



Mogumber Road West

Application for a
Native Vegetation
Clearing Permit –
Area Permit

Prepared for:
Santrev Pty Ltd

July 2018

● people ● planet ● professional

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1 Introduction

360 Environmental Pty Ltd (360 Environmental) was commissioned by Santrev Pty Ltd (Santrev) to prepare a Native Vegetation Clearing Permit (NVCP) application to support the upgrade of Mogumber Road West for truck access into and out of private property containing Poultry Farms south of Mogumber Road West.

This clearing permit application is for the area of 0.85 ha of remnant native vegetation along the road ('the site') (Figure 2).

The site is zoned 'Rural' under the Shire of Victoria Plains Local Planning Scheme No. 5 (LPS 5).

1.1 Purpose of Document

The purpose of this document is to present the results of an assessment of the clearing aspects of the Proposal against the ten clearing principles as outlined in the (then) Department of Environment Regulation (DER)'s *Guide to Assessment: Clearing of Native Vegetation under the Environmental Protection Act 1986* (EP Act). This report identifies the potential environmental impacts associated with the Proposal based on the best available data. This NVCP will be submitted to the (now) Department of Water and Environmental Regulation (DWER) for assessment.

1.2 Responsible Person

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2 Site Overview

2.1 Location

The site is located within the road reserve of Mogumber Road West abutting Lot 10, Mogumber to the south. The site is located approximately 103 km northeast of Perth's Central Business District (CBD) and approximately 61 km east of Lancelin townsite (Figure 1). The proposed works will be within a footprint of 2.49 ha and will comprise clearing approximately 0.85 ha of native vegetation and five individual trees (Figure 2).

2.2 Bioregion

The site is located within the Swan Coastal Plain (SCP) biogeographic region of Western Australia (WA). The Swan Coastal Plain is a low lying coastal plain, mainly covered with woodlands. The site is within the Swan Coastal Plain 1 (SWA1) Dandaragan Plateau IBRA sub-region. The SWA1 subregion is described as cretaceous marine sediments that are mantled by sands and laterites. The plateau is characterised by Banksia low woodland, Jarrah-Marri woodland, Marri woodland, and by scrub-heaths on laterite pavement and on gravelly sandplains (Desmond 2001).

2.3 Topography

The topography is variable across the site with elevation ranging between 177 m Australian Height Datum (AHD) and 182 m AHD.

2.4 Geology

The 1:250 000 surface geology profile mapping (GSWA 2008) indicates the geology of the Site is typically as follows:

- **Sand Plain 38499:** Sand or gravel plains; quartz sand sheets commonly with ferruginous pisoliths or pebbles, minor clay; local calcrete, laterite, silcrete, silt, clay, alluvium, colluvium, Aeolian sand; and
- **Ferruginous duricrust 38498:** Pisolitic, nodular or vuggy ferruginous laterite, some lateritic soils, ferricrete, magnesite, ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan, residual ferruginous saprolite.

Soil subsystems mapping identified that the site is within the following soil subsystem (Figure 3):

- **222Cp_3b, Capitella 3 gentle slope Phase:** Very gently inclined slopes, plain with some dunes. Colluvium, pale deep and gravelly deep sand (DAFWA 2012).

2.5 Broad Vegetation Associations

Mapping of the vegetation of the Perth of WA was completed on a broad scale (1:250,000) by Beard (1981). These vegetation units were re-assessed by Shepherd *et al.* (2001) to account for clearing in the intensive land use zone, dividing some larger vegetation units into smaller units.

There are two Beard/Shepherd vegetation units in the site (Figure 4). The Shepherd *et al.* (2001) vegetation type is described below, and its representation within the State, IBRA region, IBRA subregion and Local Government are shown in Table 1.

- **Gingin 1015:** Mosaic: Mixed scrub/heath/shrublands; dryandra thicket; and
- **Gingin 949:** Low woodland; Banksia.

Table 1: Broad Vegetation Types and its State and Regional Representation (Government of Western Australia 2017)

	PRE- EUROPEAN (HA)	CURRENT EXTENT (HA)	REMAINING (%)	REMAINING IN DBCA RESERVES (%)
IBRA Region Total				
Swan Coastal Plain	1,501,221.93	578,997.37	38.57	38.47
Statewide/IBRA Region – Swan Coastal Plain				
Beard Veg Assoc. No. 1015	19,556.98	6,639.02	33.95	44.09
Beard Veg Assoc. No. 949	218,193.94	122,966.39	56.36	55.90
In IBRA Region SWA1				
Beard Veg Assoc. No. 1015	15,871.79	6,240.65	39.32	46.20
Beard Veg Assoc. No. 949	25,507.44	16,134.07	63.25	39.77
Local Government Authority – Shire of Victoria Plains				
Beard Veg Assoc. No. 1015	1,230.29	503.59	40.93	-
Beard Veg Assoc. No. 949	925.23	387.02	41.83	-

The EPA considers it is important that ecological communities are maintained above the threshold level of 30 % of pre-European extent of each community and ecological communities with levels below 30 % should be fully retained (EPA 2008). Both vegetation communities identified in Table 1 are above the 30 % threshold.

2.6 Hydrology

Review of available surface water feature mapping did not identify any mapped water features within or in the vicinity of the site (DWER 2018a).

Wetlands of the Swan Coastal Plain have been described and mapped by Hill *et al.* (1996) and assigned a management category reflecting their condition. The Department of Biodiversity Conservation and Attractions (DBCA) Geomorphic Wetlands dataset identifies no wetlands occurring on or within the immediate vicinity of the Site. The nearest geomorphic wetlands are classified as 'Conservation Category' (CCW) and are located in excess of 500 m east of the site (DBCA 2018a) (Figure 5).

Groundwater and salinity levels across the site are unknown. However, a nearby WIN bore approximately 300 m to the north of the site has limited available data. The drill depth of this bore is 9.14 m below ground level (mbgl); however, no static water level has been reported. The depth to groundwater is potentially around the drill depth (DWER 2018b).

2.7 Conservation Features

Environmentally Sensitive Areas (ESAs) are identified and protected under the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*. Under the Notice, it is an offence to kill or destroy vegetation within an ESA. Mapping undertaken by DWER indicates there are no ESAs within the site. The nearest ESA is located approximately 124 m south of Mogumber West Road within a patch of remnant native vegetation (DWER 2018c).

The site is not within or in the vicinity of any conservation areas, including; Bush Forever Sites, Regional Reserves, ecological linkages or DBCA Managed Lands. A number of these conservation areas exist within the wider region. The nearest conservation area is Mogumber West Nature Reserve vested with the Conservation Commission of WA and managed by the DBCA, located approximately 1.9 km northeast of the site (DBCA 2018b).

2.8 Climate

The nearest official Bureau of Meteorology (BoM) weather station currently in operation with monthly climate data is the Walebing Station (#008151) located approximately 50 km north east of the site. The climate is described as having hot, dry summers and cool winters. The annual mean maximum temperature is 24.9°C and the annual mean minimum temperature is 10.8°C. The annual average rainfall is 475.4 mm (BoM 2018).

3 Assessment Methodology

3.1 Desktop Assessment

An initial desktop assessment was undertaken which included a review of current and relevant tenure and land ownership details, literature sources, database and GIS information to determine:

- Possible environmental survey and approvals requirements; and
- The location of areas with minimal environmental sensitivities/constraints and any highly constrained areas.

The desktop study provided background information on the flora and vegetation of the Site. Database searches of the Department of the Environment and Energy (DEE)'s Protected Matters Search Tool (PMST) and the Department of Biodiversity Conservation and Attractions (DBCA)'s NatureMap Search Tool were undertaken to compile a list of expected Threatened or Priority species and Threatened and Priority Ecological Communities (TECs and PECs) that may occur in the area. These database searches are described in Table 2.

Table 2: Database Searches Undertaken to Identify Potential Environmental Constraints

POTENTIAL ENVIRONMENTAL CONSTRAINT(S)	DATABASE SEARCHES
Matters of National Environmental Significance (MNES)	EPBC Act PMST Search (DEE 2018), 5 km radial search (DEE 2018).
Declared Rare Flora (DRF) and Priority Flora species	DBCA NatureMap search, 5 km radial search (DBCA 2018c) DBCA Threatened and Priority Flora Database, 5 km radial search (DBCA 2018d).
TECs and / or PECs	EPBC Act PMST (DEE 2018) DBCA TEC and PEC database search, 5 km radial search (DBCA 2018e).
Threatened and Priority Fauna Species	DBCA NatureMap search, 5 km radial search (DBCA 2018c) DBCA Threatened and Priority Fauna, 5 km radial search (DBCA 2018f).

3.2 Flora and Vegetation Field Survey

360 Environmental undertook a Detailed Flora and Vegetation Survey of the site on 29 May 2018. The Survey consisted of installing two permanent quadrats, two relevés, vegetation mapping notes and a targeted Threatened and Priority flora search within the Survey Area. The site locations are shown in Figure 8, and the site data sheets are shown in Appendix E.

The Detailed Flora and Vegetation Survey was completed with the following objectives:

- Conduct a desktop assessment of relevant literature, databases and spatial datasets to determine the environmental values and any potential issues, such as Threatened/Rare significant species and Threatened Ecological Communities (TECs) that may be present;
- Produce an inventory of flora taxa present within the Survey Area;
- Document and map the locations of any Declared Rare Flora (DRF), Priority flora and other flora of local or taxonomic significance;
- Identify, map and discuss the significance of any TECs, PECs and other areas of ecological importance; and
- Assess, map and describe the vegetation associations present.

4 Results

4.1 Database Results

4.1.1 Flora

The database searches identified a total 85 species of conservation significance as within 5 km of the site. Of these, 34 were Threatened flora and 51 were Priority flora (Department of Biodiversity Conservation and Attractions, 2018), including two Priority 1, three Priority 2, 35 Priority three and 11 Priority 4 (Appendix A, B).

4.1.1.1 Likelihood

A post-survey assessment of likelihood of occurrence was completed for the 85 species of conservation significance identified by the database searches. A post-survey assessment of likelihood assesses the presence of suitable habitat within the site, the life cycle of the potentially occurring species and the survey effort completed during the survey. Based on this, it is considered that, of the 85 species listed within the database searches, one species (*Thelymitra apiculata* P4) is considered Likely to occur within the site, and two species (*Haemodorum loratum* P3 and *Anigozanthos humilis* subsp. *chrysanthus* P4) are still considered to Possible to occur within the site. These species have previously been recorded with 5 km of the Site, suitable habitat was identified within the Site, and they are perennial herb species, with flowering times outside of the survey timing.

Thelymitra apiculata P4 flowers from May to July, *Haemodorum loratum* P3 flowers in November and *Anigozanthos humilis* subsp. *chrysanthus* P4 flowers from July to October.

4.1.1.2 Literature Review

A summary of the two previous reports is provided in Table 3.

Table 3: Summary of Previous Survey Reports

REPORT TITLE	SURVEY AREA	CONSERVATION SIGNIFICANT FLORA AND COMMUNITIES	INTRODUCED FLORA
Mogumber Chicken Farms Biological Assessment	Building envelopes and buffers of chicken sheds	One Specimen of <i>Banksia mimica</i> (T) was found. Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region was considered likely to be present	6
Floristic Survey of Northern Sandplains between Perth	Northern Sandplains between Perth and Geraldton	Due to the scale of the study detailed assessment of community conservation significance was not possible,	262

REPORT TITLE	SURVEY AREA	CONSERVATION SIGNIFICANT FLORA AND COMMUNITIES	INTRODUCED FLORA
and Geraldton	but not actually within the Survey Area	however mention was given to the vegetation around Dandaragan being poorly reserved. Significant flora was not mentioned	

4.1.2 Fauna

The NatureMap report identified two conservation significant fauna species potentially occurring within a 5 km radius of the site (DBCA 2018c). One species is listed as Threatened (Carter's Freshwater Mussel, *Westralunio carteri*) and one is listed as Priority 3 (Mogumber Bush Cricket, *Throscodectes xederoides*) (DBCA 2018c).

The DBCA's Threatened and Priority fauna database identified 35 conservation significant fauna species previously recorded within 40 km of the site. Two species are listed as Conservation Dependent species (Greater Stick-nest Rat, *Leporillus conditor*; South-western Brush-tailed Phascogale, *Phascogale tapoatafa wambenger*), two species are listed as Critically Endangered (Western Swamp Tortoise, *Pseudemydura umbrina*; Western Ringtail Possum, *Pseudocheirus occidentalis*), four are listed as Endangered (Baudin's Black Cockatoo, *Calyptorhynchus baudinii*; Carnaby's Black Cockatoo, *Calyptorhynchus latirostris*; Shield-backed Trapdoor Spider, *Idiosoma nigrum*; Dibbler, *Parantechinus apicalis*), 10 are listed as Vulnerable (Forest Red-tailed Black Cockatoo, *Calyptorhynchus banksii naso*; Chuditch, *Dasyurus geoffroii*; Western Spiny-tailed Skink, *Egernia stokesii badia*; Mud Minnow, *Galaxiella munda*; Malleefowl, *Leipoa ocellata*; Bilby, *Macrotis lagotis*; Balston's Pygmy Perch, *Nannatherina balstoni*; Heath Mouse *Pseudomys shortridgei*; Carter's Freshwater Mussel, *Westralunio carteri*; Curlew Sandpiper, *Calidris ferruginea*), four are listed as Presumed Extinct Species (Burrowing Bettong, *Bettongia lesueur graii*; Long-tailed Hopping-Mouse, *Notomys longicaudatus*; Big-eared Hopping Mouse, *Notomys macrotis*), six are protected under an International Agreement (Red-necked Stint, *Calidris ruficollis*; Caspian Tern, *Hydroprogne caspia*; Little Curlew, *Numenius minutus*; Glossy Ibis, *Plegadis falcinellus*; Wood Sandpiper, *Tringa glareola*; Common Greenshank, *Tringa nebularia*), four are listed as Priority 3 (Woolybush Bee, *Hylaeus globuliferus*; Short-tongued Bee, *Leioproctus contrarius*; Black-striped Snake, *Neelaps calonotos*; Mogumber Bush Cricket, *Throscodectes xederoides*), five are listed as Priority 4 (Water-rat, *Hydromys chrysogaster*; Quenda, *Isodon fusciventer*; Western Brush Wallaby, *Notamacropus Irma*; Blue-billed Duck, *Oxyura australis*; Hooded Plover, *Thinornis rubricollis*) and one is listed as Other Specially Protected fauna (Peregrine Falcon, *Falco peregrinus*) (DBCA 2018f).

The PMST database search identified a total of seven conservation significant fauna species protected under the EPBC Act potentially occurring within 5 km of the site. This includes two Critically Endangered species (Curlew Sandpiper, *Calidris ferruginea*; Eastern Curlew, *Numenius madagascariensis*), two Endangered species (Australian

Painted Snipe, *Rostratula australis*; Carnaby's Black Cockatoo, *Calyptorhynchus latirostris*) and four Vulnerable species (Malleefowl, *Leipoa ocellata*; Balston's Pygmy Perch, *Nannatherina balstoni*; Chuditch, *Dasyurus geoffroii*; Sheild-backed Trapdoor Spider, *Idiosoma nigrum*) (DEE 2018).

4.2 Survey Results

4.2.1 Overview of Flora

A total of 60 taxa (including species, subspecies, varieties and forms) and 45 genera and 20 families were recorded in the Survey Area. The commonly occurring families were; Proteaceae (14 taxa), Fabaceae (8 taxa) and Myrtaceae (5 taxa). The flora inventory is provided in Appendix F.

4.2.2 Flora of Conservation Significance

No Threatened species pursuant to the EPBC Act and/or gazetted as DRF pursuant to the WC Act were recorded during the 2018 survey, however, a known population of *Banksia mimica* occurs approximately 50 m southeast from the site, as recorded from the previous flora survey completed by 360 Environmental in 2018.

Three Priority flora were recorded as occurring within the Survey Area;

- *Banksia dallanneyi* subsp. *pollostata* (P3) (Plate 1);
- *Banksia pteridifolia* subsp. *vernalis* (P3) (Plate 2); and
- *Isopogon drummondii* (P3) (Plate 3).

4.2.2.1 *Banksia dallanneyi* subsp. *pollostata*

Sixteen individuals of *Banksia dallanneyi* subsp. *pollostata* were recorded at ten locations within the Survey Area (Table 4, Figure 7).



Plate 1: *Banksia dallanneyi* subsp. *pollostata* P3 *drummondii*

Table 4. Locations of *Banksia dallanneyi* subsp. *pollostata* P3 within the Survey Area

TAXA	No. OF INDIVIDUALS	COORDINATES 2018	
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i> P3	1	E 401805	N 6567033
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i> P3	1	E 401762	N 6567052
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i> P3	2	E 401699	N 6567076
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i> P3	3	E 401541	N 6567139
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i> P3	1	E 402007	N 6566947
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i> P3	1	E 402015	N 6566942
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i> P3	1	E 401532	N 6567145
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i> P3	1	E 401822	N 6567028
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i> P3	5	E 401860	N 6567007
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i> P3	20	E 401822	N 6567022

4.2.2.2 *Banksia pteridifolia* subsp. *vernalis*

Five individuals of *Banksia pteridifolia* subsp. *vernalis* were recorded at one location within the Survey Area (Table 5, Figure 7).



Plate 2: *Banksia pteridifolia* subsp. *vernalis* P3 *drummondii*

Table 5. Location of *Banksia pteridifolia* subsp. *vernalis* (P3) within the Survey Area

TAXA	No. OF INDIVIDUALS	COORDINATES 2018	
<i>Banksia pteridifolia</i> subsp. <i>vernalis</i> P3	5	E 401735	N 6567060

4.2.2.3 *Isopogon drummondii*

Four individuals of *Isopogon drummondii* were recorded at four locations within the Survey Area (Table 6, Figure 7).



Plate 3: *Isopogon drummondii*

Table 6. Locations of *Isopogon drummondii* (P3) within the Survey Area

TAXA	No. OF INDIVIDUALS	COORDINATES 2018	
<i>Isopogon drummondii</i> P3	1	E 401812	N 6567029
<i>Isopogon drummondii</i> P3	1	E 401791	N 6567037
<i>Isopogon drummondii</i> P3	1	E 401533	N 6567141
<i>Isopogon drummondii</i> P3	1	E 402045	N 6566935

4.2.3 Introduced Flora

A total of five introduced species were recorded during the survey, representing 8% of the total taxa. None of these are listed as Declared Pests (Department of Primary Industries and Regional Development, 2018) or WONS under the BAM Act (Table 7)

Table 7: Introduced Flora Recorded in the Survey Area

TAXA	COMMON NAME
* <i>Avena barbata</i>	Bearded Oat
* <i>Briza maxima</i>	Blowfly Grass
* <i>Ehrharta calycina</i>	Perennial Veldt Grass
* <i>Gladiolus caryophyllaceus</i>	Wild Gladiolus
* <i>Romulea rosea</i>	Guildford Grass

4.2.4 Vegetation Associations

One natural vegetation association was described for the Site during the survey, a description of these associations is provided in Table 8 and Figure 8. A few isolated trees were also recorded, these being: *Eucalyptus todtiana*, *Nuytsia floribunda* and *Allocasuarina* sp..

Table 8: Surveyed Vegetation Associations within the Site

VEGETATION ASSOCIATION	DESCRIPTION	SITES	EXTENT (%)	EXTENT (HA)
<p><i>EtBa</i>: <i>Eucalyptus todtiana</i>, <i>Banksia attenuata</i></p> 	Low woodland of <i>Eucalyptus todtiana</i> , <i>Banksia attenuata</i> , <i>Banksia prionotes</i> over tall shrubland of <i>Adenanthos cygnorum</i> , <i>Lambertia multiflora</i> over mid sparse shrubland of <i>Allocasuarina humilis</i> , <i>Acacia pulchella</i> , <i>Xanthorrhoea drummondii</i> sans lat over low isolated shrubs of <i>Gastrolobium linearifolium</i> , <i>Acacia stenoptera</i> .	MWQ01 MWQ02 MWR01 MWR02	34.13	0.85
Cleared	Road, track, and cleared verge areas		65.86	1.64
Total			100	2.49

4.2.5 Floristic Community Types

Statistical analysis (multivariate analysis) and data interpretation was undertaken to help determine the Floristic Community Types (FCTs) represented by the vegetation in the Survey Area. This involves reviewing site data for other factors that are diagnostic for FCTs, including the presence of indicator species, soil types and landform position. Results from the statistical analyses and the site information is in Table 9.

Table 9: Floristic Analysis for the Survey Area

QUADRAT	NEAREST NEIGHBOUR ANALYSIS			NOTES	CONCLUSION
	SIMILARITY	SITE	FCT		

QUADRAT	NEAREST NEIGHBOUR ANALYSIS			NOTES	CONCLUSION
	SIMILARITY	SITE	FCT		
MWQ01 (EtBa)	35.89	MWR03	S06	The vegetation has a sparse overstorey of <i>Banksia attenuata</i> and <i>Eucalyptus todtiana</i> . Despite the highest similarity with S06 and 23a the location of the Survey Area on the eastern side of the SCP and typical species listed for 23c and 23b being present makes both FCTs a possibility.	23b – Northern <i>Banksia attenuata</i> – <i>Banksia menziesii</i> woodlands & 23c – North – eastern <i>Banksia attenuata</i> – <i>Banksia menziesii</i> woodlands
	33.70	Tele01	23a		
	33.33	MHR01	23b		
	31.68	Kens01	23a		
	31.57	BNR19	23b		
MWQ02 (EtBa)	42.62	MHR01	23b	The location of the Survey Area on the eastern side of the SCP and typical species listed for 23c and 23b being present makes both FCTs a possibility.	23b – Northern <i>Banksia attenuata</i> – <i>Banksia menziesii</i> woodlands & 23c – North – eastern <i>Banksia attenuata</i> – <i>Banksia menziesii</i> woodlands
	41.09	MWR03	S06		
	37.68	MR09	23b		
	37.14	MWR07	S09		
	35.29	FYR01	S09		

Quadrats MWQ01 and MWQ02 which represent vegetation association EtBa, have been determined to have affiliation with both FCT SCP23b - Northern *Banksia attenuata* – *Banksia menziesii* woodlands and FCT SCP 23c – North – eastern *Banksia attenuata* – *Banksia menziesii* woodlands. SCP 23c is not listed as a TEC or PEC by the State, however, SCP 23b is listed as a Priority 3 by the State.

Both FCTs are listed as sub-communities under the EPBC Act listed *Banksia* woodlands of the Swan Coastal Plain, therefore have the potential to be listed and protected under the EPBC Act (DEE 2016). *Banksia* woodlands of the Swan Coastal Plain are also listed as a Priority 3 by the State.

4.2.6 Vegetation Condition

The Survey Area is within the road reserve and, as expected, is a narrow strip which varies in condition, influenced by past clearing, driveways, adjacent lands use, weeds and rubbish. The vegetation condition ranged from Excellent to Completely Degraded condition (Figure 9).

4.2.7 Threatened / Priority Ecological Communities

A desktop search identified one PEC listed by the State as being within a five km radius of the Survey Area; Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region. This community is also listed as a Threatened Ecological Community (TEC) under the EPBC Act.

One vegetation association was mapped for the Survey Area, EtBa, low open woodland.

Quadrats MWQ01 and MWQ02 which represent vegetation association EtBa, have been determined to have affiliation with both FCT SCP23b - Northern *Banksia attenuata* – *Banksia menziesii* woodlands and FCT SCP 23c – North – eastern *Banksia attenuata* – *Banksia menziesii* woodlands. The potential for the vegetation to be either SCP23b or SCP23c is due to the vegetation showing resemblance to 23b, as well as the location of the Survey Area being on the eastern side of the SCP and having the same typical species as 23c. Regardless, both of these FCTs are listed as sub-communities of Banksia woodlands of the Swan Coastal Plain and the presence of Banksia tree species implies that it is considered a TEC under the Endangered category under the EPBC Act.

For vegetation remnants to be under full national protection the community has to meet key diagnostic characteristics. In regards to the presence of the TEC, the Approved Conservation Advice for the thresholds state that for vegetation in Excellent Condition the minimum patch size should be 0.5 ha, while vegetation in Very Good condition should be a minimum of one hectare and vegetation in Good condition should be a minimum of two hectares. If a vegetation patch is considered Degraded or worse, it is not considered favourable for national protection (DEE 2016). The Banksia woodlands generally have a dominant Banksia component, which includes at least one of four key species, *Banksia attenuata*, *B. menziesii*, *B. prionotes* and/or *B. ilicifolia*.

Based on this information, and the survey results, the vegetation association EtBa is representative of Banksia Woodlands of the Swan Coastal Plain and therefore could be considered suitable for national protection. The variable condition, low density of Banksia canopy and thin (<12 m) linear shape, however, effects the value of the vegetation as Banksia woodlands of the Swan Coastal Plain.

5 Environmental Management Measures and Rehabilitation

To minimise the risk of impact from the activities associated with the Proposal, the following environmental management measures will be implemented:

- Appropriate speed limits will be set, signposted and adhered to on all site access roads to avoid fauna strike. Speed restrictions will apply in areas between dusk and dawn where there is a high risk of fauna/vehicle collision;
- Mulching tractors will preferentially clear areas of shrubs and trees less than 100 mm DBH;
- Dieback and weed control will be in place to minimise the risk of spread or introduction of dieback or new weed species;
- Vegetation clearing will be scheduled to occur immediately before planned earthworks and construction to minimise the potential for dust, where practicable;
- Disturbed areas will be treated with dust suppressants (water trucks or chemical suppressants) especially in high risk areas and/or on during high risk days; and
- Spill kits must be available on site while plant is onsite.

6 Assessment against the Ten Clearing Principles

The proposed clearing activities have been assessed against the ten clearing principles as defined in DER's *Guide to Assessment: Clearing of Native Vegetation under the Environmental Protection Act 1986*, taking into account the current extent and condition of the native vegetation on the site. This assessment is presented in Table 10.

Table 10: Assessment Against 10 Clearing Principles

PRINCIPLE	ASSESSMENT
<p>Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity</p>	<p>The application is to clear 0.85 ha of native vegetation and five individual native trees within a footprint of 2.49 ha within a portion of the Mogumber Road West reserve for the purpose of expanding the existing road for truck access into lots to the south.</p> <p>The PMST search with a 5km buffer from the centre of the site and subsequent likelihood assessment was undertaken and identified 18 conservation significant flora species listed under the EPBC Act as potentially occurring within the Site. The search identified one Critically Endangered flora species (Dark-bract Banksia, <i>Banksia fuscobracteata</i>), ten Endangered species (Slender Andersonia, <i>Andersonia gracilis</i>; Summer Honeypot, <i>Banksia mimica</i>; One-headed Smokebush, <i>Conospermum densiflorum subsp. unicephalatum</i>; Fine-leaved Darwinia, <i>Darwinia acerosa</i>; Mogumber Bell, <i>Darwinia carnea</i>; <i>Diplolaena andrewsii</i>; <i>Eremophila glabra subsp. chlorella</i>; Rough Emu Bush, <i>Eremophila scaberula</i>; Badgingarra Box, <i>Eucalyptus absita</i>; Scaly Butt Mallee, <i>Eucalyptus leprophloia</i>; Cadda Road Mallee, <i>Eucalyptus x balanites</i>; Narrow curved-leaf Grevillea, <i>Grevillea curviloba subsp. incurva</i>; Red Snakebush, <i>Hemiandra gardneri</i>; Cinnamon Sun Orchid, <i>Thelymitra dedmaniarum</i> and the Star Sun-orchid, <i>Thelymitra stellata</i>) and two Venerable species (Southern Serrate Dryandra, <i>Banksia serratuloides subsp. serratuloides</i>; Keighery's Eleocharis, <i>Eleocharis keigheryi</i>) (DEE 2018).</p> <p>A DBCA NatureMap Search was undertaken within a 5 km buffer from the centre of the site. The subsequent likelihood assessment identified 11 conservation significant flora species as potentially occurring on the Site.</p>

PRINCIPLE	ASSESSMENT
	<p>This identified three Threatened species (<i>Banksia mimica</i>; <i>Glischrocaryon aureum</i>; <i>Lepidosperma rostratum</i>), one Priority 1 species (<i>Synaphea panhesya</i>), three Priority 3 species (<i>Conospermum scaposum</i>; <i>Isopogon drummondii</i>; <i>Stylidium divaricatum</i>) and four Priority 4 species (<i>Banksia chamaephyton</i>; <i>Calothamnus pachystachyus</i>; <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>; <i>Verticordia paludosa</i>) as potentially occurring within the Site (DBCA 2018c;d).</p> <p>Santrev commissioned 360 Environmental to undertake a Detailed Flora and Vegetation Survey at the site on 29 May 2018. The survey identified a total of 60 flora taxa, from 45 genera and 20 families within the site.</p> <p>No Threatened flora species pursuant to the EPBC Act and/or gazetted as DRF pursuant to the WC Act were recorded during the survey. Three Priority 3 listed flora species were recorded within the site; <i>Isopogon drummondii</i> P3 (16 individuals), <i>Banksia pteridifolia</i> subsp. <i>vernalis</i> P3 (5 individuals) and <i>Banksia dallanneyi</i> subsp. <i>pollosta</i> P3 (4 individuals).</p> <p>The Proposed Disturbance Area falls within two broad Shepherd vegetation mapping units. The first, Gingin 1015: Mosaic: Mixed scrub/heath/shrublands; dryandra thicket. This unit has approximately 46.2 % of its pre-European vegetation extent remaining in the SWA01 sub-region. The second, Gingin 949: Low woodland; Banksia. This unit has approximately 39.7 % of its pre-European vegetation extent remaining in the SWA01 sub-region. (Government of Western Australia 2017). The both vegetation associations have current extents above 30%.</p> <p>The vegetation conditions within the Proposed Disturbance Area were Excellent (0.44 ha), Very Good (0.07 ha), Very Good – Good (0.12 ha), Good (0.11 ha), Good – Degraded (0.03 ha), Degraded (0.07 ha) and Completely Degraded/Cleared (1.65 ha). A total of 0.85 ha of vegetation ranging between Excellent and Degraded condition will be cleared.</p> <p>The site contains 0.85 ha of the Banksia Woodlands of the Swan Coastal Plain TEC that may be suitable for federal protection under the EPBC Act. The condition of the Banksia Woodlands TEC ranges between</p>

PRINCIPLE	ASSESSMENT
	<p>Excellent and Degraded.</p> <p>Although the Project involves the clearing of Banksia Woodlands TEC and remnant vegetation in quality condition, it is relatively isolated from other large patches of remnant native vegetation and is within a highly disturbed and cleared environment.</p> <p>Assessed Outcome: The Proposal <u>may</u> be at variance with this Principle.</p>
<p>Principle (b) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a significant habitat for fauna indigenous to Western Australia</p>	<p>The PMST database search identified 19 conservation significant fauna species listed under the EPBC Act as potentially occurring within the site. The search identified two Critically Endangered fauna (Curlew Sandpiper, <i>Calidris ferruginea</i>; Eastern Curlew, <i>Numenius madagascariensis</i>), two Endangered fauna (Carnaby's Cockatoo, <i>Calyptorhynchus latirostris</i>; Australian Painted Snipe, <i>Rostratula australis</i>), four Vulnerable fauna (Malleefowl, <i>Leipoa ocellata</i>; Balston's Pygmy Perch, <i>Nannatherina balstoni</i>; Chuditch, <i>Dasyurus geoffroii</i>; Shield-Backed Trapdoor Spider, <i>Idiosoma nigrum</i>) and 11 listed as Migratory/Marine (Fork-tailed Swift, <i>Apus pacificus</i>; Grey Wagtail, <i>Motacilla cinerea</i>; Common Sandpiper, <i>Actitis hypoleucos</i>; Sharp-tailed Sandpiper, <i>Calidris acuminata</i>; Pectoral Sandpiper, <i>Calidris melanotos</i>; Osprey, <i>Pandion haliaetus</i>; Rainbow Bee-eater, <i>Merops ornatus</i>; Hooded Plover, <i>Thinornis rubricollis</i>; Cattle Egret, <i>Ardea ibis</i>; Great Egret, <i>Ardea alba</i>; White-bellied Sea Eagle, <i>Haliaeetus leucogaster</i>) (DEE 2018).</p> <p>The NatureMap database search identified two conservation significant fauna species as potentially occurring within the site. Of these, one is listed as Threatened (Carter's Freshwater Mussel, <i>Westralunio cateri</i>) and one is listed as Priority 3 (Mogumber Bush Cricket, <i>Throscodectes xederoides</i>).</p> <p>A likelihood assessment was undertaken of the species identified in the PMST, DBCA and NatureMap databases based on suitable habitat within the site and species distributions. The likelihood assessment identified one species as High likelihood of occurrence (Carnaby's Black Cockatoo, <i>Calyptorhynchus latirostris</i>), seven species as having a Medium likelihood of occurrence and 17 species as having a Low</p>

PRINCIPLE	ASSESSMENT
	<p>likelihood of occurrence (Appendix C).</p> <p>Majority of the conservation significant fauna species identified in the PMST, NatureMap and DBCA databases included waders, waterbirds and marine species that require specific habitats (such as open water). However, as the site does not contain these specific habitats they are unlikely to be impacted by the Proposal.</p> <p>The vegetation within the site contains species considered suitable foraging habitat for the Carnaby's Black Cockatoo and the site is within the known distribution of the species. The proposed clearing of 0.85 ha of native vegetation and five individual trees within the site is not likely to have a significant impact on the habitat available for the species. The vegetation is within a road reserve and is unprotected from impacts such as weeds, trampling and edge effects from road use and surrounding rural land uses. The vegetation to be cleared is also fragmented from nearby larger patches of remnant native vegetation to the south that have been previously surveyed by 360 Environmental as containing good quality Black Cockatoo habitat. It is not likely that the vegetation clearing of 0.85 ha and five individual trees would have a significant impact on the availability of Black Cockatoo habitat.</p> <p>The site is surrounded by rural land uses with large patches of remnant native vegetation remaining and a Class A Reserve (Mogumber West Nature Reserve) located within 4 km of the site that is likely to provide more suitable, large, quality and intact areas of vegetation with higher Black Cockatoo foraging, breeding and roosting value than the vegetation within the road reserve of the site.</p> <p>Given this and the Proposal to clear 0.85 ha of native vegetation that may be suitable for Carnaby's Black Cockatoo foraging, it is not expected that the clearing of native vegetation within the site will represent a significant loss of habitat for the Black Cockatoos.</p> <p>The ground dwelling conservation significant fauna identified in the database searches that have a Medium likelihood of occurrence include the Chuditch, Black Striped Nsake, Western Brush Wallaby and Mogumber Bush Cricket. Should these species be present in the site, it is not expected that they will be significantly</p>

PRINCIPLE	ASSESSMENT
	<p>impacted by the works. These fauna species are generally mobile and will likely utilise a larger, intact area of vegetation than the site for habitat use. The presence of the species within the site would likely be sporadic. The site is also within a road reserve within a rural landscape with fragmented vegetation. Fauna species are more likely to be utilising the large patches of nearby intact vegetation to the south of the site and the surrounding area.</p> <p>It is therefore not expected that the clearing of vegetation within the site would have major impacts to fauna or fauna habitat. It is more likely fauna would utilise larger patches of vegetation than the site abutting Mogumber Road West.</p> <p>Assessed Outcome: The Proposal to clear 0.85 ha of remnant native vegetation and five individual trees within the site is not likely to have a significant impact on significant habitat for fauna species indigenous to Western Australia due to nearby large patches of remnant native vegetation that may provide more suitable habitat. The Proposal is <u>not likely</u> to be at variance with this Principle.</p>
<p>Principle (c) – Native vegetation should not be cleared if it includes, or is necessary for the continued existence of rare flora.</p>	<p>A desktop review of database searches identified <i>Eremophila glabra</i> subsp. <i>chlorella</i> (T), <i>Acacia ridleyana</i> (P3), <i>Allocasuarina grevilleoides</i> (P3), <i>Grevillea florida</i> (P3), <i>Leucopogon allittii</i> (P3), <i>Persoonia rudis</i> (P3), <i>Schoenus benthamii</i> (P3), <i>Anigozanthos humilis</i> subsp. <i>chrysanthus</i> (P4), <i>Thelymitra apiculata</i> (P4), <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i> (P4) and <i>Verticordia paludosa</i> (P4) as to likely occur within the site due to the presence of suitable habitat and close proximity to previous records.</p> <p>No Threatened flora species pursuant to the EPBC Act and/or gazetted as DRF pursuant to the WC Act were recorded within the site during the Survey. However, a known population of <i>Banksia mimica</i> (listed as Endangered under the EPBC Act and Threatened under the WC Act) occurs approximately 50 m from the site as recorded from a previous flora survey completed by 360 Environmental in 2018. Three Priority 3 listed flora species were recorded:</p>

PRINCIPLE	ASSESSMENT
	<ul style="list-style-type: none"> ● <i>Isopogon drummondii</i> (4 individuals); ● <i>Banksia pteridifolia</i> subsp. <i>vernalis</i> (5 individuals); and ● <i>Banksia dallanneyi</i> subsp. <i>pollostata</i> (16 individuals). <p>Although the site contains suitable habitat for the survival of the recorded Priority species, the existence of these species within the site is already threatened from adjacent land use pressures, use of the road, invasion of weed species and other disturbances due to its location within a road reserve.</p> <p>Assessed Outcome: The vegetation within the Proposed Disturbance Area does include habitat containing and likely to support the existence of rare flora and therefore the Proposal <u>may</u> be at variance with this Principle.</p>
PRINCIPLE	ASSESSMENT
<p>Principle (d) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a Threatened Ecological Community (TEC).</p>	<p>The vegetation association EtBa: <i>Eucalyptus todtiana</i>, <i>Banksia attenuata</i> recorded within the site is representative of the Banksia Woodlands TEC with an area of 0.85 ha proposed to be cleared. However, it is not considered to be a significant impact given the small area of clearing within the isolated road reserve. The maintenance of the Banksia Woodlands TEC statewide is not likely to be compromised by the clearing of 0.85 ha of the TEC within this site. A large patch of remnant native vegetation to the southeast of the site has been previously identified as containing large area of the Banksia Woodlands TEC as identified in a previous survey by 360 Environmental in 2018. This indicates that the wider surrounding region is likely to contain large patches of the Banksia Woodlands TEC and the removal of 0.85 ha of the TEC is not considered to be necessary for the maintenance of the TEC within a regional context.</p> <p>Assessed Outcome: As the vegetation within the site proposed for clearing represents the Banksia Woodlands TEC, the Proposal <u>may</u> be at variance with this Principle. However, the clearing of 0.85 ha of the Banksia Woodlands TEC within a road reserve is not expected to represent a significant loss necessary for the maintenance of the TEC at a regional level.</p>

PRINCIPLE	ASSESSMENT
<p>Principle (e) – Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared</p>	<p>The site is within two vegetation units mapped by Shepherd <i>et al.</i> (2001) and Beard (1981); Gingin 949 and Gingin 1015. Table 1 outlines the total remaining extent of these vegetation units within the State, Bioregion and subregion. Of the pre-European extent, approximately 56.36 % and 33.95 % of the Gingin 949 and Gingin 1015 associations remain within the Swan Coastal Plain bioregion, respectively. The remaining extent of Gingin 949 and Gingin 1015 represents 122,966.39 ha and 6,639.02 ha, respectively. The EPA's Guidance Statement No. 33 has identified a threshold of the retention of 30 % of pre-European extent of each community and ecological communities with levels below 30% should be fully retained (EPA 2008). Both vegetation associations in Table 1 have current extents greater than the abovementioned 30 % threshold. It is not likely that the clearing of 0.85 ha of native vegetation and five individual trees within the site would reduce the remaining extents of these vegetation associations to below the 30 % threshold.</p> <p>The Proposed Disturbance Area covers an area of 2.49 ha that contains limited vegetation of EtBa: <i>Eucalyptus todtiana</i>, <i>Banksia attenuata</i> vegetation association (0.85 ha). The majority of the site is disturbed from the presence of weeds, some clearing and the presence of the adjacent road. As the site does not contain a significant quantity of native vegetation, the proposed clearing is not considered to represent a significant loss in the context of the State/IBRA representation of the Gingin 949 and Gingin 1015 vegetation associations.</p> <p>In addition, the vegetation condition within the site is mostly in 'Completely Degraded/Cleared condition (1.65 ha).</p> <p>Assessed Outcome: Clearing for the Proposal is not considered to have a significant impact on the State/IBRA region representation of the Gingin 949 and Gingin 1015 vegetation associations. It is <u>unlikely</u> that the Proposal will be at variance with this Principle.</p>

PRINCIPLE	ASSESSMENT
<p>Principle (f) – Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.</p>	<p>The clearing footprint is not impinged by or in the vicinity of any watercourses, wetlands or other surface water features. Desktop mapping of DBCA's geomorphic wetlands dataset has identified no wetlands occurring within 500 m of the site. The nearest geomorphic wetland is classified as CCW and is located approximately 670 m northeast of the site (DBCA 2018a). CCWs are described as having high conservation and ecological value.</p> <p>Assessed Outcome: The site does not contain any vegetation associated with watercourses or wetlands and is not located within the immediate vicinity of any surface water features. Therefore the Proposal is <u>unlikely</u> to be at variance with this Principle.</p>
<p>Principle (g) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation</p>	<p>The (then) Department of Environment Regulation (DER) has defined land degradation as including the following (DER 2014):</p> <ul style="list-style-type: none"> ● the clearing of vegetation; ● decline in vegetation condition; ● soil erosion and soil acidity (caused by wind and water erosion due to vegetation clearing); ● salinity; or ● Waterlogging/flooding. <p>The Proposal includes the clearing of 0.85 ha of native vegetation and five individual trees within the road reserve. The vegetation condition ranges between Excellent to Completely Degraded. The immediate surrounding landscape is representative of extensive clearing for farmland, tracks and roads and some large patches of remnant native vegetation. As the proposed clearing is not significant, is within a road reserve and is separated from nearby large remnant patches, it is not likely that this clearing would cause appreciable land degradation. Particularly as the existing vegetation is not protected.</p> <p>The vegetation condition of the vegetation proposed to be cleared ranges between Excellent and Completely</p>

PRINCIPLE	ASSESSMENT
	<p>Degraded/Cleared. The vegetation is within a road reserve which currently has no protection from nearby impacts such as edge effects, rubbish dumping, trampling and weed invasion due to the existing road and nearby cleared land. The vegetation of the area would likely naturally decline from these processes in the absence of clearing. The clearing of the vegetation is not likely to increase land degradation as the cleared portions will be replaced with a sealed road.</p> <p>Sandy soils can cause some short term dust problems or localised wind erosion dependent on weather conditions at time of clearing. However, given the site is sandy and lateritic in nature but clearing covers a small footprint of 0.85 ha of native vegetation and five individual trees to be cleared, erosion is not likely to be significantly elevated from the present state. Regardless, the surface cleared will become a sealed road and erosion would likely be localised and minor. Any potential dust issues at clearing and construction will be managed in Best Practice Management where required.</p> <p>The topography of the site is flat to very gently undulating. The elevation ranges between 178 m and 182 m AHD. As the works will involve the vegetation clearing followed by fill, levelling and sealing of the surface, erosion is not considered to result from the Proposal.</p> <p>Excess stormwater runoff within the site is not considered to be significantly increased, given road infrastructure already exists within the site and the surrounding environment is substantially cleared of vegetation to the north. However, any potential surface water runoff during road construction and operations will be managed in accordance with Best Practice Management where necessary.</p> <p>ASS risk mapping has identified the site as having no known risk of ASS. It is unlikely that the clearing and construction works would involve extensive natural soil disturbance and would only be impacting the soil surface. It is not likely that the works would disturb soils at a depth that would cause ASS.</p>

PRINCIPLE	ASSESSMENT
	<p>In summary, and in the absence of available groundwater data, the Proposal is unlikely to cause additional appreciable land degradation in the area.</p> <p>Assessed Outcome: The Proposal is <u>unlikely</u> to be at variance with this Principle as the works are unlikely to cause additional land degradation.</p>
<p>Principle (h) – Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area</p>	<p>The clearing footprint is not within or immediately adjacent to any conservation areas, including regional reserves, ecological linkages or DBCA Managed Lands. The clearing footprint is located outside a mapped ESA.</p> <p>The activities associated with the Proposal is likely to only impact the vegetation within the clearing footprint. The connectivity between the vegetation within the clearing footprint and surrounding bush areas is largely fragmented, with extensive historically cleared, rural land surrounding the site. Given the distance from the site to conservation areas and other patches of intact remnant vegetation, it is not likely that the clearing within the site would have an impact on the conservation value of nearby conservation areas through the spread of weeds or dieback. However, Best Practice Management will be implemented to ensure the risk of spread of weeds or dieback is reduced during clearing works.</p> <p>Assessed Outcome: The Proposal is <u>unlikely</u> to be at variance with this Principle.</p>
<p>Principle (i) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water</p>	<p>The annual mean rainfall for the area is approximately 583.7 mm as recorded at the nearest weather station (Wannamal #9040). Most of the rain falls between June and July (BoM 2018). Given the sandy nature of the soils and the varied condition of the vegetation within the site, it is not likely that the natural surface water hydrology would be significantly altered by the proposed clearing. Furthermore, the clearing is within a road reserve that has been cleared and sealed and is also surrounded by some cleared areas.</p> <p>The site is not located within or in the vicinity of any Public Drinking Water Source Areas (PDWSAs) (DWER 2018a). Mapping indicates that there are no watercourses or surface water features present within the site.</p>

PRINCIPLE	ASSESSMENT
	<p>Given the relatively small and degraded clearing area (0.85 ha and five individual trees), lack of surface water features and considerable distance from nearby surface water features and wetlands, it is not likely the clearing would cause deterioration in the quality of surface or underground water.</p> <p>Assessed Outcome: The Proposal is <u>unlikely</u> to be at variance with this Principle.</p>
<p>Principle (j) – Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding</p>	<p>Hydrography and wetland mapping suggests there are no known watercourses or surface water features within or in the vicinity of the site (DWER 2018a). The 100 Year ARI floodplain and flood fringe mapping did not identify the site as being within a flood risk area (DWER 2018a).</p> <p>Regional soil mapping and the field survey indicates that the underlying soil profile is mostly sandy in nature:</p> <ul style="list-style-type: none"> ● Sand or gravel plains: quartz sand sheets commonly with ferruginous pisoliths or pebbles, minor clay; local calcrete, laterite, silcrete, silt, clay, alluvium, colluvium, Aeolian sand; and ● Ferruginous duricrust 38498: Pisolitic, nodular or vuggy ferruginous laterite, some lateritic soils, ferricrete, magnesite, ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan, residual ferruginous saprolite (DAFWA 2012). <p>Sandy soils are typically well draining and stormwater would likely be able to infiltrate without waterlogging or causing excessive runoff. In addition, a large portion of the site is in a degraded condition and therefore any additional clearing in this area is unlikely to significantly alter the current characteristics of the site.</p> <p>It is therefore considered unlikely that the clearing of 0.85 ha of native vegetation and five individual trees within a road reserve will cause or exacerbate the incidence of flooding.</p> <p>Assessed Outcome: The Proposal is <u>unlikely</u> to be at variance with this Principle.</p>

7 Summary of Assessment and Conclusion

In summary, after desktop and field assessments of the environmental values of the Proposed Disturbance Area, it is considered that the proposal to clear approximately 0.85 ha of native vegetation representative of the Banksia Woodlands TEC and five individual trees within a footprint of 2.49 ha, is not significant.

The Proposed Disturbance Area is not in pristine condition; it contains vegetation that varies in condition, has been subject to degradation, is surrounded by large areas of cleared rural farmland and is within a road reserve abutting Mogumber Road West. However, the Proposal may be at variance with three Clearing Principles (A, C and D).

Principle (a) states that vegetation should not be cleared if it comprises a high level of biological diversity. The vegetation is representative of the Banksia Woodlands TEC, contains some Priority flora species and is potentially Black Cockatoo habitat. However, the clearing of 0.85 ha and five individual trees is not considered to have a significant impact in a regional context. The site is already subject to degradation such as edge effects from surrounding cleared rural land, its proximity to the road and the vegetation condition is highly variable. The removal of 0.85 ha of native vegetation and five individual trees within the road reserve is not considered to represent a significant loss of biodiversity.

Principle (c) states that native vegetation should not be cleared if it includes, or is necessary for the continued existence of rare flora. The site does not contain any DRF or Threatened flora pursuant to the WC Act or the EPBC Act. However, it does contain three Priority listed species, *Banksia dallanneyi* subsp. *pollostata* (P3), *Banksia pteridifolia* subsp. *vernalis* (P3) and *Isopogon drummondii* (P3). The proposal may be at variance to this Principle.

Principle (d) states that native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of a TEC. The proposal will involve the clearing of 0.85 ha of the Banksia Woodlands TEC that varies in condition from Excellent to Degraded. Although the Proposal may be at variance with this Principle, it is not considered that the clearing of 0.85 ha of TEC would have a significant impact on the maintenance of a TEC in a regional context.

Overall, the potential impacts associated with the clearing of 0.85 ha of native vegetation and five individual trees within a road reserve are not considered to have a significant environmental impact. Furthermore, the environmental management measures proposed to be implemented will ensure the risk of impacts are mitigated and minimised.

8 Limitations

This report is produced strictly in accordance with the scope of services set out in the contract or otherwise agreed in accordance with the contract. 360 Environmental makes no representations or warranties in relation to the nature and quality of soil and water other than the visual observation and analytical data in this report.

In the preparation of this report, 360 Environmental has relied upon documents, information, data and analyses ("client's information") provided by the client and other individuals and entities. In most cases where client's information has been relied upon, such reliance has been indicated in this report. Unless expressly set out in this report, 360 Environmental has not verified that the client's information is accurate, exhaustive or current and the validity and accuracy of any aspect of the report including, or based upon, any part of the client's information is contingent upon the accuracy, exhaustiveness and currency of the client's information. 360 Environmental shall not be liable to the client or any other person in connection with any invalid or inaccurate aspect of this report where that invalidity or inaccuracy arose because the client's information was not accurate, exhaustive and current or arose because of any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to 360 Environmental.

Aspects of this report, including the opinions, conclusions and recommendations it contains, are based on the results of the investigation, sampling and testing set out in the contract and otherwise in accordance with normal practices and standards. The investigation, sampling and testing are designed to produce results that represent a reasonable interpretation of the general conditions of the site that is the subject of this report. However, due to the characteristics of the site, including natural variations in site conditions, the results of the investigation, sampling and testing may not accurately represent the actual state of the whole site at all points.

It is important to recognise that site conditions, including the extent and concentration of contaminants, can change with time. This is particularly relevant if this report, including the data, opinions, conclusions and recommendations it contains, are to be used a considerable time after it was prepared. In these circumstances, further investigation of the site may be necessary.

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9 References

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FIGURES



Legend

- Site Boundary (2.49ha)
- Road

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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 - AERIAL PHOTOGRAPHY SOURCED LANDGATE 2017
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HORIZONTAL DATUM AND PROJECTION GDA 1994 MGA Zone 50			
CREATED DV	CHECKED CM	APPROVED KC	REVISION 0

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Mogumber Road West, Mogumber

Native Vegetation Clearing Permit Application

Figure 1
Site Location

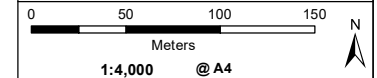


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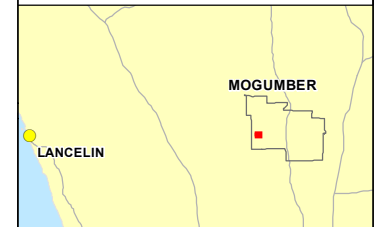
Site Boundary

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Figure 2
Clearing Footprint



Legend

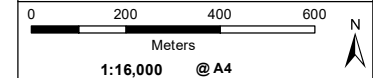
Site Boundary

Soils Subsystem North Descriptions

- 222Cp_1d: Capitella 1 minor rises Phase
- 222Cp_3a: Capitella 3 plain Phase
- 222Cp_3b: Capitella 3 gentle slope Phase
- 222Cp_5a: Capitella 5 dry Phase
- 222Cp_5b: Capitella 5 damp Phase
- 222Cp_6a: Capitella 6 low dunes Phase
- 222Cp_6b: Capitella 6 plain Phase
- 222Cp_6c: Capitella 6 wet Phase
- 222Mm_1: Moochamulla 1 Subsystem

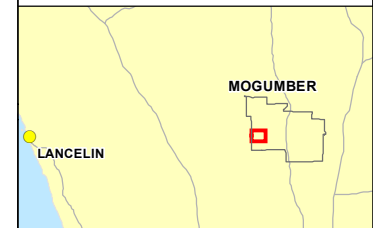
- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
 - LOCALITY MAP SOURCED LANDGATE 2018
 - SURFACE GEOLOGY SOURCED DMIRS 2018
 - AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018
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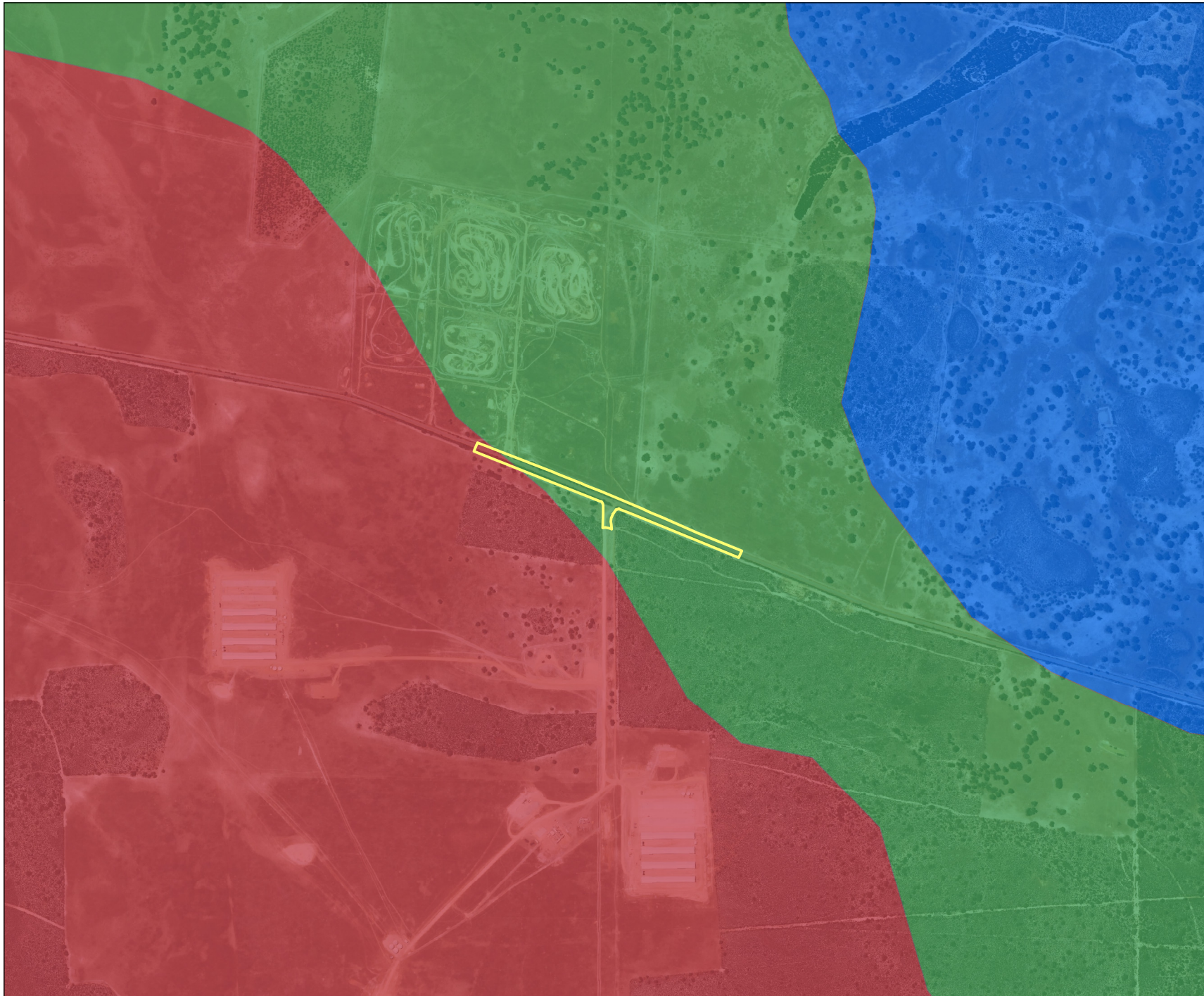


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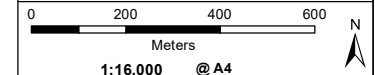
Figure 3
Geology and Soils



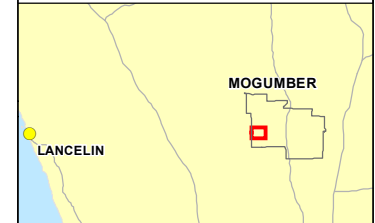
- Legend**
- Site Boundary
 - Pre-European Vegetation**
 - GINGIN_1015: Scrub-heath / Heath
 - GINGIN_949: Low woodland or open low woodland
 - MOGUMBER_4: Woodland southwest

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
 - LOCALITY MAP SOURCED LANDGATE 2018
 - PRE-EUROPEAN VEGETATION SOURCED DBCA 2018
 - AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018
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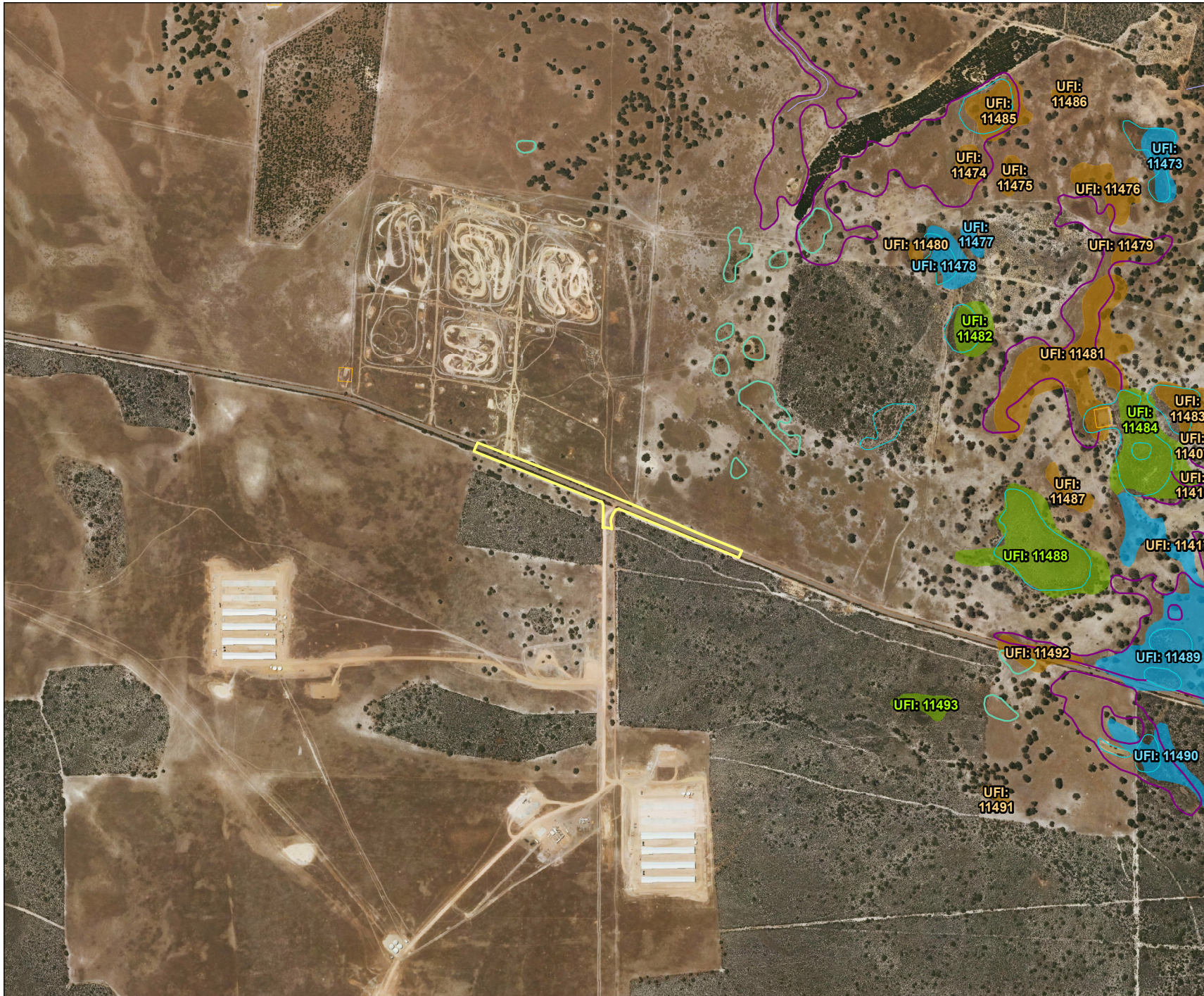
HORIZONTAL DATUM AND PROJECTION
 GDA 1994 MGA Zone 50

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Figure 4
Broad Vegetation Associations

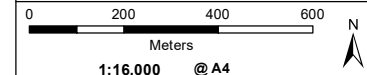


Legend

- Site Boundary
- Geomorphic Wetlands**
- Conservation Category
- Resource Enhancement Category
- Multiple Use Category
- Hydrography**
- Watercourse - minor, non-perennial
- Swamp - perennial
- Flood Limit Area
- Area Subject to Inundation
- Earth Dam

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
 - LOCALITY MAP SOURCED LANDGATE 2018
 - GEOMORPHIC WETLANDS SOURCED DBCA 2018
 - GROUNDWATER CONTOURS SOURCED DWER 2018
 - HYDROGRAPHY SOURCED DWER 2018
 - AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018
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Figure 4
Hydrology

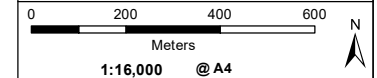


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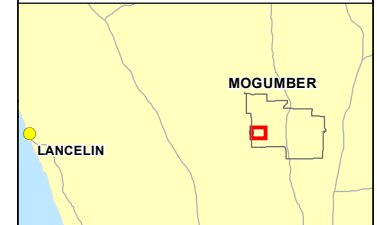
- Site Boundary
- Environmentally Sensitive Areas

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
 - LOCALITY MAP SOURCED LANDGATE 2018
 - ESA SOURCED DWER 2018
 - AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018
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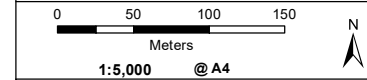
Figure 6
Conservation Areas



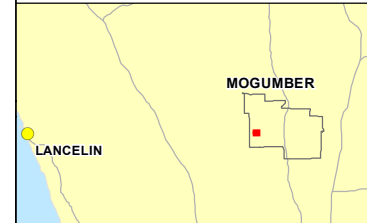
- Legend**
- Site Boundary
 - Road
- Significant Flora Locations**
- *Banksia dallanneyi subsp. pollostia* (P3)
 - *Banksia pteridifolia subsp. vernalis* (P3)
 - *Isopogon drummondii* (P3)

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Native Vegetation Clearing Permit Application

Figure 7 Conservation Significant Flora Locations



Legend

Site Boundary (2.49ha)

Site Locations

■ Quadrat

▲ Releve

Vegetation Associations

EtBa (0.85ha)

Completely Degraded/Cleared (1.64ha)

Isolated Trees

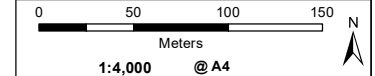
● Asp. - *Allocasuarina* sp.

● Et - *Eucalyptus tottiana*

● Nf - *Nuytsia floribunda*

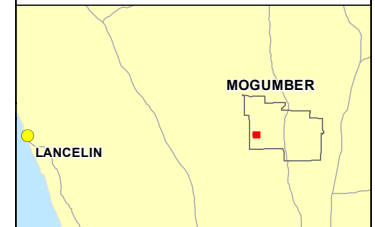
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 - LOCALITY MAP SOURCED LANDGATE 2017
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Figure 8
Surveyed Vegetation Associations



Legend

Site Boundary (2.49ha)

Vegetation Condition

Excellent (0.44ha)

Very Good (0.07ha)

Very Good - Good (0.12ha)

Good (0.11ha)

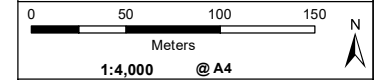
Good - Degraded (0.03ha)

Degraded (0.08ha)

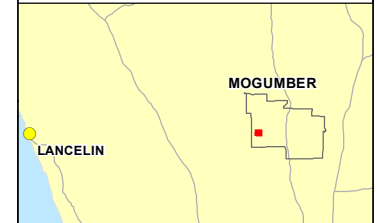
Completely Degraded/Cleared (1.64ha)

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Figure 9
Vegetation Condition

APPENDIX A

DBCA Naturemap Search Report

NatureMap Species Report

Created By Guest user on 05/06/2018

Current Names Only Yes
 Core Datasets Only Yes
 Method 'By Circle'
 Centre 115° 58' 26" E, 31° 01' 36" S
 Buffer 5km
 Group By Kingdom

Kingdom	Species	Records
Animalia	40	42
Fungi	3	4
Plantae	80	133
TOTAL	123	179

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
Animalia				
1.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
2.	25755 <i>Acrocephalus australis</i> (Australian Reed Warbler)			
3.	24312 <i>Anas gracilis</i> (Grey Teal)			
4.	24315 <i>Anas rhynchotis</i> (Australasian Shoveler)			
5.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
6.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
7.	41324 <i>Ardea modesta</i> (great egret, white egret)			
8.	<i>Barnardius zonarius</i>			
9.	42381 <i>Brachyurophis semifasciatus</i> (Southern Shovel-nosed Snake)			
10.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
11.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
12.	25592 <i>Corvus coronoides</i> (Australian Raven)			
13.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
14.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
15.	<i>Egretta novaehollandiae</i>			
16.	47937 <i>Elseya melanops</i> (Black-fronted Dotterel)			
17.	25727 <i>Fulica atra</i> (Eurasian Coot)			
18.	25729 <i>Gallinula tenebrosa</i> (Dusky Moorhen)			
19.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
20.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
21.	47965 <i>Hieraaetus morphnoides</i> (Little Eagle)			
22.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
23.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
24.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
25.	24132 <i>Macropus fuliginosus</i> (Western Grey Kangaroo)			
26.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
27.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
28.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
29.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
30.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
31.	24841 <i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
32.	25731 <i>Porphyrio porphyrio</i> (Purple Swamphen)			
33.	25008 <i>Pygopus lepidopodus</i> (Common Scaly Foot)			
34.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
35.	25590 <i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
36.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
37.	33993 <i>Throscodectes xederoides</i> (Mogumber Bush Cricket, Northern Throscos)		P3	
38.	25723 <i>Trichoglossus haematodus</i> (Rainbow Lorikeet)			
39.	34113 <i>Westralunio carteri</i> (Carter's Freshwater Mussel)			T
40.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			
Fungi				
41.	27663 <i>Cladia aggregata</i>			
42.	48177 <i>Cladia muelleri</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
43.	27748 <i>Flavoparmelia rutidota</i>			
Plantae				
44.	3303 <i>Acacia dilatata</i>			
45.	3550 <i>Acacia sphacelata</i>			
46.	15486 <i>Acacia sphacelata</i> subsp. <i>verticillata</i>			
47.	7817 <i>Actinobole uliginosum</i> (<i>Flannel Cudweed</i>)			
48.	6305 <i>Andersonia brevifolia</i>			
49.	11434 <i>Anigozanthos humilis</i> subsp. <i>humilis</i>			
50.	6336 <i>Astroloma serratifolium</i> (<i>Kondrung</i>)			
51.	1810 <i>Banksia chamaephyton</i> (<i>Fishbone Banksia</i>)		P4	
52.	1828 <i>Banksia leptophylla</i>			
53.	11714 <i>Banksia leptophylla</i> var. <i>leptophylla</i>			
54.	32211 <i>Banksia mimica</i> (<i>Summer Honeypot</i>)		T	
55.	32163 <i>Banksia platycarpa</i>			
56.	5393 <i>Beaufortia squarrosa</i> (<i>Sand Beaufortia</i> , <i>Sand Bottlebrush</i> , <i>Puno</i>)			
57.	7856 <i>Blennospora drummondii</i>			
58.	5421 <i>Calothamnus pachystachyus</i>		P4	
59.	17685 <i>Chaetanthus aristatus</i>			
60.	17833 <i>Chordifex microcodon</i>			
61.	1881 <i>Conospermum scaposum</i>		P3	
62.	6349 <i>Conostephium preissii</i>			
63.	9076 <i>Cryptandra myriantha</i>			
64.	7425 <i>Dampiera carinata</i> (<i>Summer Dampiera</i>)			
65.	7428 <i>Dampiera coronata</i> (<i>Wedge-leaved Dampiera</i>)			
66.	7482 <i>Dampiera teres</i> (<i>Terete-leaved Dampiera</i>)			
67.	5524 <i>Darwinia pinifolia</i>			
68.	3793 <i>Daviesia angulata</i>			
69.	17662 <i>Desmocladius lateriticus</i>			
70.	17846 <i>Desmocladius parthenicus</i>			
71.	3090 <i>Drosera barbiger</i>			
72.	13203 <i>Drosera closterostigma</i>			
73.	13216 <i>Drosera menziesii</i> subsp. <i>penicillaris</i>			
74.	13185 <i>Drosera pilos</i>			
75.	1643 <i>Elythranthera brunonis</i> (<i>Purple Enamel Orchid</i>)			
76.	5763 <i>Eucalyptus rudis</i> (<i>Flooded Gum</i> , <i>Kulurda</i>)			
77.	20505 <i>Gastrolobium celsianum</i>			
78.	20483 <i>Gastrolobium linearifolium</i>			
79.	6143 <i>Glischrocaryon aureum</i> (<i>Common Popflower</i>)			
80.	7491 <i>Goodenia arthrotricha</i>		T	
81.	29362 <i>Goodenia coerulea</i>			
82.	12225 <i>Hakea brownii</i>			
83.	1293 <i>Hensmania turbinata</i>			
84.	5108 <i>Hibbertia acerosa</i> (<i>Needle Leaved Guinea Flower</i>)			
85.	5114 <i>Hibbertia commutata</i>			
86.	48381 <i>Hibbertia striata</i>			
87.	12742 <i>Hyalosperma demissum</i>			
88.	5829 <i>Hypocalymma xanthopetalum</i>			
89.	29775 <i>Isopogon drummondii</i>		P3	
90.	4010 <i>Jacksonia floribunda</i> (<i>Holly Pea</i>)			
91.	14778 <i>Jacksonia nutans</i>			
92.	4025 <i>Jacksonia restioides</i>			
93.	19632 <i>Johnsonia pubescens</i> subsp. <i>pubescens</i>			
94.	1188 <i>Juncus pallidus</i> (<i>Pale Rush</i>)			
95.	942 <i>Lepidosperma rostratum</i>		T	
96.	1077 <i>Leptocarpus canus</i> (<i>Hoary Twine-rush</i>)			
97.	6444 <i>Leucopogon sprengeioides</i>			
98.	36160 <i>Liparophyllum capitatum</i>			
99.	18049 <i>Lyginia imberbis</i>			
100.	5888 <i>Melaleuca ciliosa</i>			
101.	18394 <i>Melaleuca parviceps</i>			
102.	5952 <i>Melaleuca preissiana</i> (<i>Moonah</i>)			
103.	5978 <i>Melaleuca teretifolia</i> (<i>Banbar</i>)			
104.	2258 <i>Persoonia comata</i>			
105.	18353 <i>Pithocarpa pulchella</i> var. <i>pulchella</i>			
106.	6262 <i>Platysace xerophila</i>			
107.	45237 <i>Podolepis aristata</i> subsp. <i>aristata</i>			
108.	41060 <i>Quoya dilatata</i>			
109.	13182 <i>Scaevola repens</i> var. <i>repens</i>			
110.	1009 <i>Schoenus pleiostemoneus</i>			
111.	6033 <i>Scholtzia involucreta</i> (<i>Spiked Scholtzia</i>)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
112.	17551 <i>Sphaerolobium drummondii</i>			
113.	4205 <i>Sphaerolobium linophyllum</i>			
114.	2316 <i>Stirlingia latifolia</i> (Blueboy)			
115.	7717 <i>Stylidium divaricatum</i> (Daddy-long-legs)			
116.	7766 <i>Stylidium nonscandens</i>		P3	
117.	16768 <i>Synaphea panhesya</i>		P1	
118.	15532 <i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>			
119.	1338 <i>Thysanotus manglesianus</i> (Fringed Lily)			
120.	1358 <i>Thysanotus triandrus</i>			
121.	7666 <i>Verreauxia reinwardtii</i> (Common Verreauxia)			
122.	14714 <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>		P4	
123.	12446 <i>Verticordia paludosa</i>		P4	

Conservation Codes

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

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

APPENDIX B

EPBC PMST Report



EPBC Act Protected Matters Report

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

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

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 05/06/18 16:13:33

[Summary](#)

[Details](#)

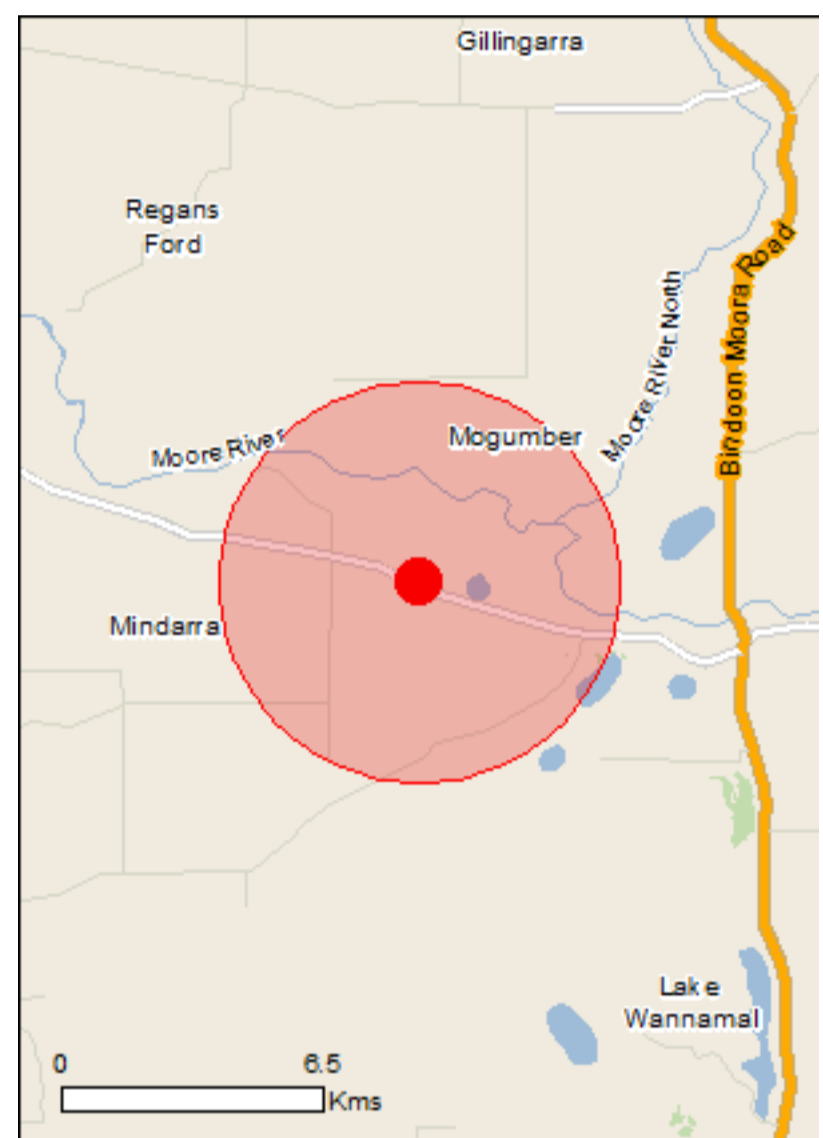
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

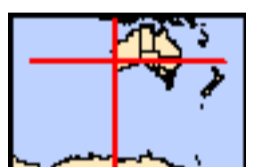
[Acknowledgements](#)



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

[Coordinates](#)

Buffer: 5.0Km



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:	26
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	14
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:	1
Regional Forest Agreements:	None
Invasive Species:	18
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities

[[Resource Information](#)]

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

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	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 Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
--	------------	--------------------------------------

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

Mammals

Dasyurus geoffroi Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
--	------------	--

Other

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

Plants

Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
---	------------	--

Banksia fuscobracteata Dark-bract Banksia [83059]	Critically Endangered	Species or species habitat may occur within
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Name	Status	Type of Presence 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 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
Darwinia carnea Mogumber Bell, Narrogin Bell [9736]	Endangered	Species or species habitat likely to occur within area
Diplolaena andrewsii [6601]	Endangered	Species or species habitat may occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat likely to occur within area
Eremophila glabra subsp. chlorella [84927]	Endangered	Species or species habitat likely to occur within area
Eremophila scaberula Rough Emu Bush [16729]	Endangered	Species or species habitat may occur within area
Eucalyptus absita Badgingarra Box [24260]	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 x balanites Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat may occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat may occur within area
Hemiandra gardneri Red Snakebush [7945]	Endangered	Species or species habitat may occur within area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat may 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

Name	Threatened	Type of Presence within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
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 may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species

Name	Threatened	Type of Presence
Merops ornatus Rainbow Bee-eater [670]		habitat may occur within area 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 may 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 may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Mogumber West	WA

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

Name	Status	Type of Presence
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

Name	Status	Type of Presence
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, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to 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
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

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-31.02665 115.97242

Acknowledgements

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

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

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

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

APPENDIX C

Fauna Likelihood Assessment

SPECIES	EPBC STATUS	STATE STATUS	LIKELIHOOD
Fauna			
Balston's Pygmy Perch (<i>Nannatherina balstoni</i>)	Vulnerable	Vulnerable	Low
Forest Red-tailed Black Cockatoo (<i>Calyptorhynchus banksii naso</i>)	Vulnerable	Vulnerable	Low
Carter's Freshwater Mussel (<i>Westralunio carteri</i>)	Vulnerable	Vulnerable	Low
Chuditch (<i>Dasyurus geoffroii</i>)	Vulnerable	Vulnerable	Medium
Red-tailed Phascogale (<i>Phascogale calura</i>)	Vulnerable	Critically Endangered	Low
Malleefowl (<i>Leipoa ocellata</i>)	Vulnerable	Vulnerable	Low
Shield-backed Trapdoor Spider (<i>Idiosoma nigrum</i>)	Vulnerable	Endangered	Low
Fork-tailed Swift (<i>Apus pacificus</i>)	Migratory/Marine	International Agreement	Medium
Osprey (<i>Pandion haliaetus</i>)	Migratory/Marine	International Agreement	Low
Grey Wagtail (<i>Motacilla cinerea</i>)	Migratory/Marine	International Agreement	Low
Glossy Ibis (<i>Plegadis falcinellus</i>)	Migratory/Marine	International Agreement	Low
White-bellied Sea Eagle (<i>Haliaeetus leucogaster</i>)	Marine	International Agreement	Low
Rainbow Bee-eater (<i>Merops ornatus</i>)	Marine	International Agreement	Medium
Australian Painted Snipe (<i>Rostratula australis</i>)	Endangered/Marine	Endangered	Low
Western Spiny-Tailed Skink (<i>Egernia stokesii badia</i>)	Endangered	Vulnerable	Low
Carnaby's Cockatoo (<i>Calyptorhynchus latirostris</i>)	Endangered	Endangered	High
Baudin's Cockatoo (<i>Calyptorhynchus baudinii</i>)	Endangered	Endangered	Low
Curlew Sandpiper (<i>Calidris ferruginea</i>)	Critically Endangered/Marine /Migratory	Vulnerable	Low

SPECIES	EPBC STATUS	STATE STATUS	LIKELIHOOD
Eastern Curlew (<i>Numenius madagascariensis</i>)	Critically Endangered/Marine /Migratory	Vulnerable	Low
Black-Striped Snake (<i>Neelaps colonotos</i>)	-	Priority 3	Medium
South-western Brush-tailed Phascogale (<i>Phascogale tapoatafa wambenger</i>)	-	Vulnerable	Low
Western Brush Wallaby (<i>Notamacropus Irma</i>)	-	Priority 4	Medium
Water-rat (<i>Hydromys chrysogaster</i>)	-	Priority 4	Low
Peregrine Falcon (<i>Falco peregrinus</i>)	-	Other specially protected fauna	Medium
Mogumber Bush Cricket (<i>Throscodectes xederoides</i>)	-	Priority 3	Medium

APPENDIX D

Flora Likelihood Assessment

Appendix G: Assessment of the Likely Occurrence of DRF and Priority Flora (DBCA and EPBC Database Searches) in the Survey Area

¹Closest record to Survey Area based on DBCA 2018. Likely = Suitable habitat present, records less than 5 km from the Survey Area and species is an annual or perennial herb species with a flowering period outside of the survey time, Possible = Suitable habitat present, records between 5 km and 15 km from the Survey Area and species is an annual or perennial herb species with a flowering period outside of the survey time, and Unlikely = No suitable habitat present, records greater than 15 km from the Survey Area and/or the species is an annual or perennial herb species with a flowering period inside of the survey time. En = Listed as Endangered under the EBPC Act, Vu = Listed as Vulnerable under the EBPC Act, Ce = Critically Endangered under the EBPC Act, P = Listed as Priority by the DPaw DRF = Declared Rare Flora as listed by the State

SPECIES	CONSERVATION STATUS		HABITAT INFORMATION	DISTANCE TO NEAREST RECORD (KM)	ANNUAL OR PERENNIAL	FLOWERING PERIOD	SUITABLE HABITAT PRESENT	LIKELIHOOD OF OCCURRENCE IN THE SURVEY AREA
	EPBC	DBCA/WC ACT						
<i>Banksia fuscobractea</i>	CR	T	Lateritic gravel, grey sand over laterite, hill tops ridges	13.2	Perennial		No	Unlikely
<i>Acacia cochlocarpa</i> subsp. <i>cochlocarpa</i>	En	T	Clayey, sandy, often gravelly soils	86	Perennial		No	Unlikely
<i>Acacia splendens</i>	En	T	White sand over clay, pale brown loam, cracked brown soil, gravel, laterite, ironstone. Slope of breakaways, especially southern slopes, hills.	16.6	Perennial		No	Unlikely
<i>Andersonia gracilis</i>	En	T	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	9.1	Perennial		No	Unlikely
<i>Banksia mimica</i>	En	T	White or grey sand over laterite, sandy loam.	0.21	Perennial		Yes	Unlikely
<i>Chamelaucium</i> sp. Gingin (N.G.Marchant 6)	En	T	White/grey/brown/yellow gravelly sand.	-	Perennial		Yes	Unlikely
<i>Conospermum densiflorum</i> subsp. <i>unicephalatum</i>	En	T	Clay soils. Low-lying areas.	7.4	Perennial		No	Unlikely
<i>Conostylis wonganensis</i>	En	T	Yellow sand, sandy clay.	69	Perennial		No	Unlikely
<i>Darwinia acerosa</i>	En	T	Sand, loam, often moist soils, Granite outcrops, road verges.	4.24	Perennial		No	Unlikely
<i>Darwinia carnea</i>	En	T	Lateritic loam and gravel	7.8	Perennial		No	Unlikely
<i>Diplolaena andrewsii</i>	En	T	Loam, clay. Granite outcrops and hillsides.	73	Perennial		No	Unlikely
<i>Eremophila glabra</i> subsp. <i>chlorella</i>	En	T	Sandy clay. Winter-wet depressions.	4.22	Perennial		Yes	Unlikely
<i>Eremophila scaberula</i>	En	T	Clay, sandy clay or loam. Winter-wet plains, inundated areas.	22.9	Perennial		No	Unlikely
<i>Eucalyptus absita</i>	En	T	White lateritic sand. Paddocks.	47.2	Perennial		Yes	Unlikely
<i>Eucalyptus leprophloia</i>	En	T	White or grey sand over laterite. Valley Slopes.	93.4	Perennial		Yes	Unlikely
<i>Eucalyptus pruiniramis</i>	En	T	Skeletal soils over sandstone or laterite. Rocky hillsides.	10.16	Perennial		No	Unlikely

SPECIES	CONSERVATION STATUS		HABITAT INFORMATION	DISTANCE TO NEAREST RECORD (KM)	ANNUAL OR PERENNIAL	FLOWERING PERIOD	SUITABLE HABITAT PRESENT	LIKELIHOOD OF OCCURRENCE IN THE SURVEY AREA
	EPBC	DBC/WC ACT						
<i>Eucalyptus recta</i>	En	T	Sandy laterite.	38.4	Perennial		Yes	Unlikely
<i>Eucalyptus x balanites</i>	En	T	Sandy soils with lateritic gravel.	89.6	Perennial		Yes	Unlikely
<i>Gastrolobium hamulosum</i>	En	T	Sandy, often gravelly soils or clay. Flats, slopes, ridges.	39.6	Perennial		Yes	Unlikely
<i>Goodenia arthrotricha</i>	En	T	Gravel. Granite rocks, slopes.	2.39	Perennial herb		No	Unlikely
<i>Grevillea curviloba</i> subsp. <i>incurva</i>	En	T	Sand, sandy loam. Winter-wet heath.	46.6	Perennial		Yes	Unlikely
<i>Grevillea pythara</i>	En	T	Sand or sandy loam with gravel.	95.5	Perennial		Yes	Unlikely
<i>Hemiandra gardneri</i>	En	T	Grey or yellow sand, clayey sand. Sandplains.	45.3	Perennial		Yes	Unlikely
<i>Lepidosperma rostratum</i>	En	T	Peaty sand, clay.	1.31	Perennial		No	Unlikely
<i>Melaleuca sciotostyla</i>	En	T	Orange clayey sand with lateritic pebbles. Scree slopes.	25.49	Perennial		No	Unlikely
<i>Roycea pycnophylloides</i>	En	T	Sandy soils, clay. Saline flats.	117.4	Perennial		No	Unlikely
<i>Spirogardnera rubescens</i>	En	T	Laterite, sand over laterite, loam.	14.9	Perennial		Yes	Unlikely
<i>Thelymitra dedmaniarum</i>	En	T	Granite	25.76	Perennial herb		No	Unlikely
<i>Thelymitra stellata</i>	En	T	Sand, gravel, lateritic loam.	46.8	Perennial herb		Yes	Unlikely
<i>Thomasia</i> sp. Green Hill (S.Paust 1322)	En	T	Rocky rise.	-	Perennial		No	Unlikely
<i>Banksia serratuloides</i> subsp. <i>serratuloides</i>	Vu	T	Loam or clay loam over laterite, sandy gravel.	4.24	Perennial		No	Unlikely
<i>Eleocharis keigheryi</i>	Vu	T	Clay, sandy loam. Emergent in freshwater; creeks, claypans	7.4	Annual		No	Unlikely
<i>Grevillea bracteosa</i> subsp. <i>bracteosa</i>		T	Gravelly hills and slopes, clay loam.	6.5	Perennial		No	Unlikely
<i>Stylidium semaphorum</i>		T	Lateritic gravelly soils. Hill summits.	21.5	Perennial herb		No	Unlikely
<i>Drosera leucostigma</i>		P1	Margins of wet depressions.	61.3	Perennial herb		No	Unlikely
<i>Synaphea panhesya</i>		P1	Gravelly loam & sandy gravel	5.9	Perennial		No	Unlikely
<i>Acacia browniana</i> var. <i>glaucescens</i>		P2	Lateritic gravelly soils.	4.24	Perennial		No	Unlikely
<i>Lepyrodia curvescens</i>		P2	Sand, laterite. Seasonally inundated swamplan.	4.51	Annual		No	Unlikely

SPECIES	CONSERVATION STATUS		HABITAT INFORMATION	DISTANCE TO NEAREST RECORD (KM)	ANNUAL OR PERENNIAL	FLOWERING PERIOD	SUITABLE HABITAT PRESENT	LIKELIHOOD OF OCCURRENCE IN THE SURVEY AREA
	EPBC	DBC/WC ACT						
<i>Synaphea rangiferops</i>		P2	Sandy loam, gravel.	4.22	Perennial		No	Unlikely
<i>Acacia anarthros</i>		P3	Lateritic gravelly soils. Slopes.	16.75	Perennial		No	Unlikely
<i>Acacia cummingiana</i>		P3	Grey or yellow sand, lateritic gravel. Sandplains, lateritic breakaways.	10.5	Perennial		Yes	Unlikely
<i>Acacia drummondii</i> subsp. <i>affinis</i>		P3	Lateritic gravelly soils	9.09	Perennial		No	Unlikely
<i>Acacia oncinophylla</i> subsp. <i>oncinophylla</i>		P3	Granitic soils.	4.24	Perennial		No	Unlikely
<i>Acacia pulchella</i> var. <i>reflexa</i> acuminate bracteole variant (R.J. Cumming 882)		P3	Sandy loam or sandy clay over laterite. Woodland.	Data not available	Perennial		No	Unlikely
<i>Acacia ridleyana</i>		P3	Grey or yellow/brown sand, gravelly clay, granitic loam.	4.22	Perennial		Yes	Unlikely
<i>Allocasuarina grevilleoides</i>		P3	Sand over laterite, gravel.	4.24	Perennial		Yes	Unlikely
<i>Babingtonia urbana</i>		P3	Swamp, wetland areas, brown loam	28	Perennial		No	Unlikely
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i>		P3	Grey/yellow sand. Flats, lateritic rises.	7.11	Perennial		Yes	Recorded
<i>Banksia kippistiana</i> var. <i>paenepeccata</i>		P3	Lateritic gravelly soils.	9.62	Perennial		No	Unlikely
<i>Banksia pteridifolia</i> subsp. <i>vernalis</i>		P3	White/grey sand over laterite.	10.73	Perennial		Yes	Recorded
<i>Beaufortia eriocephala</i>		P3	Lateritic sandy soils. Slopes.	7.63	Perennial		No	Unlikely
<i>Calytrix ecalycata</i> subsp. <i>brevis</i>		P3	Dry yellow sand. Sandplains, low rises.	35.6	Perennial		No	Unlikely
<i>Chamaescilla gibsonii</i>		P3	Winter-wet flats, shallow water-filled claypans.	4.24	Annual		No	Unlikely
<i>Conospermum scaposum</i>		P3	White-grey sand, sandy clay. Low swampy areas, road verges.	0.69	Perennial		No	Unlikely
<i>Dielsiodoxa leucantha</i> subsp. <i>leucantha</i>		P3	White sandy clay, hilltops, low ironstone, brown laterite.	4.22	Perennial		No	Unlikely
<i>Eucalyptus macrocarpa</i> x <i>pyriformis</i>		P3	Sand, lateritic sandy soils. Hills, rocky ironstone ridges, sandplains.	4.24	Perennial		No	Unlikely
<i>Grevillea florida</i>		P3	Sand, sandy clay, gravel, laterite. Sandplain, slopes, road verges.	4.30	Perennial		Yes	Unlikely

SPECIES	CONSERVATION STATUS		HABITAT INFORMATION	DISTANCE TO NEAREST RECORD (KM)	ANNUAL OR PERENNIAL	FLOWERING PERIOD	SUITABLE HABITAT PRESENT	LIKELIHOOD OF OCCURRENCE IN THE SURVEY AREA
	EPBC	DBC/WC ACT						
<i>Guichenotia impudica</i>		P3	Laterite, brown clayey sand, undulating plains, base of hills.	4.22	Perennial		No	Unlikely
<i>Guichenotia micrantha</i>		P3	Yellow or red sand, gravelly lateritic soils. Sandplains, breakaways, rocky hills, granite rocks.	3.4	Perennial		No	Unlikely
<i>Guichenotia tuberculata</i>		P3	Sand clay over laterite, sand.	4.22	Perennial		No	Unlikely
<i>Haemodorum loratum</i>		P3	Grey or yellow sand, gravel.	12.93	Bulb, perennial herb	November	Yes	Possible
<i>Hibbertia glomerata</i> subsp. <i>ginginensis</i>		P3	Sand, brown clay, laterite. Near roadsides.	18.93	Perennial		No	Unlikely
<i>Isopogon drummondii</i>		P3	Yellow, grey sand, laterite gravel, hills, hills slopes, flats.	1.40	Perennial		Yes	Recorded
<i>Lasiopetalum caroliae</i>		P3	Slopes, brown clayey sand, laterite, gravel	15.48	Perennial		No	Unlikely
<i>Lasiopetalum venustum</i>		P3	Slopes, undulating flats, rock, gravel, brown sandy loam over laterite.	16	Perennial		No	Unlikely
<i>Lepidobolus quadratus</i>		P3	Lateritic gravel, grey white sand. Dry kwongan.	45.36	Perennial		Yes	Unlikely
<i>Leucopogon allittii</i>		P3	Yellow, grey sand over laterite gravel.	4.22	Perennial		Yes	Unlikely
<i>Persoonia rudis</i>		P3	White, grey or yellow sand, often over laterite.	4.22	Perennial		Yes	Unlikely
<i>Petrophile biternata</i>		P3	Yellow/grey sand and gravel, laterite, quartzite soils. Lateritic ridges, plains.	6.88	Perennial		Yes	Unlikely
<i>Petrophile plumosa</i>		P3	Red/brown laterite, loam. Sandplains, hills.	4.22	Perennial		No	Unlikely
<i>Platysace ramosissima</i>		P3	Grey, white, yellow sandy soils.	20.4	Perennial herb		Yes	Unlikely
<i>Schoenus benthamii</i>		P3	White, grey sand, sandy clay. Winter-wet flats, swamps.	4.24	Perennial herb		Yes	Unlikely
<i>Stylidium nonscandens</i>		P3	Sand over laterite. Hillslopes and crests. Banksia woodland, heath, mallee shrubland.	3.74	Perennial herb		Yes	Unlikely
<i>Styphelia filifolia</i>		P3	Brown, yellow, grey sand, slopes, flat sandplains.	11.87	Perennial herb		Yes	Unlikely
<i>Acacia alata</i> var. <i>platyptera</i>		P4	Clay, gravelly sandy clay. Lateritic ridges, clay flats.	8.29	Perennial		No	Unlikely

SPECIES	CONSERVATION STATUS		HABITAT INFORMATION	DISTANCE TO NEAREST RECORD (KM)	ANNUAL OR PERENNIAL	FLOWERING PERIOD	SUITABLE HABITAT PRESENT	LIKELIHOOD OF OCCURRENCE IN THE SURVEY AREA
	EPBC	DBCA/WC ACT						
<i>Anigozanthos humilis</i> subsp. <i>chrysanthus</i>		P4	White, grey or yellow sand. Slopes, flats.	4.22	Perennial herb	July to October	Yes	Possible
<i>Banksia chamaephyton</i> (Fishbone Banksia)		P4	Grey or white sand over laterite.	0.76	Perennial		Yes	Unlikely
<i>Calothamnus pachystachyus</i>		P4	Lateritic soils, often gravelly. Ridges, road verges.	1.44	Perennial		No	Unlikely
<i>Hibbertia miniata</i>		P4	Lateritic gravelly soils.	10.43	Perennial		No	Unlikely
<i>Persoonia sulcata</i>		P4	Lateritic or granitic soils	4.22	Perennial		No	Unlikely
<i>Synaphea grandis</i>		P4	Brown sandy loam over laterite, low rises, hills.	16.69	Perennial		No	Unlikely
<i>Thelymitra apiculata</i>		P4	Grey sand, lateritic gravel.	4.22	Tuberous herb	May to July	Yes	Likely
<i>Thysanotus glaucus</i>		P4	White, grey or yellow sand, sandy gravel.	10.45	Perennial herb		Yes	Unlikely
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>		P4	Sand, sandy clay. Winter-wet depressions.	1.23	Perennial		Yes	Unlikely
<i>Verticordia paludosa</i>		P4	White/grey sand. Winter-wet flats.	0.14	Perennial		Yes	Unlikely

APPENDIX E

Site Data Sheets

Site MWQ01
Described by NW
Date 26/05/2018
Type Q 8 m x 12.5 m
Location Mogumber. Flat plain.

MGA Zone 50

401532 mE 6567145 mN

Soil grey, yellow silty sand

Vegetation Low woodland of *Eucalyptus todtiana*, *Banksia attenuata*, *Banksia prionotes* over tall shrubland of *Adenanthos cygnorum*, *Lambertia multiflora* over mid sparse shrubland of *Allocasuarina humilis*, *Acacia pulchella*, *Xanthorrhoea drummondii* sans lat over low isolated shrubs and sedges of *Gastrolobium linearifolium*, *Acacia stenoptera*, *Mesomelaena pseudostygia*

Veg Condition Excellent

Fire Age very old (> 12 years)

Notes Disturbance - weeds, litter
 Bareground - 2%
 Leaf litter cover - 35%
 Twigs - 6%
 Logs - 0%



SPECIES LIST:

Name	Cover	Height	Specimen	Notes
<i>Acacia pulchella</i>	2	130		
<i>Acacia stenoptera</i>	1	60	MWQ01-07	
<i>Adenanthos cygnorum</i>	15	210		
<i>Alexgeorgea nitens</i>	1.5	10		
<i>Allocasuarina humilis</i>	5	120		
<i>Austrostipa elegantissima</i>	1.5	110	MWQ01-08	
<i>Banksia attenuata</i>	30	600		
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i>	1	20	MWQ01-10P3	
<i>Banksia prionotes</i>				just outside quadrat
<i>Boronia ramosa</i> subsp. <i>anethifolia</i>	0.1	30	MWQ01-03	
* <i>Briza maxima</i>	0.1	30		
<i>Cassyltha</i> sp.	2	c		
<i>Chordifex microcodon</i>	1	45	MWQ01-06	
<i>Chordifex sinuosus</i>	0.1	15	MWQ01-09	
<i>Daviesia nudiflora</i>	1	35		
<i>Drosera</i> sp.	0.1	c		
<i>Ehrharta calycina</i>	5	80		
<i>Eremaea asterocarpa</i> subsp. <i>histoclada</i>	1	40	MWQ01-01	
<i>Eremaea pauciflora</i> var. ? <i>pauciflora</i>	3	100		
<i>Eucalyptus todtiana</i>				Just outside quadrat
<i>Gastrolobium linearifolium</i>	1	60	MWQ01-12	
* <i>Gladiolus</i> sp.	0.1	50		
<i>Gompholobium tomentosum</i>	1.5	40		
<i>Johnsonia pubescens</i> subsp. <i>pubescens</i>	0.1	25	MWQ01-14	
<i>Lambertia multiflora</i>	6	200		
<i>Lechenaultia</i> ? <i>expansa</i>	0.1	30	MWQ01-02	
<i>Lomandra caespitosa</i>	0.1	30	MWQ01-15	
<i>Lomandra preissii</i>	0.1	50	MWQ01-04	
<i>Lyginia imberbis</i>	0.1	35		
<i>Melaleuca clavifolia</i>	0.1	40	MWQ01-11	
<i>Mesomelaena pseudostygia</i>	3	45		
<i>Petrophile macrostachya</i>	2	120		

<i>Romulea rosea</i>	0.1	15	
<i>Stirlingia latifolia</i>	6	100	MWQ01-05
<i>Thysanotus arbuscula</i>	0.1	35	MWQ01-13
<i>Trachymene pilosa</i>	0.1	2	
<i>Xanthorrhoea drummondii sans lat</i>	3	130	

Site MWQ02
Described by NW
Date 29/05/2018
Type Q 5 m x 20 m
Location Mogumber road west.
 Flat plain.

MGA Zone 50 401822 mE 6567028 mN

Soil grey sand

Vegetation low open woodland of *Eucalyptus todtiana* over tall sparse shrubland of *Lambertia multiflora*, *Adenanthos cygnorum* over mid shrubland of *Xanthorrhoea drummondii* sans lat, *Calothamnus sanguineus*, *Allocasuarina humilis* over low shrubland and sedgeland of *Mesomalaena pseudostygia*, *Eremaea pauciflora* var. ? *pauciflora*, *Synaphea spinulosa* subsp. ? *spinulosa*

Veg Condition Excellent

Fire Age very Old (> 12 years)

Notes Disturbance - weeds
 Bareground - 3%
 Leaf Litter - 15%
 Twigs - 15%
 Logs 1%



SPECIES LIST:

Name	Cover	Height	Specimen	Notes
<i>Acacia stenoptera</i>	0.1	35	MWQ01-07	
<i>Adenanthos cygnorum</i>	8	400		
<i>Alexgeorgea nitens</i>	2	10		
<i>Allocasuarina humilis</i>	5	140		
<i>Austrostipa elegantissima</i>	1	60	MWQ01-08	
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i>	1	15		P3
<i>Banksia attenuata</i>				just outside quadrat
<i>Bossiaea eriocarpa</i>	2	70		
* <i>Briza maxima</i>	0.1	25		
<i>Calothamnus sanguineus</i>	2	110	MWQ02-04	
<i>Cassylia</i> sp.	1	c		
<i>Caustis dioica</i>	1.5	60		
<i>Chordifex sinuosus</i>	3	20	MWQ01-09	
<i>Conostephium pendulum</i>	0.1	40		
<i>Daviesia nudiflora</i>	0.1	70		
<i>Drosera erythrorhiza</i>	0.1	1		
<i>Ehrharta calycina</i>	2	80		
<i>Eremaea pauciflora</i> var. ? <i>pauciflora</i>	2.5	80	MWQ02-03	
<i>Eucalyptus todtiana</i>	25	700		
<i>Jacksonia nutans</i>	1	55		
<i>Lambertia multiflora</i>	4	230		
<i>Lomandra preissii</i>	0.1	45	MWQ01-04	
<i>Lyginia imberbis</i>	1	45		
<i>Melaleuca clavifolia</i>	1	35	MWQ02-01	
<i>Mesomelaena pseudostygia</i>	6	60		
<i>Patersonia occidentalis</i>	0.1	35		
<i>Scaevola repens</i>	0.1	10		
<i>Synaphea spinulosa</i> subsp. ? <i>spinulosa</i>	2.5	45	MWQ02-02	
<i>Xanthorrhoea drummondii</i> sans lat	6	120		

Site MWR01

Described by NW

Date 29/05/2018

Type Revele 10 m x 10 m

Location Mogumber road west

MGA Zone 50

401900 mE 6567000 mN

Habitat

Soil grey brown silty sand

Rock Type

Vegetation Isolated trees of *Allocasuarina fraseriana*, *Nuytsia floribunda* over mid shrubland of *Acacia pulchella*, *Adenanthos cygnorum*

Veg Condition

Fire Age

Notes Disturbance - 2.5m from road edge is very weedy with grassy weeds

SPECIES LIST:

Name

Acacia pulchella

Adenanthos cygnorum

Alexgeorgea nitens

Allocasuarina fraseriana

Allocasuarina humilis

Avena barbata

Bossiaea eriocarpa

Briza maxima

Chordifex sinuosus

Daviesia nudiflora

Ehrharta calycina

Eucalyptus todtiana

Hibbertia racemosa

Petrophile brevifolia

Lambertia multiflora

Lomandra hermaphrodita

Lyginia imberbis

Mesomelaena tetragona

Nuytsia floribunda

Stirlingia latifolia

2817 APPS Mogumber Road West

Site MWR02

Described by NW

Date 29/05/2018

Type Releve 10 m x 10 m

Location Mogumber road west

MGA Zone 50

401567 mE 6567128 mN

Habitat Hill

Soil loamy sand at surface, yellow white sand at depth

Rock Type

Vegetation low open woodland of *Banksia prionotes*, *Banksia attenuata* over mid shrubland of *Adenanthos cygnorum*

Veg Condition

Fire Age

Notes

SPECIES LIST:

Name

Adenanthos cygnorum

Banksia attenuata

Banksia prionotes

Bossiaea eriocarpa

Eremaea pauciflora

Hakea ruscifolia

Hibbertia hypericoides

Mesomelaena pseudostygia

Stirlingia latifolia

Synaphea spinulosa subsp. ?*spinulosa*

2817 APPS Mogumber Road West

Site Opportunistic collections and observations

Described by NW

Date 29/05/2018

Location Mogumber Road West

SPECIES LIST:

Name	Specimen #	Notes
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i>		3 plants - 401541e 6567139n P3
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i>		5 plants - 401860e 6567007n P3
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i>		1 plant - 401805e 6567033n P3
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i>		1 plant - 401762e 6567052n P3
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i>		2 plants - 401699e 6567076n P3
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i>		402015e 6566942n P3
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i>		402007e 6566947n P3
<i>Banksia dallanneyi</i> subsp. <i>pollostata</i>		20 plants - 401822e 6567022n P3
<i>Banksia pteridifolia</i> subsp. <i>vernalisa</i>		5 plants - 401735e 6567060n P3
<i>Chordifex microcodon</i>	MWNNW02	401799e 6567034n
<i>Conospermum incurvum</i>		3 plants - 401578e 6567121n
<i>Conospermum stoechadis</i> subsp. <i>sclerophyllum</i>	MWNNW01	401524e 6567144n
<i>Conospermum stoechadis</i> subsp. <i>sclerophyllum</i>	MWNNW01	401817e 6567026n
<i>Conospermum stoechadis</i> subsp. <i>sclerophyllum</i>		402041e 6566939n
<i>Conospermum stoechadis</i> subsp. <i>sclerophyllum</i>	MWNNW01	401745e 6567055n
<i>Daviesia angulata</i>		402508e 6565611n
<i>Isopogon drummondii</i>		402045e 6566935n P3
<i>Isopogon drummondii</i>		1 plant - 401791e 6567037n P3
<i>Isopogon drummondii</i>		1 plant - 401812e 6567029n P3
<i>Isopogon drummondii</i>		1 plant - 401533e 6567141n P3
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>		403007e 6566370n
<i>Xanthorrhoea drummondii</i> sans lat		402435e 6565578n

APPENDIX F

Flora Species List

APPENDIX G

Flora Site vs Species Matrix

Family	Species	Status
Anarthriaceae	<i>Lyginia imberbis</i>	
Araliaceae	<i>Trachymene pilosa</i>	
Asparagaceae	<i>Lomandra caespitosa</i>	
	<i>Lomandra hermaphrodita</i>	
	<i>Lomandra preissii</i>	
	<i>Thysanotus arbuscula</i>	
Casuarinaceae	<i>Allocasuarina fraseriana</i>	
	<i>Allocasuarina humilis</i>	
Cyperaceae	<i>Caustis dioica</i>	
	<i>Mesomelaena pseudostygia</i>	
	<i>Mesomelaena tetragona</i>	
Dilleniaceae	<i>Hibbertia hypericoides</i>	
	<i>Hibbertia racemosa</i>	
Droseraceae	<i>Drosera erythrorhiza</i>	
	<i>Drosera sp.</i>	
Ericaceae	<i>Conostephium pendulum</i>	
Fabaceae	<i>Acacia pulchella</i>	
	<i>Acacia stenoptera</i>	
	<i>Bossiaea eriocarpa</i>	
	<i>Daviesia angulata</i>	
	<i>Daviesia nudiflora</i>	
	<i>Gastrolobium linearifolium</i>	
	<i>Gompholobium tomentosum</i>	
	<i>Jacksonia nutans</i>	
Goodeniaceae	<i>Lechenaultia ?expansa</i>	
	<i>Scaevola repens</i>	
Hemerocallidaceae	<i>Johnsonia pubescens subsp. pubescens</i>	
Iridaceae	<i>Gladiolus caryophyllaceus</i>	*
	<i>Patersonia occidentalis</i>	
	<i>Romulea rosea</i>	*
Lauraceae	<i>Cassytha sp.</i>	
Loranthaceae	<i>Nuytsia floribunda</i>	
Myrtaceae	<i>Calothamnus sanguineus</i>	
	<i>Eremaea asterocarpa subsp. histoclada</i>	
	<i>Eremaea pauciflora var. ?pauciflora</i>	
	<i>Eucalyptus todtiana</i>	
	<i>Melaleuca clavifolia</i>	
Poaceae	<i>Austrostipa elegantissima</i>	
	<i>Avena barbata</i>	*
	<i>Briza maxima</i>	*
	<i>Ehrharta calycina</i>	*
	<i>Adenanthos cygnorum</i>	
Proteaceae	<i>Banksia attenuata</i>	

Family	Species	Status
	<i>Banksia dallanneyi</i> subsp. <i>pollostata</i>	P3
	<i>Banksia prionotes</i>	
Proteaceae	<i>Banksia pteridifolia</i> subsp. <i>vernalis</i>	P3
	<i>Conospermum incurvum</i>	
	<i>Conospermum stoechadis</i> subsp. <i>sclerophyllum</i>	
	<i>Hakea ruscifolia</i>	
	<i>Isopogon drummondii</i>	P3
	<i>Lambertia multiflora</i>	
	<i>Petrophile brevifolia</i>	
	<i>Petrophile macrostachya</i>	
	<i>Stirlingia latifolia</i>	
	<i>Synaphea spinulosa</i> subsp. <i>?spinulosa</i>	
Restionaceae	<i>Alexgeorgea nitens</i>	
	<i>Chordifex microcodon</i>	
	<i>Chordifex sinuosus</i>	
Rutaceae	<i>Boronia ramosa</i> subsp. <i>anethifolia</i>	
Xanthorrhoeaceae	<i>Xanthorrhoea drummondii</i> sans lat	

Species	MWQ01	MWQ02	MWR01	MWR02	OPP
<i>Acacia pulchella</i>	1		1		
<i>Acacia stenoptera</i>	1	1			
<i>Adenanthos cygnorum</i>	1	1	1	1	
<i>Alexgeorgea nitens</i>	1	1	1		
<i>Allocasuarina fraseriana</i>			1		
<i>Allocasuarina humilis</i>	1	1	1		
<i>Austrostipa elegantissima</i>	1	1			
* <i>Avena barbata</i>			1		
<i>Banksia attenuata</i>	1			1	
<i>Banksia dallaneyi</i> subsp. <i>pollostata</i>	1	1			1
<i>Banksia prionotes</i>	1			1	
<i>Banksia pteridifolia</i> subsp. <i>vernalis</i>					1
<i>Boronia ramosa</i> subsp. <i>anethifolia</i>	1				
<i>Bossiaea eriocarpa</i>		1	1	1	
* <i>Briza maxima</i>	1	1	1		
<i>Calothamnus sanguineus</i>		1			
<i>Cassytha</i> sp.	1	1			
<i>Caustis dioica</i>		1			
<i>Chordifex microcodon</i>	1				1
<i>Chordifex sinuosus</i>	1	1	1		
<i>Conospermum incurvum</i>					1
<i>Conospermum stoechadis</i> subsp. <i>sclerophyllum</i>					1
<i>Conostephium pendulum</i>		1			
<i>Daviesia angulata</i>					1
<i>Daviesia nudiflora</i>	1	1	1		
<i>Drosera erythrorhiza</i>		1			
<i>Drosera</i> sp.	1				
* <i>Ehrharta calycina</i>	1	1	1		
<i>Eremaea asterocarpa</i> subsp. <i>histoclada</i>	1				
<i>Eremaea pauciflora</i> var. <i>?pauciflora</i>	1	1		1	
<i>Eucalyptus todtiana</i>		1	1		
<i>Gastrolobium linearifolium</i>	1				
* <i>Gladiolus caryophyllaceus</i>	1				
<i>Gompholobium tomentosum</i>	1				
<i>Hakea ruscifolia</i>				1	
<i>Hibbertia hypericoides</i>				1	
<i>Hibbertia racemosa</i>			1		
<i>Isopogon drummondii</i>					1
<i>Petrophile brevifolia</i>			1		
<i>Jacksonia nutans</i>		1			
<i>Johnsonia pubescens</i> subsp. <i>pubescens</i>	1				
<i>Lambertia multiflora</i>	1	1	1		
<i>Lechenaultia ?expansa</i>	1				
<i>Lomandra caespitosa</i>	1				
<i>Lomandra hermaphrodita</i>			1		
<i>Lomandra preissii</i>	1	1			

Species	MWQ01	MWQ02	MWR01	MWR02	OPP
<i>Lyginia imberbis</i>	1	1	1		
<i>Melaleuca clavifolia</i>	1	1			
<i>Mesomelaena pseudostygia</i>	1	1		1	
<i>Mesomelaena tetragona</i>			1		
<i>Nuytsia floribunda</i>			1		
<i>Patersonia occidentalis</i>		1			
<i>Petrophile macrostachya</i>	1				
* <i>Romulea rosea</i>	1				
<i>Scaevola repens</i>		1			
<i>Stirlingia latifolia</i>	1		1	1	
<i>Synaphea spinulosa</i> subsp. ? <i>spinulosa</i>		1		1	1
<i>Thysanotus arbuscula</i>	1				
<i>Trachymene pilosa</i>	1				
<i>Xanthorrhoea drummondii</i> sans lat	1	1			1