ellipticum var. floridum*			
461.	11052	*Persicaria prostrata*			
462.	2258	*Persoonia comata*			
463.	2270	*Persoonia quinquenervis*			
464.	2271	*Persoonia rudis*		P3	
465.	2281	*Persoonia trinervis*			
466.		*Petroica (Petroica) boodang*			
467.	2285	*Petrophile biternata*		P3	
468.	2286	*Petrophile brevifolia*			
469.	2288	*Petrophile chrysantha*			
470.	2297	*Petrophile heterophylla (Variable-leaved Cone Bush)*			
471.	2299	*Petrophile linearis (Pixie Mops)*			
472.	2301	*Petrophile macrostachya*			
473.	16874	*Petrophile recurva*			
474.	2306	*Petrophile rigida*			
475.	2308	*Petrophile seminuda*			
476.	2309	*Petrophile serruriae*			

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477.	2312	*Petrophile striata*			
478.	19825	*Petrorhagia dubia*	Y		
479.	20460	*Pheladenia deformis*			
480.	18529	*Philotheca spicata (Pepper and Salt)*			
481.	19417	*Philotheca spicata subsp. Moore River National Park (G. & D. Woodman Op 47)*			
482.	1478	*Phlebocarya ciliata*			
483.	11557	*Phlebocarya pilosissima subsp. pilosissima*		P3	
484.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
485.	4675	*Phyllanthus calycinus (False Boronia)*			
486.	6009	*Pileanthus filifolius (Summer Coppercups)*			
487.		*Pileanthus sp.*			
488.	2408	*Pilostyles hamiltonii*			
489.	5231	*Pimelea angustifolia (Narrow-leaved Pimelea)*			
490.	5244	*Pimelea floribunda*			
491.	5268	*Pimelea sulphurea (Yellow Banjine)*			
492.	18353	*Pithocarpa pulchella var. pulchella*			
493.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
494.	6255	*Platysace juncea*			
495.	8184	*Podotheca gnaphalioides (Golden Long-heads)*			
496.	29919	*Polianthion wichurae*			
497.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
498.		*Polyzosteria pulchra*			
499.		*Pseudogobius olorum*			
500.	24230	*Pseudomys albocinereus (Ash-grey Mouse)*			
501.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
502.	12217	*Pterostylis sanguinea*			
503.		*Pterostylis sp.*			
504.	1698	*Pterostylis vittata (Banded Greenhood)*			
505.	11260	*Ptilotus drummondii var. drummondii (Pussytail)*			
506.	2733	*Ptilotus humilis*			
507.	2751	*Ptilotus polystachyus (Prince of Wales Feather)*			
508.		*Purpureicephalus spurius*			
509.		*Pycnoporus coccineus*			
510.	8195	*Quinetia urvillei*			
511.	3061	*Raphanus raphanistrum (Wild Radish)*	Y		
512.	24245	*Rattus rattus (Black Rat)*	Y		
513.		*Rhipidura (Rhipidura) albiscapa subsp. albiscapa*			
514.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
515.		*Rosopaella galonda*			
516.	2435	*Rumex drummondii*		P4	
517.	2440	*Rumex pulcher (Fiddle Dock)*	Y		
518.		*Russula sp.*			
519.	7603	*Scaevola canescens (Grey Scaevola)*			
520.	7634	*Scaevola phlebopetala (Velvet Fanflower)*			
521.	13182	*Scaevola repens var. repens*			
522.		*Scaevola sp.*			
523.	978	*Schoenus brevisetis*			
524.	984	*Schoenus curvifolius*			
525.	1009	*Schoenus pleiostemoneus*			
526.	6033	*Scholtzia involucrata (Spiked Scholtzia)*			
527.	8225	*Siloxerus humifusus (Procumbent Siloxerus)*			
528.	14583	*Siloxerus multiflorus*			
529.	30948	*Smicrornis brevirostris (Weebill)*			
530.	7018	*Solanum lasiophyllum (Flannel Bush, Mindjulu)*			
531.	7025	*Solanum oldfieldii*			
532.	9367	*Sonchus hydrophilus (Native Sowthistle)*			
533.	1312	*Sowerbaea laxiflora (Purple Tassels)*			
534.	17551	*Sphaerolobium drummondii*			
535.	4207	*Sphaerolobium medium*			
536.	4713	*Stachystemon axillaris (Leafy Stachystemon)*			
537.	4733	*Stackhousia monogyna*			
538.	9070	*Stackhousia pubescens (Downy Stackhousia)*			
539.	13475	*Stenanthemum humile*			
540.	2316	*Stirlingia latifolia (Blueboy)*			
541.	24942	*Strophurus spinigerus subsp. spinigerus*			
542.	12846	*Stylidium albolilacinum*			
543.	30276	*Stylidium bicolor*			
544.	7693	*Stylidium brunonianum (Pink Fountain Triggerplant)*			
545.	7709	*Stylidium crossocephalum (Posy Triggerplant)*			
546.	7710	*Stylidium cygnorum*			

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547.	7716	*Stylidium diuroides (Donkey Triggerplant)*			
548.	11808	*Stylidium diuroides subsp. diuroides*			
549.	7719	*Stylidium ecorne (Foot Triggerplant)*			
550.	7749	*Stylidium leptophyllum (Needle-leaved Triggerplant)*			
551.	7762	*Stylidium miniatum (Pink Butterfly Triggerplant)*			
552.	7766	*Stylidium nonscandens*		P3	
553.	7774	*Stylidium piliferum (Common Butterfly Triggerplant)*			
554.	25837	*Stylidium purpureum (Purple Fountain Triggerplant)*			
555.	7785	*Stylidium repens (Matted Triggerplant)*			
556.	25806	*Stylidium scariosum*			
557.	17992	*Stylidium sp. Bindoon (K.F. Kenneally 11405)*			
558.	33081	*Stylidium sp. Moora (J.A. Wege 713)*		P2	
559.	25836	*Stylidium spiciforme (Spiciform Triggerplant)*			
560.	20608	*Stylidium stenosepalum*			
561.	7803	*Stylidium striatum (Fan-leaved Triggerplant)*		P4	
562.	1260	*Stypandra glauca (Blind Grass)*			
563.	16882	*Synaphea aephynsa*			
564.	15532	*Synaphea spinulosa subsp. spinulosa*			
565.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
566.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
567.	24207	*Tachyglossus aculeatus (Short-beaked Echidna)*			
568.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
569.		*Tandanus bostocki*			
570.		*Temognatha fusca*			
571.	1036	*Tetraria octandra*			
572.	11032	*Thelymitra apiculata*		P4	
573.	1702	*Thelymitra campanulata (Shirt Orchid)*			
574.	24844	*Threskiornis molucca (Australian White Ibis)*			
575.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
576.	6067	*Thryptomene strongylophylla*			
577.		*Thyene sp.*			Y
578.	1328	*Thysanotus dichotomus (Branching Fringe Lily)*			
579.	1343	*Thysanotus patersonii*			
580.	1353	*Thysanotus spiniger*			
581.	1358	*Thysanotus triandrus*			
582.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
583.	1481	*Tribonanthes australis*			
584.	1485	*Tribonanthes violacea*			
585.	39097	*Trichia decipiens*			
586.	17763	*Trifolium campestre var. campestre (Hop Clover)*	Y		
587.	15659	*Trifolium lappaceum var. lappaceum*	Y		
588.	151	*Triglochin striata*			
589.	24808	*Tringa nebularia (Common Greenshank)*		IA	
590.	4737	*Tripterococcus brunonis (Winged Stackhousia)*			
591.		*Troglochernes dewae*			
592.		*Urodacus hartmeyeri*			
593.	30716	*Vachellia farnesiana (Mimosa Bush)*	Y		
594.		*Velleia sp.*			
595.	7665	*Velleia trinervis*			
596.	15725	*Verbesina encelioides*	Y		
597.	7666	*Verreauxia reinwardtii (Common Verreauxia)*			
598.	12402	*Verticordia chrysanthella*			
599.	12411	*Verticordia densiflora var. cespitosa*			
600.	15432	*Verticordia densiflora var. densiflora*			
601.	6083	*Verticordia grandis (Scarlet Featherflower)*			
602.	15433	*Verticordia huegelii var. huegelii*			
603.	6101	*Verticordia nitens (Morrison Featherflower, Kodjeningara)*			
604.	10822	*Verticordia nobilis*			
605.	6103	*Verticordia ovalifolia*			
606.	6107	*Verticordia pennigera*			
607.	13333	*Waitzia suaveolens var. suaveolens*			
608.	34113	*Westralunio carteri (Carter's Freshwater Mussel)*		T	
609.	12072	*Wurmbea dioica subsp. alba*			
610.	1252	*Xanthorrhoea drummondii*			
611.		*Xanthorrhoea sp.*			
612.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			

Conservation Codes
T - Rare or likely to become extinct

Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area

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 wholely 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: Vegetation Classification and Condition Scales, and Fauna Habitat Condition Scale

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Table D.1: NVIS Vegetation Classification System (Department of Environment and Energy 2016a).

Foliage cover/ growth form	70 to 100	30 to 70	10 to 30	5 to 10	0 to 5
Tree, palm	Closed forest	Open forest	Woodland	Open woodland	Isolated trees
Tree mallee	Closed mallee forest	Open mallee forest	Mallee woodland	Open mallee woodland	Isolated mallee trees
Shrub	Closed shrubland	Shrubland	Open shrubland	Sparse shrubland	Isolated shrubs
Mallee shrub	Closed mallee shrubland	Mallee shrubland	Open mallee shrubland	Sparse mallee shrubland	Isolated mallee shrubs
Heath shrub	Closed heathland	Heathland	Open heathland	Sparse heathland	Isolated heath shrubs
Chenopod shrub	Closed chenopod shrubland	Chenopod shrubland	Open schenopod shrubland	Sparse chenopod shrubland	Isolated chenopod shrubs
Samphire shrub	Closed samphire shrubland	Samphire shrubland	Open chenopod shrubland	Sparse chenopod shrubland	Isolated chenopod shrubs
Hummock grass	Closed hummock grassland	Hummock grassland	Open hummock grassland	Sparse hummock grassland	Isolated hummock grasses
Tussock grass	Closed tussock grassland	Tussock grassland	Open tussock grassland	Sparse tussock grassland	Isolated tussock grasses
Sedge	Closed sedgeland	Sedgeland	Open sedgeland	Sparse sedgeland	Isolated sedges
Rush	Closed rushland	Rushland	Open rushland	Sparse rushland	Isolated rushes
Forb	Closed forbland	Forbland	Open forbland	Sparse forbland	Isolated forbs
Fern	Closed fernland	Fernland	Open fernland	Sparse fernland	Isolated ferns

Table D.2: Summary of the adapted vegetation condition scale (Environmental Protection Authority and Department of Parks and Wildlife 2015).

Condition	Description
1 (Pristine)	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.
2 (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.
3 (Very Good)	Vegetation structure altered obvious signs of disturbance. Disturbance to vegetation structure covers repeated fire, aggressive weeds, dieback, logging, grazing.
4 (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 covers frequent fires, aggressive weeds, partial clearing, dieback and grazing.
5 (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 includes frequent fires, presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
6 (Completely Degraded)	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas often described as “parkland cleared” with the flora comprising weed or crop species with isolated native trees or shrubs.

Table D.3: Fauna habitat condition scale (Thompson and Thompson 2010).

Habitat condition	Condition description
High Quality Fauna Habitat	These areas closely approximate the vegetation mix and quality that would have been in the area prior to any human induced disturbance. The habitat has connectivity with other habitats and is likely to support the most natural vertebrate fauna assemblage.
Very Good Fauna Habitat	These areas show minimal signs of human induced disturbance (e.g. grazing, clearing, fragmentation, weeds) and retain almost all of the characteristics of the habitat had it not been disturbed. The habitat has connectivity with other habitats, and fauna assemblages in these areas are likely to be minimally effected by disturbance.
Good Fauna Habitat	These areas show signs of human induced disturbance (e.g. grazing, clearing, fragmentation, weeds) but generally retain many of the characteristics of the habitat had it not been disturbed. The habitat still retains some connectivity with other habitats but fauna assemblages in these areas are likely to be affected by disturbance. Fauna assemblages in these areas are likely to be similar to what might be expected in this habitat.
Disturbed Fauna Habitat	These areas show signs of human induced significant disturbance (e.g. mining, clearing, tracks and roads). Many of the trees, shrubs and undergrowth have died or have been cleared. These areas may be in the early succession and regeneration stages. Areas may show signs of significant grazing, contain an abundance of weeds or have been damaged by vehicles or machinery. Habitats are fragmented or have limited connectivity with other fauna habitats. Fauna assemblages in these areas are likely to differ significantly from what might be expected in the area had the disturbance not occurred.
Highly Degraded Fauna Habitat	These areas often have a significant human induced loss of vegetation, and / or a large number of vehicle tracks and / or have been completely cleared, and / or areas have been heavily grazed or farmed. There is limited or no fauna habitat connectivity. Fauna assemblages in these areas are likely to differ significantly from what existed prior to the disturbance, and are often depleted compared to what existed prior to the disturbance.

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Appendix E: Vegetation Type Mapping

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370500 371000 371500 372000 372500 373000

6579000 6578500 6578000 6577500 6577000 6576500 6576000

BH10
BH08
BH03
BH09
BH07
BH04
BH06
BH05

Brand Hwy

Map Extent

Brand Hwy

Legend

- Survey Site
- Survey Areas

Vegetation Type

- Pl01
- Pl02
- Pl03
- Pl04
- W01
- Cleared

Main Roads Western Australia
Brand Highway, Regans Ford – Biological Surveys

Figure E.1: Vegetation Type Mapping

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Author: J. Atkinson	Date: 17-11-2016
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureE1_VegType

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 metres

N

376500 377000 377500 378000 378500

6569500 6569000 6568500 6568000 6567500 6567000

BH18 BH12 BH11 BH13 BH19 BH02 BH15 BH14 BH16

Brand Hwy

Map Extent

Legend

- Survey Site
- Survey Areas

Vegetation Type

- Pl01
- Pl04
- Pl05
- W02
- Cleared

Main Roads Western Australia

Brand Highway, Regans Ford – Biological Surveys

Figure E.2: Vegetation Type Mapping

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Author: J. Atkinson	Date: 17-11-2016
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureE2_VegType

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 metres

N

380000
380500
381000
6562500
6562000
6561500
BH17
BH01
Brand Hwy
Map Extent
Legend
Survey Site
Survey Areas
Vegetation Type
PI01
Cleared

Main Roads Western Australia
Brand Highway, Regans Ford – Biological Surveys

Figure E.3: Vegetation Type Mapping

Author: J. Atkinson	Date: 17-11-2016
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureE3_VegType

Coordinate System: GDA 1994 MGA Zone 50
0 100 200 metres
N

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Appendix F: Threatened and Priority Flora and Fauna Species Likelihood of Occurrence within the Survey Area

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Table F.1: Likelihood of occurrence of Threatened and Priority flora recorded within 10 km of the survey area (Department of Parks and Wildlife 2016b, 2016e, 2016f, 2016g). The Threatened and Priority Flora List database is searched using place names and as a result some of the records obtained from this database may occur beyond 50 km of the survey area.

Species	Habit and flowering information	Life form	Habitat	Likelihood of occurrence	
				Pre-survey	Post-survey
Threatened (Declared Rare Flora)					
Acacia denticulosa	Erect, diffuse, spindly shrub, 1 m to 4 m high. Yellow flowers, September to October.	Perennial	Sand, loam, clay. Granite outcrops, rarely on sandplains.	Unlikely	Unlikely
Anigozanthos viridis subsp. terraspectans	Rhizomatous, herb, 0.05 m to 0.2 m high. Green/yellow-green, August to September.	Perennial	Grey sand, clay loam. Winter-wet depressions.	Potential	Potential
Asterolasia nivea	Open, weak, densely branched shrub, 0.3 m to 0.5 m high. White flowers, August to October.	No information available	Sand or clay with lateritic gravel, saline loam. Breakaways, slopes.	Unlikely	Unlikely
Darwinia acerosa	Spreading, compact shrub, 0.2 m to 0.6 m high. Green & red & purple flowers, September to November.	Perennial	Sand, loam, often moist soils. Granite outcrops, road verges.	Potential	Unlikely
Darwinia carnea	Spreading shrub, 0.2 m to 0.45 m high. Green and red flowers, October to December.	Perennial	Lateritic loam & gravel.	Potential	Unlikely
Dasymalla axillaris	Low shrub to 0.3 m high. Red to yellowish-scarlet flowers, July to December.	No information available	Plain, road verges. Yellow sand.	Unlikely	Unlikely
Drakaea elastica	Tuberous herb, 0.12 m to 0.3 m high. Red, green and yellow. October to November.	Perennial	White or grey sand. Low-lying situations adjoining winter-wet swamps.	Potential	Potential
Macarthuria keigheryi	Erect or spreading herb or shrub, 0.2 m to 0.4 m high, 0.3 m to 0.6 m wide. Flowers from September to December or February to March.	Perennial	White or grey sand.	Likely	Unlikely

Species	Habit and flowering information	Life form	Habitat	Likelihood of occurrence	
				Pre-survey	Post-survey
Paracaleana dixonii	Tuberous, herb, 0.09 m to 0.2 m high. Yellow-brown, October to January.	Perennial	Grey sand over granite.	Potential	Unlikely
Ptychosema pusillum	Herb, mostly 0.05 m to 0.1 m high. Red and brown and yellow, August to October.	Perennial	No information available	Potential	Potential
Priority 1					
Babingtonia delicata	No information available	No information available.	No information available	Potential	Unlikely
Drosera x sidjamesii	Fibrous-rooted perennial, herb, to 0.06 m high. Green-pink flowers, November to December or January to March.	Perennial	Peaty sand. Along lake margins, close to winter high-water line.	Potential	Unlikely
Priority 2					
Anigozanthos humilis subsp. Badgingarra (S.D. Hopper 7114)	Erect, hirsute rhizomatous, herb, to 0.9 m high.	Short-lived perennial	Grey-white sand, rich brown sandy loam, sandy clay, alluvial soils. Low plains, river-banks, winter-wet swamps.	Potential	Potential
Dampiera tephrea	Ascending to erect herb or shrub, 0.3 m to 0.6 m high. Flowers blue, July.	Perennial	Sand, gravelly loam.	Potential	Unlikely
Hypocalymma sp. Cataby (G.J. Keighery 5151)	Erect, spreading shrub, 0.5 m to 1 m high, to 1 m wide. White, August.	Perennial	Grey sand.	Potential	Unlikely
Lepyrodia curvescens	Dioecious, shortly creeping, tufted rhizomatous, herb, 0.24 m to 0.4 m high, rhizomes on surface or to 1 cm deep. September to November.	Short-lived perennial	Sand, laterite. Seasonally inundated swampland.	Potential	Potential

Species	Habit and flowering information	Life form	Habitat	Likelihood of occurrence	
				Pre-survey	Post-survey
Leucopogon squarrosus subsp. trigynus	No information available	No information available	No information available	Potential	Potential
Stylidium sp. Moora (J.A. Wege 713)	No information available	No information available	No information available	Potential	Potential
Scaevola paludosa	Erect or prostrate herb or shrub, to 0.5 m high. White flowers, September to December.	Perennial	Sandy soils.	Unlikely	Unlikely
Priority 3					
Acacia drummondii subsp. affinis	Erect shrub, 0.3-1 m high. Yellow flowers, July to August.	Perennial	Lateritic gravelly soils.	Potential	Unlikely
Babingtonia urbana	No information available	No information available	No information available	Potential	Potential
Banksia dallanneyi subsp. pollosta	Prostrate, lignotuberous shrub. Flowers yellow-brown, August to September.	Perennial	Grey/yellow sands. Flats, lateritic rises.	Potential	Unlikely
Banksia kippistiana var. paenepeccata	Erect, prickly, lignotuberous shrub, 0.3 m to 1.2 m high. Flowers yellow-cream, October to November.	Perennial	Lateritic gravelly soils.	Unlikely	Unlikely
Calytrix ecalycata subsp. brevis	Erect, open shrub, 1 m to 1.5 m high. Flowers yellow, July to September to October.	Perennial	Yellow or white sand, sandy gravel, clay loam, granite, sandstone. Uplands, valley flats, ridges, hills, road verges.	Potential	Unlikely
Cyathochaeta teretifolia	Rhizomatous, clumped, robust grass-like or herb (sedge), to 2 m high. Brown flowers.	Perennial	Grey sand, sandy clay. Swamps, creek edges.	Potential	Unlikely

Species	Habit and flowering information	Life form	Habitat	Likelihood of occurrence	
				Pre-survey	Post-survey
Dampiera triloba	Erect perennial, herb or shrub, to 0.5 m high.	Perennial	No information available.	Potential	Unlikely
Desmocladus biformis	Rhizomatous, densely tufted herb (sedge-like), 0.1 m to 0.2 m high. September to October.	Perennial	Sand, sandy clay, lateritic soils. Dry sites.	Potential	Potential
Dillwynia dillwynioides	Decumbent or erect, slender shrub, 0.3 m to 1.2 m high. Red & yellow/orange flowers, August to December.	Perennial	Sandy soils. Winter-wet depressions.	Potential	Unlikely
Haemodorum loratum	Bulbaceous herb 0.45 m to 1.2 m high. Black-brown-green flowers, November.	Perennial	Grey or yellow sand, gravel.	Likely	Recorded
Hensmania stoniella	Tufted, stilt-rooted herb, 0.1 m to 0.2 m high. Black-brown-green flowers, November.	Perennial	Grey or yellow sand, gravel.	Potential	Potential
Hypocalymma serrulatum	Erect shrub, 0.45 m to 1.7 m high. Flowers white-pink, April to May.	Perennial	Grey or white sand. Along drainage lines.	Potential	Potential
Hypocalymma tetrapterum	Shrub, 0.4 m to 0.9 m high.	Perennial	Grey sand, loam, lateritic gravel. Riverbanks, breakaways.	Unlikely	Unlikely
Leucopogon sp. Yanchep (M. Hislop 1986)	Erect shrub, 0.15 m to 1 m high, to 0.6 m wide. White/pink, April to June or September.	Perennial	Light grey-yellow sand, brown loam, limestone, laterite, granite. Coastal plain, breakaways, valley slopes, low hills.	Potential	Unlikely
Persoonia rudis	Erect, often spreading shrub, 0.2 m to 1 m high. White/pink, April to June or September.	Perennial	Light grey-yellow sand, brown loam, limestone, laterite, granite. Coastal plain, breakaways, valley slopes, low hills.	Likely	Unlikely

Species	Habit and flowering information	Life form	Habitat	Likelihood of occurrence	
				Pre-survey	Post-survey
Petrophile biternata	Stout, rigid, non-lignotuberous shrub, 0.8 m to 1.5 m high. Flowers yellow/cream-yellow, August to October.	Perennial	Yellow/grey sand & gravel, laterite, quartzite soils. Lateritic ridges, plains.	Potential	Unlikely
Phlebocarya pilosissima subsp. pilosissima	Shortly rhizomatous, compactly tufted grass-like or herb, 0.15 m to 0.4 m high. Flowers cream-white, August to October.	Perennial	White or grey sand, lateritic gravel.	Potential	Potential
Stylidium nonscandens	Erect herb, 0.18 m to 0.46 m high. Flowers pink, September to November.	Perennial	Sand over laterite. Hillslopes and crests. Banksia woodland, heath, mallee shrubland.	Likely	Potential
Priority 4					
Anigozanthos humilis subsp. chrysanthus	Rhizomatous herb, 0.2 m to -0.4(-0.8) m high. Yellow flowers July to October.	Perennial	Grey or yellow sand.	Potential	Potential
Eucalyptus macrocarpa subsp. elachantha	Spreading or sprawling mallee, 0.8 m to 4 m high. Bark smooth, grey over salmon pink. Red-pink, August to September or November to December.	Perennial	White or grey sand over laterite. Hillslopes, ridges, sandplains.	Potential	Unlikely
Grevillea rudis	Loose, spreading to erect shrub, 0.2 m to 1.2 m high. White-cream/cream-yellow flowers from January or April or June to September or November to December.	Perennial	White, grey, yellow or red sand, often with gravel & over laterite.	Potential	Unlikely
Hypolaena robusta	Dioecious rhizomatous herb, about 0.5 m high. September to October.	Perennial	White sand. Sandplains.	Potential	Potential
Leucopogon blepharolepis	Erect slender shrub, 0.2 m to 1.2 m high. White flowers, August to December.	Perennial	White/grey sand, calcareous sand, sandy clay over quartzite. Sandy ridges, sandplains, hills.	Potential	Unlikely

Species	Habit and flowering information	Life form	Habitat	Likelihood of occurrence	
				Pre-survey	Post-survey
Rumex drummondii	Erect herb, 0.6 m to 0.9 m high.	Perennial	No information available	Likely	Potential
Schoenus griffinianus	Small, tufted grass-like or herb (sedge), to 0.1 m high. Flowers September to October.	Perennial	White sand.	Potential	Potential
Stylidium striatum	Caespitose herb, 0.06 m to 0.13 m high, Leaves narrowly oblanceolate to oblanceolate, 0.5 cm to 1 cm long, 0.8 mm to 2 mm wide, apex subacute, margin entire, glandular. Scape mostly glabrous, sparingly glandular on inflorescence axis. Inflorescence racemose. Flowers yellow, October to November.	Perennial	Sandy clay. Hillslopes, or adjacent to granite outcrops. Open woodland, shrubland.	Potential	Unlikely
Thelymitra apiculata	Tuberous herb, 0.2 m to 0.35 m high. Flowers purple and yellow, May to July.	Perennial	Grey sand, lateritic gravel.	Potential	Unlikely
Tripterococcus sp. Brachylobus (A.S. George 14234)	No information available	No information available	No information available	Potential	Potential
Verticordia lindleyi subsp. lindleyi	Erect shrub, 0.2 m to 0.75 m high. Pink flowers from May or November to December or January.	Perennial	Sand, sandy clay. Winter-wet depressions.	Potential	Unlikely
Verticordia paludosa	Erect shrub, 0.3 m to 0.9 m high. Pink-white flowers from January to May.	Perennial	White/grey sand. Winter-wet flats	Likely	Potential

Table F.2: Likelihood of occurrence of Threatened and Priority fauna recorded in the vicinity of the survey.

Scientific name (common name)	Conservation codes			Preferred habitat	Likelihood of occurrence
	EPBC Act	WC Act	Parks and Wildlife		
Reptiles					
Neelaps calonotos (Black-striped snake)			P3	Occurs on sand dunes and sand-plains vegetated with heaths and eucalypt/banksia woodlands.	Moderate
Birds					
Leipoa ocellata (Malleefowl)	VU	S3		Largely confined to arid and semi-arid woodland that is dominated by mallee eucalypts on sandy soils with less than 430 mm of rainfall annually.	Low
Oxyura australis (Blue-billed duck)			P4	Mainly the deeper freshwater lakes and swamps, occasionally saltlakes and estuaries freshened by floodwates.	Moderate
Apus pacificus (Fork-tailed swift)	Mi	S5		Largely aerial species independent of the terrestrial environment.	Moderate
Botaurus poiciloptilus (Australasian bittern)	EN	S2		Found in beds of tall rush mixed with or near short fine sedge and open pools. Also occurs around swamps, lakes, pools, rivers and channels fringed with lignum, canegrass or other dense vegetation.	Low
Ardea ibis (Cattle egret)	Mi	S5		Largely wetland species however can exploit drier open habitats more than other heron species.	Moderate
Ardea modesta (Eastern great egret)	Mi	S5		Wide range of wetland habitats (for example inland and coastal, freshwater and saline, permanent and ephemeral).	High
Plegadis falcinellus (Glossy ibis)	Mi	S5		Wetland habitats such as fresh water marshes at the edges of lakes, rivers and wet swamp areas. This species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes and coastal lagoons.	High (previously recorded)

Scientific name (common name)	Conservation codes			Preferred habitat	Likelihood of occurrence
	EPBC Act	WC Act	Parks and Wildlife		
Panidon haliaetus (Eastern osprey)	Mi	S5		Favours coastal areas, especially the mouths of large rivers, lagoons and lakes.	Low
Falco peregrinus (Peregrine falcon)		S7		Cosmopolitan, will hunt in any habitat, soaring at height or from a perch; often near cliffs. Nests on rocky ledges in tall, vertical cliff faces and tall trees associated with drainage lines.	Moderate
Charadrius mongolus (Lesser sand plover)	EN, Mi	S3 (S5)		Mainly sandy beaches and tidal estuarine flats.	Low
Thinornis rubricollis (Hooded plover)			P4	Inhabits sandy, ocean beaches, with highest densities on beaches with large amounts of washed up seaweed and open dunes. Also inhabits coastal and inland salt lakes.	Low
Rostratula benghalensis (sensu lato) (Australian painted snipe)	EN	S2		Shallow terrestrial freshwater wetlands, temporary/permanent lakes, swamps and claypans with emergent grass, sedges, rushes and samphire.	Low
Numenius minutus (Little curlew)				Mainly tidal mud and reef flats. Occasionally sandy beaches, salt flats and saltwork ponds.	Low
Numenius madagascariensis (Eastern curlew)	CR, Mi	S3 (S5)		Mainly tidal flats, also reef flats, sandy beaches and rarely near coastal lakes.	Low
Tringa nebularia (Common greenshank)	Mi	S5		Inland wetlands and coastal habitats of varying salinity. Typically large mudflats, saltmarsh, mangroves and seagrass	High (previously recorded)
Tringa glareola (Wood sandpiper)	Mi	S5		Occurs mainly on freshwater wetlands of the inland interior and arid regions.	High
Calidris ruficollis (Red-necked stint)	Mi	S5		This species can be found in intertidal mudflats and along the muddy margins of freshwater lakes.	High

Scientific name (common name)	Conservation codes			Preferred habitat	Likelihood of occurrence
	EPBC Act	WC Act	Parks and Wildlife		
Calidris ferruginea (Curlew sandpiper)	CR	S3 (S5)		Mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast.	Moderate
Philomachus pugnax (Ruff)	Mi	S5		Freshwater lakes and swamps, saltwork ponds and estuaries.	High
Calyptorhynchus latirostris (Carnaby's black-cockatoo)	EN	S2		Woodland or forest that contains live or dead trees of Salmon Gum, Wandoo, Tuart, Jarrah, Flooded Gum, Karri or Marri. Feeds on seeds, flowers and nectar of native proteaceous plant species (e.g. *Banksia* spp., *Dryandra* spp., *Grevillea* spp.), eucalypts and *Pinus* spp.	High (recorded)
Merops ornatus (Rainbow bee-eater)		S5		Lightly wooded, preferably sandy soil, near drainage channels and creek lines.	High (previously recorded)
Motacilla cinerea (Grey wagtail)	Mi	S5		Mainly banks and rocks in fast flowing fresh water. Vagrant to Australia.	Low
Mammals					
Dasyurus geoffroii (Western quoll, chuditch)	VU	S3		Wandoo and Salmon Gum woodland, mallee, Jarrah forest and mixed Marri/Jarrah forest.	High (previously recorded)
Macropus Irma (Western brush wallaby)			P4	Open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets.	Moderate
Hydromys chrysogaster (Water-rat)			P4	Usually found near permanent bodies of fresh or brackish water along river and lake banks. They prefer areas with riparian vegetation and a degree of habitat complexity.	Moderate

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Appendix G: Results of Fauna Database Searches, Literature Reviews and this Biological Survey

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Table G.1: Amphibian species list – results of database searches, literature reviews and Astron survey results.

Scientific name	Common name	Introduced	Conservation codes			NatureMap	EPBC PMST	DPaW T and P	Previous Surveys	Current Survey
			EPBC Act	WC Act	DPaW					
Hylidae										
Litoria moorei	Motorbike frog					x				
Limnodynastidae										
Limnodynastes dorsalis	Western banjo frog									x
Myobatrachidae										
Crinia insignifera	Squelching froglet					x				x
Pseudophryne guentheri	Crawling toadlet					x				

Table G.2: Reptile species list – results of database searches, literature reviews and Astron survey results.

Scientific Name	Common Name	Introduced	Conservation Codes			NatureMap	EPBC PMST	DPaW T and P	Previous Surveys	Current Survey
			EPBC Act	WC Act	DPaW					
Agamidae										
Ctenophorus adelaidensis	Western heath dragon								x	
Diplodactylidae										
Strophurus spinigerus						x				
Gekkonidae										
Gehyra variegata									x	
Pygopodidae										
Delma fraseri									x	
Scincidae										
Menetia greyii						x				
Tiliqua rugosa									x	
Elapidae										
Brachyurophis fasciolatus						x				
Brachyurophis semifasciatus						x				
Demansia psammophis	Yellow-faced whipsnake								x	
Neelaps calonotos	Black-striped snake				P3			x		
Parasuta gouldii						x				
Parasuta nigriceps						x				
Pseudonaja nuchalis	Gwardar								x	

Table G.3: Bird species list – results of database searches, literature reviews and Astron survey results.

Scientific Name	Common Name	Introduced	Conservation Codes			NatureMap	Birdata	EPBC PMST	DPaW T and P	Previous Surveys	Current Survey
			EPBC Act	WC Act	DPaW						
Casuariidae											
Dromaius novaehollandiae	Emu						x			x	
Megapodiidae											
Leipoa ocellata	Malleefowl		VU	S3				x	x		
Anatidae											
Biziura lobata	Musk duck						x				
Cygnus atratus	Black swan					x	x				
Tadorna tadornoides	Australian shelduck					x	x				
Chenonetta jubata	Australian wood duck					x	x				x
Malacorhynchus membranaceus	Pink-eared duck						x				
Anas rhynchotis	Australasian shoveler					x	x				
Anas gracilis	Grey teal					x	x				x
Anas platyrhynchos	Northern mallard							x			
Anas superciliosa	Pacific black duck					x	x				x
Aythya australis	Hardhead						x				
Oxyura australis	Blue-billed duck				P4		x		x		
Podicipedidae											
Tachybaptus novaehollandiae	Australasian grebe					x	x				
Poliocephalus poliocephalus	Hoary-headed grebe					x	x				x
Columbidae											
Columba livia	Rock dove	*						x			
Streptopelia senegalensis	Laughing dove						x	x			
Streptopelia chinensis	Spotted dove						x	x			
Phaps chalcoptera	Common bronzewing						x				x

Scientific Name	Common Name	Introduced	Conservation Codes			NatureMap	Birdata	EPBC PMST	DPaW T and P	Previous Surveys	Current Survey
			EPBC Act	WC Act	DPaW						
Ocyphaps lophotes	Crested pigeon						x			x	
Apodidae											
Apus pacificus	Fork-tailed swift			S5				x			
Anhingidae											
Anhinga novaehollandiae	Australasian darter						x				
Phalacrocoracidae											
Microcarbo melanoleucos	Little pied cormorant					x	x				
Phalacrocorax sulcirostris	Little black cormorant						x				
Phalacrocorax varius	Pied cormorant										x
Pelecanidae											
Pelecanus conspicillatus	Australian pelican						x				
Ardeidae											
Botaurus poiciloptilus	Australasian bittern		EN	S2					x		
Ardea pacifica	White-necked heron						x				
Ardea modesta	Eastern great egret			S5			x	x	x		
Ardea ibis	Cattle egret			S5				x			
Egretta novaehollandiae	White-faced Heron					x	x			x	
Nycticorax caledonicus	Nankeen night-heron						x				
Threskiornithidae											
Plegadis falcinellus	Glossy ibis			S5			x		x		
Threskiornis molucca	Australian white ibis					x	x				
Threskiornis spinicollis	Straw-necked Ibis					x	x				
Platalea flavipes	Yellow-billed Spoonbill					x	x				
Accipitridae											
Pandion cristatus	Eastern osprey			S5			x	x			
Elanus axillaris	Black-shouldered kite						x			x	

Scientific Name	Common Name	Introduced	Conservation Codes			NatureMap	Birdata	EPBC PMST	DPaW T and P	Previous Surveys	Current Survey
			EPBC Act	WC Act	DPaW						
Lophoictinia isura	Square-tailed kite						x				
Haliastur sphenurus	Whistling kite					x	x				
Accipiter fasciatus	Brown goshawk						x			x	
Accipiter cirrocephalus	Collared sparrowhawk						x			x	
Circus assimilis	Spotted harrier						x				
Circus approximans	Swamp harrier						x				
Aquila audax	Wedge-tailed Eagle						x			x	
Hieraaetus morphnoides	Little eagle						x				x
Falconidae											
Falco cenchroides	Nankeen kestrel					x	x			x	x
Falco berigora	Brown falcon						x			x	
Falco longipennis	Australian hobby						x				
Falco peregrinus	Peregrine falcon			S7					x		
Rallidae											
Porphyrio porphyrio	Purple swamphen						x				
Tribonyx ventralis	Black-tailed native-hen						x				
Gallinula tenebrosa	Dusky moorhen						x				
Fulica atra	Eurasian coot					x	x				x
Recurvirostridae											
Himantopus himantopus	Black-winged stilt					x					
Recurvirostra novaehollandiae	Red-necked avocet						x				
Cladorhynchus leucocephalus	Banded stilt						x				
Charadriidae											
Charadrius ruficapillus	Red-capped Plover						x				
Charadrius mongolus	Lesser sand plover			S2 (S5)					x		
Elseyornis melanops	Black-fronted dotterel					x	x				

Scientific Name	Common Name	Introduced	Conservation Codes			NatureMap	Birdata	EPBC PMST	DPaW T and P	Previous Surveys	Current Survey
			EPBC Act	WC Act	DPaW						
Thinornis rubricollis	Hooded plover				P4		x	x	x		
Erythrogonys cinctus	Red-kneed dotterel						x				
Vanellus tricolor	Banded lapwing						x				
Rostratulidae											
Rostratula australis	Australian painted snipe		EN	S2				x			
Scolopacidae											
Numenius minutus	Little curlew			S5					x		
Numenius madagascariensis	Eastern curlew		CR	S3(S5)				x			
Tringa nebularia	Common greenshank			S5		x	x	x	x		
Tringa glareola	Wood sandpiper			S5					x		
Calidris ruficollis	Red-necked Stint			S5			x		x		
Calidris ferruginea	Curlew sandpiper		CR	S3(S5)				x	x		
Philomachus pugnax	Ruff			S5					x		
Laridae											
Chroicocephalus novaehollandiae	Silver gull						x				
Cacatuidae											
Calyptorhynchus banksii	Red-tailed black-cockatoo						x				
Calyptorhynchus latirostris	Carnaby's black-cockatoo		EN	S2		x	x	x	x	x	x
Eolophus roseicapillus	Galah					x	x			x	x
Cacatua pastinator	Western corella					x	x				
Cacatua sanguinea	Little corella					x	x			x	x
Psittacidae											
Polytelis anthopeplus	Regent parrot						x			x	
Platycercus icterotis	Western rosella						x				
Barnardius zonarius	Australian ringneck					x	x			x	x
Purpureicephalus spurius	Red-capped parrot					x	x				

Scientific Name	Common Name	Introduced	Conservation Codes			NatureMap	Birdata	EPBC PMST	DPaW T and P	Previous Surveys	Current Survey
			EPBC Act	WC Act	DPaW						
Cuculidae											
Chalcites basalis	Horsfield's bronze-cuckoo						x				
Chalcites osculans	Black-eared cuckoo						x				
Chalcites lucidus	Shining bronze-cuckoo						x				
Cacomantis pallidus	Pallid cuckoo					x	x			x	
Strigidae											
Ninox novaeseelandiae	Southern boobook						x				
Halcyonidae											
Dacelo novaeguineae	Laughing kookaburra					x	x			x	x
Todiramphus sanctus	Sacred kingfisher					x	x				
Meropidae											
Merops ornatus	Rainbow bee-eater			S5		x	x	x	x	x	
Climacteridae											
Climacteris rufa	Rufous treecreeper						x				
Maluridae											
Malurus splendens	Splendid fairy-wren					x	x			x	
Malurus leucopterus	White-winged fairy-wren					x	x				
Malurus lamberti	Variegated fairy-wren						x			x	
Acanthizidae											
Sericornis frontalis	White-browed scrubwren						x				
Smicrornis brevirostris	Weebill					x	x			x	x
Gerygone fusca	Western gerygone					x	x			x	
Acanthiza chrysorrhoa	Yellow-rumped thornbill					x	x				
Acanthiza inornata	Western thornbill					x	x				
Acanthiza apicalis	Inland thornbill					x	x				
Pardalotidae											

Scientific Name	Common Name	Introduced	Conservation Codes			NatureMap	Birdata	EPBC PMST	DPaW T and P	Previous Surveys	Current Survey
			EPBC Act	WC Act	DPaW						
Pardalotus striatus	Striated pardalote					x	x			x	
Meliphagidae											
Acanthorhynchus superciliosus	Western spinebill					x	x			x	
Lichenostomus virescens	Singing honeyeater						x			x	x
Lichenostomus ornatus	Yellow-plumed honeyeater						x				
Manorina flavigula	Yellow-throated miner						x			x	
Anthochaera lunulata	Western wattlebird					x	x				
Anthochaera carunculata	Red wattlebird					x	x			x	
Epthianura tricolor	Crimson chat						x			x	
Epthianura albifrons	White-fronted chat					x	x				
Glyciphila melanops	Tawny-crowned honeyeater						x				
Lichmera indistincta	Brown honeyeater					x	x			x	x
Phylidonyris novaehollandiae	New holland honeyeater					x	x			x	x
Phylidonyris niger	White-cheeked honeyeater									x	x
Melithreptus brevirostris	Brown-headed honeyeater						x				
Neosittidae											
Daphoenositta chrysoptera	Varied sittella						x				
Campephagidae											
Coracina novaehollandiae	Black-faced cuckoo-shrike					x	x			x	x
Lalage sueurii	White-winged triller						x			x	
Pachycephalidae											
Pachycephala pectoralis	Golden whistler					x	x			x	
Pachycephala rufiventris	Rufous whistler					x	x			x	
Colluricincla harmonica	Grey shrike-thrush					x	x				
Artamidae											
Artamus cinereus	Black-faced woodswallow					x	x			x	

Scientific Name	Common Name	Introduced	Conservation Codes			NatureMap	Birdata	EPBC PMST	DPaW T and P	Previous Surveys	Current Survey
			EPBC Act	WC Act	DPaW						
Artamus cyanopterus	Dusky woodswallow						x				
Cracticus torquatus	Grey butcherbird						x				
Cracticus nigrogularis	Pied butcherbird						x			x	x
Cracticus tibicen	Australian magpie					x	x			x	x
Strepera versicolor	Grey currawong					x					
Rhipiduridae											
Rhipidura albiscapa	Grey fantail					x	x			x	
Rhipidura leucophrys	Willie wagtail					x	x			x	x
Corvidae											
Corvus coronoides	Australian raven					x	x			x	x
Corvus bennetti	Little crow						x			x	
Monarchidae											
Myiagra inquieta	Restless flycatcher						x				
Grallina cyanoleuca	Magpie-lark					x	x			x	x
Petroicidae											
Petroica boodang	Scarlet robin					x	x				
Petroica goodenovii	Red-capped robin						x				
Eopsaltria griseogularis	Western yellow robin									x	
Acrocephalidae											
Acrocephalus australis	Australian reed-warbler					x	x				
Megaluridae											
Megalurus gramineus	Little grassbird					x					
Cincloramphus cruralis	Brown songlark									x	
Timaliidae											
Zosterops lateralis	Silvereye					x	x				x
Hirundinidae											

Scientific Name	Common Name	Introduced	Conservation Codes			NatureMap	Birdata	EPBC PMST	DPaW T and P	Previous Surveys	Current Survey
			EPBC Act	WC Act	DPaW						
Cheramoeca leucosterna	White-backed swallow					x	x				
Hirundo neoxena	Welcome swallow						x				x
Petrochelidon nigricans	Tree martin						x				
Sturnidae											
Sturnus vulgaris	Common starling							x			
Nectariniidae											
Dicaeum hirundinaceum	Mistletoebird						x				
Motacillidae											
Anthus novaeseelandiae	Australasian pipit									x	
Motacilla cinerea	Grey wagtail			S5				x			

Table G.4: Mammal species list – results of database searches, literature reviews and Astron survey results.

Scientific Name	Common name	Introduced	Conservation Codes			NatureMap	EPBC PMST	DPaW T and P	Previous Surveys	Current Survey
			EPBC Act	WC Act	DPaW					
Tachyglossidae										
Tachyglossus aculeatus	Short-beaked echidna					x			x	
Dasyuridae										
Dasyurus geoffroii	Western quoll, chuditch		VU	S3		x	x	x		
Macropodidae										
Macropus fuliginosus	Western grey kangaroo								x	x
Macropus irma	Western brush wallaby				P4	x		x		
Macropus robustus	Euro, biggada								x	
Vespertilionidae										
Chalinolobus gouldii	Gould's wattled bat					x				
Nyctophilus geoffroyi	Lesser long-eared bat					x				
Muridae										
Hydromys chrysogaster	Water-rat				P4			x		
Mus musculus	House mouse	*					x			
Pseudomys albocinereus	Ash-grey mouse					x				
Rattus rattus	Black rat	*				x	x			
Leporidae										
Oryctolagus cuniculus	Rabbit	*					x		x	x
Canidae										
Canis lupus familiaris	Dog	*					x			x
Vulpes vulpes	Red fox	*					x		x	
Felidae										

Scientific Name	Common name	Introduced	Conservation Codes			NatureMap	EPBC PMST	DPaW T and P	Previous Surveys	Current Survey
			EPBC Act	WC Act	DPaW					
Felis catus	Cat	*					x		x	
Suidae										
Sus scrofa	Pig	*					x			

Appendix H: Flora Survey Site Data

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Site: BH01
Location: Brand highway, south end **Type:** 10x10m Quadrat
Date: 2016-09-18 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 380718 **Northing:** 6561504
Habitat: Plain
Soil: Light grey sand
Rock type: NA
Vegetation: *Banksia attenuata*, *Banksia menziesii* open low woodland over *Adenanthos cygnorum* subsp. *cygnorum* open tall shrubland over *Eremaea pauciflora* var. *pauciflora* open shrubland over *Stirlingia latifolia*, *Regelia ciliata* and *Scholtzia involucrata* open low shrubland.
Veg Condition: Excellent
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
Adenanthos cygnorum subsp. *cygnorum*	3	2.5
Amphipogon turbinatus	0.5	0.4
Andersonia heterophylla	0.5	0.4
Anigozanthos humilis subsp. *humilis*	0.5	0.1
Banksia attenuata	4	5.0
Banksia menziesii	3	5.5
Blancoa canescens	0.5	0.2
Bossiaea eriocarpa	0.5	0.4
Cassytha glabella forma *casuarinae*	0.5	
Chordifex microcodon	0.5	0.4
Chordifex sinuosus	0.5	0.15
Conospermum acerosum subsp. *acerosum*	0.5	2.3
Conospermum incurvum	0.5	0.7
Conospermum stoechadis subsp. *stoechadis*	0.5	1.1
Conostephium pendulum	1	0.5
Conostylis aurea	0.5	0.2
Conostylis teretifolia subsp. *teretifolia*	0.5	0.15
Dampiera linearis	0.5	0.3
Drosera ?macrantha	0.5	0.2
Drosera ?parvula	0.5	0.05
*Drosera erythrorhiza ?*subsp. *magna*	0.5	0.05
Eremaea pauciflora var. *pauciflora*	5	1.0
Hibbertia acerosa	0.5	0.2
Hibbertia huegelii	0.5	0.15
Hibbertia ovata	0.5	0.1
Hibbertia spicata subsp. *spicata*	0.5	0.2
Hypocalymma xanthopetalum	0.5	0.3
Jacksonia floribunda	0.5	0.4
Jacksonia sternbergiana	0.5	0.8
Leptospermum spinescens	0.5	0.8
Leucopogon conostephioides	0.5	0.5
Lyginia barbata	0.5	0.7
Lysinema pentapetalum	0.5	1.1

Name	Cover (%)	Height (m)
Melaleuca seriata	1	0.8
Mesomelaena pseudostygia	0.5	0.5
Petrophile linearis	0.5	0.3
Petrophile macrostachya	0.5	0.6
Regelia ciliata	1	0.9
Schoenus curvifolius	0.5	0.4
Schoenus pedicellatus	0.5	0.5
Schoenus pleiostemoneus	0.5	0.2
Scholtzia involucrata	1	0.6
Stirlingia latifolia	4	0.7
Stylidium ?bicolor	0.5	0.05
Synaphea spinulosa subsp. *spinulosa*	0.5	0.6
Thysanotus patersonii	0.5	0.1
Verticordia sp.	0.5	0.8

* denotes weed species
? denotes unconfirmed ID

Site: BH02
Location: Brand highway, south end **Type:** 10x10m Quadrat
Date: 2016-09-18 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 377458 **Northing:** 6568247
Habitat: Wet depression
Soil: Black loam
Rock type: NA
Vegetation: *Melaleuca incana* subsp*. incana* and *Melaleuca preissiana* open low woodland over *Hypocalymma angustifolium* and *Astartea scoparia* open shrubland over *Baumea juncea* open sedgeland.
Veg Condition: Excellent
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
Alexgeorgea nitens	0.5	0.1
**Arctotheca calendula*	0.5	0.05
Astartea scoparia	1	1.6
Baumea juncea	28	0.2
Boronia ramosa subsp. *anethifolia*	0.5	0.2
Hypocalymma angustifolium	2	1.2
Hypochaeris sp.	0.5	0.01
Melaleuca cuticularis	0.5	1.0
Melaleuca incana subsp. *incana*	17	3.0
Melaleuca preissiana	15	6.5
Melaleuca rhaphiophylla	0.5	1.6
Pericalymma ellipticum var. *ellipticum*	0.5	1.2
Pterostylis glebosa	0.5	0.1
Trachymene pilosa	0.5	0.05
**Ursinia anthemoides*	0.5	0.3

* denotes weed species
? denotes unconfirmed ID

Site: BH03
Location: Brand Hwy north end **Type:** 10x10m Quadrat
Date: 2016-09-19 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 371376 **Northing:** 6578298
Habitat: Riseslope
Soil: Yellow brown sand
Rock type: NA
Vegetation: *Grevillea eriostachya* open tall shrubland over *Calothamnus quadrifidus* subsp. *quadrifidus, Eremaea pauciflora* var. *pauciflora* and *Xanthorrhoea preissii* shrubland *over Podotheca gnaphalioides* open low shrubland over *Austrostipa elegantissima* and *Amphipogon turbinatus* very open tussock grassland and *Mesomelaena pseudostygia* very open sedgeland.
Veg Condition: Very Good
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
?Leporella fimbriata	0.5	0.01
**Aira caryophyllea*	0.5	0.1
Allocasuarina microstachya	0.5	0.7
Amphipogon turbinatus	1	0.4
**Arctotheca calendula*	0.5	0.01
Austrostipa elegantissima	4	0.6
Banksia shuttleworthiana	0.5	0.5
Burchardia congesta	0.5	0.3
Caladenia flava subsp. *flava*	0.5	0.2
Calandrinia corrigioloides	0.5	0.01
Calothamnus quadrifidus subsp. *quadrifidus*	4	1.8
Conospermum stoechadis subsp. *stoechadis*	0.5	0.5
Crassula colorata	0.5	0.5
Drosera erythrorhiza ?subsp. *magna*	0.5	0.01
Drosera menziesii	0.5	0.2
**Ehrharta longiflora*	0.5	0.4
Eremaea pauciflora var. *pauciflora*	4	1.1
**Galium murale*	0.5	0.05
Grevillea eriostachya	2	2.1
Hakea incrassata	0.5	0.7
Hibbertia crassifolia	0.5	0.5
**Hypochaeris radicata*	0.5	0.01
Lepidobolus preissianus	0.5	0.3
Lepidosperma leptostachyum	0.5	0.4
Leptospermum spinescens	0.5	0.4
Mesomelaena pseudostygia	6	0.4
Neurachne alopecuroidea	0.5	0.3
Petrophile brevifolia	0.5	0.4
Podotheca gnaphalioides	6	0.3
Schoenus pleiostemoneus	0.5	0.2
Tetraria octandra	0.5	3.0

Name	Cover (%)	Height (m)
Thysanotus patersonii	0.5	0.1
Trachymene pilosa	0.5	0.05
**Ursinia anthemoides*	0.5	0.5
Verticordia pennigera	0.5	0.6
**Wahlenbergia capensis*	0.5	0.2
Xanthorrhoea preissii	2	1.5

* denotes weed species
? denotes unconfirmed ID

Site: BH04
Location: Brand Hwy north end **Type:** 10x10m Quadrat
Date: 2016-09-19 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 371780 **Northing:** 6577814
Habitat: Other
Soil: Yellow brown loamy sand
Rock type: NA
Vegetation: *Eucalyptus todtiana* low open woodland over *Adenanthos cygnorum* subsp. *cygnorum* and *Calothamnus quadrifidus* subsp. *quadrifidus* open scrub over *Eremaea pauciflora* var. *pauciflora*, *Allocasuarina humilis* and *Jacksonia floribunda* shrubland over *Hibbertia crassifolia* and *Scholtzia involucrata* open low shrubland over *Tetraria octandra*, *Mesomelaena pseudostygia* and *Caustis dioica* open sedgeland.
Veg Condition: Very Good
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
Acacia stenoptera	0.5	0.5
Adenanthos cygnorum subsp. *cygnorum*	20	3.3
Allocasuarina humilis	5	1.9
Austrostipa elegantissima	0.5	0.5
Calothamnus quadrifidus subsp. *quadrifidus*	20	2.2
Caustis dioica	2	0.3
Conyza sp.	0.5	0.05
Dasypogon obliquifolius	0.5	0.3
**Ehrharta calycina*	0.5	0.5
**Eragrostis curvula*	0.5	0.5
Eremaea pauciflora var. *pauciflora*	6	1.4
**Erodium botrys*	0.5	0.01
Eucalyptus todtiana	2	3.5
**Galium murale*	0.5	0.01
Gastrolobium linearifolium	0.5	0.5
Hibbertia crassifolia	1	0.8
Jacksonia floribunda	1	1.6
Jacksonia nutans	1	1.2
Lepidobolus preissianus	0.5	0.5
Mesomelaena pseudostygia	5	0.5
Microtis media subsp. *densiflora*	0.5	0.5
Patersonia occidentalis	0.5	0.5
**Polycarpon tetraphyllum*	0.5	0.05
Scholtzia involucrata	1	0.5
**Sonchus asper*	0.5	0.05
Tetraria octandra	9	0.5
Xanthorrhoea preissii	0.5	1.1

* denotes weed species
? denotes unconfirmed ID

Site: BH05
Location: Brand Hwy north end **Type:** 10x10m Quadrat
Date: 2016-09-19 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 373066 **Northing:** 6576527
Habitat: Other
Soil: Yellow brown loamy sand
Rock type: NA
Vegetation: *Eucalyptus todtiana* scattered low trees over *Banksia attenuata* and *Jacksonia nutans* open tall shrubland over *Xanthorrhoea preissii* and *Banksia menziesii* open shrubland over *Hibbertia crassifolia*, *Eremaea pauciflora* var. *pauciflora* and *Allocasuarina humilis* low shrubland over *Mesomelaena pseudostygia* and *Tetraria octandra* very open sedgeland.
Veg Condition: Pristine
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
Acacia barbinervis subsp. *borealis*	0.5	0.4
Alexgeorgea nitens	0.5	0.1
Allocasuarina humilis	2	0.9
Amphipogon turbinatus	0.5	0.3
Andersonia lehmanniana subsp. *lehmanniana*	0.5	0.4
Anigozanthos humilis	0.5	0.2
Banksia attenuata	2	2.5
Banksia menziesii	1	1.5
Bossiaea eriocarpa	0.5	0.4
Burchardia congesta	0.5	0.4
Caustis dioica	0.5	0.3
Centrolepis drummondiana	0.5	0.02
Conospermum sp.	0.5	0.3
Conospermum stoechadis subsp. *stoechadis*	0.5	0.8
Conostephium pendulum	0.5	0.3
Conostylis aurea	0.5	0.2
Conostylis teretifolia subsp. *teretifolia*	1	0.2
Daviesia angulata	0.5	0.6
Daviesia incrassata subsp. *incrassata*	2	0.9
Daviesia nudiflora	2	0.5
Drosera ?parvula	0.5	0.05
Drosera erythrorhiza ?subsp. *magna*	0.5	0.01
Drosera menziesii	0.5	0.3
Eremaea pauciflora var. *pauciflora*	3	0.4
Eucalyptus todtiana	1	2.5
Gastrolobium linearifolium	0.5	0.4
Gyrostemon subnudus	1	0.7
Hibbertia acerosa	0.5	0.2
Hibbertia crassifolia	12	0.5
Hibbertia huegelii	0.5	0.3
Hovea stricta	0.5	0.5

Name	Cover (%)	Height (m)
Hypocalymma xanthopetalum	0.5	0.3
Jacksonia nutans	2	2.2
Lepidobolus preissianus	0.5	0.4
Leucopogon sprengelioides	0.5	0.3
Lyginia imberbis	0.5	0.4
Mesomelaena pseudostygia	4	0.4
Neurachne alopecuroidea	0.5	0.05
Petrophile brevifolia	0.5	0.2
Phyllangium paradoxum	0.5	0.02
Scaevola canescens	1	0.15
Schoenus pleiostemoneus	0.5	0.1
Stylidium ?bicolor	0.5	0.05
Stylidium repens	0.5	0.1
Synaphea spinulosa subsp. *spinulosa*	0.5	0.5
Tetraria octandra	1	0.7
Thysanotus patersonii	0.5	
Xanthorrhoea preissii	5	1.0
Xanthosia huegelii	0.5	0.1

* denotes weed species
? denotes unconfirmed ID

Site: BH06
Location: Brand Hwy north end **Type:** 10x10m Quadrat
Date: 2016-09-20 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 372824 **Northing:** 6576537
Habitat: Other
Soil: Yellow brown loamy sand
Rock type: NA
Vegetation: *Eucalyptus todtiana* low open woodland over *Xanthorrhoea preissii* and *Adenanthos cygnorum* subsp. *cygnorum* open shrubland over *Eremaea pauciflora* var. *pauciflora*, *Jacksonia sternbergiana* and *Thysanotus dichotomus* low shrubland over *Mesomelaena pseudostygia* very open sedgeland.
Veg Condition: Excellent
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
?Hypochaeris glabra	0.5	0.01
Acacia pulchella var. *glaberrima*	0.5	0.5
Adenanthos cygnorum subsp. *cygnorum*	3	1.2
Allocasuarina humilis	0.5	0.5
Amphipogon turbinatus	0.5	0.3
Anigozanthos humilis	0.5	0.2
Banksia dallanneyi var. *dallanneyi*	0.5	0.4
Burchardia congesta	0.5	0.4
Caladenia flava subsp. *flava*	0.5	0.2
Calothamnus quadrifidus subsp. *quadrifidus*	0.5	0.4
Cassytha flava	0.5	0.3
Cassytha glabella forma *casuarinae*	0.5	0.5
Caustis dioica	0.5	0.25
Conospermum stoechadis subsp. *stoechadis*	0.5	0.7
Conostylis aurea	0.5	0.1
Conostylis teretifolia subsp. *teretifolia*	0.5	0.1
Drosera erythrorhiza ?subsp. *magna*	0.5	0.02
Drosera menziesii	0.5	0.3
Eremaea pauciflora var. *pauciflora*	10	0.6
Eucalyptus todtiana	2	4.0
Hakea costata	0.5	1.2
Hakea incrassata	0.5	0.5
Hibbertia crassifolia	0.5	0.4
Hibbertia huegelii	0.5	0.3
Jacksonia nutans	0.5	2.0
Jacksonia sternbergiana	5	0.6
Lepidobolus preissianus	2	0.4
Leptospermum spinescens	0.5	0.8
Macarthuria australis	0.5	0.2
Melaleuca ciliosa	0.5	0.5
Mesomelaena pseudostygia	4	0.5

Name	Cover (%)	Height (m)
Neurachne alopecuroidea	0.5	0.3
Orianthera spermacocea	0.5	0.1
Phyllangium paradoxum	0.5	0.05
Podotheca gnaphalioides	0.5	0.1
Pyrorchis nigricans	0.5	0.01
Regelia ciliata	1	0.3
Scaevola repens var. *repens*	0.5	0.1
Schoenus nanus	0.5	0.05
Stylidium ?bicolor	0.5	0.05
Stylidium repens	0.5	0.2
Tetraria octandra	0.5	0.3
Thysanotus dichotomus	4	0.2
Xanthorrhoea preissii	4	1.2
Xanthosia huegelii	0.5	0.4

* denotes weed species
? denotes unconfirmed ID

Site: BH07
Location: Brand Hwy north end **Type:** 10x10m Quadrat
Date: 2016-09-20 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 371622 **Northing:** 6578051
Habitat: Riseslope
Soil: Yellow brown loamy sand
Rock type: NA
Vegetation: *Eremaea pauciflora* var. *pauciflora*, *Allocasuarina humilis* and *Calothamnus quadrifidus* subsp. *quadrifidus* open scrub over *Xanthorrhoea preissii* open shrubland over *Hibbertia crassifolia* low open shrubland over *Tetraria octandra* and *Baumea rubiginosa* open sedgeland.
Veg Condition: Very Good
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
Adenanthos cygnorum subsp. *cygnorum*	6	3.3
Allocasuarina humilis	10	2.8
Austrostipa elegantissima	0.5	0.7
Banksia shuttleworthiana	0.5	0.6
Baumea rubiginosa	2	0.3
Boronia ramosa subsp. *anethifolia*	0.5	0.5
Bossiaea eriocarpa	0.5	0.4
Burchardia congesta	0.5	0.5
Calothamnus quadrifidus subsp. *quadrifidus*	7	2.1
Centrolepis drummondiana	0.5	0.05
Conostylis aurea	0.5	0.2
Cotula australis	0.5	0.01
Crassula colorata	0.5	0.01
Daviesia nudiflora	0.5	1.2
Drosera erythrorhiza ?subsp. *magna*	0.5	0.02
**Ehrharta longiflora*	0.5	0.5
**Eragrostis curvula*	0.5	1.0
Eremaea pauciflora var. *pauciflora*	17	2.5
**Galium murale*	0.5	0.05
Gastrolobium linearifolium	0.5	0.6
Hakea incrassata	0.5	1.1
Hibbertia crassifolia	6	0.6
Hibbertia huegelii	0.5	0.3
**Hypochaeris radicata*	0.5	0.01
Jacksonia floribunda	0.5	1.2
Leptoceras menziesii	0.5	0.01
Leptospermum spinescens	0.5	0.8
Mesomelaena pseudostygia	0.5	0.5
Persoonia comata	0.5	1.9
Petrophile brevifolia	0.5	0.5
Petrophile macrostachya	0.5	1.5

Name	Cover (%)	Height (m)
**Polycarpon tetraphyllum*	0.5	0.5
Scaevola canescens	0.5	0.3
Sonchus sp.	0.5	0.05
Tetraria octandra	15	0.4
Xanthorrhoea preissii	3	1.6
Xanthosia huegelii	0.5	0.2

* denotes weed species
? denotes unconfirmed ID

Site: BH08
Location: Brand Hwy north end **Type:** 10x10m Quadrat
Date: 2016-09-20 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 371294 **Northing:** 6578415
Habitat: Riseslope
Soil: Yellow brown loamy sand
Rock type: NA
Vegetation: *Allocasuarina humilis*, *Allocasuarina microstachya* and *Xanthorrhoea preissii* shrubland over *Hibbertia crassifolia*, *Eremaea pauciflora* var. *pauciflora* and *Banksia shuttleworthiana* low shrubland over *Mesomelaena pseudostygia* very open sedgeland.
Veg Condition: Very Good
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
Allocasuarina humilis	6	1.8
Allocasuarina microstachya	2	1.0
Amphipogon turbinatus	0.5	0.3
Anigozanthos humilis	0.5	0.15
**Arctotheca calendula*	0.5	0.1
Austrostipa elegantissima	0.5	1.0
Banksia shuttleworthiana	3	0.3
Baumea rubiginosa	0.5	0.3
**Briza maxima*	0.5	0.2
Burchardia congesta	0.5	0.4
Caladenia flava subsp. *flava*	0.5	0.2
Calandrinia corrigioloides	0.5	0.05
Conospermum stoechadis subsp. *stoechadis*	0.5	0.5
Conostylis sp.	0.5	0.15
Conostylis teretifolia subsp. *teretifolia*	0.5	0.3
Crassula colorata	0.5	0.02
Drosera erythrorhiza ?subsp. *magna*	0.5	0.1
Drosera menziesii	0.5	0.1
Eremaea pauciflora var. *pauciflora*	4	0.8
**Gladiolus caryophyllaceus*	0.5	0.8
Grevillea eriostachya	0.5	1.5
Hakea incrassata	0.5	0.8
Hibbertia crassifolia	6	0.4
Hibbertia huegelii	0.5	0.4
**Hypochaeris radicata*	0.5	0.01
Jacksonia calcicola	0.5	1.1
Jacksonia floribunda	0.5	1.4
Lepidobolus preissianus	1	0.5
Leptospermum spinescens	0.5	0.7
Melaleuca ciliosa	2	1.0
Mesomelaena pseudostygia	3	0.5

Name	Cover (%)	Height (m)
Mirbelia trichocalyx	0.5	0.8
Neurachne alopecuroidea	0.5	0.3
**Pentameris airoides* subsp. *airoides*	0.5	0.2
Petrophile macrostachya	0.5	0.4
Phyllangium paradoxum	0.5	0.05
Podotheca gnaphalioides	1	0.3
**Raphanus raphanistrum*	0.5	0.3
**Romulea rosea*	0.5	0.05
Schoenus nanus	0.5	0.05
Schoenus pleiostemoneus	0.5	0.2
**Sonchus oleraceus*	0.5	0.3
Tetraria octandra	0.5	0.3
Trachymene pilosa	0.5	0.1
**Ursinia anthemoides*	0.5	0.3
Verticordia pennigera	0.5	0.3
**Vulpia myuros* forma *myuros*	0.5	0.2
Xanthorrhoea preissii	2	1.1
Xanthosia huegelii	0.5	0.05

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? denotes unconfirmed ID

Site: BH09
Location: Brand Hwy north end **Type:** 10x10m Quadrat
Date: 2016-09-20 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 371495 **Northing:** 6578166
Habitat: Riseslope
Soil: Yellow brown loamy sand
Rock type: NA
Vegetation: *Calothamnus quadrifidus* subsp. *quadrifidus*, *Allocasuarina humilis* and *Jacksonia floribunda* tall shrubland over *Eremaea pauciflora* var. *pauciflora*, *Xanthorrhoea preissii* and *Banksia shuttleworthiana* shrubland over *Hibbertia crassifolia* open low shrubland over *Tetraria octandra*, *Mesomelaena pseudostygia* open sedgeland.
Veg Condition: Excellent
Fire Age: >10 years
Notes: Disturbance and animal burrow

Species List

Name	Cover (%)	Height (m)
Allocasuarina humilis	8	2.2
Amphipogon turbinatus	0.5	0.4
**Arctotheca calendula*	0.5	0.2
Austrostipa elegantissima	0.5	0.7
Banksia shuttleworthiana	2	1.0
Baumea rubiginosa	0.5	0.4
Bossiaea eriocarpa	0.5	0.4
**Brassica tournefortii*	0.5	0.01
Burchardia congesta	0.5	0.6
Caladenia flava subsp. *flava*	0.5	0.1
Calothamnus quadrifidus subsp. *quadrifidus*	15	2.7
Calothamnus sanguineus	0.5	1.1
Caustis dioica	0.5	0.4
Conostylis aurea	0.5	0.3
Crassula colorata	0.5	0.05
Daviesia nudiflora	0.5	0.4
Drosera erythrorhiza ?subsp. *magna*	0.5	0.2
Eremaea pauciflora var. *pauciflora*	10	1.5
Grevillea eriostachya	1	2.2
Hakea ruscifolia	1	1.8
Hibbertia crassifolia	7	0.6
Hibbertia huegelii	0.5	0.4
**Hypochaeris glabra*	0.5	0.01
Jacksonia floribunda	2	2.4
Leptospermum spinescens	0.5	0.4
Melaleuca ciliosa	0.5	1.4
Mesomelaena pseudostygia	1	0.7
Neurachne alopecuroidea	0.5	0.5
Patersonia occidentalis	0.5	0.4
Petrophile macrostachya	0.5	1.1
Pterostylis sp.	0.5	0.3

Name	Cover (%)	Height (m)
Schoenus nanus	0.5	0.5
**Sonchus oleraceus*	0.5	0.05
Tetraria octandra	10	0.5
Trachymene pilosa	0.5	0.1
Xanthorrhoea preissii	7	1.6

* denotes weed species
? denotes unconfirmed ID

Site: BH10
Location: Brand Hwy north end **Type:** 10x10m Quadrat
Date: 2016-09-21 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 370877 **Northing:** 6578957
Habitat: Wetland bank
Soil: Light grey sand
Rock type: NA
Vegetation: *Banksia prionotes* and *Melaleuca rhaphiophylla* tall shrubland over *Acacia saligna* subsp. *saligna* open shrubland over *Juncus kraussii* subsp. *australiensis* open low shrubland over **Ehrharta calycina* very open tussock grassland.
Veg Condition: Very Good
Fire Age: No fire evident
Notes: Old fence line running through quad

Species List

Name	Cover (%)	Height (m)
Acacia saligna subsp. *saligna*	2	1.8
Banksia prionotes	8	6.0
Caladenia longicauda subsp. *albella*	0.5	0.2
Casuarina obesa	0.5	7.0
Crassula colorata	0.5	0.01
**Ehrharta calycina*	9	0.9
**Eragrostis curvula*	0.5	1.0
**Galium murale*	0.5	0.01
**Hypochaeris radicata*	0.5	0.01
Juncus kraussii subsp. *australiensis*	7	0.5
Melaleuca rhaphiophylla	6	4.3
**Sonchus asper*	0.5	0.3
Trachymene pilosa	0.5	0.02
**Ursinia anthemoides*	0.5	0.4
**Wahlenbergia capensis*	0.5	0.3

* denotes weed species
? denotes unconfirmed ID

Site: BH11
Location: Brand Hwy centre **Type:** 10x10m Quadrat
Date: 2016-09-21 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 377206 **Northing:** 6568994
Habitat: Undulating plain
Soil: Brown sandy loam
Rock type: NA
Vegetation: *Corymbia calophylla* open forest over *Hakea trifurcata* and *Adenanthos cygnorum* subsp. *cygnorum* open tall shrubland over *Xanthorrhoea preissii* open shrubland over *Daviesia angulata* and *Chordifex sinuosus* low open shrubland over *Caustis dioica* and *Mesomelaena pseudostygia* very open sedgeland.
Veg Condition: Excellent
Fire Age: No fire evident
Notes: NA

Species List

Name	Cover (%)	Height (m)
Acacia pulchella var. *glaberrima*	0.5	0.4
Acacia stenoptera	0.5	0.2
Adenanthos cygnorum subsp. *cygnorum*	3	2.6
Alexgeorgea nitens	0.5	0.1
Banksia dallanneyi var. *dallanneyi*	0.5	0.3
Banksia sp.	0.5	0.1
**Briza maxima*	0.5	0.3
Caladenia flava subsp. *flava*	0.5	0.2
Caustis dioica	5	0.4
Chordifex sinuosus	1	0.3
Conostylis aculeata subsp. *aculeata*	0.5	0.1
Corymbia calophylla	40	15.0
Daviesia angulata	4	0.8
**Ehrharta calycina*	0.5	0.5
**Gladiolus caryophyllaceus*	0.5	1.0
Hakea trifurcata	4	2.3
Hibbertia crassifolia	0.5	0.3
**Hypochaeris radicata*	0.5	0.01
Isotropis cuneifolia subsp. *cuneifolia*	0.5	0.3
Kennedia prostrata	0.5	0.1
Lomandra caespitosa	0.5	0.3
Lomandra preissii	0.5	0.5
Melaleuca ?dichroma	0.5	0.6
Mesomelaena pseudostygia	1	0.4
Pyrorchis sp.	0.5	0.1
Xanthorrhoea preissii	4	1.3

* denotes weed species
? denotes unconfirmed ID

Site: BH12
Location: Brand Hwy centre **Type:** 10x10m Quadrat
Date: 2016-09-21 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 377076 **Northing:** 6569047
Habitat: Plain
Soil: Brown sandy loam
Rock type: NA
Vegetation: *Corymbia calophylla* woodland over *Jacksonia sternbergiana* and *Banksia menziesii* open tall shrubland over *Xanthorrhoea preissii* open shrubland *over Patersonia occidentalis*, *Alexgeorgea nitens* and *Lyginia imberbis* low open shrubland over *Mesomelaena pseudostygia* and *Caustis dioica* open sedgeland.
Veg Condition: Excellent
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
Acacia pulchella var. *glaberrima*	0.5	0.6
Alexgeorgea nitens	2	0.3
Banksia dallanneyi var. *dallanneyi*	0.5	0.2
Banksia menziesii	2	2.2
**Briza maxima*	0.5	0.2
Caladenia flava subsp. *flava*	0.5	0.1
Caustis dioica	5	0.4
Conostephium pendulum	0.5	0.6
Conostylis aculeata subsp. *aculeata*	1	0.2
Corymbia calophylla	27	13.5
Daviesia angulata	0.5	0.7
Diuris corymbosa	0.5	0.4
Drosera erythrorhiza ?subsp. *magna*	0.5	0.01
**Gladiolus caryophyllaceus*	0.5	0.8
Hakea ruscifolia	0.5	1.0
Hibbertia crassifolia	0.5	0.3
Jacksonia sternbergiana	3	3.3
Lepidosperma leptostachyum	0.5	0.4
Lomandra caespitosa	0.5	0.3
Lomandra preissii	0.5	0.4
Lyginia imberbis	2	0.7
Melaleuca ?dichroma	0.5	0.5
Mesomelaena pseudostygia	5	0.6
Neurachne alopecuroidea	0.5	0.1
Patersonia occidentalis	3	0.4
Xanthorrhoea preissii	4	1.1

* denotes weed species
? denotes unconfirmed ID

Site: BH13
Location: Brand Hwy centre **Type:** 10x10m Quadrat
Date: 2016-09-21 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 377162 **Northing:** 6568793
Habitat: Plain
Soil: Brown sandy loam
Rock type: NA
Vegetation: *Corymbia calophylla* open low forest over *Xanthorrhoea preissii* open shrubland over *Bossiaea eriocarpa*, *Jacksonia sternbergiana* and *Conostylis aculeata* subsp. *aculeata* low shrubland over **Briza maxima* very open tussock grassland and *Mesomelaena pseudostygia* scattered sedges.
Veg Condition: Very Good
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
Acacia stenoptera	0.5	0.5
Adenanthos cygnorum subsp. *cygnorum*	0.5	1.1
**Aira caryophyllea*	0.5	0.1
Alexgeorgea nitens	0.5	0.1
Allocasuarina humilis	0.5	1.0
Amphipogon turbinatus	0.5	0.2
Anigozanthos humilis	0.5	0.2
Aotus procumbens	0.5	0.3
Banksia attenuata	0.5	1.5
Banksia dallanneyi var. *dallanneyi*	0.5	0.4
Bossiaea eriocarpa	6	0.3
**Briza maxima*	3	0.2
Burchardia congesta	0.5	0.5
Caladenia flava subsp. *flava*	0.5	0.1
Caladenia lorea	0.5	0.2
Calothamnus sanguineus	0.5	0.5
Caustis dioica	0.5	0.4
Chordifex sinuosus	0.5	0.2
Conostephium pendulum	0.5	0.3
Conostylis aculeata subsp. *aculeata*	2	0.1
Conostylis teretifolia subsp. *teretifolia*	0.5	0.2
Corymbia calophylla	45	9.5
Daviesia angulata	1	0.54
Drosera ?macrantha	0.5	0.1
Drosera erythrorhiza ?subsp. *magna*	0.5	0.01
Gastrolobium capitatum	2	0.3
Gompholobium tomentosum	0.5	0.3
Haemodorum loratum P3	0.5	0.2
Hakea trifurcata	0.5	0.4
Hibbertia crassifolia	1	0.5
**Hypochaeris glabra*	0.5	0.05

Name	Cover (%)	Height (m)
Isotropis cuneifolia subsp. *cuneifolia*	0.5	0.25
Jacksonia sternbergiana	4	0.5
Lomandra caespitosa	0.5	0.2
Lomandra preissii	0.5	0.3
Macarthuria australis	0.5	0.3
Mesomelaena pseudostygia	1	0.4
Opercularia vaginata	0.5	0.2
Orianthera spermacocea	0.5	0.1
Patersonia occidentalis	0.5	0.5
Philotheca spicata subsp. Moore River National Park (G. & D. Woodman Op 47)	0.5	0.6
Podotheca gnaphalioides	0.5	0.1
Pyrorchis sp.	0.5	0.1
Scaevola repens var. *repens*	0.5	0.1
Schoenus nanus	0.5	0.05
**Solanum nigrum*	0.5	0.02
Stirlingia latifolia	0.5	0.3
Thysanotus triandrus	0.5	0.2
Trachymene pilosa	0.5	0.1
**Ursinia anthemoides*	0.5	0.3
Xanthorrhoea preissii	4	1.4
Xanthosia huegelii	0.5	0.3

* denotes weed species
? denotes unconfirmed ID

Site: BH14
Location: Brand highway, south end **Type:** 10x10m Quadrat
Date: 2016-09-22 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 377588 **Northing:** 6567962
Habitat: Wetland bank
Soil: Grey sand
Rock type: NA
Vegetation: *Melaleuca cuticularis* and *Adenanthos cygnorum* subsp. *cygnorum* tall shrubland over *Melaleuca viminea* subsp. *viminea*, *Hypocalymma angustifolium*, *Banksia sphaerocarpa* var. *sphaerocarpa* shrubland over *Baumea juncea* very open sedgeland.
Veg Condition: Excellent
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
Acacia stenoptera	0.5	0.3
Adenanthos cygnorum subsp. *cygnorum*	1	2.8
Amphipogon turbinatus	0.5	0.1
**Arctotheca calendula*	0.5	0.05
Astartea scoparia	0.5	1.5
Banksia menziesii	0.5	0.3
Banksia sphaerocarpa var. *sphaerocarpa*	3	1.3
Baumea juncea	4	0.1
Bossiaea eriocarpa	0.5	0.8
Cassytha glabella	0.5	
Centrolepis polygyna	0.5	0.01
Gastrolobium capitatum	0.5	0.3
Hakea psilorrhyncha	0.5	3.1
Hypocalymma angustifolium	6	1.5
Hypocalymma xanthopetalum	0.5	0.2
**Hypochaeris glabra*	0.5	0.01
Jacksonia sternbergiana	0.5	1.1
Melaleuca ?dichroma	0.5	0.7
Melaleuca cuticularis	18	2.5
Melaleuca incana subsp. *incana*	0.5	1.0
Melaleuca teretifolia	0.5	1.1
Melaleuca viminea subsp. *viminea*	6	1.2
**Pentameris airoides* subsp. *airoides*	0.5	0.1
Podotheca gnaphalioides	0.5	0.3
Schoenus rigens	0.5	0.7
Schoenus subfascicularis	0.5	0.3
Stirlingia latifolia	0.5	0.2
Trachymene pilosa	0.5	0.1
**Ursinia anthemoides*	0.5	0.3

* denotes weed species
? denotes unconfirmed ID

Site: BH15
Location: Brand highway, south end **Type:** 10x10m Quadrat
Date: 2016-09-22 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 377630 **Northing:** 6568057
Habitat: Wetland bank
Soil: Grey sand
Rock type: NA
Vegetation: *Melaleuca cuticularis*, *Melaleuca preissiana* and *Melaleuca incana* subsp. *incana* open scrub over *Hypocalymma angustifolium* open shrubland over *Baumea juncea* very open sedgeland.
Veg Condition: Excellent
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
**Arctotheca calendula*	0.5	0.1
Astartea scoparia	0.5	1.5
Baumea juncea	2	0.5
Caladenia sp.	0.5	0.2
Dampiera linearis	0.5	0.2
**Ehrharta calycina*	0.5	0.5
**Gladiolus caryophyllaceus*	0.5	0.8
Hypocalymma angustifolium	6	1.1
**Hypochaeris radicata*	0.5	0.01
Jacksonia floribunda	0.5	0.9
Lechenaultia floribunda	0.5	0.4
Lepidosperma apricola	0.5	0.3
Lobelia rhombifolia	0.5	0.1
Melaleuca cuticularis	17	3.2
Melaleuca incana subsp. *incana*	7	2.1
Melaleuca preissiana	9	9.5
Melaleuca teretifolia	0.5	0.9
Melaleuca viminea subsp. *viminea*	0.5	1.3
Podotheca gnaphalioides	0.5	0.1
Stylidium ?albolilacinum	0.5	0.1
Trachymene pilosa	0.5	0.05
**Ursinia anthemoides*	0.5	0.3
Verticordia sp.	0.5	0.6

* denotes weed species
? denotes unconfirmed ID

Site: BH16
Location: Brand highway, south end **Type:** 10x10m Quadrat
Date: 2016-09-22 **Described by:** JA
MGA Zone: 50 **Easting:** 377927 **Northing:** 6567323
Habitat: Undulating plain
Soil: Grey sand
Rock type: NA
Vegetation: *Banksia menziesii* and *Adenanthos cygnorum* open tall shrubland over *Verticordia nitens* open shrubland over *Eremaea pauciflora* var. *pauciflora*, *Melaleuca* ?*dichroma* and *Astroloma xerophyllum* low shrubland.
Veg Condition: Pristine
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
?Leporella fimbriata	0.5	0.02
Adenanthos cygnorum	2	2.3
Alexgeorgea nitens	0.5	0.1
Amphipogon turbinatus	0.5	0.15
Andersonia heterophylla	1	0.4
Astroloma xerophyllum	5	0.5
Banksia menziesii	4	4.0
Blancoa canescens	0.5	0.1
Bossiaea eriocarpa	0.5	0.2
Burchardia congesta	0.5	0.4
Calytrix sapphirina	1	0.9
Cassytha glabella forma *casuarinae*	0.5	
Chordifex microcodon	1	0.3
Chordifex sinuosus	0.5	0.2
Drosera ?macrantha	0.5	0.4
Drosera erythrorhiza ?subsp. *magna*	0.5	0.02
Eremaea pauciflora var. *pauciflora*	7	0.8
Hensmania turbinata	0.5	0.2
Hibbertia subvaginata	0.5	0.2
Jacksonia floribunda	0.5	1.3
Lechenaultia floribunda	0.5	0.3
Leucopogon sp. Moore River (M. Hislop 1695)	4	0.9
Lyginia barbata	0.5	0.4
Lysinema elegans	0.5	0.5
Melaleuca ?dichroma	5	0.3
Patersonia occidentalis var. *occidentalis*	0.5	0.3
Petrophile rigida	0.5	0.2
Philotheca spicata subsp. Moore River National Park (G. & D. Woodman Op 47)	0.5	1.1
Phlebocarya ciliata	0.5	0.2
Phyllangium paradoxum	0.5	0.05
Schoenus curvifolius	0.5	0.3

Name	Cover (%)	Height (m)
Scholtzia involucrata	1	0.3
Stirlingia latifolia	0.5	0.3
Thelymitra campanulata	0.5	0.4
Verticordia nitens	2	1.3
Verticordia ovalifolia	0.5	1.5

* denotes weed species
? denotes unconfirmed ID

Site: BH17
Location: Brand highway, south end **Type:** 10x10m Quadrat
Date: 2016-09-23 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 380205 **Northing:** 6562465
Habitat: Plain
Soil: Light grey sand
Rock type: NA
Vegetation: *Banksia menziesii* and *Banksia attenuata* open low woodland over *Adenanthos cygnorum* subsp. *cygnorum* tall shrubland over *Eremaea pauciflora* var. *pauciflora* and *Regelia ciliata* open shrubland over *Hibbertia spicata* subsp. *spicata*, *Hibbertia crassifolia* and *Stirlingia latifolia* open low shrubland over *Mesomelaena pseudostygia* very open sedgeland.
Veg Condition: Excellent
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
Adenanthos cygnorum subsp. *cygnorum*	16	3.1
Alexgeorgea nitens	0.5	0.2
Amphipogon turbinatus	0.5	0.4
Andersonia heterophylla	0.5	0.3
Astroloma xerophyllum	0.5	0.5
Banksia attenuata	12	3.4
Banksia menziesii	15	5.2
Blancoa canescens	0.5	0.15
Bossiaea eriocarpa	0.5	0.3
Burchardia congesta	0.5	0.3
Calectasia narragara	0.5	0.4
Cassytha glabella forma *casuarinae*	0.5	
Chordifex microcodon	0.5	0.4
Chordifex sinuosus	0.5	0.3
Conospermum acerosum subsp. *acerosum*	0.5	1.1
Conostylis aurea	0.5	0.2
Drosera ?macrantha	0.5	0.3
Drosera erythrorhiza ?subsp. *magna*	0.5	0.01
Eremaea pauciflora var. *pauciflora*	7	1.5
Gastrolobium capitatum	0.5	0.5
Gompholobium tomentosum	0.5	0.3
Hemiandra sp.	0.5	0.3
Hemiphora bartlingii	0.5	0.6
Hensmania turbinata	0.5	0.3
Hibbertia crassifolia	2	0.6
Hibbertia ovata	0.5	0.3
Hibbertia spicata subsp. *spicata*	2	0.3
Hypocalymma xanthopetalum	0.5	0.4
Isotropis cuneifolia subsp. *cuneifolia*	0.5	0.15
Jacksonia floribunda	0.5	0.5

Name	Cover (%)	Height (m)
Jacksonia sternbergiana	0.5	1.2
Kunzea glabrescens	0.5	2.2
Leptospermum spinescens	0.5	1.0
Lomandra preissii	0.5	0.3
Lyginia barbata	0.5	0.4
Mesomelaena pseudostygia	3	0.6
Patersonia occidentalis	0.5	0.4
Petrophile linearis	0.5	0.3
Petrophile macrostachya	0.5	0.8
Phlebocarya filifolia	0.5	0.3
Pyrorchis sp.	0.5	0.2
Regelia ciliata	1	1.2
Schoenus curvifolius	0.5	0.4
Scholtzia involucrata	0.5	0.7
Stirlingia latifolia	1	0.7
Stylidium purpureum	0.5	0.3
Stylidium sp.	0.5	0.05
Synaphea spinulosa subsp. *spinulosa*	0.5	0.4
Xanthorrhoea preissii	0.5	1.1

* denotes weed species
? denotes unconfirmed ID

Site: BH18
Location: Brand Hwy; centre **Type:** 10x10m Quadrat
Date: 2016-09-23 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 376954 **Northing:** 6569223
Habitat: Plain
Soil: Yellow brown sand
Rock type: NA
Vegetation: *Banksia attenuata* open low woodland over *Xanthorrhoea preissii* tall shrubland over *Hibbertia crassifolia*, *Jacksonia sternbergiana* and *Conospermum stoechadis* subsp. *stoechadis* low shrubland over *Mesomelaena pseudostygia* and *Caustis dioica* very open sedgeland.
Veg Condition: Excellent
Fire Age: 5-10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
Adenanthos cygnorum subsp. *cygnorum*	0.5	0.4
Alexgeorgea nitens	0.5	0.15
Allocasuarina humilis	0.5	0.8
Amphipogon turbinatus	0.5	0.4
Anigozanthos humilis	0.5	0.2
Banksia attenuata	3	4.5
Baumea rubiginosa	0.5	0.4
Boronia ramosa subsp. *anethifolia*	0.5	0.3
Burchardia congesta	0.5	0.4
Caladenia flava subsp. *flava*	0.5	0.1
Calothamnus quadrifidus subsp. *quadrifidus*	0.5	0.5
Caustis dioica	1	0.2
Comesperma calymega	0.5	0.3
Conospermum stoechadis subsp. *stoechadis*	3	0.6
Conostylis teretifolia subsp. *teretifolia*	0.5	0.1
Crassula colorata	0.5	0.01
Drosera erythrorhiza ?subsp. *magna*	0.5	0.01
Drosera menziesii	0.5	0.3
Elythranthera brunonis	0.5	0.2
Eremaea pauciflora var. *pauciflora*	1	0.4
Gyrostemon subnudus	1	0.8
Helichrysum luteoalbum	0.5	0.1
Hemiphora bartlingii	0.5	0.6
Hibbertia crassifolia	10	0.5
**Hypochaeris radicata*	0.5	0.01
Isotropis cuneifolia subsp. *cuneifolia*	0.5	0.15
Jacksonia sternbergiana	7	0.8
Laxmannia sessiliflora	0.5	0.05
Lepidobolus preissianus	0.5	0.3
Leptospermum spinescens	0.5	0.5
Mesomelaena pseudostygia	2	0.5

Name	Cover (%)	Height (m)
Neurachne alopecuroidea	0.5	0.1
Opercularia vaginata	0.5	0.2
Orianthera spermacocea	1	0.2
Petrophile brevifolia	0.5	0.5
Phyllangium paradoxum	0.5	0.05
Scaevola repens var. *repens*	0.5	0.1
Schoenus latitans	0.5	0.05
Scholtzia involucrata	0.5	0.3
Stirlingia latifolia	0.5	0.5
Stylidium crossocephalum	0.5	0.15
Stylidium purpureum	0.5	0.1
Thysanotus dichotomus	0.5	0.1
Thysanotus triandrus	0.5	0.1
Trachymene pilosa	0.5	0.05
**Ursinia anthemoides*	0.5	0.2
Verreauxia reinwardtii	0.5	0.9
Xanthorrhoea preissii	3	2.2
Xanthosia huegelii	0.5	0.1

* denotes weed species
? denotes unconfirmed ID

Site: BH19
Location: Brand Hwy; centre **Type:** 10x10m Quadrat
Date: 2016-09-23 **Described by:** JA/DR
MGA Zone: 50 **Easting:** 377255 **Northing:** 6568710
Habitat: Undulating plain
Soil: Grey yellowish brown sandy loam
Rock type: NA
Vegetation: *Banksia attenuata* and *Banksia menziesii* open low woodland over *Xanthorrhoea preissii, Conospermum stoechadis* subsp. *stoechadis* and *Adenanthos cygnorum* subsp. *cygnorum* open shrubland over *Eremaea pauciflora* var. *pauciflora, Jacksonia sternbergiana* and *Hibbertia crassifolia* low shrubland over *Mesomelaena pseudostygia* and *Caustis dioica* very open sedgeland.
Veg Condition: Excellent
Fire Age: >10 years
Notes: NA

Species List

Name	Cover (%)	Height (m)
Acacia pulchella var. *glaberrima*	1	0.8
Acacia stenoptera	0.5	0.4
Adenanthos cygnorum subsp. *cygnorum*	1	1.1
Alexgeorgea nitens	0.5	0.1
Amphipogon turbinatus	0.5	0.4
Anigozanthos humilis	0.5	0.15
Astroloma xerophyllum	0.5	0.4
Banksia attenuata	6	4.2
Banksia menziesii	1	3.8
Blancoa canescens	0.5	0.1
Boronia ramosa subsp. *anethifolia*	0.5	0.3
Bossiaea eriocarpa	0.5	0.3
Burchardia congesta	0.5	0.4
Calytrix sapphirina	0.5	0.7
Caustis dioica	1	0.3
Chordifex sinuosus	0.5	0.1
Conospermum stoechadis subsp. *stoechadis*	2	1.1
Conostylis aurea	0.5	0.2
Conostylis teretifolia subsp. *teretifolia*	0.5	0.1
Dampiera linearis	0.5	0.2
Drosera ?macrantha	0.5	0.2
Drosera ?parvula	0.5	0.02
Drosera erythrorhiza ?subsp. *magna*	0.5	0.01
Drosera menziesii	0.5	0.1
Elythranthera brunonis	0.5	0.3
Eremaea pauciflora var. *pauciflora*	6	0.8
Gastrolobium capitatum	0.5	0.4
Gompholobium tomentosum	0.5	0.4
Gyrostemon subnudus	0.5	0.7
Haemodorum loratum P3	0.5	0.2
Hakea psilorrhyncha	0.5	1.1

Name	Cover (%)	Height (m)
Hibbertia crassifolia	2	0.5
Hibbertia huegelii	0.5	0.3
Hibbertia spicata subsp. *spicata*	0.5	0.4
Hypocalymma xanthopetalum	0.5	0.2
Isotropis cuneifolia subsp. *cuneifolia*	0.5	0.2
Jacksonia sternbergiana	4	0.8
Lepidobolus preissianus	0.5	0.4
Leptomeria empetriformis	0.5	0.5
Macarthuria australis	0.5	0.3
Melaleuca ?dichroma	2	0.5
Mesomelaena pseudostygia	3	0.6
Neurachne alopecuroidea	0.5	0.3
Opercularia vaginata	0.5	0.2
Orianthera spermacocea	0.5	0.1
Patersonia occidentalis	0.5	0.5
Scaevola canescens	0.5	0.1
Schoenus latitans	0.5	0.05
Schoenus pleiostemoneus	0.5	0.1
Scholtzia involucrata	0.5	0.4
Stirlingia latifolia	0.5	0.5
Stylidium ?albolilacinum	0.5	0.1
Stylidium crossocephalum	0.5	0.1
Stylidium repens	0.5	0.05
Synaphea spinulosa subsp. *spinulosa*	0.5	0.4
Thelymitra campanulata	0.5	0.3
Thysanotus triandrus	0.5	0.2
Tripterococcus brunonis	0.5	0.4
Verticordia nitens	0.5	0.6
Xanthorrhoea preissii	2	1.6
Xanthosia huegelii	0.5	0.1

* denotes weed species
? denotes unconfirmed ID

Project: 8208-16 **Site:** Opportunistic

Species List

Name	Cover (%)	Height (m)
Acacia saligna subsp. *saligna*	0.5	
**Agonis flexuosa*	0.5	
**Arctotheca calendula*	0.5	
Astroloma xerophyllum	0.5	
**Avena sativa*	0.5	
Banksia grandis	0.5	
**Brassica tournefortii*	0.5	
**Briza maxima*	0.5	
Caladenia arenicola	0.5	
Caladenia longicauda subsp. *borealis*	0.5	
Calandrinia granulifera	0.5	
Calectasia narragara	0.5	
Callitris pyramidalis	0.5	
**Chamaecytisus palmensis*	0.5	
Conyza sp.	0.5	
**Coriandrum sativum*	0.5	
Cryptandra pungens	0.5	
**Dischisma capitatum*	0.5	
Diuris corymbosa	0.5	
Drosera glanduligera	0.5	
**Ehrharta calycina*	0.5	
Elythranthera brunonis	0.5	
**Eragrostis curvula*	0.5	
**Erodium botrys*	0.5	
**Eucalyptus camaldulensis* subsp. *obtusa*	0.5	
**Gladiolus caryophyllaceus*	0.5	
Haemodorum loratum P3	0.5	
**Hordeum leporinum*	0.5	
Hybanthus calycinus	0.5	
**Hypochaeris glabra*	0.5	
**Hypochaeris radicata*	0.5	
Isolepis marginata	0.5	
Jacksonia sternbergiana	0.5	
Kennedia prostrata	0.5	
Laxmannia ramosa	0.5	
**Leptospermum laevigatum*	0.5	
**Lolium rigidum*	0.5	
**Lupinus angustifolius*	0.5	
**Lupinus cosentinii*	0.5	

Name	Cover (%)	Height (m)
**Lysimachia arvensis*	0.5	
Macrozamia fraseri	0.5	
**Medicago polymorpha*	0.5	
Melaleuca preissiana	0.5	
Melaleuca viminea subsp. *viminea*	0.5	
**Monoculus monstrosus*	0.5	
Nuytsia floribunda	0.5	
**Orobanche minor*	0.5	
**Osteospermum ecklonis*	0.5	
**Oxalis pes-caprae*	0.5	
**Petrorhagia dubia*	0.5	
**Pinus radiata*	0.5	
**Polycarpon tetraphyllum*	0.5	
**Raphanus raphanistrum*	0.5	
**Romulea rosea*	0.5	
**Solanum nigrum*	0.5	
**Sonchus asper*	0.5	
**Sonchus oleraceus*	0.5	
**Trifolium campestre* var. *campestre*	0.5	
**Trifolium hirtum*	0.5	
**Ursinia anthemoides*	0.5	
**Vulpia myuros* forma *myuros*	0.5	
**Wahlenbergia capensis*	0.5	
Waitzia suaveolens var. *suaveolens*	0.5	
**Zaluzianskya divaricata*	0.5	

* denotes weed species
? denotes unconfirmed ID

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Appendix I: Vegetation Condition Mapping

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370500 371000 371500 372000 372500 373000

6579000 6578500 6578000 6577500 6577000 6576500 6576000

BH10 BH08 BH03 BH09 BH07 BH04 BH06 BH05

Brand Hwy

Map Extent

Brand Hwy

Legend

- Survey Site
- Survey Areas

Vegetation Condition

- Excellent
- Very Good
- Good
- Degraded
- Completely Degraded

Main Roads Western Australia

Brand Highway, Regans Ford – Biological Surveys

Figure I.1: Vegetation Condition Mapping

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delivering environmental intelligence™

Author: J. Atkinson	Date: 17-11-2016
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureI1_VegCondition

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 metres

N

376500 377000 377500 378000 378500

6569500 6569000 6568500 6568000 6567500 6567000

BH18 BH12 BH11 BH13 BH19 BH02 BH15 BH14 BH16

Brand Hwy

Map Extent

Legend

- Survey Site
- Survey Areas

Vegetation Condition

- Excellent
- Very Good
- Good
- Completely Degraded

Main Roads Western Australia

Brand Highway, Regans Ford – Biological Surveys

Figure I.2: Vegetation Condition Mapping

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Author: J. Atkinson	Date: 17-11-2016
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureI2_VegCondition

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 metres

N

380000
380500
381000
6562500
6562000
6561500
BH17
BH01
Brand Hwy
Map Extent

Legend

- Survey Site
- Survey Areas

Vegetation Condition

- Excellent
- Good
- Completely Degraded

Main Roads Western Australia
Brand Highway, Regans Ford – Biological Surveys

Figure I.3: Vegetation Condition Mapping

astron
delivering environmental intelligence™

Author: J. Atkinson	Date: 17-11-2016
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureI3_VegCondition

Coordinate System: GDA 1994 MGA Zone 50
0 100 200 metres
N

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Appendix J: Vascular Flora Species List and Site by Species Matrix

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Table J.1: Vascular flora species list for the survey area.

Family	Species name	Conservation status	Weed
Anarthriaceae	*Lyginia barbata*		
	Lyginia imberbis		
Apiaceae	**Coriandrum sativum*		*
	Xanthosia huegelii		
Araliaceae	*Trachymene pilosa*		
Asparagaceae	*Laxmannia ramosa*		
	Laxmannia sessiliflora		
	Lomandra caespitosa		
	Lomandra preissii		
	Thysanotus dichotomus		
	Thysanotus patersonii		
	Thysanotus triandrus		
Asteraceae	**Arctotheca calendula*		*
	**Conyza* sp.		*
	**Hypochaeris glabra*		*
	**Hypochaeris radicata*		*
	*?*Hypochaeris glabra*		*
	Hypochaeris sp.		*
	**Monoculus monstrosus*		*
	**Osteospermum ecklonis*		*
	**Sonchus asper*		*
	**Sonchus oleraceus*		*
	**Sonchus* sp.		*
	**Ursinia anthemoides*		*
	Cotula australis		
	Helichrysum luteoalbum		
	Podotheca gnaphalioides		
	Waitzia suaveolens var. *suaveolens*		
Brassicaceae	**Brassica tournefortii*		*
	**Raphanus raphanistrum*		*
Campanulaceae	**Wahlenbergia capensis*		*
	Lobelia rhombifolia		
Caryophyllaceae	**Petrorhagia dubia*		*
	**Polycarpon tetraphyllum*		*
Casuarinaceae	*Allocasuarina humilis*		
	Allocasuarina microstachya		
	Casuarina obesa		
Celastraceae	*Tripterococcus brunonis*		
Centrolepidaceae	*Centrolepis drummondiana*		

Family	Species name	Conservation status	Weed
Centrolepidaceae	*Centrolepis polygyna*		
Colchicaceae	*Burchardia congesta*		
Crassulaceae	*Crassula colorata*		
Cupressaceae	*Callitris pyramidalis*		
Cyperaceae	*Baumea juncea*		
	Baumea rubiginosa		
	Caustis dioica		
	Isolepis marginata		
	Lepidosperma apricola		
	Lepidosperma leptostachyum		
	Mesomelaena pseudostygia		
	Schoenus curvifolius		
	Schoenus latitans		
	Schoenus nanus		
	Schoenus pedicellatus		
	Schoenus pleiostemoneus		
	Schoenus rigens		
	Schoenus subfascicularis		
	Tetraria octandra		
Dasypogonaceae	*Calectasia narragara*		
	Dasypogon obliquifolius		
Dilleniaceae	*Hibbertia acerosa*		
	Hibbertia crassifolia		
	Hibbertia huegelii		
	Hibbertia ovata		
	Hibbertia spicata subsp. *spicata*		
	Hibbertia subvaginata		
Droseraceae	*Drosera glanduligera*		
	Drosera menziesii		
	Drosera ?parvula		
	Drosera erythrorhiza ?subsp. *magna*		
	Drosera ?macrantha		
Ericaceae	*Andersonia heterophylla*		
	Andersonia lehmanniana subsp. *lehmanniana*		
	Astroloma xerophyllum		
	Conostephium pendulum		
	Leucopogon conostephioides		
	Leucopogon sp. Moore River (M. Hislop 1695)		
	Leucopogon sprengelioides		
	Lysinema elegans		

Family	Species name	Conservation status	Weed
Ericaceae	*Lysinema pentapetalum*		
Fabaceae	**Chamaecytisus palmensis*		*
	**Lupinus angustifolius*		*
	**Lupinus cosentinii*		*
	**Medicago polymorpha*		*
	**Trifolium campestre* var. *campestre*		*
	**Trifolium hirtum*		*
	Acacia barbinervis subsp. *borealis*		
	Acacia pulchella var. *glaberrima*		
	Acacia saligna subsp. *saligna*		
	Acacia stenoptera		
	Aotus procumbens		
	Bossiaea eriocarpa		
	Daviesia angulata		
	Daviesia incrassata subsp. *incrassata*		
	Daviesia nudiflora		
	Gastrolobium capitatum		
	Gastrolobium linearifolium		
	Gompholobium tomentosum		
	Hovea stricta		
	Isotropis cuneifolia subsp. *cuneifolia*		
	Jacksonia calcicola		
	Jacksonia floribunda		
	Jacksonia nutans		
	Jacksonia sternbergiana		
	Kennedia prostrata		
	Mirbelia trichocalyx		
Geraniaceae	**Erodium botrys*		*
Goodeniaceae	*Dampiera linearis*		
	Lechenaultia floribunda		
	Scaevola canescens		
	Scaevola repens var. *repens*		
	Verreauxia reinwardtii		
Gyrostemonaceae	*Gyrostemon subnudus*		
Haemodoraceae	*Anigozanthos humilis*		
	Anigozanthos humilis subsp. *humilis*		
	Blancoa canescens		
	Conostylis aculeata subsp. *aculeata*		
	Conostylis aurea		
	Conostylis teretifolia subsp. *teretifolia*		

Family	Species name	Conservation status	Weed
Haemodoraceae	*Conostylis* sp.		
	Haemodorum loratum P3	P3	
	Phlebocarya ciliata		
	Phlebocarya filifolia		
Hemerocallidaceae	*Hensmania turbinata*		
Iridaceae	**Gladiolus caryophyllaceus*		*
	**Romulea rosea*		*
	Patersonia occidentalis		
	Patersonia occidentalis var. *occidentalis*		
Juncaceae	*Juncus kraussii subsp. australiensis*		
Lamiaceae	*Hemiphora bartlingii*		
	Hemiandra sp.		
Lauraceae	*Cassytha flava*		
	Cassytha glabella		
	Cassytha glabella forma *casuarinae*		
Loganiaceae	*Orianthera spermacocea*		
	Phyllangium paradoxum		
Loranthaceae	*Nuytsia floribunda*		
Molluginaceae	*Macarthuria australis*		
Myrtaceae	**Agonis flexuosa*		*
	**Eucalyptus camaldulensis* subsp. *obtusa*		*
	**Leptospermum laevigatum*		*
	Astartea scoparia		
	Calothamnus quadrifidus subsp. *quadrifidus*		
	Calothamnus sanguineus		
	Calytrix sapphirina		
	Corymbia calophylla		
	Eremaea pauciflora var. *pauciflora*		
	Eucalyptus todtiana		
	Hypocalymma angustifolium		
	Hypocalymma xanthopetalum		
	Kunzea glabrescens		
	Leptospermum spinescens		
	Melaleuca ciliosa		
	Melaleuca cuticularis		
	Melaleuca incana subsp. *incana*		
	Melaleuca preissiana		
	Melaleuca rhaphiophylla		
	Melaleuca seriata		
	Melaleuca teretifolia		

Family	Species name	Conservation status	Weed
Myrtaceae	*Melaleuca viminea* subsp. *viminea*		
	Melaleuca ?dichroma		
	Pericalymma ellipticum var. *ellipticum*		
	Regelia ciliata		
	Scholtzia involucrata		
	Verticordia nitens		
	Verticordia ovalifolia		
	Verticordia pennigera		
	Verticordia sp.		
Orchidaceae	*Caladenia arenicola*		
	Caladenia flava subsp. *flava*		
	Caladenia longicauda subsp. *albella*		
	Caladenia longicauda subsp. *borealis*		
	Caladenia lorea		
	Caladenia sp.		
	Diuris corymbosa		
	Elythranthera brunonis		
	?Leporella fimbriata		
	Leptoceras menziesii		
	Microtis media subsp. *densiflora*		
	Pterostylis glebosa		
	Pterostylis sp.		
	Pyrorchis nigricans		
	Pyrorchis sp.		
	Thelymitra campanulata		
Orobanchaceae	**Orobanche minor*		*
Oxalidaceae	**Oxalis pes-caprae*		*
Pinaceae	**Pinus radiata*		*
Poaceae	**Aira caryophyllea*		*
	**Avena sativa*		*
	**Briza maxima*		*
	**Ehrharta calycina*		*
	**Ehrharta longiflora*		*
	**Eragrostis curvula*		*
	**Hordeum leporinum*		*
	**Lolium rigidum*		*
	**Pentameris airoides* subsp. *airoides*		*
	**Vulpia myuros forma myuros*		*
	Amphipogon turbinatus		
	Austrostipa elegantissima		

Family	Species name	Conservation status	Weed
Poaceae	*Neurachne alopecuroidea*		
Polygalaceae	*Comesperma calymega*		
Portulacaceae	*Calandrinia corrigioloides*		
	Calandrinia granulifera		
Primulaceae	**Lysimachia arvensis*		*
Proteaceae	*Adenanthos cygnorum*		
	Adenanthos cygnorum subsp. *cygnorum*		
	Banksia attenuata		
	Banksia dallanneyi var. *dallanneyi*		
	Banksia grandis		
	Banksia menziesii		
	Banksia prionotes		
	Banksia shuttleworthiana		
	Banksia sphaerocarpa var. *sphaerocarpa*		
	Banksia sp.		
	Conospermum acerosum subsp. *acerosum*		
	Conospermum incurvum		
	Conospermum stoechadis subsp. *stoechadis*		
	Conospermum sp.		
	Grevillea eriostachya		
	Hakea costata		
	Hakea incrassata		
	Hakea psilorrhyncha		
	Hakea ruscifolia		
	Hakea trifurcata		
	Persoonia comata		
	Petrophile brevifolia		
	Petrophile linearis		
	Petrophile macrostachya		
	Petrophile rigida		
	Stirlingia latifolia		
	Synaphea spinulosa subsp. *spinulosa*		
Restionaceae	*Alexgeorgea nitens*		
	Chordifex microcodon		
	Chordifex sinuosus		
	Lepidobolus preissianus		
Rhamnaceae	*Cryptandra pungens*		
Rubiaceae	**Galium murale*		*
	Opercularia vaginata		
Rutaceae	*Boronia ramosa subsp. anethifolia*		

Family	Species name	Conservation status	Weed
Rutaceae	*Philotheca spicata* subsp. Moore River National Park (G. & D. Woodman Op 47)		
Santalaceae	*Leptomeria empetriformis*		
Scrophulariaceae	**Dischisma capitatum*		*
	**Zaluzianskya divaricata*		*
Solanaceae	**Solanum nigrum*		*
Stylidiaceae	*Stylidium crossocephalum*		
	Stylidium purpureum		
	Stylidium repens		
	Stylidium ?albolilacinum		
	Stylidium ?bicolor		
	Stylidium sp.		
Violaceae	*Hybanthus calycinus*		
Xanthorrhoeaceae	*Xanthorrhoea preissii*		
Zamiaceae	*Macrozamia fraseri*		

Table J.2: Site by species list for the survey area.

Species	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11	BH12	BH13	BH14	BH15	BH16	BH17	BH18	BH19	OPPS
?Hypochaeris glabra						0.5														
?Leporella fimbriata			0.5													0.5				
Acacia barbinervis subsp. borealis					0.5															
Acacia pulchella var. glaberrima						0.5					0.5	0.5							1	
Acacia saligna subsp. saligna										2										0.5
Acacia stenoptera				0.5							0.5		0.5	0.5					0.5	
Adenanthos cygnorum																2				
Adenanthos cygnorum subsp. cygnorum	3			20		3	6				3		0.5	1			16	0.5	1	
**Agonis flexuosa*																				0.5
**Aira caryophyllea*			0.5										0.5							
Alexgeorgea nitens		0.5			0.5						0.5	2	0.5			0.5	0.5	0.5	0.5	
Allocasuarina humilis				5	2	0.5	10	6	8				0.5					0.5		
Allocasuarina microstachya			0.5					2												
Amphipogon turbinatus	0.5		1		0.5	0.5		0.5	0.5				0.5	0.5		0.5	0.5	0.5	0.5	
Andersonia heterophylla	0.5															1	0.5			
Andersonia lehmanniana subsp. lehmanniana					0.5															
Anigozanthos humilis					0.5	0.5		0.5					0.5					0.5	0.5	
Anigozanthos humilis subsp. humilis	0.5																			
Aotus procumbens													0.5							
**Arctotheca calendula*		0.5	0.5					0.5	0.5					0.5	0.5					0.5
Astartea scoparia		1												0.5	0.5					
Astroloma xerophyllum																5	0.5		0.5	0.5
Austrostipa elegantissima			4	0.5			0.5	0.5	0.5											
**Avena sativa*																				0.5
Banksia attenuata	4				2								0.5				12	3	6	
Banksia dallanneyi var. dallanneyi						0.5					0.5	0.5	0.5							
Banksia grandis																				0.5
Banksia menziesii	3				1							2		0.5		4	15		1	
Banksia prionotes										8										
Banksia shuttleworthiana			0.5				0.5	3	2											
Banksia sp.											0.5									
Banksia sphaerocarpa var. sphaerocarpa														3						
Baumea juncea		28												4	2					
Baumea rubiginosa							2	0.5	0.5									0.5		

Species	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11	BH12	BH13	BH14	BH15	BH16	BH17	BH18	BH19	OPPS
Blancoa canescens	0.5															0.5	0.5		0.5	
Boronia ramosa subsp. anethifolia		0.5					0.5											0.5	0.5	
Bossiaea eriocarpa	0.5				0.5		0.5		0.5				6	0.5		0.5	0.5		0.5	
**Brassica tournefortii*									0.5											0.5
**Briza maxima*								0.5			0.5	0.5	3							0.5
Burchardia congesta			0.5		0.5	0.5	0.5	0.5	0.5				0.5			0.5	0.5	0.5	0.5	
Caladenia arenicola																				0.5
Caladenia flava subsp. flava			0.5			0.5		0.5	0.5		0.5	0.5	0.5					0.5		
Caladenia longicauda subsp. albella										0.5										
Caladenia longicauda subsp. borealis																				0.5
Caladenia lorea													0.5							
Caladenia sp.															0.5					
Calandrinia corrigioloides			0.5					0.5												
Calandrinia granulifera																				0.5
Calectasia narragara																	0.5			0.5
Callitris pyramidalis																				0.5
Calothamnus quadrifidus subsp. quadrifidus			4	20		0.5	7		15									0.5		
Calothamnus sanguineus									0.5				0.5							
Calytrix sapphirina																1			0.5	
Cassytha flava						0.5														
Cassytha glabella														0.5						
Cassytha glabella forma casuarinae	0.5					0.5										0.5	0.5			
Casuarina obesa										0.5										
Caustis dioica				2	0.5	0.5			0.5		5	5	0.5					1	1	
Centrolepis drummondiana					0.5		0.5													
Centrolepis polygyna														0.5						
**Chamaecytisus palmensis*																				0.5
Chordifex microcodon	0.5															1	0.5			
Chordifex sinuosus	0.5										1		0.5			0.5	0.5		0.5	
Comesperma calymega																		0.5		
Conospermum acerosum subsp. acerosum	0.5																0.5			
Conospermum incurvum	0.5																			
Conospermum sp.					0.5															
Conospermum stoechadis subsp. stoechadis	0.5		0.5		0.5	0.5		0.5										3	2	
Conostephium pendulum	1				0.5							0.5	0.5							

Species	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11	BH12	BH13	BH14	BH15	BH16	BH17	BH18	BH19	OPPS
Conostylis aculeata subsp. aculeata											0.5	1	2							
Conostylis aurea	0.5				0.5	0.5	0.5		0.5								0.5		0.5	
Conostylis sp.								0.5												
Conostylis teretifolia subsp. teretifolia	0.5				1	0.5		0.5					0.5					0.5	0.5	
Conyza sp.				0.5																0.5
**Coriandrum sativum*																				0.5
Corymbia calophylla											40	27	45							
Cotula australis							0.5													
Crassula colorata			0.5				0.5	0.5	0.5	0.5								0.5		
Cryptandra pungens																				0.5
Dampiera linearis	0.5														0.5				0.5	
Dasypogon obliquifolius				0.5																
Daviesia angulata					0.5						4	0.5	1							
Daviesia incrassata subsp. incrassata					2															
Daviesia nudiflora					2		0.5		0.5											
**Dischisma capitatum*																				0.5
Diuris corymbosa												0.5								0.5
Drosera ?macrantha	0.5												0.5			0.5	0.5		0.5	
Drosera ?parvula	0.5				0.5														0.5	
Drosera erythrorhiza ?subsp. magna	0.5		0.5		0.5	0.5	0.5	0.5	0.5			0.5	0.5			0.5	0.5	0.5	0.5	
Drosera glanduligera																				0.5
Drosera menziesii			0.5		0.5	0.5		0.5										0.5	0.5	
**Ehrharta calycina*				0.5						9	0.5				0.5					0.5
**Ehrharta longiflora*			0.5				0.5													
Elythranthera brunonis																		0.5	0.5	0.5
**Eragrostis curvula*				0.5			0.5			0.5										0.5
Eremaea pauciflora var. pauciflora	5		4	6	3	10	17	4	10							7	7	1	6	
**Erodium botrys*				0.5																0.5
**Eucalyptus camaldulensis subsp. obtusa*																				0.5
Eucalyptus todtiana				2	1	2														
**Galium murale*			0.5	0.5			0.5			0.5										
Gastrolobium capitatum													2	0.5			0.5		0.5	
Gastrolobium linearifolium				0.5	0.5		0.5													
**Gladiolus caryophyllaceus*								0.5			0.5	0.5			0.5					0.5
Gompholobium tomentosum													0.5				0.5		0.5	

Species	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11	BH12	BH13	BH14	BH15	BH16	BH17	BH18	BH19	OPPS
Grevillea eriostachya			2					0.5	1											
Gyrostemon subnudus					1													1	0.5	
Haemodorum loratum P3													0.5						0.5	0.5
Hakea costata						0.5														
Hakea incrassata			0.5			0.5	0.5	0.5												
Hakea psilorrhyncha														0.5					0.5	
Hakea ruscifolia									1			0.5								
Hakea trifurcata											4		0.5							
Helichrysum luteoalbum																		0.5		
Hemiandra sp.																	0.5			
Hemiphora bartlingii																	0.5	0.5		
Hensmania turbinata																0.5	0.5			
Hibbertia acerosa	0.5				0.5															
Hibbertia crassifolia			0.5	1	12	0.5	6	6	7		0.5	0.5	1				2	10	2	
Hibbertia huegelii	0.5				0.5	0.5	0.5	0.5	0.5										0.5	
Hibbertia ovata	0.5																0.5			
Hibbertia spicata subsp. spicata	0.5																2		0.5	
Hibbertia subvaginata																0.5				
**Hordeum leporinum*																				0.5
Hovea stricta					0.5															
Hybanthus calycinus																				0.5
Hypocalymma angustifolium		2												6	6					
Hypocalymma xanthopetalum	0.5				0.5									0.5			0.5		0.5	
**Hypochaeris glabra*									0.5				0.5	0.5						0.5
**Hypochaeris radicata*			0.5				0.5	0.5		0.5	0.5				0.5			0.5		0.5
Hypochaeris sp.		0.5																		
Isolepis marginata																				0.5
Isotropis cuneifolia subsp. cuneifolia											0.5		0.5				0.5	0.5	0.5	
Jacksonia calcicola								0.5												
Jacksonia floribunda	0.5			1			0.5	0.5	2						0.5	0.5	0.5			
Jacksonia nutans				1	2	0.5														
Jacksonia sternbergiana	0.5					5						3	4	0.5			0.5	7	4	0.5
Juncus kraussii subsp. australiensis										7										
Kennedia prostrata											0.5									0.5
Kunzea glabrescens																	0.5			

Species	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11	BH12	BH13	BH14	BH15	BH16	BH17	BH18	BH19	OPPS
Laxmannia ramosa																				0.5
Laxmannia sessiliflora																		0.5		
Lechenaultia floribunda															0.5	0.5				
Lepidobolus preissianus			0.5	0.5	0.5	2		1										0.5	0.5	
Lepidosperma apricola															0.5					
Lepidosperma leptostachyum			0.5									0.5								
Leptoceras menziesii							0.5													
Leptomeria empetriformis																			0.5	
**Leptospermum laevigatum*																				0.5
Leptospermum spinescens	0.5		0.5			0.5	0.5	0.5	0.5								0.5	0.5		
Leucopogon conostephioides	0.5																			
Leucopogon sp. Moore River (M. Hislop 1695)																4				
Leucopogon sprengelioides					0.5															
Lobelia rhombifolia															0.5					
**Lolium rigidum*																				0.5
Lomandra caespitosa											0.5	0.5	0.5							
Lomandra preissii											0.5	0.5	0.5				0.5			
**Lupinus angustifolius*																				0.5
**Lupinus cosentinii*																				0.5
Lyginia barbata	0.5															0.5	0.5			
Lyginia imberbis					0.5							2								
**Lysimachia arvensis*																				0.5
Lysinema elegans																0.5				
Lysinema pentapetalum	0.5																			
Macarthuria australis						0.5							0.5						0.5	
Macrozamia fraseri																				0.5
**Medicago polymorpha*																				0.5
Melaleuca ?dichroma											0.5	0.5		0.5		5			2	
Melaleuca ciliosa						0.5		2	0.5											
Melaleuca cuticularis		0.5												18	17					
Melaleuca incana subsp. incana		17												0.5	7					
Melaleuca preissiana		15													9					0.5
Melaleuca rhaphiophylla		0.5								6										
Melaleuca seriata	1																			
Melaleuca teretifolia														0.5	0.5					

Species	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11	BH12	BH13	BH14	BH15	BH16	BH17	BH18	BH19	OPPS
Melaleuca viminea subsp. viminea														6	0.5					0.5
Mesomelaena pseudostygia	0.5		6	5	4	4	0.5	3	1		1	5	1				3	2	3	
Microtis media subsp. densiflora				0.5																
Mirbelia trichocalyx								0.5												
**Monoculus monstrosus*																				0.5
Neurachne alopecuroidea			0.5		0.5	0.5		0.5	0.5			0.5						0.5	0.5	
Nuytsia floribunda																				0.5
Opercularia vaginata													0.5					0.5	0.5	
Orianthera spermacocea						0.5							0.5					1	0.5	
**Orobanche minor*																				0.5
**Osteospermum ecklonis*																				0.5
**Oxalis pes-caprae*																				0.5
Patersonia occidentalis				0.5					0.5			3	0.5				0.5		0.5	
Patersonia occidentalis var. occidentalis																0.5				
**Pentameris airoides subsp. airoides*								0.5						0.5						
Pericalymma ellipticum var. ellipticum		0.5																		
Persoonia comata							0.5													
Petrophile brevifolia			0.5		0.5		0.5											0.5		
Petrophile linearis	0.5																0.5			
Petrophile macrostachya	0.5						0.5	0.5	0.5								0.5			
Petrophile rigida																0.5				
**Petrorhagia dubia*																				0.5
Philotheca spicata subsp. Moore River National Park (G. & D. Woodman Op 47)													0.5			0.5				
Phlebocarya ciliata																0.5				
Phlebocarya filifolia																	0.5			
Phyllangium paradoxum					0.5	0.5		0.5								0.5		0.5		
**Pinus radiata*																				0.5
Podotheca gnaphalioides			6			0.5		1					0.5	0.5	0.5					
**Polycarpon tetraphyllum*				0.5			0.5													0.5
Pterostylis glebosa		0.5																		
Pterostylis sp.									0.5											
Pyrorchis nigricans						0.5														
Pyrorchis sp.											0.5		0.5				0.5			
**Raphanus raphanistrum*								0.5												0.5
Regelia ciliata	1					1											1			

Species	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11	BH12	BH13	BH14	BH15	BH16	BH17	BH18	BH19	OPPS
**Romulea rosea*								0.5												0.5
Scaevola canescens					1		0.5												0.5	
Scaevola repens var. repens						0.5							0.5					0.5		
Schoenus curvifolius	0.5															0.5	0.5			
Schoenus latitans																		0.5	0.5	
Schoenus nanus						0.5		0.5	0.5				0.5							
Schoenus pedicellatus	0.5																			
Schoenus pleiostemoneus	0.5		0.5		0.5			0.5											0.5	
Schoenus rigens														0.5						
Schoenus subfascicularis														0.5						
Scholtzia involucrata	1			1												1	0.5	0.5	0.5	
**Solanum nigrum*													0.5							0.5
**Sonchus asper*				0.5						0.5										0.5
**Sonchus oleraceus*								0.5	0.5											0.5
Sonchus sp.							0.5													
Stirlingia latifolia	4												0.5	0.5		0.5	1	0.5	0.5	
Stylidium ?albolilacinum															0.5				0.5	
Stylidium ?bicolor	0.5				0.5	0.5														
Stylidium crossocephalum																		0.5	0.5	
Stylidium purpureum																	0.5	0.5		
Stylidium repens					0.5	0.5													0.5	
Stylidium sp.																	0.5			
Synaphea spinulosa subsp. spinulosa	0.5				0.5												0.5		0.5	
Tetraria octandra			0.5	9	1	0.5	15	0.5	10											
Thelymitra campanulata																0.5			0.5	
Thysanotus dichotomus						4												0.5		
Thysanotus patersonii	0.5		0.5		0.5															
Thysanotus triandrus													0.5					0.5	0.5	
Trachymene pilosa		0.5	0.5					0.5	0.5	0.5			0.5	0.5	0.5			0.5		
**Trifolium campestre var. campestre*																				0.5
**Trifolium hirtum*																				0.5
Tripterococcus brunonis																			0.5	
**Ursinia anthemoides*		0.5	0.5					0.5		0.5			0.5	0.5	0.5			0.5		0.5
Verreauxia reinwardtii																		0.5		
Verticordia nitens																2			0.5	

Species	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH10	BH11	BH12	BH13	BH14	BH15	BH16	BH17	BH18	BH19	OPPS
Verticordia ovalifolia																0.5				
Verticordia pennigera			0.5					0.5												
Verticordia sp.	0.5														0.5					
**Vulpia myuros forma myuros*								0.5												0.5
**Wahlenbergia capensis*			0.5							0.5										0.5
Waitzia suaveolens var. suaveolens																				0.5
Xanthorrhoea preissii			2	0.5	5	4	3	2	7		4	4	4				0.5	3	2	
Xanthosia huegelii					0.5	0.5	0.5	0.5					0.5					0.5	0.5	
**Zaluzianskya divaricata*																				0.5

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Appendix K: Conservation Significant Flora and Introduced Flora Species Locations and Descriptions

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371000

371500

6579000

6578500

6578000

Brand Hwy

1

2

3

4

5

Legend

Survey Areas

Introduced Flora

- **Agonis flexuosa*
- **Aira caryophyllea*
- **Arctotheca calendula*
- **Avena sativa*
- **Brassica tournefortii*
- **Briza maxima*
- **Chamaecytisus palmensis*
- **Conyza* sp.
- **Coriandrum sativum*
- **Dischisma capitatum*
- **Ehrharta calycina*
- **Ehrharta longiflora*
- **Eragrostis curvula*
- **Erodium botrys*
- **Eucalyptus camaldulensis* subsp. *obtusa*
- **Galium murale*
- **Gladiolus caryophyllaceus*
- **Hypochaeris glabra*
- **Hypochaeris radicata*
- **Leptospermum laevigatum*
- **Lupinus cosentinii*
- **Lysimachia arvensis*
- **Medicago polymorpha*
- **Orobanche minor*
- **Pentameris airoides* subsp. *airoides*
- **Pinus radiata*
- **Polycarpon tetraphyllum*
- **Raphanus raphanistrum*
- **Romulea rosea*
- **Solanum nigrum*
- **Sonchus asper*
- **Sonchus oleraceus*
- **Trifolium hirtum*
- **Ursinia anthemoides*
- **Vulpia myuros forma myuros*
- **Wahlenbergia capensis*

Main Roads Western Australia

Brand Highway, Regans Ford – Biological Surveys

Figure K.1: Conservation Significant Flora and Introduced Plant Species (Weed) Locations

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Author: D. Roocke	Date: 17-11-2016	Coordinate System: GDA 1994 MGA Zone 50
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureK_WeedPflora	0 100 200 metres

N

372000
372500
373000
6577500
6577000
6576500
Brand Hwy
1
2
3
4
5
Legend
Survey Areas
Introduced Flora
*Arctotheca calendula
*Avena sativa
*Brassica tournefortii
*Briza maxima
*Ehrharta calycina
*Eragrostis curvula
*Erodium botrys
*Lysimachia arvensis
*Orobanche minor
*Raphanus raphanistrum
*Solanum nigrum
*Sonchus asper
Main Roads Western Australia
Brand Highway, Regans Ford – Biological Surveys
Figure K.2: Conservation Significant Flora and Introduced Plant Species (Weed) Locations
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Author: D. Roocke	Date: 17-11-2016	Coordinate System: GDA 1994 MGA Zone 50
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureK_WeedPflora	0 100 200 metres
N

377000

377500

6569500

6569000

6568500

Brand Hwy

1

2

3

4

5

Legend

Survey Areas

Conservation Significant Flora

Haemodorum loratum P3

Introduced Flora

**Aira caryophyllea*

**Arctotheca calendula*

**Avena sativa*

**Briza maxima*

**Ehrharta calycina*

**Eragrostis curvula*

**Erodium botrys*

**Gladiolus caryophyllaceus*

**Hypochaeris glabra*

**Petrorhagia dubia*

**Romulea rosea*

**Solanum nigrum*

**Trifolium campestre* var. *campestre*

**Ursinia anthemoides*

**Wahlenbergia capensis*

Main Roads Western Australia

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Figure K.3: Conservation Significant Flora and Introduced Plant Species (Weed) Locations

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Author: D. Roocke	Date: 17-11-2016	Coordinate System: GDA 1994 MGA Zone 50
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureK_WeedPflora	metres 0 100 200

N

377500

378000

378500

6568000

6567500

6567000

Brand Hwy

1

2

3

4

5

Legend

Survey Areas

Introduced Flora

- **Arctotheca calendula*
- **Avena sativa*
- **Briza maxima*
- **Ehrharta calycina*
- **Gladiolus caryophyllaceus*
- **Hypochaeris glabra*
- **Lolium rigidum*
- **Monoculus monstrosus*
- **Osteospermum ecklonis*
- **Oxalis pes-caprae*
- **Pentameris airoides* subsp. *airoides*
- **Romulea rosea*
- **Ursinia anthemoides*
- **Wahlenbergia capensis*

Main Roads Western Australia

Brand Highway, Regans Ford – Biological Surveys

Figure K.4: Conservation Significant Flora and Introduced Plant Species (Weed) Locations

astron

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Author: D. Roocke	Date: 17-11-2016	Coordinate System: GDA 1994 MGA Zone 50
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureK_WeedPflora	0 100 200 metres

N

380000
380500
381000
6562500
6562000
6561500
Brand Hwy
1
2
3
4
5
Legend
Survey Areas
Introduced Flora
*Arctotheca calendula
*Avena sativa
*Ehrharta calycina
*Eragrostis curvula
*Gladiolus caryophyllaceus
*Hordeum leporinum
*Hypochaeris glabra
*Lolium rigidum
*Lupinus angustifolius
*Lupinus cosentinii
*Raphanus raphanistrum
*Zaluzianskya divaricata

Main Roads Western Australia
Brand Highway, Regans Ford – Biological Surveys

Figure K.5: Conservation Significant Flora and Introduced Plant Species (Weed) Locations

astron
delivering environmental intelligence™

Author: D. Roocke	Date: 17-11-2016	Coordinate System: GDA 1994 MGA Zone 50
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureK_WeedPflora	0 100 200 metres; N

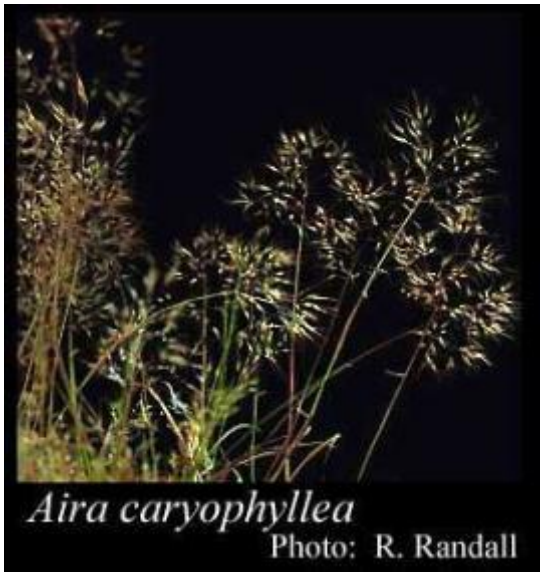
Table K.1: Priority flora recorded in the survey area.

Species	Description	Habitat
Haemodorum loratum P3 No photograph available	Bulbaceous perennial herb growing 0.45 m to 1.2 m high. Black/brown to black/ green flowers in November.	Grows in grey or yellow sand and gravel.

Table K.2: Priority flora recorded in the survey area (GDA94, Zone 50).

Species	Cover (%)	Estimated abundance	Easting (mE)	Northing (mN)
Haemodorum loratum P3	0.5	1	377162	6568793
	0.5	1	377255	6568710

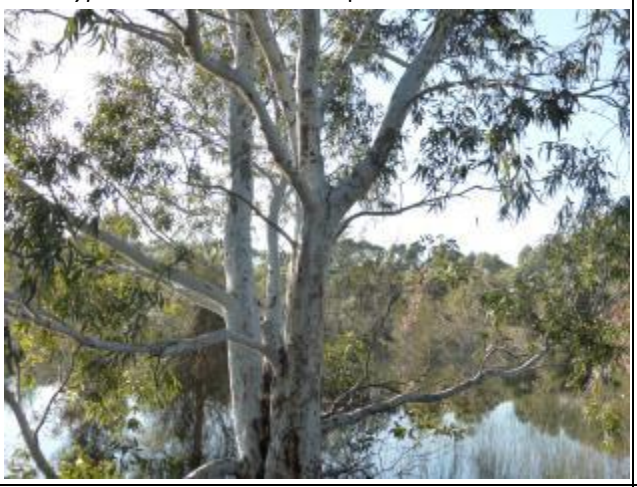
Table K.3: Introduced flora recorded in the survey area.

Species	Description	Habitat
**Agonis flexuosa* 	Tree or shrub growing to 10 m high. White flowers from July to December (WAHerb 2016).	Grows in white or grey sand, sandy soils, laterite and limestone. Grows on coastal sand dunes, granite outcrops and limestone areas (WAHerb 2016).
**Aira caryophyllea* 	Annual grass growing 0.07 m to 0.4 m high. Green-purple flowers from October to November (WAHerb 2016).	Grows in clay, grey sand, peat and gravel. Grows on winter-wet claypans (WAHerb 2016).
**Arctotheca calendula* 	Decumbent or ascending annual herb growing 0.03 m to 0.3 m high. Yellow flowers from August to November (WAHerb 2016).	A weed of roadsides, waste places and cultivated land (WAHerb 2016).

Species	Description	Habitat
**Avena sativa* 	Erect annual grass growing to 1.5 m high. Green flowers in October (WAHerb 2016).	Grows in black sand, calcareous loam, brown clay, red ironstone gravel. Grows on hills, plains, disturbed road verges, railway reserves and paddocks (WAHerb 2016).
**Brassica tournefortii* 	Annual herb growing 0.1 m to 0.6 m high. Yellow-cream-white flowers from June to November (WAHerb 2016).	Grows in sandy soils. An aggressive weed of disturbed ground, roadsides, cultivation and the seaside (WAHerb 2016).
**Briza maxima* 	Tufted glabrous annual grass growing 0.2 m to 0.6 m high. Flowers green-purple from September to October (WAHerb 2016).	Grows in sand, loam or clay (WAHerb 2016).

Species	Description	Habitat
**Chamaecytisus palmensis* 	Erect shrub or tree growing 0.7 m to 6 m high. White-cream-yellow flowers from April to October (WAHerb 2016).	Grows in white sand, grey sandy clay and lateritic loam, along creeks and roadsides and disturbed areas (WAHerb 2016).
**Conyza* sp. 	Annual herb with white-cream flowers.	Grows in a variety of soils and common to disturbed areas, horticulture and settled areas.
**Coriandrum sativum* No photograph available	Upright annual herb to 0.5 m high. Pink flowers in October (WAHerb 2016).	Roadside drains (WAHerb 2016).
**Dischisma capitatum* No photograph available	Erect or ascending annual herb growing 0.05 m to 0.5 m high. White flowers from August to September (WAHerb 2016).	Grows in sandy or peaty soils, in creeds and swamp edges (WAHerb 2016).

Species	Description	Habitat
**Ehrharta calycina* 	Caespitose perennial grass growing 0.3 m to 0.7 m high. Green-purple-red flowers from March to April or August to September (WAHerb 2016).	Grows in white, grey or yellow sand or loam (WAHerb 2016).
**Ehrharta longiflora* 	Caespitose annual grass growing 0.2 m to 0.6 m high. Purple-green flowers from July to November (WAHerb 2016).	Grows in white or grey sand, loam and on sand dunes (WAHerb 2016).
**Eragrostis curvula* 	A densely caespitose perennial grass between 0.3 m and 1.2 m in height. Flowers are purple and green, and generally occur between November and May (WAHerb 2016).	Often occurs in disturbed habitats and favours sandy loams and well drained fertile soils, however will grow in a wide range of soils. It is adapted to semi-arid and desert areas (WAHerb 2016).

Species	Description	Habitat
**Erodium botrys* 	Ascending or decumbent annual herb, growing 0.01 m to 0.2 m high. Blue-purple flowers from August to November (WAHerb 2016).	Grows in a range of habitats, including disturbed ground.
**Eucalyptus camaldulensis* subsp. *obtusa* 	Perennial tree.	Adjacent to water courses and drainage lines.
**Galium murale* No photograph available	Erect or procumbent annual herb growing 0.02 m to 0.15 m high. Green-yellow-cream flowers from August to December (WAHerb 2016).	Grows in sandy soils, winter wet depressions, rocky run-off areas and along drainage lines (WAHerb 2016).

Species	Description	Habitat
**Gladiolus caryophyllaceus* 	Cormous perennial herb growing 0.2 m to 1 m high with twisted leaf blades. Pink flowers from August to November (WAHerb 2016).	Grows in grey or white sand or loam (WAHerb 2016).
**Hordeum leporinum* 	Tufted annual grass growing 0.1 m to 0.4 m high. Green-cream flowers in September to October (WAHerb 2016).	Grows in white, grey or red clayey sand, sandy loam and clay (WAHerb 2016).
**Hypochaeris glabra* 	Rosetted annual or perennial herb growing 0.08 m to 0.5 m high. Smooth leaves and flower heads up to 1.5 cm across. Yellow flowers from January to December (mainly Spring) (WAHerb 2016).	A common weed of lawns, horticultural areas, roadsides and bushland (WAHerb 2016).

Species	Description	Habitat
**Hypochaeris radicata* 	Rosetted annual herb growing 0.08 m to 0.5 m high with rough bristly leaves and flower heads to 3 cm across. Yellow flowers throughout the year, mainly Spring (WAHerb 2016).	Common weed of lawns, horticultural areas, roadsides and bushland (WAHerb 2016).
**Leptospermum laevigatum* 	Shrub or tree growing 1.5 m to 6 m high. White flowers from April or July to October (WAHerb 2016).	Grows in white or grey sand or loam (WAHerb 2016).
**Lolium rigidum* 	Annual grass growing 0.3 to 1 m tall with a spike 30 cm long. Flowers in spring and summer (Hussey et al. 2007)	A weed of crops, islands, coastal sands, disturbed sites and road verges (Hussey et al. 2007)

Species	Description	Habitat
**Lupinus angustifolius* 	Erect, much-branched annual herb growing 0.2 m to 1.5 m high. Blue/white flowers from August to November (WAHerb 2016).	Grows in sand, loam and clay. Cultivated, occasionally naturalised in disturbed areas (WAHerb 2016).
**Lupinus cosentinii* 	Robust, much-branched annual herb growing 0.2 m to 1.4 m high. Blue flowers from August to November (WAHerb 2016).	Grows in a range of habitats including sand or loam soils, along river edges, swamps and roadsides (WAHerb 2016).
**Lysimachia arvensis* 	Annual or biennial hers growing 13 cm to 30 cm tall (Atlas of Living Australia 2016).	Grows in cultivated areas, wasteland and roadsides (Atlas of Living Australia 2016).

Species	Description	Habitat
**Medicago polymorpha* 	Prostrate or ascending annual herb growing 0.04 m to 0.2 m high and 0.5 m wide. Yellow flowers throughout the year (WAHerb 2016).	Grows in black, brown, white, yellow or grey sand, ironstone gravel, orange brown sandy clay and granite. Grows on floodplains, valley slopes, dunes, clay flats and roadsides (WAHerb 2016).
**Monoculus monstrosus* 	Erect annual herb growing to 0.7 m high (WAHerb 2016).	Grows in red-brown loams or sandy clays, yellow-white or grey-brown sandy loam, limestone or granite. Grows on undulating sandplains, hills, slopes, valley slopes, creekbeds and saline watercourses (WAHerb 2016).
**Orobanche minor* 	Erect, parasitic herb growing 0.1 m to 0.45 m high. White-cream, to purple-brown flowers from September to December (WAHerb 2016).	Grows in shallow soils over granite, deep sand, calcareous soils and clay. Occurs on coastal dunes, cliffs, sandplains, roadsides and granite outcrops (WAHerb 2016).

Species	Description	Habitat
**Osteospermum ecklonis* 	Perennial herb.	An escaped horticultural species.
**Oxalis pes-caprae* 	Bulbaceous and rhizomatous perennial herb growing 0.1 m to 0.3 m high. Yellow flowers June to October (WAHerb 2016).	A common weed that grows in a variety of habitats (WAHerb 2016).
**Pentameris airoides subsp. airoides* No photograph available	Annual or perennial grass, flowers from August to December (Simon BK & Alfonso, Y 2016)	Widespread weed in the temperate southern half of Australia (Simon BK & Alfonso, Y 2016)
**Petrorhagia dubia* 	Erect annual herb growing 0.1 m to 0.7 m high. Pink/pink-purple/white flowers from March or July to December (WAHerb 2016).	Grows in sand, loam or clay (WAHerb 2016).

Species	Description	Habitat
**Pinus radiata* 	Tree (conifer) to 30 m to 40 m high, cones with numerous scales. Flowers September to October (WAHerb 2016).	*P. radiata* is commonly found near plantations (WAHerb 2016).
**Polycarpon tetraphyllum* 	Erect, spreading or prostat annual herb growing 0.02 m to 0.15 m high. Green-red/ green-white flowers throughout the year (WAHerb 2016).	Grows in sandy soils (WAHerb 2016).
**Raphanus raphanistrum* 	Erect annual herb growing 0.15 m to 1 m high. Yellow-white/pink flowers from April to May or July to November (WAHerb 2016).	Grows in disturbed areas (WAHerb 2016).

Species	Description	Habitat
**Romulea rosea* 	Cormous perennial herb growing to 0.25 m high. Red-pink-purple-blue flowers from August to November (WAHerb 2016).	Grows in white-grey sandy loam or clay, red-brown sandy loam, gravel, laterite, granite, limestone. Grows on hills, flats, roadsides and pasture land (WAHerb 2016).
**Solanum nigrum* 	An erect perennial (short-lived) herb or shrub from 0.3 m to 1 m high. It produces white flowers from January to December. It has dull black or purplish berries and small seeds (Hussey et al. 2007, WAHerb 2016).	A weed of gardens, wastelands, disturbed woodlands, horticultural crops, pastures, creeklines and wetlands (Hussey et al. 2007).
**Sonchus asper* 	Erect, robust spiny annual or biennial herb to 1.8 m high. Yellow flowers October to December (WAHerb 2016).	Grows in white to grey sand, brown clay loam, black sandy loam, black clayey peat. Grows on dunes, valleys and seasonally wet areas, watercourses, lakes and wetlands and disturbed sites (WAHerb 2016).

Species	Description	Habitat
**Sonchus oleraceus* 	An erect annual or short-lived perennial herb to 1.5 m high. Its yellow flowers bloom throughout the whole year. Leaves are generally flaccid and are either weakly prickled or not at all (Hussey et al. 2007, WAHerb 2016).	*S. oleraceus* occurs in a variety of soils, it is a weed of waste places and disturbed ground (WAHerb 2016).
**Trifolium campestre* var. *campestre* 	Prostrate ascending or erect annual herb growing 0.03 m to 0.3 m high. Yellow/white flowers from August to January (WAHerb 2016).	Grows in sandy loams, laterite gravel, on flats, slopes, seasonally damp areas, along creeks, road verges and settled areas.
**Trifolium hirtum* 	Robust, erect or decumbent, villous annual herb, to 0.3 m high. Produces red-pink/purple flowers from August to December or January to March (WAHerb 2016).	White-grey sand, brown sandy clay-loam, yellow sandy clay, sandstone, limestone, granite. Sand dunes, hills, plains. WA (Herb 2016).

Species	Description	Habitat
**Ursinia anthemoides* 	Slender, erect annual herb growing 0.1 m to 0.5 m high. Yellow-orange-cream-white flowers from July to December (WAHerb 2016).	A weed of roadsides and waste places (WAHerb 2016).
**Vulpia myuros forma myuros* No photograph available	Tufted annual grass growing to 0.7 m. Green flowers from July to November (WAHerb 2016).	Grows in sand, loam and lateritic gravel (WAHerb 2016).
**Wahlenbergia capensis* 	Slender, erect or ascending annual herb, growing 0.1 m to 0.4 m high. Blue- blue/green flowers from September to November (WAHerb 2016).	Grows in sandy soils, on disturbed grounds and plains (WAHerb 2016).
**Zaluzianskya divaricata* 	Erect annual herb growing 0.03 m to 0.35 m high. Yellow flowers from August to October (WAHerb 2016).	Grows in sandy soils, on disturbed or vacant sites and paddocks (WAHerb 2016).

Table K.4: Locations of introduced flora recorded in the survey area (GDA94, Zone 50).

Species	Estimated abundance	Cover (%)	Easting (mE)	Northing (mN)
**Agonis flexuosa*	2	90	370965	6578873
**Aira caryophyllea*	n/a	0.5	371376	6578298
	n/a	0.5	377162	6568793
**Arctotheca calendula*	4	0.5	371315	6578383
	10	0.5	380686	6561643
	25	0.5	380791	6561449
	75	5	377204	6568669
	20	1	372804	6576675
	1	0.5	377589	6567963
	50	0.5	380894	6561363
	50	2	371886	6577801
	5	0.5	377635	6568049
	20	30	371637	6578064
	1	0.5	372851	6576675
	50	5	380280	6562365
	2	0.5	371295	6578410
	500	20	371708	6577872
	10	0.5	377461	6568238
	25	5	377005	6569298
	5	0.5	371380	6578301
	n/a	0.5	371495	6578166
**Avena sativa*	15	0.5	371878	6577798
	5	0.5	377007	6569284
	10	0.5	380905	6561362
	10	1	380537	6561901
	5	0.5	371380	6578288
	5	0.5	377558	6568159
**Brassica tournefortii*	1	0.5	371506	6578163
	50	50	372733	6576736
	1	0.5	371360	6578312
**Briza maxima*	25	0.5	370865	6578942
	2	0.5	371303	6578411
	250	1	371896	6577782
	20	1	377609	6568126
	75	0.5	377172	6568789
	100	5	377636	6568080
	5	0.5	377080	6569041
	50	10	377003	6569304

Species	Estimated abundance	Cover (%)	Easting (mE)	Northing (mN)
**Briza maxima*	50	0.5	377210	6568985
**Chamaecytisus palmensis*	4	10	370765	6579154
	1	1	370842	6578995
**Conyza* sp.	1	0.5	371784	6577808
**Coriandrum sativum*	20	2	370804	6579083
**Dischisma capitatum*	1	0.5	371377	6578359
**Ehrharta calycina*	250	10	371899	6577785
	10	0.5	377211	6568995
	25	5	372784	6576674
	250	30	371384	6578362
	25	10	371155	6578546
	10	0.5	380863	6561422
	15	2	371791	6577811
	25	10	370892	6578956
	10	1	380400	6562162
	10	0.5	377640	6568052
	50	20	372046	6577465
	25	10	371944	6577585
**Ehrharta longiflora*	n/a	0.5	371376	6578298
	n/a	0.5	371622	6578051
**Eragrostis curvula*	2	0.5	370864	6578982
	10	0.5	371377	6578370
	20	2	371787	6577812
	1	0.5	371634	6578052
	20	5	370702	6579141
	50	5	380388	6562203
	50	10	372774	6576690
	50	50	370700	6579145
	20	1	377396	6568633
	100	60	371686	6577900
	50	60	377247	6568980
	100	60	370991	6578740
**Erodium botrys*	2	0.5	377255	6568547
	250	1	371978	6577546
	1	0.5	371780	6577810
	100	1	371380	6578371
	500	30	371974	6577548
**Eucalyptus camaldulensis* subsp. *obtusa*	1	50	371299	6578499
**Galium murale*	n/a	0.5	371376	6578298

Species	Estimated abundance	Cover (%)	Easting (mE)	Northing (mN)
**Galium murale*	n/a	0.5	371780	6577814
	n/a	0.5	371622	6578051
	n/a	0.5	370877	6578957
**Gladiolus caryophyllaceus*	5	0.5	380297	6562310
	4	0.5	377269	6568557
	2	0.5	377085	6569041
	5	0.5	377200	6568988
	20	0.5	377523	6568264
	5	0.5	371292	6578420
	5	0.5	380403	6562172
	3	0.5	377639	6568049
	3	0.5	377037	6569322
**Hordeum leporinum*	5	0.5	380690	6561641
	1	0.5	380897	6561374
**Hypochaeris glabra*	5	0.5	371499	6578158
	3	0.5	376951	6569219
	10	0.5	370857	6578985
	10	0.5	377589	6567956
	25	0.5	371290	6578406
	10	0.5	377461	6568244
	15	0.5	377162	6568786
	10	0.5	377205	6568992
	10	1	377634	6568054
	10	0.5	380887	6561388
	10	5	371624	6578054
**Hypochaeris radicata*	5	0.5	371381	6578299
**Leptospermum laevigatum*	1	1	370815	6579050
**Lolium rigidum*	250	1	380323	6562331
	20	0.5	377744	6567929
	10	0.5	380874	6561407
**Lupinus angustifolius*	15	0.5	380809	6561477
**Lupinus cosentinii*	50	50	371149	6578557
	10	1	370888	6578903
	100	40	371266	6578409
	250	40	371171	6578551
	15	3	380332	6562313
	10	1	371497	6578135
**Lysimachia arvensis*	15	0.5	372836	6576539
	5	0.5	371335	6578366

Species	Estimated abundance	Cover (%)	Easting (mE)	Northing (mN)
**Medicago polymorpha*	1	0.5	370898	6578887
**Monoculus monstrosus*	1	0.5	377631	6568096
**Orobanche minor*	1	0.5	372746	6576722
	5	2	371352	6578339
**Osteospermum ecklonis*	10	10	377746	6567910
**Oxalis pes-caprae*	10	0.5	377744	6567904
**Pentameris airoides* subsp. *airoides*	n/a	0.5	371294	6578415
	n/a	0.5	377588	6567962
**Petrorhagia dubia*	20	0.5	377232	6568997
**Pinus radiata*	1	90	371352	6578320
**Polycarpon tetraphyllum*	1	0.5	371781	6577810
	n/a	0.5	371622	6578051
**Raphanus raphanistrum*	1	0.5	371295	6578412
	75	5	371903	6577788
	75	2	380342	6562283
**Romulea rosea*	1	0.5	371296	6578416
	5	0.5	377592	6568137
**Solanum nigrum*	3	0.5	377169	6568784
	10	1	371827	6577832
**Sonchus asper*	10	0.5	370875	6578960
	15	0.5	372785	6576700
	25	0.5	371787	6577813
**Sonchus oleraceus*	10	0.5	371298	6578413
	5	0.5	371622	6578053
	3	0.5	371503	6578156
	n/a	0.5	371294	6578415
**Trifolium campestre* var. *campestre*	10	0.5	377233	6569000
**Trifolium hirtum*	5	1	371382	6578365
**Ursinia anthemoides*	2	0.5	376959	6569217
	250	5	377200	6569046
	25	0.5	377638	6568055
	75	0.5	377165	6568795
	25	0.5	377450	6568234
	25	0.5	377589	6567952
	n/a	0.5	371294	6578415
	n/a	0.5	371376	6578298
**Vulpia myuros forma myuros*	1	0.5	371309	6578407
**Wahlenbergia capensis*	1	0.5	371383	6578300
	25	1	377570	6568170

Species	Estimated abundance	Cover (%)	Easting (mE)	Northing (mN)
**Wahlenbergia capensis*	15	0.5	370876	6578964
	2	0.5	371307	6578394
**Zaluzianskya divaricata*	5	0.5	380801	6561484

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Appendix L: Fauna Habitat Mapping

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370500 371000 371500 372000 372500 373000

6579000 6578500 6578000 6577500 6577000 6576500 6576000

Map Extent

Brand Hwy

Brand Hwy

Legend

Survey Areas

Fauna Habitat

Banksia Woodland

Eucalypt Woodland

Ephemeral Wetland

Cleared

Main Roads Western Australia

Brand Highway, Regans Ford – Biological Surveys

Figure L.1: Fauna Habitat Mapping

astron

delivering environmental intelligence™

Author: J. Atkinson	Date: 17-11-2016
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureL1_FaunaHabitat

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 metres

N

376500 377000 377500 378000 378500

6569500 6569000 6568500 6568000 6567500 6567000

Brand Hwy

Map Extent

Brand Hwy

Legend

Survey Areas

Fauna Habitat

Banksia Woodland

Eucalypt Woodland

Ephemeral Wetland

Cleared

Main Roads Western Australia

Brand Highway, Regans Ford – Biological Surveys

Figure L.2: Fauna Habitat Mapping

astron

delivering environmental intelligence™

Author: J. Atkinson	Date: 17-11-2016
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureL2_FaunaHabitat

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 metres

N

380000
380500
381000
6562500
6562000
6561500
Brand Hwy
Brand Hwy
Map Extent
Legend
Survey Areas
Fauna Habitat
Banksia Woodland
Cleared
Main Roads Western Australia
Brand Highway, Regans Ford – Biological Surveys
Figure L.3: Fauna Habitat Mapping
astron
delivering environmental intelligence™
Author: J. Atkinson	Date: 17-11-2016
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureL3_FaunaHabitat

Coordinate System: GDA 1994 MGA Zone 50
0 100 200 metres
N

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Appendix M: Carnaby's Black-Cockatoo Habitat Mapping and Tree Locations and Descriptions

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370500 371000 371500 372000 372500 373000

6579000 6578500 6578000 6577500 6577000 6576500 6576000

Map Extent

Brand Hwy

Brand Hwy

Legend

Survey Areas

Carnaby's Black-Cockatoo Habitat

Foraging Habitat

Limited Foraging Habitat

Cleared

Main Roads Western Australia

Brand Highway, Regans Ford – Biological Surveys

Figure M.1: Black Cockatoo Habitat Mapping

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Author: J. Atkinson	Date: 17-11-2016
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureM1_BlackCockatooHabitat

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 300 400 500 metres

N

376500 377000 377500 378000 378500

6569500 6569000 6568500 6568000 6567500 6567000

Brand Hwy

Map Extent

Legend

- Survey Areas
- Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*) Location
- Mature Tree Locations

Carnaby's Black-Cockatoo Habitat

- Breeding, Roosting and Foraging Habitat
- Foraging Habitat
- Limited Foraging Habitat
- Cleared

Main Roads Western Australia

Brand Highway, Regans Ford – Biological Surveys

Figure M.2: Black Cockatoo Habitat Mapping

astron
delivering environmental intelligence™

Author: J. Atkinson	Date: 17-11-2016	Coordinate System: GDA 1994 MGA Zone 50
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureM2_BlackCockatooHabitat	0 100 200 300 400 metres

N

380000
380500
381000
6562500
6562000
6561500
Brand Hwy
Brand Hwy
Map Extent

Legend

Survey Areas

Carnaby's Black-Cockatoo Habitat

Foraging Habitat

Cleared

Main Roads Western Australia

Brand Highway, Regans Ford – Biological Surveys

Figure M.3: Black Cockatoo Habitat Mapping

astron
delivering environmental intelligence™

Author: J. Atkinson	Date: 17-11-2016
Drawn: W. An	Figure Ref: 8208-16-BIDR-1Rev0_161117_FigureM3_BlackCockatooHabitat

Coordinate System: GDA 1994 MGA Zone 50

0 100 200 metres

N

Table M.1: Potential habitat tree locations, descriptions and photos.

Tree number	Species	Diameter at breast height (cm)	GDA94, Zone 50		Tree height (m)	Hollow presence	Hollow height (m)	Diameter of branch (cm)	Hollow width (cm)	Breeding evidence	Photo
			Easting (mE)	Northing (mN)							
1	Marri	90	377236	6569004	17	Nil				None visible	
2	Marri	90	377085	6569039	13.5	1	12	30	20	None visible	
3	Marri	70	377110	6568923	15	1	7	40	20	None visible	

Tree number	Species	Diameter at breast height (cm)	GDA94, Zone 50		Tree height (m)	Hollow presence	Hollow height (m)	Diameter of branch (cm)	Hollow width (cm)	Breeding evidence	Photo
			Easting (mE)	Northing (mN)							
4	Marri	70	377128	6569022	14	2	9	40	15	None visible – bee hive	
5	Marri	70	377124	6569055	15	1	8	30	20	None visible	

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