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Part of Lot 500 Park Street, Brabham

Native Vegetation Clearing Permit Application [Area Permit] - Supporting Documentation

Prepared for
Cranford Property Pty Ltd
by Strategen

June 2019


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Part of Lot 500 Park Street, Brabham

Native Vegetation Clearing Permit Application [Area Permit] - Supporting Documentation

Strategen is a trading name of
Strategen Environmental Consultants Pty Ltd
Level 1, 50 Subiaco Square Road Subiaco WA 6008
ACN: 056 190 419

June 2019

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Client: Cranford Property Pty Ltd

Report Version	Revision No.	Purpose	Strategen author/reviewer	Submitted to Client	
				Form	Date
Preliminary Draft Report	A	Client Review	W Oversby / D Newsome / K Choo	Electronic	31/05/2019
Final Report	B	Client	W Oversby / K. Choo	Electronic	11/06/2019
Final Report	C	Client	W Oversby / K Choo	Electronic	11/06/2019
Final Report	1	For submission to DWER	W Oversby / K Choo	Electronic	28/06/2019

Filename: CED19086.01 R004 Rev 1 - 28 June 2019

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1. Introduction

1.1 Applicant details

Cranford Property Pty Ltd (Cranford Property) is the applicant for the purposes of this Native Vegetation Clearing Permit. Cranford Property is a wholly owned subsidiary company of Cedar Woods.

1.2 Ownership details

This Native Vegetation Clearing Permit (NVCP) application applies to clearing associated with the residential development of part of Lot 500 Park Street, Brabham owned by Cranford Property.

1.3 Contact details for enquiries

The contact details for this NVCP application are detailed below in Table 1 and Table 2:

Table 1: Development Manager contact Cranford Property

Subject	Detail
Contact	Preston O'Keefe
Title	Development Manager
Company	Cedar Woods
Address	Perth Office Ground Floor, 50 Colin Street, West Perth, WA 6005
Postal Address	PO Box 788, West Perth, WA, 6872
Office Phone	(08) 9480 1539
Email	Preston.OKeefe@cedarwoods.com.au

Table 2: Strategen contact for technical queries relating to this NVCP application

Subject	Detail
Contact	Kathy Choo
Title	Principal Environmental Consultant
Company	Strategen Environmental
Address	Level 1, 50 Subiaco Square Road, Subiaco WA 6008
Postal Address	PO Box 243 Subiaco WA 6904
Office Phone	(08) 9380 3100
Email	k.choo@strategen.com.au

1.4 Purpose and scope

Cranford Property is proposing to develop part of Lot 500 on Plan 74198 Park Street, Brabham Western Australia (the site, Figure 1) for the following purposes:

- residential development
- internal public road network

The NVCP application seeks to attain approval for the clearing of 1.080 ha of native vegetation within the site to enable the development.

This document, prepared to support the NVCP application form (Area Permit) to be assessed by Department of Water and Environmental Regulation (DWER) under Part V of the EP Act, includes:

- an outline of existing environmental conditions of the site

- an evaluation of potential impacts of the vegetation clearing
- management measures
- an evaluation of the proposed clearing against the 10 clearing principles listed under schedule 5 of the EP Act

1.5 Location and timing

The site is located approximately 20 km northeast of the Perth CBD in the City of Swan and comprises an area of 2.03 ha and is located within the northern portion of Lot 500 (which is 22.24 ha in area) (Figure 1). The site is enclosed by an area bound by Park Street to the north, Partridge Street to the west, residential development to the east, and the remainder of Lot 500 to the south.

1.6 Relevant legislation

Western Australian legislation relevant to this NVCP application includes:

- *Aboriginal Heritage Act 1972* (AH Act)
- *Biodiversity Conservation Act 2016* (BC Act)
- *Biosecurity and Agriculture Management Act 2007* (BAM Act)
- *Bushfires Act 1954*
- *Contaminated Sites Act 2003* (CS Act)
- *Metropolitan Water Supply, Sewerage and Drainage Act 1909* (MWSSD Act)
- *Environmental Protection Act 1986* (EP Act)

Federal Government legislation relevant to this NVCP application includes:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

The following Environmental Protection Authority (EPA) guidelines and position statements are relevant to survey practices:

- EPA Guidance Statement No. 51–Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2004a)
- EPA Guidance Statement No. 56–Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA 2004b)
- EPA Position Statement No. 3–Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002).

All surveys commissioned for the purposes of assessing the environmental impact of the Project conformed to these EPA guidelines.

1.7 Proposed development

The area of vegetation proposed to be cleared is 1.080 ha (see Figure 2). Figure 3 presents the condition of the native vegetation within the site.

Clearing is required to facilitate residential development of the site, as per the concept plan (Appendix 1). It is worthwhile to note that earthworks will be required ahead of the subdivision and development process.

Vegetation clearing will involve the stripping of vegetation and topsoil. Vegetation and topsoil/overburden material will either be stockpiled separately for use in future landscaping works, sold to market for off site use, or taken to landfill.

Figure 1: Site boundary

N

Scale 1:4,000 at A4

0 50 100 m

Coordinate System:
GDA 1994 MGA Zone 50

Date: 14/05/2019

Legend

- Part Lot boundary
- Lot 500 (balance)
- Existing roads

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info@strategen.com.au | www.strategen.com.au

Nearmap: Aerial image, flown 04/2019. Landgate: Cadastre, 07/2018. Client: Cedar Woods. Site data 1/2019. Created by: c.thatcher

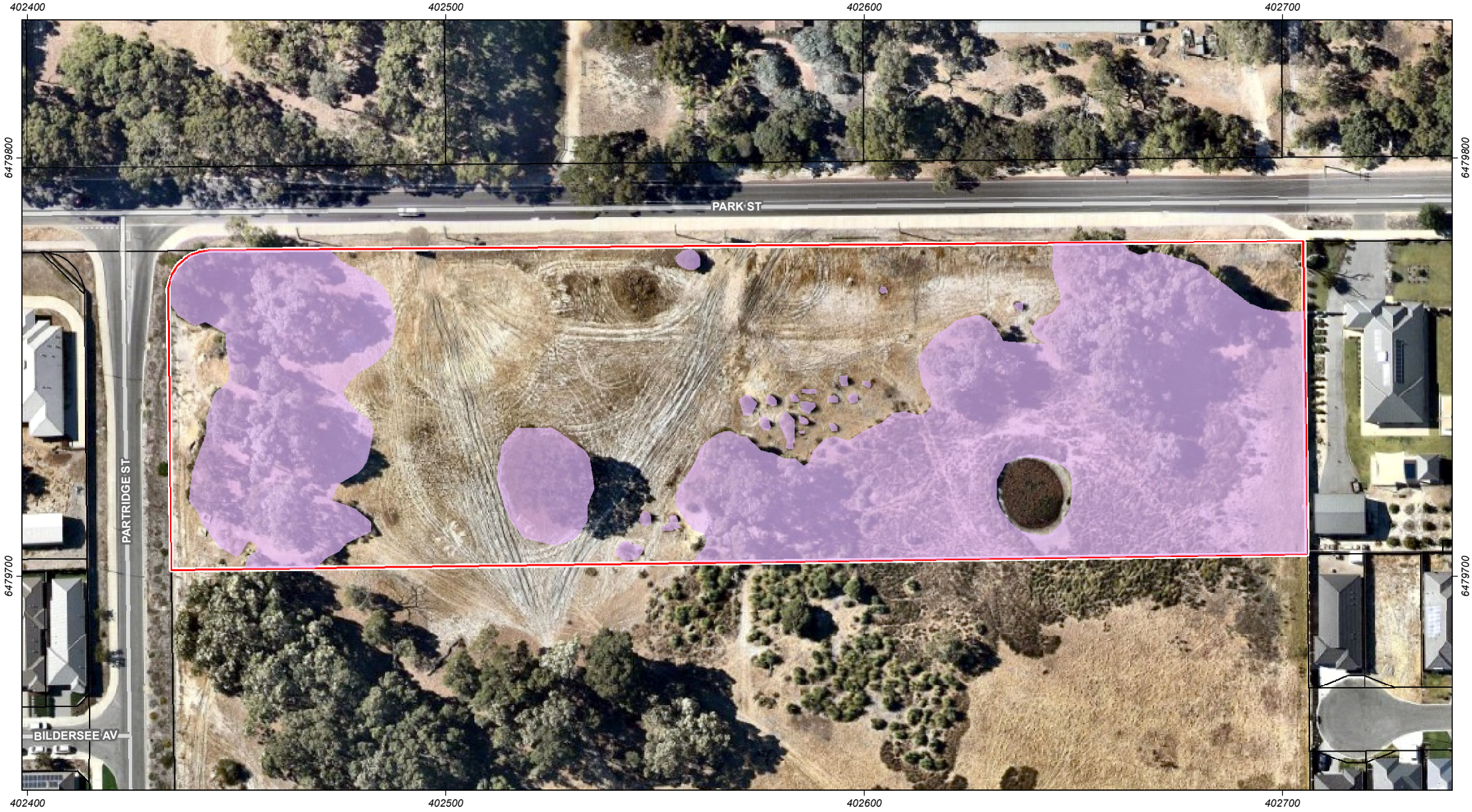

Figure 2: Native vegetation to be cleared

N

Scale 1:1,200 at A4

0 10 20 m

Coordinate System: GDA 1994 MGA Zone 50

Date: 17/05/2019

Legend

- Part Lot 500 area
- Native vegetation to be cleared (1.080 ha)
- Cadastral boundary
- Roads

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Service Layer Credits: Nearmap: Aerial image, flown 02/2019. Landgate: Cadastre, 07/2018. Client: Cedar Woods. Site data 03/2019. Created by: h.sullivan

2. Existing Environment

2.1 Climate

The site experiences a Mediterranean climate characterised by cool wet winters and hot dry summers. The nearest Bureau of Meteorology (BoM) weather station at Perth Airport provides average monthly rainfall statistics for the site (Plate 1). Average annual rainfall recorded at Perth Airport since 1994 is 765 mm (BoM 2019). Rainfall may occur at any time of year, however most occurs in winter in association with cold fronts from the south west. The BoM weather station at Perth Airport also provides the most representative monthly temperature data for the Project Area. Highest temperatures occur between December and march, with average monthly maximums ranging from 29°C in December to 31.9°C in February (BoM 2019). Lowest temperatures occur between June and August, with average monthly minimums ranging from 8°C in July to 9°C in June (BoM 2019).

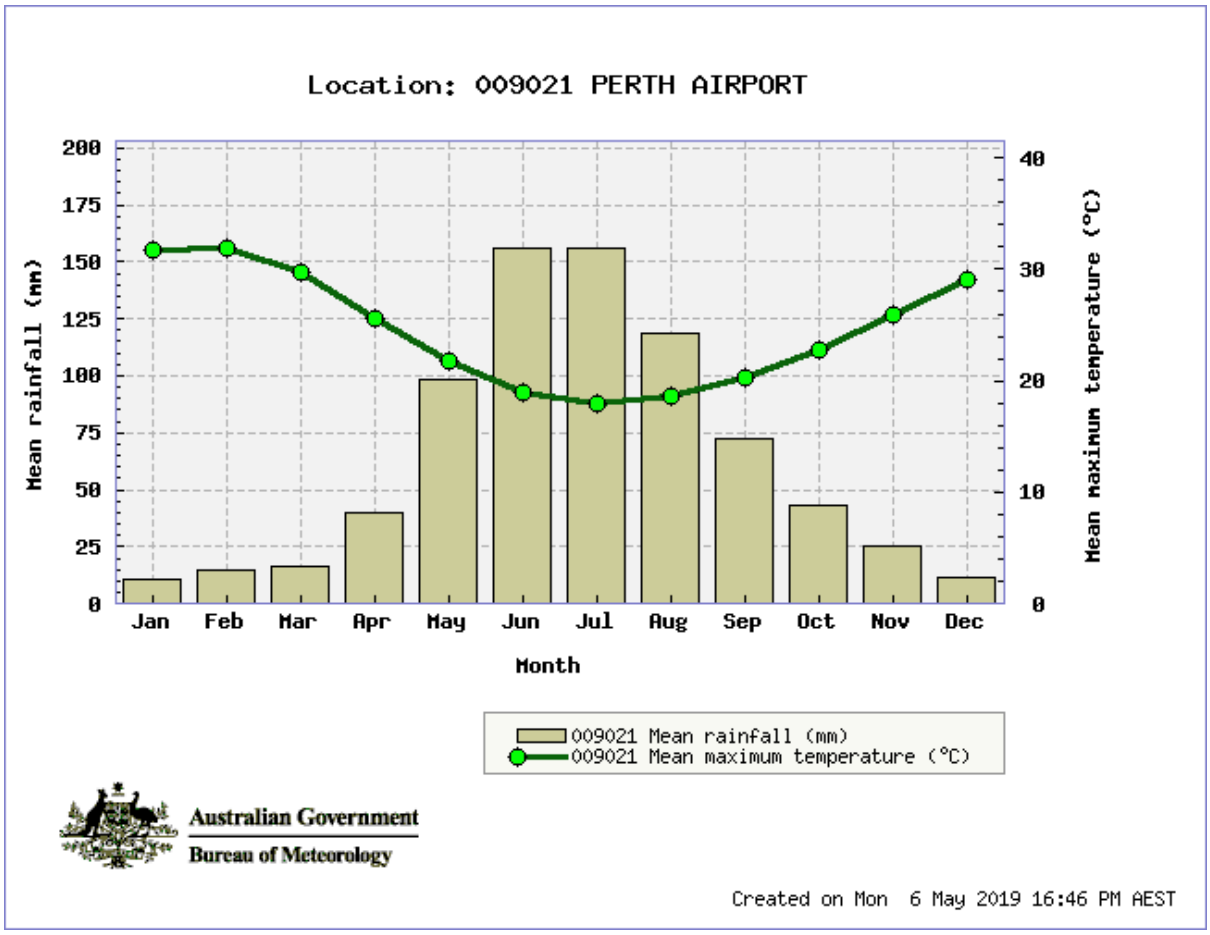

Plate 1: Mean monthly rainfall and maximum temperatures (BoM 2019)

2.2 Topography, geology and soils

Topography on site is low lying with elevation ranging from approximately 33 m to 36 m Australian height datum (AHD), undulating from the highest point in the north to the lowest point in the southwest (DPIRD 2019).

The subject site is located on the Swan Coastal Plain 2 (SWA2 – Swan Coastal Plain subregion) of Western Australia (Mitchell et al. 2002). Beard (1990) describes the Swan Coastal Plain as a low-lying coastal plain, often swampy, with sandhills also containing dissected country rising to the duricrusted Dandaragan plateau on Mesozoic, mainly sandy, yellow soils.

The Swan Coastal Plain comprises five major geomorphologic systems that lie parallel to the coast, the Quindalup Dunes, Spearwood Dunes, Bassendean Dunes, Pinjarra Plain and Ridge Hill Shelf (Churchward & McArthur 1980; Gibson *et al.* 1994). Each major system is further subdivided into detailed geomorphologic units (Churchward & McArthur 1980; Semeniuk 1990; Gibson *et al.*1994). The Project area lies within the Bassendean Dunes system, characterised by sand dunes and sand plains comprising swamps and flats on sandy alluvium over sedimentary rocks (DPIRD 2018). The soils of this system typically have low fertility and are susceptible to leaching, consist of pale deep sand, semi-wet soil and wet soil (Safstrom and Short 2012).

Regional environmental geological mapping (Gozzard 1986) identifies the soil type of the site as being Sands (S10) which is described as very light grey at the surface, yellow at depth, fine to medium grained sub-rounded quartz of aeolian origin.

2.3 Hydrology

2.3.1 Groundwater

The Perth Groundwater Atlas indicates that maximum groundwater levels within the site range between approximately 33 m AHD in the north west to 31 m AHD in the south east (DWER 2018). Depth to groundwater ranges from approximately 3 m in the north west of the site to 1.5 m in the south east (DWER 2018).

Average Annual Maximum Groundwater levels were established by JDA (2009) as part of the preparation of the Albion Local Water Management Strategy (LWMS). The Albion LWMS presents both district and local level drainage information.

2.3.2 Surface water

The site is located within the Saint Leonards Creek sub catchment of the Swan Avon Catchment on the Swan Coastal Basin. A site visit was undertaken in 2018 (Strategen 2019), and several small drains were identified intercepting the subject site. These drains are likely a combination of natural drainage lines and excavated drains, extended or deepened to enhance drainage from the area (JDA 2009). Drains in the area were historically installed to lower the water table in adjacent farmland and reduce the incidence of inundation and water logging (JDA 2009).

There are no recorded Ramsar sites or the (then) Commonwealth Department of Environment (DoE) (1993) Important Wetlands within the site.

The Department of Biodiversity, Conservations and Attraction's (DBCAs) Regional geomorphic wetland mapping indicates that there are no conservation category wetlands within the site (WALGA 2019). The nearest conservation category wetland, UFI 8548, is approximately 821.4 m to the west of the subject site (WALGA 2019).

The majority of the site comprises palusplain Multiple Use Wetland (MUW), UFI 13396 (WALGA 2019). MUW's are typically wetlands with few important ecological attributes and function remaining; approved development can progress within MUW's providing the on-ground values reflect the wetland category, and therefore these wetland values do not represent a constraint to development, other than the limitations associated with the site's geology and depth to groundwater / perched surface water as previously discussed.

2.3.3 Public Drinking Water Source Areas

The site lies within a State Planning Policy 2.7 Public Drinking Water Source Area, specifically within the Gnangara Underground Water Pollution Control area. The site is subsequently subject to State Planning Policy 2.2 - Gnangara Groundwater Protection and has been identified as Priority 3 – Source Protection Area.

2.4 Acid sulphate soils

A search of the Western Australian Atlas Acid Sulphate Soil (ASS) Swan Coastal Plain risk map indicates that most of the site has a 'moderate to low' risk of ASS occurring within 3 m of natural soil surface (WALGA 2018).

A strategic ASS investigation was undertaken over the site as part of the wider Albion District Structure Plan (JDA 2009). The investigation identified that ASS conditions would not prevent development within the DSP area, nor place unreasonable requirements on development (JDA 2009). The strategic ASS investigation suggested that development of the area would require similar management of soil and groundwater actions that have been successfully implemented for other projects, including:

- lime dosing of soil and groundwater as appropriate
- control of soil movement and groundwater discharge
- monitoring of soil and groundwater quality.

2.5 Vegetation and flora

2.5.1 Desktop assessment

Vegetation

System 6 mapping refers to vegetation assessment undertaken at a Vegetation Complex scale by Heddle *et al.* (1980). This is the primary source of information used to calculate potential impacts of proposals to clear native vegetation on the Swan Coastal Plain. The subject site comprises Southern River Complex vegetation which is described as open woodland of *Corymbia calophylla*, *Eucalyptus marginata* and *Banksia* species with fringing woodland of *Eucalyptus rudis* and *Melaleuca rhaphiophylla* along creek beds (Heddle *et al* 1980). There is approximately 18.42% of this vegetation complex remaining, of which 1.18% is vested within lands protected for conservation.

At a finer scale, the site is mapped within the Bassendean 1018 vegetation system association by Beard (1990). This association is characterised by a mosaic of medium forest and woodlands of Jarrah, Marri, Banksia and *Casuarina obesa.* Approximately 17% of the pre-European extent of this system association remains, with 0.71% of the current extent protected in conservation.

In terms of biodiversity conservation targets, the National Objectives and Targets for Biodiversity Conservation 2001 – 2005 aims to:

- prevent clearing of ecological communities with less than 30 percent of the original extent remaining
- recover ecological communities with less than 10 percent of the original extent remaining.

These national targets are reflected in state government policy for Western Australia and generally, are used to guide planning and decision-making (WAPC 2011). However, in relation to bushland conservation within the Perth Metropolitan Region portion of the Swan Coastal Plain, which is recognised as a constrained area, *State Planning Policy 2.8 – Bushland Policy for the Perth Metropolitan Region* and *Bush Forever* seeks to protect a target of at least 10 percent of the original extent of each vegetation complex (WAPC 2010).

The current extent for Southern River Complex and Bassendean 1018 vegetation association within the site is above the 10% threshold.

Flora

A desktop assessment of Threatened and Priority Flora and/or communities potentially occurring within 5 km of the site was undertaken using the DBCAs *Naturemap* database and the Department of the Environment and Energy's (DEEs) *Protected Matters Search Tool.* The assessment reports (Appendix 2) identified 16 Threatened and 11 Priority flora species which may potentially occur in the vicinity of the site. The search reports also identified the potential for three Threatened Ecological Communities (TEC) to occur in the vicinity of the site. These species/communities are listed in Table 3 along with a description of their preferred habitat and likelihood of occurrence within the site.

Based on the known habitat requirements of each species, four Priority flora species were considered to have the potential to occur within the site.

Table 3: Threatened and Priority flora species and communities that may potentially occur within the site

Species	Conservation status		Description	Likelihood of presence within the site
	BC Act	EPBC Act		
Acacia oncinophylla subsp. oncinophylla	Priority 3	Not listed	A shrub, growing to between 0.9 - 2.5 m high, exhibits 'minni-ritchi' bark, phyllodes are mostly 8-13 cm long, 1-2 mm wide. Flowers are yellow from August to October. Prefers granitic soils (WAH 2019).	**Unlikely.** No suitable habitat occurs within the site
Amanitia fibrillopes	Priority 3	Not listed	Solitary or gregarious fungus, occurring in sandy or gravelly soil in dry schlerophyll forest and *Banksia* woodland, or in humus rich soil in seasonally wet eucalypt and paperbark woodland, often associated with *Eucalyptus marginata, E. jacksonii, Allocasuarina fraseriana, Corymbia calophylla, Melaleuca preissiana* and *Agonis* sp.	**Possible.** Potentially suitable habitat occurs within the site.
Slender Andersonia *Andersonia gracilis*	Threatened	Threatened (endangered)	Found on seasonally damp, black sandy clay flats near or on the margins of swamps, often on duplex soils supporting low open heath vegetation with species such as *Calothamnus hirsutus*, *Verticordia densiflora* and *Kunzea recurva* over sedges (DEC 2006).	**Unlikely**. No suitable habitat occurs within the site
Dwarf Green Kangaroo Paw *Anigozanthos viridis* subsp. *terraspectans*	Threatened	Threatened (vulnerable)	Occurs in winter-wet depressions where it grows on grey sandy clay loam, or grey sand, in low post-fire regenerating heath. It is associated with species such as Slender-leaved Banksia (*Banksia leptophylla*), melaleucas (*Melaleuca* spp.), Compact Featherflower (*Verticordia densiflora*), coneflowers (*Conostylis* spp.) and sedges (TSSC 2008).	**Unlikely**. The Project area is outside of the known range of this species and no other species associated with the Dwarf Green Kangaroo Paw occurs within the site.
Grand Spider Orchid *Caladenia huegelii*	Threatened	Threatened (endangered)	*Caladenia huegelii* grows up to 60 cm tall with a single erect, pale green, hairy leaf and one or two (rarely three) predominantly pale greenish-cream flowers (DEC 2008). Preferred habitat is a mixed woodland dominated by *Eucalyptus* and *Banksia* species, usually within 20 km of the coast. Soils are usually deep grey-white sand associated with the Bassendean sand dune system.	**Unlikely.** No suitable habitat occurs within the site.
Gingin Wax *Chamelaucum sp.* Gingin	Threatened	Threatened (endangered)	*Chamelaucium sp. Gingin* is endemic to confined to the Gingin / Chittering area, where it is known from a range of only 3 km. The six known populations contain a total of approximately 4700 adult plants and 1800 juveniles. The species occurs on white/yellow sand supporting open low woodland with Eucalyptus todtiana, Banksia attenuata and Hibbertia sp. (Stack & English 2003).	**Unlikely.** The site occurs outside the known distribution of the species
Cyathochaeta teretifolia	Priority 3	Not listed	A rhizomatous, clumped, robust perennial sedge to 2 m tall. Habitat for this species occurs in grey sand and sandy clay in swamps or along creek edges (WAH 2019)	**Unlikely.** No suitable habitat occurs within the site
Darwinia pimelioides	Priority 4	Not listed	An erect shrub from 0.25 to 0.5(-1) m high. Flowers are red/pink & green from September to October. Prefers loam, sandy loam. Granite outcrops (WAH 2019).	**Unlikely.** No suitable habitat occurs within the site

Species	Conservation status		Description	Likelihood of presence within the site
	BC Act	EPBC Act		
Native Wild Rose *Diplolaena andrewsii*	Threatened	Threatened (endangered)	An erect shrub, 0.5-1 m high, with inner involucral bracts glabrous, leaves broadly cordate. Flowers are red and evident from July to October. Preferred habitat is loam, clay and granite outcrops & hillsides (WAH 2019). D. andrewsii is found in Marri (*Corymbia calophylla*) and Wandoo (*Eucalyptus wandoo*) woodlands, amongst Two-leaf Hakea (*Hakea trifurcata*), Trymalium ledifolium, Grass tree (*Xanthorrhoea preissii*), Prickly Moses (*Acacia pulchella*), and *Thelymitra dedmaniarum* (TSSC 2018).	**Unlikely**. The site is outside of the known distribution of the species, which is restricted to two populations within a National Park.
Purdie's Donkey Orchid *Diuris purdiei*	Threatened	Threatened (endangered)	This species is a slender orchid to 45 cm tall, with unusually flattened flowers, marked with brown blotches on the under surface. Habitat for this species occurs in areas subject to winter inundation within dense heath with scattered Myrtaceous trees.	**Unlikely.** No suitable habitat occurs within the site.
Glossy-leafed Hammer Orchid *Drakea elastica*	Threatened	Threatened (endangered)	This species occurs from Perth south to near the Whicher Range, within the Swan Natural Resource Management Region. It grows on sand to sandy clay soils, in areas subject to winter inundation, and amongst native sedges and dense heath with scattered emergent *Melaleuca preissiana, Corymbia calophylla, Eucalyptus marginata* and *Nuytsia floribunda* (Kelly *et al.* 1993; Brown *et al.* 1998; Williams *et al.* 2001).	**Unlikely.** While potentially suitable habitat for this species occurs within the site, the degraded condition of this habitat is likely to prevent the ongoing survival of the population.
Keighery's Eleocharis *Eleocharis keigheryi*	Threatened	Threatened (vulnerable)	This species is known from 15 populations between north of Eneabba and south-east to Qualeup. The number of mature plants that constitute this population is estimated to be 13,800. The species prefers a substrate of clay or sandy loam, emergent in freshwater creeks or claypans.	**Unlikely.** No suitable habitat occurs within the site
Cadda Mallee *Eucalyptus x balanites*	Threatened	Threatened (endangered)	Eucalyptus balanites is an erect, robust tree mallee, 5-8 metres tall and to 15 metres wide. It is a sprawling tree with rough flaky grey bark up to the branchlets. The species is found on light coloured sandy soils over laterite. Habitat consists of gently sloping heathlands; open mallee woodland over shrubland, or heathland with emergent mallees	**Unlikely.** No suitable habitat occurs within the site. The site is also outside the known distribution of the species.
Christine's Grevillea *Grevillea christineae*	Threatened	Threatened (endangered)	This species is an erect, wiry shrub, 0.5-0.6 m high, flowering white-cream between August and September. Occurs on clay loam, sandy clay soils, often in damp areas (WAH 2019). Known populations are located to the north and east of the Darling Scarp in the Wheatbelt, in remnant shrubland and disturbed areas including road verges.	**Unlikely**. The site is outside the known range of the species and no suitable habitat occurs within the site.

Species	Conservation status		Description	Likelihood of presence within the site
	BC Act	EPBC Act		
Curved-leaf Grevillea *Grevillea curviloba* subsp. *curviloba*	Threatened	Threatened (endangered)	The subspecies is very geographically restricted, with a range of less than 20 km. This subspecies is generally associated with the Muchea Limestone community which is ranked as Endangered due to threats associated with its restricted nature. The community is characterised by a suite of species including *Melaleuca huegelii, M. systena ms* and *Acacia saligna* (CALM 2000a).	**Unlikely.** The site is outside of the known range of the species.
Narrow curved-leaf Grevillea *Grevillea curviloba* subsp. *incurva*	Threatened	Threatened (endangered)	This species is confined to an area between Muchea and Badgingarra (CALM 2000b). It occurs amongst low trees, or tall (sclerophyll) shrubland; in sand or clay soils on winter-wet flats (WAH 2019). It is associated with the 'shrublands and woodlands on Perth to Gingin Ironstone' ('Northern Ironstone') and the 'Shrublands and Woodlands on Muchea Limestone' communities (CALM 2000b).	**Unlikely.** The site is outside of the known range of this species.
Hydrocotyle striata	Priority 1	Not listed	A semiaquatic herb preferring clay and springs (WAH 2019)	**Unlikely**. No suitable habitat occurs within the site
Beaked Lepidosperma *Lepidosperma rostratum*	Threatened	Threatened (endangered)	A rhizomatous, tufted perennial, grass-like or herb (sedge), 50 cm tall. Flowers are brown, and flowering occurs from May to June. Habitat for this species occurs in peaty sand or clay and within seasonally wet swamps. The known distribution for the species is limited to four populations in the east of the Perth Metropolitan Area (WAH 2019-).	**Unlikely.** No suitable habitat occurs within the site. This is due to the degraded condition of the vegetation which lacks the low heath component within seasonally wet areas.
Meionectes tenuifolia	Priority 3	Not listed	Decumbent annual herb to 10 cm tall. Habitat for this species included seasonally wet areas on grey sand over clay/	**Possible.** Potentially suitable habitat for this species occurs within the site.
Schoenus capillifolius	Priority 3	Not listed	A semi-aquatic tufted annual, grass-like or herb (sedge), growing to 0.05 m high. Flowers are green, from October to November. Preferred habitat includes brown mud, Claypans.	**Unlikely.** No suitable habitat occurs within the site.
Schoenus sp. Waroona (G.J. Keighery 12235)	Priority 3	Not listed	A tufted annual, grass-like or herb (sedge), 0.02-0.06 m high. Fl. brown-red-green, October to November. Found on clay or sandy clay on winter-wet flats.	**Unlikely.** No suitable habitat occurs within the site.
Stachystemon sp. Keysbrook (R. Archer 17/11/99)	Priority 1	Not listed	Prefers seasonally damp grey sand	**Possible.** Potentially suitable habitat for this species occurs within the site.
Jumping Jacks *Stylidium longitubum*	Priority 4	Not listed	An erect annual (ephemeral) herb. Grows to 0.05-0.12 m high. Flowers are pink, from October to December. Prefers sandy clay, clay and seasonal wetlands (WAH).	**Unlikely**. No suitable habitat occurs within the site
Selena's Synaphea *Synaphea sp.* Fairbridge	Threatened	Threatened (critically endangered)	Selena's *Synaphea* is endemic to the Pinjarra Plain of Western Australia (TSSC, 2009). It is known from five subpopulations from Serpentine to Dardanup (a range of approximately 120 km north to south), south of Perth, Western Australia. The species occurs on grey, clayey sand with lateritic pebbles in low woodland areas near winter flats.	**Unlikely.** The site is outside the known range of the species, and suitable habitat does not occur on site.

Species	Conservation status		Description	Likelihood of presence within the site
	BC Act	EPBC Act		
Cinnamon Sun Orchid *Thelymitra dedmaniarum*	Threatened	Threatened (endangered)	This species is a terrestrial orchid, herb, growing up to 80 cm tall. Flowers are yellow and have a strong cinnamon odour, occurring from November to December or January. This species inhabits open wandoo woodland on red-brown sandy loam, associated with dolerite and granite outcropping (WAH 2019).	**Unlikely**. Preferred habitat not present within the site. Also not recorded in the Wanneroo area (Flora base 2017).
Star Sun Orchid *Thelymitra stellata*	Threatened	Threatened (endangered)	This species is a terrestrial orchid growing 15 to 50 cm tall with multiple (up to six) golden-brown flowers with yellow or orange sepals and petals on a single, robust stem. The column hood is deeply fringed on both sides and usually bright orange in colour. The central portion is woolly with dense papillate glands. Flowering occurs from October to November. A single, broad lily-like leaf, up to 9 cm long and 4 cm wide clasps the stem at the base. Habitat for this species is within sand, gravel, and lateritic loam on ridges, slopes, flats, riverbanks and breakaways (WAH 2019).	**Unlikely.** Preferred habitat not present within the site.
Swan Hydatella *Trithuria occidentalis*	Threatened	Threatened (endangered)	*Trithuria occidentalis* is currently known from one confirmed location near Ellenbrook. There is also a possible second location in Upper Swan in which the species has not been relocated since 1978. The species grows partly submerged on the edge of shallow, winter-wet claypans in very open shrubland of *Melaleuca lateritia* (DEC 2012).	**Unlikely**. The site is outside of the known distribution of the species, and no suitable habitat occurs within the site
Verticordia lindleyi subsp. *lindleyi*	P4	Not listed	An erect shrub between 20-75 cm tall. Flowers are pink and visible in May or November-January. Habitat for this species occurs on sand or sandy clay soils in winter wet depressions (WAH 2019).	**Possible.** Potentially suitable habitat for this species occurs within the site.

2.5.2 Site assessment

A flora and vegetation assessment was undertaken by an ecologist from Strategen on 22 June 2018. The survey was conducted according to standards set out in the Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016).

Vegetation

Two Vegetation Types (VT's) were identified within the site (VT1 and VT3), which are summarised in Table 4 below. Vegetation within the site was considered not to be representative of any TEC or Priority Ecological Communities (PEC).

Table 4: Vegetation types

Vegetation type	Description	Area (ha)	Percentage (%) of site
VT1	*Corymbia calophylla* open woodland over *Xanthorrhoea preissii*	0.689	33.593
VT3	*Melaleuca* woodland in wetter areas	0.259	12.628
Cleared	-	1.024	49.927
Parkland Cleared	-	0.052	2.535
Dam	-	0.027	1.316
Total	-	2.051	100

The condition of remnant vegetation across the site was classified as Degraded, with the remaining cleared areas classified as Completely Degraded due to historic agricultural use (Table 5; Figure 3).

Table 5: Vegetation condition

Condition	Area (ha)	Percentage of Survey Area
Degraded	0.948	46.22
Completely Degraded	1.103	53.78
Total	**2.051**	**100**

Flora

Four Priority flora species were identified in the desktop assessment as having the potential to occur within the site (Table 3), based on the presence of potentially suitable habitat for each species. However, none of these species are expected to occur within the site, due to the site's highly degraded nature.

Most of the site is highly degraded and dominated by weed species. One weed species that was noted during the site assessment, cotton bush (*Gomphocarpus fruticosus*), is listed as a declared pest under the *Biosecurity and Agriculture Management Act 2007*. This species typically requires regular and ongoing weed control.

Threatened Ecological Communities

A desktop assessment of Threatened and Priority ecological communities potentially occurring within 5 km of the site was undertaken using the DBCAs *Naturemap* database and the DEEs *Protected Matters Search Tool.* The assessment reports (Appendix 2) identified the potential for three TECs to occur in the vicinity of the site. These communities are listed in Table 6Table 3 along with a description of their preferred habitat and likelihood of occurrence within the site.

In summary, and based on a site assessment, vegetation within the site was considered to not be representative of any TECs or PECs.

Table 6: Threatened/Priority ecological communities that may potentially occur within the site

Ecological Community	Conservation status		Description	Likelihood of presence within the site
	BC Act	EPBC Act		
Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain TEC	Critically Endangered	Threatened	On the eastern side of the Swan Coastal Plain there is continuous growth and breakdown of vegetation that causes the formation of peat around the permanent water supply. Water continues to penetrate the increasingly elevated peat layers due to the pressure created by local and regional hydrological forces. Where water finds a 'preferred pathway' or conduit through the soil, water movement is much faster than normal groundwater flow. Such conduits or pipes may carry sand and silt to the surface, where it is deposited as a 'collar' of increasing height, so enhancing the formation of mounds. No such formations were identified during the site assessment (Strategen 2019)	**Unlikely**
Banksia Woodland TEC	Priority 3	Threatened	Located on the Swan Coastal Plan consisting of a prominent tree layer of Banksia, with scattered eucalypts and other tree species often present among or emerging above the Banksia canopy. The understorey is a species rich mix of sclerophyllous shrubs, graminoids and forbs. A flora and vegetation assessment was undertaken in 2018 (Strategen 2019) which identified species within remnant vegetation outside of the site boundary within Lot 500 as being analogous to those of this Threatened Ecological Community (TEC), namely *Banksia menziesii, Banksia attenuata,* and *Corymbia calophylla*. This patch of remnant vegetation was however too small (< 2 ha) and degraded to meet the diagnostic criteria of this TEC as outlined in the *Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community* (TSSC 2016).	**Unlikely**
Corymbia calophylla - *Xanthorrhoea preissii* woodlands and shrublands TEC	Critically Endangered	Threatened	Located on heavy soils of the eastern side of the Swan Coastal Plain between Bullsbrook, and Waterloo near Bunbury. Dominant species in the community are the trees *Corymbia calophylla* and occasionally *Eucalyptus wandoo*; the shrubs *Xanthorrhoea preissii*, *Acacia pulchella*, *Dryandra nivea*, *Gompholobium marginatum*, and *Hypocalymma angustifolia.* A flora and vegetation assessment was undertaken in 2018 (Strategen 2019) which identified the canopy of remnant vegetation within the project area as matching the listed dominant trees (*Corymbia calophylla*) within the conservation advice for the TEC (TSSC 2017). However, only one of the listed dominant shrubs (*Xanthorrhoea preissii*) and none of the listed dominant herbs were recorded. Advice given by the DBCA Species and Communities branch supported the conclusion of the flora and vegetation assessment that the remnant vegetation does not represent this TEC (Strategen 2019).	**Unlikely**

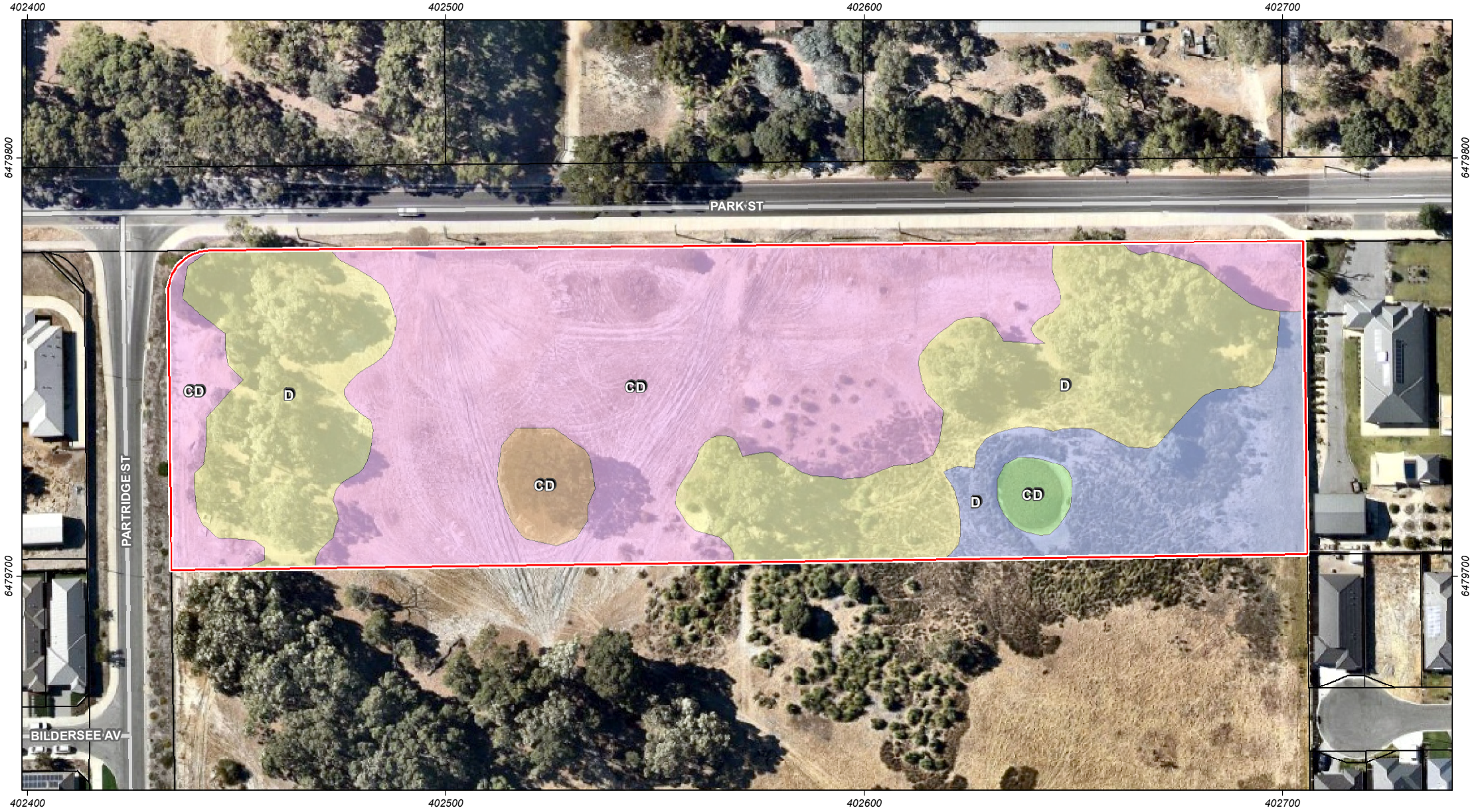

Figure 3: Vegetation types and condition

N

Scale 1:1,200 at A4

0 10 20 m

Coordinate System: GDA 1994 MGA Zone 50

Date: 16/05/2019

Legend

- Project area
- Cadastral boundary
- Roads

Vegetation type

- VT1
- VT3
- Parkland Cleared
- Dam
- Cleared

Vegetation condition

- D: Degraded
- CD: Completely Degraded

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Service Layer Credits: Nearmap: Aerial image, flown 02/2019. Landgate: Cadastre, 07/2018. Client: Cedar Woods. Site data 03/2019. Created by: h.sullivan

2.6 Fauna

2.6.1 Desktop assessment

A desktop assessment of conservation significant fauna potentially occurring within 5 km of the site was undertaken using the DBCAs *Naturemap* database and the DEE's *Protected Matters Search Tool.* The assessment reports (Appendix 2) identified 12 Threatened and seven Priority fauna species which may potentially occur in the vicinity of the site. The search reports also identified the potential for two Specially Protected and one Internationally Protected fauna to occur in the vicinity of the site. These species are listed in Table 7 along with a description of their preferred habitat and likelihood of occurrence within the site.

Of the species listed in Table 7, the following species were considered likely to utilise the site as habitat, or there was a possibility that they utilise the site based on a desktop assessment:

- Forest Red Tailed Black Cockatoo (FRTBC; *Calyptorhynchus banksii naso*)
- Baudin's Black Cockatoo (BBC; *Calyptorhynchus baudinii*)
- Carnaby's Black Cockatoo (CBC; *Calyptorhynchus latirostris*)
- Southern Brown Bandicoot (Quenda; *Isoodon fusciventer*).

Site investigations were conducted to identify black cockatoo foraging, breeding and roosting habitat within the site.

Table 7: Threatened and Priority fauna species that may potentially occur within the site

Species	Conservation status		Description	Likelihood of presence within the site
	BC Act	EPBC Act		
Australian Lesser Noddy *Anous tenuirostris* subsp. *melanops*	Threatened	Threatened (Vulnerable)	A seabird threatened predominately with predation by introduced species, marine debris, and climatic and oceanic change. Currently has a limited distribution (DEH 2005).	**Unlikely.** The site is not on the coast, nor is suitable habitat available
Curlew Sandpiper *Calidris ferruginea*	Threatened	Threatened (critically endangered)	The Curlew Sandpiper occurs on intertidal mudflats of sheltered coastal areas such as estuaries, bays, inlets and lagoons, in shallow waters. They also occur in non-tidal swamps, lakes and lagoons. They occur less often in inland areas such as ephemeral and permanent lakes, dams, waterholes and bore drains (Birdlife Australia 2019). If present, this species would be limited to either of two small man-made dams within the project area, however each of these is in a completely degraded condition (Strategen 2019)	**Unlikely.** The site is not on the coast, nor is suitable habitat present.
Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*	Threatened	Threatened (vulnerable)	Red-tailed Black-Cockatoos inhabit a wide variety of habitats, especially forests and woodlands dominated by eucalypts or casuarinas. Some subspecies prefer specific vegetation assemblages, such as Brown Stringybark forests in south-western Victoria and south-eastern SA, or Marri, Jarrah and Karri forests in south-western Australia, but others are less restricted in the habitats they occupy. They also occur in some regional towns and cities (Birdlife Australia 2019).	**Confirmed.** Individuals were sighted foraging during a site visit.
Baudin's Black Cockatoo *Calyptorhynchus baudinii*	Threatened	Threatened (endangered)	Baudin's Cockatoo occurs predominantly in jarrah, marri and karri eucalypt forests, and less frequently in woodlands and cleared urban areas. During breeding season they forage on banksia, hakea, and dryandra species. During non-breeding season they forage in marri forests. Breeding occurs predominantly in woodland or forest habitats, nesting in hollows of live or dead trees of karri, marri, wandoo and tuart (DSEWPaC 2012). They roost typically in eucalypt trees near permanent water sources.	**Likely.** The site is within the known distribution (DSEWPC 2012).
Carnaby's Black Cockatoo *Calyptorhynchus latirostris*	Threatened	Threatened (endangered)	Carnaby's Black Cockatoo 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 (DSEWPaC 2012).	**Likely**. The site is within the known distribution (DSEWPC 2012).
Woylie *Bettongia penicillata ogilbyi*	Threatened	Threatened (endangered)	The Woylie occurs predominantly in forest and woodland habitats dominated by tall eucalypts and dense, protective understoreys of myrtaceous shrubs and kwongan heath. This species is now only known from two areas: Upper Warren and Dryandra Woodlands. There are also translocated populations at Batalling, and inside fenced areas in Mt Gibson, Karakamia and Whiteman Park.	**Unlikely**. The site is outside the known distribution of the species

Species	Conservation status		Description	Likelihood of presence within the site
	BC Act	EPBC Act		
Chuditch *Dasyurus geoffroi*	Threatened	Threatened (vulnerable)	The Chuditch has undergone a dramatic decline since European settlement (its former distribution was about 70% of the continent) and is now restricted to Western Australia, mostly the south west of Western Australia, but there are occasional records from drier woodland and mallee shrubland in the Wheatbelt and Goldfield Regions (DEC 2012b). The Chuditch disappeared from the Swan Coastal Plain (and therefore much of Perth) in the 1930s, however, there have been records in the outer metropolitan areas such as Gooseberry Hill, East Martin and on the Swan Coastal Plain, Upper Swan Valley, High Wycombe, Wandi, Yalgorup National Park and Leschenault Conservation Park (DEC 2012b). In much of its current range the Chuditch now occurs in the Jarrah forests and woodlands where it primarily requires hollow logs, earth burrows or rock crevices to den (DEC 2012b).	**Unlikely**. The site is outside of the known distribution of the species and there is no jarrah forest on site.
Peregrine falcon *Falco peregrinus*	Specially Protected	Not listed	The Peregrine Falcon is not restricted to a specific habitat, and can occur across woodlands, grasslands and coastal cliffs	**Possible**
Western False Pipistrelle *Falsistrellus mackenziei*	Priority 4	Not listed	A gregarious predator inhabiting tall woodland. It occurs in wet sclerophyll forest dominated by Karri (*Eucalyptus diversicolor*), and in the high rainfall zones of the Jarrah (*E. marginata*) and Tuart (*E. gomphocephala*) forests. It has also been recorded in mixed Tuart-Jarrah tall woodlands on the adjacent coastal plain. Marri (*E. calophylla*), Sheoak (*Casuarina heugeliana*) and Peppermint (*Agonis flexuosa*) trees are often co-dominant at its collection localities.	**Unlikely.** The site is outside of the known range of the species, and no suitable habitat occurs within the project area.
Black-stripe Minnow *Galaxiella nigrostriata*	Threatened	Threatened (Endangered)	A freshwater fish that is endemic to the seasonally dry coastal wetlands of south-west Western Australia. The species aestivates in the sediment over the long, dry Mediterranean summer and its dispersal is limited by lack of habitat connectivity.	**Unlikely.** No suitable habitat present within the site.
Rakali *Hydromys chryogaster*	Priority 4	Not listed	Water rats can live anywhere in Australia where there is water all year around. They water can be fresh, brackish or marine, as long as the water is clean and there is lots of vegetation. They like to have old logs and rock ledges about as a place to hide and nest. In Western Australia, it is found in fresh, brackish and marine water in the southwest, and along the coast up to the Kimberley.	**Unlikely.** No suitable habitat is present within the site.
Quenda *Isoodon fusciventer*	Priority 4	Not listed	Quenda have a patchy distribution through the Jarrah and Karri forest, the Swan Coastal Plain. Scrubby, often swampy, vegetation with dense cover up to 1 m high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover.	**Possible.**
Malleefowl *Leipoa ocellata*	Threatened	Threatened (vulnerable)	Malleefowl usually occur in mallee eucalypt woodlands with a dense but discontinuous canopy and varied shrubby understorey, especially where the mallee trees are multi-stemmed. They also very occasionally occur in other types of dry eucalypt forests. The key to their presence is the period since the habitat was last burnt, with habitat that has not been burnt for 40–60 years preferred; frequently burnt areas are unsuitable and do not support populations of Malleefowl.	**Unlikely**. Suitable habitat not present.

Species	Conservation status		Description	Likelihood of presence within the site
	BC Act	EPBC Act		
Bilby *Macrotis lagotis*	Threatened	Threatened (Vulnerable)	In Western Australia, the bilby is now largely restricted to the Gibson, Little Sandy and Great Sandy Deserts, and parts of the Pilbara, Dampierland, Central Kimberley and Ord-Victoria Plains bioregions. The bilby continues to occupy a wide range of vegetation types, with the major vegetation types defined as open tussock grassland on uplands and hills, mulga woodland/shrubland growing on ridges and rises, and hummock grassland (spinifex) growing on sandplains and dunes, drainage systems, salt lake systems and other alluvial areas.	**Unlikely.** The site lies outside of the known distribution of the species, and no suitable habitat exists within the site.
Black Striped Snake *Neelaps calonotos*	Priority 3	Not listed	This species inhabits Banksia woodlands and sandy areas of the Perth region.	**Unlikely.** No suitable habitat is present within the site.
Notamacropus irma	Priority 4	Not listed	The Western Brush Wallaby is a medium sized wallaby weighing no more than 10kg. They prefer banksia woodland with dense understorey habitats such as *Hibbertia hypericoides* and *Stirlingia latifolia* association, reflecting their preference for their favourite foods.	**Unlikely**. The size of remnant vegetation is too small, and appropriate habitat does not exist.
Eastern Curlew *Numinius madagascariensis*	Threatened	Threatened (critically endangered)	The Eastern Curlew occurs on mudflats or sandflats associated with sheltered coastal areas, such as estuaries, bays, harbours, inlets and lagoons. They are also often recorded within mangroves and saltmarshes. The Eastern Curlew does not breed in Australia. In southern Western Australia, eastern curlews are recorded from Eyre, and there are scattered records from Stokes Inlet to Peel Inlet. The species is a scarce visitor to Houtman Abrolhos and the adjacent mainland and is also recorded around Shark Bay. It is also recorded on Norfolk Island and Lord Howe Island (Marchant & Higgins 1993).	**Unlikely**. The site is not on the coast, nor is there any suitable habitat present.
Blue-billed Duck *Oxyura australis*	Priority 4	Not listed	The Blue-billed Duck is almost wholly aquatic, and is seldom seen on land. Non-breeding flocks, often with several hundred individuals, congregate on large, deep open freshwater dams and lakes in autumn. The Blue-billed duck occurs in freshwater to saline terrestrial wetlands (Birdlife Australia 2019).	**Unlikely.** There is no suitable habitat within the site
Glossy Ibis *Plegadis falcinellus*	International Agreement	Not listed	The Glossy Ibis requires shallow water and mudflats, so is found in well-vegetated wetlands, floodplains, mangroves and ricefields (Birdlife Australia 2019).	**Unlikely.** There is no suitable habitat within the site.
Australian Painted Snipe *Rostratula australis*	Specially Protected	Threatened (endangered)	The Australian Painted Snipe inhabits many different types of shallow, brackish or freshwater terrestrial wetlands, especially temporary ones which have muddy margins and small, low-lying islands. Suitable wetlands usually support a mosaic of low, patchy vegetation, as well as lignum and cane grass (Birdlife 2019).	**Unlikely.** There are no wetlands not highly degraded on the site.
Graceful Sunmoth *Synemon gratiosa*	Priority 4	Not listed	Sun-moths are most common in sedgelands, heathlands, woodlands and sometimes in open parts of the forest where their 'foodplants' (various grasses, sedges and mat-rushes) are found. Most sun-moths only breed on one or two plant species - their caterpillars are adapted to feed only on these particular plants. The graceful sunmoth breeds on two species of *Lomandra* mat-rushes (*L. maritima* and *L. hermaphrodita*).	**Unlikely.** The site is degraded to such an extent that their main food plants are rare or no longer present.

Species	Conservation status		Description	Likelihood of presence within the site
	BC Act	EPBC Act		
Carter's Freshwater Mussel *Carter's Freshwater Mussel*	Threatened	Threatened (Vulnerable)	The Carter's Freshwater Mussel occurs in freshwater lakes, rivers and streams in sandy or muddy sediments. Greatest densities associated with exposed submerged tree roots (*Eucalyptus rudis*, *Melaleuca* spp. and others), woody debris and overhanging riparian vegetation near stream banks and edges of lakes/dams.	**Unlikely.** Suitable habitat is not present on site

2.6.2 Site assessment

A black cockatoo habitat assessment was conducted for the entirety of Lot 500 in March 2019 by qualified zoologists with relevant experience as specified by the EPBC Act referral guidelines (DSEWPaC 2012) (Appendix 3).

Within the site, the assessment identified approximately 0.314 ha of suitable foraging habitat for all three species of Black Cockatoo (Figure 4). Foraging habitat consisted exclusively of Marri trees. Foraging evidence in the form of chewed Marri fruits was observed in several locations, although this was not recent. Given the extremely restricted variety of food species available within the site (Marri) and the degraded quality of the vegetation, Black Cockatoo foraging habitat is considered to be of low to moderate value.

An assessment of black cockatoo roosting and breeding habitat was also undertaken within the site to identify potential black cockatoo roosting and breeding trees. “Breeding habitat” for black cockatoos is defined in DSEWPaC (2012) as trees of a species known to support breeding within the range of the species which either have a suitable nest hollow or are of a suitable Diameter at Breast Height (DBH) to develop a nest hollow (>300 mm for salmon gum and wandoo, and >500 mm for other species).

Trees of this size may also be large enough to provide roosting habitat (i.e. trees which provide a roost or rest area for the birds). Significant trees which contain hollows that have an entrance chamber of more than 100 mm are suitable for use by black cockatoos (Whitford and Williams 2002).

During the habitat assessment, 12 potential breeding trees were recorded within the site (Appendix 3; Figure 4). None of these trees had hollows of sufficient size to enable black cockatoos to nest in.

No black cockatoos were seen or heard in the survey area or adjacent whilst on site.

It should also be noted that the site supports a population of Western Grey Kangaroos (*Macropus fuliginosus*). Given the site is not connected to other bushland areas and the resident population is unable to be “moved on”, a defined strategy, such as relocation, will be implemented. This strategy will be implemented well in advance of the proposed clearing to provide maximum flexibility and allow the consideration of all options.

Figure 4: Black Cockatoo Habitat

N

Scale 1:1,200 at A4

0 10 20 m

Coordinate System: GDA 1994 MGA Zone 50

Date: 16/05/2019

Legend

- Site boundary
- Cadastral boundary
- Roads

Black Cockatoo habitat

- Marri (0.314 ha)

Black Cockatoo potential breeding trees

- Marri (12)

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Service Layer Credits: Nearmap: Aerial image, flown 02/2019. Landgate: Cadastre, 07/2018. Client: Cedar Woods. Site data 03/2019. Created by: h.sullivan

2.7 Conservation areas

State Planning Policy 2.8: Bushland Policy for the Perth Metropolitan Region (SPP 2.8) aims to provide a policy and implementation framework that ensures bushland protection and management issues throughout the Perth Metropolitan Region are adequately addressed and integrated with broader land use planning and decision-making (WAPC 2010).

The policy predominantly deals with two distinct subjects, Bush Forever areas and local bushland areas.

No Bush Forever sites or ecological linkages are located within the site. The nearest Bush Forever site, 304 (Whiteman Park), is located within 1 km of the subject site, approximately 0.5 km to the west (Figure 5). No Bush Forever sites will be directly impacted by the proposed development as there is existing residential development between the subject site and the nearest Bush Forever sites in all directions.

No DBCA or local government conservation reserves have been identified within, or nearby the site However, based on the broad scale mapping provided within the City of Swan's Local Biodiversity Strategy, it appears that a Local Natural Area (LNA) is associated with the remnant vegetation located within Lot 500 (City of Swan 2015). This area is identified as 'to be negotiated' non-Local Government Area, reserved for special use or public purposes under the City of Swan Local Biodiversity Strategy (City of Swan 2015).

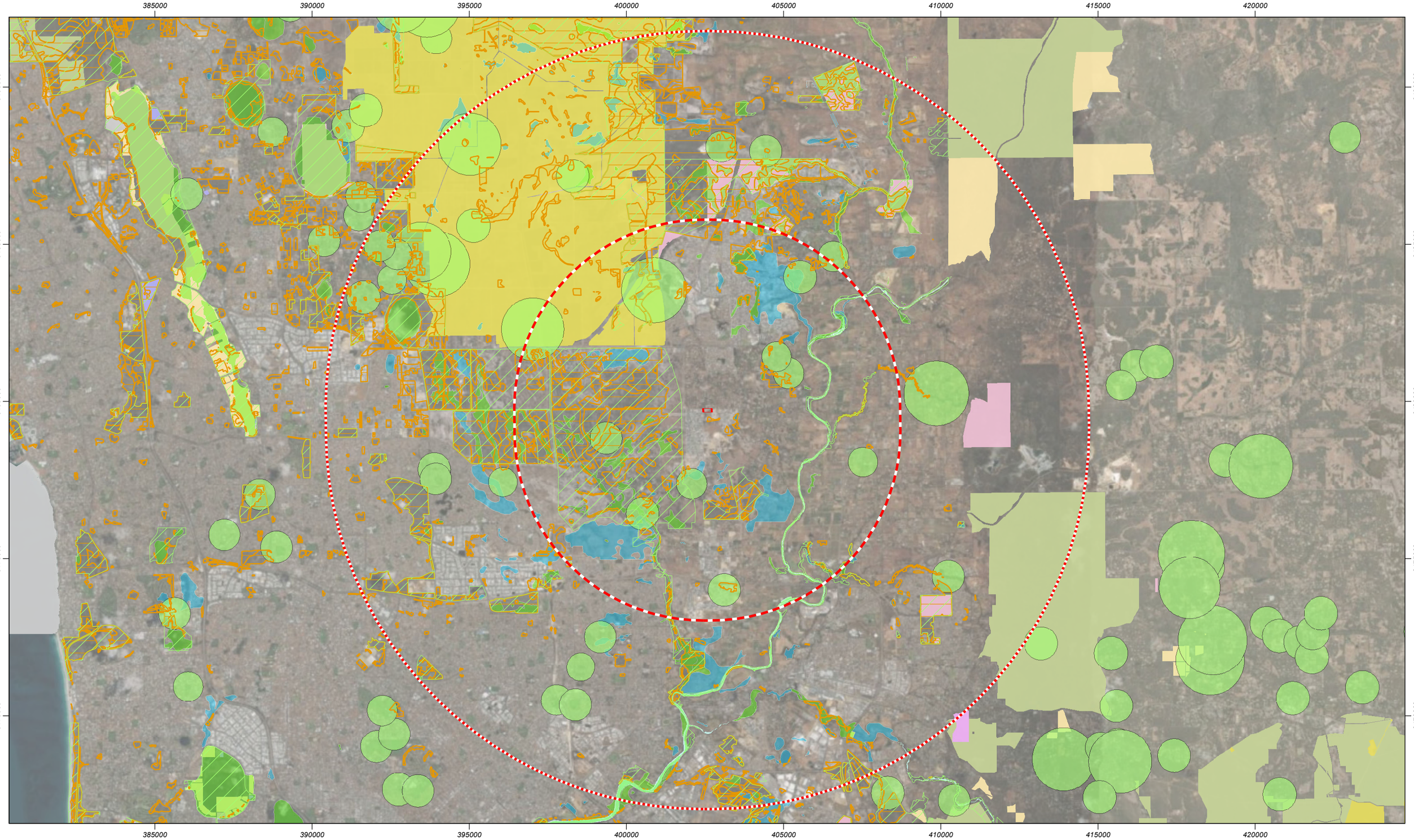

Figure 5: Conservation Reserves and Regional Context

N

Scale 1:110,000 at A3

0 1 2 km

Coordinate System: GDA 1994 MGA Zone 50

Date: 7/06/2019

Legend

- Project area
- Project area 6km buffer
- Project area 12km buffer
- Black Cockatoo habitat (Potential feeding areas)
- Black Cockatoo habitat (Roosting areas)
- Bush Forever site (DOP)

Geomorphic Wetlands (DBCA)

- Conservation
- Resource Enhancement

Legislated Lands and Waters (DBCA)

- National Park
- Crown Freehold - Dept Managed
- BGPA - Reserve
- SCRM ACT - River Reserve
- Section 5(1)(g) Reserve
- Section 5(1)(h) Reserve
- Nature Reserve
- State Forest
- Other Reserves

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Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Landgate: Cadastre, 07/2018. Created by: h.sullivan

info@strategen.com.au | www.strategen.com.au

3. Assessment against the EP Act clearing principles

There are 10 clearing principles defined under Schedule 5 of the EP Act. These principals are considered prior to the decision being made to issue a clearing permit. The project is expected to comply with the 10 clearing principles; the assessment of which is detailed in Table 8.

Table 8: Compliance with the 10 principles of EP Act Schedule 5 for clearing native vegetation

Principle	Assessment	Conclusion
Native vegetation should not be cleared if it comprises a high level of biological diversity.	The site has been subjected to a long history of disturbance from clearing and associated agricultural use. Native vegetation that remains on site, 0.948 ha of which is degraded and 0.132 ha is completely degraded (Strategen 2019), is considered to be of only low biological diversity. The current extent of Southern River vegetation complex (Heddle et al. 1980) is above the 10% threshold (WAPC 2010) and is well represented in the region within conservation reserves (e.g. Bush Forever Site 304, 0.5 km west of the site). No PEC's, TEC's or threatened flora were recorded within the site during the site assessment.	The site does not comprise a high level of biological diversity as the majority is cleared or disturbed by grazing activities and the remaining vegetation is well represented within the region Therefore, the proposed clearing is not at variance with this principle.
Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	The proposal will result in clearing of approximately 0.314 ha of foraging habitat for all three species of Black Cockatoo in south west Western Australia (Figure 4). This clearing also includes 12 potential breeding trees, however a habitat assessment conducted in 2019 confirmed that none of these trees contained hollows of a size suitable for nesting by Black Cockatoos. Based on the absence of hollows and local breeding records, the vegetation to be cleared is unlikely to constitute breeding habitat for Black Cockatoos, nor is the vegetation a known night roosting site for Black Cockatoos. Regional mapping of potential Black Cockatoo foraging habitat (DPaW 2011) provides an indication of the extent of foraging habitat in the broader area, as shown in Figure 5. Approximately 1,752.6 ha of Black Cockatoo foraging habitat is available within 6 km of the project area of which 1462.92 ha is situated within Bush Forever areas and 145.52 ha is vested within other conservation reserves. At a distance of 12 km from the project area, 6304.63 ha of foraging habitat is available, of which 4620.38 ha is within Bush Forever areas and 1803.55 ha is vested within other conservation reserves. The regional mapping (Figure 5) indicates that clearing of vegetation within the site will not create a gap greater than 4 km between patches of black cockatoo habitat, as there remain patches within 1 km of the site to the south east, and within 2 km of the site to the west within Bush Forever Site No. 304. There is a large amount of habitat available within the local area, the foraging habitat on	The proposed clearing is not at variance with this principle.

Principle	Assessment	Conclusion
	site is of a low to moderate quality, and there is no recent evidence of the sites use by Black Cockatoos (all chewed marri nuts observed were old). As a result, the site is highly unlikely to lead to a long-term decrease in the size of a population, reduce the area of occupancy of the species, fragment an existing population into two or more populations, or adversely affect habitat critical to the survival of Black Cockatoos. It is also highly unlikely that the proposed clearing will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that Black Cockatoos are likely to decline, or interfere with the recovery of the species. The proposal will necessitate the clearing of approximately 1.080 ha of potential Quenda habitat. Quenda are listed as Priority 3 fauna and have substantial areas of habitat available nearby in conservation reserves. If confirmed on site, Quenda can be translocated as required prior to construction.	
Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	No Threatened or Priority flora species were recorded within the site during the site assessment. A desktop assessment identified the potential for two Priority flora species to occur within the area (section 2.5), however due to the Degraded nature of the site it is considered unlikely that any Threatened or Priority flora persist within the site.	The site is unlikely to comprise vegetation that includes or is necessary for the continued existence of rare flora. Therefore, the proposed clearing is not likely to be at variance with this principle.
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.	The site does not contain vegetation that comprises part of, or is necessary for the maintenance of a TEC or PEC, as no TEC's or PEC's are known from, or were recorded within the site during the site assessment and subsequent DBCA consultation (Strategen 2019).	The proposed clearing is not at variance with this principle.
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 proposal will necessitate the clearing of approximately 1.080 ha of native vegetation representation of the Southern River vegetation complex (Heddle et al. 1980). This vegetation complex is maintained at 18.42% of the pre-European extent. The proposed clearing will reduce the extent of the complex by <1% The site lies within a constrained area of the Swan Coastal Plain and the vegetation complex will be retained at above the 10% threshold. The vegetation to be cleared does not form part of any ecological corridor or stepping stone between reserves. The vegetation to be cleared does not form part of a large remnant vegetation patch, with much larger areas of remnant vegetation located nearby in Bush Forever site No. 304 "Whiteman Park".	The proposed clearing is not at variance with this principle.

Principle	Assessment	Conclusion
Native vegetation should not be cleared if it is growing in or in association with a watercourse or wetland.	Remnant vegetation within the site occurs within a palusplain Multiple Use Wetland (section 2.3.2). The degraded nature of the vegetation on site supports this wetland categorisation. The proposed clearing will not result in clearing of vegetation associated with a Resource Enhancement or Conservation Category Wetland or their buffers.	The proposed clearing is at variance with this principle.
Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	The proposed clearing is not expected to increase salinity, waterlogging, nutrient export, water or wind erosion, or soil acidity. Construction will be subject to a Construction Environmental Management Plan that will mitigate the risk of water and wind erosion. The site has long been subjected to disturbance associated with clearing and grazing activities. As such, the proposed clearing of the remaining Degraded vegetation is unlikely to cause any further disturbance to the site or surrounding land.	There is not expected to be any appreciable land degradation within the site or surrounding land, due to the historic level of disturbance associated with the sites agricultural land use. Therefore, the proposed clearing is not at variance with his principle.
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 closest conservation area is Bush Forever site 304 “Whiteman Park” approximately 0.5 km west of the site. This conservation area is separated from the site by residential development, and is hydrologically upstream (groundwater flows in a north west to south east direction) of the site (Strategen 2019). Clearing within the site is unlikely to create any additional impact on the environmental values of this conservation area.	Clearing of vegetation within the site is not expected to cause any impact on any conservation areas as none exist within proximity of the proposed clearing. Therefore, the proposed clearing is not at variance with this principle.
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.	Native vegetation within the site has long been subjected to disturbances including clearing and grazing activities. The proposed clearing is not expected to result in sediment or nutrient impacts to wetlands, soil acidity, or increased salinity. Construction will be subject to a Construction Environmental Management Plan that will mitigate the risk of erosion.	Clearing of vegetation within the site is not expected to cause any deterioration in the quality of surface or groundwater. Therefore, the proposed clearing is not at variance with this principle.
Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the intensity of flooding.	Native vegetation within the site has long been subjected to disturbance including clearing and grazing activities. As a result of historical clearing, the majority of remnant native vegetation has already been removed. The proposed clearing of the site is consequently unlikely to result in additional flood risk or exacerbation of flooding intensity. Following clearing the level of the majority of the site will be raised with urban development drainage infrastructure to reduce the flood risk to the site. Construction will be subject to a Construction Environmental Management Plan that will mitigate the risk of flooding across the site.	The clearing of vegetation within the site will not cause or exacerbate the incidence of flooding. Therefore, the proposed clearing is not at variance with this principle.

4. Environmental approval and management

4.1 Environmental approvals

The key approval required to support the proposed clearing is a NVCP under section 51 E of the EP Act.

Cranford Property is also referring the proposal as part of a larger development (the entirety of Lot 500) to the Commonwealth Department of the Environment and Energy (DEE) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). The referral is being made due to the proposed clearing of approximately 2.42 ha of foraging habitat for Black Cockatoos and 57 potential breeding trees, of which 0.314 ha of foraging habitat and 12 potential breeding trees are present within the site. This is considered to represent a potentially significant impact to all three species of South West Black Cockatoo under the Commonwealth's significant impact guidelines.

However, it is worthwhile to note that the development for the wider Lot 500 has been strategically designed to ensure that vegetation of greater quality and significant trees are retained within conservation POS in the central and western parts of the site. The POS areas will result in approximately 0.535 ha of Very Good to Good vegetation (Figure 6). Therefore, due to the commitment by Cranford Property to retain approximately 0.535 ha of foraging habitat and 32 potential breeding trees in POS within the greater Lot 500, it is considered likely, subject to the proposed mitigation measures, the proposed action for the wider Lot 500 will be deemed a not-controlled action.

Cranford Property has undertaken a desktop Aboriginal Heritage assessment for the project, which found no Aboriginal heritage sites present within or nearby the site. Accordingly, no Section 18 consent is required under the Aboriginal Heritage Act 1972.

If required, a Section 5C license will be sought for construction dewatering under the RIWI Act.

4.2 Environmental Management

Cranford Property will develop a Construction Environmental Management Plan (CEMP) for the project. This CEMP will be developed in accordance with *Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans*, and will include the following:

- weed and dieback spread mitigation and management
- strategies for the spotting, trapping, and relocation of fauna
- details on the reporting requirements and provision of care for injured fauna
- clearing and access control measures, including that of potential habitat trees
- tree retention where possible
- staff inductions regarding fauna management
- waste and fire management
- dust and noise control.

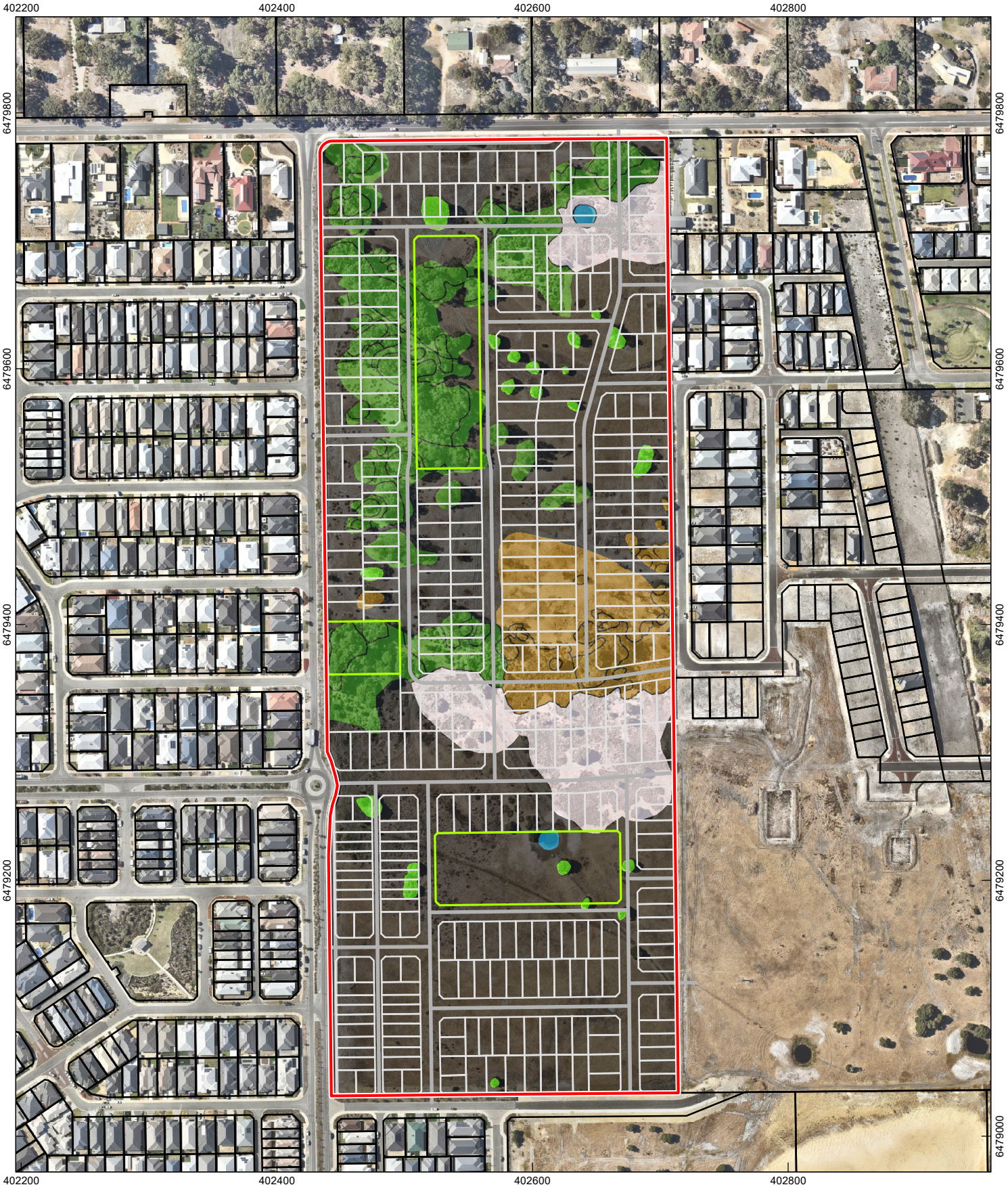

Figure 6: Vegetation type and clearing footprint

N

Scale 1:4,000 at A4

0 50 100 m

Coordinate System:
GDA 1994 MGA Zone 50

Date: 5/04/2019

Legend

- Project area (20.226 ha)
- Existing cadastre
- Carraigeways
- POS
- Sub-division boundaries
- Road reserve

Vegetation type

- Cleared
- Dam
- Parkland Cleared
- VT1
- VT2
- VT3

strategen ENVIRONMENTAL

Q:\Consult\2019\CED\CED19086\01_GIS_documents\ArcMap_documents\CED19086_G007_RevA.mxd

info@strategen.com.au | www.strategen.com.au

Nearmap: Aerial image, flown 02/2019. Landgate: Cadastre, 07/2018. Client: Cedar Woods. Site data 1/2019. Created by: c.thatcher

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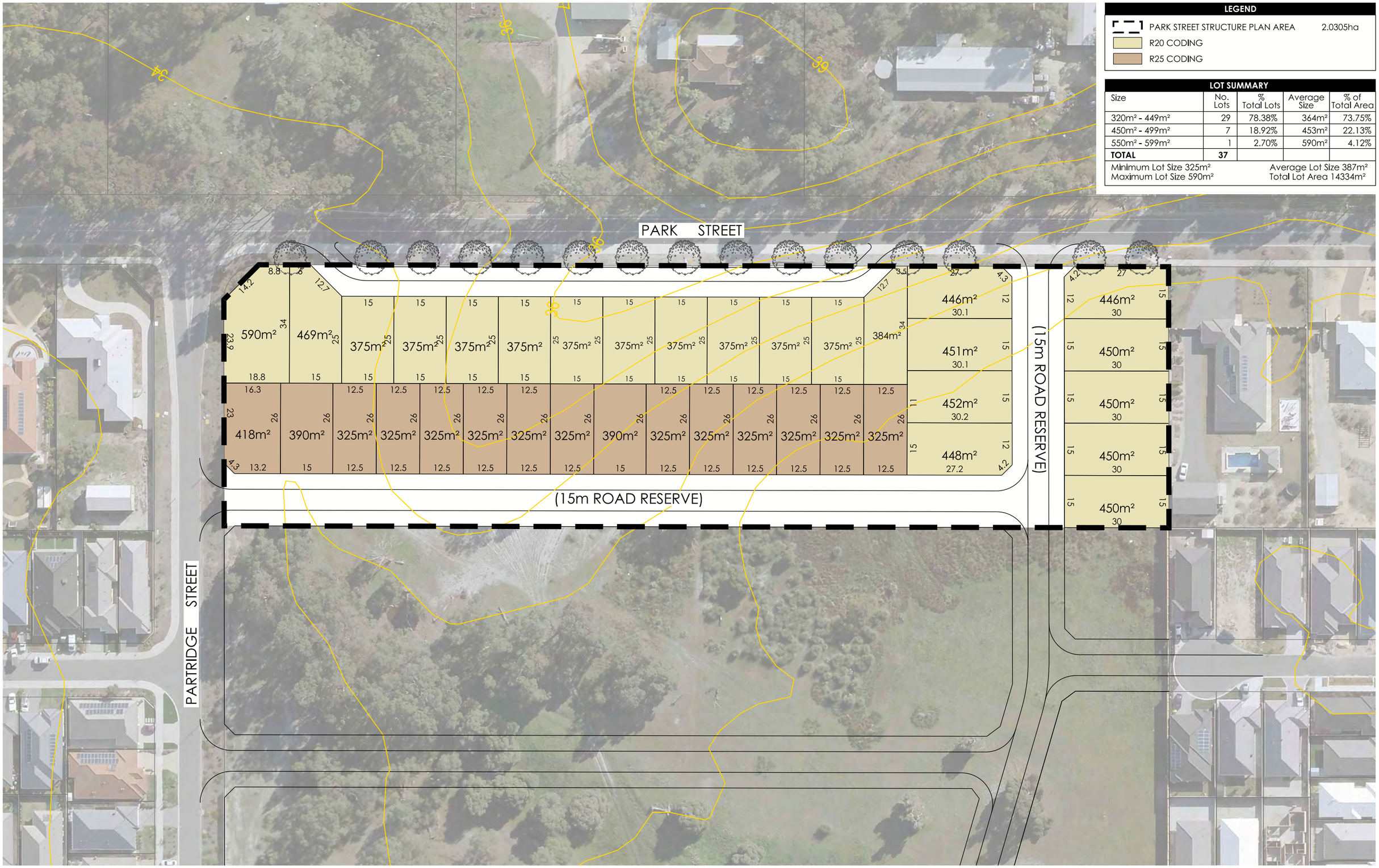
Appendix 1
Concept Plan



LEGEND

PARK STREET STRUCTURE PLAN AREA	2.0305ha
R20 CODING	
R25 CODING	

LOT SUMMARY

Size	No. Lots	% Total Lots	Average Size	% of Total Area
320m² - 449m²	29	78.38%	364m²	73.75%
450m² - 499m²	7	18.92%	453m²	22.13%
550m² - 599m²	1	2.70%	590m²	4.12%
TOTAL	**37**			

Minimum Lot Size 325m²
Maximum Lot Size 590m²
Average Lot Size 387m²
Total Lot Area 14334m²

Park Street Structure Plan Amendment

LOT 500 PARK STREET, BRABHAM

A CEDAR WOODS PROJECT

DRAFT

plan: 19/006/0028
date: 08/03/2019
projection: PCG 94
designed: ME
checked: JF
drawn: BR
scale: 1:1000@A3 | 1:500@A1
0 10 20m

Taylor Burrell Barnett Town Planning & Design
Level 7, 160 St Georges Terrace, Perth WA 6000
p: (08) 9226 4276 e: admin@tbbplanning.com.au

Appendix 2
Database Search Reports

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.

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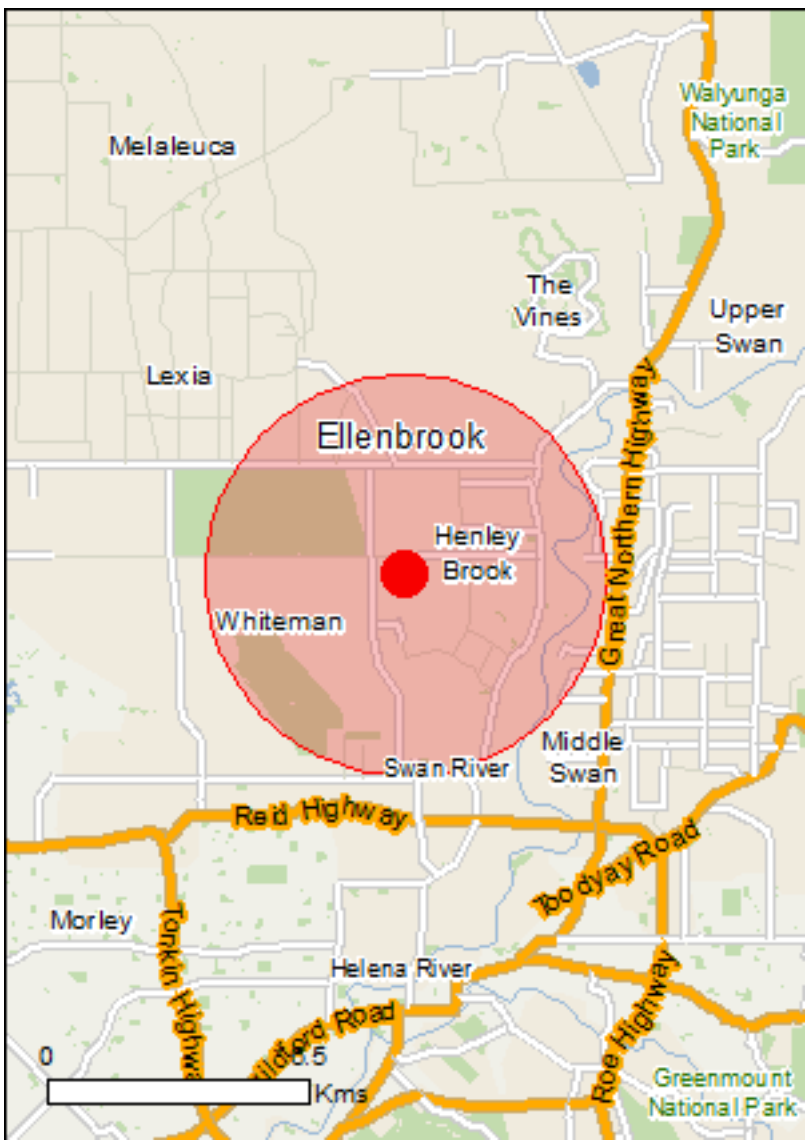

Coordinates
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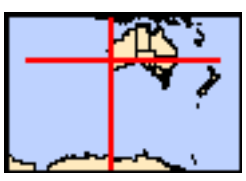

Summary

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:	28
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:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	15
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:	44
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

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

Name	Status	Type of Presence
Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain	Endangered	Community known to occur within area
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	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 may occur within area
Fish		
Galaxiella nigrostriata Blackstriped Dwarf Galaxias, Black-stripe Minnow [88677]	Endangered	Species or species habitat may occur within area
Mammals		
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
[Dasyurus geoffroii](#) Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Other		
[Westralunio carteri](#) Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat may 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 likely to occur within area
[Chamelaucium sp. Gingin (N.G.Marchant 6)](#) Gingin Wax [88881]	Endangered	Species or species habitat may occur within area
[Diplolaena andrewsii](#) [6601]	Endangered	Species or species habitat likely to occur within area
[Diuris purdiei](#) Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may 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
[Eleocharis keigheryi](#) Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat likely to occur within area
[Eucalyptus x balanites](#) Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat may occur within area
[Grevillea christineae](#) Christine's Grevillea [64520]	Endangered	Species or species habitat likely to occur within area
[Grevillea curviloba subsp. curviloba](#) Curved-leaf Grevillea [64908]	Endangered	Species or species habitat likely to occur within area
[Grevillea curviloba subsp. incurva](#) Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat likely to occur within area
[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 likely to occur within area
[Thelymitra dedmaniarum](#) Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat may occur within area
[Thelymitra stellata](#) Star Sun-orchid [7060]	Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence
		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		
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 known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat known to 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 likely to 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

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land -
Defence - RAAF CAVERSHAM

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 known to occur within area

Name	Threatened	Type of Presence
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 known to 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 likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area
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		

Name	Status	Type of Presence
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
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
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
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
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
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		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

Name	Status	Type of Presence
		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
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		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

Nationally Important Wetlands [Resource Information]

Name	State
RAAF Caversham	WA

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-31.81653 115.97058

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.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 07/05/2019

Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 115° 58' 14" E,31° 49' 00" S
Buffer 5km
Group By Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	569	4615
Other specially protected fauna	1	6
Priority 1	2	4
Priority 3	7	9
Priority 4	9	52
Protected under international agreement	1	1
Rare or likely to become extinct	10	264
TOTAL	**599**	**4951**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Rare or likely to become extinct					
1.	24506	*Anous tenuirostris subsp. melanops (Australian Lesser Noddy)*		T	
2.	25452	*Bettongia penicillata (Woylie, Brush-tailed Bettong)*		T	
3.	24162	*Bettongia penicillata subsp. ogilbyi (Woylie, Brush-tailed Bettong)*		T	
4.	1596	*Caladenia huegelii (Grand Spider Orchid)*		T	
5.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black Cockatoo)*		T	
6.	24733	*Calyptorhynchus baudinii (Baudin's Cockatoo, White-tailed Long-billed Black Cockatoo)*		T	
7.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)*		T	
8.	24168	*Macrotis lagotis (Bilby, Dalgyte, Ninu)*		T	
9.	32658	*Trithuria occidentalis (Swan Hydatella)*		T	
10.	34113	*Westralunio carteri (Carter's Freshwater Mussel)*		T	
Protected under international agreement					
11.	24843	*Plegadis falcinellus (Glossy Ibis)*		IA	
Other specially protected fauna					
12.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
Priority 1					
13.	11074	*Hydrocotyle striata*		P1	
14.	20666	*Stachystemon sp. Keysbrook (R. Archer 17/11/99)*		P1	
Priority 3					
15.	14129	*Acacia oncinophylla subsp. oncinophylla*		P3	
16.	43543	*Amanita fibrillopes*		P3	
17.	16245	*Cyathochaeta teretifolia*		P3	
18.	33638	*Meionectes tenuifolia*		P3	
19.	25249	*Neelaps calonotos (Black-striped Snake, black-striped burrowing snake)*		P3	
20.	980	*Schoenus capillifolius*		P3	
21.	17731	*Schoenus sp. Waroona (G.J. Keighery 12235)*		P3	
Priority 4					
22.	5523	*Darwinia pimelioides*		P4	
23.	24189	*Falsistrellus mackenziei (Western False Pipistrelle, Western Falsistrelle)*		P4	
24.	24215	*Hydromys chrysogaster (Water-rat, Rakali)*		P4	
25.	48588	*Isoodon fusciventer (Quenda, southwestern brown bandicoot)*		P4	
26.	48022	*Notamacropus irma (Western Brush Wallaby)*		P4	
27.	24328	*Oxyura australis (Blue-billed Duck)*		P4	
28.	7756	*Stylidium longitubum (Jumping Jacks)*		P4	
29.	33992	*Synemon gratiosa (Graceful Sunmoth)*		P4	
30.	14714	*Verticordia lindleyi subsp. lindleyi*		P4	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Non-conservation taxon					
31.	15466	*Acacia applanata*			
32.	17858	*Acacia dealbata*	Y		
33.	3374	*Acacia huegelii*			
34.	3383	*Acacia incurva*			
35.	17861	*Acacia longifolia*	Y		
36.	18597	*Acacia longifolia subsp. sophorae*	Y		
37.	3502	*Acacia pulchella (Prickly Moses)*			
38.	30032	*Acacia saligna subsp. saligna*			
39.	3541	*Acacia sessilis*			
40.	3557	*Acacia stenoptera (Narrow Winged Wattle)*			
41.	3576	*Acacia tetragonocarpa*			
42.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
43.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
44.	24262	*Acanthiza inornata (Western Thornbill)*			
45.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
46.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
47.	25536	*Accipiter fasciatus (Brown Goshawk)*			
48.	42368	*Acritoscincus trilineatus (Western Three-lined Skink)*			
49.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
50.	1775	*Adenanthos cygnorum (Common Woollybush)*			
51.	11837	*Adenanthos cygnorum subsp. cygnorum (Common Woollybush)*			
52.	1791	*Adenanthos obovatus (Basket Flower)*			
53.	184	*Aira caryophyllea (Silvery Hairgrass)*	Y		
54.	1056	*Alexgeorgea nitens*			
55.	1728	*Allocasuarina fraseriana (Sheoak, Kondil)*			
56.	1732	*Allocasuarina humilis (Dwarf Sheoak)*			
57.	38757	*Amanita xanthocephala*			
58.	2655	*Amaranthus albus (Tumbleweed)*	Y		
59.	200	*Amphipogon turbinatus*			
60.	2380	*Amyema miquelii (Stalked Mistletoe)*			
61.	2383	*Amyema preissii (Wireleaf Mistletoe)*			
62.	24312	*Anas gracilis (Grey Teal)*			
63.	24313	*Anas platyrhynchos (Mallard)*			
64.	24315	*Anas rhynchotis (Australasian Shoveler)*			
65.	24316	*Anas superciliosa (Pacific Black Duck)*			
66.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
67.	11434	*Anigozanthos humilis subsp. humilis*			
68.	1411	*Anigozanthos manglesii (Mangles Kangaroo Paw, Kurulbrang)*			
69.	11261	*Anigozanthos manglesii subsp. manglesii*			
70.	1416	*Anigozanthos viridis (Green Kangaroo Paw, Kurulbardang)*			
71.	25241	*Antaresia stimsoni subsp. stimsoni (Stimson's Python)*			
72.	24561	*Anthochaera carunculata (Red Wattlebird)*			
73.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
74.	25670	*Anthus australis (Australian Pipit)*			
75.	3686	*Aotus cordifolia*			
76.	3688	*Aotus gracillima*			
77.	1117	*Aphelia cyperoides*			
78.	1118	*Aphelia drummondii*			
79.	24991	*Aprasia repens (Sand-plain Worm-lizard)*			
80.	24285	*Aquila audax (Wedge-tailed Eagle)*			
81.		*Arachnura higginsi*			
82.	7838	*Arctotheca calendula (Cape Weed, African Marigold)*	Y		
83.	41324	*Ardea modesta (great egret, white egret)*			
84.	24340	*Ardea novaehollandiae (White-faced Heron)*			
85.	24341	*Ardea pacifica (White-necked Heron)*			
86.	1264	*Arnocrinum preissii*			
87.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
88.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			
89.	8779	*Asparagus asparagoides (Bridal Creeper)*	Y		
90.	20350	*Astartea affinis (West-coast Astartea)*			
91.	20283	*Astartea scoparia (Common Astartea)*			
92.	6339	*Astroloma xerophyllum*			
93.	2471	*Atriplex prostrata (Hastate Orache)*	Y		
94.		*Austracantha minax*			
95.	38764	*Austropaxillus muelleri*			
96.	17234	*Austrostipa compressa*			
97.	17254	*Austrostipa tenuifolia*			
98.	24318	*Aythya australis (Hardhead)*			
99.	36441	*Babingtonia camphorosmae (Camphor Myrtle)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
100.		*Backobourkia brounii*			
101.	1800	*Banksia attenuata (Slender Banksia, Piara)*			
102.	32576	*Banksia dallanneyi (Couch Honeypot)*			
103.	32580	*Banksia dallanneyi var. dallanneyi*			
104.	1819	*Banksia grandis (Bull Banksia, Pulgarla)*			
105.	1822	*Banksia ilicifolia (Holly-leaved Banksia)*			
106.	1830	*Banksia littoralis (Swamp Banksia, Pungura)*			
107.	1834	*Banksia menziesii (Firewood Banksia)*			
108.	32315	*Barbula calycina*			
109.		*Barnardius zonarius*			
110.	5382	*Beaufortia elegans (Elegant Beaufortia)*			
111.	48868	*Bellardia viscosa*	Y		
112.	25788	*Billardiera fraseri (Elegant Pronaya)*			
113.	24319	*Biziura lobata (Musk Duck)*			
114.	1417	*Blancoa canescens (Winter Bell)*			
115.	11381	*Boronia ramosa subsp. anethifolia*			
116.	1272	*Borya scirpoidea*			
117.	3710	*Bossiaea eriocarpa (Common Brown Pea)*			
118.	8661	*Brachypodium distachyon (False Brome)*	Y		
119.	7878	*Brachyscome iberidifolia*			
120.	7883	*Brachyscome pusilla*			
121.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
122.	244	*Briza maxima (Blowfly Grass)*	Y		
123.	245	*Briza minor (Shivery Grass)*	Y		
124.	249	*Bromus diandrus (Great Brome)*	Y		
125.	1383	*Burchardia bairdiae*			
126.	12770	*Burchardia congesta*			
127.	1385	*Burchardia multiflora (Dwarf Burchardia)*			
128.	24359	*Burhinus grallarius (Bush Stone-curlew)*			
129.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
130.	25715	*Cacatua roseicapilla (Galah)*			
131.	25716	*Cacatua sanguinea (Little Corella)*			
132.	24729	*Cacatua tenuirostris (Eastern Long-billed Corella)*	Y		
133.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
134.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
135.	11136	*Caladenia denticulata*			
136.	1586	*Caladenia discoidea (Dancing Orchid)*			
137.	1592	*Caladenia flava (Cowslip Orchid)*			
138.	15348	*Caladenia flava subsp. flava*			
139.	1599	*Caladenia latifolia (Pink Fairy Orchid)*			
140.	15503	*Caladenia paludosa*			
141.	18019	*Caladenia vulgata*			
142.	19309	*Calectasia narragara*			
143.	92	*Callitris canescens*			
144.	5415	*Calothamnus lateralis*			
145.	35816	*Calothamnus quadrifidus subsp. quadrifidus*			
146.	5429	*Calothamnus sanguineus (Silky-leaved Blood flower, Pindak)*			
147.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
148.	5439	*Calytrix angulata (Yellow Starflower)*			
149.	5458	*Calytrix flavescens (Summer Starflower)*			
150.	5460	*Calytrix fraseri (Pink Summer Calytrix)*			
151.	5461	*Calytrix glutinosa*			
152.	2795	*Carpobrotus edulis (Hottentot Fig)*	Y		
153.	2952	*Cassytha glabella (Tangled Dodder Laurel)*			
154.	2957	*Cassytha racemosa (Dodder Laurel)*			
155.	1742	*Casuarina obesa (Swamp Sheoak, Kuli)*			
156.	6539	*Centaurium erythraea (Common Centaury)*	Y		
157.	1121	*Centrolepis aristata (Pointed Centrolepis)*			
158.	1125	*Centrolepis drummondiana*			
159.	1129	*Centrolepis glabra (Smooth Centrolepis)*			
160.	24086	*Cercartetus concinnus (Western Pygmy-possum, Mundarda)*			
161.	17685	*Chaetanthus aristatus*			
162.	5498	*Chamelaucium uncinatum (Geraldton Wax)*			
163.	43380	*Chelodina colliei (South-western Snake-necked Turtle)*			
164.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
165.		*Cherax sp.*			
166.	11900	*Chrysanthemoides monilifera subsp. monilifera*	Y		
167.	24288	*Circus approximans (Swamp Harrier)*			
168.	7937	*Cirsium vulgare (Spear Thistle, Scotch Thistle)*	Y		
169.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
170.		*Coltricia cinnamomea*			
171.	24399	*Columba livia (Domestic Pigeon)*	Y		
172.	1882	*Conospermum stoechadis (Common Smokebush)*			
173.	6348	*Conostephium pendulum (Pearl Flower)*			
174.	6349	*Conostephium preissii*			
175.	1418	*Conostylis aculeata (Prickly Conostylis)*			
176.	11513	*Conostylis aculeata subsp. cygnorum*			
177.	1423	*Conostylis aurea (Golden Conostylis)*			
178.	11438	*Conostylis candicans subsp. candicans*			
179.	1436	*Conostylis juncea*			
180.	1454	*Conostylis setigera (Bristly Cottonhead)*			
181.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
182.	38776	*Cortinarius phalarus*			
183.	24416	*Corvus bennetti (Little Crow)*			
184.	25592	*Corvus coronoides (Australian Raven)*			
185.	12945	*Corybas recurvus*			
186.	17104	*Corymbia calophylla (Marri)*			
187.	1285	*Corynotheca micrantha (Sand Lily)*			
188.	11283	*Corynotheca micrantha var. micrantha*			
189.	7945	*Cotula coronopifolia (Waterbuttons)*	Y		
190.	25595	*Cracticus tibicen (Australian Magpie)*			
191.	25596	*Cracticus torquatus (Grey Butcherbird)*			
192.	3137	*Crassula colorata (Dense Stonecrop)*			
193.	25398	*Crinia georgiana (Quacking Frog)*			
194.	25399	*Crinia glauerti (Clicking Frog)*			
195.	25400	*Crinia insignifera (Squelching Froglet)*			
196.	13470	*Cryptandra arbutiflora var. arbutiflora*			
197.	30893	*Cryptoblepharus buchananii*			
198.	30899	*Ctenophorus adelaidensis (Southern Heath Dragon, Western Heath Dragon)*			
199.	25049	*Ctenotus labillardieri*			
200.	768	*Cyathochaeta avenacea*			
201.	24322	*Cygnus atratus (Black Swan)*			
202.	783	*Cyperus congestus (Dense Flat-sedge)*	Y		
203.	815	*Cyperus tenellus (Tiny Flatsedge)*	Y		
204.	10916	*Cyrtostylis huegelii*			
205.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
206.	7454	*Dampiera linearis (Common Dampiera)*			
207.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
208.	41026	*Dasymalla teckiana*			
209.	1218	*Dasypogon bromeliifolius (Pineapple Bush)*			
210.	15656	*Daviesia brachyphylla*			
211.	18560	*Daviesia divaricata subsp. divaricata*			
212.	3832	*Daviesia physodes*			
213.	3845	*Daviesia triflora*			
214.	25296	*Demansia psammophis subsp. reticulata (Yellow-faced Whipsnake)*			
215.	17663	*Desmocladus asper*			
216.	17691	*Desmocladus fasciculatus*			
217.	16595	*Desmocladus flexuosus*			
218.	39008	*Diachea leucopodia*			
219.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
220.	1289	*Dichopogon preissii*			
221.	17838	*Dielsia stenostachya*			
222.	3011	*Diplotaxis muralis (Wall Rocket)*	Y		
223.	19649	*Disa bracteata*	Y		
224.	12943	*Diuris brumalis*			
225.	11049	*Diuris corymbosa*			
226.	13219	*Drosera bulbosa subsp. bulbosa*			
227.	48751	*Drosera drummondii*			
228.	3095	*Drosera erythrorhiza (Red Ink Sundew)*			
229.	3097	*Drosera gigantea (Giant Sundew)*			
230.	3098	*Drosera glanduligera (Pimpernel Sundew)*			
231.	3101	*Drosera heterophylla (Swamp Rainbow)*			
232.	3106	*Drosera macrantha (Bridal Rainbow)*			
233.	3109	*Drosera menziesii (Pink Rainbow)*			
234.	48709	*Drosera minutiflora*			
235.	3118	*Drosera pallida (Pale Rainbow)*			
236.	2501	*Dysphania glomulifera*			
237.	25251	*Echiopsis curta (Bardick)*			
238.	6681	*Echium plantagineum (Paterson's Curse)*	Y		
239.	25096	*Egernia kingii (King's Skink)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
240.	25100	*Egernia napoleonis*			
241.		*Egretta novaehollandiae*			
242.	347	*Ehrharta calycina (Perennial Veldt Grass)*	Y		
243.	349	*Ehrharta longiflora (Annual Veldt Grass)*	Y		
244.		*Elanus axillaris*			
245.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
246.		*Eolophus roseicapillus*			
247.	13950	*Eremaea asterocarpa subsp. asterocarpa*			
248.	5541	*Eremaea pauciflora*			
249.	5542	*Eremaea purpurea*			
250.		*Eriophora biapicata*			
251.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
252.	13547	*Eucalyptus marginata subsp. marginata (Jarrah)*			
253.	5739	*Eucalyptus patens (Swan River Blackbutt, Dwuda)*			
254.	5763	*Eucalyptus rudis (Flooded Gum, Kulurda)*			
255.	5790	*Eucalyptus todtiana (Coastal Blackbutt)*			
256.	3872	*Euchilopsis linearis (Swamp Pea)*			
257.	3880	*Eutaxia virgata*			
258.	10765	*Exocarpos sparteus (Broom Ballart, Djuk)*			
259.	25621	*Falco berigora (Brown Falcon)*			
260.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
261.	25623	*Falco longipennis (Australian Hobby)*			
262.	24041	*Felis catus (Cat)*	Y		
263.	894	*Fimbristylis velata*			
264.	25727	*Fulica atra (Eurasian Coot)*			
265.	24761	*Fulica atra subsp. australis (Eurasian Coot)*			
266.	2969	*Fumaria capreolata (Whiteflower Fumitory)*	Y		
267.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
268.	24763	*Gallinula tenebrosa subsp. tenebrosa (Dusky Moorhen)*			
269.	20475	*Gastrolobium capitatum*			
270.	20473	*Gastrolobium ebracteolatum*			
271.	3933	*Gastrolobium villosum (Crinkle-leaved Poison)*			
272.	42314	*Gavicalis virescens (Singing Honeyeater)*			
273.	25530	*Gerygone fusca (Western Gerygone)*			
274.	1517	*Gladiolus alatus*	Y		
275.	1520	*Gladiolus caryophyllaceus (Wild Gladiolus)*	Y		
276.	1524	*Gladiolus undulatus (Wild Gladiolus)*	Y		
277.	2836	*Glinus oppositifolius*			
278.	6143	*Glischrocaryon aureum (Common Popflower)*			
279.	47962	*Glyciphila melanops (Tawny-crowned Honeyeater)*			
280.	3957	*Gompholobium tomentosum (Hairy Yellow Pea)*			
281.	6150	*Gonocarpus diffusus*			
282.	7538	*Goodenia pulchella*			
283.	24443	*Grallina cyanoleuca (Magpie-lark)*			
284.	1468	*Haemodorum laxum*			
285.	1472	*Haemodorum simplex*			
286.	1475	*Haemodorum spicatum (Mardja)*			
287.	2214	*Hakea trifurcata (Two-leaf Hakea)*			
288.	2216	*Hakea varia (Variable-leaved Hakea)*			
289.	24295	*Haliastur sphenurus (Whistling Kite)*			
290.	24296	*Hamirostra isura (Square-tailed Kite)*			
291.	25409	*Heleioporus barycragus (Hooting Frog)*			
292.	25410	*Heleioporus eyrei (Moaning Frog)*			
293.	25412	*Heleioporus psammophilus (Sand Frog)*			
294.	8024	*Helichrysum leucopsideum*			
295.	6838	*Hemiandra linearis (Speckled Snakebush)*			
296.	6839	*Hemiandra pungens (Snakebush)*			
297.	25115	*Hemiergis initialis subsp. initialis*			
298.	25119	*Hemiergis quadrilineata*			
299.	1526	*Hesperantha falcata*	Y		
300.	5112	*Hibbertia aurea*			
301.	5134	*Hibbertia huegelii*			
302.	5135	*Hibbertia hypericoides (Yellow Buttercups)*			
303.	45534	*Hibbertia hypericoides subsp. hypericoides*			
304.	5154	*Hibbertia perfoliata*			
305.	5162	*Hibbertia racemosa (Stalked Guinea Flower)*			
306.	5172	*Hibbertia stellaris (Orange Stars)*			
307.	48381	*Hibbertia striata*			
308.	5173	*Hibbertia subvaginata*			
309.	47965	*Hieraaetus morphnoides (Little Eagle)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
310.	25734	*Himantopus himantopus (Black-winged Stilt)*			
311.	24491	*Hirundo neoxena (Welcome Swallow)*			
312.		*Hogna crispipes*			
313.		*Holocnemus pluchei*			
314.	6222	*Homalosciadium homalocarpum*			
315.	3968	*Hovea trisperma (Common Hovea)*			
316.	12741	*Hyalosperma cotula*			
317.	5216	*Hybanthus calycinus (Wild Violet)*			
318.	6223	*Hydrocotyle alata*			
319.	6226	*Hydrocotyle callicarpa (Small Pennywort)*			
320.	452	*Hyparrhenia hirta (Tambookie Grass)*	Y		
321.	5817	*Hypocalymma angustifolium (White Myrtle, Kudjid)*			
322.	5825	*Hypocalymma robustum (Swan River Myrtle)*			
323.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
324.	9352	*Hypochaeris radicata (Flat Weed, Cats-ear)*	Y		
325.	1070	*Hypolaena exsulca*			
326.	17841	*Hypolaena pubescens*			
327.	48549	*Inocybe subferruginea*			
328.	917	*Isolepis marginata (Coarse Club-rush)*			
329.	10831	*Isolepis prolifera (Budding Club-rush)*	Y		
330.		*Isopeda leishmanni*			
331.	7396	*Isotoma hypocrateriformis (Woodbridge Poison)*			
332.	19700	*Isotropis cuneifolia subsp. cuneifolia*			
333.	1534	*Ixia polystachya (Variable Ixia)*	Y		
334.	4010	*Jacksonia floribunda (Holly Pea)*			
335.	4012	*Jacksonia furcellata (Grey Stinkwood)*			
336.	4029	*Jacksonia sternbergiana (Stinkwood, Kapur)*			
337.	1298	*Johnsonia pubescens (Pipe Lily)*			
338.	1179	*Juncus caespiticius (Grassy Rush)*			
339.	1188	*Juncus pallidus (Pale Rush)*			
340.	1190	*Juncus planifolius (Broadleaf Rush)*			
341.	4044	*Kennedia prostrata (Scarlet Runner)*			
342.	4045	*Kennedia stirlingii (Bushy Kennedia)*			
343.	17461	*Kunzea micrantha subsp. micrantha*			
344.	5841	*Kunzea recurva*			
345.	18585	*Lagenophora huegelii*			
346.	24511	*Larus novaehollandiae subsp. novaehollandiae (Silver Gull)*			
347.	4052	*Latrobea tenella*			
348.	38323	*Lavandula stoechas subsp. stoechas*	Y		
349.	1309	*Laxmannia squarrosa*			
350.	925	*Lepidosperma angustatum*			
351.	930	*Lepidosperma costale*			
352.	937	*Lepidosperma longitudinale (Pithy Sword-sedge)*			
353.	944	*Lepidosperma scabrum*			
354.		*Lepidosperma sp.*			
355.	1077	*Leptocarpus canus (Hoary Twine-rush)*			
356.	5850	*Leptospermum laevigatum (Coast Teatree)*	Y		
357.	25133	*Lerista elegans*			
358.	6374	*Leucopogon conostephioides*			
359.	6434	*Leucopogon polymorphus*			
360.	6439	*Leucopogon pulchellus (Beard-heath)*			
361.	40803	*Leucopogon squarrosus subsp. squarrosus*			
362.	7677	*Levenhookia stipitata (Common Stylewort)*			
363.	25005	*Lialis burtonis*			
364.	25661	*Lichmera indistincta (Brown Honeyeater)*			
365.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
366.	25378	*Litoria adelaidensis (Slender Tree Frog)*			
367.	25388	*Litoria moorei (Motorbike Frog)*			
368.	9289	*Lobelia anceps (Angled Lobelia)*			
369.	7408	*Lobelia tenuior (Slender Lobelia)*			
370.	9356	*Logfia gallica*	Y		
371.	478	*Lolium rigidum (Wimmera Ryegrass)*	Y		
372.	1223	*Lomandra caespitosa (Tufted Mat Rush)*			
373.	1228	*Lomandra hermaphrodita*			
374.	1234	*Lomandra nigricans*			
375.	1239	*Lomandra preissii*			
376.	8564	*Lotus subbiflorus*	Y		
377.	4065	*Lupinus angustifolius (Narrowleaf Lupin)*	Y		
378.	1097	*Lyginia barbata*			
379.	18049	*Lyginia imberbis*			

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380.	36375	*Lysimachia arvensis (Pimpernel)*	Y		
381.	34736	*Lysinema pentapetalum*			
382.	2839	*Macarthuria australis*			
383.	24132	*Macropus fuliginosus (Western Grey Kangaroo)*			
384.	85	*Macrozamia riedlei (Zamia, Djiridji)*			
385.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
386.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
387.	25654	*Malurus splendens (Splendid Fairy-wren)*			
388.	24552	*Malurus splendens subsp. splendens (Splendid Fairy-wren)*			
389.	24583	*Manorina flavigula (Yellow-throated Miner)*			
390.	34676	*Meionectes brownii (Swamp Raspwort)*			
391.	5926	*Melaleuca lateritia (Robin Redbreast Bush)*			
392.	5952	*Melaleuca preissiana (Moonah)*			
393.	5959	*Melaleuca rhaphiophylla (Swamp Paperbark)*			
394.	5964	*Melaleuca seriata*			
395.	5987	*Melaleuca viminea (Mohan)*			
396.	47997	*Melanodryas cucullata (Hooded Robin)*			
397.	14985	*Melinis repens*	Y		
398.	25184	*Menetia greyii*			
399.	24598	*Merops ornatus (Rainbow Bee-eater)*			
400.	953	*Mesomelaena graciliceps*			
401.	955	*Mesomelaena pseudostygia*			
402.	957	*Mesomelaena tetragona (Semaphore Sedge)*			
403.		*Microcarbo melanoleucos*			
404.	12761	*Microtis media subsp. densiflora*			
405.	8106	*Millotia tenuifolia (Soft Millotia)*			
406.	4100	*Mirbelia spinosa*			
407.	7085	*Misopates orontium (Lesser Snapdragon)*	Y		
408.		*Missulena granulosa*			
409.	29418	*Monoculus monstrosus*	Y		
410.	37440	*Monopsis debilis var. depressa*	Y		
411.	19179	*Moraea flaccida (One-leaf Cape Tulip)*	Y		
412.	24223	*Mus musculus (House Mouse)*	Y		
413.	25610	*Myiagra inquieta (Restless Flycatcher)*			
414.	25420	*Myobatrachus gouldii (Turtle Frog)*			
415.	14187	*Myriocephalus occidentalis*			
416.	6185	*Myriophyllum aquaticum (Brazilian Water Milfoil)*	Y		
417.	25426	*Neobatrachus pelobatoides (Humming Frog)*			
418.	24738	*Neophema elegans (Elegant Parrot)*			
419.	492	*Neurachne alopecuroidea (Foxtail Mulga Grass)*			
420.	25252	*Notechis scutatus (Tiger Snake)*			
421.		*Notiasemus glauerti*			
422.	2401	*Nuytsia floribunda (Christmas Tree, Mudja)*			
423.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
424.	2922	*Nymphaea mexicana (Yellow Waterlily)*	Y		
425.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
426.	18255	*Opercularia vaginata (Dog Weed)*			
427.	11749	*Orthrosanthus laxus var. laxus (Morning Iris)*			
428.	4356	*Oxalis pes-caprae (Soursob)*	Y		
429.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
430.	25253	*Parasuta gouldii*			
431.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
432.	24625	*Pardalotus punctatus subsp. punctatus (Spotted Pardalote)*			
433.	25682	*Pardalotus striatus (Striated Pardalote)*			
434.	1550	*Patersonia occidentalis (Purple Flag, Koma)*			
435.	30471	*Patersonia occidentalis var. angustifolia*			
436.	43761	*Pauridia occidentalis var. occidentalis*			
437.	4343	*Pelargonium capitatum (Rose Pelargonium)*	Y		
438.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
439.	40422	*Pentameris pallida*	Y		
440.	6006	*Pericalymma ellipticum (Swamp Teatree)*			
441.	2273	*Persoonia saccata (Snottygobble)*			
442.	48061	*Petrochelidon nigricans (Tree Martin)*			
443.	48066	*Petroica boodang (Scarlet Robin)*			
444.	24659	*Petroica goodenovii (Red-capped Robin)*			
445.	2299	*Petrophile linearis (Pixie Mops)*			
446.	19825	*Petrorhagia dubia*	Y		
447.	25697	*Phalacrocorax carbo (Great Cormorant)*			
448.	25698	*Phalacrocorax melanoleucos (Little Pied Cormorant)*			
449.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			

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450.	25699	*Phalacrocorax varius (Pied Cormorant)*			
451.	24409	*Phaps chalcoptera (Common Bronzewing)*			
452.	25587	*Phaps elegans (Brush Bronzewing)*			
453.	18529	*Philotheca spicata (Pepper and Salt)*			
454.	1478	*Phlebocarya ciliata*			
455.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			
456.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
457.		*Phytophthora cinnamomi*			
458.	5268	*Pimelea sulphurea (Yellow Banjine)*			
459.		*Pisolithus sp.*			
460.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
461.	25720	*Platycercus icterotis (Western Rosella)*			
462.	24747	*Platycercus spurius (Red-capped Parrot)*			
463.	25721	*Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)*			
464.	571	*Poa annua (Winter Grass)*	Y		
465.	578	*Poa porphyroclados*			
466.	25703	*Podargus strigoides (Tawny Frogmouth)*			
467.	25704	*Podiceps cristatus (Great Crested Grebe)*			
468.	8175	*Podolepis gracilis (Slender Podolepis)*			
469.	8182	*Podotheca angustifolia (Sticky Longheads)*			
470.	8184	*Podotheca gnaphalioides (Golden Long-heads)*			
471.	25510	*Pogona minor (Dwarf Bearded Dragon)*			
472.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
473.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
474.	582	*Polypogon monspeliensis (Annual Beardgrass)*	Y		
475.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
476.	24767	*Porphyrio porphyrio subsp. bellus (Purple Swamphen)*			
477.	25261	*Pseudechis australis (Mulga Snake)*			
478.	24230	*Pseudomys albocinereus (Ash-grey Mouse)*			
479.	25511	*Pseudonaja affinis (Dugite)*			
480.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
481.	42416	*Pseudonaja mengdeni (Western Brown Snake)*			
482.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
483.	41651	*Pteridium esculentum subsp. esculentum*			
484.	48677	*Pterostylis ectypha*			
485.	12217	*Pterostylis sanguinea*			
486.	1698	*Pterostylis vittata (Banded Greenhood)*			
487.	2751	*Ptilotus polystachyus (Prince of Wales Feather)*			
488.	42344	*Purnella albifrons (White-fronted Honeyeater)*			
489.		*Purpureicephalus spurius*			
490.	24245	*Rattus rattus (Black Rat)*	Y		
491.	48096	*Rhipidura albiscapa (Grey Fantail)*			
492.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
493.	38834	*Rhizopogon roseolus*			
494.	13300	*Rhodanthe citrina*			
495.	13312	*Rhodanthe pyrethrum*			
496.	1556	*Romulea rosea (Guildford Grass)*	Y		
497.	2429	*Rumex acetosella (Sorrel)*	Y		
498.	2433	*Rumex crispus (Curled Dock)*	Y		
499.	13182	*Scaevola repens var. repens*			
500.	6263	*Schoenolaena juncea*			
501.	972	*Schoenus armeria*			
502.	984	*Schoenus curvifolius*			
503.	985	*Schoenus discifer*			
504.	987	*Schoenus elegans*			
505.	1002	*Schoenus nanus (Tiny Bog Rush)*			
506.	1007	*Schoenus pedicellatus*			
507.	1011	*Schoenus rigens*			
508.	1013	*Schoenus sculptus (Gimlet Bog-rush)*			
509.	17409	*Schoenus variicellae*			
510.	6033	*Scholtzia involucrata (Spiked Scholtzia)*			
511.	32433	*Sematophyllum homomallum*			
512.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
513.	2909	*Silene gallica (French Catchfly)*	Y		
514.	8225	*Siloxerus humifusus (Procumbent Siloxerus)*			
515.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
516.	30948	*Smicrornis brevirostris (Weebill)*			
517.	6988	*Solanum americanum (Glossy Nightshade)*	Y		
518.	7022	*Solanum nigrum (Black Berry Nightshade)*	Y		
519.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		

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520.	617	*Sorghum halepense (Johnson Grass)*	Y		
521.	1312	*Sowerbaea laxiflora (Purple Tassels)*			
522.	1558	*Sparaxis bulbifera*	Y		
523.	4211	*Sphaerolobium vimineum (Leafless Globe Pea)*			
524.		*Steatoda capensis*			
525.	2316	*Stirlingia latifolia (Blueboy)*			
526.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
527.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
528.	30278	*Stylidium androsaceum*			
529.	7693	*Stylidium brunonianum (Pink Fountain Triggerplant)*			
530.	7696	*Stylidium calcaratum (Book Triggerplant)*			
531.	7712	*Stylidium despectum (Dwarf Triggerplant)*			
532.	7719	*Stylidium ecorne (Foot Triggerplant)*			
533.	7734	*Stylidium guttatum (Dotted Triggerplant)*			
534.	25829	*Stylidium neurophyllum (Coastal Plain Triggerplant)*			
535.	7774	*Stylidium piliferum (Common Butterfly Triggerplant)*			
536.	7785	*Stylidium repens (Matted Triggerplant)*			
537.	25806	*Stylidium scariosum*			
538.		*Stylidium sp.*			
539.	7806	*Stylidium utricularioides (Pink Fan Triggerplant)*			
540.	1260	*Stypandra glauca (Blind Grass)*			
541.	2321	*Synaphea acutiloba (Granite Synaphea)*			
542.	2325	*Synaphea pinnata (Helena Synaphea)*			
543.	2329	*Synaphea spinulosa*			
544.	32438	*Syntrichia pagorum*			
545.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
546.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
547.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
548.	24167	*Tarsipes rostratus (Honey Possum, Noolbenger)*			
549.	20135	*Taxandria linearifolia*			
550.	1034	*Tetraria capillaris (Hair Sedge)*			
551.	1036	*Tetraria octandra*			
552.	1705	*Thelymitra crinita (Blue Lady Orchid)*			
553.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
554.	1318	*Thysanotus arbuscula*			
555.	1319	*Thysanotus arenarius*			
556.	1335	*Thysanotus gracilis*			
557.	1338	*Thysanotus manglesianus (Fringed Lily)*			
558.	1339	*Thysanotus multiflorus (Many-flowered Fringe Lily)*			
559.	1351	*Thysanotus sparteus*			
560.	1354	*Thysanotus tenellus*			
561.	1357	*Thysanotus thyrsoideus*			
562.	25203	*Tiliqua occipitalis (Western Bluetongue)*			
563.	25519	*Tiliqua rugosa*			
564.	25207	*Tiliqua rugosa subsp. rugosa*			
565.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
566.	6280	*Trachymene pilosa (Native Parsnip)*			
567.		*Trichoglossus chlorolepidotus*			
568.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
569.	24755	*Trichoglossus haematodus subsp. moluccanus (Rainbow Lorikeet)*	Y		
570.	25521	*Trichosurus vulpecula (Common Brushtail Possum)*			
571.	1361	*Tricoryne elatior (Yellow Autumn Lily)*			
572.	17145	*Trifolium angustifolium var. angustifolium*	Y		
573.	17542	*Trifolium arvense var. arvense*	Y		
574.	35016	*Trihaloragis hexandra subsp. integrifolia*			
575.	1139	*Trithuria bibracteata*			
576.	48147	*Turnix varius (Painted Button-quail)*			
577.	99	*Typha orientalis (Bulrush, Cumbungi)*			
578.	24852	*Tyto alba subsp. delicatula (Barn Owl)*			
579.		*Urodacus novaehollandiae*			
580.	8255	*Ursinia anthemoides (Ursinia)*	Y		
581.	38388	*Ursinia anthemoides subsp. anthemoides*	Y		
582.	24386	*Vanellus tricolor (Banded Lapwing)*			
583.	8257	*Vellereophyton dealbatum (White Cudweed)*	Y		
584.	7666	*Verreauxia reinwardtii (Common Verreauxia)*			
585.	15431	*Verticordia acerosa var. acerosa*			
586.	15432	*Verticordia densiflora var. densiflora*			
587.	24206	*Vespadelus regulus (Southern Forest Bat)*			
588.	17285	*Vicia sativa subsp. cordata*	Y		

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589.	17042	*Vitis vinifera*	Y		
590.	722	*Vulpia bromoides (Squirrel Tail Fescue)*	Y		
591.	7384	*Wahlenbergia capensis (Cape Bluebell)*	Y		
592.	8282	*Waitzia suaveolens (Fragrant Waitzia)*			
593.	12072	*Wurmbea dioica subsp. alba*			
594.	1251	*Xanthorrhoea brunonis*			
595.	1256	*Xanthorrhoea preissii (Grass tree, Palga)*			
596.	6289	*Xanthosia huegelii*			
597.	44861	*Xerochrysum macranthum*			
598.	1049	*Zantedeschia aethiopica (Arum Lily)*	Y		
599.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			

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

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

Appendix 3
Black Cockatoo Habitat Assessment

Level 1, 50 Subiaco Square Road Subiaco WA 6008 PO Box 243 Subiaco WA 6904
Phone (08) 9380 3100 Fax (08) 9380 4606
177 Spencer Street Bunbury WA 6230 PO Box 287 Bunbury WA 6231
Phone (08) 9792 4797 Fax (08) 9792 4708

Company: Cedar Woods

Contact: Preston O'Keefe

Fax/email: Preston.OKeefe@cedarwoods.com.au

Project No: CED18086.01

Date: 05/04/2019

Inquiries: Kathy Choo

Lot 500 Park Street, Brabham: Black Cockatoo Habitat Assessment

Background

Strategen Environmental (Strategen) was commissioned by Cedar Woods (CW) to undertake a Black Cockatoo habitat assessment for 285 Park Street Brabham (Survey Area; Figure 1). The proposed development of the site has the potential to impact native vegetation and as such, a Black Cockatoo habitat assessment was deemed necessary to determine the Black Cockatoo values of the potential clearing area.

All three species of Black Cockatoo - Baudin's Cockatoo (*Calyptorhynchus baudinii*), Carnaby's Cockatoo (*Calyptorhynchus latirostris*), and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) could potentially occur in the Survey Area. Clearing of vegetation may result in the removal of vegetation potentially containing habitat for Baudin's Cockatoo, Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo (FRTBC).

All three species of Black Cockatoos are listed as Threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Western Australia *Biodiversity Conservation Act 1950* (BC Act). Given this, an assessment of the habitat values is required to support potential future assessment and approval requirements and to inform development design.

This report presents the findings of the Black Cockatoo habitat assessment undertaken in the Survey Area.

Objectives

The objectives of the work undertaken were to:

- undertake a Black Cockatoo habitat assessment
- define and map Black Cockatoo habitat within the Survey Area
- prepare a short report summarising the findings.

Figure 1: Project Area

N

Scale 1:4,000 at A4

0 50 100 m

Coordinate System:
GDA 1994 MGA Zone 50

Date: 4/04/2019

Legend

- Project area (20.226 ha)
- Cadastral boundary
- Roads

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info@strategen.com.au | www.strategen.com.au

Nearmap: Aerial image, flown 02/2019. Landgate: Cadastre, 07/2018. Client: Cedar Woods. Site data 1/2019. Created by: c.thatcher

Methods

The Black Cockatoo habitat assessment was undertaken on 20 March 2019 by two Zoologists with relevant experience as specified by the EPBC Act referral guidelines for three threatened Black Cockatoo species (DSEWPaC 2012, DEE 2017).

The habitat assessment involved traversing the Survey Area by foot. Any trees meeting the following criteria for potential breeding and foraging habitat were recorded, marked and electronically logged using a hand held Global Positioning System (GPS) unit:

- native trees (e.g. Jarrah, Tuart, Marri)
- diameter at breast height (DBH) ≥ 500 mm (≥ 300 mm for Wandoo and Salmon Gum)
- suitable sized nest hollow i.e. large enough entrance and adequate depth
- evidence of feeding (chewed cones, seed and nut material)
- opportunistic observations of Black Cockatoos in the Survey Area.

Surveying for Black Cockatoo foraging habitat was also carried out in any vegetation containing proteaceous heath/woodland, eucalypt woodlands or forest (particularly Marri and Jarrah forest), as well as in any areas dominated by Pines (*Pinus* spp.).

Results

During the Black cockatoo habitat assessment, no Black Cockatoos were recorded in the Survey Area.

Potential Breeding Habitat

One species of Eucalypt, Marri (*Corymbia calophylla*) recorded in the Survey Area, is considered Black Cockatoo potential breeding habitat when the DBH is ≥ 500 mm. The Survey Area contains 89 potential breeding trees with a DBH ≥ 500 mm, of which 87 were Marri, one was a Jarrah (*Eucalyptus marginata*), and one was a stag (dead tree). The dimensions and the locations of these potential breeding trees are displayed in **Error! Reference source not found.** and Appendix 1.

No hollows observed from the ground were considered to have entrances that were high enough or large enough for Black Cockatoos to nest in (> 5 m off the ground and > 100 mm diameter opening) (Appendix 1).

Foraging Habitat

There is a total of 2.919 ha of foraging habitat in the Survey Area (**Error! Reference source not found.**). Foraging species in the Survey Area consist of, Marri, Coastal Blackbutt (*Eucalyptus todtiana*), *Banksia attenuata*, *B. menziesii, B. sessilis and Xanthorrhoea preissii*.

The majority of Black Cockatoo habitat is in the top half of the Survey Area or the north-western section (Figure 2 and Plate 1), while the bottom half of the Survey Area or the southern section is almost entirely cleared of native vegetation (highly degraded), apart from a few scattered trees (Melaleuca) (Figure 2 and Plate 2).

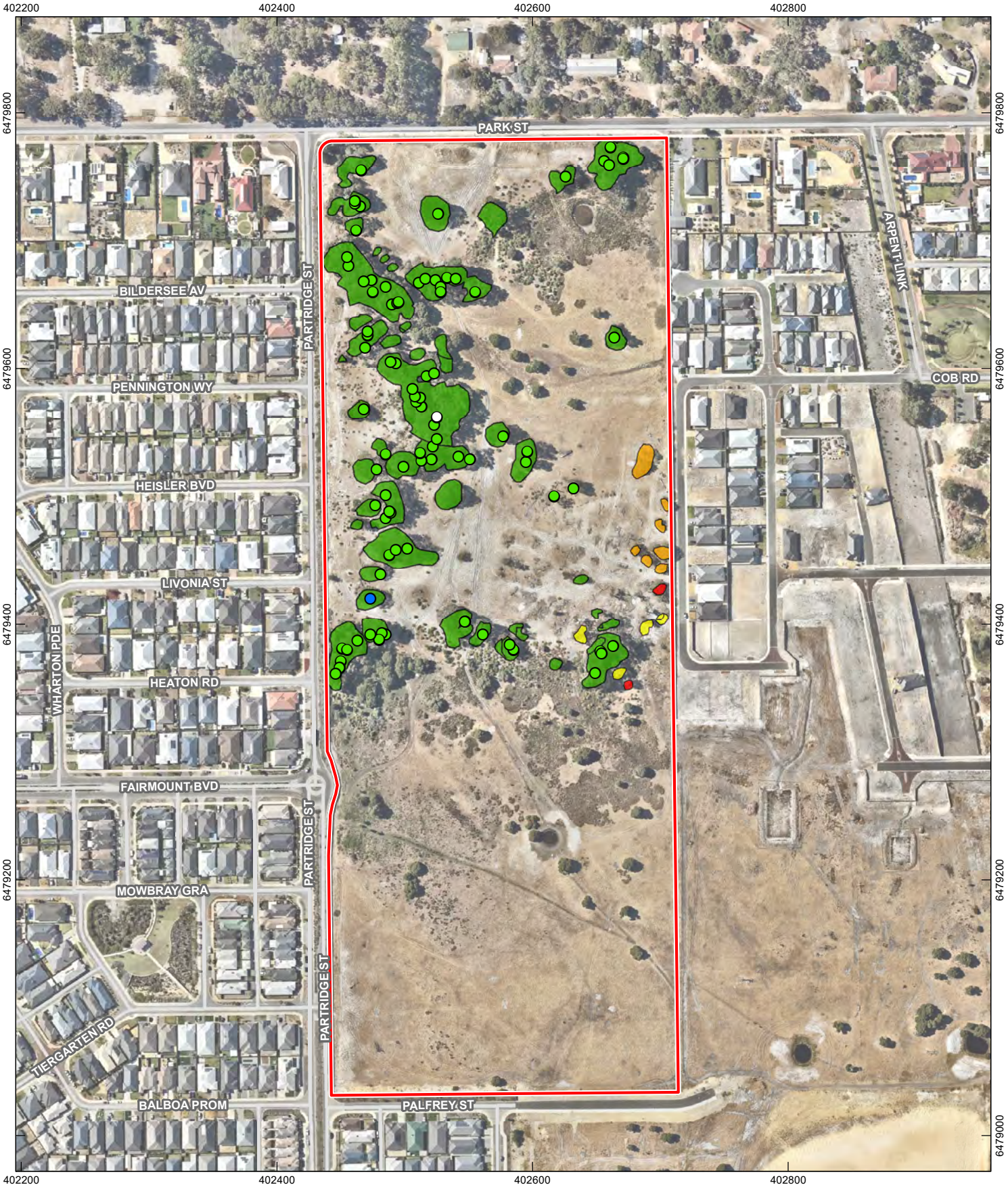

Figure 2: Black Cockatoo Habitat

N

Scale 1:4,000 at A4

0 50 100 m

Coordinate System:
GDA 1994 MGA Zone 50

Date: 5/04/2019

Legend

- Project area
- Black Cockatoo potential breeding trees
  - Jarrah (1)
  - Marri (87)
  - Stag (1)
- Black Cockatoo habitat
  - Banksia attenuata (0.01 ha)
  - Banksia sessilis (0.314 ha)
  - Eucalyptus todtiana (0.68 ha)
  - Marri (1.915 ha)
- Roads

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info@strategen.com.au | www.strategen.com.au

Nearmap: Aerial image, flown 02/2019. Landgate: Cadastre, 07/2018. Client: Cedar Woods. Site data 1/2019. Created by: c.thatcher

Plate 1: An example of Black Cockatoo foraging habitat in the northern half of the Survey Area

Plate 2: An example of the degraded habitat in the northern half of the Survey Area

The same potential breeding trees mentioned above are also considered foraging species and includes trees that are of various sizes, however, all are considered mature (i.e. had fruit or were large enough to produce fruit).

Chewed Marri nuts with markings considered likely to be from Carnaby's Cockatoo and FRTBC were observed in several locations, particularly under Marri trees on the western side of the Survey Area.

Discussion

Potential Breeding Habitat

Black Cockatoos breed in large hollow-bearing trees, generally within woodlands or forests (Johnstone *et al*. 2013). The size of the tree can be a useful indication of the hollow-bearing potential of the tree. Trees of suitable DBH are potentially important for maintaining breeding in the long-term, through maintaining the integrity of the habitat and allowing trees to provide future nest hollows. Maintaining the long-term supply of trees of a size to provide suitable nest hollows is particularly important in woodland stands that are known to support Black Cockatoo breeding (DSEWPaC 2012).

The Black Cockatoo habitat assessment revealed that the Survey Area contains Marri trees which have reached a size to be considered potential future hollow bearing trees, therefore potential breeding trees (i.e. ≥ 500 mm according to the EPBC Act revised draft referral Black Cockatoo guidelines). In total, 89 trees were recorded which met the criteria to be classed as a potential breeding tree. This suggests that these trees may develop hollows and have the potential to be use for nesting in the future.

Past studies have found that on average hollow openings are 25 cm x 27 cm (Saunders *et al.* 1982, Saunders and Dawson 2017) and 30 cm x 34 cm (Johnstone et al. 2013). The height of a hollow entrance off the ground is on average14.49 m (Johnstone et al. 2013). Nearly all hollows that are used for nesting by Black Cockatoos are located in the main trunk and have a vertical aspect (Johnstone et al. 2013, Saunders and Dawson 2017). Black Cockatoos are large birds with shoulders that are about 100 mm wide, therefore they require hollows with an entrance bigger than this (as shown above they are typically much larger), but the internal dimensions (depth and floor base) need to be considerably larger.

Previous research has found that mean depth of hollows for the FRTBC is 1.44 m and floor base is 32 cm and for Carnaby's Cockatoo a mean depth of 1.2 m and a floor diameter of 40 cm in order for it to be suitable to lay eggs in and for adults to be able to move around (Johnstone et al. 2013a, Saunders and Dawson 2017). None of the 89 potential breeding trees recorded during this assessment had hollows that were large enough and therefore not suitable for nesting.

Foraging Habitat

Other Marri trees in the Survey Area had a DBH of < 500 mm and therefore are not considered potential breeding trees, however, these trees are all considered to be foraging habitat. Marri was the principal dietary species in the Survey Area, though other known foraging species were present, but in very low abundance and this included Coastal Blackbutt, *B. attenuata*, *B. menziesii B. sessilis and X. preissii*. However, *X. preissii* is not considered a primary dietary item for Black Cockatoos (Johnstone *et al*. 2011), and they are not commonly observed foraging on or in close vicinity to this species.

All three Black Cockatoo species leave unique feeding patterns on Marri nuts as they extract the seeds. Each species has a different style – from the inelegant "chomp-chomp" style of the FRTBC and Carnaby's Cockatoo to the delicate style of the Baudin's Cockatoo which use their long upper beak to extract the Marri seeds (WAM 2013). Evidence of foraging was recorded in several location in the Survey Area, with many chewed Marri nuts observed. It is important to note that this foraging evidence was not considered recent and appeared to be a number of years old.

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Park St Brabham

Tree Number	Species	Easting (GDA 94)	Northing (GDA94)	Number of Hollows	Hollow Size	Notes
1	Marri	402526	6479721			
2	Marri	402626	6479750			
3	Marri	402656	6479762			
4	Marri	402660	6479759			
5	Marri	402661	6479773			
6	Marri	402671	6479765			
7	Marri	402671	6479764	1	~ 5 cm	Too small for BC
8	Marri	402664	6479624			
9	Marri	402663	6479383			Old chewed Marri nuts
10	Marri	402653	6479379			
11	Marri	402654	6479377			
12	Marri	402649	6479362			
13	Marri	402585	6479380			
14	Marri	402582	6479384			
15	Marri	402561	6479392			
16	Marri	402547	6479402			
17	Marri	402547	6479402			
18	Marri	402485	6479392			
19	Marri	402482	6479393			
20	Marri	402480	6479388			
21	Marri	402473	6479392			
22	Marri	402463	6479387			
23	Marri	402451	6479381	1	~ 5 cm	Too small for BC
24	Marri	402455	6479380			
25	Marri	402450	6479371			
26	Marri	402449	6479366			
27	Marri	402446	6479361			
28	Jarrah	402473	6479420			
29	Marri	402481	6479439			
30	Marri	402488	6479454			
31	Marri	402493	6479458			
32	Marri	402502	6479459			
33	Marri	402485	6479483	1	~ 7 cm	Too small for BC
34	Marri	402489	6479487			
35	Marri	402488	6479488			Old chewed Marri nuts
36	Marri	402477	6479493			
37	Marri	402485	6479501			
38	Marri	402478	6479521			
39	Marri	402485	6479533			
40	Marri	402499	6479523			
41	Marri	402617	6479500			
42	Marri	402632	6479506			
43	Marri	402595	6479527			
44	Marri	402596	6479535			
45	Marri	402577	6479547			
46	Marri	402551	6479529			
47	Marri	402542	6479531			
48	Marri	402521	6479529			
49	Marri	402513	6479528			
50	Marri	402512	6479534			

51	Marri	402522	6479539			Old chewed Marri nuts
52	Marri	402525	6479545			
53	Marri	402523	6479556			
54	Stag	402525	6479562			
55	Marri	402513	6479570			Old chewed Marri nuts
56	Marri	402509	6479574			
57	Marri	402512	6479577			
58	Marri	402508	6479578			
59	Marri	402506	6479584			
60	Marri	402468	6479568			
61	Marri	402517	6479594			
62	Marri	402523	6479596			
63	Marri	402493	6479604			
64	Marri	402489	6479605			
65	Marri	402469	6479616			
66	Marri	402471	6479626			
67	Marri	402471	6479629			
68	Marri	402490	6479650			
69	Marri	402494	6479651			
70	Marri	402495	6479652	1	~ 6 cm	Too small for BC
71	Marri	402511	6479667			
72	Marri	402516	6479670			
73	Marri	402524	6479669			
74	Marri	402528	6479664			
75	Marri	402528	6479660	1	~ 5 cm	Too small for BC
76	Marri	402533	6479671			
77	Marri	402540	6479670			
78	Marri	402555	6479660			
79	Marri	402485	6479664			
80	Marri	402475	6479660			
81	Marri	402474	6479669			
82	Marri	402468	6479668			
83	Marri	402456	6479680			
84	Marri	402455	6479687			
85	Marri	402462	6479708			
86	Marri	402465	6479727			
87	Marri	402461	6479729			
88	Marri	402461	6479731			
89	Marri	402466	6479755			