360 environmental

Lot 820 (No. 501) Alexander Drive, Mirrabooka

Native Vegetation Clearing Permit: Supporting Documentation

Prepared for

Atlas Brick Pty Ltd

November 2019

people planet professional

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1 Introduction

1.1 Background

360 Environmental Pty Ltd (360 Environmental) was commissioned by Atlas Brick Pty Ltd (Atlas Brick) to prepare a Native Vegetation Clearing Permit (NVCP) application for Lot 820 (No. 501) Alexander Drive, Mirrabooka (the site) (Figure 1). The application is for the clearance of 1.39 ha of vegetation on an Industrial zoned lot to facilitate site development (Figure 5)(Department of Planning, 2019).

Under Section 51C of the *Environmental Protection Act 1986* (EP Act), clearing of any native vegetation requires an approved clearing permit, unless an exemption applies. Exemptions generally apply to small areas of vegetation cleared for maintenance/ fire issues, or for proposals that have already been assessed by the Environmental Protection Authority (EPA) or Department of Water, Environment and Regulation (DWER) through a separate process. Exemptions do not apply for the vegetation within the proposed clearing area that has been identified as a TEC, and a clearing permit is therefore required from DWER before any clearing can commence.

1.2 Purpose of Clearing Permit Application

The purpose of this NVCP supporting document is to present the assessment results of the clearing aspects of this proposal against the ten clearing principles as outlined in the (then) Department of Environment Regulation (DER)'s *A guide to the assessment of applications to clear native vegetation* (2014a) under Part V Division 2 of the EP Act. This report identifies the potential environmental impacts associated with the proposal based on the best available data. This document and accompanying NVCP Purpose Permit application will be submitted to the DWER for assessment.

1.3 Responsible Applicant

Atlas Brick is responsible for the implementation of the clearing described within this document. Correspondence relating to this NVCP application should be addressed to:

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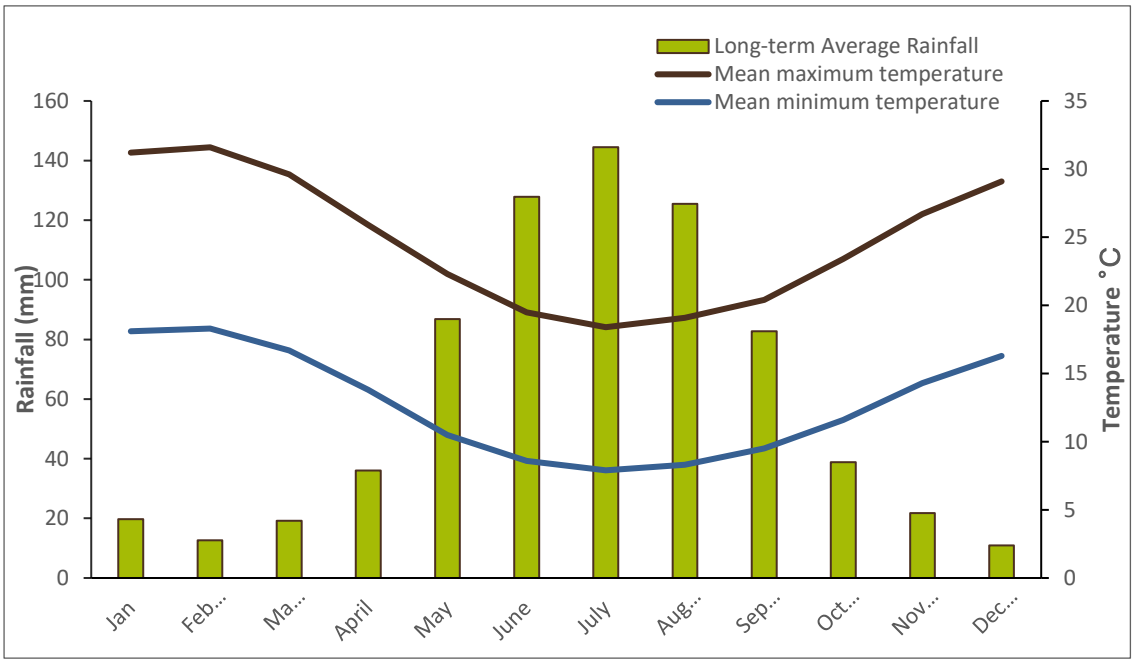
2 Site Overview

2.1 Climate

The closest long-term Bureau of Meteorology (BoM) weather station with a complete dataset is Perth Metro WA (#9225), located approximately 6.6 km away from the site, using data between 1994 to 2019. The mean annual maximum temperature is 31.2 ˚C, and the mean annual minimum temperature is 18.1 ˚C. The annual mean rainfall was recorded at 733.2 mm (Bureau of Meteorology, 2019) (Graph 1).



Graph 1: Climate Statistics for Perth Metro (9225) 1994 – 2019 (Bureau of Meteorology, 2019)

2.2 Bioregion

The site is within the Swan Coastal Plain Bioregion and Perth subregion (SWA2) of the IBRA. The Perth subregion is a low-lying coastal plain composed of colluvial and aeolian sands, alluvial river flats and coastal limestone rising to duricrusted Mesozoic sediments in the east. Outwash plains are extensive only in the south, while a complex series of seasonal wetlands and swamps extends from north to south. Vegetation comprises heath and/or Tuart woodlands on limestone, Banksia and Jarrah-Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvial soils, Casuarina obesa on out-wash plains, and paperbark (Melaleuca spp.) in wetland areas (Mitchell, Williams, & Desmond, 2002).

2.3 Topography

Regional topography contours indicate the range within the clearing permit area is between approximately 41m AHD to 59m AHD.

2.4 Geology and Soils

Soil-landscape mapping of south WA has been captured at scales ranging from 1:20,000 to 1:250,000 (Department of Primary Industries and Regional Development, 2018b). Soil-landscape mapping

describes broad soil and landscape characteristics from regional to local scales. The Survey Area contains the following soil system:

- 211Sp; Sand dunes and plains. Yellow deep sands, pale deep sands and yellow/brown shallow sands; and
- 212Bs; Swan Coastal Plain from Busselton to Jurien. Sand dunes and sandplains with pale deep sand, semi-wet and wet soil. Banksia-paperbark woodlands and mixed heaths.

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 is one Beard/Shepherd vegetation unit mapped in the site (Figure 2). 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.

- **Bassendean 1001**: The vegetation type is described as Low forest, woodland or low woodland with scattered trees (Department of Primary Industries and Regional Development, 2018a).

Table 1: Broad Vegetation Types and its State and Regional Representation

Vegetation Type	Pre-European Extent (HA)	Current Extent (ha)	Remaining (%)	Current Extent Managed in DBCA Lands (%)
Vegetation Type in Western Australia				
Bassendean 10001	57,410.23	12,660.76	22.05	14.19
Vegetation Type in IBRA bioregion				
Swan Coastal Plain	57,410.23	12,660.76	22.05	14.19
Vegetation in subregion				
Perth	57,410.23	12,660.76	22.05	14.19
Vegetation in Local Government Authority				
City of Stirling	1,641.07	76.41	4.66	NA

The EPA considers it 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. The vegetation community identified in Table 1 is below 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 (Department of Water and Environmental Regulation, 2019a).

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 (Department of Biodiversity Conservation and Attractions, 2019). The nearest geomorphic wetland identified is a Resource Enhancement Wetland located approximately 470 m southeast of the site (Department of Biodiversity Conservation and Attractions, 2019).

The site is located within a Public Drinking Water Source Area (PDWSA) , the West Mirrabooka Underground Water Pollution Control Area (Department of Water and Environmental Regulation, 2019b). PDWSAs are proclaimed under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909.* These areas were assigned priorities and are managed under the Department of Water and Environmental Regulation (DWER) to protect WA's drinking water supply. The site is within a Priority 3 PDWSA which are defined and managed to maintain the quality of the drinking water source for as long as possible, with the objective of *risk management* (Department of Water, 2016). These areas occur where the land is zoned for urban and commercial or light industrial uses.

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. Exemptions contained in the *Environmental Protection (Clearing of Native vegetation) Regulations 2004* for low impact land clearing do not apply in ESAs and a clearing permit is required.

Mapping undertaken by DWER indicates there is an ESA and Regional Ecological Linkage including '21' and '22' mapped over the site and the immediate surrounding land (Figure 4) (Department of Water and Environmental Regulation, 2018; Western Australian Local Government Authority, 2014).

One Bush Forever Site, Site 385, abuts the northern, southern and western boundaries of the site. See Figure 4 (Department of Planning, 2014).

3 Assessment Methodology

3.1 Flora and Vegetation Survey

360 Environmental was commissioned to undertake a Level 2 Flora and Vegetation Assessment for the eastern portion of Lot 820 (No. 501) Alexander Drive, Mirrabooka (Survey Area). The Survey Area is approximately 15.81 ha in size.

3.1.1 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 Threatened or Priority species and Threatened and Priority Ecological Communities (TECs and PECs) that may occur in the area.

The database search identified 19 flora species of conservation significance as potentially occurring within the survey area. This included 14 Threatened Species and 5 Priority Species, all which maintain the same status in 2019. Of the species, *Caladenia Huegelii* was considered likely to occur in the survey area however it was not identified in the Level 2 field survey. The database review also identified one Threatened Ecological Community (TEC) and two Priority Ecological Communities (PEC) potentially occurring within 5km of the survey.

A more recent database search through PMST identified the potential presence of two TECs within a 1km radius of the site. The two TECs are:

- Banksia Woodlands of the Swan Coastal Plain ecological community
- Tuart (*eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community

The presence of the Banksia Woodlands is consistent with the field results however the site survey shows that no Tuarts are present.

3.1.2 Site Survey

A Level 2 Flora and Vegetation Assessment was completed by 360 Environmental botanist Narelle Whittington on 14 September and 7 October 2015. The full Flora and Vegetation Assessment is provided in Appendix A.

A total of 58 taxa (including species, subspecies, varieties and forms) from 48 genera and 24 families were recorded, with the common families including; *Fabaceae* (10 taxa), *Asparagaceae* (4 taxa) and *Proteaceae* and *Poaceae* (both with 5 taxa). The most frequently recorded genera were; *Lomandra*, *Hibbertia, Acacia* and *Daviesia* which were all represented by three taxa (see Appendix A for more information).

3.1.2.1 Flora of Conservation Significance

No Threatened or priority species pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* and/or gazetted as Declared Rare Flora pursuant to the *Biodiversity Conservation Act 2016* were recorded during the field survey.

3.1.2.2 Vegetation Associations

The survey did identify two natural vegetation associations in the area, including a TEC. The identified vegetation associations were:

- BmMps- Low Open Woodland of *Banksia menziesii* over *Mesomelaena pseudostygia*, *Daviesia nudiflora subsp. nudiflora*, *Xanthorrhoea preissii, Eremaea pauciflora var. pauciflora, Stirlingia latifolia, Acacia pulchella* and *Daviesia triflora* (0.09 ha).
- Em – Low Open Woodland of *Eucalyptus marginata* over *Mesomelaena pseudostygia, Jacksonia sternbergiana* and *Daviesia divaricata subsp. divaricata (ms)* over introduced species (0.06 ha).

The vegetation associations in the area are described in Table 2 and mapped in Figure 2 (360 Environmental Pty Ltd, 2015).

Table 2: Vegetation Types Recorded within the site (360 Environmental Pty Ltd, 2015)

Vegetation Association Code	Description	Total Area (ha)
BaMps	Low Open Woodland of *Banksia menziesii* over *Mesomelaena pseudostygia, Daviesia nudiflora* *subsp. nudiflora, Xanthorrhoea preissii, Eremaea pauciflora var. pauciflora, Stirlingia latifolia, Acacia pulchella* and *Daviesia triflora*	0.09
Em	Low Open Woodland of Eucalyptus *marginata* over *Mesomelaena pseudostygia, Jacksonia sternbergiana* and *Daviesia divaricata subsp. divaricata (ms*) over introduced species	0.06
Bm	Isolated mature trees of *Banksia menziesii*	0.02
NE	Non Endemic	0.98
NE/n	Non Endemic over Natives	0.21
Pp	*Pinus pinaster*	0.01

3.1.2.3 Vegetation Condition

The vegetation condition ranged from Excellent to Completely Degraded, with the majority of the site considered to be in Completely Degraded condition (1.02 ha). See Figure 3 (360 Environmental Pty Ltd, 2015). All vegetation excluding a small pocket of vegetation in the north east corner of the site consists of non-endemic and/or garden variety species. The strip of vegetation along the southern boundary contains non-endemic Eucalypt species with an understorey of a few scattered native species dominated with introduced grasses.

The only area considered to be in Excellent condition is the pocket of native vegetation mapped as BaMps. This area is very small and had been disturbed by the installation of a fire break and the removal of dead trees and shrubs (Figure 3) (360 Environmental Pty Ltd, 2015). Condition mapping is provided in Figure 3 and the extent is described in Table 3. The average fire age of the vegetation was considered very old (>12 years since last fire) (360 Environmental Pty Ltd, 2015).

Table 3: Vegetation Condition Recorded within the Site (360 Environmental Pty Ltd, 2015)

Condition	Extent in Survey Area (HA)
Excellent	0.09
Degraded	0.06
Degraded- Completely Degraded	0.22
Completely Degraded	1.02
Total	**1.39 ha**

3.1.2.4 Floristic Community Types

Statistical analysis (multivariate analysis) and data interpretation, as shown in Table 6 and 7 in the Level 2 Flora Report (360 Environmental Pty Ltd, 2015) was undertaken to help determine the FCT represented by the vegetation in the project area.

The vegetation association, BmMps, was identified as Floristic Community Type (FCT) SCP20a, which is a Threatened Ecological Community according to the EPBC. SCP20a is described as *Banksia attenuata* woodlands over species rich dense shrublands and is listed as Endangered by the State. Vegetation association Em has also been inferred as 20a although it lacks community structure and the dominant species that typifies FCT SCP20a, such as *Banksia attenuata*. There are known occurrences of FCT SCP20a being dominated *by Eucalyptus marginata* and without the disturbances that have occurred in the site, it is likely that associations BmMps and Em formed the same community type.

3.1.2.5 Introduced Flora

A total of 13 introduced species were recorded during the survey. None of these are listed as Declared under the BAM Act or listed as a WONS. These are included in Table 4.

Table 4: Introduced Flora Species Recorded on Site

Taxon	(Common Name)	DBCA Ranking
Avena barbata	Bearded oat	Low
Briza maxima	Blowfly Grass	Low
Ehrharta calycina	Perennial Veldtgrass, Perennial Veldt Grass	Low
Eragrostis curvula	African lovegrass	Low
Euphorbia terracina	Geraldton carnation weed	Moderate
Fumaria capreolata	Climbing Fumitory, Whiteflower Fumitory	Low
Hypochaeris glabra	Flatweed, Smooth Catsear	Low
Lysimachia arvensis	Scarlet Pimpernel	Negligible
Oxalis pes-caprae	Soursob	Low

Taxon	(Common Name)	DBCA Ranking
Pelargonium capitatum	Rose Pelargonium	Low
Sonchus oleraceus	Sowthistle	Negligible
Trachyandra divaricata	Dune onion weed	Low
Ursinia anthemoides	Ursinia	Negligible

3.1.2.6 Threatened / Priority Ecological Communities

Two vegetation associations were mapped for the site covering an area of 0.15 ha including, BmMps and Em, described as Low Open Woodlands of Banksia *menziesii* and *Eucalyptus marginata.* The vegetation association BmMps was analysed through a quadrat analysis, which determined to have inferred affiliation with one FCT; SCP20a – *Banksia attenuata* woodlands over species rich dense shrublands.

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 associations BmMps and Em are representative of Banksia Woodlands of the Swan Coastal Plain and therefore could be considered suitable for national protection. The variable condition and low density of Banksia canopy however, effects the value of the vegetation as Banksia woodlands of the Swan Coastal Plain.

3.2 Fauna and Habitats

3.2.1 Overview

The NatureMap and the PMST databases identified 11 conservation significant fauna species as potentially occurring within a 1 km radius of the site.

There are no surface water areas or wetlands located within the site, and therefore marine species have not been included in the Likelihood assessment.

Likelihood was determined based on the presence or absence of suitable fauna habitat. The assessment identified two species as Likely to occur within the site; the *Calyptorhynchus latirostris* (Carnaby's Cockatoo) and the *Calyptorhynchus banksia naso* (Forest red-tailed Black-Cockatoo).

The likelihood of conservation significant fauna species occurring within the site vicinity is provided in Table 5.

Table 5: Assessment of the Likelihood of Occurrence of Significant Fauna in the Site

Species	Conservation Status		Habitat	Likelihood of Presence within the site
	EPBC Act (CTH)	BC Act (WA)		
Oxyura Australis (Blue-billed duck)	P4	NA	Breeds in deep permanent, densely vegetated freshwater lakes, swamps and dams; winters on more open waters	Unlikely
Calyptorhynchus latirostris (Carnaby's Cockatoo)	EN	EN	Typically occurs in woodlands and scrubs of semiarid interior of Western Australia, in non- breeding season wandering in flocks to coastal areas, especially pine plantations and *Banksia* woodlands. Food includes the flowers, nectar and seeds of *Banksia*, *Dryandra*, *Hakea*, *Eucalyptus*, *Corymbia*, *Grevillea*, also seeds of Pinus	Likely
Botaurus poiciloptilus (Australian Bittern)	EN	EN	Freshwater wetlands, occasionally estuarine; prefers heavy vegetation - shrubbery, reedbeds, sedges	Unlikely
Calidris ferruginea (Curlew sandpiper)	CR	CR & MI	Inter-tidal mudflats of estuaries, lagoons, mangrove channels; around lakes, dams, floodwaters, flooded saltbush surrounds of inland lakes	Unlikely
Calyptorhynchus banksia naso (Forest red-tailed Black-Cockatoo)	VU	VU	Tall eucalypt forest, woodland, feeds on seeds of large-fruited eucalypts	Likely
Leipoa ocellate (Malleefowl)	VU	VU	Unburned mallee and woodland with abundant litter and low scrub	Unlikely
Numenius madagascariensis (Eastern Curlew)	CR	CR & MI	Widespread but patchily distributed along coast, most numerous at sites with extensive tidal flats[1]	Unlikely
(Rostratula australis) Australian Painted-snipe	EN	EN	Surrounds and shallows of wetlands that are well vegetated with dense low cover	Unlikely
Hesperocolletes douglasi (Rottnest Bee)	NA	CR	Unknown	Unknown
Bettongia penicillata ogilbyi (Woylie)	EN	CR	Restricted to three small wheatbelt reserves, all characterised by the presence thickets of the plant genus *Gastrolobium*	Unlikely

Species	Conservation Status		Habitat	Likelihood of Presence within the site
	EPBC Act (CTH)	BC Act (WA)		
Dasyurus geoffroii (Western Quoll)	VU	VU	Areas dominated by sclerophyll forest or drier woodland, heath and mallee shrubland	Unlikely
Pseudocheirus occidentalis (Western Ringtail Possum)	CR	CR	*Agonis* forest and woodland, and Tuart forest with an *Agonis* midstorey	Unlikely
Apus pacificus (Fork-tailed Swift)	MI & MA	IA	Low to very high airspace over varied habitat, rainforest to semi-desert	Unlikely
Motacilla cinereal (Grey Wagtail)	MI & MA	IA	Usually near fresh sandy or rocky streams, but also on mown grass, ploughed land, sewage ponds	Unlikely
Actitis hypoleucos (Common Sandpiper)	MI & MA	IA	Varied coastal and interior wetlands – narrow muddy edges of billabongs, river pools, mangroves, among rocks and snags, reefs or rocky beaches; avoids wide open mudflats. Perches on branches, posts, boats	Unlikely
Calidris acuminate (Sharp-tailed Sandpiper)	MI & MA	IA	Fresh or salt wetlands – muddy edges of lagoons, swaps, lakes, dams, soaks, sewage farms, temporary floodwaters	Unlikely
Calidris melanotos (Pectoral Sandpiper)	MI & MA	IA	Usually coastal wetlands, both fresh and saline, but also inland on permanent and temporary wetlands. Uses sites with mudflats, fringing vegetation, swamps with heavy overgrowth of vegetation	Unlikely
Pandion haliaetus (Osprey)	MA	-	Coastal waters and estuaries, beaches islets and reefs - but usually not far out to sea except on islets or exposed reefs. Follows major rivers and wetlands far inland from the coast to larger river pools, even to arid regions where large pools occur in gorges hundreds of kilometers inland	Unlikely
Tringa nebularian (Common Greenshank)	MI & MA	IA	Diverse inland and coastal spots. Away from the coast - uses both permanent and temporary wetlands – billabongs, swamps, lakes, floodplains, sewage farms and salt works ponds, flooded irrigated crops. On the coast – uses sheltered estuaries and bays with extensive	Unlikely

Species	Conservation Status		Habitat	Likelihood of Presence within the site
	EPBC Act (CTH)	BC Act (WA)		
			mudflats, mangrove swamps, muddy shallows of harbours and lagoons, occasionally rocky tidal ledges. Prefers wet and flooded mud and clay rather than sand	

4 Environmental Management Measures

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

- Induction of all contractors and/or internal personal undertaking the clearing in accordance with Atlas Brick's internal procedures. GPS coordinates of clearing permit area, as shown in Figure 5, to be supplied to contractor
- Prior to clearing and earthworks commencing within the clearing permit area, the area will be clearly outlined (by barrier tape or star pickets) to ensure that no over clearing occurs beyond the permitted area
- Dieback and weed control will be in place to minimise the risk of spread or introduction of dieback or new weed species; and
- Vegetation clearing will be scheduled to occur immediately before planned earthworks and construction to minimise the potential for dust, where practicable.

5 Assessment Against the Ten Clearing Principles

The proposed clearing of 1.39 ha has been assessed against the ten clearing principles as defined in DER's Guide to Assessment: Clearing of Native Vegetation under the EP Act, taking into account the current extent and condition of the native vegetation on the site. This assessment is presented in Table 5.

Table 5: Assessment Against the Ten Clearing Principles

Principle	Assessment	Outcome
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	The application is to clear 1.39 ha of vegetation in Lot 820 (No. 501) Alexander Drive, Mirrabooka (the site) for the purpose of industrial development. The site is zoned industrial. A database search with a 5 km buffer from the centre of the site and subsequent likelihood assessment was undertaken and identified 19 conservation significant flora potentially occurring in the area. Of these, 14 were classed as Threatened; *Andersonia gracilis, Anigozanthos viridis subsp. Terraspectans, Caladenia huegelii, Calectasia cyanea, Darwinia foetida, Diuris micrantha, Diuris purdiei, Drakaea elastica, Drakaea micrantha, Grevillea curviloba subsp. Incurva, Lepidosperma rostratum, Thelymitra dedmaniarum (Thelymitra manginii), Thelymitra stellata* and *Trithuria occidentalis.* Two as Priority 1; including *Amphibromus vickeryae* and *Drosera x sidjamesii.* One as Priority 3, *Cyathochaeta teretifolia* and two as Priority 4, *Drosera occidentalis subsp. Occidentalis, Jacksonia sericea*. A search of the then DPaW database and EPBC PMST for TEC's and PEC's identified one State listed TEC as occurring within 5 km of the site and two PEC's including the following: • FCT SCP20a – *Banksia attenuata* woodlands over species rich dense shrublands (Endangered, DPaW) • FCT SCP22 – *Banksia ilicifolia* woodlands (Priority 3, DPaW); and • FCT SCP21c – Low lying *Banksia attenuata* woodlands or shrublands (Priority 3, DPaW). Atlas Brick commissioned 360 Environmental to undertake a Level 2 Flora & Vegetation survey at the site in September-October 2015. The survey identified a total of 58 taxa (including species, subspecies, varieties and forms) from 48 genera and 24 families within the site. No Threatened flora species pursuant to the EPBC Act and/or gazetted as Declared Rare Flora pursuant to the WC Act were recorded during the survey. No Priority species, as listed by DPaW were recorded during the survey.	Proposed clearing of 1.39 ha is unlikely to be at variance with this principle.

Principle	Assessment	Outcome
	Two vegetation associations were mapped on site. The vegetation association, BmMps has been identified as FCT SCP20a. SCP20a is described as '*Banksia attenuata* woodlands over species rich dense shrublands' and is listed as Endangered by the State. Vegetation association Em has also been inferred as SCP20a even through it lacks community structure and the dominant species that typifies FCT SCP20a, such as *Banksia attenuata.* There are known occurrences of FCT SCP20a being dominated by *Eucalyptus marginata* and without the disturbances that have occurred in the Survey Area it is likely that associations BmMps and Em formed the same community type. Only 0.09 ha of excellent vegetation remains (BaMps). This Banksia woodland has been assessed against the Approved conservation advice for the Swan Coastal Plain (DoEE, 2016). The 0.09ha of Banksia Woodland is below the minimum patch size applicable to Excellent quality vegetation. It was found not to contribute to connectivity and is a highly fragmented patch of vegetation that would likely degrade over time. The site is also located adjacent to Bush Forever Site 385 which is protected for the purpose of maintaining unique biodiversity of the Swan Coastal Plain. The proposed clearing area therefore contains low diversity relative to the surrounding area. Based on the above, the proposed clearing area does not comprise a high level of biological diversity.	
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	The desktop fauna search suggests that two species may be likely to occur on the site, Carnaby's cockatoo and the Red-Tailed Black Cockatoo. The site includes two vegetation associations BaMps and Em. BaMps is low open woodland of *Banksia menziesii* and commonly used as foraging habitat for the Carnaby Black Cockatoo. The second vegetation association, Em, is a potential foraging, breeding and roosting habitat for both the Red-Tailed Black Cockatoo and Carnaby's Cockatoo. Despite this, the total clearing of 0.15 ha of potential cockatoo habitat is well below the threshold of 1 ha as identified by the EPBC Act Referral Guidelines for three Threatened Black Cockatoo species. The adjacent Bush Forever Site 385 contains significant areas of potential cockatoo foraging and breeding habitat. The vegetation in the Survey Area does very little in contributing to the linkage of bushland areas in the region due to its isolation and size. In addition to this, the various current land uses within the boundaries of the Survey Area limit the sustainability of the	The proposal to clear 1.39 ha of vegetation within the site is unlikely to have a significant impact on significant habitat for fauna species indigenous to Western Australia due to nearby large areas of remnant vegetation that may provide more suitable habitat. The proposal is unlikely to be at variance with this Principle.

Principle	Assessment	Outcome
	vegetation due to the stresses of firebreak maintenance and weed infestations on an already very small pocket of vegetation. The site is not considered necessary for the maintenance of a significant habitat for fauna indigenous to Western Australia and therefore the proposed clearing is not likely to be at variance to this principle.	
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of rare flora.	A desktop review of database searches identified *Andersonia gracilis* (T), *Anigozanthos viridis subsp. Terraspectans* (T), *Caladenia huegelii* (T)*i, Calectasia cyanea* (T), *Darwinia foetida* (T), *Diuris micrantha* (T), *Diuris purdiei* (T), *Drakaea elastica* (T), *Drakaea micrantha* (T), *Grevillea curviloba subsp. Incurva* (T), *Lepidosperma rostratum* (T), *Thelymitra dedmaniarum (Thelymitra manginii)* (T), *Thelymitra stellata* (T) , *Trithuria occidentalis (T), Amphibromus vickeryae* (P1) *Drosera x sidjamesii (P1), Cyathochaeta teretifolia* (P3) *Drosera occidentalis subsp. Occidentalis (*P4*), Jacksonia sericea* (P4) as potentially occurring within the site. The site survey concluded that no Threatened Species listed under the EPBC Act and/or gazetted as Declared Rare Flora pursuant to the WC Act were recorded. Following the Reconnaissance Flora and Vegetation assessment completed by 360 Environmental, it was determined that the clearing permit area is unlikely to support rare flora due to the conditions of the site.	The Proposal is unlikely to be at variance with this Principle.
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).	The survey identified two vegetation associations; Em and BmMps. These species are identified as Floristic Community Type SCP20a and are listed as Threatened under the EPBC Act and BC Act. Vegetation condition ranged from Excellent to Completely Degraded with the majority of the Survey Area considered to be in Completely Degraded condition (1.02 ha). All vegetation excluding a small pocket of vegetation in the north east corner of the Survey Area consists of non-endemic and/or garden variety species. The strip of vegetation along the southern boundary contains non-endemic Eucalypt species with an understorey of a few scattered native species dominated with introduced grasses. The only area considered to be in Excellent condition is the pocket of native vegetation mapped as BmMps. This area is very small and has been recently disturbed from the installation of a fire break and the removal of dead trees and shrubs (0.09 ha). Over time, the remnant vegetation has experienced some death of Banksia species and the small size and isolation from other bushland remnants increases the impacts of edge effects, making it unlikely to be sustainable in the long term.	As the vegetation within the site proposed for clearing represents the Banksia Woodlands TEC, the Proposal may be at variance with this Principle. However, the clearing of 1.39 ha of mostly degraded vegetation is not expected to represent a significant loss necessary for the maintenance of the TEC at a regional level.

Principle	Assessment	Outcome
	As the *Banksia* woodland is below the minimum patch size applicable to Excellent quality vegetation, it is not expected to contribute to connectivity.	
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	The site is within one vegetation unit map-ped by Sheperd *et al.* (2001) and Beard (1981): Bassendean 1001. Table 1 outlines the total remaining extent of this vegetation unit within the State, Bioregion and subregion. Of the pre-European extent, approximately 22% of Bassendean 1001 association remains within the Swan Coastal Plain bioregion, respectively. The National Objectives and Targets for Biodiversity Conservation 2001 – 2005 include a target to have clearing controls in place that prevent the clearance of ecological communities with a pre-European extent below 30% (Commonwealth of Australia 2001). In the Perth metropolitan area, the EPA has a modified objective to retain at least 10% of pre-clearing extents of a vegetation association for defined constrained areas (EPA 2008). The application area is within a constrained area given that it is within the Perth metropolitan area and is within an industrial area. The pre-clearing extent of Bassendean 1001 vegetation association falls below the 30% threshold, however it is above the 10% threshold. Given the above and the small size and condition of the vegetation and fragmentation, it is unlikely that the proposed clearing would be at variance with this principle. The surrounding Bush Forever area and Banksia also appears to be in greater condition.	The proposal is unlikely to be at variance with this Principle.
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.	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 REW and is located approximately 440 m south east of the site (Department of Biodiversity Conservation and Attractions, 2019).	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 unlikely to be at variance with this Principle.
Principle (g) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	The (then) Department of Environment Regulations (DER) defined land degradation as including the following (DER 2014): • The clearing of vegetation; • Decline in vegetation condition (including spread of weeds); • Soil erosion and soil acidity (caused by wind and water erosion due to vegetation clearing)	The proposal is unlikely to be at variance with this Principle as the works are unlikely to cause additional land degradation.

Principle	Assessment	Outcome
	• Salinity; or • Waterlogging/flooding. The proposal includes the clearing of 1.39 ha of native vegetation. The vegetation condition ranges from Excellent to Completely Degraded. The immediate surrounding landscape has been cleared for industrial and residential use, and a parks and recreation reserve. As the proposed clearing is not significant, is within an industrial zoned area and is isolated vegetation, it is not likely that this clearing would cause appreciable land degradation. The site will be developed, and any erosion would likely be localised and minor. Any potential dust issues at clearing and construction will be managed in Best Practice Management where required.	
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	The site forms part of the Perth Regional Ecological Linkage network and is part of a non-continuous linkage of bushland which is adjacent to a Bush Forever site on three sides. The vegetation in the proposed clearing area does very little in contributing to the linkage of bushland areas in the region due to its isolation and size. In addition to this, the various current land uses within the boundaries of the site limit the sustainability of the vegetation due to stresses of firebreak maintenance and weed infestations on an already very small pocket of vegetation. The activities associated with the proposal is likely to only impact the vegetation within the clearing footprint. It is not likely that the clearing 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.	The proposal is unlikely to be at variance with this Principle.
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	The site is within the Perth Groundwater Area which is legislated under the *Rights in Water and Irrigation Act 1914* (RIWI Act). The site is also within a Public Drinking Water Source Area (PDWSA), the West Mirrabooka Underground Water Pollution Control Area (Department of Water and Environmental Regulation, 2019b). Given the relatively small and mostly degraded clearing area (1.39 ha), lack of surface water features and the 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.	The proposed action is unlikely to be at variance with this Principle.
Principle (j) – Native vegetation should not be cleared if clearing	Hydrography and wetland mapping suggests there are no known watercourses or surface water features within or in the vicinity of the site(Department of Biodiversity Conservation and	The proposal is unlikely to be at variance with this Principle.

Principle	Assessment	Outcome
the vegetation is likely to cause, or exacerbate, the incidence of flooding	Attractions, 2019; Department of Water and Environmental Regulation, 2019c). The 100 Year ARI floodplain and flood fringe mapping did not identify the site as being within a flood risk area (Department of Water, 2015). Soil-landscape mapping of south WA has been captured at scales ranging from 1:20,000 to 1:250,000 (Department of Primary Industries and Regional Development, 2018b). Soil-landscape mapping describes broad soil and landscape characteristics from regional to local scales. The Survey Area contains the following soil system: • 211Sp; Sand dunes and plains. Yellow deep sands, pale deep sands and yellow/brown shallow sands; and • 212Bs; Swan Coastal Plain from Busselton to Jurien. Sand dunes and sandplains with pale deep sand, semi-wet and wet soil. Banksia-paperbark woodlands and mixed heaths. 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. It is therefore considered unlikely that the clearing of 1.39 ha of native vegetation within the developed area will cause or exacerbate the incidence of flooding.	

6 Summary of Assessment

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 1.39 ha of native vegetation is not significant.

The Proposed Disturbance Area is not in pristine condition; it contains vegetation that varies in condition, has been subject to degradation and is surrounded by a large industrial area. However, the proposal may be at variance with one Clearing Principle (d).

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 0.09 ha of the Banksia Woodlands TEC in excellent condition. Although the Proposal may be at variance with this Principle. It is not considered that the clearing of 0.09 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 1.39 ha of native vegetation within an industrial zoned area, 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.

7 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.

8 References

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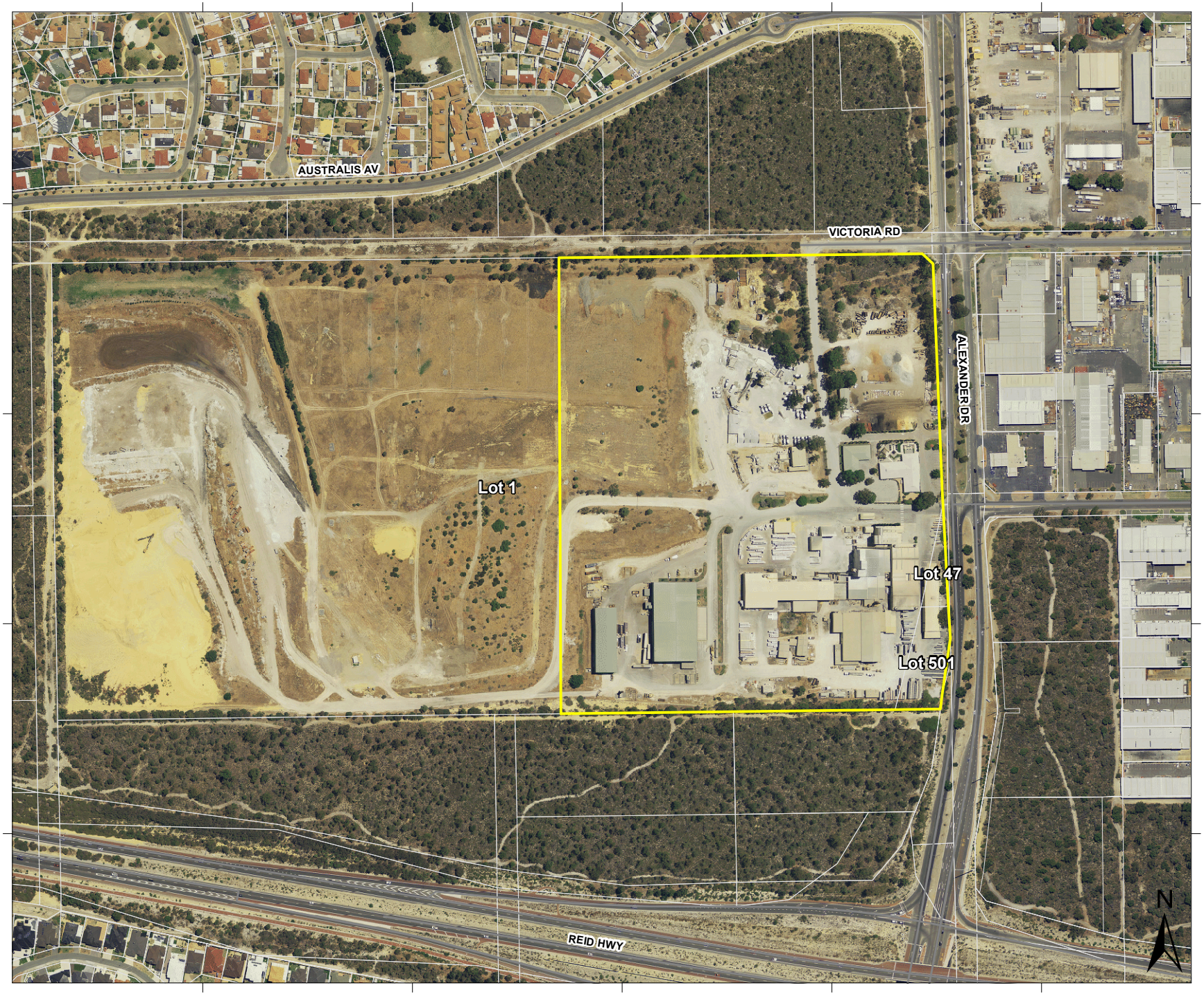
Figures



Legend

- Survey Area (15.81 ha)
- Cadastre
- Roads

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- CADASTRE SOURCED SLIP SERVICES OCTOBER 2015
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LOCALITY MAP

PROJECT ID	DATE
1358 Mirrabooka	19/10/2015

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
LF	NW	RF	0

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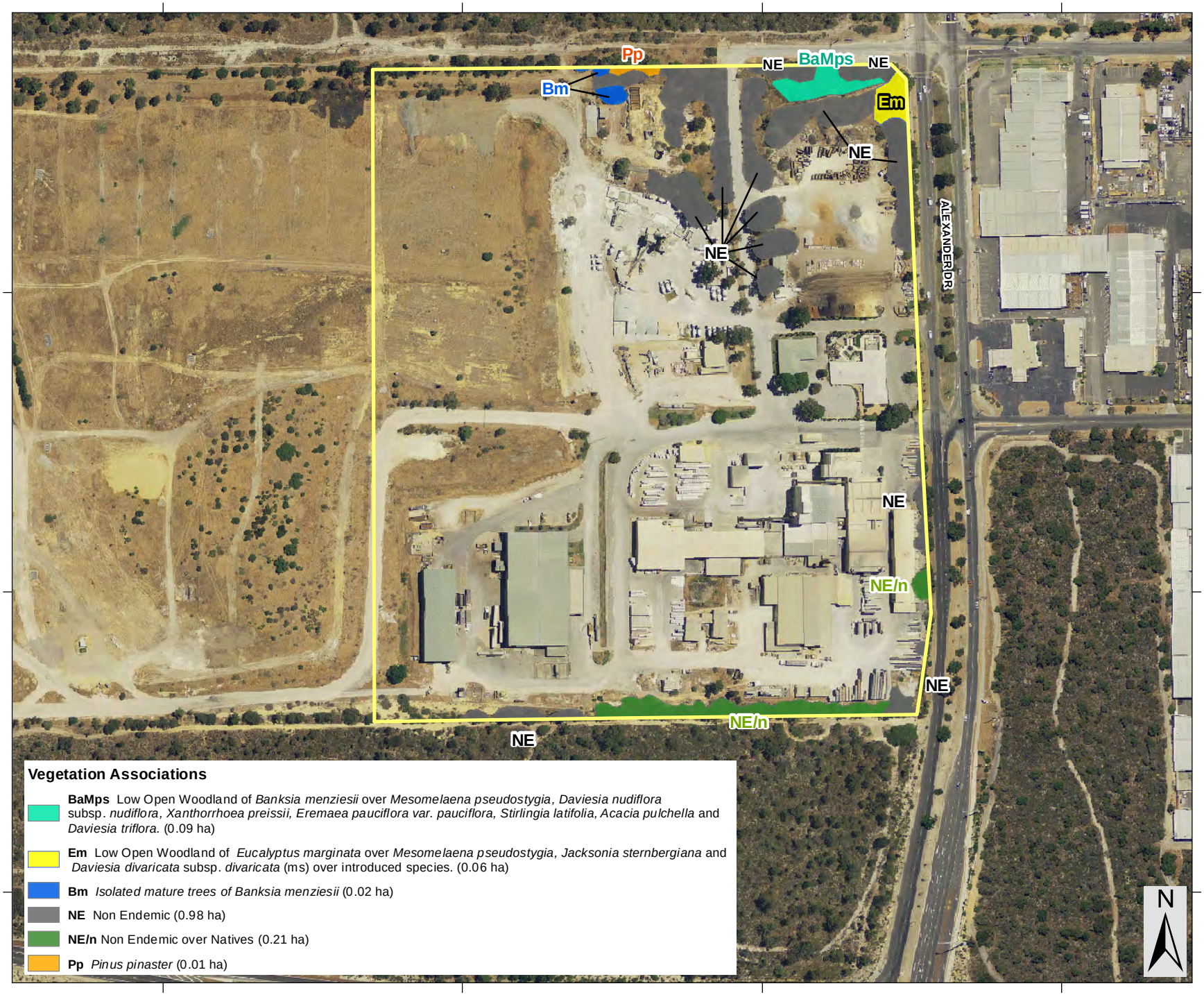
Figure 1 - Site Location



Vegetation Associations

- **BaMps** Low Open Woodland of *Banksia menziesii* over *Mesomelaena pseudostygia*, *Daviesia nudiflora* subsp. *nudiflora*, *Xanthorrhoea preissii*, *Eremaea pauciflora var. pauciflora*, *Stirlingia latifolia*, *Acacia pulchella* and *Daviesia triflora*. (0.09 ha)
- **Em** Low Open Woodland of *Eucalyptus marginata* over *Mesomelaena pseudostygia*, *Jacksonia sternbergiana* and *Daviesia divaricata* subsp. *divaricata* (ms) over introduced species. (0.06 ha)
- **Bm** *Isolated mature trees of Banksia menziesii* (0.02 ha)
- **NE** Non Endemic (0.98 ha)
- **NE/n** Non Endemic over Natives (0.21 ha)
- **Pp** *Pinus pinaster* (0.01 ha)

Legend

Survey Area (15.81 ha)

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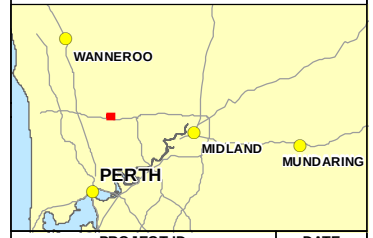

PROJECT ID	DATE
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HORIZONTAL DATUM AND PROJECTION
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Figure 2 -
Vegetation Associations

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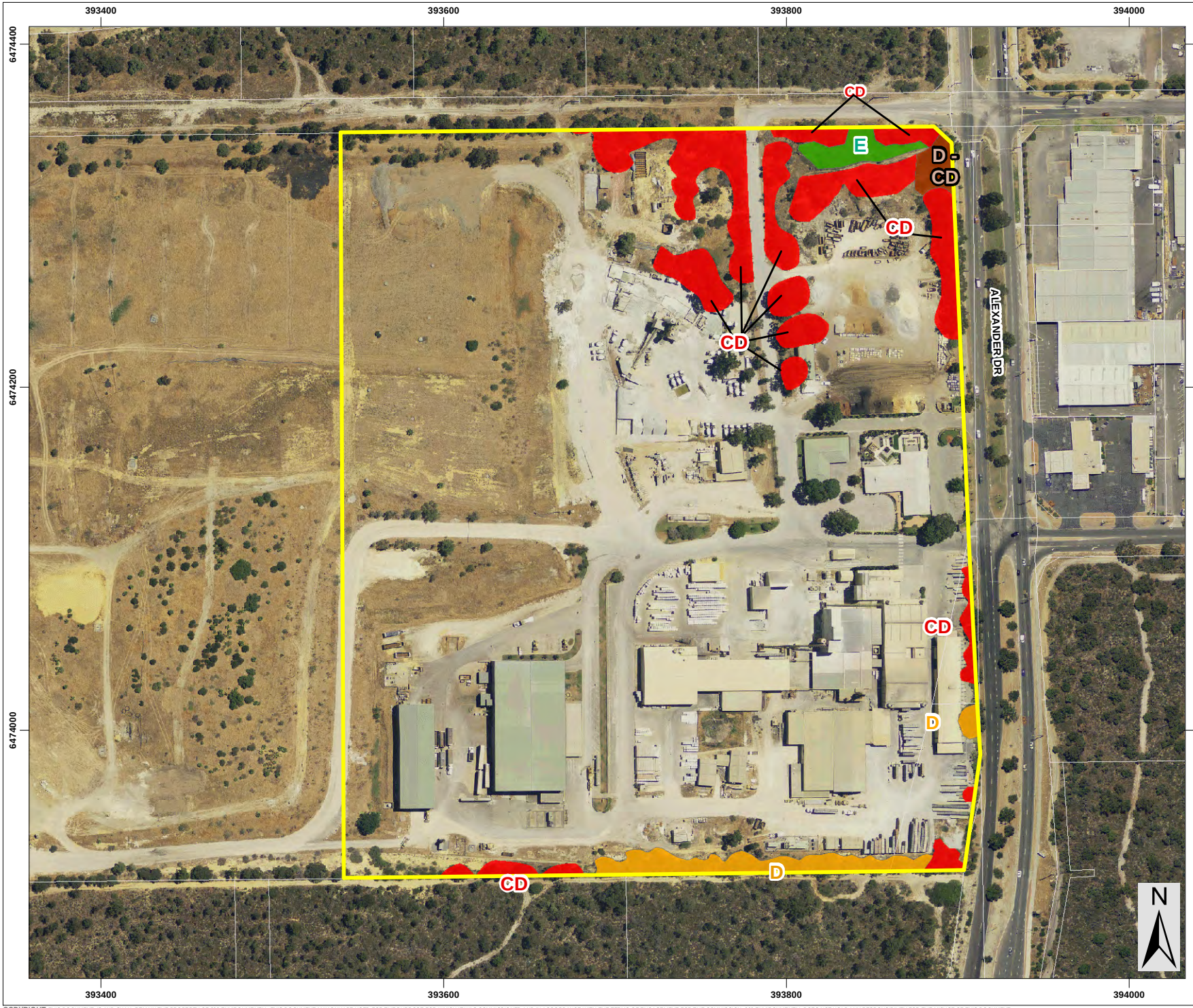

Legend

Survey Area (15.81 ha)

Vegetation Conditions

- Excellent (0.09 ha)
- Degraded (0.06 ha)
- Degraded - Completely Degraded (0.22 ha)
- Completely Degraded (1.02 ha)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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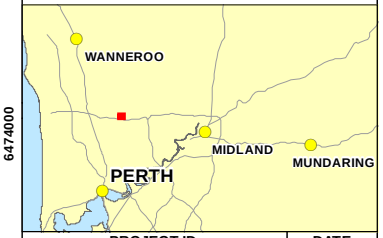
LOCALITY MAP



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HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

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Figure 3 -
Vegetation Conditions

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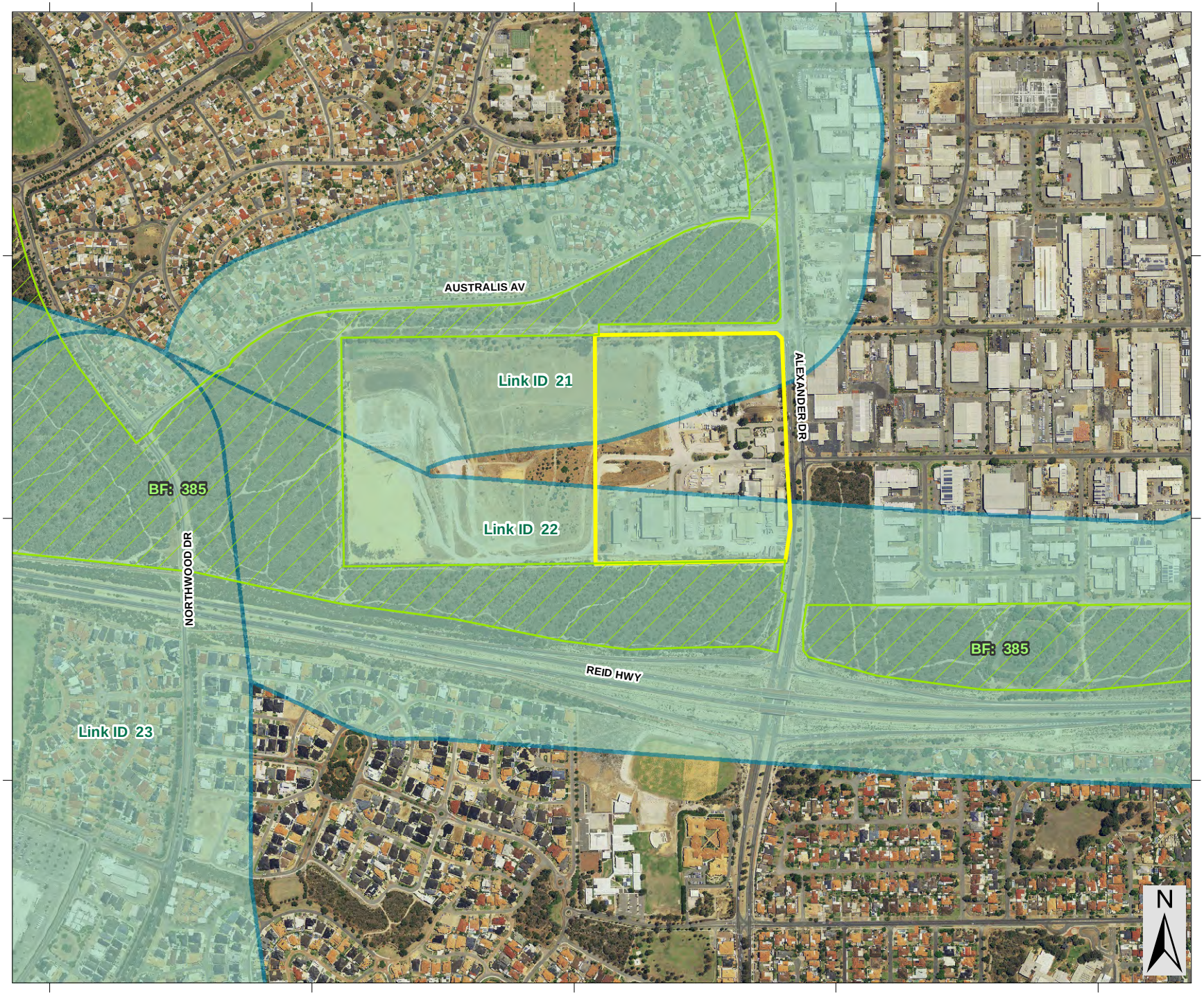

Legend

- Survey Area (15.81 ha)
- Bush Forever Sites
- Perth Regional Ecological Linkages

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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- BUSH FOREVER SOURCED DOP 2014
- PERTH ECOLOGICAL LINKAGES SOURCED WALGA 2015
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LOCALITY MAP

PROJECT ID	DATE
1358 Mirrabooka	19/10/2015

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

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LF	NW	RF	0

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Figure 4 - Bush Forever and Ecological Linkages

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Legend

Survey Area (15.81 ha)

Vegetation Clearing Area

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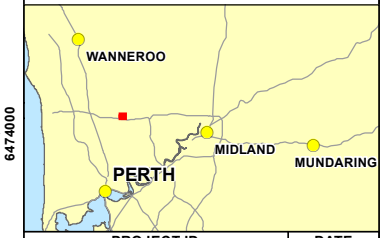
LOCALITY MAP



PROJECT ID	DATE
1358	18/11/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

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NVCP Supporting Documentation

Figure 5
Vegetation Clearing Area

Appendices

Appendix A
Level 2 Flora and Vegetation Report (360 Environmental 2019)

360 environmental

Lot 1 (No. 501) Alexander Drive, Mirrabooka

Level 2 Flora and Vegetation Survey Report

Prepared for:

Rowe Group

October 2015

people planet professional

Document Reference	Revision	Prepared by	Reviewed by	Submitted to Client	
				Copies	Date
1303 AB	A INTERNAL DRAFT	NW	FJ		22/10/15
1303 AB	B SUBMITTED TO CLIENT	NW	Rowe Group	1 Electronic (email)	22/10/15

Executive Summary

360 Environmental Pty Ltd (360 Environmental) was commissioned by Rowe Group in September 2015 to undertake a Level 2 Flora and Vegetation Assessment for the eastern portion of Lot 1 (No. 501) Alexander Drive, Mirrabooka (Survey Area). The Survey Area is approximately 15.81 ha in size.

Database searches returned 19 flora species of conservation significance potentially occur within the Survey Area. This included 14 Threatened species, and five Priority species.

Of the Threatened species, *Caladenia huegelii,* was considered likely to occur within the Survey Area, due to the presence of suitable habitat, however it was not recorded during the survey, which was completed within the flowering period for this species.

A search of the DPaW database and EPBC PMST for TECs and PECs identified one State listed TEC as occurring within five kilometres of the Survey Area and two Priority communities.

A total of 58 taxa (including species, subspecies, varieties and forms) from 48 genera and 24 families were recorded in the Survey Area.

No Threatened species pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* and/or gazetted as Declared Rare Flora pursuant to the *Wildlife Conservation Act 1950* were recorded during the survey. No Priority species, as listed by Department of Parks and Wildlife were recorded during the survey.

A total of 13 introduced plant species were recorded during the survey. None of these are listed as Declared under the *Biosecurity and Agriculture Management Act 2007* or listed as Weeds of National Significance.

Two vegetation associations were mapped on site. The vegetation association, BmMps, has been identified as FCT SCP20a. SCP20a is described as '*Banksia attenuata* woodlands over species rich dense shrublands' and is listed as Endangered by the State.

Vegetation association Em has also been inferred as SCP20a even through it lacks community structure and the dominant species that typifies FCT SCP20a, such as *Banksia attenuata*. There are known occurrences of FCT SCP20a being dominated by *Eucalyptus marginata* and without the disturbances that have occurred in the Survey Area it is likely that associations BmMps and Em formed the same community type.

Possible impacts to TECs are taken into account by state assessment bodies when applications to develop or clear land are evaluated. Under the EP Act, any clearing of native vegetation requires a permit unless done for an exempt purpose. These exemptions do not apply in Environmentally Sensitive Areas (ESAs). TECs have been defined under the regulations as ESAs so the exemptions from requiring a clearing

permit do not apply in these areas. Any such clearing proposal, therefore, must be undertaken under a specific permit and be assessed for any environmental impact.

Vegetation condition ranged from Excellent to Completely Degraded with the majority of the Survey Area considered to be in Completely Degraded condition (1.02 ha). All vegetation excluding a small pocket of vegetation in the north east corner of the Survey Area consists of non-endemic and/or garden variety species. The strip of vegetation along the southern boundary contains non-endemic Eucalypt species with an understorey of a few scattered native species dominated with introduced grasses. The only area considered to be in Excellent condition is the pocket of native vegetation. This area is very small and has been recently disturbed from the installation of a fire break and the removal of dead trees and shrubs

Permits

This flora survey was conducted under the following licences issued by DPaW; Licence to take flora for scientific or other prescribed purposes SL011541 and Permit to take Declared Rare Flora 44-1516 issued to Narelle Whittington.

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1 Introduction

1.1 The Project

360 Environmental Pty Ltd (360 Environmental) was commissioned by Rowe Group in September 2015 to undertake a Level 2 Flora and Vegetation Assessment for the eastern portion of Lot 1 (No. 501) Alexander Drive, Mirrabooka (Survey Area). The Survey Area is approximately 15.81 ha in size and located 11 km North of Perth in the Swan Coastal Plain Biogeographic Region of Western Australia (WA) (Figure 1).

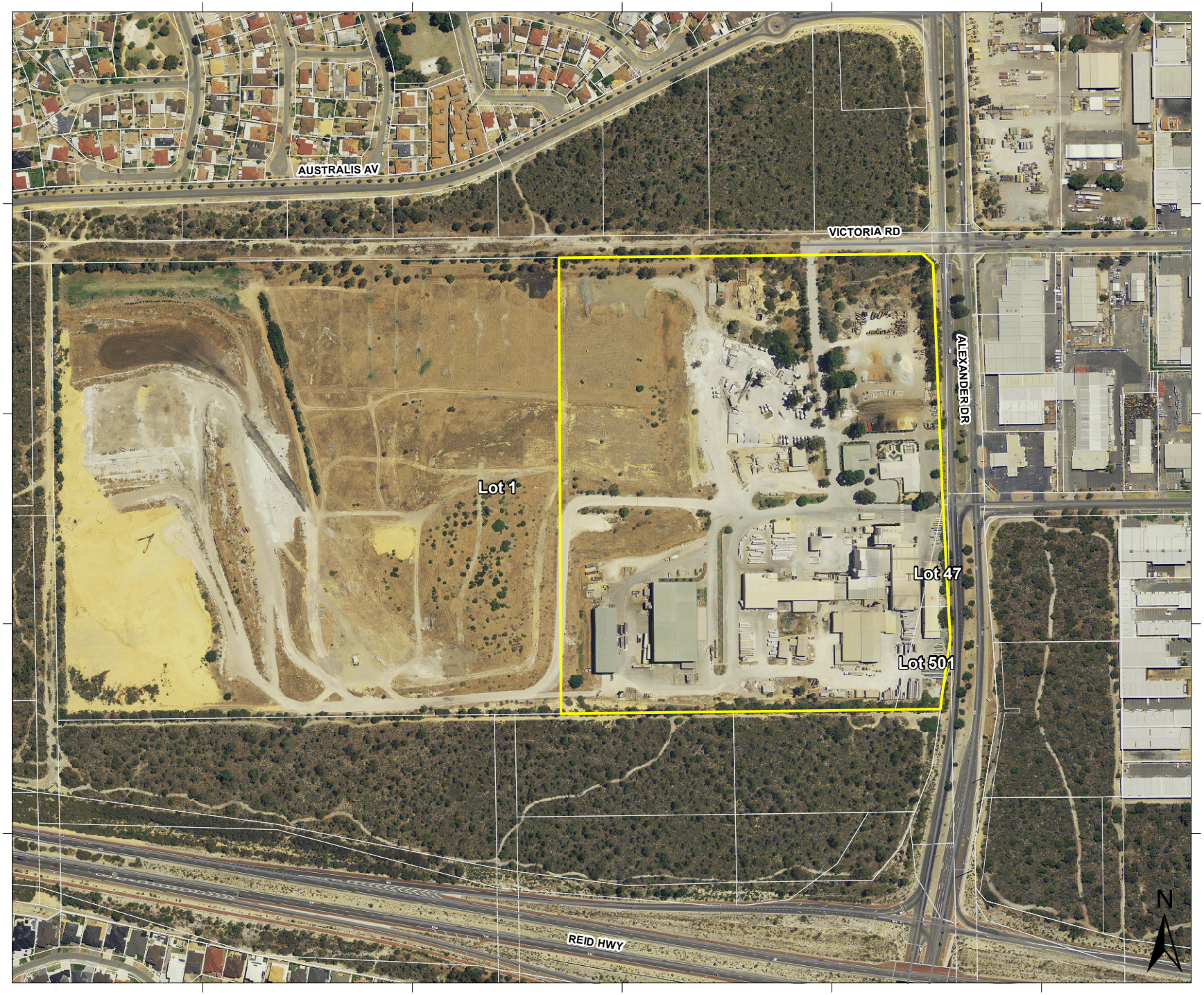
The Survey Area is bound on three sides by Bush Forever site 385 with a road on the eastern side.

1.1.1 Objective and Scope of Work

The scope of the flora and vegetation assessment were to:

- Conduct a desktop assessment of relevant literature, databases and spatial datasets to determine the environmental values and any potential issues, such as Threatened/Rare and significant species, Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs), that may be present in the site and the surrounding area;
- Produce a list of plant species (including weed species);
- Document and map the location of any Declared Rare Flora (DRF), Priority flora and any other flora of local or taxonomic significance;
- Identify, map and discuss the significance of any TECs, PECs and any other areas of ecological importance (e.g. National Parks, wetlands and Environmentally Sensitive Areas [ESAs] etc.);
- Assess, map and photograph vegetation condition; and
- Document, describe and map the vegetation associations present.

The objective of this scope of work was to support a Local Structure Plan application.



Legend

- Survey Area (15.81 ha)
- Cadastre
- Roads

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- CADASTRE SOURCED SLIP SERVICES OCTOBER 2015
- AERIAL PHOTOGRAPHY SOURCED LANDGATE FEB 2015
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LOCALITY MAP

PROJECT ID	DATE
1096_f1_site_location.mxd	19/10/2015

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
CS	NW	RF	0

Rowe Group Pty. Ltd.
501 Alexander Drive, Mirrabooka

Level 2 Flora and Vegetation Survey Report

Figure 1 - Site Location and Premises boundary

1.2 Background to the Protection of Flora and Vegetation

Western Australian (WA) flora is protected formally and informally by various legislative and non-legislative measures, which are as follows:

Legislative measures:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- *Wildlife Conservation Act 1950* (WC Act);
- *Environmental Protection Act 1986* (EP Act); and
- *Biosecurity and Agriculture Management Act 2007* (BAM Act).

Non-legislative measures:

- Western Australian Department of Parks and Wildlife (DPaW) Priority lists for flora and ecological communities;
- Weeds of National Significance (WONS); and
- Recognition of locally significant populations by the DPaW.

Other definitions, including species conservation categories, are provided in Appendix A. Conservation categories for ecological communities are provided in Appendix B.

1.2.1 EPBC Act

The EPBC Act aims to protect matters of national environmental significance (MNES). Under the EPBC Act, the Commonwealth Department of the Environment lists threatened species and communities in categories determined by criteria set out in the Act (www.environment.gov.au/epbc/index.html) (Appendix A and B).

Projects likely to cause a significant impact on MNES should be referred to the DotE for assessment under the EPBC Act.

1.2.2 WC Act

The WA DPaW lists flora under the provisions of the WC Act as protected according to their need for protection (Appendix A).

Flora is given Declared Rare status when populations are geographically restricted or are threatened by local processes. In addition, under the WC Act, by Notice in the WA Government Gazette of 9 October 1987, all native flora (spermatophytes, pteridophytes, bryophytes and thallophytes) is protected throughout the State.

1.2.3 EP Act

Declared Rare Flora (DRF) and TECs are given special consideration in environmental impact assessments, and have special status as Environmentally Sensitive Areas (ESAs) under the EP Act and the *Environmental Protection (Clearing of Native Vegetation)*

Regulations 2004. Exemptions for a clearing permit do not apply in an ESA. In addition, habitat necessary for the maintenance of indigenous fauna is considered in the clearing principles and assessed during consideration of applications for a clearing permit.

1.2.4 BAM Act

Plants may be 'Declared' by the Agriculture Protection Board (APB) under the BAM Act 2007 (WA). Declared Plants are gazetted under three categories (C1-C3), which define the action required. Details of the definitions of these categories are provided in Appendix C. A declaration may apply to the whole State, to districts, individual properties or even to single paddocks. If a plant is 'Declared', landholders are obliged to control that plant on their properties (Department of Agriculture and Food WA [DAFWA] 2015).

DPaW Weed Prioritisation Process

The DPaW Weed Prioritisation Process (WPP) was developed to progress the Environmental Weed Strategy of WA (CALM 1999). The Weed Prioritisation Process for DPaW (DPaW 2013) prioritises weeds in each of the DPaW Regions, with the aim being to establish both a species-led and an asset-protection-based approach to weed management

The species-led process assesses weed species for their invasiveness, ecological impacts, potential and current distribution and feasibility of control. The resulting priorities focus on infestations of species which are considered to be high impact, rapidly invasive and still at a population size which is feasible to eradicate or contain to a manageable size. Weed species which are already widespread do not rank as a high priority through this part of the process.

The next stage of the process investigates the use of an asset-protection-based approach to guide the management of widespread weeds. This approach focuses on identifying high value biodiversity assets, the weeds that pose a threat to these assets and the sites where control will have the greatest biodiversity benefit and cost effectiveness. Social, cultural and economic assets as well as good neighbour issues are considered at a later stage of the process.

1.2.5 Weeds of National Significance

The Australian Government along with the State and Territory governments has endorsed 32 WONS. Four major criteria were used in determining WONS:

- The invasiveness of a weed species;
- A weed's impacts;
- The potential for spread of a weed; and
- Socio-economic and environmental values.

Each WONS has a national strategy and a national coordinator, responsible for implementing the strategy. WONS are regarded as the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts (Thorp & Lynch 2000).

1.2.6 DPaW Priority Lists

The DPaW lists 'Priority' flora that have not been assigned statutory protection as Declared Rare or 'Scheduled' under the WC Act, but which are under consideration for declaration as DRF. Flora assessed as Priority 1-3 are considered to be in urgent need of further survey. Priority 4 flora require monitoring every 5-10 years and Priority 5 flora are subject to a specific conservation program (Appendix A).

The DPaW maintains a list of PECs which identifies ecologically valuable communities that need further investigation before possible nomination for TEC status. Once listed, a community is a PEC, and when endorsed by the WA Minister of Environment becomes a TEC, and protected as an ESA under *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Appendix B).

1.2.7 Informal Recognition of Flora

Certain populations or communities of flora may be of local significance or interest because of their patterns of distribution and abundance. For example, specific locations of flora may be locally significant because they are range extensions to the previously known distribution, or are newly discovered taxa (and have the potential to be of more than local significance). In addition, many species are in decline as a result of threatening processes (land clearing, grazing, changed fire regimes), and relict populations of such species assume local importance for the DPaW. It is not uncommon for the DPaW to make comment on these species of interest.

2 Biophysical Environment

2.1 Climate

The closest official Bureau of Meteorology (BoM) weather station which provides all climate data near to the Survey Area is the Perth Metro Weather Station (Station number 009225), approximately 6.1 km south of the Survey Area. The climate for Perth is described as Mediterranean (Mitchell *et al.* 2002), with mean minima of approximately 12.8˚C and a maxima of 24.7˚C. Rainfall totals approximately 733.3 mm per annum (BoM 2015).

The Perth Metro Weather Station recorded 460.8 mm of rain in the months prior to the Spring survey (January 2015 – September 2015), 204.1 mm (30.7%) below the long term average rainfall of 664.9 mm for the same period (BoM 2015). The three months prior to survey (July 2015 – September 2015), Perth Metro Weather Station recorded 267.4 mm of rainfall, 24.7% below the 355.1 mm average long term rainfall for the same period (BoM 2015) (Figure 2).

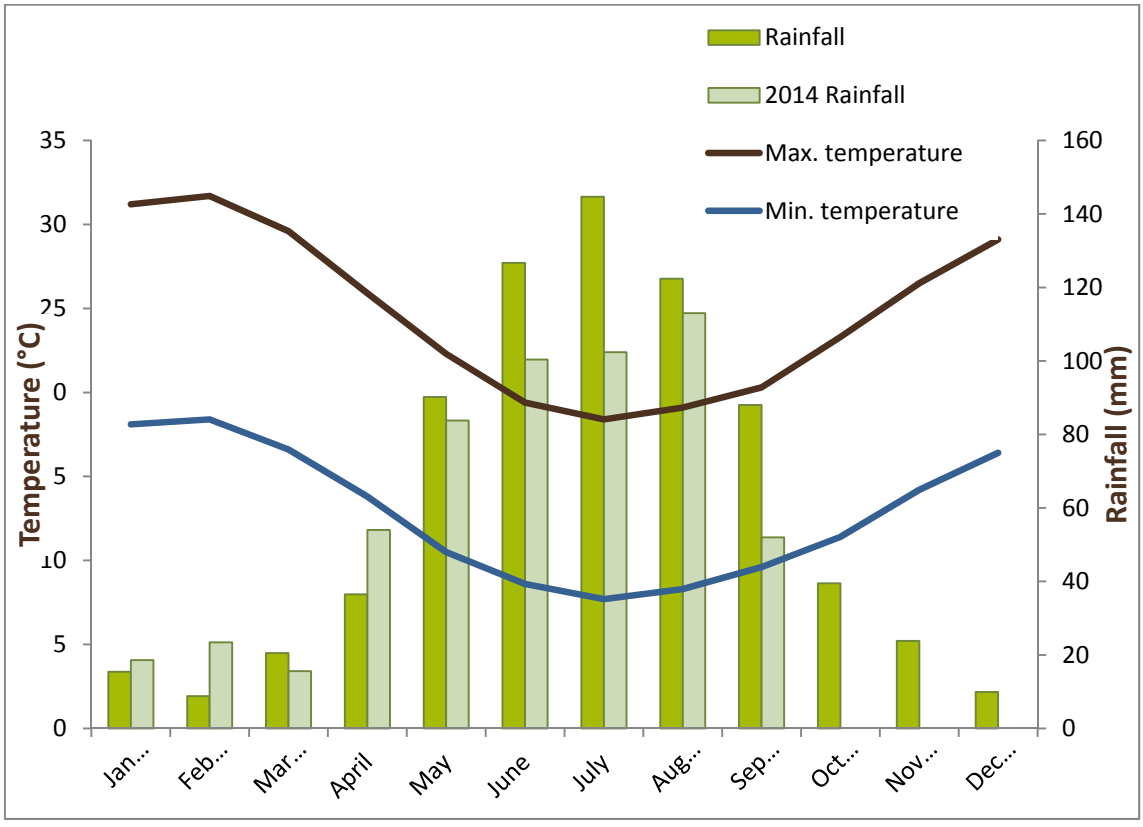

Figure 2: 2015 rainfall (mm) and temperature (˚C) for Perth Metro from 1990 to 2015 (BoM 2015).

2.2 Geology and Soils

Soil-landscape mapping of south WA has been captured at scales ranging from 1:20,000 to 1:250,000 (DAFWA 2012). Soil-landscape mapping describes broad soil and landscape characteristics from regional to local scales. The Survey Area contains the following soil system:

- 211Sp; Sand dunes and plains. Yellow deep sands, pale deep sands and yellow/brown shallow sands; and
- 212Bs; Swan Coastal Plain from Busselton to Jurien. Sand dunes and sandplains with pale deep sand, semi-wet and wet soil. Banksia-paperbark woodlands and mixed heaths.

2.3 Hydrology

No streams or tributaries according to Department of Water (DoW 2015) or Geomorphic wetlands as mapped by Department of Parks and Wildlife occur in the Survey Area (DPaW 2015d).

2.4 Bush Forever

Bush Forever is a State Government Policy and program that identifies 51,200 ha of regionally significant vegetation for protection, covering 26 vegetation complexes. This amounts to approximately 18% of the original vegetation on the Swan Coastal Plain (SCP) portion of the Perth metropolitan area.

Regionally significant vegetation has been identified based on criteria relating to its conservation value. Important criteria in the identification process include the achievement, where possible, of a comprehensive representation of all the ecological communities originally occurring in the region, principally through protecting a target of at least 10% of each vegetation complex in the Bush Forever project boundary (Government of WA 2000).

No Bush Forever Sites are in the Survey Area. There is one Bush Forever site adjacent to the survey area on the north, west and south boundaries, Site 385 Reid Highway Bushland, Mirrabooka/Malaga (Figure 3).

2.5 Ecological Linkages

The Survey Area forms part of the Perth Biodiversity Project's Draft Regional Ecological linkage network presented in Figure 3. The purpose of the Regional Ecological Linkages identified by the Perth Biodiversity Project was to link protected natural areas with other areas of mapped native vegetation. Priority was given to identifying linkages through those areas having the greatest assumed protection and to those areas that maximised opportunities to form continuous corridors of native vegetation. The Survey Area forms part of linkage '21' and '22' that connects to a southern link west of the Survey Area

'23'. Given the lack of vegetation in the Survey Area its contribution to the linkage system is limited.

2.6 Biogeographic Regionalisation for Australia

The Biogeographic Regionalisation of Australia (IBRA7) divides Australia into 89 bioregions based on major biological and geographical/geological attributes. These bioregions are subdivided into 419 subregions, as part of a refinement of the IBRA framework (Department of the Environment 2015a).

The Survey Area lies within the Swan Coastal Plain Bioregion and Perth subregion (SWA2) of the IBRA. The Perth subregion is a low lying coastal plain composed of colluvial and aeolian sands, alluvial river flats and coastal limestone rising to duricrusted Mesozoic sediments in the east. Outwash plains are extensive only in the south, while a complex series of seasonal wetlands and swamps extends from north to south. Vegetation comprises heath and/or Tuart woodlands on limestone, Banksia and Jarrah-Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvial soils, *Casuarina obesa* on out-wash plains, and paperbark (*Melaleuca* spp.) in wetland areas (Mitchell et al. 2001).

2.7 Broad Vegetation Types

Mapping of the vegetation of the Perth region of WA was completed on a broad scale (1:250,000) by Beard (1978). 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 Survey Area. The Shepherd *et al.* (2001) vegetation type (along with the corresponding Beard [1978] type in brackets) is described below, and its representation within the Survey Area, subregion, region and state is shown is Table 2.

- Spearwood_6 (e2, 4Mi) Medium woodland; Tuart and Jarrah; and
- Bassendean_1001 (e2MbcbLi): Medium very sparse woodland; Jarrah, with low woodland; Banksia and Casuarina.

Table 1: Broad Vegetation Type within the Survey Area and its State and Regional Representation (DPaW 2014)

	Pre-European area (ha)	Current extent (ha) 1	Remaining (%)	Current extent % in IUCN Class I-IV Reserves1
Vegetation Types (Beard 1979/ Shepherd *et al.* 2001) in the state				
6 (e2,4Mi)	56,343	14,018	24.88	13.38
1001 (e2MbcbLi)	57,410	14,152	24.65	1.14
Vegetation Types (Beard 1979/ Shepherd *et al.* 2001) in the Swan Coastal Bioregion				
6 (e2,4Mi)	56,343	14,018	24.88	3.33
1001 (e2MbcbLi)	57,410	14,152	24.65	1.14
Vegetation Types (Beard 1979/ Shepherd *et al.* 2001) in the Perth Subregion				
6 (e2,4Mi)	56,343	14,018	24.88	3.33
1001 (e2MbcbLi)	57,410	14,152	24.65	1.14

Mapping by Heddle *et al.* (1980) based on relation to the landform-soil units determined by Churchward and McArthur (1980) identified one vegetation complex occurring in the Survey Area which is summarised in Table 2. The delineation of vegetation complexes is based on the concept of series of plant communities forming regularly repeating complexes associated with a particular soil unit. The Heddle *et al.* (1980) vegetation complex that occurs across the Survey Area is described below:

- Karrakatta – Central and/South: Predominantly open forest of *Eucalyptus gomphocephala – Eucalyptus marginata – Corymbia calophylla* and woodland of *E. marginata* and *Banksia* spp.

Table 2: Vegetation Complex within the Survey Area and its State and Regional Representation

	Pre-European area (ha)	Current extent (ha)	Remaining (%)	Current extent % Secure Tenure Reserves
Vegetation Complexes (Heddle *et al.*, 1980) in the System 6/part System 1 area (EPA 2006)				
Karrakatta – Central and/South	49,912	14,729	29.5	2.5
Vegetation (Heddle *et al.*, 1980) in the Swan Coastal Bioregion (PBP 2013)				
Karrakatta – Central and/South	49,786	11,905	23.91	2.57

3 Methods

3.1 Background

The flora survey was consistent with a single season Level 2 survey as per the EPA requirements for environmental surveying and reporting for flora and vegetation in WA where practical and relevant, as set out in the following documents:

- EPA Guidance for the Assessment of Environmental Factors: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in WA No. 51 (EPA 2004a); and
- EPA Guidance for the Level of Assessment for Proposals affecting Natural Areas within the System 6 Region and Swan Coastal Plain Portion of the System 1 region. Guidance Statement No. 10 (EPA 2006).

3.2 Flora and Vegetation Survey Methods

3.2.1 Flora and Vegetation Database Review

The desktop study provided background information on the flora and vegetation of the Survey Area. This involved a search of the following sources:

- Reports from surrounding area;
- DPaW Threatened and Priority Flora database (DPaW 2015a);
- DPaW Threatened and Priority Ecological Communities database (DPaW 2015b); and
- Protected Matters Search Tool (DotE 2015b); and
- NatureMap (DPaW 2015d).

A request for a database search was submitted to the DPaW on 14 September 2015 (5 km buffer search around the Survey Area) to obtain a list of Declared Rare Flora/Threatened or Priority flora, and TECs and PECs in and near the Survey Area (Figure 4). These sources were used to compile a list of expected DRF or Priority species and TECs and PECs that may occur based on the landforms in the Survey Area.

3.2.2 Flora and Vegetation Field Survey

The field survey was conducted by one botanist, on 14 September and 7 October 2015. The survey included the assessment of one quadrat and two relevés and mapping notes. Quadrats are vegetation survey plots which are accurately measured out as 10 x 10 m (or an area equivalent to 100 m^2) and marked at the SW corner using a handheld Garmin GPS unit.

The information recorded at the quadrat included landscape features, surface soil colour and texture, bare ground, litter cover, disturbance, fire age and aspect. Vegetation condition was mapped as per Bush Forever condition scales (Government of WA 2000). Each species of plant at each quadrat was recorded, including information on height and percentage cover.

3.2.3 Systematic Searches

In addition to the information collected from the quadrats, systematic traverses (transects across the Survey Area on foot) throughout the Survey Area were undertaken for significant flora. For each population of significant flora identified during the field survey, the following was recorded:

- Co-ordinate locations (using handheld GPS units);
- Description of vegetation association present; and
- Estimation of population size.

3.2.4 Taxonomy and Nomenclature

Where field identification of plant taxa was not possible, specimens were collected for later identification at the WA Herbarium (WAH).

The species list was checked against FloraBase (WAH 2015) to determine the species' conservation status. Threatened and Priority Flora were verified against the EPBC Act listing of threatened species to determine Commonwealth listing.

Introduced species were checked against the DPaW Weed Prioritisation Process (WPP) (DPaW 2013), to determine their ranking in terms of environmental impact. The BAM Act Declared Plants list was consulted to determine if any are Declared Plants, and the Weeds of National Significance list to determine any WONS (Commonwealth of Australia 2015).

3.2.5 Vegetation Mapping

The vegetation mapping units were described based on their structure and species composition, as defined by quadrat data and field observations. Vegetation was mapped in the field using handheld GPS (Garmin) units and high-resolution aerial photographs (1:3,402 scale), which in the office were digitised using GIS software (ArcGIS 9.3.1).

Vegetation condition was mapped in the field using handheld GPS (Garmin) units and high-resolution aerial photographs (1:10,000 scale), which in the office were digitised using GIS software (ArcGIS 9.3.1). Vegetation condition was assessed based on Bush Forever (Government of WA 2000) (Appendix D).

4 Results

4.1 Flora, Vegetation and Fauna Survey Limitations and Constraints

Survey constraints are often difficult to predict, as is the extent to which they influence survey effort. Survey limitations and constraints of the flora, vegetation and fauna survey are detailed in Table 3.

Table 3: Limitations and Constraints Associated with the Survey Area.

VARIABLE	IMPACT ON SURVEY OUTCOMES
Access	The whole Survey Area was accessed and traversed. Particular focus was given to areas expected to be impacted and or that may have species of conservation significance.
Experience	The personnel who executed these surveys were practitioners suitably qualified in their respective fields: • Coordinating Principal Botanist: Narelle Whittington; • Field Staff: Narelle Whittington; • Data Interpretation and Reporting: Narelle Whittington; and • Report Review: Felicity Jones.
Timing, weather, season	The survey was conducted during spring (see section 3.2.2) after three months of below average rainfall (refer to section 2.1). Flora composition changes with time, particularly seasonally as a result of seasonal conditions. Therefore, botanical surveys completed at different times will have varying results.
Scope: Life forms sampled	The scope of this project included the detailed surveying of flora and vegetation and searching for conservation significant species or communities.
Sources of information	The Swan Coastal Plain bioregion has been extensively surveyed; as a result, numerous published and unpublished flora surveys have been undertaken in the area. Relevant DPaW searches were undertaken for the study area and

	are listed in section 3.2
Completeness	The entire Survey Area was accessible; the time spent conducting the survey was considered adequate for the size (15.81 ha) and complexity of the site. The vegetation association was sufficiently surveyed; with one quadrat and two relevés being assessed.
Disturbances	The Survey Area contains multiple types of disturbance. Recent disturbance includes the installation of fire breaks, along with the presence of weed species and historical clearing and stockpiling of fill.

4.2 Flora Results

4.2.1 Database Results

The database searches identified 19 conservation significant flora potentially occurring in the vicinity of the Survey Area. Of these, 14 are classed as Threatened, two as Priority 1, one as Priority 3 and two as Priority 4.

The likelihood of these 19 conservation significant flora occurring in the Survey Area is shown in Table 3 (refer also to Figure 4).

A search of the DPaW database and EPBC PMST for TECs and PECs identified one State listed TEC as occurring within five kilometres of the Survey Area and two Priority communities (Figure 4), these are as follows:

- FCT SCP20a – Banksia attenuata woodlands over species rich dense shrublands (Endangered, DPaW);
- FCT SCP22 - *Banksia ilicifolia* woodlands (Priority 3, DPaW); and
- FCT SCP21c - Low lying *Banksia attenuata* woodlands or shrublands (Priority 3, DPaW).

Table 4: Assessment of the Likelihood of Occurrence of Significant Flora in the Survey Area

[1]Closest record to Survey Area based on DPaW 2015.
Likely = Suitable habitat present and records less than 5 km from the Survey Area, Possible = Suitable habitat present and records between 5 km and 20 km from the Survey Area, and Unlikely = No suitable habitat present and/or records greater than 20 km from the Survey Area. En = Listed as Endangered under the EBPC Act, Vu = Listed as Vulnerable under the EBPC, Ce= Critically Endangered under the EBPC Act, P = Listed as Priority by the DPaW DRF = Declared Rare Flora as listed by the State.

Conservation Status	DATA	Species	Habitat Information (WAH 2013)	Suitable Habitat	Closest Record[1] (km)	Likelihood
T	EPBC	*Andersonia gracilis*	Grey-white sand on swampy, seasonally wet sites.	No	19.9	Unlikely
T	EPBC	*Anigozanthos viridis* subsp. *terraspectans*	Grey sand, clay loam. Winter-wet depressions.	No	84	Unlikely
T	DPaW EPBC	*Caladenia huegelii*	Grows in deep sandy soil in Banksia-Eucalyptus marginata woodland (Brown et al. 2013).	Yes	3.1	Likely
T	DPaW (Naturemap)	*Calectasia cyanea*	White grey or yellow sand, gravel. Is not known to occur in the Perth Region.	No	11.7	Unlikely
T	EPBC	*Darwinia foetida*	No information available	Unknown	22.47	Unlikely
T	EPBC	*Diuris micrantha*	Brown loamy clay. Winter-wet swamps, in shallow water	No	33.8	Unlikely
T	EPBC	*Diuris purdiei*	Grey-black sand, moist. Winter-wet swamps.	No	14	Unlikely
T	EPBC	*Drakaea elastica*	White or grey sand. Low-lying areas adjoining winter-wet swamps.	No	23.7	Unlikely
T	EPBC	*Drakaea micrantha*	White-grey sand.	No	22	Unlikely

Conservation Status	DATA	Species	Habitat Information (WAH 2013)	Suitable Habitat	Closest Record[1] (km)	Likelihood
T	EPBC	*Grevillea curviloba* subsp. *incurva*	Sand, Sandy loam. Winter-wet heath.	No	18	Unlikely
T	EPBC	*Lepidosperma rostratum*	Peaty sand, clay.	No	17.4	Unlikely
T	EPBC	*Thelymitra dedmaniarum* (*Thelymitra manginii*)	The species is found in open *Eucalyptus wandoo* and *E. accedens* woodlands. Soil is red-brown sandy-loam associated with dolerite and granite outcrops (DEC 2012).	No	17.62	Unlikely
T	EPBC	*Thelymitra stellata*	Sand gravel, lateritic loam	No	16.2	Unlikely
T	EPBC	*Trithuria occidentalis*	Wet areas	No	11.6	Unlikely
P1	DPaW	*Amphibromus vickeryae*	Wet areas	No	Not available	Unlikely
P1	DPaW	*Drosera x sidjamesii*	Peaty sand, along lake margins close to winter high-water line.	No	9.5	Unlikely
P3	DPaW	*Cyathochaeta teretifolia*	Grey sand, sandy clay. Swamps, creek edges	No	3.4	Unlikely
P4	DPaW	*Drosera occidentalis subsp. occidentalis*	Sandy & clayey soils. Swamps & wet depressions	No	3.1	Unlikely
P4	DPaW	*Jacksonia sericea*	Calcareous and sandy soils.	No	2.1	Unlikely

4.1 Flora and Vegetation Field Results

4.1.1 Overview of Flora

A total of 58 taxa (including species, subspecies, varieties and forms) from 48 genera and 24 families were recorded in the Survey Area. The commonly occurring families were; Fabaceae (10 taxa), Asparagaceae (4 taxa) and Proteaceae and Poaceae (both with 5 taxa). The most frequently recorded genera were; *Lomandra, Hibbertia, Acacia and Daviesia* which were all represented by three taxa.

The flora inventory is provided in Appendix E and the site data sheets in Appendix F.

4.1.2 Flora of Conservation Significance

No Threatened species listed under the EPBC Act and/or gazetted as Declared Rare Flora (Threatened) pursuant to the WC Act were recorded during the survey. No species listed as Priority by DPaW were recorded during the survey.

4.1.3 Introduced Flora

A total of 13 introduced species were recorded during the survey. None of these are listed as Declared under the BAM Act or listed as a WONS.

Table 4: Introduced Flora Recorded in the Survey Area and their Ranking under the DPaW Weed Prioritisation Process (DPaW 2013a)

TAXON	(COMMON NAME)	DPAW WPP RANKING
* *Avena barbata*	Bearded oat	Low
**Briza maxima*	Blowfly Grass	Low
**Ehrharta calycina*	Perennial Veldtgrass, Perennial Veldt Grass	Low
**Eragrostis curvula*	African lovegrass	Low
**Euphorbia terracina*	Geraldton carnation weed	Moderate
**Fumaria capreolata*	Climbing Fumitory, Whiteflower Fumitory	Low
**Hypochaeris glabra*	Flatweed, Smooth Catsear	Low
**Lysimachia arvensis*	Scarlet Pimpernel	Negligible
**Oxalis pes-caprae*	Soursob	Low
**Pelargonium capitatum*	Rose Pelargonium	Low
**Sonchus oleraceus*	Sowthistle	Negligible

TAXON	(COMMON NAME)	DPAW WPP RANKING
**Trachyandra divaricata*	Dune onion weed	Low
**Ursinia anthemoides*	Ursinia	Negligible

*Denotes Introduced species

4.1.4 Vegetation Associations

Two natural vegetation associations were described for the Survey Area which covered 0.15 ha in area (Figure 5):

- BmMps- Low Open Woodland of *Banksia menziesii* over *Mesomelaena pseudostygia*, *Daviesia nudiflora* subsp. *nudiflora*, *Xanthorrhoea preissii*, *Eremaea pauciflora* var. *pauciflora*, *Stirlingia latifolia*, *Acacia pulchella* and *Daviesia triflora*.
- Em – Low Open Woodland of *Eucalyptus marginata* over *Mesomelaena pseudostygia*, *Jacksonia sternbergiana* and *Daviesia divaricata* subsp. *divaricata* (ms) over introduced species.

4.1.5 Vegetation Condition

Vegetation condition ranged from Excellent to Completely Degraded with the majority of the Survey Area considered to be in Completely Degraded condition (1.02 ha). All vegetation excluding a small pocket of vegetation in the north east corner of the Survey Area consists of non-endemic and/or garden variety species. The strip of vegetation along the southern boundary contains non-endemic Eucalypt species with an understorey of a few scattered native species dominated with introduced grasses. The only area considered to be in Excellent condition is the pocket of native vegetation mapped as BaMps. This area is very small and has been recently disturbed from the installation of a fire break and the removal of dead trees and shrubs (Plates 1 and 2).

Plate 1: New Firebreak.

Plate 2: Removal of dead *Banksia*.

Condition mapping is presented in Figure 6 and the extent described in Table 5. The average fire age of the vegetation was considered very old (>12 years since last fire).

Table 5: Vegetation Condition and Extent in the Survey Area

CONDITION	EXTENT (HA)
Excellent	0.09
Degraded	0.06
Degraded – Completely Degraded	0.22
Completely Degraded	1.02

4.1.6 Floristic Community Types

Statistical analysis (multivariate analysis) and data interpretation, as shown in Table 6 and 7 was undertaken to help determine the FCT represented by the vegetation in the project area. Due to the small area of native vegetation, two separate analyses were undertaken. The first involved comparing the data collected from the one quadrat established in the survey area to the 509 individual quadrats established by Gibson *et al.* (Table 6). The second analysis involved comparing the combined data collected from the native vegetation, inclusive of the quadrat, relevé and opportunistic collections, against the community data produced by Gibson *et al.* (Table 7).

Due to the poor condition and size of the Eucalyptus marginata vegetation association a quadrat was not established and therefore a FCT was inferred. This involves reviewing site data for other factors that are diagnostic of FCTs, including the presence of indicator species, soil types and landform position.

Table 6: FCT Quadrat Analysis

VEGETATION ASSOCIATION	FLORISTIC COMMUNITY TYPES1	SIMILARITY BASED ON STATISTICAL ANALYSIS	COMMENTS	INFERRED FLORISTIC COMMUNITY TYPE
BmMps	SCP20a – *Banksia attenuata* woodlands over species rich dense shrublands	30.3%	Even though the site lacked a dominance of *Banksia attenuata*, the understorey species present and the adjacent occurrence of the FCT supports the analysis results.	SCP20a – *Banksia attenuata* woodlands over species rich dense shrublands Based on surrounding

Vegetation Association	Floristic Community Types1	Similarity Based on Statistical analysis	Comments	Inferred Floristic Community Type
	SCP23b – Northern *Banksia attenuata – B. menziesii* woodlands	29.8%	SCP 23b has a northern distribution between Melaleuca Park and Gingin so is unlikely to occur in the Survey Area.	occurrences, landform, soils and dominate species present (30.3% similarity)
	SCP20c – Eastern shrublands and woodlands	29.4%	Generally the FCT is restricted to the Forrestfield and Guildford units and is not known to occur in the area.	

Table 7: FCT Community Analysis

Vegetation Association	Gibson *et al.* Quadrat & FCT	Similarity Based on Statistical analysis	Comments	Inferred Floristic Community Type
BmMps	KOON – 1 (20a)	39.2%	Given that the top two closest quadrats in similarity to the one established in the Survey Area are both FCT20a it is likely the results are accurate.	SCP20a – *Banksia attenuata* woodlands over species rich dense shrublands Based on the similarity results and the close proximity of the Gibson quadrat to the Survey Area. (39.2% & 38.8%)
	LAND - 1 (20a)	38.8%	As above	
	KING – 2 (28)	38.6%	As above.	

Vegetation Association	Comments	Inferred Floristic Community Type
Em	This vegetation association was dominated by *Eucalyptus marginata* and lacked a diverse native understorey. Due to the location and the scattered species present it has been inferred as FCT SCP20a.	SCP20a – *Banksia attenuata* woodlands over species rich dense shrublands

4.1.7 Threatened and Priority Ecological Communities

The vegetation association, BmMps, has been identified as FCT SCP20a. SCP20a is described as '*Banksia attenuata* woodlands over species rich dense shrublands' and is listed as Endangered by the State.

Vegetation association Em has also been inferred as 20a even through it lacks community structure and the dominant species that typifies FCT SCP20a, such as *Banksia attenuata*. There are known occurrences of FCT SCP20a being dominated by *Eucalyptus marginata* and without the disturbances that have occurred in the Survey Area it is likely that associations BmMps and Em formed the same community type.

4.1.8 Regional Representation

Vegetation mapping units described in the Survey Area were correlated with the Beard (1978) and Shepherd *et al*. (2001) broad vegetation types as much as possible by examining similarities in vegetation descriptions. Differences exist with the terminology used in the descriptions as they are based on different methods of categorising and characterising vegetation types, and the different spatial scales of the analysis (i.e. region vs. local). Beard (1978) and Shepherd *et al*. (2001) Vegetation type 6 (e2, 4Mi) was determined to correspond with the vegetation associations in the Survey Area.

5 Discussion

5.1 Flora Context

A total of 58 taxa (including species, subspecies, varieties and forms) from 48 genera and 24 families were recorded in the Survey Area.

The flora species richness recorded for the remnant vegetation in the Survey Area is slightly below the average expected, when compared to the species richness recorded by Gibson *et al.* (1994) for the same FCT represented in the Survey Area. For example Gibson *et al*. (1994) recorded a mean species richness of 67.4 species within quadrats of SCP20a 'Banksia attenuata woodlands over species rich dense shrublands'. The slightly lower diversity can be accounted for by the high level of disturbance in the Survey Area and the isolation of the remnant vegetation from other bushland areas by roads and development.

5.2 Flora of Conservation Significance

No Threatened species pursuant to the EPBC Act or to the WC Act were recorded in the Survey Area during the field survey. *Caladenia huegelii*, listed as Threatened by the EPBC Act, and also listed under the WC Act, was identified as potentially occurring in the Survey Area due to suitable habitat occurring in the Survey Area and the nearest occurrence being 3.1 km away.

Caladenia huegelii is a tuberous, perennial orchid that grows to 0.6 m high and is easily recognizable during its flowering period from September to October (WAH 2015). The survey was undertaken in both September and October within the known flowering period of the orchid. Outside of this period *C. huegelii* remains as an underground tuber and is difficult to detect in the field. The species was not found on site during the survey.

A further five priority taxa were identified as potentially occurring in the Survey Area based on database searches. Of these, none are considered likely to occur based on the habitat preference of these species not occurring in the Survey Area.

5.3 Vegetation of Conservation Significance

A search of the DPaW TEC and PEC database identified One TEC and two PECs occurring within five km of the Survey Area (DPaW 2015c). The TEC, FCT SCP20a – *Banksia attenuata* woodlands over species rich dense shrublands has been identified as occurring on site.

Results from the statistical analysis (multivariate analysis) and data interpretation indicate that the vegetation association BmMps and Em are analogous to FCT SCP20a. The remnant, over time, has experienced some death of Banksia species, however, the understorey remains relatively intact and in Excellent condition. Regardless of this, however, the small size and isolation from other bushland

remnants increases the impacts of edge effects and is unlikely to be sustainable in the long term.

Possible impacts to TECs are taken into account by state assessment bodies when applications to develop or clear land are evaluated. Under the EP Act, any clearing of native vegetation requires a permit unless done for an exempt purpose. These exemptions do not apply in ESAs. TECs have been defined under the regulations as ESAs so the exemptions from requiring a clearing permit do not apply. Any such clearing proposal, therefore, must be undertaken under a specific permit and be assessed for any environmental impact.

5.4 Vegetation Condition and Introduced Flora

Vegetation condition ranged from Excellent to Completely Degraded with the majority of the Survey Area considered to be in Completely Degraded condition (1.02 ha). All vegetation excluding a small pocket of vegetation in the north east corner of the Survey Area consists of non-endemic and/or garden variety species. The lack of native vegetation on site can be attributed to the past and present land use of the Survey Area and the removal of vegetation for the installation of drainage sumps and the stockpiling of soil. There was also waste material from the various businesses that have encroached into bushland.

The strip of vegetation along the southern boundary contains non-endemic Eucalypt species with an understorey of a few scattered native species dominated with introduced grasses. The only area considered to be in Excellent condition is the pocket of native vegetation. A quadrat was established in the vegetation remnant using flagging tape instead of a permanent marker. The second visit discovered that due to bushfire management, a firebreak had been installed and dead trees removed. These activities have reduced the size of the remnant, encroached into the quadrat and prevented another quadrat being established. Instead a relevé was established next to the original quadrat to collect addition flora data.

The current land use and roads are an introduction source for weeds, rubbish and tracks. These will likely diminish the condition of the isolated pocket of vegetation.

A total of 13 introduced species were recorded during the survey, but none are listed as Declared under the BAM act or WONS. All of the weed species recorded are common bushland and agricultural weeds (Hussey *et al.* 2007).

5.5 Regional Representation

The Karrakatta Complex Central and/ South is estimated to have 29.5% native vegetation remaining based on the pre-European extent, with 2.5% in secure tenure (EPA 2006). More recently the Perth Biodiversity Project (PBP 2013) has mapped native vegetation extent by vegetation complex on the Swan Coastal Plain. It is estimated that

23.91% of Karrakatta Complex Central and/ South remains compared to its pre-European extent (PBP 2013).

The EPA recognises vegetation complexes that are not well represented as being significant. Vegetation complexes which have 10%-30% remaining may be considered regionally significant. Proposals that would affect a vegetation complex with 10% or less remaining are likely to be formally assessed by the EPA (EPA 2006).

5.6 Ecological Linkages

The Survey Area forms part of the Perth Biodiversity Project's Draft Regional Ecological linkage network. The Survey Area is part of a non-continuous linkage of bushland which is adjacent to a Bush Forever site on three sides. Recognised by the EPA, DPaW and local government, the retention of native vegetation and fauna habitat within the Regional Ecological Linkages aims to reduce the loss of biodiversity and key ecological functions across the South West. The EPA expects that in preparing plans and proposals for development, consideration will be given to both the site-specific biodiversity conservation values of patches of native vegetation, as well as the landscape function and core linkage significance of a patch in supporting the maintenance of an ecological linkage.

The vegetation in the Survey Area does very little in contributing to the linkage of bushland areas in the region due to its isolation and size. In addition to this, the various current land uses within the boundaries of the Survey Area limit the sustainability of the vegetation due to the stresses of firebreak maintenance and weed infestations on an already very small pocket of vegetation.

6 Conclusions

The targeted flora survey was undertaken at a time considered appropriate for the species of conservation significance considered likely to occur, and within the recommended season and flowering period for the south west botanical province. The Survey Area was sufficiently surveyed and as such the following conclusions can be made:

- A total of 58 taxa from 48 genera and 24 families were recorded in the Survey Area;
- No Threatened species are present on site;
- No Priority species are present on site;
- One TEC, FCT SCP20a – *Banksia attenuata* woodlands over species rich dense shrublands has been identified as occurring on site;
- TECs have been defined under the regulations as ESAs so the exemptions from requiring a clearing permit do not apply in these areas. Any such clearing proposal, therefore, must be undertaken under a specific permit and be assessed for any environmental impact; and
- The vegetation in the Survey Area does very little in contributing to the linkage of bushland areas in the region due to its isolation and size. The current land use and roads are an introduction source for weeds, rubbish and tracks. These will likely diminish the condition of the isolated pocket of vegetation.

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8 Limitations

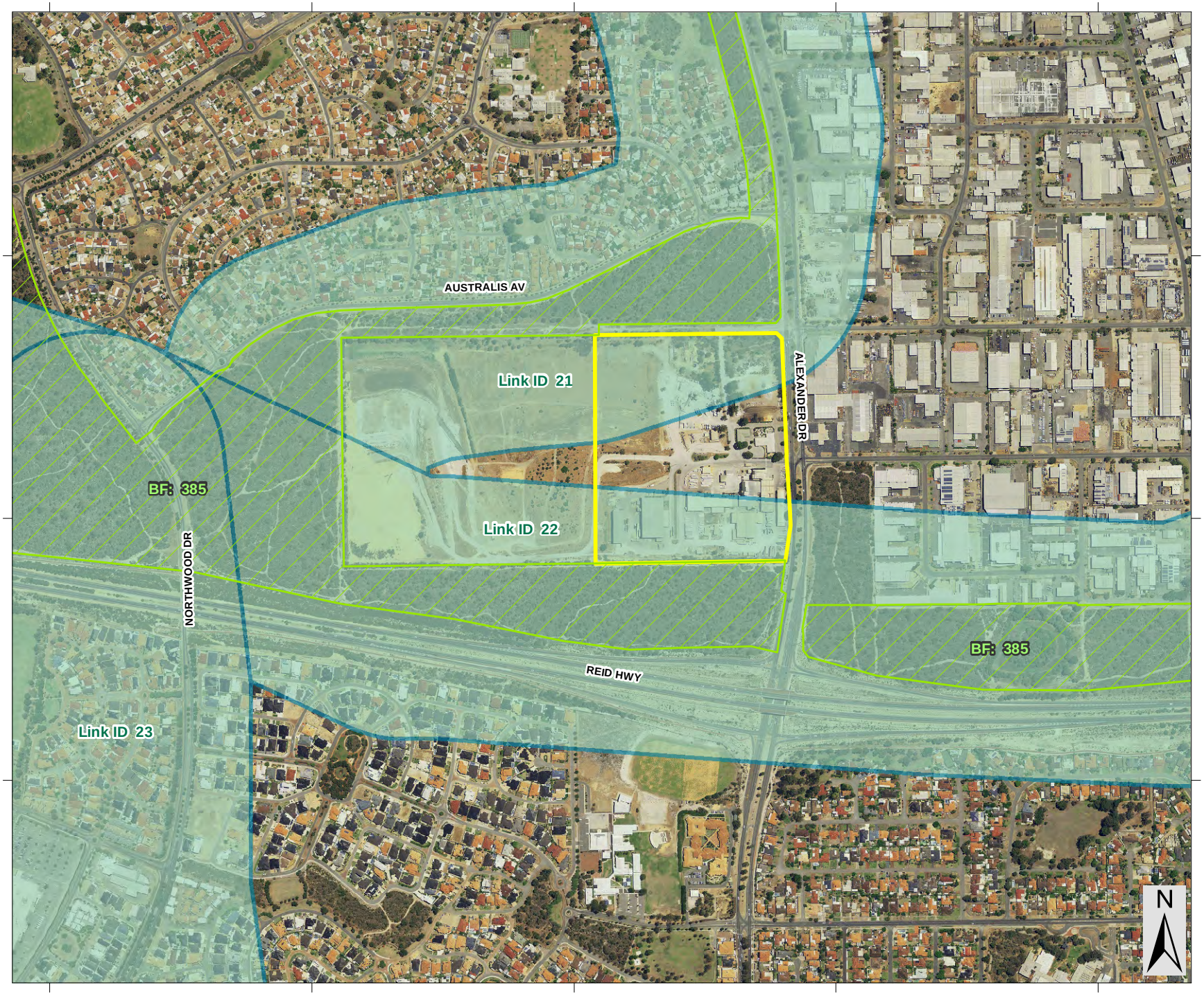
This report is produced strictly in accordance with the scope of services set out in the contract or otherwise agreed in accordance with the contract. 360 Environmental makes no representations or warranties in relation to the nature and quality of soil and water other than the visual observation and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

FIGURES



Legend

- Survey Area (15.81 ha)
- Bush Forever Sites
- Perth Regional Ecological Linkages

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- CADASTRE SOURCED SLIP SERVICES OCTOBER 2015
- BUSH FOREVER SOURCED DOP 2014
- PERTH ECOLOGICAL LINKAGES SOURCED WALGA 2015
- AERIAL PHOTOGRAPHY SOURCED LANDGATE FEB 2015
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LOCALITY MAP

PROJECT ID	DATE
1096_f1_site_location.mxd	19/10/2015

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
CS	NW	RF	0

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Figure 3 - Bush Forever and Ecological Linkages

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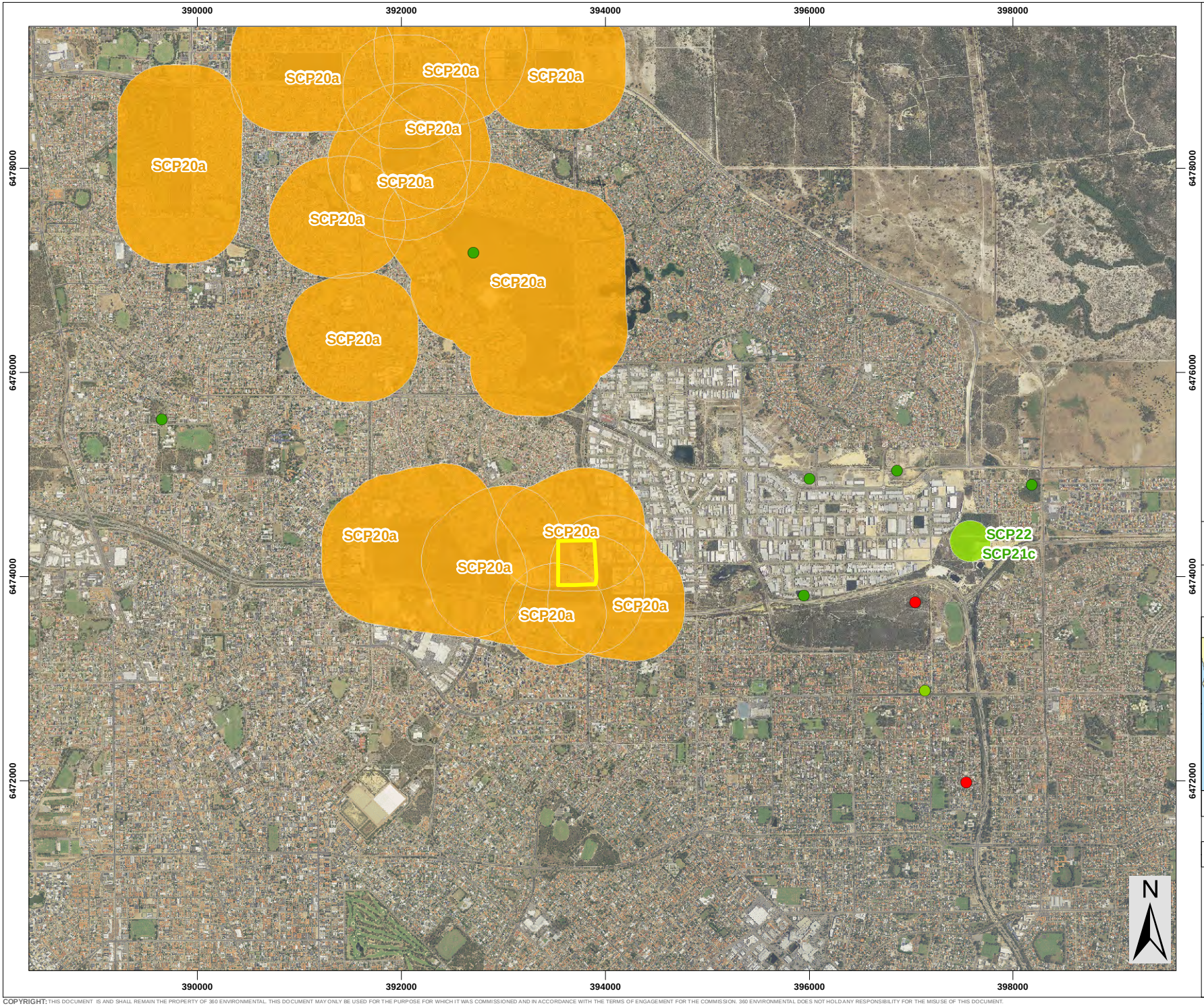

Legend

Survey Area (15.81 ha)

TECs/PECs

- Priority 4
- Priority 3
- Priority 2
- Priority 1
- Vulnerable
- Endangered
- Critically Endangered

Rare and Priority Flora

- Priority 4
- Priority 3
- Priority 2
- Priority 1
- Declared Rare

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- CADASTRE SOURCED SLIP SERVICES OCTOBER 2015
- TEC/PEC AND FLORA SOURCED DPAW SEPT 2015
- AERIAL PHOTOGRAPHY SOURCED LANDGATE FEB 2015
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LOCALITY MAP

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Figure 4 -
DPAW Results

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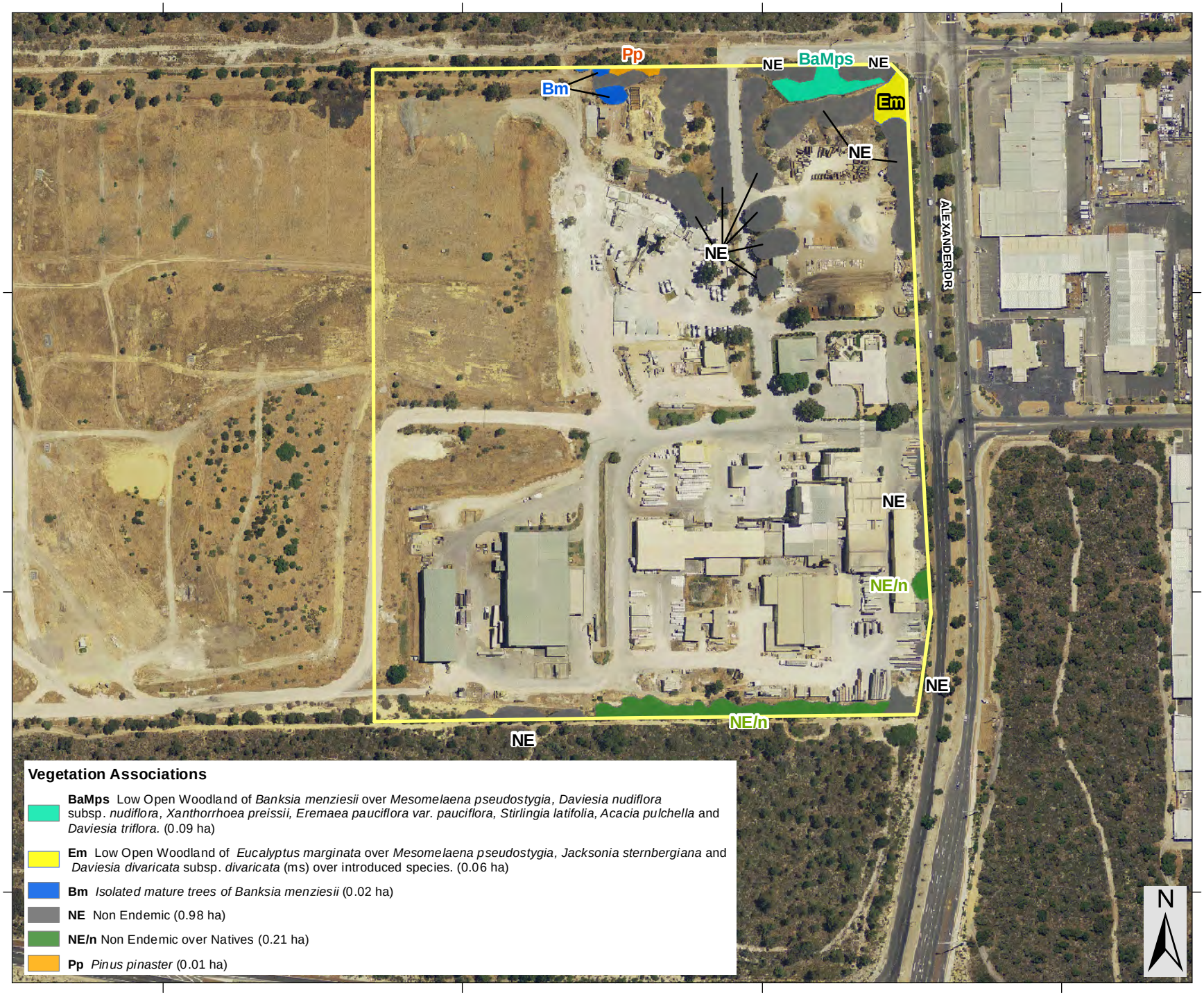

Vegetation Associations

- **BaMps** Low Open Woodland of *Banksia menziesii* over *Mesomelaena pseudostygia*, *Daviesia nudiflora* subsp. *nudiflora*, *Xanthorrhoea preissii*, *Eremaea pauciflora var. pauciflora*, *Stirlingia latifolia*, *Acacia pulchella* and *Daviesia triflora*. (0.09 ha)
- **Em** Low Open Woodland of *Eucalyptus marginata* over *Mesomelaena pseudostygia*, *Jacksonia sternbergiana* and *Daviesia divaricata* subsp. *divaricata* (ms) over introduced species. (0.06 ha)
- **Bm** *Isolated mature trees of Banksia menziesii* (0.02 ha)
- **NE** Non Endemic (0.98 ha)
- **NE/n** Non Endemic over Natives (0.21 ha)
- **Pp** *Pinus pinaster* (0.01 ha)

Legend

Survey Area (15.81 ha)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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LOCALITY MAP

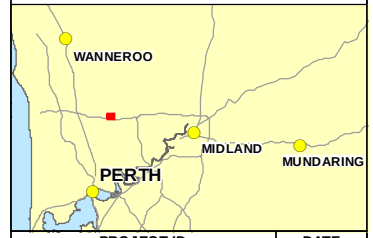

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Figure 5 -
Vegetation Associations

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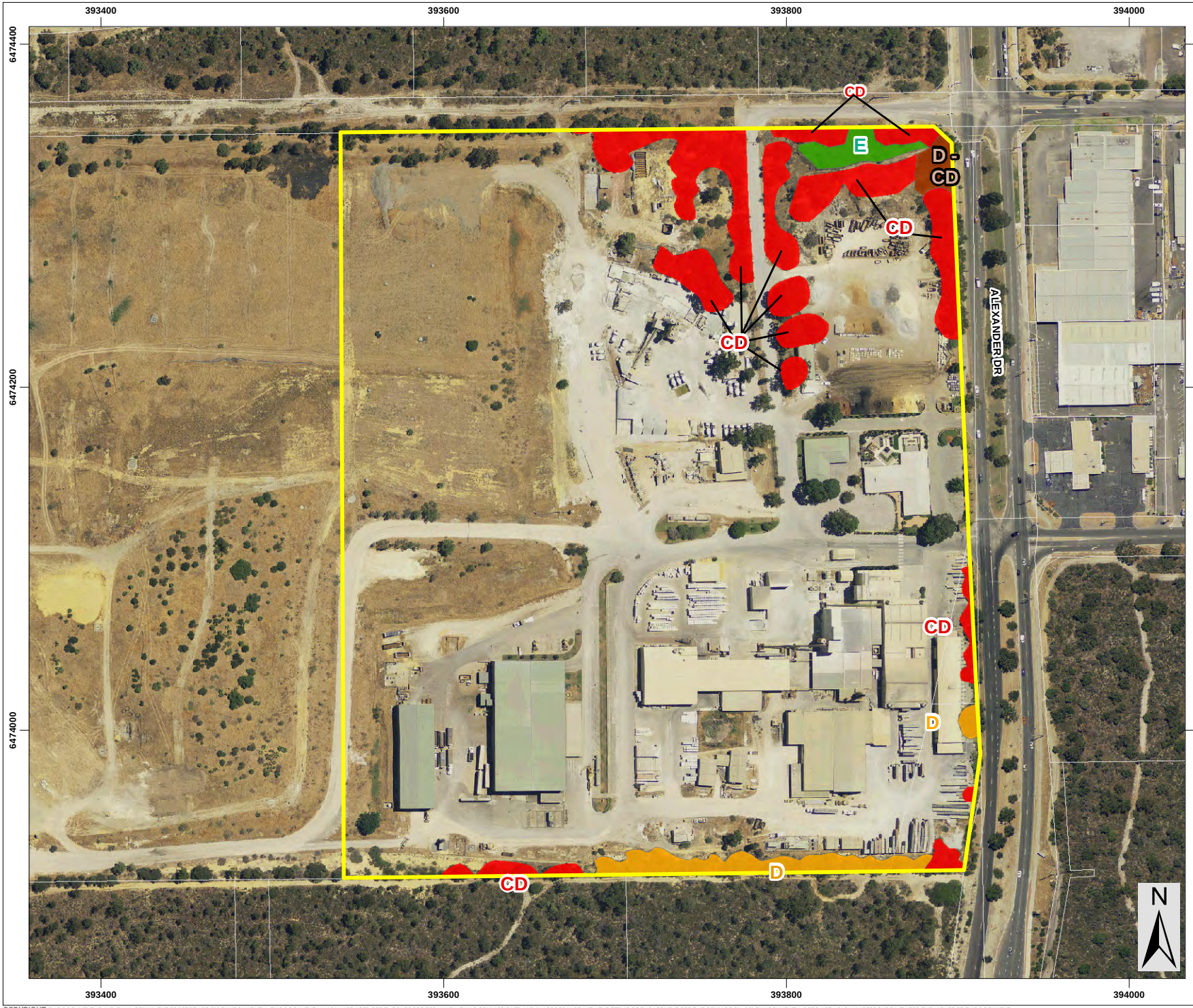

Legend

Survey Area (15.81 ha)

Vegetation Conditions

- Excellent (0.09 ha)
- Degraded (0.06 ha)
- Degraded - Completely Degraded (0.22 ha)
- Completely Degraded (1.02 ha)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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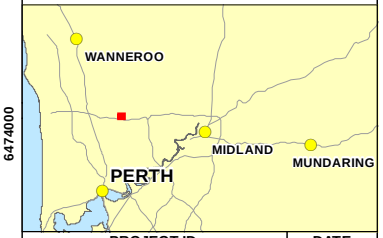
LOCALITY MAP



PROJECT ID	DATE
1096_f1_site_location.mxd	19/10/2015

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

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Figure 6 -
Vegetation Conditions

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APPENDIX A

Definition of Declared Rare / Priority / Threatened Flora

Categories of Declared Rare Flora (WC act) and Priority listings (DPaW)

Conservation Code	Description
X	Presumed Extinct Flora (Declared Rare Flora – Extinct) "Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such (Schedule 2 under the *Wildlife Conservation Act 1950*)."
T	Threatened Flora (Declared Rare Flora – Extant) "Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedule 1 under the *Wildlife Conservation Act 1950*)." "Threatened Flora (Schedule 1) are further ranked by the Department according to their level of threat using IUCN Red List criteria: CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild; EN: Endangered – considered to be facing a very high risk of extinction in the wild; VU: Vulnerable – considered to be facing a high risk of extinction in the wild."
P1	Priority One: Poorly-known taxa "Taxa which are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes."
P2	Priority Two: Poorly-known taxa "Taxa which are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown Land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes."
P3	Priority Three: Poorly-known taxa "Taxa which are known from collections or sight records from several localities not under imminent threat, or few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them."

P4	**Priority Four: Rare, Near Threatened and other taxa in need of monitoring** a. Rare. "Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands." b. Near Threatened. "Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable." c. "Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy."
P5	**Priority Five: Conservation Dependent taxa** "Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years."

Source: Department of Parks and Wildlife (2013). Online: http://florabase.dpaw.wa.gov.au.

Categories of Threatened Flora under the EPBC Act

CONSERVATION CODE	DESCRIPTION
Ex	**Extinct** Taxa which at a particular time if, at the time, there is no reasonable doubt that the last member of the species has died.
ExW	**Extinct in the Wild** Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	**Critically Endangered** Taxa which at a particular time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	**Endangered** Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
V	**Vulnerable** Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent** Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a

	period of 5 years.

Source: *Environment Protection and Biodiversity Conservation Act 1999*

APPENDIX B

Definition of Threatened and Priority Ecological Communities

Definitions of Threatened Ecological Communities as Endorsed by the Western Australian Minister for the Environment

Presumed Totally Destroyed (PD)

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

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

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

Critically Endangered (CR)

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

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

i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 5 years)

ii) modification throughout its range is continuing such that in the immediate future (within approximately 5 years) the community is unlikely to be capable of being substantially rehabilitated.

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

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 5 years)

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

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

C) The ecological community exists only as highly modified occurrences which may be capable of being rehabilitated if such work begins in the immediate future (within approximately 5 years)

Endangered (EN)

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

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

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

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

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

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

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

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

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

Vulnerable (VU)

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

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

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

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

Source: Department of Environment and Conservation (2010). Definitions, Categories and Criteria for Threatened and Priority Ecological Communities. Department of Environment and Conservation, Perth, Western Australia. Online: www.naturebase.net/

Definitions of Priority Ecological Communities as listed DPaW

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

Priority One: Poorly known ecological communities

Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly known ecological communities

Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.

Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities

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

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

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

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

Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened or that have been recently removed from the threatened list.

These communities require regular monitoring.

(a) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.

(b) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.

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

Priority Five: Conservation Dependent ecological communities.

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

Source: Department of Parks and Wildlife (2013). Definitions, Categories and Criteria for Threatened and Priority Ecological Communities. Department of Environment and Conservation, Perth, WA. Online: www.naturebase.net/

APPENDIX C

Environmental Weeds and Declared Plant Categories

Criteria used for Ranking Environmental Weeds

The Weed Prioritisation Process for DPaW contains criteria for the assessment and ranking of weeds in terms of their environmental impact on biodiversity. These criteria are as follows:

Potential Distribution – Area of potential habitat in the Region that could be occupied or the area at risk of invasion by the weed.

Current Distribution - Area of habitat in the Region currently occupied by the weed, in relation to the habitat that it could invade.

Ecological Impact - Impact of species within the Region, from low impact (causes minimal disruption to ecological processes or loss of biodiversity) to high (causes acute disruption of ecological processes, dominates and/or significantly alters vegetation structure, composition and function of ecosystems).

Invasiveness – rate of spread of a weed in native vegetative, encompassing factors of establishment, reproduction and long distance dispersal (>100m).

Feasibility of Control - The longer a coordinated control program takes to achieve its desired goal, the more expensive and less feasible it becomes. Is it feasible to eradicate or at least contain the infestation?

Source: DPaW (2013). Weed Prioritisation Process for DPaW (formerly DEC) – "An integrated approach to Weed Management on DPaW-managed lands in WA"

Standard Meanings of Declared Plant Categories

Under the Biosecurity and Agriculture Management Act 2007 (the BAM Act), all declared pests are placed in one of three categories, namely C1 (exclusion), C2 (eradication) or C3 (management).

C1 category (Exclusion) - Pests will be assigned to this category if they are not established in WA and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.

C2 category (Eradication) – Pests will be assigned to this category if they are present in WA in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.

C3 category (Management) – Pests will be assigned to this category if they are established in WA but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

Source: Department of Agriculture and Food, WA. Online: http://www.biosecurity.wa.gov.au/western-australian-organism-list-waol

APPENDIX D

Vegetation Condition Scale

Condition Scale Code	Condition Scale
E	**Excellent (1)** Pristine or nearly so, no obvious signs of damage caused by the activities of European man.
VG	**Very Good (2)** Some relatively slight signs of damage caused by the activities of European man, e.g. some signs of damage to tree trunks caused by repeated fire and the presence of some relatively non-aggressive weeds or occasional vehicle tracks.
G	**Good (3)** More obvious signs of damage caused by the activities of European man, including some obvious impact on the vegetation structure such as caused by low levels of grazing. Weeds as above, possibly plus some more aggressive ones.
P	**Poor (4)** Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of activities of European man such as grazing or partial clearing (chaining) or very frequent fires. Weeds as above, probably plus some more aggressive species.
VP	**Very Poor (5)** Severely impacted by grazing, fire, clearing or a combination of these activities. Scope for some regeneration but, not to a state approaching good condition without intensive management. Usually with a number of weed species including aggressive species.
CD	**Completely Degraded (6)** Areas that are completely or almost completely without native species in the structure of their vegetation, e.g. areas that are cleared or "parkland cleared" with their flora comprising weed or crop species with isolated native trees or shrubs.

Source: Trudgen (1991)

APPENDIX E

Flora Inventory

FAMILY	TAXA
Anarthriaceae	*Lyginia imberbis*
Asparagaceae	*Lomandra caespitosa*
	Lomandra hermaphrodita
	Lomandra suaveolens
	Thysanotus dichotomus
Asphodelaceae	**Trachyandra divaricata*
Asteraceae	**Hypochaeris glabra*
	**Sonchus oleraceus*
	**Ursinia anthemoides*
Colchicaceae	*Burchardia congesta*
Cyperaceae	*Lepidosperma leptostachyum*
	Mesomelaena pseudostygia
Dilleniaceae	*Hibbertia huegelii*
	Hibbertia hypericoides
	Hibbertia recurvifolia
Euphorbiaceae	**Euphorbia terracina*
Fabaceae	*Acacia applanata*
	Acacia cyclops
	Acacia pulchella
	Bossiaea eriocarpa
	Daviesia divaricata subsp. *divaricata*
	Daviesia nudiflora subsp. *nudiflora*
	Daviesia triflora
	Gompholobium tomentosum
	Jacksonia floribunda
	Jacksonia sternbergiana
Geraniaceae	**Pelargonium capitatum*
Goodeniaceae	*Dampiera linearis*
	Scaevola repens var. *repens*
Haemodoraceae	*Anigozanthos humilis*
	Conostylis aculeata
	Conostylis aculeata subsp. *cygnorum*
	Haemodorum sp.

Iridaceae	**Gladiolus caryophyllaceus*
Myrtaceae	*Eremaea pauciflora* var. *pauciflora*
	Eucalyptus marginata
	Hypocalymma robustum
Orchidaceae	*Diuris corymbosa*
Oxalidaceae	**Oxalis pes-caprae*
Papaveraceae	**Fumaria capreolata*
Poaceae	*Neurachne alopecuroidea*
	**Avena barbata*
	**Briza maxima*
	**Ehrharta calycina*
	**Eragrostis curvula*
Primulaceae	**Lysimachia arvensis*
Proteaceae	*Banksia menziesii*
	Conospermum stoechadis subsp. *stoechadis*
	Petrophile linearis
	Stirlingia latifolia
	Synaphea spinulosa subsp. *spinulosa*
Restionaceae	*Alexgeorgea nitens*
	Chordifex sinuosus
	Desmocladus flexuosus
	Hypolaena exsulca
Rutaceae	*Philotheca spicata*
Violaceae	*Hybanthus calycinus*
Xanthorrhoeaceae	*Xanthorrhoea preissii*

APPENDIX F

Quadrat Data Sheets

Mirrabooka		**Site**	Q1
Described by	NW		
Date	14/09/2015		
Type	Q 10x10		
Location	East of Exit Road		
MGA Zone	50 393820**mE** 6474337**mN**		
Habitat	mid slope		
Soil	Grey Sand		
Vegetation	Open Woodland of *Banksia menzieii* over diverse understorey		
Veg Condition	Very Good - Good		
Fire Age	Old (8-12)		
Notes	some banksia death		

SPECIES LIST:

Name	Cover	Height
Acacia applanata	+	35
Acacia cyclops	3	400
Acacia pulchella	3	60
Alexgeorgea nitens	2	15
Anagallis arvensis	+	5
Anigozanthos humilis	+	15
Avena barbata	2	100
Banksia menziesii	5	600
Buchardia congesta	+	45
Chordifex sinuosus	+	25
Conospermum stoechadis subsp. *stoechadis*	1.5	70
Conostylis aculeata subsp. *cygnorum*	+	40
Daviesia divaricata subsp. *divaricata*	4	85
Daviesia nudiflora subsp. *nudiflora*	+	50
Daviesia triflora	1.5	90
Desmocladus flexuosus	+	15
Ehrharta calycina	1	80
Eremaea pauciflora var. *pauciflora*	2.5	65
Euphorbia terracina	1	35
Fumaria capreolata	3	
Gladiolus caryophyllaceus	+	90
Gompholobium tomentosum	1	60
Haemodorum sp.	+	60
Hibbertia hypericoides	1	50
Hibbertia subvaginata	+	30
Hybanthus calycinus	1.5	30
Hypocalymma robustum	1.5	55
Hypochaeris glabra	+	1
Hypolaena exsulca	1.5	30
Lepidosperma leptostachyum	+	40
Lomandra caespitosa	+	35
Lomandra hermaphrodita	+	35
Lomandra suaveolens	+	35
Lyginia imberbis	1.5	45
Mesomelaena pseudostygia	4.5	60
Neurachne alopecuroidea	+	45
Pelargonium capitatum	+	35
Scaevola repens var. *repens*	1	5
Sonchus oleraceus	+	25

Stirlingia latifolia	2	85
Synaphea spinulosa subsp. *spinulosa*	1.5	50
Ursinia anthemoides	+	15
Xanthorrhoea preissii	4.5	110

Mirrabooka **Site** R1

Described by NW
Date 14/09/2015
Type R
Location Cnr of Alexander Drive and Victor
MGA Zone 50 368369 **mE** 6474323 **mN**
Habitat altered midslope
Soil Yellow brown sand
Vegetation Low Open Woodland of Eucalyptus marginata over Jacksonia sternbergiana, Mesomelaena pseudostygia and introduced species.
Veg Condition D-CD
Fire Age >12

SPECIES LIST:

Name	Cover	Height
Avena barbata	10	40
Briza maxima	2	30
Conostylis aculeata subsp. *cygnorum*	+	30
Daviesia nudiflora subsp. *nudiflora*	1	110
Ehrharta calycina	5	100
Eragrostis curvula	2	110
Eucalyptus marginata	6	700
Euphorbia terracina	1.5	40
Jacksonia sternbergiana	3	180
Mesomelaena pseudostygia	6	400
Oxalis pes-caprae	+	20
Pelargonium capitatum	6	40
Stirlingia latifolia	1	100
Thysanotus dichotomus	1	70
Trachyandra divaricata	1	35

Mirrabooka **Site** R2

Described by NW
Date 5/10/2015
Type R
MGA Zone 50 393837 **mE** 6474337 **mN**
Soil Grey sand

Vegetation Shrubland of *Acacia pulchella*, *Eremaea pauciflora* var. *pauciflora*, *Stirlingia latifolia*, *Daviesia divaricata* subsp. *divaricata* (ms), *Xanthorrhoea preissii* and *Mesomelaena pseudostygia* with scattered *Banksia attenuata* and *Banksia menziesii*.

Veg Condition E

Fire Age 8-12

Notes ph 1438 - 1439 areas of localised disturbance caused by removing dead trees

SPECIES LIST:

Name	Cover	C Class	Height	Specimen	Notes
Acacia pulchella	15		120		
Alexgeorgea nitens	+		15		
Bossiaea eriocarpa	+		40		
Briza maxima	+		25		
Conostylis aculeata	+		35		
Dampiera linearis	+		25		
Daviesia divaricata subsp. *divaricata*	5		130		
Daviesia triflora	2		60		
Desmocladus flexuosus	+		15		
Ehrharta calycina	4		100		
Eremaea pauciflora var. *pauciflora*	6		100		
Euphorbia terracina	+		30		
Fumaria capreolata	1		C		
Gompholobium tomentosum	+		45		
Hibbertia huegelii	1.5		40		
Hibbertia hypericoides	1		60		
Hybanthus calycinus	1		45		
Jacksonia floribunda	1		130		
Jacksonia sternbergiana	1		120		
Lepidosperma leptostachyum	+		45		
Lomandra caespitosa	+		30		
Mesomelaena pseudostygia	2		45		
Pelargonium capitatum	+		15		
Petrophile linearis	+		30		
Philotheca spicata	+		55		
Scaevola repens var. *repens*	+		10		
Stirlingia latifolia	3		85		
Synaphea spinulosa subsp. *spinulosa*	1		50		
Ursinia anthemoides	+		15		
Xanthorrhoea preissii	1.5		180		

Opportunistic Species

Taxa

Diuris corymbosa
Hypolaena exsulca

APPENDIX G

Desktop Searches

FID_	PopId	Nameid	Taxon	ConsStatus	WARank	PopNumber	SubPopCode	Gda94Lat	Gda94Long	PopStatus	Location	District	Vesting	Purpose1	Purpose2	CountDate	Method	MatureCoun	JuvenileCo	SeedlingCo	LiveTotal	PlantTypeC	AreaOccupi	inFlower	Population
	84948.00000000000	1596.00000000000	Caladenia huegelii	T	CR	52.00000000000		-31.86738900000	115.91155600000	U	**Species correct ID not confirmed**Freehold land, lot 100, located at Lightning Swamp, Malaga. West of Reid Hwy and Tonkin Hwy junction, north of Matthews Cl.	SWAN COASTAL	LGA			18/10/2004		0.00000000000			0.00000000000			N	
	93198.00000000000	16245.00000000000	Cyathochaeta teretifolia	3		14.00000000000		-31.87519400000	115.91247200000		Shire Reserve (42592). NW cnr of Della and ?Marshall(Benara - more likely)Rd's, Beechboro, Della Reserve. Plants in wettest area of sumpland.	SWAN COASTAL	LGA	REC		8/12/1995		0.00000000000			0.00000000000			N	
	90830.00000000000	13191.00000000000	Drosera occidentalis subsp. occidentalis	4		2.00000000000		-31.85572300000	115.90981400000		Private Property. 13 m S of Marshall Rd at 1.5 km W of Beechboro Rd, Malaga. 50 W of the track running N-S, between the power lines and the first row of high voltage lines.	SWAN COASTAL	PRI			6/01/1986	ESTMT	100.00000000000			100.00000000000			N	
	90837.00000000000	13191.00000000000	Drosera occidentalis subsp. occidentalis	4		3.00000000000		-31.85711200000	115.92370300000		Private Property. SW corner of Marshall and Beechboro Rds, Malaga. 250 m S of Marshall Rd and 10 W of Beechboro Rd.	SWAN COASTAL	PRI			6/01/1986		0.00000000000			0.00000000000			N	

FID_	Sheet	NameID	Taxon	Cons_Code	Plant_Desc	Site_Descr	Vegetation	Frequency	Other_Note	Locality	Latitude	Longitude	Geocode_Me	Accuracy	Date	Distance
	6053297.00000000000	1596.00000000000	Caladenia huegelii	T	Orchid 0.6 m high x 0.1 m wide.	Plain. Organic litter, grey sand over sand.	Low Forest A. Banksia menziesii, B. attenuata.	occasional.		Lightning Swamp, Malaga	-31.88333300000	115.91666700000	MAN	3.00000000000	4/09/2000	4.2km
	6053785.00000000000	4027.00000000000	Jacksonia sericea	4	Spreading shrub 0.4 m high x 1 m wide.	Gentle slope. Organic litter. Grey Bassendean sand.	Open Low Woodland A. Acacia saligna, Banksia menziesii.	occasional.		Fauna Rehabilitation Centre, E of Camboon Road and N of Reid Highway, Malaga	-31.86666700000	115.90000000000	MAN	3.00000000000	6/12/2000	2.1km
	7793189.00000000000	4027.00000000000	Jacksonia sericea	4		Well drained site on gentle slope with E aspect. Cream sand with pale yellow subsurface sand.	Banksia attenuata, B. menziesii, Allocasuarina fraseriana Low Woodland to Low Open Woodland with scattered emergent Eucalyptus marginata over species rich Shrubland over mixed Sedgeland, Herbland and Grassland.			Section KOON H in Koondoola Regional Bushland, Koondoola, bordered by Marangaroo Drive, Alexander Drive, Beach Road and Koondoola Avenue. Section is bordered on W by Koondoola Avenue and on SE by Water Corp Water Tower Boundary.	-31.83611100000	115.86611100000	GPS	1.00000000000	9/01/1999	2.8km
	7833016.00000000000	4027.00000000000	Jacksonia sericea	4	Shrub perennial.	Flat, residential.	Parkland.		Potential threats from weeds, disease and recreational activities.	Heritage Park	-31.85053000000	115.83366800000	GPS	1.00000000000	10/11/2005	3.6km
	7684096.00000000000	4027.00000000000	Jacksonia sericea	4		Slope. Grey sand.	Disturbed area dominated by Adenanthos cygnorum, Jacksonia furcellata and Melaleuca preissiana. Associated species: Ehrharta calycina, Verticordia ? densiflora, Lyginia imberbis, Acacia stenoptera, Hypolaena exsulca, Thysanotus multiflorus.		Healthy population.	Near substation, W of Bullfinch Drive	-31.85636100000	115.90069400000	UNK	2.00000000000	2/11/2004	2.1km

Taxon	Status	Rank	IUCNCriter	EPBC	DPaWRegion	DPaWDistrict	Distribution	FloweringPeriod	RecoveryPlan
Amphibromus vickeryae		1			SWAN	SWAN COASTAL	Beechboro	Dec	
Drosera occidentalis subsp. occidentalis		4			SWAN,SWST	BLACKWOOD,PERTH HILLS,SWAN COASTAL,WELLINGTON	Gingin-Pinjarra, Palgarup, Darling Range, Kenwick, Wattle Grove, Beechboro	Nov-Dec	
Drosera x sidjamesii		1			SWAN	SWAN COASTAL	Gnangarra, Wanneroo, Beechboro	Nov-Mar	

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 08/10/2015

Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 115°52' 31" E,31°51' 47" S
Buffer 5km
Group By Family

Family	Species	Records
Acanthizidae	5	89
Accipitridae	4	19
Actinopodidae	1	8
Agamidae	2	3
Amanitaceae	1	1
Amaranthaceae	2	7
Amaryllidaceae	1	1
Anarthriaceae	2	13
Anatidae	8	107
Anhingidae	1	1
Anystidae	1	1
Apiaceae	8	14
Apocynaceae	1	1
Araceae	1	1
Araliaceae	1	2
Araneidae	4	11
Arcyriaceae	1	2
Ardeidae	3	26
Artamidae	1	8
Asparagaceae	22	46
Asphodelaceae	1	1
Asteraceae	26	40
Barychelidae	2	19
Bothriuridae	2	3
Brassicaceae	2	5
Buthidae	3	3
Campanulaceae	5	7
Campephagidae	1	61
Canidae	2	2
Caprifoliaceae	1	1
Caryophyllaceae	2	3
Castniidae	1	49
Casuarinaceae	1	6
Charadriidae	1	1
Colchicaceae	3	9
Colletidae	1	1
Columbidae	5	214
Commelinaceae	1	1
Cortinariaceae	2	2
Corvidae	1	127
Cracticidae	3	178
Crassulaceae	2	3
Cribrariaceae	1	2
Cuculidae	2	15
Cupressaceae	1	1
Cyperaceae	19	38
Dasypogonaceae	3	9
Desidae	1	1
Dicaeidae	1	3
Dicruridae	2	219
Dilleniaceae	6	34
Diplodactylidae	2	5
Droseraceae	8	18
Echinosteliaceae	1	1
Elaeocarpaceae	2	8
Elapidae	11	74
Ericaceae	13	41
Euphorbiaceae	8	13
Fabaceae	44	135
Falconidae	6	27
Felidae	1	1
Fringillidae	1	1
Garypinidae	1	1
Gekkonidae	1	2
Gentianaceae	1	1
Geraniaceae	3	4
Goodeniaceae	7	27
Gyrostemonaceae	1	1
Haemodoraceae	12	50
Halcyonidae	3	33
Haloragaceae	3	5
Hemerocallidaceae	8	14
Hirundinidae	1	46
Hyaloscyphaceae	1	1
Hylidae	1	34
Idiopidae	1	19
Iridaceae	9	19

Australian Government

Department of the Environment

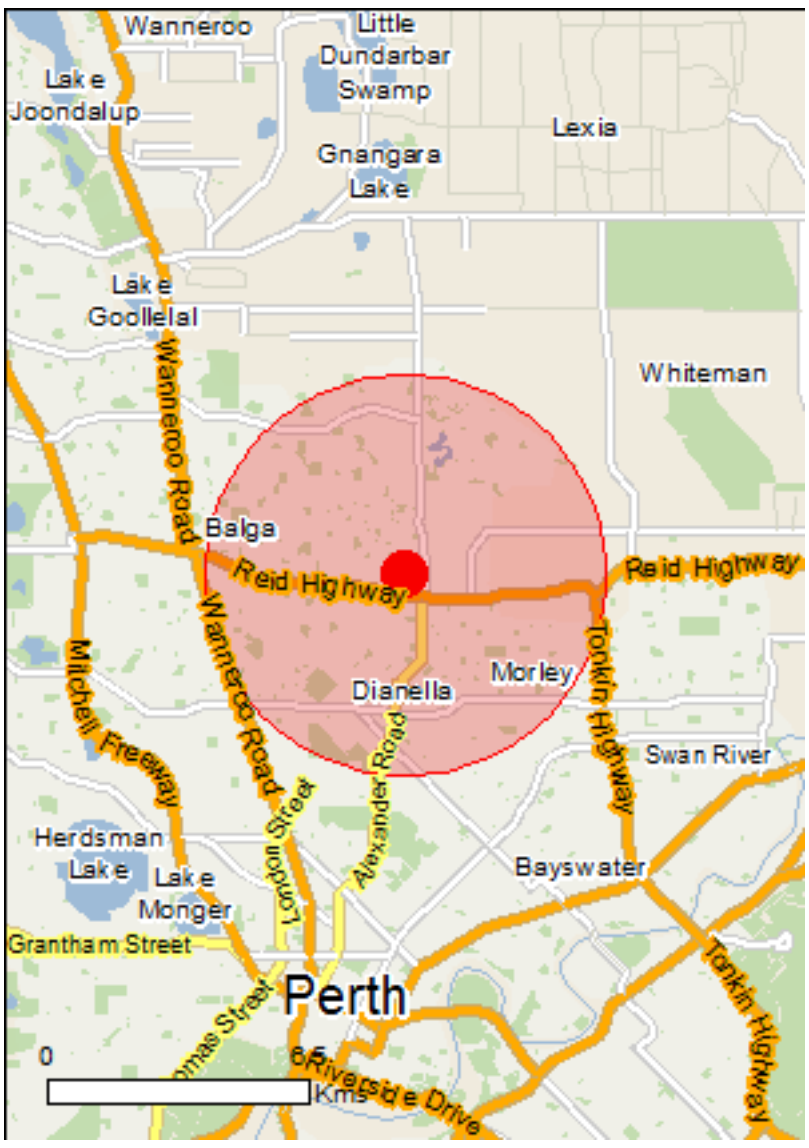
EPBC Act Protected Matters Report

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

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

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

Report created: 08/10/15 19:28:15



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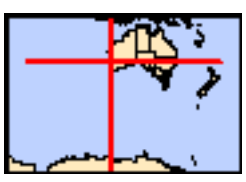
Coordinates

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:	None
Listed Threatened Species:	19
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	9
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	41
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir [25911]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat likely to occur within area
Anigozanthos viridis subsp. terraspectans Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
Darwinia foetida Muchea Bell [83190]	Critically Endangered	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Drakaea elastica Glossy-leafed Hammer-orchid, Praying Virgin [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat may occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
Thelymitra manginii K.Dixon & Batty ms. [67443]	Endangered	Species or species habitat may occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat may occur within area
Trithuria occidentalis Swan Hydatella [42224]	Endangered	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area

Extra Information

Invasive Species

[Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		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
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
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
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		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 norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Rattus rattus Black Rat, Ship Rat [84]		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		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus declinatus Bridal Veil, Bridal Veil Creeper, Pale Berry Asparagus Fern, Asparagus Fern, South African Creeper [66908]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus densiflorus Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		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
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		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.

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-31.86361 115.87393

Acknowledgements

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

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

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

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

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Iulomorphidae	1	1
Ixodidae	1	4
Julidae	1	1
Juncaceae	1	1
Lamiaceae	5	11
Lamponidae	4	11
Lauraceae	1	1
Liceaceae	1	1
Limnocharidae	1	2
Limnodynastidae	2	9
Loganiaceae	2	2
Loranthaceae	1	2
Lycosidae	6	15
Macropodidae	2	6
Maluridae	1	14
Marsileaceae	1	2
Meliphagidae	9	288
Menyanthaceae	1	2
Meropidae	1	26
Micropholcommatidae	2	6
Mimetidae	1	2
Miturgidae	1	6
Molluginaceae	1	6
Muridae	1	1
Myobatrachidae	2	25
Myrtaceae	37	80
Nemesiidae	2	25
Neopilionidae	1	6
Neosittidae	1	4
Nicodamidae	1	3
Onagraceae	3	4
Orchidaceae	20	34
Orobanchaceae	1	1
Oxalidaceae	3	3
Pachycephalidae	1	26
Papaveraceae	1	1
Paradoxosomatidae	2	8
Pararchaeidae	2	3
Pardalotidae	2	35
Paxillaceae	1	1
Pelecanidae	1	1
Peramelidae	2	7
Petroicidae	1	3
Phalacrocoracidae	3	10
Phanerochaetaceae	1	1
Pholcidae	2	20
Phrymaceae	1	1
Phyllanthaceae	2	2
Phytolaccaceae	1	1
Pittosporaceae	1	2
Plantaginaceae	2	2
Poaceae	21	37
Podargidae	2	3
Podicipedidae	2	52
Polygalaceae	2	2
Polygonaceae	1	1
Polyporaceae	1	1
Portulacaceae	3	7
Potamogetonaceae	1	1
Potoroidae	1	21
Pottiaceae	1	2
Procellariidae	2	3
Prodidomidae	1	5
Proteaceae	21	58
Psittacidae	6	165
Pygopodidae	5	53
Pythiaceae	1	12
Rallidae	4	36
Restionaceae	9	28
Rubiaceae	1	2
Russulaceae	1	1
Rutaceae	4	9
Salticidae	1	1
Salviniaceae	1	1
Santalaceae	2	2
Scincidae	14	123
Scolopendridae	1	1
Scrophulariaceae	1	1
Solanaceae	4	7
Sparassidae	3	10
Stemonitidaceae	6	13
Strigidae	2	8
Stylidiaceae	14	36
Sylviidae	1	2
Tachyglossidae	1	2
Theridiidae	2	5
Threskiornithidae	2	38
Thymelaeaceae	2	8
Urodacidae	2	38
Varanidae	1	3
Vespertilionidae	1	3
Violaceae	1	9
Xanthorrhoeaceae	2	2
Zamiaceae	1	1
Zodariidae	3	10
Zosteropidae	1	46
Zygophyllaceae	1	1
TOTAL	**629**	**3599**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Acanthizidae					
1.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
2.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
3.	24262	*Acanthiza inornata (Western Thornbill)*			
4.	25530	*Gerygone fusca (Western Gerygone)*			
5.	30948	*Smicrornis brevirostris (Weebill)*			
Accipitridae					
6.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
7.	25536	*Accipiter fasciatus (Brown Goshawk)*			
8.	24282	*Accipiter fasciatus subsp. fasciatus (Brown Goshawk)*			
9.	24288	*Circus approximans (Swamp Harrier)*			
Actinopodidae					
10.		*Missulena occatoria*			
Agamidae					
11.	30899	*Ctenophorus adelaidensis (Southern Heath Dragon, Western Heath Dragon)*			
12.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
Amanitaceae					
13.	38756	*Amanita umbrinella*			
Amaranthaceae					
14.	2742	*Ptilotus manglesii (Pom Poms, Mulamula)*			
15.	2751	*Ptilotus polystachyus (Prince of Wales Feather)*			
Amaryllidaceae					
16.	44496	*Narcissus tazetta subsp. italicus*	Y		
Anarthriaceae					
17.	1097	*Lyginia barbata*			
18.	18049	*Lyginia imberbis*			
Anatidae					
19.	24312	*Anas gracilis (Grey Teal)*			
20.	24315	*Anas rhynchotis (Australasian Shoveler)*			
21.	24316	*Anas superciliosa (Pacific Black Duck)*			
22.	24318	*Aythya australis (Hardhead)*			
23.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
24.	24322	*Cygnus atratus (Black Swan)*			
25.	24328	*Oxyura australis (Blue-billed Duck)*		P4	
26.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
Anhingidae					
27.	25553	*Anhinga melanogaster (Darter)*			
Anystidae					
28.		*Erythracarus decoris*			
Apiaceae					
29.	6203	*Actinotus glomeratus*			
30.	6214	*Centella asiatica*			
31.	6219	*Eryngium pinnatifidum (Blue Devils)*			
32.	6221	*Foeniculum vulgare (Fennel)*	Y		
33.	6222	*Homalosciadium homalocarpum*			
34.	6249	*Platysace compressa (Tapeworm Plant)*			
35.	6253	*Platysace filiformis*			
36.	6289	*Xanthosia huegelii*			
Apocynaceae					
37.	6587	*Gomphocarpus fruticosus (Narrowleaf Cottonbush)*	Y		
Araceae					
38.	1049	*Zantedeschia aethiopica (Arum Lily)*	Y		
Araliaceae					
39.	6280	*Trachymene pilosa (Native Parsnip)*			
Araneidae					
40.		*Argiope protensa*			
41.		*Austracantha minax*			
42.		*Eriophora biapicata*			
43.		*Paraplectanoides crassipes*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Arcyriaceae					
44.	38973	*Arcyria pomiformis*			
Ardeidae					
45.	41324	*Ardea modesta (Eastern Great Egret)*		IA	
46.	24341	*Ardea pacifica (White-necked Heron)*			
47.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
Artamidae					
48.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
Asparagaceae					
49.	8779	*Asparagus asparagoides (Bridal Creeper)*	Y		
50.	1280	*Chamaescilla corymbosa (Blue Squill)*			
51.	16091	*Lachenalia bulbifera*	Y		
52.	1307	*Laxmannia ramosa (Branching Lily)*			
53.	11911	*Laxmannia ramosa subsp. ramosa*			
54.	11464	*Laxmannia sessiliflora subsp. australis*			
55.	1309	*Laxmannia squarrosa*			
56.	1223	*Lomandra caespitosa (Tufted Mat Rush)*			
57.	1228	*Lomandra hermaphrodita*			
58.	1234	*Lomandra nigricans*			
59.	1239	*Lomandra preissii*			
60.	1246	*Lomandra suaveolens*			
61.	1312	*Sowerbaea laxiflora (Purple Tassels)*			
62.	1318	*Thysanotus arbuscula*			
63.	1319	*Thysanotus arenarius*			
64.	1338	*Thysanotus manglesianus (Fringed Lily)*			
65.	1339	*Thysanotus multiflorus (Many-flowered Fringe Lily)*			
66.	1343	*Thysanotus patersonii*			
67.	1348	*Thysanotus rectantherus*			
68.	1351	*Thysanotus sparteus*			
69.	1357	*Thysanotus thyrsoideus*			
70.	1358	*Thysanotus triandrus*			
Asphodelaceae					
71.	1364	*Asphodelus fistulosus (Onion Weed)*	Y		
Asteraceae					
72.	7838	*Arctotheca calendula (Cape Weed)*	Y		
73.	7867	*Brachyscome bellidioides*			
74.	7937	*Cirsium vulgare (Spear Thistle)*	Y		
75.	7941	*Conyza parva*	Y		
76.	7947	*Cotula turbinata (Funnel Weed)*	Y		
77.	18307	*Dimorphotheca ecklonis*	Y		
78.	7961	*Dittrichia graveolens (Stinkwort)*	Y		
79.	16311	*Gazania linearis*	Y		
80.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
81.	8095	*Lactuca saligna (Wild Lettuce)*	Y		
82.	18585	*Lagenophora huegelii*			
83.	8105	*Millotia myosotidifolia*			
84.	29418	*Monoculus monstrosus*	Y		
85.	8133	*Olearia elaeophila*			
86.	8165	*Pithocarpa pulchella (Beautiful Pithocarpa)*			
87.	8182	*Podotheca angustifolia (Sticky Longheads)*			
88.	8183	*Podotheca chrysantha (Yellow Podotheca)*			
89.	13255	*Pterochaeta paniculata*			
90.	8195	*Quinetia urvillei*			
91.	20663	*Senecio multicaulis subsp. multicaulis*			
92.	8225	*Siloxerus humifusus (Procumbent Siloxerus)*			
93.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		
94.	38388	*Ursinia anthemoides subsp. anthemoides*	Y		
95.	8257	*Vellereophyton dealbatum (White Cudweed)*	Y		
96.	8282	*Waitzia suaveolens (Fragrant Waitzia)*			
97.	13333	*Waitzia suaveolens var. suaveolens*			
Barychelidae					
98.		*Idiommata blackwalli*			
99.		*Synothele mullaloo*			
Bothriuridae					
100.		*Cercophonius granulosus*			
101.		*Cercophonius sulcatus*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Brassicaceae					
102.	18555	*Cardamine sp. Jandakot (P. Luff s.n. 4/7/1969)*	Y		
103.	3016	*Heliophila pusilla*	Y		
Buthidae					
104.		*Isometroides vescus*			
105.		*Urodacus armatus*			
106.		*Urodacus hartmeyeri*			
Campanulaceae					
107.	9289	*Lobelia anceps (Angled Lobelia)*			
108.	7402	*Lobelia gibbosa (Tall Lobelia)*			
109.	7408	*Lobelia tenuior (Slender Lobelia)*			
110.	7384	*Wahlenbergia capensis (Cape Bluebell)*	Y		
111.	7389	*Wahlenbergia preissii*			
Campephagidae					
112.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
Canidae					
113.	30883	*Canis lupus subsp. familiaris (Dog)*	Y		
114.	24040	*Vulpes vulpes (Red Fox)*	Y		
Caprifoliaceae					
115.	7368	*Scabiosa atropurpurea (Purple Pincushion)*	Y		
Caryophyllaceae					
116.	19825	*Petrorhagia dubia*	Y		
117.	15972	*Silene gallica var. gallica*	Y		
Castniidae					
118.	33992	*Synemon gratiosa (Graceful Sunmoth)*		P4	
Casuarinaceae					
119.	1732	*Allocasuarina humilis (Dwarf Sheoak)*			
Charadriidae					
120.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
Colchicaceae					
121.	1383	*Burchardia bairdiae*			
122.	12770	*Burchardia congesta*			
123.	1385	*Burchardia multiflora (Dwarf Burchardia)*			
Colletidae					
124.	33977	*Hylaeus globuliferus (bee)*		P3	
Columbidae					
125.	24399	*Columba livia (Domestic Pigeon)*	Y		
126.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
127.	24409	*Phaps chalcoptera (Common Bronzewing)*			
128.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
129.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
Commelinaceae					
130.	1162	*Cartonema philydroides*			
Cortinariaceae					
131.	38774	*Cortinarius archeri*			
132.	38791	*Hebeloma crustuliniforme*			
Corvidae					
133.	25592	*Corvus coronoides (Australian Raven)*			
Cracticidae					
134.	25595	*Cracticus tibicen (Australian Magpie)*			
135.	25596	*Cracticus torquatus (Grey Butcherbird)*			
136.	25597	*Strepera versicolor (Grey Currawong)*			
Crassulaceae					
137.	3137	*Crassula colorata (Dense Stonecrop)*			
138.	11563	*Crassula colorata var. colorata*			
Cribrariaceae					
139.	39003	*Cribraria minutissima*			
Cuculidae					
140.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
141.	24432	*Chrysococcyx lucidus subsp. plagosus (Shining Bronze Cuckoo)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Cupressaceae					
142.	96	*Callitris preissii (Rottnest Island Pine, Maro)*			
Cyperaceae					
143.	741	*Baumea articulata (Jointed Rush)*			
144.	743	*Baumea juncea (Bare Twigrush)*			
145.	16245	*Cyathochaeta teretifolia*		P3	
146.	806	*Cyperus polystachyos (Bunchy Sedge)*	Y		
147.	831	*Eleocharis sphacelata (Tall Spikerush, Djabren)*			
148.	894	*Fimbristylis velata*			
149.	917	*Isolepis marginata (Coarse Club-rush)*			
150.	937	*Lepidosperma longitudinale (Pithy Sword-sedge)*			
151.	940	*Lepidosperma pubisquameum*			
152.	944	*Lepidosperma scabrum*			
153.	945	*Lepidosperma squamatum*			
154.	946	*Lepidosperma striatum*			
155.	955	*Mesomelaena pseudostygia*			
156.	968	*Schoenoplectus pungens (Sharpleaf Rush)*			
157.	979	*Schoenus caespititius*			
158.	984	*Schoenus curvifolius*			
159.	992	*Schoenus grandiflorus (Large Flowered Bogrush)*			
160.	1018	*Schoenus subfascicularis*			
161.	1036	*Tetraria octandra*			
Dasypogonaceae					
162.	1213	*Calectasia cyanea (Blue Tinsel Lily)*		T	
163.	19309	*Calectasia narragara*			
164.	1218	*Dasypogon bromeliifolius (Pineapple Bush)*			
Desidae					
165.		*Badumna insignis*			
Dicaeidae					
166.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
Dicruridae					
167.	24443	*Grallina cyanoleuca (Magpie-lark)*			
168.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
Dilleniaceae					
169.	5108	*Hibbertia acerosa (Needle Leaved Guinea Flower)*			
170.	5112	*Hibbertia aurea*			
171.	5134	*Hibbertia huegelii*			
172.	5135	*Hibbertia hypericoides (Yellow Buttercups)*			
173.	5162	*Hibbertia racemosa (Stalked Guinea Flower)*			
174.	5173	*Hibbertia subvaginata*			
Diplodactylidae					
175.	24939	*Diplodactylus polyophthalmus*			
176.	24942	*Strophurus spinigerus subsp. spinigerus*			
Droseraceae					
177.	3095	*Drosera erythrorhiza (Red Ink Sundew)*			
178.	13217	*Drosera erythrorhiza subsp. erythrorhiza*			
179.	3098	*Drosera glanduligera (Pimpernel Sundew)*			
180.	3109	*Drosera menziesii (Pink Rainbow)*			
181.	13216	*Drosera menziesii subsp. penicillaris*			
182.	13191	*Drosera occidentalis subsp. occidentalis*		P4	
183.	3118	*Drosera pallida (Pale Rainbow)*			
184.	3124	*Drosera pulchella (Pretty Sundew)*			
Echinosteliaceae					
185.	39029	*Echinostelium minutum*			
Elaeocarpaceae					
186.	4524	*Platytheca galioides*			
187.	4535	*Tetratheca hirsuta (Black Eyed Susan)*			
Elapidae					
188.	42380	*Brachyurophis fasciolatus subsp. fasciolatus (Narrow-banded Shovel-nosed Snake)*			
189.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
190.	25251	*Echiopsis curta (Bardick)*			
191.	25248	*Neelaps bimaculatus (Black-naped Snake)*			
192.	25249	*Neelaps calonotos (Black-striped Snake)*		P3	
193.	25252	*Notechis scutatus (Tiger Snake)*			
194.	25253	*Parasuta gouldii*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
195.	25255	*Parasuta nigriceps*			
196.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
197.	25263	*Pseudonaja modesta (Ringed Brown Snake)*			
198.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
Ericaceae					
199.	6334	*Astroloma pallidum (Kick Bush)*			
200.	6339	*Astroloma xerophyllum*			
201.	6347	*Conostephium minus (Pink-tipped Pearl flower)*			
202.	6348	*Conostephium pendulum (Pearl Flower)*			
203.	6349	*Conostephium preissii*			
204.	6374	*Leucopogon conostephioides*			
205.	6402	*Leucopogon hirsutus*			
206.	6420	*Leucopogon oldfieldii*			
207.	6427	*Leucopogon parviflorus (Coast Beard-heath)*			
208.	6434	*Leucopogon polymorphus*			
209.	6436	*Leucopogon propinquus*			
210.	40803	*Leucopogon squarrosus subsp. squarrosus*			
211.	34736	*Lysinema pentapetalum*			
Euphorbiaceae					
212.	4587	*Amperea protensa*			
213.	4627	*Euphorbia helioscopia (Sun Spurge)*	Y		
214.	4638	*Euphorbia peplus (Petty Spurge)*	Y		
215.	4648	*Euphorbia terracina (Geraldton Carnation Weed)*	Y		
216.	4662	*Monotaxis grandiflora (Diamond of the Desert)*			
217.	19585	*Monotaxis grandiflora var. grandiflora*			
218.	4695	*Ricinocarpos glaucus*			
219.	19942	*Ricinocarpos undulatus*			
Fabaceae					
220.	15466	*Acacia applanata*			
221.	3374	*Acacia huegelii*			
222.	18217	*Acacia iteaphylla*	Y		
223.	17861	*Acacia longifolia*	Y		
224.	15481	*Acacia pulchella var. glaberrima*			
225.	30032	*Acacia saligna subsp. saligna*			
226.	3541	*Acacia sessilis*			
227.	3557	*Acacia stenoptera (Narrow Winged Wattle)*			
228.	3688	*Aotus gracillima*			
229.	3692	*Aotus procumbens*			
230.	41824	*Aotus sp. Diffusa (W.E. Blackall & C.A. Gardner 1739)*			
231.	3710	*Bossiaea eriocarpa (Common Brown Pea)*			
232.	3807	*Daviesia divaricata (Marno)*			
233.	18560	*Daviesia divaricata subsp. divaricata*			
234.	3824	*Daviesia nudiflora*			
235.	3832	*Daviesia physodes*			
236.	3845	*Daviesia triflora*			
237.	3872	*Euchilopsis linearis (Swamp Pea)*			
238.	3880	*Eutaxia virgata*			
239.	20475	*Gastrolobium capitatum*			
240.	20473	*Gastrolobium ebracteolatum*			
241.	20483	*Gastrolobium linearifolium*			
242.	10909	*Gompholobium confertum*			
243.	11083	*Gompholobium scabrum*			
244.	3957	*Gompholobium tomentosum (Hairy Yellow Pea)*			
245.	3961	*Hardenbergia comptoniana (Native Wisteria)*			
246.	3966	*Hovea pungens (Devil's Pins, Puyenak)*			
247.	3968	*Hovea trisperma (Common Hovea)*			
248.	12859	*Hovea trisperma var. trisperma*			
249.	3992	*Isotropis cuneifolia (Granny Bonnets)*			
250.	19700	*Isotropis cuneifolia subsp. cuneifolia*			
251.	4010	*Jacksonia floribunda (Holly Pea)*			
252.	4012	*Jacksonia furcellata (Grey Stinkwood)*			
253.	4027	*Jacksonia sericea (Waldjumi)*		P4	
254.	4029	*Jacksonia sternbergiana (Stinkwood, Kapur)*			
255.	4044	*Kennedia prostrata (Scarlet Runner)*			
256.	4059	*Lotus angustissimus (Narrowleaf Trefoil)*	Y		
257.	4114	*Ornithopus pinnatus (Slender Serradella)*	Y		
258.	17114	*Paraserianthes lophantha subsp. lophantha*			
259.	4181	*Pultenaea reticulata*			
260.	17542	*Trifolium arvense var. arvense*			

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			Y		
261.	4292	*Trifolium campestre (Hop Clover)*	Y		
262.	4298	*Trifolium hirtum (Rose Clover)*	Y		
263.	11474	*Vicia sativa subsp. nigra*	Y		
Falconidae					
264.	25621	*Falco berigora (Brown Falcon)*			
265.	25622	*Falco cenchroides (Australian Kestrel)*			
266.	25623	*Falco longipennis (Australian Hobby)*			
267.	24474	*Falco longipennis subsp. longipennis (Australian Hobby)*			
268.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
269.	24475	*Falco peregrinus subsp. macropus (Australian Peregrine Falcon)*		S	
Felidae					
270.	24041	*Felis catus (Cat)*	Y		
Fringillidae					
271.	25625	*Carduelis carduelis (Goldfinch, European Goldfinch)*	Y		
Garypinidae					
272.		*Protogarypinus giganteus*			
Gekkonidae					
273.	24980	*Christinus marmoratus (Marbled Gecko)*			
Gentianaceae					
274.	6539	*Centaurium erythraea (Common Centaury)*	Y		
Geraniaceae					
275.	4332	*Erodium botrys (Long Storksbill)*	Y		
276.	4333	*Erodium cicutarium (Common Storksbill)*	Y		
277.	4343	*Pelargonium capitatum (Rose Pelargonium)*	Y		
Goodeniaceae					
278.	7454	*Dampiera linearis (Common Dampiera)*			
279.	7538	*Goodenia pulchella*			
280.	19286	*Goodenia pulchella subsp. Coastal Plain A (M. Hislop 634)*			
281.	7568	*Lechenaultia biloba (Blue Leschenaultia)*			
282.	7574	*Lechenaultia floribunda (Free-flowering Leschenaultia)*			
283.	13181	*Scaevola repens var. angustifolia*			
284.	13182	*Scaevola repens var. repens*			
Gyrostemonaceae					
285.	2788	*Gyrostemon subnudus*			
Haemodoraceae					
286.	1409	*Anigozanthos humilis (Catspaw)*			
287.	11434	*Anigozanthos humilis subsp. humilis*			
288.	1411	*Anigozanthos manglesii (Mangles Kangaroo Paw, Kurulbrang)*			
289.	11261	*Anigozanthos manglesii subsp. manglesii*			
290.	11513	*Conostylis aculeata subsp. cygnorum*			
291.	1423	*Conostylis aurea (Golden Conostylis)*			
292.	1436	*Conostylis juncea*			
293.	1454	*Conostylis setigera (Bristly Cottonhead)*			
294.	11597	*Conostylis setigera subsp. setigera*			
295.	1468	*Haemodorum laxum*			
296.	1475	*Haemodorum spicatum (Mardja)*			
297.	1478	*Phlebocarya ciliata*			
Halcyonidae					
298.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
299.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
300.	24309	*Todiramphus sanctus subsp. sanctus (Sacred Kingfisher)*			
Haloragaceae					
301.	6160	*Gonocarpus paniculatus*			
302.	6161	*Gonocarpus pithyoides*			
303.	6199	*Myriophyllum tillaeoides*			
Hemerocallidaceae					
304.	1264	*Arnocrinum preissii*			
305.	1277	*Caesia occidentalis*			
306.	1285	*Corynotheca micrantha (Sand Lily)*			
307.	11283	*Corynotheca micrantha var. micrantha*			
308.	1259	*Dianella revoluta (Blueberry Lily)*			
309.	1295	*Johnsonia acaulis*			
310.	1361	*Tricoryne elatior (Yellow Autumn Lily)*			

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311.	1363	*Tricoryne tenella*			
Hirundinidae					
312.	24491	*Hirundo neoxena (Welcome Swallow)*			
Hyaloscyphaceae					
313.	38803	*Lachnum virgineum*			
Hylidae					
314.	25388	*Litoria moorei (Motorbike Frog)*			
Idiopidae					
315.		*Idiosoma sigillatum*			
Iridaceae					
316.	18279	*Babiana angustifolia*	Y		
317.	1513	*Chasmanthe floribunda (African Cornflag)*	Y		
318.	18392	*Freesia alba x leichtlinii*	Y		
319.	1520	*Gladiolus caryophyllaceus (Wild Gladiolus)*	Y		
320.	1546	*Patersonia juncea (Rush Leaved Patersonia)*			
321.	1550	*Patersonia occidentalis (Purple Flag, Koma)*			
322.	30472	*Patersonia occidentalis var. occidentalis*			
323.	1554	*Romulea flava*	Y		
324.	11544	*Romulea rosea var. australis (Guildford Grass)*	Y		
Iulomorphidae					
325.		*Dinocambala ingens*			
Ixodidae					
326.		*Amblyomma triguttatum*			
Julidae					
327.		*Ommatoiulus moreleti*			
Juncaceae					
328.	1188	*Juncus pallidus (Pale Rush)*			
Lamiaceae					
329.	16934	*Hemiandra glabra subsp. glabra*			
330.	6838	*Hemiandra linearis (Speckled Snakebush)*			
331.	6839	*Hemiandra pungens (Snakebush)*			
332.	41020	*Hemiphora bartlingii (Woolly Dragon)*			
333.	38324	*Lavandula dentata var. candicans*	Y		
Lamponidae					
334.		*Lampona cylindrata*			
335.		*Paralampona marangaroo*			
336.		*Prionosternum nitidiceps*			
337.		*Prionosternum scutatum*			
Lauraceae					
338.	2952	*Cassytha glabella (Tangled Dodder Laurel)*			
Liceaceae					
339.	39041	*Licea kleistobolus*			
Limnocharidae					
340.		*Limnochares australica*			
Limnodynastidae					
341.	25410	*Heleioporus eyrei (Moaning Frog)*			
342.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
Loganiaceae					
343.	16825	*Phyllangium divergens*			
344.	16177	*Phyllangium paradoxum*			
Loranthaceae					
345.	2401	*Nuytsia floribunda (Christmas Tree, Mudja)*			
Lycosidae					
346.		*Artoria linnaei*			
347.		*Artoriopsis expolita*			
348.		*Dingosa serrata*			
349.		*Hogna crispipes*			
350.		*Lycosa gilberta*			
351.		*Venator immansueta*			
Macropodidae					
352.	24132	*Macropus fuliginosus (Western Grey Kangaroo)*			

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353.	24133	*Macropus irma (Western Brush Wallaby)*		P4	
Maluridae					
354.	25654	*Malurus splendens (Splendid Fairy-wren)*			
Marsileaceae					
355.	77	*Marsilea mutica*			
Meliphagidae					
356.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
357.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
358.	24561	*Anthochaera carunculata (Red Wattlebird)*			
359.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
360.	25659	*Lichenostomus leucotis (White-eared Honeyeater)*			
361.	25661	*Lichmera indistincta (Brown Honeyeater)*			
362.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
363.	25669	*Phylidonyris nigra (White-cheeked Honeyeater)*			
364.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
Menyanthaceae					
365.	36177	*Ornduffia albiflora*			
Meropidae					
366.	24598	*Merops ornatus (Rainbow Bee-eater)*		IA	
Micropholcommatidae					
367.		*Raveniella cirrata*			
368.		*Raveniella peckorum*			
Mimetidae					
369.		*Ero aphana*			
Miturgidae					
370.		*Mituliodon tarantulinus*			
Molluginaceae					
371.	2839	*Macarthuria australis*			
Muridae					
372.	24223	*Mus musculus (House Mouse)*	Y		
Myobatrachidae					
373.	25400	*Crinia insignifera (Squelching Froglet)*			
374.	25420	*Myobatrachus gouldii (Turtle Frog)*			
Myrtaceae					
375.	20350	*Astartea affinis*			
376.	20283	*Astartea scoparia*			
377.	36441	*Babingtonia camphorosmae (Camphor Myrtle)*			
378.	5382	*Beaufortia elegans*			
379.	5415	*Calothamnus lateralis*			
380.	5428	*Calothamnus rupestris (Mouse Ears)*			
381.	5429	*Calothamnus sanguineus (Silky-leaved Blood flower, Pindak)*			
382.	5439	*Calytrix angulata (Yellow Starflower)*			
383.	5458	*Calytrix flavescens (Summer Starflower)*			
384.	5460	*Calytrix fraseri (Pink Summer Calytrix)*			
385.	5498	*Chamelaucium uncinatum (Geraldton Wax)*			
386.	13949	*Eremaea asterocarpa*			
387.	5541	*Eremaea pauciflora*			
388.	14104	*Eremaea pauciflora var. pauciflora*			
389.	5542	*Eremaea purpurea*			
390.	5708	*Eucalyptus marginata (Jarrah, Djara)*			
391.	13547	*Eucalyptus marginata subsp. marginata (Jarrah)*			
392.	5763	*Eucalyptus rudis (Flooded Gum, Kulurda)*			
393.	5790	*Eucalyptus todtiana (Coastal Blackbutt)*			
394.	35070	*Hypocalymma angustifolium subsp. Swan Coastal Plain (G.J. Keighery 16777)*			
395.	5825	*Hypocalymma robustum (Swan River Myrtle)*			
396.	15498	*Kunzea glabrescens (Spearwood)*			
397.	5850	*Leptospermum laevigatum (Coast Teatree)*	Y		
398.	5857	*Leptospermum spinescens*			
399.	5926	*Melaleuca lateritia (Robin Redbreast Bush)*			
400.	5952	*Melaleuca preissiana (Moonah)*			
401.	5959	*Melaleuca rhaphiophylla (Swamp Paperbark)*			
402.	5964	*Melaleuca seriata*			
403.	6006	*Pericalymma ellipticum (Swamp Teatree)*			
404.	16478	*Pericalymma ellipticum var. floridum*			

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405.	6011	*Pileanthus peduncularis (Coppercups)*			
406.	6012	*Regelia ciliata*			
407.	6033	*Scholtzia involucrata (Spiked Scholtzia)*			
408.	15432	*Verticordia densiflora var. densiflora*			
409.	6077	*Verticordia drummondii (Drummond's Featherflower)*			
410.	12422	*Verticordia eriocephala (Common Cauliflower)*			
411.	6101	*Verticordia nitens (Morrison Featherflower, Kodjeningara)*			
Nemesiidae					
412.		*Aname mainae*			
413.		*Aname tepperi*			
Neopilionidae					
414.		*Ballarra longipalpus*			
Neosittidae					
415.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
Nicodamidae					
416.		*Nicodamus mainae*			
Onagraceae					
417.	44680	*Ludwigia repens*	Y		
418.	6138	*Oenothera drummondii (Beach Evening Primrose)*	Y		
419.	35416	*Oenothera lindheimeri*	Y		
Orchidaceae					
420.	15330	*Caladenia arenicola*			
421.	15348	*Caladenia flava subsp. flava*			
422.	1596	*Caladenia huegelii (Grand Spider Orchid)*		T	
423.	18019	*Caladenia vulgata*			
424.	11049	*Diuris corymbosa*			
425.	12939	*Diuris magnifica*			
426.	1643	*Elythranthera brunonis (Purple Enamel Orchid)*			
427.	15410	*Eriochilus dilatatus subsp. dilatatus*			
428.	15412	*Eriochilus dilatatus subsp. multiflorus*			
429.	1653	*Leporella fimbriata (Hare Orchid)*			
430.	15419	*Microtis media subsp. media*			
431.	20460	*Pheladenia deformis*			
432.	1676	*Prasophyllum hians (Yawning Leek Orchid)*			
433.	1680	*Prasophyllum parvifolium (Autumn Leek Orchid)*			
434.	10853	*Prasophyllum plumiforme*			
435.	17267	*Pterostylis brevisepala*			
436.	1693	*Pterostylis recurva (Jug Orchid)*			
437.	12217	*Pterostylis sanguinea*			
438.	1698	*Pterostylis vittata (Banded Greenhood)*			
439.	16367	*Pyrorchis nigricans (Red beaks, Elephants ears)*			
Orobanchaceae					
440.	7122	*Orobanche minor (Lesser Broomrape)*	Y		
Oxalidaceae					
441.	4352	*Oxalis glabra*	Y		
442.	4356	*Oxalis pes-caprae (Soursob)*	Y		
443.	4358	*Oxalis purpurea (Largeflower Wood Sorrel)*	Y		
Pachycephalidae					
444.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
Papaveraceae					
445.	2969	*Fumaria capreolata (Whiteflower Fumitory)*	Y		
Paradoxosomatidae					
446.		*Antichiropus variabilis*			
447.		*Antichiropus whistleri*			
Pararchaeidae					
448.		*Ozarchaea westraliensis*			
449.		*Westrarchaea spinosa*			
Pardalotidae					
450.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
451.	25682	*Pardalotus striatus (Striated Pardalote)*			
Paxillaceae					
452.	38816	*Omphalotus nidiformis*			

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Pelecanidae					
453.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
Peramelidae					
454.	25478	*Isoodon obesulus (Southern Brown Bandicoot)*		P5	
455.	24153	*Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot)*		P5	
Petroicidae					
456.	24659	*Petroica goodenovii (Red-capped Robin)*			
Phalacrocoracidae					
457.	25698	*Phalacrocorax melanoleucos (Little Pied Cormorant)*			
458.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
459.	25699	*Phalacrocorax varius (Pied Cormorant)*			
Phanerochaetaceae					
460.	44729	*Porostereum crassum*			
Pholcidae					
461.		*Pholcus phalangioides*			
462.		*Smeringopus natalensis*			
Phrymaceae					
463.	7060	*Glossostigma diandrum*			
Phyllanthaceae					
464.	4689	*Poranthera ericoides (Heath Poranthera)*			
465.	4691	*Poranthera microphylla (Small Poranthera)*			
Phytolaccaceae					
466.	2793	*Phytolacca octandra (Red Ink Plant)*	Y		
Pittosporaceae					
467.	25788	*Billardiera fraseri (Elegant Pronaya)*			
Plantaginaceae					
468.	14282	*Gratiola pubescens*			
469.	7075	*Linaria maroccana*	Y		
Poaceae					
470.	184	*Aira caryophyllea (Silvery Hairgrass)*	Y		
471.	185	*Aira cupaniana (Silvery Hairgrass)*	Y		
472.	200	*Amphipogon turbinatus*			
473.	17234	*Austrostipa compressa*			
474.	17241	*Austrostipa hemipogon*			
475.	233	*Avena barbata (Bearded Oat)*	Y		
476.	234	*Avena fatua (Wild Oat)*	Y		
477.	244	*Briza maxima (Blowfly Grass)*	Y		
478.	245	*Briza minor (Shivery Grass)*	Y		
479.	258	*Cenchrus ciliaris (Buffel Grass)*	Y		
480.	277	*Cortaderia selloana (Pampas Grass)*	Y		
481.	347	*Ehrharta calycina (Perennial Veldt Grass)*	Y		
482.	349	*Ehrharta longiflora (Annual Veldt Grass)*	Y		
483.	376	*Eragrostis curvula (African Lovegrass)*	Y		
484.	452	*Hyparrhenia hirta (Tambookie Grass)*	Y		
485.	485	*Microlaena stipoides (Weeping Grass)*			
486.	492	*Neurachne alopecuroidea (Foxtail Mulga Grass)*			
487.	527	*Paspalum dilatatum*	Y		
488.	40422	*Pentameris pallida*	Y		
489.	40426	*Rytidosperma occidentale*			
490.	724	*Vulpia myuros (Rat's Tail Fescue)*	Y		
Podargidae					
491.	25703	*Podargus strigoides (Tawny Frogmouth)*			
492.	24679	*Podargus strigoides subsp. brachypterus (Tawny Frogmouth)*			
Podicipedidae					
493.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
494.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
Polygalaceae					
495.	4550	*Comesperma calymega (Blue-spike Milkwort)*			
496.	4564	*Comesperma virgatum (Milkwort)*			
Polygonaceae					
497.	2409	*Emex australis (Doublegee)*	Y		
Polyporaceae					

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
498.	38802	*Laccocephalum tumulosum*			
Portulacaceae					
499.	2848	*Calandrinia corrigioloides (Strap Purslane)*			
500.	2854	*Calandrinia granulifera (Pygmy Purslane)*			
501.	2856	*Calandrinia liniflora (Parakeelya)*			
Potamogetonaceae					
502.	109	*Potamogeton crispus (Curly Pondweed)*			
Potoroidae					
503.	24162	*Bettongia penicillata subsp. ogilbyi (Woylie, Brush-tailed Bettong)*		T	
Pottiaceae					
504.	32315	*Barbula calycina*			
Procellariidae					
505.	24689	*Halobaena caerulea (Blue Petrel)*			
506.	24703	*Pterodroma lessonii (White-headed Petrel)*			
Prodidomidae					
507.		*Myandra bicincta*			
Proteaceae					
508.	1775	*Adenanthos cygnorum (Common Woollybush)*			
509.	1791	*Adenanthos obovatus (Basket Flower)*			
510.	1800	*Banksia attenuata (Slender Banksia, Piara)*			
511.	32580	*Banksia dallanneyi var. dallanneyi*			
512.	1822	*Banksia ilicifolia (Holly-leaved Banksia)*			
513.	1834	*Banksia menziesii (Firewood Banksia)*			
514.	32203	*Banksia nivea subsp. nivea*			
515.	15607	*Conospermum acerosum subsp. acerosum*			
516.	1882	*Conospermum stoechadis (Common Smokebush)*			
517.	15520	*Conospermum stoechadis subsp. sclerophyllum*			
518.	15611	*Conospermum stoechadis subsp. stoechadis (Common Smokebush)*			
519.	2032	*Grevillea leucopteris (White Plume Grevillea)*			
520.	2197	*Hakea prostrata (Harsh Hakea)*			
521.	2203	*Hakea ruscifolia (Candle Hakea)*			
522.	2216	*Hakea varia (Variable-leaved Hakea)*			
523.	2273	*Persoonia saccata (Snottygobble)*			
524.	2299	*Petrophile linearis (Pixie Mops)*			
525.	2301	*Petrophile macrostachya*			
526.	2316	*Stirlingia latifolia (Blueboy)*			
527.	2329	*Synaphea spinulosa*			
528.	15532	*Synaphea spinulosa subsp. spinulosa*			
Psittacidae					
529.	25716	*Cacatua sanguinea (Little Corella)*			
530.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black-Cockatoo)*		T	
531.	24733	*Calyptorhynchus baudinii (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's Cockatoo)*		T	
532.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)*		T	
533.	24738	*Neophema elegans (Elegant Parrot)*			
534.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
Pygopodidae					
535.	24991	*Aprasia repens (Sand-plain Worm-lizard)*			
536.	25766	*Delma fraseri (Fraser's Legless Lizard)*			
537.	24999	*Delma grayii*			
538.	25005	*Lialis burtonis*			
539.	25007	*Pletholax gracilis subsp. gracilis (Keeled Legless Lizard)*			
Pythiaceae					
540.		*Phytophthora cinnamomi*			
Rallidae					
541.	25727	*Fulica atra (Eurasian Coot)*			
542.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
543.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
544.	24771	*Porzana tabuensis (Spotless Crake)*			
Restionaceae					
545.	1056	*Alexgeorgea nitens*			
546.	17706	*Chordifex sinuosus*			
547.	17691	*Desmocladus fasciculatus*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
548.	16595	*Desmocladus flexuosus*			
549.	1070	*Hypolaena exsulca*			
550.	18074	*Lepidobolus preissianus subsp. preissianus*			
551.	1090	*Lepyrodia muirii*			
552.	17677	*Meeboldina roycei*			
553.	17843	*Meeboldina tephrina*			
Rubiaceae					
554.	18255	*Opercularia vaginata (Dog Weed)*			
Russulaceae					
555.	38836	*Russula erumpens*			
Rutaceae					
556.	17665	*Boronia purdieana subsp. purdieana*			
557.	11381	*Boronia ramosa subsp. anethifolia*			
558.	18529	*Philotheca spicata (Pepper and Salt)*			
559.	18547	*Rhadinothamnus anceps*			
Salticidae					
560.		*Ocrisiona leucocomis*			
Salviniaceae					
561.	79	*Salvinia molesta (Salvinia)*	Y		
Santalaceae					
562.	10765	*Exocarpos sparteus (Broom Ballart, Djuk)*			
563.	2350	*Leptomeria pauciflora (Sparse-flowered Currant Bush)*			
Scincidae					
564.	30893	*Cryptoblepharus buchananii*			
565.	25020	*Cryptoblepharus plagiocephalus*			
566.	25027	*Ctenotus australis*			
567.	25039	*Ctenotus fallens*			
568.	25096	*Egernia kingii (King's Skink)*			
569.	25119	*Hemiergis quadrilineata*			
570.	25133	*Lerista elegans*			
571.	25148	*Lerista lineopunctulata*			
572.	25165	*Lerista praepedita*			
573.	25184	*Menetia greyii*			
574.	25191	*Morethia lineoocellata*			
575.	25192	*Morethia obscura*			
576.	25204	*Tiliqua rugosa subsp. aspera*			
577.	25207	*Tiliqua rugosa subsp. rugosa*			
Scolopendridae					
578.		*Ethmostigmus rubripes*			
Scrophulariaceae					
579.	7055	*Dischisma capitatum (Woolly-headed Dischisma)*	Y		
Solanaceae					
580.	10900	*Lycopersicon esculentum*	Y		
581.	6987	*Salpichroa origanifolia (Pampas Lily of the Valley)*	Y		
582.	7022	*Solanum nigrum (Black Berry Nightshade)*	Y		
583.	7035	*Solanum sisymbriifolium (Viscid Nightshade)*	Y		
Sparassidae					
584.		*Eodelena convexa*			
585.		*Isopeda leishmanni*			
586.		*Pediana occidentalis*			
Stemonitidaceae					
587.	38984	*Collaria arcyrionema*			
588.	38986	*Comatricha elegans*			
589.	38987	*Comatricha ellae*			
590.	39030	*Enerthenema papillatum*			
591.	39056	*Paradiacheopsis fimbriata*			
592.	40882	*Stemonitopsis hyperopta*			
Strigidae					
593.	25748	*Ninox novaeseelandiae (Boobook Owl)*			
594.	24820	*Ninox novaeseelandiae subsp. boobook (Boobook Owl)*			
Stylidiaceae					
595.	7676	*Levenhookia pusilla (Midget Stylewort)*			
596.	7677	*Levenhookia stipitata (Common Stylewort)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
597.	7679	*Stylidium adpressum (Trigger-on-stilts)*			
598.	30278	*Stylidium androsaceum*			
599.	7693	*Stylidium brunonianum (Pink Fountain Triggerplant)*			
600.	7696	*Stylidium calcaratum (Book Triggerplant)*			
601.	7699	*Stylidium carnosum (Fleshy-leaved Triggerplant)*			
602.	7710	*Stylidium cygnorum*			
603.	7713	*Stylidium dichotomum (Pins-and-needles)*			
604.	25829	*Stylidium neurophyllum*			
605.	7774	*Stylidium piliferum (Common Butterfly Triggerplant)*			
606.	7785	*Stylidium repens (Matted Triggerplant)*			
607.	25806	*Stylidium scariosum*			
608.	7798	*Stylidium schoenoides (Cow Kicks)*			
Sylviidae					
609.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
Tachyglossidae					
610.	24207	*Tachyglossus aculeatus (Short-beaked Echidna)*			
Theridiidae					
611.		*Crustulina bicruciata*			
612.		*Latrodectus hasseltii*			
Threskiornithidae					
613.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
614.	24844	*Threskiornis molucca (Australian White Ibis)*			
Thymelaeaceae					
615.	5254	*Pimelea leucantha*			
616.	5268	*Pimelea sulphurea (Yellow Banjine)*			
Urodacidae					
617.		*Urodacus novaehollandiae*			
618.		*Urodacus planimanus*			
Varanidae					
619.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
Vespertilionidae					
620.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
Violaceae					
621.	5216	*Hybanthus calycinus (Wild Violet)*			
Xanthorrhoeaceae					
622.	14544	*Xanthorrhoea brunonis subsp. brunonis*			
623.	1256	*Xanthorrhoea preissii (Grass tree, Palga)*			
Zamiaceae					
624.	18119	*Macrozamia fraseri*			
Zodariidae					
625.		*Masasteron tuart*			
626.		*Phenasteron longiconductor*			
627.		*Phenasteron machinosum*			
Zosteropidae					
628.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			
Zygophyllaceae					
629.	4383	*Tribulus terrestris (Caltrop)*	Y		

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

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

Appendix B
Desktop Searches

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 09/10/2019

Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 115° 52' 36" E,31° 51' 48" S
Buffer 1km

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
2.	24262	*Acanthiza inornata (Western Thornbill)*			
3.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
4.		*Aname mainae*			
5.	24312	*Anas gracilis (Grey Teal)*			
6.	24315	*Anas rhynchotis (Australasian Shoveler)*			
7.	24316	*Anas superciliosa (Pacific Black Duck)*			
8.	24561	*Anthochaera carunculata (Red Wattlebird)*			
9.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
10.	41324	*Ardea modesta (great egret, white egret)*			
11.	24341	*Ardea pacifica (White-necked Heron)*			
12.	20283	*Astartea scoparia (Common Astartea)*			
13.	6334	*Astroloma pallidum (Kick Bush)*			
14.	24318	*Aythya australis (Hardhead)*			
15.		*Barnardius zonarius*			
16.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
17.	19309	*Calectasia narragara*			
18.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)*		T	
19.	17706	*Chordifex sinuosus*			
20.	6349	*Conostephium preissii*			
21.	1423	*Conostylis aurea (Golden Conostylis)*			
22.	1436	*Conostylis juncea*			
23.		*Conostylis sp.*			
24.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
25.	25592	*Corvus coronoides (Australian Raven)*			
26.	25595	*Cracticus tibicen (Australian Magpie)*			
27.	25596	*Cracticus torquatus (Grey Butcherbird)*			
28.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
29.	7454	*Dampiera linearis (Common Dampiera)*			
30.	16595	*Desmocladus flexuosus*			
31.	48751	*Drosera drummondii*			
32.		*Egretta garzetta*			
33.		*Egretta novaehollandiae*			
34.		*Elanus axillaris*			
35.		*Eolophus roseicapillus*			
36.	25727	*Fulica atra (Eurasian Coot)*			
37.	25530	*Gerygone fusca (Western Gerygone)*			
38.	24443	*Grallina cyanoleuca (Magpie-lark)*			
39.	2788	*Gyrostemon subnudus*			
40.	17557	*Hakea recurva subsp. recurva*			
41.	3016	*Heliophila pusilla*	Y		
42.	16933	*Hemiandra glabra*			
43.	5108	*Hibbertia acerosa (Needle Leaved Guinea Flower)*			
44.	5112	*Hibbertia aurea*			
45.	47965	*Hieraaetus morphnoides (Little Eagle)*			
46.	24491	*Hirundo neoxena (Welcome Swallow)*			
47.		*Hogna crispipes*			
48.	5216	*Hybanthus calycinus (Wild Violet)*			
49.		*Idiommata blackwalli*			
50.	1309	*Laxmannia squarrosa*			
51.	25661	*Lichmera indistincta (Brown Honeyeater)*			
52.	18049	*Lyginia imberbis*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
53.	5936	*Melaleuca megacephala*			
54.	24598	*Merops ornatus (Rainbow Bee-eater)*			
55.		*Microcarbo melanoleucos*			
56.	19585	*Monotaxis grandiflora var. grandiflora*			
57.	25248	*Neelaps bimaculatus (Black-naped Snake)*			
58.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
59.	24328	*Oxyura australis (Blue-billed Duck)*		P4	
60.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
61.	25682	*Pardalotus striatus (Striated Pardalote)*			
62.	48061	*Petrochelidon nigricans (Tree Martin)*			
63.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
64.	24409	*Phaps chalcoptera (Common Bronzewing)*			
65.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
66.	5268	*Pimelea sulphurea (Yellow Banjine)*			
67.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
68.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
69.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
70.		*Purpureicephalus spurius*			
71.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
72.	79	*Salvinia molesta (Salvinia)*	Y		
73.	30948	*Smicrornis brevirostris (Weebill)*			
74.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
75.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
76.	7774	*Stylidium piliferum (Common Butterfly Triggerplant)*			
77.	15532	*Synaphea spinulosa subsp. spinulosa*			
78.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
79.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
80.	6280	*Trachymene pilosa (Native Parsnip)*			
81.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
82.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			

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

Australian Government
Department of the Environment and Energy

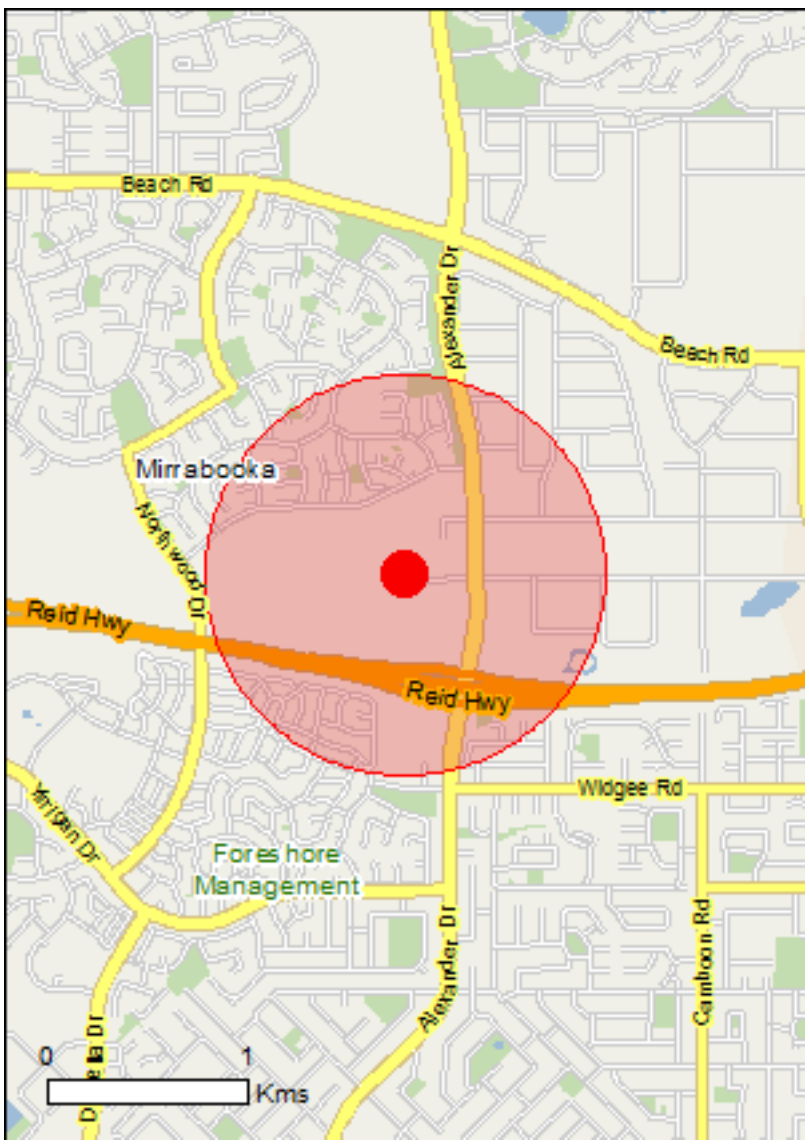
EPBC Act Protected Matters Report

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

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

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

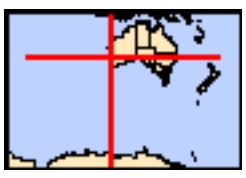
Report created: 11/10/19 18:57:25



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

Coordinates

Buffer: 1.0Km



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:	2
Listed Threatened Species:	21
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	14
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	38
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
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat likely to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat 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, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Insects		
Hesperocolletes douglasi Douglas' Broad-headed Bee, Rottnest Bee [66734]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
[Dasyurus geoffroii](#)		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
[Pseudocheirus occidentalis](#)		
Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat likely to occur within area
Plants		
[Andersonia gracilis](#)		
Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
[Anigozanthos viridis subsp. terraspectans](#)		
Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat may occur within area
[Caladenia huegelii](#)		
King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat may occur within area
[Diuris micrantha](#)		
Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
[Diuris purdiei](#)		
Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area
[Drakaea elastica](#)		
Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
[Drakaea micrantha](#)		
Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
[Lepidosperma rostratum](#)		
Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
[Synaphea sp. Fairbridge Farm (D. Papenfus 696)](#)		
Selena's Synaphea [82881]	Critically 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 within area
Migratory Terrestrial Species		
[Motacilla cinerea](#)		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
[Actitis hypoleucos](#)		
Common Sandpiper [59309]		Species or species habitat may occur within area
[Calidris acuminata](#)		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
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
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat 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 habitat likely to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
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 likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		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
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
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
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		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 norvegicus Brown Rat, Norway Rat [83]		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
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus declinatus Bridal Veil, Bridal Veil Creeper, Pale Berry Asparagus Fern, Asparagus Fern, South African Creeper [66908]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area

Name	Status	Type of Presence
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to 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
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		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
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		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

-31.86366 115.87552

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.

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