

APPENDIX 6B

ENVIRONMENTAL ASSESSMENT REPORT (SUPERSEDED)



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Lot 48 Stoneville Road and Lot 1 Roland Road, Stoneville

Environmental Assessment Report (Original)

Prepared for
Satterley Property Group
by Strategen

November 2018

**Lot 48 Stoneville Road and
Lot 1 Roland Road,
Stoneville**

**Environmental Assessment Report
(Original)**

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November 2018

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Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

Client: Satterley Property Group

Report Version	Revision No.	Purpose	Strategen author/reviewer	Submitted to Client	
				Form	Date
Final Report	Rev 0	For client review	M Dunlop and C Turner/ D Newsome	Electronic PDF	28.11.2018

Filename: SPG18275.01 R002 Rev 0 - 28 November 2018

Executive Summary

Satterley Property Group (Satterley) is preparing to lodge a Structure Plan (SP) for Lot 48 Stoneville Road and Lot 1 Roland Road, Stoneville (the site; Figure 1) in the Shire of Mundaring (the Shire).

The SP (Figure 2) identifies:

- Urban land uses
- Natural Living land uses
- two school sites
- an Aboriginal heritage complex
- recycled waste water infrastructure
- internal road network
- areas of Public Open Space (POS) and drainage
- a large conservation area.

Strategen were commissioned to prepare an Environmental Assessment Report (EAR) to demonstrate that all environmental values and potential impacts associated with future land use can be managed in accordance with legislative and policy requirements, and have been adequately considered in the design of the development.

The EAR considered the following factors:

- topography, geology and soils
- hydrology
- acid sulfate soils
- vegetation and flora
- fauna and habitat
- contamination
- bushfire risk
- heritage.

The key factors and values identified in the EAR are listed below, along with their proposed management measures where relevant:

- soils within the site are mapped as predominantly grantie (Gr) and gravel (G2) geological units. Smurthwaite (1986) indicates that these geological units are compatible with urbanisation and the construction of roads. Prior to development, the geological site conditions can be confirmed through geotechnical investigation as required.
- The site contains several drainage lines and man-made dams which require consideration in development design and ongoing management (Figure 4). These drainage lines have predominantly been retained in the development design through the strategic placement of public open space (POS) along creek-line corridors, and will be landscaped where possible to improve both the ecological and hydrological value.
- A *Local Water Management Plan* (Emerge Associates 2018) has been prepared to support development of the site, which details how stormwater across the site will be managed to ensure that these hydrological features are not negatively impacted.
- The site is mapped within the Dwellingup and Yarragil 1 vegetation complexes which have approximately 86 % and 81 % of the pre-European extent remaining, respectively (Government of Western Australia 2018) and are therefore well represented in the South- West Forest region. The site also falls within the West Darling 3 vegetation system association which has approximately 82% of the pre-European extent remaining and is well represented in the Northern Jarrah Forest IBRA sub-region.

- Vegetation present within the site is regionally well represented and does not resemble any known Threatened or Priority Ecological Communities.
- No Threatened or Priority flora species were recorded during 2016 and 2017 Spring field surveys.
- A number of conservation significant fauna were considered to potentially utilise the site as habitat. Site investigations identified potential black cockatoo foraging, breeding and roosting habitat evenly distributed within vegetation across the site, as well as vegetation suitable for use by Chuditch and Brush-tailed Phascogale.
- The retention of a large (approximately 90 ha) patch of remnant vegetation in the northern portion of the site within a 100 ha Conservation POS will contribute to the long-term conservation of the pre-European vegetation complexes and associations as well as providing foraging, roosting and potential breeding habitat for native fauna. Additionally, trees will be retained and planted in areas of POS and streetscaping to maintain and enhance the ecological value of the site.
- As part of the approvals process for the development, a referral will be submitted to the Department of Environment and Energy for impacts to matters of national environmental significance (MNES). As part of this process the proponent will be required to mitigate or offset these impacts to the satisfaction of DEE which will include retention of conservation POS on site, and will likely include additional offset requirements.
- The use of historical aerial photography available from Landgate (from 1965 to 2016) was used to consider the historical land uses within the site. The current and historical land use of extensive agriculture (predominantly grazing) is not identified as a potentially contaminating industry, activity or land use by DER (2014). There is the potential that isolated areas of contamination may occur due to current or historical asbestos and chemical use/storage on the site. However, such areas are not considered to present a constraint to development and can be managed through investigation and remediation if required at the subdivision stage.
- Strategen assessed the bushfire risk to the site through an on-ground assessment and identified areas of Class A forest, Class D scrub and Class G grassland within 150 m of proposed development resulting in a moderate to extreme bushfire hazard. A Bushfire Management Plan (BMP) has been prepared to support the structure plan which details how the development will achieve compliance with the requirements of SPP3.7 and the Guidelines for Planning in Bushfire Prone Areas, and importantly manage the bushfire risk to future residents.
- A search of Department of Planning, Lands and Heritage Aboriginal Heritage Sites mapping (DPLH 2017) identified six registered Aboriginal Heritage Sites within the site boundary. An application was submitted in 1998 pursuant to Section 18 of the *Aboriginal Heritage Act 1972* to use the land for residential subdivision, and was approved subject to a number of conditions set out by the Minister. Development of the site will be in accordance with the prescribed conditions and in accordance with the *Aboriginal Heritage Due Diligence Guidelines* (DAA 2013).
- A search of the Heritage Council of Western Australia *inHerit* database did not identify any European heritage places within the site (HCWA & SHO 2017).

The EAR determined that the site is relatively unconstrained with the exception of vegetation and fauna habitat, and the presence of Aboriginal heritage sites. It is considered, however, that any potential impacts associated with the factors identified above can be appropriately mitigated, managed or offset through the State planning process and assessment under the EPBC Act and through the existing Section 18 approval under the *Aboriginal Heritage Act 1972*.

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1. Introduction

1.1 Background

Subsequent to the lifting of 'Urban Deferred' zoning, Satterley Property Group (Satterley) is now preparing to lodge a Structure Plan (SP) for Lot 48 Stoneville Road and Lot 1 Roland Road, Stoneville (the site; Figure 1) in the Shire of Mundaring (the Shire). Lots 48 and Lot 1 (the site) are in total approximately 555 ha in area and is located approximately 29 km north-east of the Perth Central Business District. Of this 555 ha, 337.4 ha is included with the SP area (Figure 2). The balance of the site is proposed to retain a 'rural' zoning.

The site is zoned 'Development' (DA4) under provisions of the Shire of Mundaring Local Planning Scheme No 4. Historically, under the Metropolitan Region Scheme (MRS), the site incorporated three 'Urban Deferred' precincts surrounded by 'Rural' land. Under DA4 provisions of the Local Planning Scheme, no subdivision to create residential lots will be supported until the subject 'Urban Deferred' land is zoned 'Urban' under the MRS.

Rezoning of the 'Urban Deferred' land to 'Urban' was approved by the Western Australian Planning Commission (WAPC) on 25 October 2016, therefore enabling residential development of the site.

1.2 Structure plan

The SP (Figure 2) identifies:

- Urban land uses
- Natural Living land uses
- two school sites
- an Aboriginal heritage complex
- recycled waste water infrastructure
- internal road network
- areas of Public Open Space (POS) and drainage
- a large conservation area.

1.3 Purpose of this document

The purpose of this Environmental Assessment Report (EAR) is to demonstrate that all environmental values are understood and potential impacts associated with future land use can be managed in accordance with legislative and policy requirements, and have been adequately considered in the design of the development.

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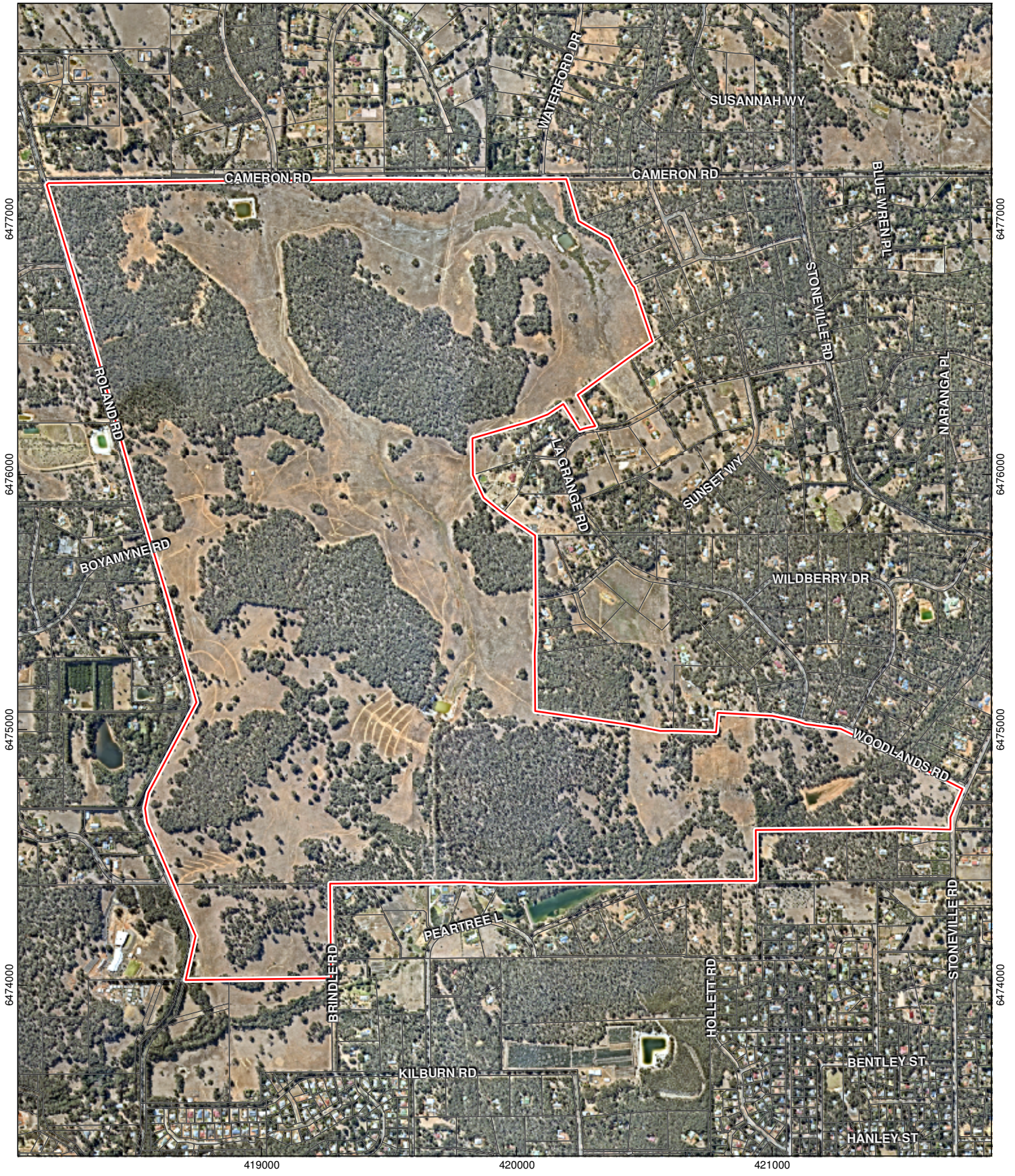


Figure 1: Site location

Legend

- Project area
- Cadastre

Scale 1:20,000 at A4

Coordinate System: GDA 1994 MGA Zone 50

Date: 8/11/2018

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Data source: Nearmap: Aerial image, flown 08/2018. Landgate: Cadastre, 11/2017. Client: Satterley Property Group. Development layout, 08/2018. Created by: CJT

LEGEND

----- Structure Plan Boundary

Reserves

- Conservation
- Important Local Roads
- Public Purposes
- Public Purposes: School
- Recreation

Zones

- Residential
- Rural Residential
- Special Use
- Local Centre

Other

- Connector (Access Street A)
- Perimeter Road (Bushfire)
- Fire Service Access Route
- Suggested POS Location
- Green Link
- Potential Special Use Location
- Recycled Water Plant

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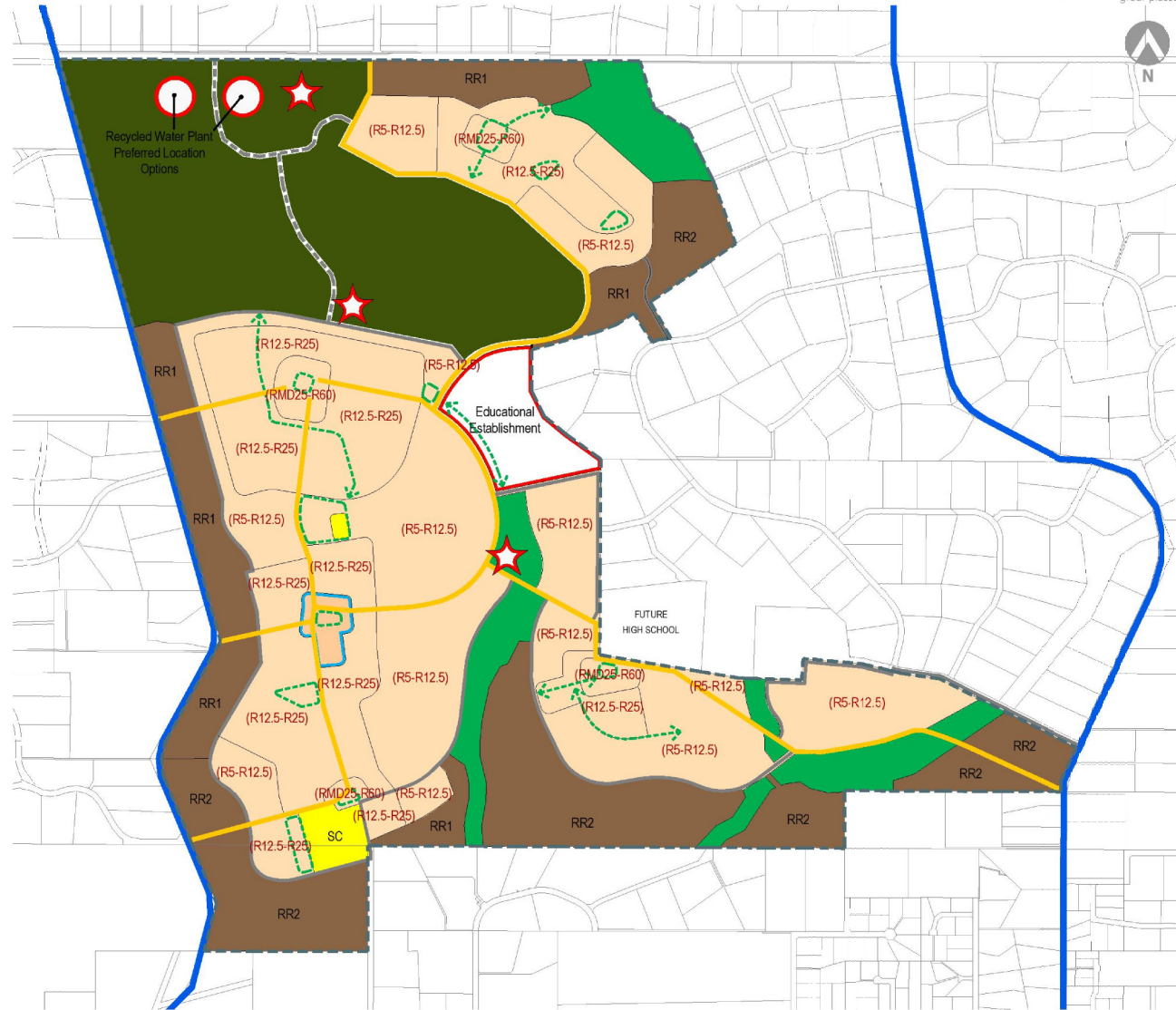


Figure 2: Structure Plan

2. Planning Context

2.1 State

The original MRS Amendment for the townsite was referred to the Environmental Protection Authority (EPA) pursuant to Section 48A of the *Environment Protection Act 1986* (EP Act). The EPA determined that the Amendment did not require formal assessment.

2.2 Local

The site is currently zoned 'Development' under the Shire of Mundaring Local Planning Scheme No. 4.

3. Environmental legislation, policy and guidelines

Key statutory and policy documents are listed below, and where specifically relevant to the Project, are described in detail in the following sections.

3.1 Commonwealth legislation

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

Under the *Environmental Protection and Biodiversity Conservation Act (1999)* (EPBC Act) an action that could be a significant impact on any matter of National Environmental Significance in accordance with the Significant Impact Guidelines 1.1-Matters of Environmental National Significance (MNES) (Department of the Environment, Water, Heritage and the Arts, 2013) should be referred to the Department of Environment and Energy (DEE) for assessment by the minister.

The proposed development will remove 151 ha of vegetation that comprises habitat suitable for Threatened Black Cockatoos (see Section 4.5.1) to enable residential and commercial development. A further 14 ha of vegetation will be cleared for fuel reduction purposes, however, within these fuel reduction areas significant trees will be retained at varying densities but will have understorey removed and canopy cover reduced consistent with State bushfire management policy requirements.

As such, the proposed clearing has the potential to result in a significant impact to MNES and therefore the project will be assessed under the EPBC Act to ensure that the project does not result in a significant residual impact. Clearing of any MNES will not occur until approval from the DEE has been granted.

3.2 State government legislation

The environmental assessment has been conducted with reference to the following State legislation which provides for the environmental and heritage values, and bushfire risk addressed within this report:

- *Wildlife Conservation Act 1950* (WC Act)
- *Environmental Protection Act 1986* (EP Act)
- *Biosecurity and Agriculture Management Act 2007* (BAM Act)
- *Rights in Water and Irrigation Act 1914* (RIWI Act)
- *Metropolitan Water Supply, Sewerage and Drainage Act 1909*
- *Aboriginal Heritage Act 1972* (WA) (AH Act)
- *Contaminated sites Act 2003* (CS Act)
- Contaminated Sites Regulations 2006 (CS regulations)
- *Planning and Development Act 2005*.

3.2.1 Aboriginal Heritage Act 1972

The *Aboriginal Heritage Act 1972* protects all Aboriginal heritage sites in Western Australia. Consent is required from the Minister for Aboriginal Affairs for any activity which will negatively impact Aboriginal heritage sites. Where land users conclude that impact to a Site is unavoidable, the consent of the Minister may be sought under section 18 of the Act.

Given the presence of Aboriginal heritage sites within the site, as described in Section 4.9.1, a Section 18 was applied for and granted in 1998 (DAA reference 04482). Satterley will develop the site in accordance with any obligations under the *Aboriginal Heritage Act 1972* and the conditions of the Section 18 approval.

3.3 State Planning Policies

The following State planning policies are prepared and adopted by the WAPC under statutory procedures set out in part 3 of the *Planning and Development Act 2005*:

- *State Planning Policy 2.5: Land Use Planning in Rural Areas (SPP 2.5)*
- *State Planning Policy 2.8: Bushland Policy for the Perth Metropolitan Areas (SPP 2.8)*
- *State Planning Policy 2.9: Water Resources (SPP 2.9)*
- *State Planning Policy 3.5: Historic Heritage Conservation (SPP 3.5)*
- *State Planning Policy 3.7: Planning in Bushfire Prone Areas (SPP 3.7)*
- *State Planning Policy 5.4: Road and Rail Transport Noise and Freight Considerations in Land Use Planning – Section 5.3 Noise Criteria (SPP 5.4)*

3.3.1 SPP 2.8: Bushland Policy for Perth Metropolitan 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 does not prevent development where it is consistent with the policy measures in this policy and other planning and environmental considerations.

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

In accordance with SPP 2.8, proposals must recognise regionally significant bushland and outline methods by which it will avoid, minimise and offset any likely adverse impacts it will have on regionally significant bushland.

The development design has taken into consideration the objectives of SPP 2.8 and has included the retention of a significant area of vegetation in the northern portion of the site, for conservation purposes. Vegetation retention is discussed in more detail in Section 5.2.2.

3.3.2 SPP 3.7: Planning in Bushfire Prone Areas

State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP 3.7) requires all land which has been designated as bushfire prone by the Fire and Emergency Services (FES) Commissioner to address bushfire risk management. Development within a bushfire prone area is required to address the relevant policy provisions, for the particular stage of the planning process relevant to the development.

In accordance with Policy Measure 6.3 of SPP 3.7, a Bushfire Management Plan has been prepared for the site which includes:

- a bushfire hazard level (BHL) assessment
- identification of bushfire hazard issues arising from the above assessment
- assessment against the bushfire protection criteria requirements contained within the Guidelines demonstrating compliance can be achieved in subsequent planning stages.

3.4 Environmental Protection Authority (EPA) guidance

The assessment has given consideration to the recommendations of EPA regulatory guidance as listed below:

- *Environmental Factor Guideline - Social Surroundings*
- *Environmental Factor Guideline - Human Health*
- *Environmental Factor Guideline - Inland Waters*
- *Environmental Factor Guideline - Terrestrial Fauna*
- *Environmental Factor Guideline - Terrestrial Environmental Quality*

- *Environmental Factor Guideline – Landforms*
- *Environmental Factor Guideline - Flora and Vegetation*
- *Technical Guidance - Terrestrial fauna surveys*
- *Technical Guidance - Sampling methods for terrestrial vertebrate fauna*
- *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment*
- *EPA Guidance Statement No. 33 Environmental Guidance for Planning and Development (EPA 2008)*
- *Environmental Protection Bulletin No. 20 Protection of naturally vegetated areas through planning and development.*

3.5 State government agency guidance

The assessment has given consideration to the recommendations of State government agency guidance as listed below:

- *WA Environmental Offsets Policy 2011 and guidelines*
- *Aboriginal Heritage Due Diligence Guidelines (DAA 2013)*
- *Better Urban Water Management (WAPC 2008)*

3.6 Shire of Mundaring local policies, strategies and guidance

The Shire has developed numerous policies, strategies and guidelines relevant to planning and the environment, as listed below. Reference to these documents has been made throughout the report where applicable to a specific environmental factor.

- *Shire of Mundaring Environmental Management Plan 2012 – 2022*
- *Landscape and Revegetation Guidelines 2015*
- *Shire of Mundaring Local Biodiversity Strategy 2009*
- *Wildlife Corridor Strategy 2000*
- *Shire of Mundaring Local Planning Scheme No. 4*
- *Local Planning Strategy*
- *Town Planning Scheme No. 3 Public Open Space Strategy*
- *Bushfire Area Access Strategy 2016*
- *Heritage Policy 2016*
- *Street Trees Policy*
- *Environmental Guidelines for the Construction of Dams 2000*

4. Existing environment

4.1 Site description

The site comprises approximately 555 ha and is surrounded by:

- Cameron Road and Rural Residential zoned landholdings to the north
- Rural zoned landholdings to the south
- Rural zoned landholdings and undeveloped Department of Education land to the east
- Roland Road and Rural zoned landholdings to the west (Figure 1).

4.2 Topography, geology and soils

The site is generally undulating, with slopes ranging from flat to approximately 15 degrees (limited to the southern portion of the site). Elevation across the site ranges from approximately 242 meters Australian Height Datum (AHD) in the south-western portion of the site, to approximately 316 m AHD in the centre of the site.

The site lies in the Darling Ranges, with the majority of the development precinct areas being mapped by Churchward and MacArthur (1980) as Dwellingup Phase 2 (Dw2) being:

- gently undulating lateritic uplands with well drained, shallow to moderately deep gravelly brownish sands, pale brown sands and earthy sands, overlying lateritic duricrust (hardpan) (Figure 3).

The lateritic hardpan is a layer of gravel with varying degrees of cementation from low to high. These hardpans may be up to 4 m thick (Smurthwaite 1986) and are generally underlain by a clayey pallid zone. While the sandy soils above the hardpan have a high permeability, the hardpan layer generally has a low permeability. Laterite hardpans have been observed at the surface of hilltops (Plate 1).



Plate 1: Lateritic hardpan and laterite boulders at the surface on the site.

On hilltops, these hardpans may be exposed at the surface. Further downslope:

- the thickness and cementation of the hardpans decreases
- the depth of soil above the hardpan increases.

On valley floors, the action of streams will have eroded the hardpans, leaving behind Yarragil group soils (Yg1 and Yg4) including duplex soils (sand over clay) and earthy soils (loam over clay) which do not have a cemented layer. These soil types occur only in the vicinity of creek lines within the site.

Smurthwaite (1986) identifies the site as predominantly grantie (Gr) and gravel (G₂) geological units and indicates that these geological units are compatible with urbanisation and the construction of roads. Prior to development, the geological site conditions can be confirmed through geotechnical investigation as required.

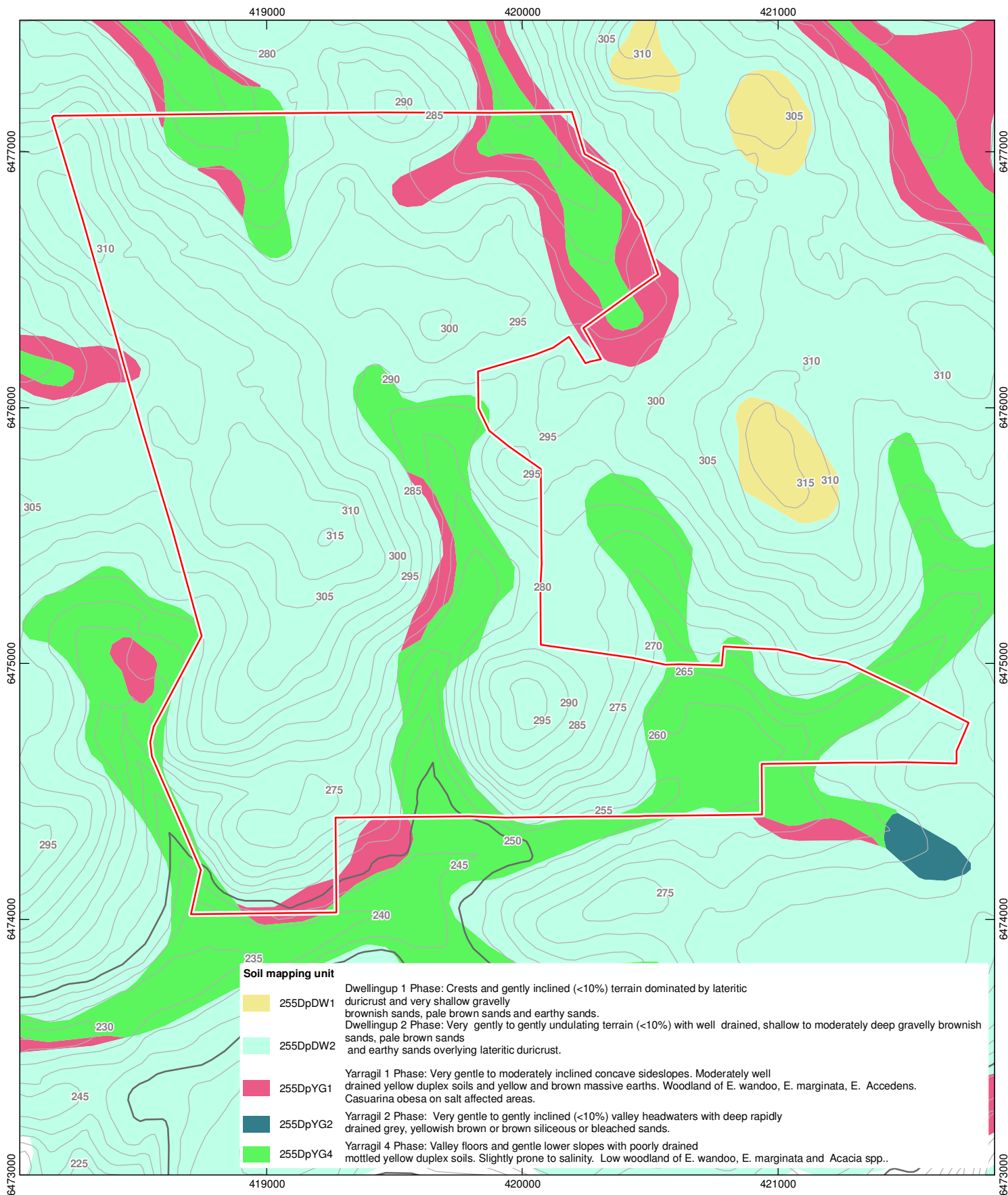


Figure 3: Soil type



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Data source: Nearmap: Aerial image, flown 08/2018. Landgate: Cadastre, 11/2017. Client: Satterley Property Group. Development layout, 08/2018. Created by: CJT

4.3 Hydrology

The hydrology of the site is discussed in detail within the Local Water Management Strategy (Emerge Associates 2018). A summary of the hydrological characteristics of the site is provide in the following subsections and Figure 4.

4.3.1 Groundwater

Due to the nature of the soils of the site, groundwater close to the surface is anticipated to be limited to:

- seasonal perched groundwater in the sandy or loamy layers of the valley floors (Yarragil 4 phase soils)
- isolated seasonal perched groundwater at limited locations on lateritic hardpan.

Groundwater may occur in the fractured rock material below the soils and pallid zones, however there is no evidence onsite of this occurring (Emerge Associates 2018). This deeper groundwater is not a constraint to development from a waterlogging perspective. Yields and quality of groundwater from fractured rock aquifers are unreliable and considered unlikely to be a suitable source for use for irrigation or potable supply.

It is likely that there would be seasonal saturation of the shallow clayey soil profile, and that the moisture in this shallow layer would migrate to the lower parts of the site as evidenced by the vegetation that is sustained in the low points (valleys) of the site (Emerge Associates 2018).

4.3.2 Surface water and wetlands

There are no geomorphic wetlands mapped within the site. There is however one portion of the site which exhibits wetland-like characteristics, located immediately downstream of the north-eastern dam and south of Cameron Road (Emerge Associates 2018).

There are four main streamlines present within the site, all of which have had surface water capture dams constructed in the past (Emerge Associates 2018). Clutterbuck Creek flows through the eastern portion of the site, and the main central catchment discharges to this Creek south of the site (Emerge Associates 2018). Clutterbuck Creek is a tributary of Jane Brook and those catchments which discharge northwards eventually discharge to Susannah Brook (Emerge Associates 2018).

In addition to the dams there is a minor culvert which discharges runoff from the site west under Roland Road (Emerge Associates 2018).

Emerge Associates (2018) has undertaken surface water quality monitoring between July 2017 and September 2018 at five locations across the site.

Total phosphorus (TP) was observed to be generally below the NWQMS trigger value for lowland rivers (which is most relevant as the destination is a lowland river. Total nitrogen (TN) was above the trigger level values for three sites. Measurements of pH across the site ranges from moderately acidic to neutral. Surface water throughout the site shows elevated levels of salinity (EC); up to five times greater than the upper limit of the acceptable range.

4.3.3 Public drinking water source area

The proposed development is not located within a Public Drinking Water Source Area (PDWSA).

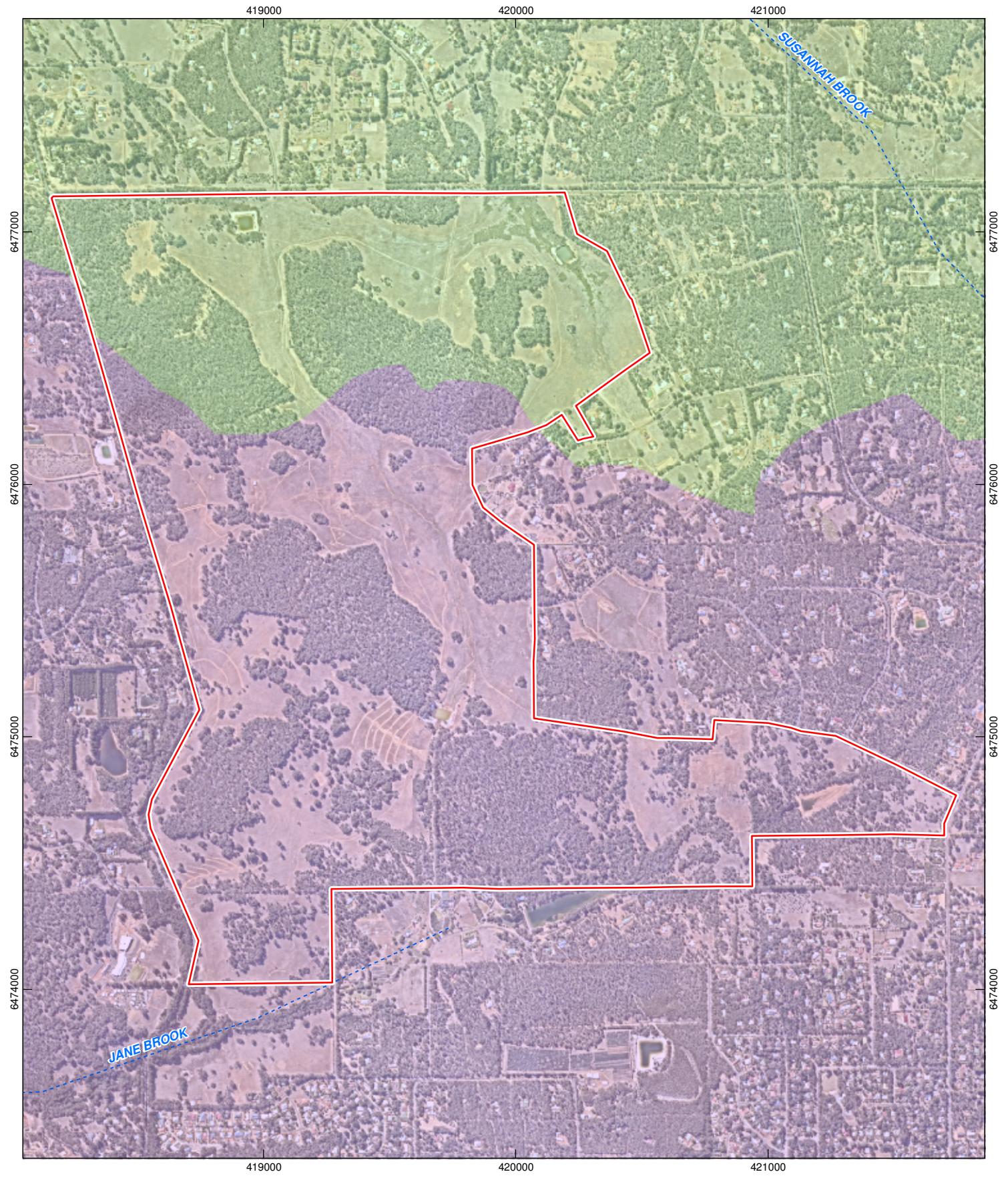


Figure 4: Hydrology



Scale 1:20,000 at A4



Coordinate System: GDA 1994 MGA Zone 50

Date: 9/11/2018

Legend

- Project area
- Subcatchment
- Jane Brook
- Susannah Brook
- Watercourse



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Data source: Nearmap: Aerial image, flown 04/2018. Landgate: Cadastre, 11/2017. Client: Satterley Property Group. Development layout, 08/2018. Created by: CJT

4.4 Vegetation and flora

4.4.1 Desktop assessment

Beard (1990) Botanical Sub-district

The site occurs within the Dale Botanical Subdistrict, characterised by Jarrah forest on ironstone gravels and Marri-Wandoo woodland on loamy soils, with sclerophyllous understoreys (Beard 1990).

IBRA sub-region

IBRA describes a system of 85 'biogeographic regions' (bioregions) and 403 sub-regions covering the entirety of the Australian continent (Thackway & Cresswell 1995). Bioregions are defined on the basis of climate, geology, landforms, vegetation and fauna.

The survey area occurs within the Northern Jarrah Forest IBRA sub-region which is characterised by vegetation comprising Jarrah - Marri forest in the west with Bullich and Blackbutt in the valleys grading to Wandoo and Marri woodlands in the east with Powderbark on breakaways. Banksia low woodlands occur on sandy soils and heath is found on granite rocks and as a common understorey of forests and woodlands in the north and east. Granite soils and lower slopes in this subregion can host highly diverse suites of species, due to rapid changes in site conditions near granite soils where there are rapid changes in site conditions (Williams and Mitchell 2001).

System 6 and vegetation system association mapping

System 6 mapping refers to vegetation mapping 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 survey area occurs within the following broad vegetation complexes described by GoWA (2017a) as:

- Dwellingup Complex: Open forest of *Eucalyptus marginata* subsp. *marginata*-*Corymbia calophylla* on lateritic uplands in mainly humid and subhumid zones
- Yarragil 1 Complex: Open forest of *Eucalyptus marginata* subsp. *marginata*-*Corymbia calophylla* on slopes with mixtures of *Eucalyptus patens* and *Eucalyptus megacarpa* on the valley floors in humid and subhumid zones.

The Dwellingup Complex and Yarragil 1 Complex have approximately 86 % and 81 % of the pre-European extent remaining, respectively (Government of Western Australia 2018).

At a finer scale, the survey area falls within the West Darling 3 vegetation system association (i.e. medium forest; jarrah-marri) as defined in Government of Western Australia (2017b).

Vegetation association 'West Darling 3' is estimated to have 81.63% remaining within the Northern Jarrah Forest IBRA sub-region compared to the pre-European extent. This extent remaining is well above the IUCN target of 30%.

Threatened and Priority Ecological Communities

One Priority Ecological Community (PES) was identified within 5 km of the Survey Area, the Central Northern Darling Scarp Granite Shrubland Community, which is listed as Priority 4(i) by DBCA. The community's closest occurrence is situated approximately 2.5 km from the southwestern boundary of the Survey Area. This community is described as follows:

Shrublands and heath on deeper loams and red earths on fragmented granite/quartzite. Heath species typically consist of the taller shrubs Xanthorrhoea acanthostachya and Allocasuarina humilis over smaller proteaceous and myrtaceous shrubs, namely Melaleuca aff. scabra, Baeckea camphorosmae and to a lesser extent, the proteaceous shrubs Dryandra armata, Hakea incrassata and Hakea undulata. Located in central region of the Northern Darling Scarp near Perth.

Threatened and Priority flora

The desktop assessment (Strategen 2017) identified nine Threatened flora and six Priority flora species that have been recorded in the regional area. The assessment determined that of these, based on specific habitat requirements, the following four Threatened flora species and four Priority flora species were considered to have the potential to occur within the survey area:

- *Acacia aphylla* (Threatened – Vulnerable [EPBC Act]; Threatened [WC Act])
- *Caladenia huegelii* (Threatened – Endangered [EPBC Act]; Threatened [WC Act])
- *Grevillea flexuosa* (Threatened – Vulnerable [EPBC Act]; Threatened [WC Act])
- *Thelymitra stellata* (Threatened – Endangered [EPBC Act]; Threatened [WC Act])
- *Acacia oncinophylla* subsp. *oncinophylla* (Priority 3)
- *Grevillea manglesii* subsp. *dissectifolia* (Priority 3)
- *Pimelea rara* (Priority 4)
- *Tetradthea pilifera* (Priority 3).

4.4.2 Site survey

Two flora and vegetation surveys were undertaken by Strategen at the site, one in November 2016 (for areas proposed for development at that time) and the balance of the site on 22 November 2017. A combined survey report is provided (Appendix 1).

The two survey areas are shown in Figure 5.

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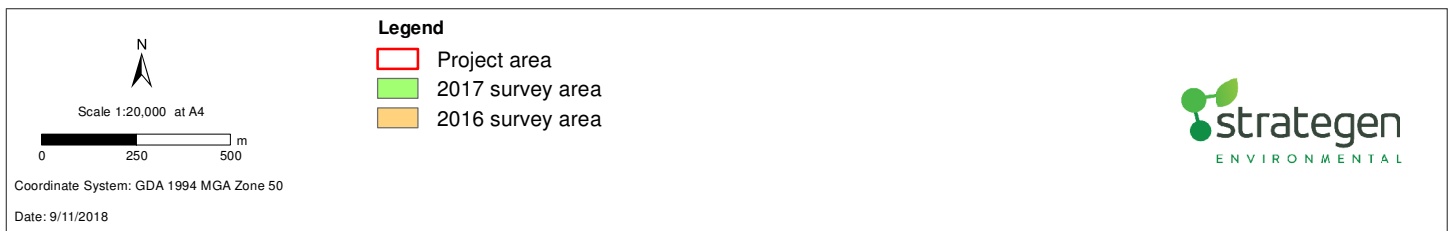
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Figure 5: Flora and vegetation survey areas



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Data source: Nearmap: Aerial image, flown 04/2018. Landgate: Cadastre, 11/2017. Client: Satterley Property Group. Development layout, 08/2018. Created by: CJT

Vegetation Types

Approximately 304.9 ha (55%) of the site was assessed as containing remnant native vegetation, comprising five different vegetation types. The balance of the site, 250.1 ha, comprises cleared pasture land described in Table 1 and depicted in Figure 6.

Table 1: Vegetation Types

Vegetation Type	Description	Site	
		Area (ha)	% of site
VT1	<i>Eucalyptus marginata</i> , <i>Corymbia calophylla</i> and <i>Banksia grandis</i> mid woodland to mid open forest over <i>Xanthorrhoea preissii</i> , <i>Leucopogon propinquus</i> and <i>Hakea amplexicaulis</i> sparse shrubland over <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> , <i>Lomandra sonderi</i> and <i>Phyllanthus calycinus</i> low hermland.	148.8	27
VT2	<i>Eucalyptus marginata</i> , <i>Corymbia calophylla</i> mid woodland to mid open forest over <i>Persoonia elliptica</i> and <i>Banksia sessilis</i> tall sparse shrubland over <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> , <i>Banksia dallanneyi</i> and <i>Desmocladius fascicularis</i> low hermland.	52.8	10
VT3	<i>Eucalyptus marginata</i> , <i>Corymbia calophylla</i> , <i>Allocasuarina fraseriana</i> mid woodland to mid open forest over <i>Xanthorrhoea preissii</i> and <i>Xanthorrhoea gracilis</i> sparse low shrubland over <i>Grevillea wilsonii</i> , <i>Lomandra sonderi</i> and <i>Phyllanthus calycinus</i> low hermland.	13.4	2
VT4	<i>Eucalyptus marginata</i> , <i>Corymbia calophylla</i> mid woodland to mid open forest over sparse mixed shrubland.	81.9	15
VT5	<i>Corymbia calophylla</i> mid woodland over <i>Taxandria linearifolia</i> tall shrubland.	8.0	1
C	Parkland Cleared and Cleared areas.	250.1	45
TOTAL		555	100

Vegetation condition across the site ranges from Completely Degraded where vegetation had been cleared (approximately 45 % of the site) to Very Good - Excellent (approximately 11% of the site) (Table 2, Figure 7).

Table 2: Vegetation condition

Vegetation Condition	Site	
	Area (ha)	% of site
Completely Degraded	249.38	45
Degraded	72.54	13
Good to Degraded	20.55	3.7
Good	94.37	17
Good to Very Good	47.65	1.4
Very Good	7.84	
Very Good - Excellent	62.26	11

Threatened and Priority Ecological Communities

One PEC, the Darling Scarp Granite Shrubland Community, is known from within 5 km of the Survey Area; however, vegetation within the Survey Area was not considered to represent any known TECs or PECs. Vegetation present within the site does not resemble any known Threatened or Priority Ecological Communities.

Threatened and Priority flora

The 2017 survey recorded a total of 71 native vascular plant taxa from 54 plant genera and 26 plant families were recorded from quadrats within the survey area. The majority of taxa were recorded within the Proteaceae family (12 taxa). No Threatened flora species listed under section 178 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Schedule 1 of the *Wildlife Conservation Act 1950* (WC Act) and Parks and Wildlife (2015) or Western Australian Herbarium (1998-) were recorded during the assessment. Additionally, no Priority flora species as listed by Western Australian Herbarium (1998-) were recorded.

One Declared Pest plant (**Zantedeschia aethiopica*) was recorded which is listed under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) according to the Western Australian Department of Agriculture and Food (DPIRD 2017).

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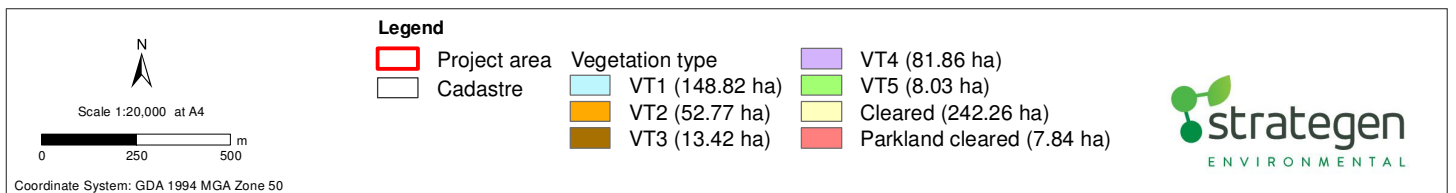
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Figure 6: Vegetation types



Coordinate System: GDA 1994 MGA Zone 50

Date: 14/11/2018

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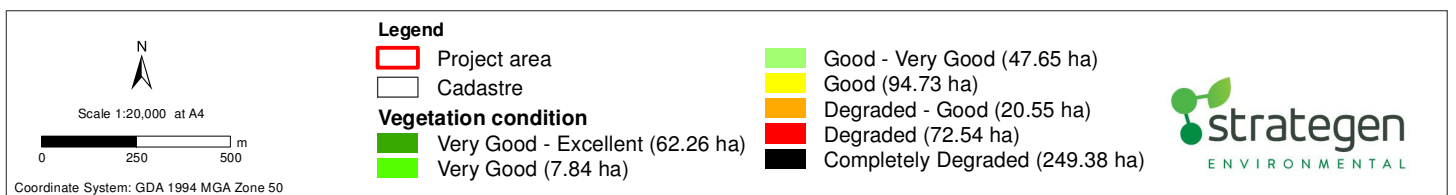
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Figure 7: Vegetation condition



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Data source: Nearmap: Aerial image, flown 08/2018. Landgate: Cadastre, 11/2017. Client: Satterley Property Group. Development layout, 08/2018. Created by: c.thatcher

4.5 Fauna and habitat

A desktop assessment of conservation significant fauna potentially occurring within 5 km of the site was undertaken using the Department of Biodiversity Conservation and Attractions *Naturemap* database and the Department of the Environment and Energy's *Protected Matters Search Tool*. The assessment reports (Appendix 2) identified 11 Threatened and two Priority fauna species which may potentially occur in the vicinity of the site. The search reports also identified the potential for nine Migratory species and three specially protected fauna to occur in the vicinity of the site. These species are listed in Table 3 along with a description of their preferred habitat and likelihood of occurrence within the site.

Of the species listed in Table 3, 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:

- Carnaby's Black-Cockatoo (CBC; *Calyptorhynchus latirostris*)
- Forest Red-tailed Black-Cockatoo (FRTBC; *Calyptorhynchus banksii* subsp. *naso*)
- Baudin's Black-Cockatoo (BBC; *Calyptorhynchus baudinii*)
- Chuditch/ Western Quoll (*Dasyurus geoffroii*)
- Brush-tailed Phascogale (*Phascogale tapoatafa*)
- Carter's Freshwater Mussel (*Westralunio carteri*)
- Quenda/ southwestern brown bandicoot (*Isodon fusciventer*)
- Blue-billed duck (*Oxyura australis*)
- Peregrine Falcon (*Falco peregrinus*).

Site investigations were conducted to identify potential black cockatoo foraging, breeding and roosting habitat within the site, as well as vegetation suitable for use by Chuditch and Brush-tailed Phascogale. The details of these investigations are described below.

Whilst not listed by State or Commonwealth legislation as being of conservation significance (i.e declining numbers or under threat of decline), the Wedge Tailed Eagle (*Aquila audax*) is an iconic species and is known to utilise the site, with one pair known to have nest sites on the property as well as in surrounding areas that form part of their home range. This species is likely to utilise the site due to the presence of a large number of kangaroos, the young of which are prey for Wedge Tailed Eagles.

In addition to the conservation significant fauna listed above, there is a large resident population of Western Grey Kangaroos within the site which will require consideration during clearing and development.

Table 3: Conservation significant fauna potentially occurring within site

Species name	Common name	Conservation status		Preferred habitat	Likelihood of occurrence
		State	Commonwealth		
<i>Calidris ferruginea</i>	Curlew Sandpiper	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.	Unlikely to occur as far east as the site as the species prefers coastal habitat. If present, limited to man-made dams.
<i>Numenius madagascariensis</i>	Eastern Curlew, Far Eastern Curlew	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 as the site is outside of the usual distribution of this species.
<i>Calyptorhynchus baudinii</i>	Baudin's Cockatoo, Long-billed Black-Cockatoo	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 2012b). They roost typically in eucalypt trees near permanent water sources.	Likely
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo, Short-billed Black-Cockatoo	Threatened	Threatened – Endangered	Carnaby's Cockatoo occurs in uncleared or remnant native eucalypt woodland, and heathlands containing hakea, dryandra, banksia and grevilleia species. They forage on a range of native and non-native vegetation. They breed in eucalypt woodlands, mainly within the wheatbelt region, in large hollows of live or dead eucalypt trees. Roosting occurs near water sources in large trees such as marri and pine trees.	Likely
<i>Rostratula australis</i>	Australian Painted Snipe	Threatened	Threatened - Endangered	The Australian Painted Snipe occurs in shallow terrestrial wetlands, permanent and temporary lakes, swamps and claypans. They favour environments hosting tussocks of grass, sedges, rushes/reeds and samphire. They breed and nest in shallow wetlands with areas of bare wet mud and canopy cover nearby.	Unlikely. There are limited wet areas within the site, and little vegetation coverage surrounding constructed dams.

Species name	Common name	Conservation status		Preferred habitat	Likelihood of occurrence
		State	Commonwealth		
<i>Bettongia penicillata</i> subsp. <i>ogilbyi</i>	Woylie	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.	Unlikely. 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 (DBCA 2017a)
<i>Calyptrorhynchus banksii</i> subsp. <i>naso</i>	Forest Red-tailed Black-Cockatoo, Karrak	Threatened	Threatened - Vulnerable	The Forest Red-tailed Black-Cockatoo occurs predominantly in dense eucalypt forests of jarrah, marri and karri, and occasionally in more open woodland habitats. They forage on marri, jarrah and other native and non-native vegetation species. They breed and nest in woodland or forest in live or dead eucalypt trees. Roosting occurs in tall eucalypt trees within or on the edges of forests and woodlands.	Likely
<i>Leipoa ocellata</i>	Malleefowl	Threatened	Threatened - Vulnerable	The Malleefowl occurs in shrublands and low woodlands dominated by mallee and acacia species. They favour environments with dense vegetation and require an abundance of leaf litter and a sandy substrate for breeding.	Unlikely. Suitable habitat not present.
<i>Dasyurus geoffroii</i>	Chuditch, Western Quoll	Threatened	Threatened - Vulnerable	The Western Quoll occurs in jarrah forests and woodlands, and mallee heath and shrublands.	Possible
<i>Setonix brachyurus</i>	Quokka	Threatened	Threatened - Vulnerable	The Quokka occurs across a range of habitats, but typically favours shrublands with a complex vegetation structure (minimum of three layers), with sufficient understorey that offers protection from predators. Given its high water requirements the Quokka is also often found in riparian and swamp habitats (Hayward et al. 2005a).	Unlikely. While this species is found in found in isolated patches of the northern Jarrah forest (DBCA 2017b), <i>Naturemap</i> did not identify any records of this species within 5 km of the site centre-point.
<i>Westralunio carteri</i>	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 (<i>Eucalyptus rudis</i> , <i>Melaleuca</i> spp. and others), woody debris and overhanging riparian vegetation near stream banks and edges of lakes/dams.	Unlikely. The waterways on
<i>Apus pacificus</i>	Fork-tailed Swift	Protected under international agreement - Migratory	Marine; Migratory	The Fork-tailed Swift occurs over inland plains over dry and open habitats, including riparian woodland, tea-tree swamps, low scrub, heathland and saltmarsh. The Fork-tailed Swift does not breed in Australia.	Unlikely. Prefers coastal habitat with only sparsely scattered inland records in Western Australia (DotE 2015).

Species name	Common name	Conservation status		Preferred habitat	Likelihood of occurrence
		State	Commonwealth		
<i>Motacilla cinerea</i>	Grey Wagtail	Protected under international agreement – Migratory	Marine; Migratory	The Grey Wagtail occurs in wetland habitats and along the banks of lakes, marshes and rivers (DotE 2015). The Grey Wagtail does not breed in Australia.	Unlikely. This species has been recorded at coastal locations in northern and southern parts of Western Australia.
<i>Actitis hypoleucos</i>	Common Sandpiper	Protected under international agreement - Migratory	Marine; Migratory	The Common Sandpiper occurs in coastal and inland wetland environments around muddy or rocky shores, and are also often associated with mangroves (Geering <i>et al.</i> 2007; Higgins and Davies 1996). The Common Sandpiper does not breed in Australia.	Unlikely. Preferred coastal or muddy habitat not present within site.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Protected under international agreement - Migratory	Marine; Migratory	The Sharp-tailed Sandpiper occurs in coastal lagoons, swamps and lakes, and inland dams, wetlands/swamps and bore drains. They forage in areas of bare or wet mud/sand and in shallow waters, and among inundated vegetation such as sedges, grasses or saltmarsh. The Sharp-tailed Sandpiper does not breed in Australia.	Unlikely. <i>Naturemap</i> did not identify any records of this species within 5 km of the site centre-point.
<i>Calidris melanotos</i>	Pectoral Sandpiper	Protected under international agreement - Migratory	Marine; Migratory	The Pectoral Sandpiper occurs predominantly in coastal environments and favours shallow fresh to saline wetlands, coastal lagoons, estuaries, swamps, lakes, inundated grasslands and saltmarshes. They favour shallow waters and soft mud with low, fringing vegetation for foraging. The Pectoral Sandpiper does not breed in Australia.	Unlikely. Prefers coastal habitat. <i>Naturemap</i> did not identify any records of this species within 5 km of the site centre-point.
<i>Pandion haliaetus</i>	Osprey	Not listed	Marine; Migratory	The Osprey occurs predominantly in coastal areas, frequenting wetland habitats, beaches, estuaries, rivers, mangrove swamps and large lakes. They forage in open areas of fresh, brackish or saline water (Marchant and Higgins 1993).	Unlikely. Prefers coastal habitat. <i>Naturemap</i> did not identify any records of this species within 5 km of the site centre-point.
<i>Tringa nebularia</i>	Common Greenshank, Greenshank	Protected under international agreement - Migratory	Marine; Migratory	The Common Greenshank occurs across a range of inland wetland and sheltered coastal habitats. They forage at the edges of wetlands in soft muds and shallow waters, and along fringing vegetation such as sedges and saltmarsh.	Unlikely. Possible habitat within site associated with 'wetland-like' area. however, <i>Naturemap</i> did not identify any records of this species within 5 km of the site centre-point.
<i>Falco peregrinus</i>	Peregrine Falcon	Specially Protected Fauna	Not listed	The Peregrine Falcon is not restricted to a specific habitat, and can occur across woodlands, grasslands and coastal cliffs.	Possible
<i>Phascogale calura</i>	Red-tailed Phascogale, Kenngoos	Specially Protected Fauna	Vulnerable	The Red-tailed Phascogale favours <i>Allocasuarina</i> woodlands with continuous canopy cover, and eucalypt hollows for nesting. Population numbers are higher in habitat that has been unburnt for more than 20 years (Kitchener 1981).	Unlikely, distribution is east of the project area.

Species name	Common name	Conservation status		Preferred habitat	Likelihood of occurrence
		State	Commonwealth		
<i>Phascogale tapoatafa</i> subsp. <i>wambenger</i>	South-western Brush-tailed Phascogale, Wambenger	Specially Protected Fauna	Not listed	The South-western Brush-tailed Phascogale occurs in dry sclerophyll forests and open woodlands with hollow-bearing trees and minimal understorey ground cover.	Possible
<i>Isoodon fusciventer</i>	Quenda, southwestern brown bandicoot	Priority 4	Not listed	The Quenda occurs across a broad range of habitats such as forests and dense scrub vegetation, to open croplands or pastures that contain or are adjacent to dense native vegetation. They are also associated with wetlands on the Swan Coastal Plain (DEC 2012b).	Likely
<i>Oxyura australis</i>	Blue-billed duck	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 International 2016).	Possible. If present would be limited to constructed dams.

4.5.1 Black Cockatoo habitat assessment

Black Cockatoo habitat assessments were undertaken in November 2016 (for areas proposed for development at that time) and October 2017 (for the remaining portions of the site). The surveys were undertaken by Strategen Zoologists with relevant experience as specified by the EPBC Act referral guidelines (DSEWPaC 2012a). The findings of the Black Cockatoo habitat assessment are outlined in the following subsections.

It is noted that during the surveys FRTBC were seen and or heard (flying over or in trees) and CBC were also heard and observed flying overhead.

Foraging habitat

The black cockatoo habitat assessment identified approximately 304.9 ha of suitable foraging habitat for all three species of black cockatoos. The areas of suitable foraging habitat correspond with the Eucalyptus and Corymbia woodland vegetation types (VT1 to VT5) discussed in Section 4.4.

Suitable black cockatoo foraging habitat was identified within the site ranging from Excellent to Moderate quality based on the criteria presented in Table 4. The highest quality foraging habitat for black cockatoos was predominantly noted within the large intact patches of Jarrah-Marri forest proposed for retention as conservation POS (as discussed further in Section 5.3). These areas contain high densities of black cockatoo foraging species including *Eucalyptus marginata*, *Corymbia calophylla*, *E. patens* and *Banksia grandis* at canopy and midstorey levels as well as other suitable food species in the understorey.

The distribution of habitat quality across the site is depicted in Figure 8.

Table 4: Definition of black cockatoo foraging habitat within the survey area

Foraging quality	Justification
Excellent	High density of species suitable for foraging by black cockatoos (i.e. foliage cover of suitable species >60%) and presence of food sources at several strata (i.e. canopy, midstorey and understorey).
Good	High density of species suitable for foraging by black cockatoos (i.e. foliage cover of suitable species >60%) but food sources only present at one or two strata (i.e. canopy and midstorey).
Moderate	Moderate foraging value density of species suitable for foraging by black cockatoos (i.e. foliage cover of suitable species 20-40%) and food sources only present at one or two strata (i.e. canopy and midstorey).
Poor	Low density of species suitable for foraging by black cockatoos (i.e. foliage cover of suitable species 10-20%) and presence of food sources at only one stratum (i.e. canopy).
Very poor	Very low density of species suitable for foraging by black cockatoos (i.e. foliage cover of suitable species <10%) and presence of food sources at only one stratum (i.e. canopy).
Nil	Cleared areas - no suitable vegetation present.

During survey's FRTBC foraging evidence, in the form of chewed Marri nuts was observed regularly while walking between survey quadrats (Strategen 2018).

Potential breeding habitat

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 species known to support breeding within the range of the species which either have a suitable nest hollow or are of a suitable 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 diameter of more than 100 mm are suitable for use by black cockatoos (Whitford and Williams 2002).

During the 2017 survey, potential breeding habitat (Jarrah and Marri trees) was recorded in all 24 quadrats surveyed, with potential breeding tree numbers per quadrat ranging from 2 to 10. Within the quadrats, only three trees with hollows with entrances that were considered large enough and in the correct position for Black Cockatoos to potentially nest in we recorded (Johnstone *et al.* 2013).

The distribution of potentially significant trees is relatively uniform throughout the Jarrah-Marri forest vegetation type, and scattered trees within the pasture vegetation type. Given the extent of the site, each individual potential breeding tree was not surveyed.

No direct evidence (adults entering hollow or young birds heard) of nesting was observed, nor was indirect evidence e.g. feathers on the ground or bespatter. In addition, bees were recorded in several of the hollows during the 2017 assessment.

Roosting habitat

The Great Cocky Count data from 2017 was examined and there were many roost sites within 12 km of the survey Area, five of which were within 1 km (Peck and Williams 2017). However, no roosts have been recorded within the survey area.

The black cockatoo habitat assessment identified approximately 304.9 ha of suitable roosting habitat for all three Black Cockatoo species within the site comprising predominantly Jarrah and Marri trees within VT1 to VT5.

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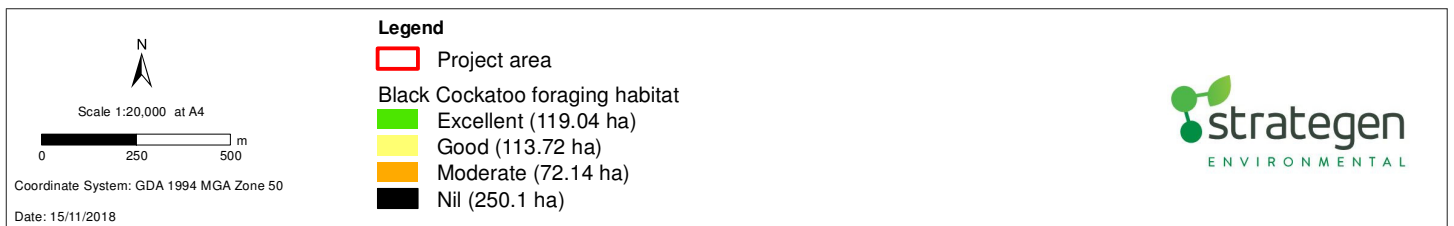
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Figure 8: Black Cockatoo foraging habitat



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4.5.2 Chuditch habitat assessment

The Chuditch (*Dasyurus geoffroii*) inhabits eucalypt forests or woodlands, mallee shrublands and rocky outcrops in southwest Western Australia (DEC 2012a). The Chuditch has been recorded in the Parkerville and Mundaring areas (Parks and Wildlife 2007-) and is highly likely to occur as a resident or visitor to the survey area. Appropriate habitat within the survey area is likely to be restricted to better quality patches of Jarrah-Marri forest which contain high densities of as well as established midstorey and understorey strata. Pasture areas with scattered trees within the survey area are not expected to be utilised by the species due to the increased likelihood of predation by cats and foxes in these areas due to the lack of vegetation cover.

An assessment of habitat suitable for the Chuditch was conducted in November 2016 (for areas proposed for development at that time) and October 2017 across the remaining areas of the site. Based on the two site assessments, it is estimated that there is approximately 304.9 ha of habitat for Chuditch within the site corresponding to remnant Jarrah and Marri vegetation (VT1 to VT5). The 2017 habitat assessment and evidence of presence of the species included searching for and recording hollow logs, earth burrows or rock piles if present in the quadrats and actively looking for signs, such as scats.

No signs of the Chuditch, such as scats were observed during the 2017 assessment. No potential earth burrows for denning were observed in any of the 24 quadrats or opportunistically across the survey area. There was one rock pile recorded at one of the 24 quadrats, however, it was too small with very little space, most likely not enough for a Chuditch to den in. There were also several other rock piles in the survey area, but again none of these were considered suitable for Chuditch to den in, given the size of the rock pile and the spaces between the rocks. The site also had very few hollow logs, with only two of the 24 quadrats having logs with hollows considered large enough for Chuditch to den in.

It is important to note that none of the rock piles observed were natural and had been pushed together because of previous farming activities.

4.5.3 Brush-tailed Phascogale habitat assessment

The site consisted of a tree canopy made up of Jarrah and Marri, trees having a DBH \geq 500 mm recorded in each quadrat (Appendix 1), however, very few had hollows when observed from the ground, particularly, those that would be considered suitable in size (mean hollow entrance width of 3.9 cm and length of 7.3 cm) for Phascogales to den in (Rhind 1996).

4.6 Conservation areas

4.6.1 Bush forever sites

Bush Forever is a 10 year strategic plan that aims to protect and retain at least 10% of each of the original 26 vegetation complexes that have been identified on the Swan Coastal Plain. Bush forever sites are the specific localities that have been recognised as containing regionally significant vegetation and are endorsed for protection and retention under Bush Forever.

The site is located east of the Swan Coastal Plain and therefore there are no listed Bush forever sites within or adjacent to the survey area (WALGA 2018).

4.6.2 Local Natural Areas

Local Natural Areas (LNAs) are areas of bushland, forest, water courses or granite outcrops, for example, which are not protected under the public conservation estate, proclaimed water catchments or Bush Forever sites. LNAs are afforded consideration through local planning strategies.

The Shire of Mundaring has developed a Local Biodiversity Strategy which focuses on the protection, retention and management of LNAs within the Shire (Ironbark Environmental and Eco Logical Australia 2009). There are 9175 ha of LNAs in the Shire which are under private ownership (6730 ha), managed by the Shire (285 ha), or other Government lands (2160 ha) (Ironbark Environmental and Eco Logical Australia 2009). Land clearing and fragmentation of native vegetation has been identified within the Local Biodiversity Strategy as a significant threat to the LNAs within the Shire (Ironbark Environmental and Eco Logical Australia 2009).

The areas of vegetation within the site that have been proposed for retention in conservation (see Section 5.2.2) are consistent with the LNAs identified within the site (Plate 2; WALGA 2018). The LNAs within the survey area have been assigned a 'Conservation Priority' of 1 or 2, which are described below in Table 5 (adapted from Ironbark Environmental and Eco Logical Australia 2009).

Table 5: LNA categories

Priority	Aim	Conservation Assets
1	To be conserved or protected and receive active management	Rare vegetation complexes At Risk vegetation complexes Within 20m of a Watercourse Regional Linkage over special features Regional Linkage over Habitat
2	To be conserved or protected and receive active management	Habitat Special features Regional Linkages Within 20-50m of Watercourse

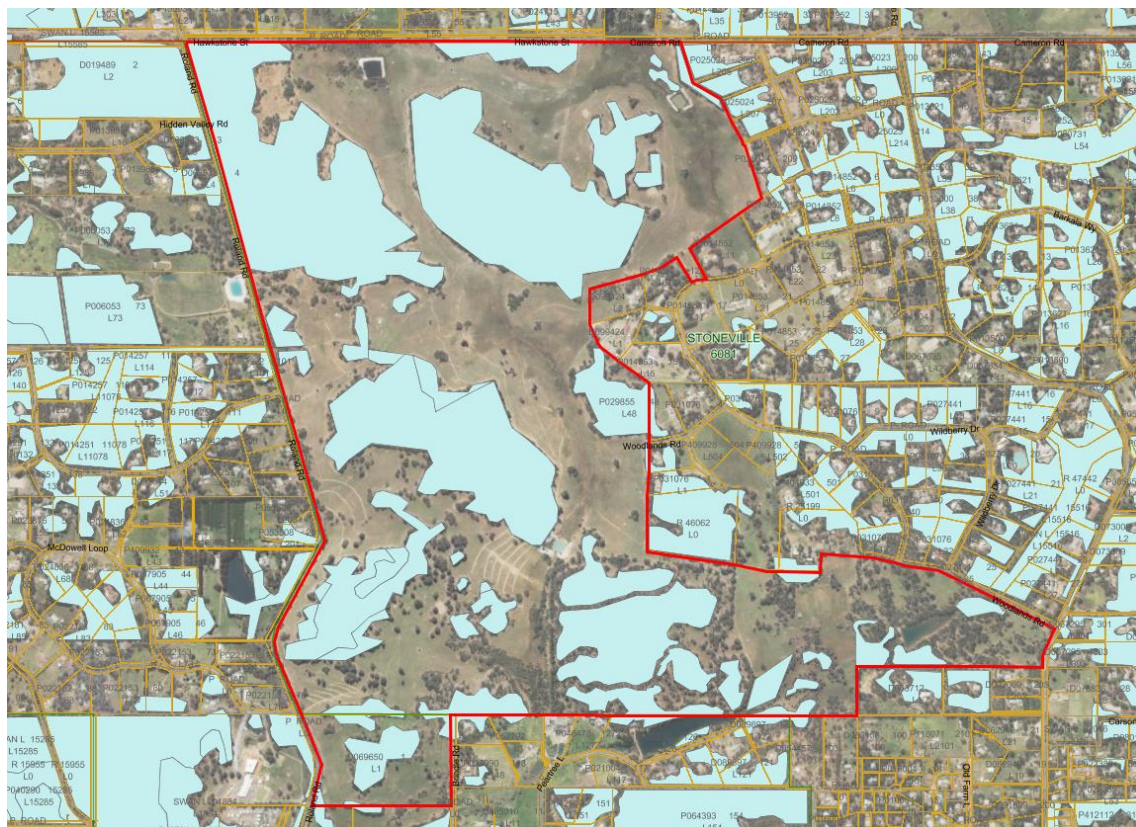


Plate 2: Local Natural Areas

4.6.3 Regional Ecological Linkages

Regional Ecological Linkages are a network of protected Regionally Significant Natural Areas which act as corridors to maintain habitat connectivity for flora and fauna species. A number of these linkages exist within the Shire of Mundaring, with two of these falling within the survey area (Link ID: 123 and Link ID: 125; Plate 3) (WALGA 2003). Link 123 runs from east to west and intersects Link 125 which runs north to south through the survey area.

The development proposes to retain vegetation in the northern portion of the site for conservation purposes, in perpetuity.

The retention, enhancement and conservation of vegetation within conservation POS and within the north-south drainage corridor POS will maintain and protect the ecological linkages within the site, as discussed in Section 5.

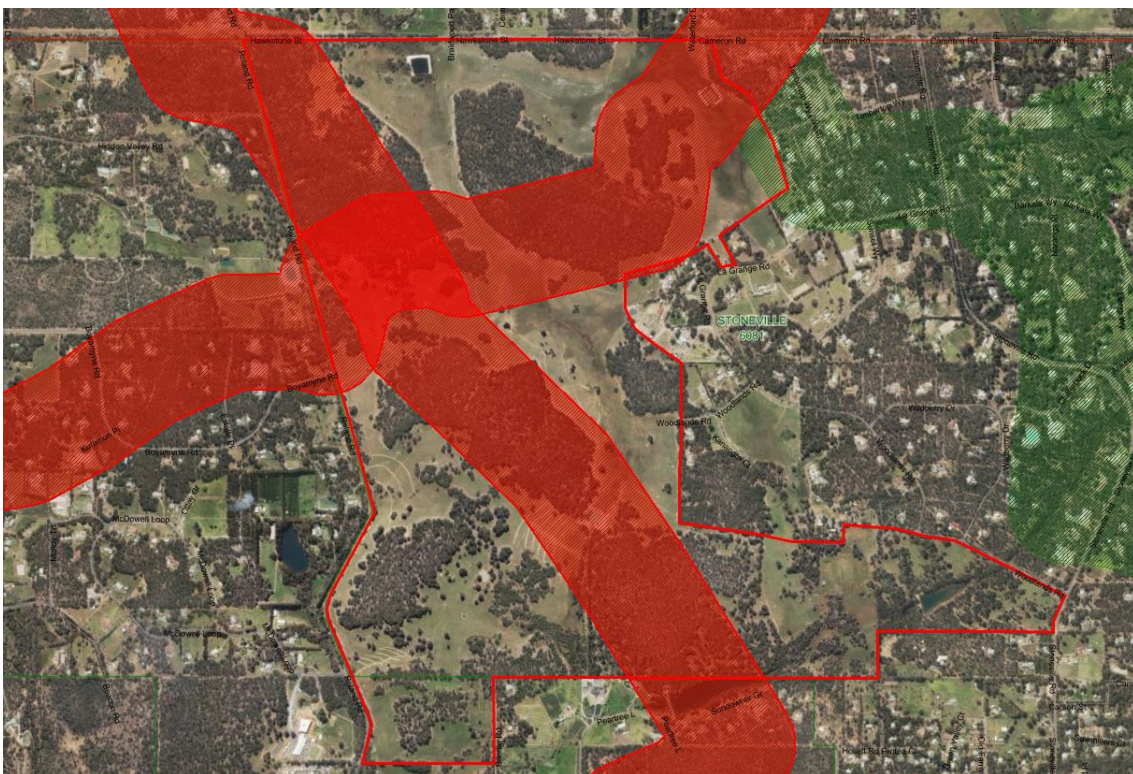


Plate 3: Regional Ecological Linkages

4.7 Contamination

The use of historical aerial photography available from Landgate (from 1965 to 2016) was used to consider the historical land uses within the site.

The southern portion of the site appears to have been cleared prior to 1965 to facilitate livestock grazing and other agricultural activities. The northern portion of the site was cleared between 1965 and 1974 for similar purposes.

Adjacent land comprises a mix of agricultural and rural-residential areas; with majority of clearing occurring pre-1965. Remnant pockets of native vegetation occur throughout the surrounding area.

The current and historical land use of extensive agriculture (predominantly grazing) is not identified as a potentially contaminating industry, activity or land use by DER (2014). There is the potential that isolated areas of contamination may occur due to current or historical asbestos containing buildings or areas of intensive chemical use/storage (e.g. sheds, sheep dipping facilities) on the site. Such areas are not considered to present a constraint to development and can be managed through investigation and remediation if required at the subdivision stage.

4.8 Bushfire risk

The majority of the project area is designated as bushfire prone on the WA *Map of Bush Fire Prone Areas* (DFES 2018; see Plate 4).

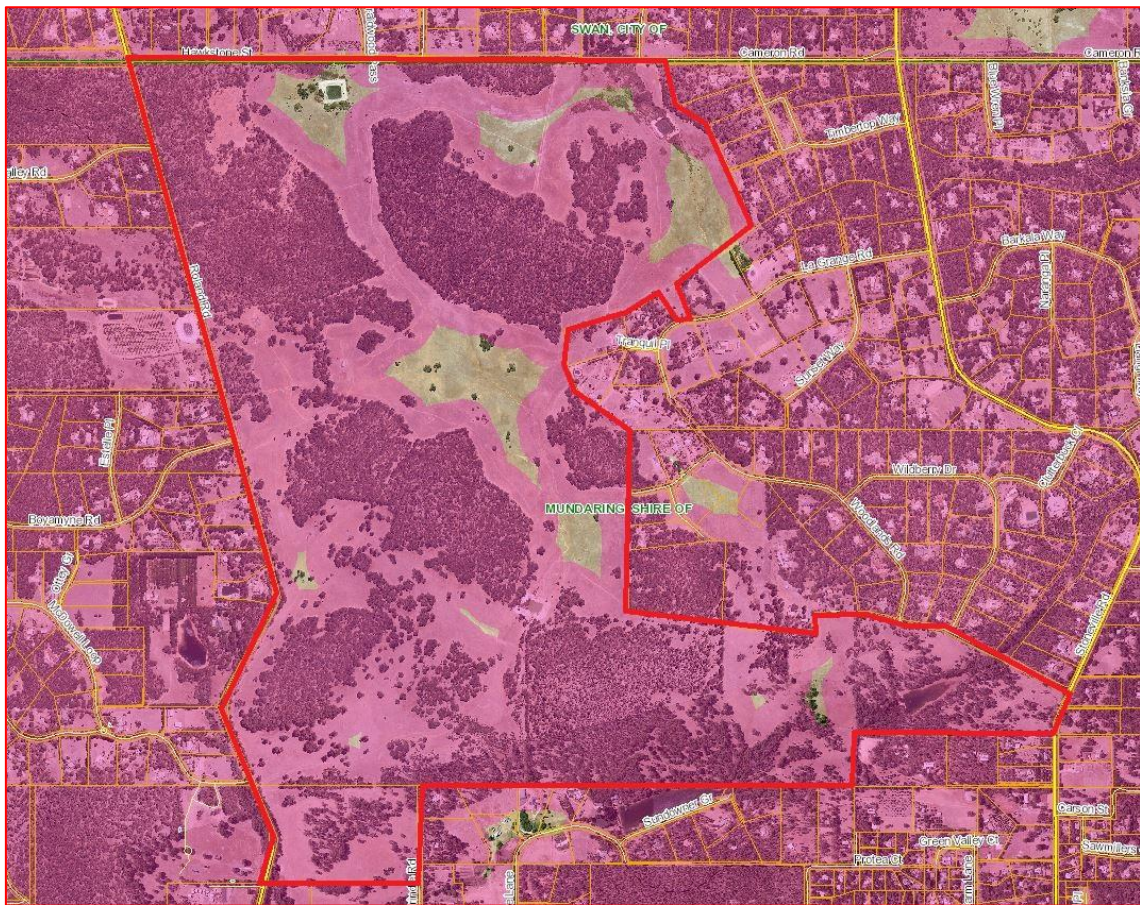


Plate 4: Bush Fire Prone Area mapping

Strategen assessed the bushfire risk to the site through an on-ground assessment of classified vegetation and exclusions within 150 m of proposed development in accordance with *AS 3959—2009 Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2009). The bushfire assessment identified areas of Class A forest, Class D scrub and Class G grassland within 150 m of proposed development resulting in a moderate to extreme bushfire hazard.

A Bushfire Management Plan (BMP) is required to accompany the structure plan application. The Bushfire Management Plan builds upon the 2016 Bushfire Management Plan that was prepared and approved to support the lifting of the Urban Deferred Zone to Urban under the Metropolitan Region Scheme. The Bushfire Management Plan prepared to support the Structure Plan addresses the requirements of *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7), namely Policy Measure 6.3.

4.9 Heritage

4.9.1 Indigenous heritage

The *Aboriginal Heritage Act 1972* protects all Aboriginal heritage sites in Western Australia. Consent is required from the Minister for Aboriginal Affairs for any activity which will negatively impact Aboriginal heritage sites. Where land users conclude that impact to a Site is unavoidable, the consent of the Minister may be sought under section 18 of the Act.

A search of Department of Planning, Lands and Heritage *Aboriginal Heritage Sites* mapping (DPLH 2017) was conducted which identified the following registered Aboriginal Heritage Sites within the site boundary (Figure 9):

- Parkerville 01 (site 15729); registered for artefacts / scatter
- Parkerville 02 (site 15730); registered for artefacts / scatter
- Parkerville 05 (site 15733); registered for artefacts / scatter
- Parkerville Complex (06-08) (site 15734); registered for artefacts / scatter
- Parkerville 12 (site 15738); registered for artefacts / scatter
- Parkerville 14 (site 15740); registered for artefacts / scatter

A number of 'Other Heritage Places' are also mapped within the site boundary, however the status of these sites is 'stored data/ not a site' and therefore these sites do not meet the criteria for protection under Schedule 5 of the Act.

The Aboriginal heritage sites listed above are shown in Figure 9.

4.9.2 European heritage

A search of the Heritage Council of Western Australia *inHerit* database did not identify any European heritage places within the site (HCWA & SHO 2017). The nearest European heritage listed place is 'Hillston Boys' (Place Number: 11519) which is located approximately 720 m west of the site.

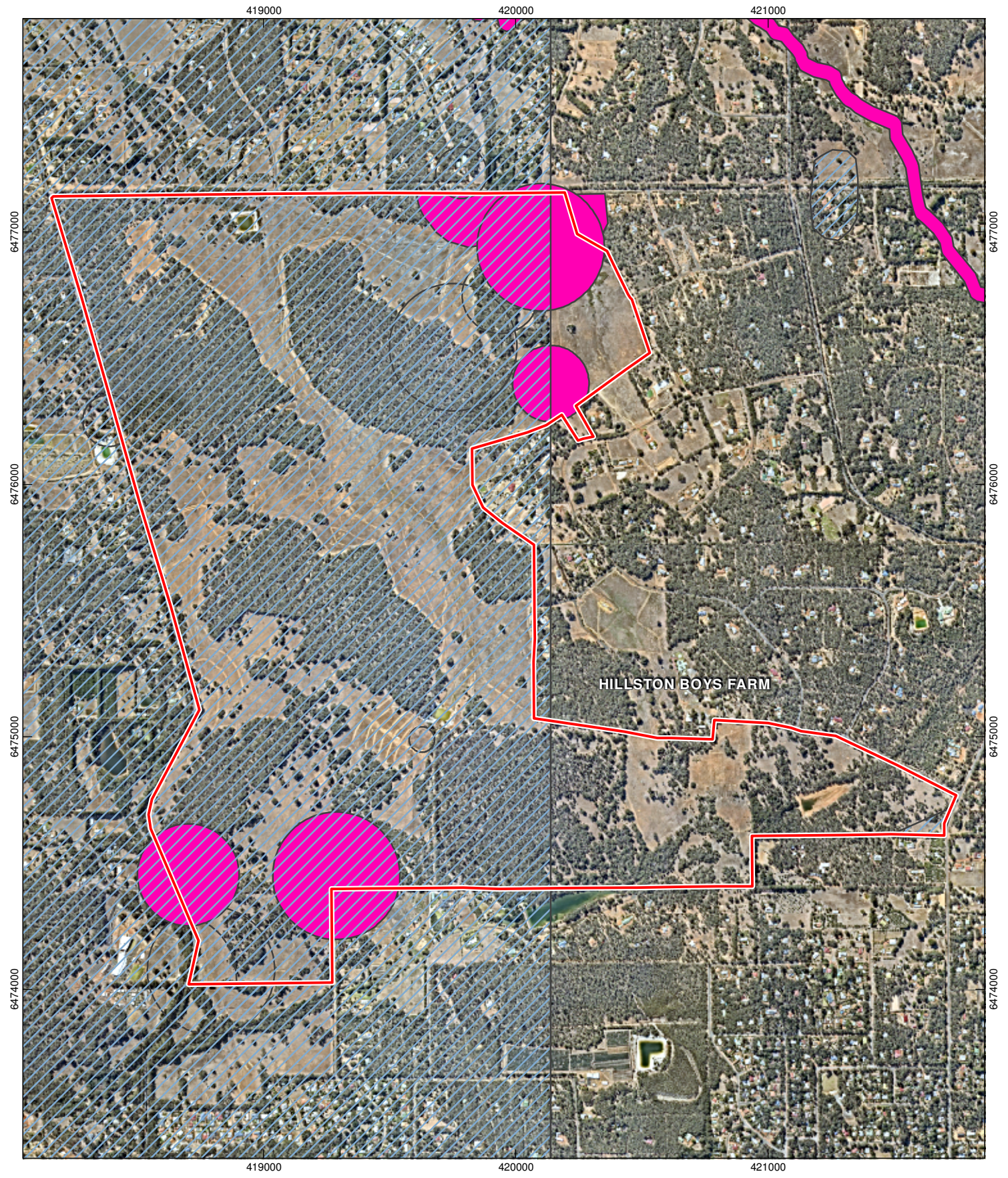


Figure 9: Heritage areas

Scale 1:20,000 at A4

0 250 500 m

Coordinate System: GDA 1994 MGA Zone 50

Date: 9/11/2018

Legend

- Project area
- Aboriginal Heritage Places (DAA-001)
- Registered Site
- Other Heritage Place

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5. Potential impacts, mitigation and management

5.1 Water management

5.1.1 Potential impacts

Without appropriate consideration and management, the development has the potential to impact upon the pre-development hydrological cycle and water quality, including:

- groundwater recharge and aquifer levels
- surface water characteristics
- export of pollutants such as phosphorus and nitrogen to surface or groundwater
- export of pollution from sewerage.

Development design must also take into consideration separation to groundwater to avoid flood damage in developed areas and to prevent erosion of waterways, slopes and banks.

5.1.2 Stormwater management

The environmental assessment identified four streamlines within the site, all of which have had surface water capture dams constructed. The proposed management of the sites pre-development hydrological characteristics, including these hydrological features is detailed in the Local Water Management Strategy (LWMS) prepared by Emerge Associates (2018).

The measures outlined in the LWMS will ensure that the potential impacts associated with the development are managed in accordance with *Better Urban Water Management* (WAPC 2008).

5.1.3 Wastewater management

The site is remote from the existing Water Corporation reticulated sewerage system. As a consequence, onsite wastewater treatment and recycling is proposed. The recycled water will be used to irrigate POS and potentially larger lots, dependent on demand and availability.

A Recycled Water Plant (RWP) and approximately 70 – 90 ML of storage dams will be required to support the treatment and recycling of water. The recycled water collection, treatment and reuse scheme is proposed to be constructed by Satterley and Water West and managed by Water West in perpetuity.

Because there is more recycled water generated across the year than is required for (or can be absorbed by) open space irrigation, an additional mechanism for disposal of this surplus recycled water will need to be implemented; this could be achieved through the delivery of recycled water to a minor proportion of the residential lots or direct disposal to the environment via a constructed wetland or a subsurface irrigation area, or a combination of these mechanisms.

Approvals for the RWP will be sought as the project progresses. This includes approvals from Department of Health (Recycled Water Quality Management Plan), Department of Water and Environment Regulation (Works Approval, Local Water Management Strategy), Shire of Mundaring (Planning Approval) and Economic Regulation Authority (Water Service Providers Licence).

5.2 Vegetation and flora

5.2.1 Potential impacts

While the development has been strategically located to utilise 167.8 ha of Completely Degraded, cleared land, the project will necessitate the clearing of approximately 151 ha of native vegetation (Figure 10) ranging from Very Good - Excellent to Degraded. The development proposes to clear approximately 151 ha of native vegetation. A further 30 ha will be subject to fuel reduction for the purpose of minimising bushfire risk. These areas will retain significant trees at varying densities but will have understorey removed and canopy cover reduced consistent with State bushfire management policy requirements. These areas mostly occur in the proposed rural residential lots and include the Building Envelopes and Asset Protection Zones, but also this treatment will be required in a number of the areas of Public Open Space, creating a parkland cleared environment in which significant trees are retained.

Clearing of native vegetation has the potential to impact upon mapped LNAs and ecological linkages, if not appropriately factored into the development design and future management measures.

Clearing practices have the potential to result in the spread of *Phytophthora cinnamomi* (Dieback) to retained vegetation and vegetation in areas adjacent to the site, if not managed appropriately.

Without appropriate construction management procedures, clearing practices may also result in accidental clearing of vegetation and trees proposed for retention.

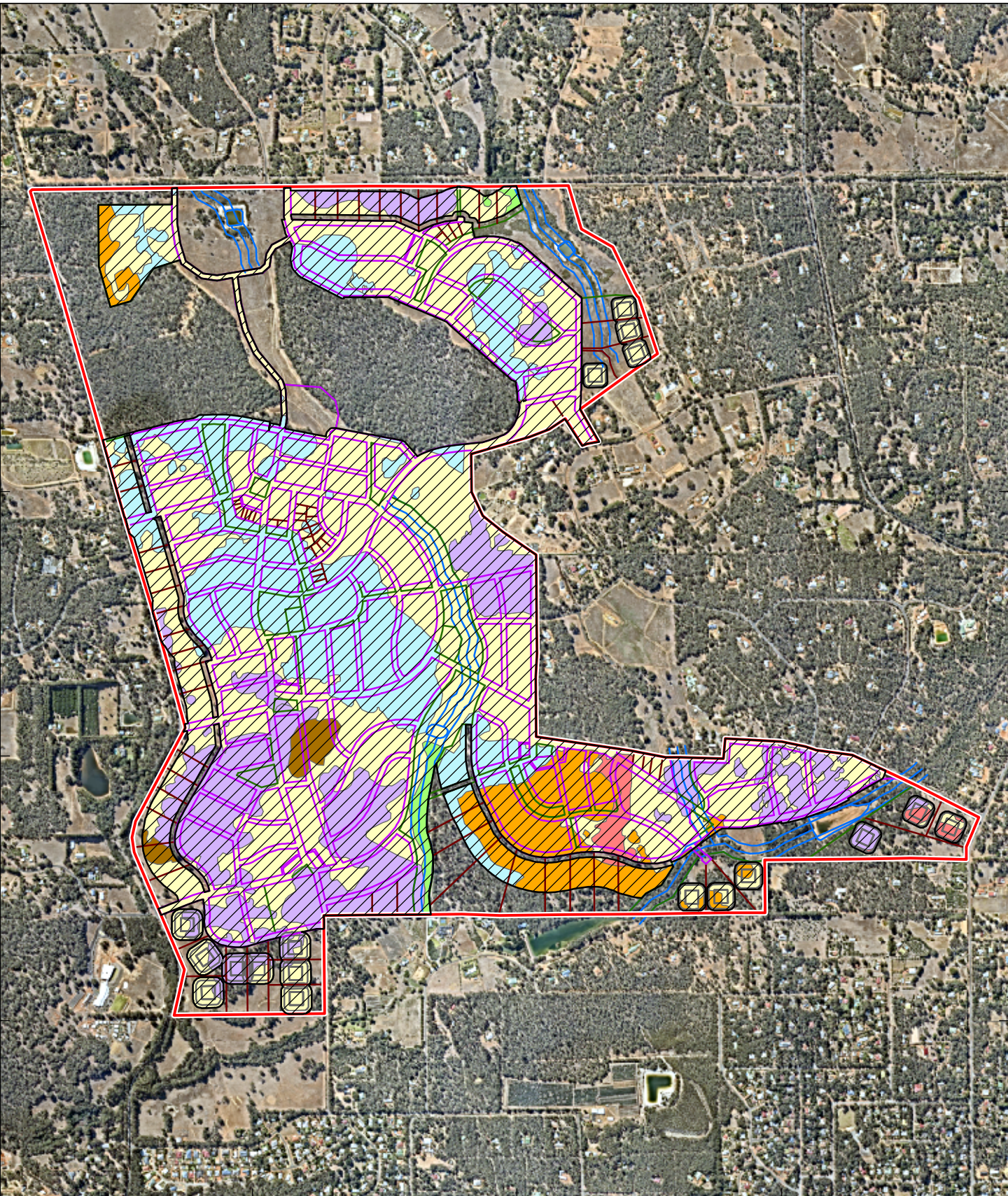
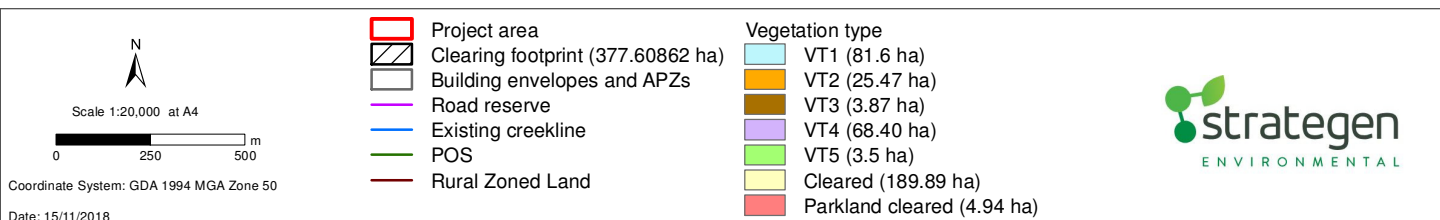


Figure 10: Vegetation type and clearing footprint



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5.2.2 Mitigation and management

Vegetation retention

The development has been strategically located to ensure that vegetation of greater quality is retained within conservation POS in the northern part of the site, and urban areas are concentrated in parts of the site which are predominantly 'Completely Degraded'. For example, of the area to be developed, approximately 53% is in Completely Degraded condition and 6% is in Very Good - Excellent condition.

A Conservation Area of approximately 100 ha will protect approximately 90 ha of the highest quality vegetation on the site (71 % of the Very Good – Excellent and 100% of Good – Very Good condition). The Conservation area will also provide the opportunity for both rehabilitation of vegetation and recreation pursuits.

In addition to the retention vegetation within conservation POS, the development design includes approximately 45 ha of POS which provides opportunity for the retention of vegetation and trees, where engineering and bushfire constraints permit.

It is anticipated that rehabilitation of the north-south drainage corridor (POS), which in addition to the retention of vegetation within conservation POS will contribute to maintaining both an east-west and north-south ecological linkage across the site. Rehabilitation of the drainage corridors within the site will enhance their ecological value and improve water quality, particularly where these areas are completely degraded due to historical clearing.

A Conservation Area Management Plan (or equivalent) for vegetation to be conserved within the POS will be developed in through the subsequent planning process. The aim of the plan will be to:

- incorporate a Landscape Plan to specify area where vegetation is retained or planted
- ensure the protection and management of the sites environmental assets (i.e. native vegetation and habitat)
- ensure that best practice management is employed during the clearing stage of development, to minimise impact to retained vegetation (including accidental clearing)
- identification and implementation of management measures i.e. dieback and weed hygiene, controlled access (pathways and fencing/bollards).

Dieback management

There are several potential pathways for dieback to be introduced or spread throughout the site and potentially to retained or adjacent vegetation. Management of these pathways should be a consideration at future planning stages to ensure mitigating the potential introduction and spread of dieback and particularly to protect vegetation within the conservation POS. Management measures can include methods such as establishing 'clean on entry' points during construction.

Clearing controls

Clearing of vegetation will be subject to general construction management practices, to be determined at future planning stages. For example, to ensure that vegetation proposed to be retained is not accidentally cleared or damaged, areas of retention should be clearly demarcated and all clearing contractors inducted accordingly.

Bushfire management provisions

While clearing of vegetation is required in order for the development to achieve compliance with SPP3.7 and the Guidelines, the BMP has included several measures to reduce the impact on vegetation where possible. These measures include:

- construction of dwellings to an increased (but compliant) BAL rating to minimise the extent of clearing required

- allowing for retention of vegetation in 'natural living' lots where this vegetation is able to qualify for an exemption under Clause 2.2.3.2 of AS3959, or does not pose a bushfire risk to future buildings
- allowing for retention of trees (15% canopy coverage) within asset protection zones in accordance with the requirements of the Guidelines.

5.3 Fauna habitat

5.3.1 Potential impacts

The proposed development will necessitate clearing of fauna habitat to facilitate the construction of future buildings and public roads, as well as limited clearing for bushfire hazard management. With the exception of these areas, all remnant vegetation is proposed to be retained including approximately 90 ha within the 100 ha Conservation Area in the north of the site.

The proposed removal of vegetation may result in a reduction of habitat available for conservation significant species potentially occurring within the project area including:

- Black Cockatoos (Carnaby's cockatoo, Baudin's cockatoo and Forest red-tailed black cockatoo; see Figure 11)
- Chuditch/ Western Quoll (*Dasyurus geoffroyi*)
- Brush-tailed Phascogale (*Phascogale tapoatafa*)
- Carter's Freshwater Mussel (*Westralunio carteri*)
- Quenda/ southwestern brown bandicoot (*Isodon fusciventer*)
- Blue-billed duck (*Oxyura australis*)
- Peregrine Falcon (*Falco peregrinus*)

In addition to the conservation significant fauna listed above, there is a large resident population of Western Grey Kangaroos within the site which will require consideration during clearing and development of the site to minimise vehicle strikes and ensure that the species can naturally disperse to the conservation POS and surrounding areas.

Whilst the site will remain within the home range of the Wedge Tailed Eagles, it is understood that the increased use of the site by people is ultimately likely to cause the cessation of the utilisation of the site for breeding purposes. At least of one the known nesting sites on the property will be retained in the 100 ha Conservation area, however, as the site becomes increasingly developed over a 10 to 15 year period, the presence of human activity is likely to cause the breeding pair currently using the site to utilise their alternative breeding sites within the home range such as John Forest National Park. The site, particularly the 100 ha Conservation Area will remain available to Wedge Tailed Eagles for hunting purposes and may be used for breeding purposes for many years, depending on development timeframes.

5.3.2 Mitigation and management

The potential impacts to these species can be mitigated through the following measures and recommendations:

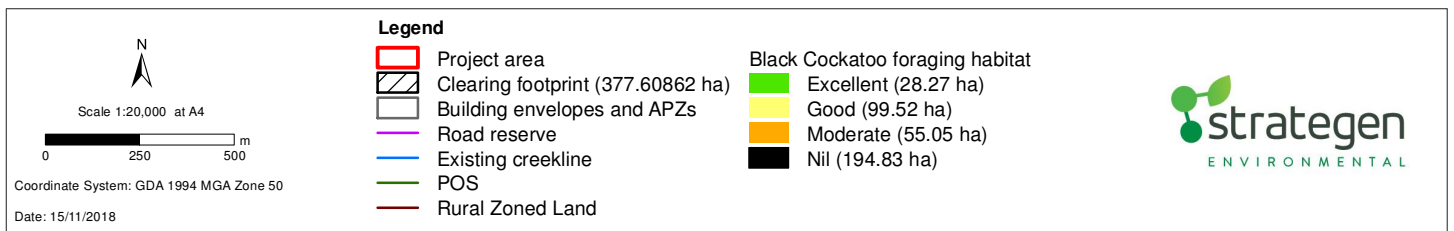
- the retention of approximately 90 ha of vegetation within the 100 ha Conservation Area in the north of the site, which will allow the continuation of ecological linkages for mobile fauna in accordance with the objectives of the Shire of Mundaring *Local Biodiversity Strategy 2009* and *Wildlife Corridor Strategy 2000*
- concentrating urban lots and public roads in the degraded portions of the site
- the retention of vegetation and black cockatoo habitat trees within POS and road reserves, and within APZs where this can be achieved in accordance with Schedule 1 of the *Guidelines for Planning in Bushfire Prone Areas* (up to 15% canopy cover)
- planting of habitat trees and landscaping within POS and creek-line corridors, with species that provide habitat for conservation significant fauna (noting that the creek-line corridors are currently highly devoid of vegetation)

- pre-clearing inspections for native fauna of conservation significance including black cockatoo habitat trees and potential nesting hollows, as well as any suitable den logs and den sites for the Chuditch
- clearing protocols including clearing toward areas of vegetation/ habitat for fauna species to allow them to naturally disperse into the surrounding area
- relocation of logs providing potentially suitable den habitat for the Chuditch into vegetation retention areas within the project area
- erection of 'wildlife crossing' signage along proposed roads to prevent vehicle strikes particularly for Western Grey Kangaroos.

5.3.3 EPBC Act referral

As part of the approvals process for the development, a referral will be submitted to the Department of Environment and Energy for impacts to matters of national environmental significance (MNES). As part of this process the proponent will be required to mitigate or offset these impacts to the satisfaction of DEE which will include retention of conservation POS on site, and will likely include additional offset requirements.

Figure 11: Black Cockatoo foraging habitat and clearing footprint



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5.4 Bushfire management

As a result of the bushfire prone status of the site, a Bushfire Management Plan (BMP) is required to accompany the structure plan application to address the following requirements of *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7), namely Policy Measure 6.3:

- a bushfire hazard level (BHL) assessment or where lot layout is known, a Bushfire Attack Level (BAL) contour assessment to determine the indicative acceptable BAL ratings across the site
- identification of any bushfire hazard issues arising from the above assessment
- assessment against the bushfire protection criteria requirements contained within the Guidelines demonstrating compliance can be achieved in subsequent planning stages.

The BMP is required to be prepared in accordance with *Guidelines for Planning in Bushfire Prone Areas* (the Guidelines). A BMP has been prepared to support the structure plan which details how the development will achieve compliance with the requirements of SPP3.7 and the Guidelines, and importantly manage the bushfire risk to future residents.

5.5 Heritage

Six registered indigenous heritage sites are known to occur within the site. An application was submitted in 1998 pursuant to Section 18 of the *Aboriginal Heritage Act 1972* to use the land for residential subdivision, and was approved subject to a number of conditions set out by the Minister. The prescribed conditions include:

- preserving tributaries of Jane and Susannah Brooks in POS where possible, and the establishment of a 30 m buffer zone along their banks
- implementing strategies to ensure that pollutants do not enter watercourses in the survey area
- reintroducing native vegetation around the watercourses in POS
- protecting sites within 'Parkerville Site Complex 1' in POS, and site 'Parkerville 5' in POS if practicable
- involving the Aboriginal community in landscaping activities and accepting guidance of a qualified archaeologist with a Section 16 permit
- considering requests of the Aboriginal consultants for recognition of the former use of the area.

Development of the site will be in accordance with the prescribed conditions and in accordance with the *Aboriginal Heritage Due Diligence Guidelines* (DAA 2013).

6. Conclusion

The EAR determined that the site is relatively unconstrained with the exception of vegetation and fauna habitat, and the presence of Aboriginal heritage sites. It is considered that any potential impacts associated with the factors identified above can be appropriately mitigated, managed or offset through the State planning process, through assessment under the EPBC Act and through the existing Section 18 approval under the *Aboriginal Heritage Act 1972*.

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Appendix 1
Flora, vegetation and fauna survey



intelligent outcomes | respected experience

Lot 48 Stoneville Road and Lot 1 Roland Road, Stoneville

Flora, vegetation and fauna survey

Prepared for
Satterley Property Group
by Strategen

December 2018

Lot 48 Stoneville Road and Lot 1 Roland Road, Stoneville

Flora, vegetation and fauna survey

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December 2018

Limitations

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Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

Client: Satterley Property Group

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- Appendix 2 Flora Desktop Assessment Results
- Appendix 3 Black Cockatoo Distribution Maps
- Appendix 4 Quadrat data and site photographs
- Appendix 5 Vascular plant taxa recorded from quadrats within the survey area
- Appendix 6 Fauna habitat assessment sheets

1. Introduction

1.1 Background

Satterley Property Group (Satterley) is preparing a Structure Plan (SP) to support the development of Lot 48 Stoneville Road and Lot 1 Roland Road, Stoneville (the survey area, Figure 1). The survey area is approximately 555 ha in area and is located approximately 29 km north-east of the Perth Central Business District.

In November 2016, a preliminary flora and vegetation assessment and Black Cockatoo (all three species that occur in the south-west of WA) and Chuditch (*Dasyurus geoffroii*) habitat assessment (2016 survey) was undertaken by Strategen in areas proposed for development at that time.

The balance of the site was subsequently surveyed and a detailed flora and vegetation survey, and Black Cockatoo, Chuditch and Brush-tailed Phascogale (*Phascogale tapoatafa*) habitat assessment (2017 survey) in areas not assessed by Strategen in 2016 was undertaken on 22 November 2017. These areas are outside of the Urban Precincts, and are proposed for Rural Residential development, infrastructure or open space. This survey completes the evaluation of the ecological values that are proposed to be impacted and retained.

This report presents the combined findings of the 2016 and 2017 surveys.

1.2 Scope

The scope of this flora and vegetation survey and Black Cockatoo and preliminary Chuditch and Brush-tailed Phascogale habitat assessment was to undertake a desktop assessment and field assessment in the survey area.

The objectives were to:

- conduct a desktop survey for Threatened and Priority flora which have been identified as being present in or around the survey area
- collect and identify the vascular plant species present within the survey area
- search areas of suitable habitat for Threatened and/or Priority flora
- define and map the native vegetation communities present within the survey area
- map vegetation condition within the survey area
- provide recommendations on the local and regional significance of the vegetation communities
- assess Black Cockatoo, Chuditch and Brush-tailed Phascogale habitat in areas of (11 discrete patches for the fauna component of this work)
- prepare a report summarising the findings.

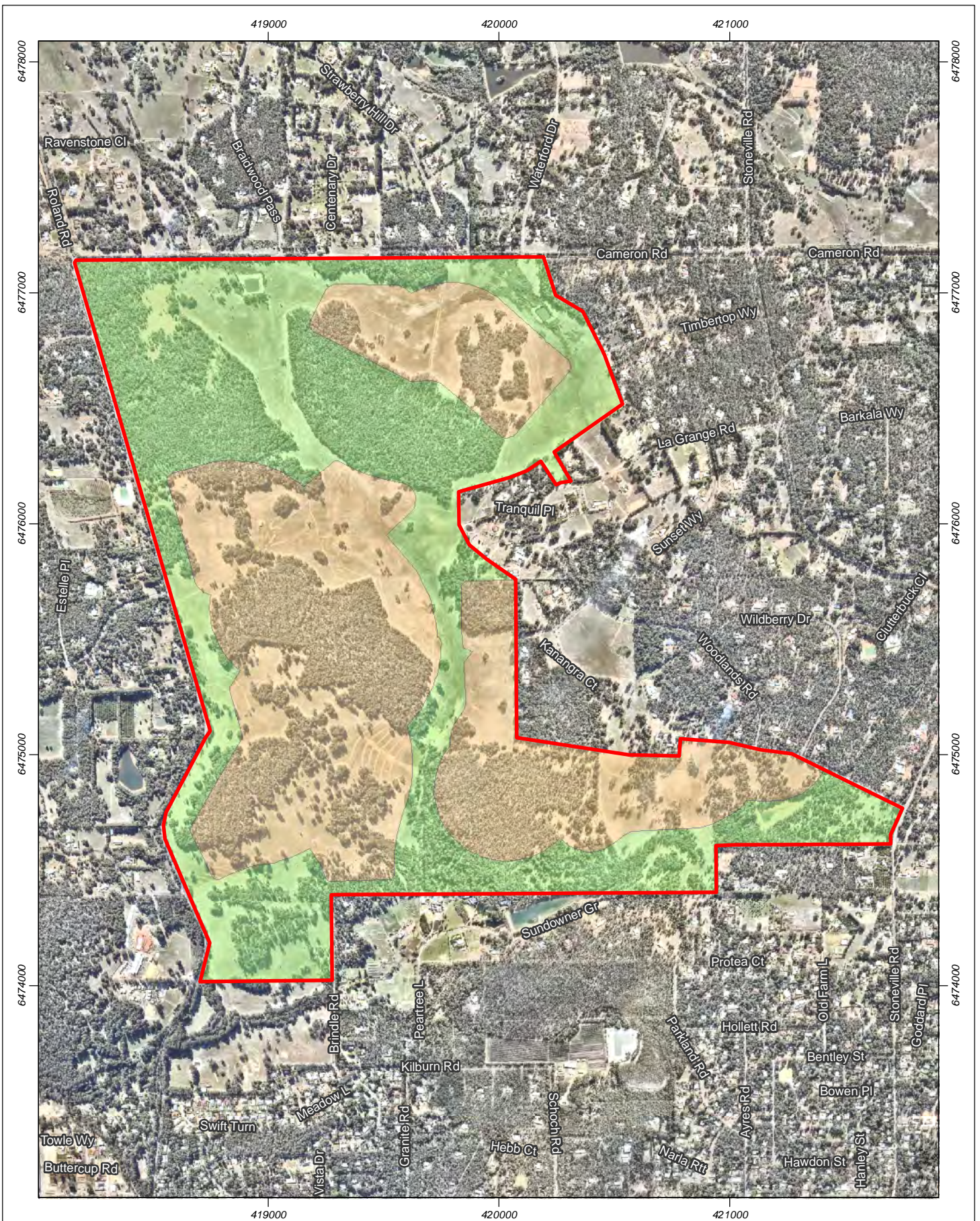


Figure 1: Survey Area

Scale 1:22,000 at A4



Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 7/12/2018
 Author: DWhite
 Source: Aerial image: Nearmap, flown 06/2017. Roads: Main Roads 2012.

Legend

- Survey area
- 2016 survey
- 2017 survey



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Under the EPBC Act, a person must not undertake an action that has or will have a significant impact on a listed TEC without approval from the Australian Government Minister for the Environment, unless those actions are not prohibited under the EPBC Act. A description of each of these categories of TECs is presented in Appendix 1. The current EPBC Act list of TECs can be located on the DEE (2018e) website.

Ecological communities identified as Threatened, but not listed as TECs, are classified as Priority Ecological Communities (PECs). These communities are under threat, but there is insufficient information available concerning their distribution to make a proper evaluation of their conservation status. Parks and Wildlife categorises PECs according to their conservation priority, using five categories, P1 (highest conservation significance) to P5 (lowest conservation significance), to denote the conservation priority status of such ecological communities. Appendix 1 defines PECs (DEC 2013). Parks and Wildlife (2017) contains a list of current PECs.

2.1.2 Protection of native vegetation

Native vegetation is defined under the EP Act as “indigenous aquatic or terrestrial vegetation, and includes dead vegetation unless that dead vegetation is of a class declared by regulation to be excluded from this definition but does not include vegetation in a plantation”.

This definition of native vegetation does not include vegetation that was intentionally sown, planted or propagated unless either of the following applies:

- (a) the vegetation was sown, planted or propagated as required under the EP Act or another written law
- (b) the vegetation is declared to be native under Regulation 4 of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

Regulation 4 prescribes the kinds of intentionally planted indigenous vegetation that are “native vegetation” and which therefore require a clearing permit or exemption to clear and includes:

- (a) planting that was funded (fully or partly)
 - i. by a person who was not the owner of the land
 - ii. for the purpose of biodiversity conservation or land conservation
- (b) intentionally planted vegetation that has one of the following:
 - i. a conservation covenant or agreement to reserve under section 30B of the *Soil and Land Conservation Act 1945*
 - ii. a covenant to conserve under section 21A of the *National Trust of Australia (WA) Act 1964*
 - iii. restrictive covenant to conserve under section 129B of the *Transfer of Land Act 1983*
 - iv. some other form of binding or undertaking to establish and maintain, or maintain, the vegetation.

Native vegetation can only be cleared with a clearing permit, unless for some circumstances where exemptions apply pursuant to the EP Act and the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (the Regulations). Clearing permits issued pursuant to the Regulations may be issued as area permits or purpose permits. Exemptions for clearing under Regulation 5 of the Regulations do not apply within ESAs.

2.1.3 Fauna

Species of fauna are defined as Threatened where their populations are under threat, require protection or are protected under an international agreement. Parks and Wildlife recognises these threats of extinction and consequently applies regulations towards population and species protection.

Threatened fauna species are protected under section 16 of the WC Act. Under the Act, it is an offence to “take, destroy or possess” Threatened fauna without Ministerial approval.

Threatened fauna (Schedule 1) are further ranked by Parks and Wildlife according to their threat using International Union for Conservation of Nature (IUCN) Red List criteria that are described as follows:

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

2. Context

2.1 Legislative context

This biological survey has been conducted with reference to the following Australian and Western Australian legislation:

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

2.1.1 Conservation significant flora and ecological communities

Conservation significant flora and ecological communities are determined at a state and federal legislative level.

Flora within Western Australia that is considered to be under threat may be classed as either Threatened flora or Priority flora. Where flora has been gazetted as Threatened flora under the WC Act, the taking of such flora without the written consent of the Minister is an offence. The WC Act defines “to take” flora as to gather, pluck, cut, pull up, destroy, dig up, remove or injure the flora or to cause or permit the same to be done by any means. The Department of Biodiversity, Conservation and Attractions (DBCA) (2017a) contains the current list of Threatened flora in Western Australia.

Priority flora are considered to be species which are potentially under threat, but for which there is insufficient information available concerning their distribution and/or populations to make a proper evaluation of their conservation status. Parks and Wildlife categorises Priority flora according to their conservation priority using five categories, P1 (highest conservation significance) to P5 (lowest conservation significance), to denote the conservation priority status of such species. Priority flora species are regularly reviewed and may have their priority status changed when more information on the species becomes available. Appendix 1 defines levels of Threatened and Priority flora (Western Australian Herbarium 1998-).

At the national level, the EPBC Act lists Threatened species as extinct, extinct in the wild, critically endangered, endangered, vulnerable, or conservation dependent. Appendix 1 defines each of these categories of Threatened species. The EPBC Act prohibits an action that has or will have a significant impact on a listed Threatened species without approval from the Australian Government Minister for the Environment. The current EPBC Act list of Threatened flora may be found on the DEE (2018d) website.

Threatened Ecological Communities (TECs) are listed under both the EPBC Act and EP Act (Appendix 1). Priority Ecological Communities (PECs) are listed by Parks and Wildlife and include species of significant conservation value (Appendix 1).

A TEC is defined under the EP Act as an ecological community listed, designated or declared under a written law or a law of the Australian Government as Threatened, Endangered or Vulnerable. There are four State categories of TECs (DEC 2013):

- presumed totally destroyed (PD)
- critically endangered (CR)
- endangered (EN)
- vulnerable (VU).

A description of each of these TEC categories is presented in Appendix 1. TECs are gazetted as such (Parks and Wildlife 2016) and some Western Australian TECs listed by Parks and Wildlife (2016) are also listed as Threatened under the EPBC Act.

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

Priority fauna not listed as Threatened (Scheduled) under the WC Act, but are poorly known or poorly represented in the conservation estate are regarded as Priority and attention is given to their conservation by Parks and Wildlife.

Threats of extinction of fauna species are also recognised at a Commonwealth level and are categorised according to the EPBC Act, administered by Department of the Environment and Energy (DEE).

Migratory species are MNES under the EPBC Act. Migratory species are defined as animals that migrate to Australia and its external territories, or pass through or over Australian waters during their annual migrations. Recognised migratory species include any native species identified in an international agreement approved by the Minister and those listed under:

- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
- China-Australia Migratory Bird Agreement (CAMBA)
- Japan-Australia Migratory Bird Agreement (JAMBA)
- Republic of Korea – Australia Migratory Bird Agreement (ROKAMBA).

2.1.4 Introduced species

The BAM Act provides for management and control of listed organisms, including introduced flora species (weeds). Species listed as declared pests under the BAM Act are classified under three categories:

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

Under the BAM Act, land managers are required to manage populations of declared pests as outlined under the relevant category.

2.2 Environmental setting

2.2.1 Soils and topography

The survey area is located within the Northern Jarrah Forest bioregion, which is characterised by Jarrah-Marri forest on laterite gravels and, in the eastern part, by woodlands of Wandoo - Marri on clayey soils. Eluvial and alluvial deposits support *Agonis* shrublands. In areas of Mesozoic sediments, Jarrah forests occur in a mosaic with a variety of species-rich shrublands. The climate is Warm Mediterranean (Williams & Mitchell 2001).

2.2.2 Climate

The Stoneville locality experiences a Mediterranean climate characterised by mild, wet winters and warm to hot, dry summers. The nearest Bureau of Meteorology (BoM) weather station at Bickley (Station No. 009240) provides average monthly climate statistics for the locality (Figure 2). Average annual rainfall recorded at Bickley since 1969 is 1088.4 mm (BoM 2018). Rainfall may occur at any time of year; however, most occurs in winter in association with cold fronts from the southwest. Highest temperatures occur between January and February, with average monthly maximums ranging from 15.1°C in July to 30.6°C in January (BoM 2018). Lowest temperatures occur between June and August, with average monthly minimums ranging from 7.2°C in July to 15.8°C in February (BoM 2018).

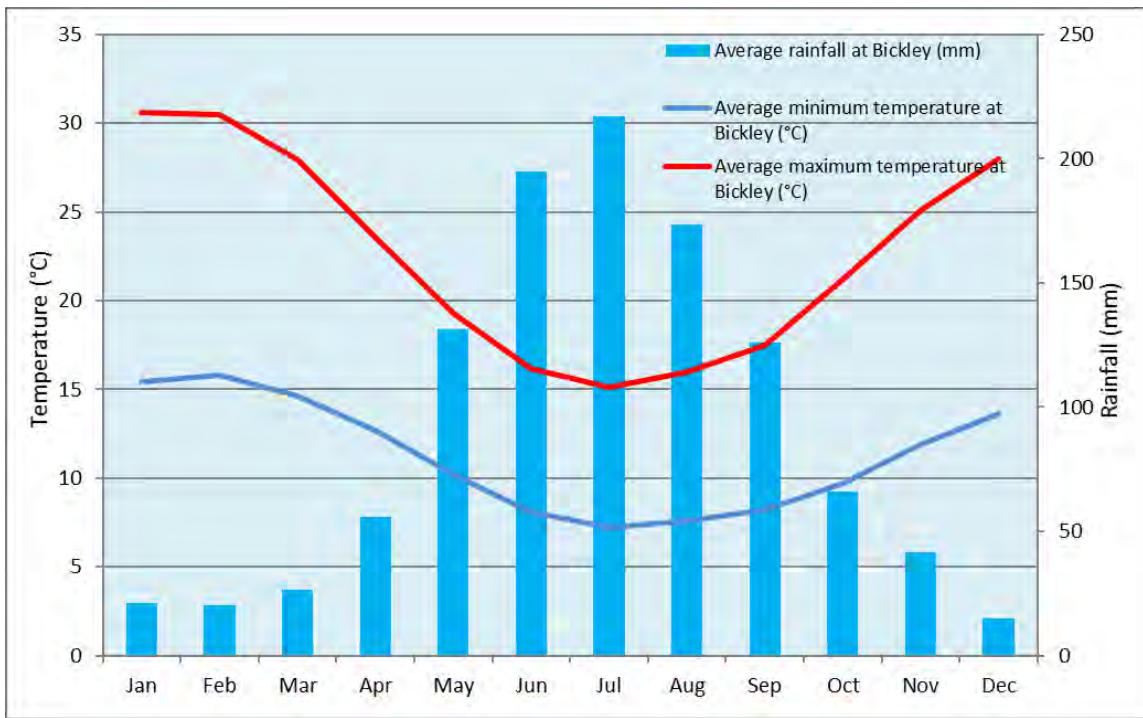


Figure 2: Mean monthly climatic data (temperature and rainfall) for Bickley

2.2.3 Regional vegetation

Vegetation occurring within the region was initially mapped at a broad scale (1:1 000 000) by Beard during the 1970s. This dataset has formed the basis of several regional mapping systems, including physiographic regions defined by Beard (1981) which led to the delineation of botanical districts as described in Beard (1990); the biogeographical region dataset (Interim Biogeographic Regionalisation for Australia, IBRA) for Western Australia (DEE 2018a) and System 6 Vegetation Complex mapping undertaken by Hedde et al. (1980).

Beard (1990) Botanical Subdistrict

The survey area occurs within the Dale Botanical Subdistrict, characterised by Jarrah forest on ironstone gravels and Marri-Wandoo woodland on loamy soils, with sclerophyllous understoreys (Beard 1990).

IBRA subregion

IBRA describes a system of 85 'biogeographic regions' (bioregions) and 403 subregions covering the entirety of the Australian continent (Thackway & Cresswell 1995). Bioregions are defined on the basis of climate, geology, landforms, vegetation and fauna.

The survey area occurs within the Jarrah Forest 1 IBRA subregion which is characterised by vegetation comprising Jarrah - Marri forest in the west with Bullich and Blackbutt in the valleys grading to Wandoo and Marri woodlands in the east with Powderbark on breakaways. Banksia low woodlands occur on sandy soils and heath is found on granite rocks and as a common understorey of forests and woodlands in the north and east. Granite soils and lower slopes in this subregion can host highly diverse suites of species, due to rapid changes in site conditions near granite soils where there are rapid changes in site conditions (Williams and Mitchell 2001).

Vegetation system association and vegetation complex mapping

Vegetation occurring within the region was initially mapped at a broad scale (1: 1 000 000) by Beard during the 1970s. This dataset formed the basis of several regional mapping systems, including the biogeographical region dataset (Interim Biogeographic Regionalisation for Australia) for Western Australia (DEE 2017a), physiographic regions defined by Beard (1981), and Vegetation Complex mapping undertaken by Mattiske and Havel (1998).

The project area comprises one Beard (1981) vegetation system association, West Darling 3 (medium forest; jarrah-marri), of which 86 % remains in the IBRA bioregion (GoWA 2018a).

Based on regional vegetation complex mapping (Mattiske and Havel 1998) the project area comprises two vegetation complexes (Table 1, Figure 3). Both complexes have greater than 80% of their original extent remaining in the IBRA bioregion (GoWA 2018b).

Table 1: Vegetation complexes within the project area

Vegetation Complex	Description	Percent remaining in IBRA Region
Dwellingup Complex	Open forest of <i>Eucalyptus marginata</i> subsp. <i>marginata</i> - <i>Corymbia calophylla</i> on lateritic uplands in mainly humid and subhumid zones	85.79
Yarragil 1 Complex	Open forest of <i>Eucalyptus marginata</i> subsp. <i>marginata</i> - <i>Corymbia calophylla</i> on slopes with mixtures of <i>Eucalyptus patens</i> and <i>Eucalyptus megacarpa</i> on the valley floors in humid and subhumid zones	81.02

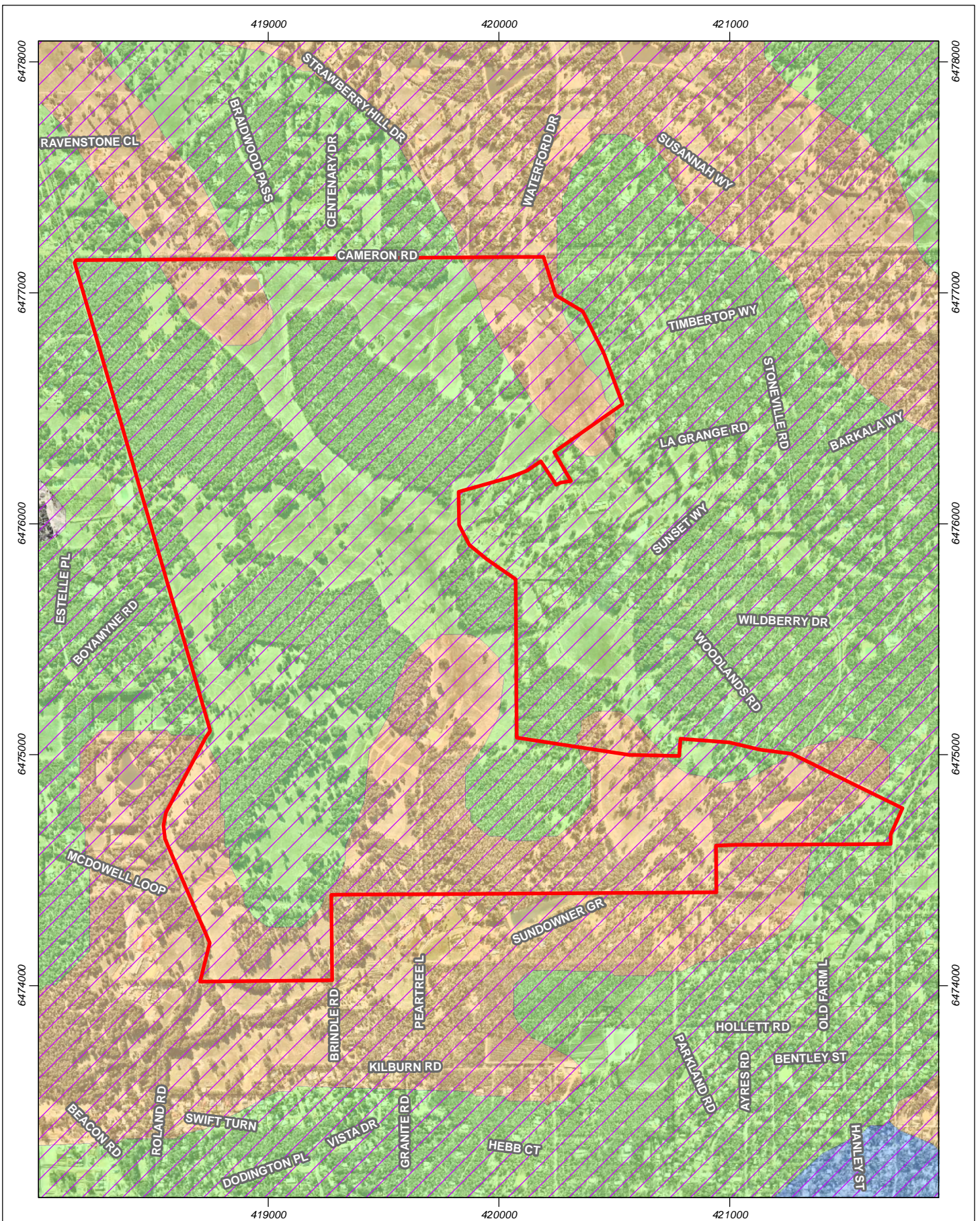


Figure 3: Regional vegetation mapping

Scale 1:22,000 at A4



Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 7/12/2018
 Author: DWhite
 Source: Aerial image: Nearmap, flown 06/2017. Roads: Main Roads 2012.

Legend

Survey area

Vegetation system association (Beard)

WEST DARLING_3

Vegetation class (Hedde et al)

Dwellingup complex in medium to high rainfall

Murray and bindoon complex in low to medium rainfall

Yarragil complex (minimum development swamps) in medium to h



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3. Methods

3.1 Flora and vegetation

3.1.1 Desktop assessment

A desktop assessment was conducted using FloraBase, Parks and Wildlife, and Department of the Environment and Energy (DEE) databases to identify the possible occurrence of TECs, PECs and Threatened and Priority flora potentially occurring within the survey area (Appendix 2). Reports that document regional flora, vegetation and fauna within the surrounds of the survey area were also reviewed prior to the field assessment.

A database search request was also submitted to the Threatened Communities Branch of Parks and Wildlife to identify any potential TECs or PECs within 5 km of the survey area.

3.1.2 Field assessment

The field survey was conducted according to standards set out in the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016). A Senior Ecologist undertook the vegetation assessment conducted in 2016 and 2017. Table 2 identifies staff involved in the field surveys, their role and qualifications.

Table 2: Personnel

Name	Role
T. Sleight Senior Ecologist	Planning, fieldwork, plant identification, data interpretation and report preparation
D. Panickar Senior Ecologist	Planning, fieldwork, plant identification, data interpretation and report preparation
R. Chesney Senior Ecologist	Report preparation

The survey area was traversed on foot to record changes in vegetation structure and type. Eight vegetation quadrats were surveyed in the 2016 survey and twenty-one vegetation quadrats were surveyed in the 2017 survey to identify vegetation types. Site selection for vegetation mapping was determined from aerial photographs and based on differences in structure and species composition of the communities present within the survey area.

Flora and vegetation was described and sampled systematically at each quadrat and additional opportunistic collecting was undertaken wherever previously unrecorded plants were observed. At each site the following floristic and environmental parameters were noted:

- GPS location
- topography
- soil type and colour
- outcropping rocks and their type
- percentage cover and average height of each vegetation stratum.

For each vascular plant species, the average height, number of plants and percent cover were recorded.

All plant specimens collected during the field surveys were identified using appropriate reference material or through comparisons with pressed specimens housed at the Western Australian Herbarium where necessary. Nomenclature of the species recorded is in accordance with Western Australian Herbarium (1998-).

3.1.3 Data analysis and vegetation mapping

Quadrat data were grouped into a species by site matrix to delineate individual vegetation types (VTs) present within the survey area. Aerial photography interpretation and field notes taken during the survey were then used to develop VT mapping polygon boundaries over the survey area. These polygon boundaries were then digitised using Geographic Information System (GIS) software.

VT descriptions (though floristic in origin) have been adapted from the National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual Version 6.0 (ESCAVI 2003), a system of describing structural vegetation units (based on dominant taxa). This model follows nationally-agreed guidelines to describe and represent vegetation types, so that comparable and consistent data is produced nation-wide. For the purposes of this report, a VT is considered equivalent to a NVIS sub-association as described in ESCAVI (2003).

Vegetation condition was recorded at all quadrats, and also opportunistically within the survey area during the field assessment where required. Vegetation condition was described using the vegetation condition scale for the South West Botanical Province (Keighery 1994). Vegetation condition polygon boundaries were developed using this information in conjunction with aerial photography interpretation, and were digitised as for vegetation type mapping polygon boundaries.

3.1.4 Survey limitations and constraints

Table 3 displays the evaluation of the flora and vegetation assessment against a range of potential limitations that may have an effect on that assessment. Based on this evaluation, the assessment has not been subject to constraints that would affect the thoroughness of the assessment and the conclusions reached.

Table 3: Flora and vegetation survey potential limitations and constraints

Potential limitation	Impact on assessment	Comment
Sources of information and availability of contextual information (i.e. pre-existing background versus new material).	Not a constraint.	The survey has been undertaken in the Dale Botanical Subdistrict in the Jarrah Forest bioregion which has been well studied and documented with ample literature available (Beard 1990).
Scope (i.e. what life forms, etc., were sampled).	Not a constraint.	Due to the degraded nature and uniform distribution of vegetation within the survey area and timing of the survey (i.e. spring); most life forms are likely to have been sampled adequately during the time of the survey.
Proportion of flora/fauna collected and identified (based on sampling, timing and intensity).	Not a constraint.	The proportion of flora surveyed was adequate. The entire survey area was traversed and flora species were recorded systematically.
Completeness and further work which might be needed (i.e. was the relevant survey area fully surveyed).	Not a constraint.	The information collected during the survey was sufficient to assess the vegetation that was present during the time of the survey.
Mapping reliability.	Not a constraint.	Aerial photography of a suitable scale was used to map the survey area and identify potential fauna habitat. Sites were chosen from these aerials to reflect changes in community structure. Opportunistic sites were also used if differences were observed during on ground reconnaissance. Vegetation types were assigned to each site based on topography, soil type and presence/absence and percent foliage cover of vegetation.
Timing, weather, season, cycle.	Not a constraint.	Flora and vegetation surveys are normally conducted following winter rainfall in the South-West Province, ideally during spring (EPA 2004). The field assessment was conducted in November (i.e. spring), in the 2016 and 2017 survey in fine weather conditions and therefore these factors are not deemed to be constraints.
Disturbances (fire flood, accidental human intervention, etc.).	Not a constraint.	The survey area and regional surrounds have been subject to disturbance over a significant period of time. Given the wide range of this disturbance, this is not considered to be a limitation within the survey area.
Intensity (in retrospect, was the intensity adequate).	Not a constraint.	The survey area was traversed on foot and all differences in vegetation structure were recorded appropriately.
Resources (i.e. were there adequate resources to complete the survey to the required standard).	Not a constraint.	The available resources were adequate to complete the survey.
Access problems (i.e. ability to access survey area).	Not a constraint.	Existing tracks enabled adequate access to survey the vegetation and fauna within the survey area. Where access was not available by car, the area was easily traversed by foot.
Experience levels (e.g. degree of expertise in species identification to taxon level).	Not a constraint.	All survey personnel have the appropriate training in sampling and identifying the flora of the region.

3.2 Fauna habitat assessment

The fauna habitat assessment focussed on the three Black Cockatoo species: Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) both listed as Endangered under the EPBC Act and the Forest Red-tailed Black Cockatoo (FRTBC) (*Calyptorhynchus banksii naso*) which is classed as Vulnerable under the EPBC Act. These three species have known distributions that include the survey area (Appendix 3).

The survey area was also assessed for potential habitat for the Chuditch (*Dasyurus geoffroi*) and the Brush-tailed Phascogale (*Phascogale tapoatafa*).

3.2.1 Black Cockatoo habitat assessment

The Black Cockatoo habitat assessment was undertaken on 8 and 9 November 2016 by a Strategen Ecologist (2016 survey) and on 30 and 31 October 2017 by two Strategen Zoologists (2017 survey) with relevant experience as specified by the EPBC Act referral guidelines for three (see species above in section 3.2) threatened Black Cockatoo species (DSEWPac 2012).

Given the size of the survey area (555 ha) it was not possible or practical to traverse the entire vegetated component of the site on foot in the time allotted to measure all trees with a diameter at breast height (DBH) \geq 500 mm. Consequently 50 x 50 m quadrats (survey quadrats) were systematically sampled for Black Cockatoo habitat. Values across quadrats within the vegetation units will be extrapolated from this data for the purpose of impact assessment and estimate of the values within retained vegetation.

Any trees meeting the following criteria for potential breeding and foraging habitat were recorded in the survey quadrats:

- native trees (e.g. Jarrah, Tuart, Marri)
- diameter at breast height (DBH) \geq 500 mm (\geq 300 mm for Wandoo and Salmon Gum)
- suitable sized nest hollow i.e. large enough entrance and adequate depth (noting that these were observed from the ground)
- evidence of feeding (chewed cones, seed and nut material)
- opportunistic observations of Black Cockatoos in the survey area.

The centre of the quadrat was marked using a hand-held GPS.

The Black Cockatoo habitat assessment considered the EPBC Act referral guidelines for three threatened Black Cockatoo species where practical and relevant (DSEWPac 2012).

In addition, the Great Cocky Count data from 2017 was examined to see if any known roosts were in or near the survey area (Birdlife 2017).

3.2.2 Preliminary Chuditch and Brush-tailed Phascogale habitat assessment

The preliminary Chuditch and Brush-tailed Phascogale (Phascogale) assessment was undertaken on 30 and 31 October 2017 by two Strategen Zoologists and updated the information provided from the 2016 survey. The Chuditch and Phascogale habitat assessment was also systematically sampled in the same 50 x 50 m quadrats (survey quadrats) as the Black Cockatoo assessment.

Chuditch

The Chuditch has undergone a dramatic decline since European settlement and for the most part disappeared from the Swan Coastal Plain (and therefore much of Perth) in the 1930s (DEC 2012). In the Perth Metropolitan area, the Chuditch now primarily occurs in Eucalypt woodland/forest that includes species such as Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*). The Chuditch also requires hollow logs or earth burrows to den in.

Assessment of habitat and evidence of presence included searching for and looked for and recording hollow logs, earth burrows or rock piles if present in the quadrats and actively looking for signs, such as scats.

Brush-tailed Phascogale

The Phascogale is known to den in hollows in mature and dead Marri and Jarrah (Rhind 1996). Consequently, a search for hollows in trees was undertaken in each quadrat and opportunistically throughout the site.

4. Results

4.1 Flora and vegetation

4.1.1 Desktop assessment results

A total of 71 native vascular plant taxa from 26 plant families have the potential to occur within the survey area (Parks and Wildlife 2007-; DEE 2018c). The majority of taxa were from within the Proteaceae (12 taxa) and Fabaceae (10 taxa) families.

Threatened and Priority flora

The desktop assessment identified nine Threatened flora and six Priority flora species that have been recorded in the regional area (Table 4; Appendix 2). Of these, based on specific habitat requirements, the following four Threatened flora species and four Priority flora species were considered to have the potential to occur within the survey area:

- *Acacia aphylla* (Threatened – Vulnerable [EPBC Act]; Threatened [WC Act])
- *Caladenia huegelii* (Threatened – Endangered [EPBC Act]; Threatened [WC Act])
- *Grevillea flexuosa* (Threatened – Vulnerable [EPBC Act]; Threatened [WC Act])
- *Thelymitra stellata* (Threatened – Endangered [EPBC Act]; Threatened [WC Act])
- *Acacia oncinophylla* subsp. *oncinophylla* (Priority 3)
- *Grevillea manglesii* subsp. *dissectifolia* (Priority 3)
- *Pimelea rara* (Priority 4)
- *Tetratheca pilifera* (Priority 3).

Table 4: Threatened and Priority flora potentially occurring within the survey area

Species	Conservation status		Description	Potential to occur
	EPBC Act	WC Act		
<i>Acacia aphylla</i>	Threatened – Vulnerable	Threatened	A divaricately branched, spinescent, glaucous shrub from 0.9 to 2.5 m tall. Flowers are yellow and visible from August to October. Habitat for this species occurs in open forest dominated by <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> , or woodland dominated by <i>E. loxophleba</i> associated with laterite and granite outcrops on hillsides (Western Australian Herbarium 1998-, DEE 2018b).	Possible due to presence of preferred habitat.
<i>Acacia oncinophylla</i> subsp. <i>oncinophylla</i>	N/A	P3	Shrub to 2.5 m tall. Has 'minni-ritchi' bark, with phyllodes mostly 8-13 cm long, and 1-2 mm wide. Flowers are yellow and visible August to October. Habitat for this species is restricted to granitic soils (Western Australian Herbarium 1998-).	Possible due to presence of preferred habitat.
<i>Anthocercis gracilis</i>	Threatened – Vulnerable	Threatened	An erect, spindly shrub to 0.6 m tall. The species is known from nine populations in the Darling Scarp area on steep granite slopes in shallow, humus-rich sandy or loamy soils (DEE 2018b).	Unlikely due to absence of preferred habitat.
<i>Caladenia huegelii</i>	Threatened – Endangered	Threatened	A slender orchid from 30 to 50 cm tall. One or two striking flowers characterised by a greenish-cream lower petal with a maroon tip. Other petals are cream with red or pink suffusions. Habitat for this species occurs within well-drained, deep sandy soils in low mixed Banksia, Allocasuarina and Jarrah woodlands (Western Australian Herbarium 1998-, DEE 2018b).	Possible due to presence of preferred habitat.
<i>Diuris micrantha</i>	Threatened – Vulnerable	Threatened	A slender orchid to 60 cm tall. Yellow flowers with reddish-brown markings measuring 1.3 cm across. Habitat for this species occurs within clay-loam substrates in winter-wet depressions or swamps (DEE 2018b).	Unlikely due to absence of preferred habitat.
<i>Diuris purdiei</i>	Threatened – Endangered	Threatened	A slender orchid to 45 cm tall. 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 (DEE 2018b).	Unlikely due to absence of preferred habitat.
<i>Grevillea christineae</i>	Threatened – Endangered	Threatened	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 (Western Australian Herbarium 1998-). 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 (DEWHA 2008a).	Unlikely due to absence of preferred habitat and current known distribution.
<i>Grevillea flexuosa</i>	Threatened – Vulnerable	Threatened	Irregular, few-branched, non-lignotuberous shrub, to 2 m high, flowering creamy-yellow between July and October. The species grows on sands of granite ridgetop plateaus and associated breakaways or lateritic sands and gravel on hilltops, slopes and in gullies (DEWHA 2008b).	Possible due to presence of preferred habitat.
<i>Grevillea manglesii</i> subsp. <i>dissectifolia</i>	N/A	P3	Spreading, virgate shrub, 1.5-3(-5) m high, flowering white, red and brown in June, September or November. Occurs on gravelly loam, moist soils and roadsides (Western Australian Herbarium 1998-).	Possible due to presence of preferred habitat.

Species	Conservation status		Description	Potential to occur
	EPBC Act	WC Act		
<i>Grevillea pimeleoides</i>	N/A	P4	Non-lignotuberous shrub, 0.4-2.4 m high, flowering yellow-orange between May and November. Occurs on gravelly soils over granite and rocky hillsides (Western Australian Herbarium 1998-).	Unlikely due to absence of preferred habitat.
<i>Lepyrodia heleocharoides</i>	N/A	P3	Rhizomatous, slender, tufted perennial, herb (sedge-like), 0.15 – 0.25 m high, flowering in December. Occurs on moist peaty sand, dry or seasonally inundated heath or woodland, swamps (Western Australian Herbarium 1998-).	Unlikely due to absence of preferred habitat.
<i>Pimelea rara</i>	N/A	P4	A shrub, 0.2-0.35 m tall. Flowers are white, occurring in December or January on lateritic soils (Western Australian Herbarium 1998-).	Possible due to presence of preferred habitat.
<i>Tetratheca pilifera</i>	N/A	P3	A spreading shrub, 0.1-0.3 m high. Flowers are purple, occurring from August to October. Habitat for this species includes gravelly soils (Western Australian Herbarium 1998-).	Possible due to presence of preferred habitat.
<i>Thelymitra dedmaniarum</i>	Threatened – Endangered	Threatened	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 (Western Australian Herbarium 1998-, DEE 2018b).	Unlikely due to absence of preferred habitat.
<i>Thelymitra stellata</i>	Threatened – Endangered	Threatened	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 (Western Australian Herbarium 1998-, DEE 2018b).	Possible due to presence of preferred habitat.

Threatened and Priority Ecological Communities

One PEC was identified within 5 km of the survey area (Figure 4), the Central Northern Darling Scarp Granite Shrubland Community, which is listed as Priority 4(i) by DBCA. The community's closest occurrence is situated approximately 2.5 km from the southwestern boundary of the survey area. This community is described as follows:

Shrublands and heath on deeper loams and red earths on fragmented granite/quartzite. Heath species typically consist of the taller shrubs Xanthorrhoea acanthostachya and Allocasuarina humilis over smaller proteaceous and myrtaceous shrubs, namely Melaleuca aff. scabra, Baeckea camphorosmae and to a lesser extent, the proteaceous shrubs Dryandra armata, Hakea incrassata and Hakea undulata. Located in central region of the Northern Darling Scarp near Perth.

Wetlands

No wetlands are known within the survey area.

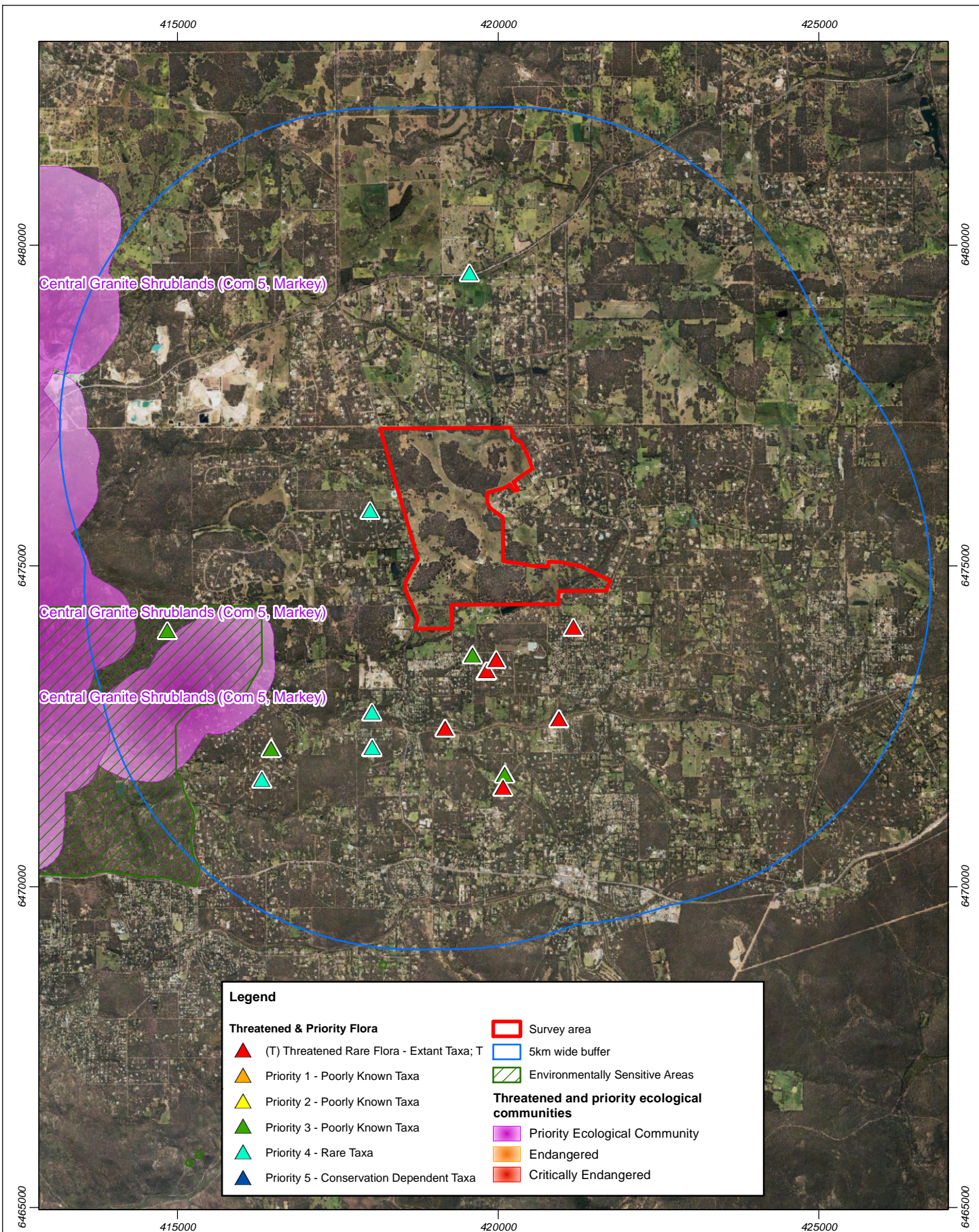
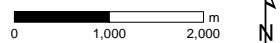


Figure 4: Environmentally Sensitive Areas, location of Threatened and Priority Flora species and Ecological Communities within 5 km of the survey area

Scale 1:80,000 at A4



Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 7/12/2018

Author: DWhite
 Source: Aerial image: Nearmap, flown 06/2017. Roads: Main Roads 2012.



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4.1.2 Field survey results

Native flora

A total of 89 native vascular plant taxa from 67 plant genera and 30 plant families were recorded from quadrats within the survey area. The majority of taxa were recorded within the Fabaceae and Proteaceae family (10 taxa) (Appendix 4; Appendix 5).

Threatened and Priority flora

No Threatened flora species as listed under section 178 of the EPBC Act, pursuant to Schedule 1 of the WC Act and as listed by Parks and Wildlife (2015) were recorded within the survey area. Additionally, no Priority flora species as listed by Western Australian Herbarium (1998-) were recorded.

Introduced (exotic) taxa

Nine introduced (exotic) taxa were recorded within the survey area (Appendix 5):

- **Aira caryophyllea*
- **Briza maxima*
- **Cynodon dactylon*
- **Gomphocarpus fruticosus*
- **Hordeum* sp.
- **Hypochaeris glabra*
- **Trifolium campestre*
- **Ursinia anthemoides*
- **Zantedeschia aethiopica*.

**Z. aethiopica* is a Declared Plant species in Western Australia pursuant to section 22 of the *Biosecurity and Agriculture Management Act 2007* (BAM Act) according to the Western Australian Department of Agriculture and Food (DPIRD 2017). One individual of this species was recorded opportunistically during the 2016 survey.

Accumulated species – sites surveyed (species-area curve)

The species-area curve, (Figure 5), based on a species accumulation analysis was used to evaluate the adequacy of sampling in the 2017 survey (Colwell 2013). The asymptotic value was determined using Michaelis-Menten modelling. Using this analysis, the incidence based coverage estimator of species richness (ICE) was calculated to be 83 (Chao 2005). Based on this value, and the total of 71 species recorded from the 2017 survey, approximately 86 % of the flora species potentially present within the survey area were recorded.

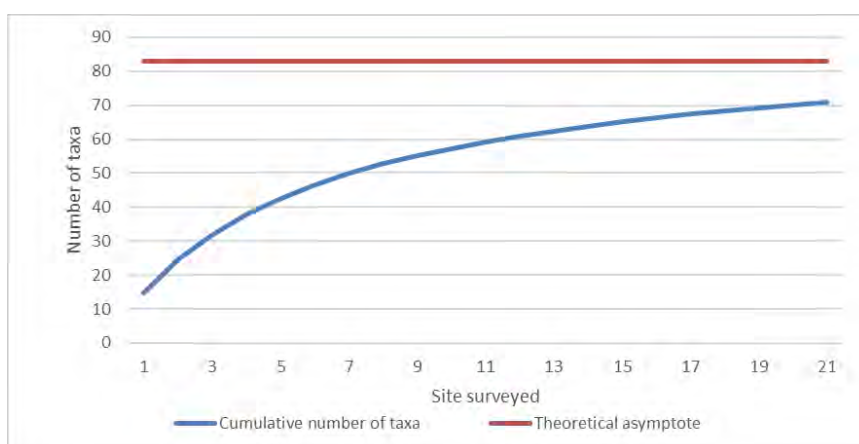


Figure 5: Averaged randomised Species Accumulation Curve

Vegetation types

Five native vegetation types (VTs) were defined and mapped in the survey area with data collected from the 2016 and 2017 surveys (Figure 6) and are summarised in Table 5. Areas containing vegetation in parkland cleared or highly degraded state have not been counted as unique native VTs but have been included in Table 5 for area calculation purposes. Total areas occupied within the survey area by each of the identified VTs are set out in Table 7.

Table 5: Vegetation Types recorded in the 2016 and 2017 survey

Vegetation Type	Description
VT1	<i>Eucalyptus marginata</i> , <i>Corymbia calophylla</i> and <i>Banksia grandis</i> mid woodland to mid open forest over <i>Xanthorrhoea preissii</i> , <i>Leucopogon propinquus</i> and <i>Hakea amplexicaulis</i> sparse shrubland over <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> , <i>Lomandra sonderi</i> and <i>Phyllanthus calycinus</i> low herbland.
VT2	<i>Eucalyptus marginata</i> , <i>Corymbia calophylla</i> mid woodland to mid open forest over <i>Persoonia elliptica</i> and <i>Banksia sessilis</i> tall sparse shrubland over <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> , <i>Banksia dallaneyi</i> and <i>Desmocladius fascicularis</i> low herbland.
VT3	<i>Eucalyptus marginata</i> , <i>Corymbia calophylla</i> , <i>Allocasuarina fraseriana</i> mid woodland to mid open forest over <i>Xanthorrhoea preissii</i> and <i>Xanthorrhoea gracilis</i> sparse low shrubland over <i>Grevillea wilsonii</i> , <i>Lomandra sonderi</i> and <i>Phyllanthus calycinus</i> low herbland.
VT4	<i>Eucalyptus marginata</i> , <i>Corymbia calophylla</i> mid woodland to mid open forest over sparse mixed shrubland.
VT5	<i>Corymbia calophylla</i> mid woodland over <i>Taxandria linearifolia</i> tall shrubland.
PC	Parkland cleared
C	Cleared areas

Vegetation type coverage

The total area mapped within the survey area was 550 ha which includes parkland cleared, highly degraded and fully cleared areas (Table 6). The majority of the survey area was mapped as Cleared; however, the dominant native VT within remnant vegetation of the survey area was VT1, which can be broadly described as a *Eucalyptus marginata*, *Corymbia calophylla* and *Banksia grandis* woodland.

Table 6: Area (ha) covered by each VT within the survey area (2016 and 2017 surveys)

VT	Area (ha)	Percentage of the survey area
1	148.8	27
2	52.80	10
3	13.4	2
4	81.9	15
5	8.0	1

VT	Area (ha)	Percentage of the survey area
Parkland cleared	7.84	1
Cleared	242.26	44
TOTAL	555	100

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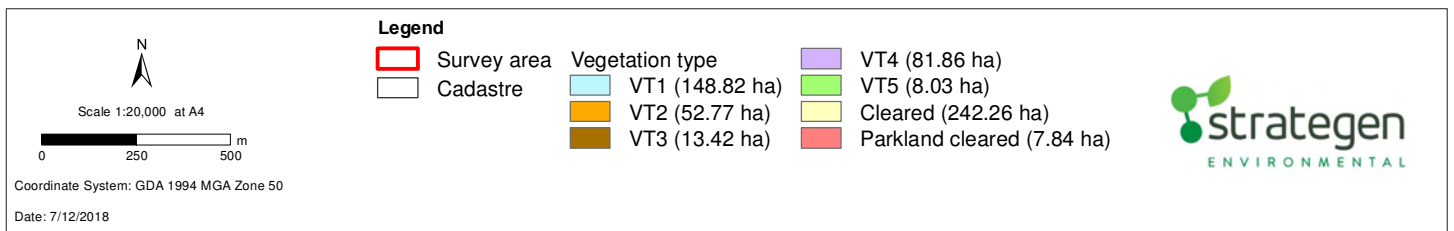
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Figure 6: Vegetation types



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Data source: Nearmap: Aerial image, flown 04/2018. Landgate: Cadastre, 11/2017. Client: Satterley Property Group. Development layout, 08/2018. Created by: c.thatcher

Vegetation condition

The survey area shows signs of having been degraded for a long period of time. The entire survey area has been subject to agricultural practices, principally stock grazing, with most patches of remnant vegetation having a degraded or absent understorey. The two larger patches of vegetation in the north and north west of the site show the least effects of grazing and retain an understorey.

Vegetation condition within the survey area ranged from Excellent to Completely Degraded (Keighery 1994; Figure 7; Table 7).

Table 8 gives a numerical breakdown of the area occupied by each vegetation condition rating within the survey area.

Table 7: Vegetation condition scale (Keighery 1994)

Condition rating	Description
Pristine (1)	Pristine or nearly so, no obvious sign of disturbance.
Excellent (2)	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very Good (3)	Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good (4)	Vegetation structure significantly altered by obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback, grazing.
Degraded (5)	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Completely Degraded (6)	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Table 8: Area (ha) covered by each vegetation condition category within the survey area

Vegetation Condition	Area (ha)	Percentage of the survey area
Very Good - Excellent	62.26	11
Very Good	7.84	3.54
Good – Very Good	47.65	1.4
Good	94.73	17
Good – Degraded	20.55	3.7
Degraded	72.54	13
Completely Degraded	249.38	45
Total	555	100

4.1.3 Threatened and Priority Ecological Communities

One PEC was identified as having the potential to occur within 5 km of the survey area by the desktop survey.

No TECs or PECs were identified within the survey area.

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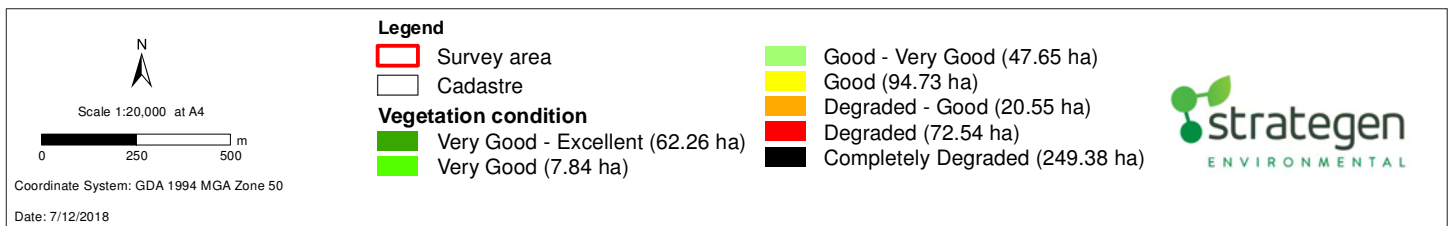
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Figure 7: Vegetation condition



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4.2 Fauna habitat

4.2.1 Black Cockatoo habitat assessment

Black Cockatoo habitat assessment were undertaken in the 2016 survey (for areas proposed for development at that time) and in the 2017 survey (for the remaining portions of the site).

During the Black Cockatoo habitat assessment (2017 survey), a total of 24 quadrats were examined for potential breeding habitat and foraging habitat (Figure 8, Appendix 6). While walking between survey quadrats FRTBC were seen and or heard (flying over or in trees) on many occasions and Carnaby's Cockatoos were also heard and observed flying overhead, but only on two occasions. FRTBC foraging evidence in the form of chewed Marri nuts was observed regularly while walking between survey quadrats.

Potential breeding habitat

As assessment of black cockatoo roosting and breeding habitat was also undertaken within the site to identify potential black cockatoo roosting and breeding trees.

Potential breeding habitat in the form of trees with a DBH \geq 500 mm was recorded in all 24 quadrats in the 2017 survey. These trees were comprised of either Jarrah or Marri. All quadrats support potential breeding habitat, with potential breeding tree numbers per quadrat ranging from 2 to 10. Within the quadrats, only three trees with hollows with entrances that were considered large enough and in the correct position for Black Cockatoos to potentially nest in we recorded (Johnstone et al. 2013a) (Appendix 6). No direct evidence (adults entering hollow or young birds heard) of nesting was observed, nor was indirect evidence e.g. feathers on the ground or bespatter.

The distribution of potentially significant trees is relatively uniform throughout the Jarrah-Marri forest vegetation type, and scattered trees within the pasture vegetation type. Given the extent of the site, each individual potential breeding tree was not surveyed.

Bees were recorded in a couple of hollows during the assessment.

Foraging habitat

During the 2017 survey FRTBC were observed feeding in Marri trees at five of the 24 quadrats (Appendix 6). Carnaby's Cockatoos were recorded at two of the 24 quadrats feeding in marri trees.

Further to this, foraging evidence, particularly in the form of chewed Marri nuts was recorded at five of the 24 quadrats (Plate 1).



Plate 1: Example of FRTBC foraging evidence on Marri nuts

Other species of flora present in the survey area that are known to be eaten by Black Cockatoos include: Jarrah, Sheoak, Banksia (*Banksia grandis* and *B. sessilis*) and *Xanthorrhoea preissii* (Groom 2011, Johnstone et al. 2011, Johnstone et al. 2013b).

Apart from the areas already cleared of vegetation, the vegetation in the survey area has a canopy of Jarrah and Marri in various proportions. Both these species are known to be an important dietary component for the FRTBC and Baudin's and to a lesser extent Carnaby's Cockatoo. Consequently, there is 304.9 ha of foraging habitat present in the survey area (Figure 8).

Roosting habitat

The Great Cocky Count data from 2017 was examined and there were many roost sites within 12 km of the survey area, five of which were within 1 km (Birdlife 2017). However, no roosts have been recorded in the survey area.

The Black Cockatoo habitat assessment identified approximately 304.9 ha of suitable roosting habitat for all three Black Cockatoo species within the site comprising predominantly Jarrah and Marri trees within VT1 to VT5.

4.2.2 Chuditch and Brush-tailed Phascogale habitat assessment

Chuditch

An assessment of habitat suitable for the Chuditch was conducted in November 2016 (for areas proposed for development at that time) and October 2017 across the remaining areas of the site. Based on the two site assessments, it is estimated that there is approximately 304.9 ha of habitat for Chuditch within the site corresponding to remnant Jarrah and Marri vegetation (VT1 to VT5). The 2017 habitat assessment and evidence of presence of the species included searching for and recording hollow logs, earth burrows or rock piles if present in the quadrats and actively looking for signs, such as scats.

During the assessment, no signs of the Chuditch, such as scats were observed. No potential earth burrows for denning were observed in any of the 24 quadrats or opportunistically across the survey area. There was one rock pile recorded at one of the 24 quadrats (Appendix 6), however, it was too small with very little space, most likely not enough for a Chuditch to den in. There were also several other rock piles in the survey area, but again none of these were considered suitable for Chuditch to den in, given the size of the rock pile and the spaces between the rocks. The site also had very few hollow logs, with only two of the 24 quadrats having logs with hollows considered large enough for Chuditch to den in (Appendix 6).

It is important to note that none of the rock piles observed were natural and had been pushed together because of previous farming activities.

Brush-tailed Phascogale

The site consisted of a tree canopy made up of Jarrah and Marri, trees having a DBH \geq 500 mm recorded in each quadrat (Appendix 6), however, very few had hollows when observed from the ground, particularly, those that would be considered suitable in size (mean hollow entrance width of 3.9 cm and length of 7.3 cm) for Phascogales to den in (Rhind 1996).

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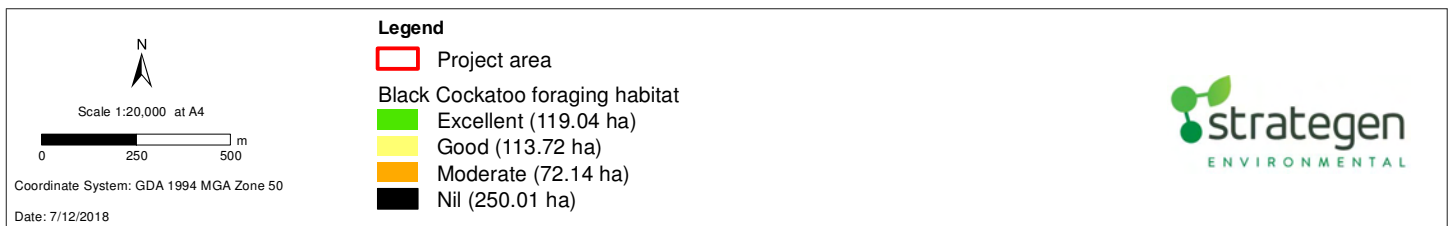
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Figure 8: Black Cockatoo foraging habitat



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 Data source: Nearmap: Aerial image, flown 04/2018. Landgate: Cadastre, 11/2017. Client: Satterley Property Group. Development layout, 08/2018. Created by: c.thatcher

5. Discussion

5.1 Flora and vegetation

The detailed flora and vegetation survey was conducted in spring in 2016 and 2017 during the prime flowering time for the majority of flora species in the region. The surveys focussed on traversing the entire survey area (555 ha) to delineate vegetation types and is consistent with the requirements of a detailed flora and vegetation survey as specified in the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016).

A total of 89 native vascular plant taxa from 67 plant genera and 30 plant families were recorded from quadrats within the survey area. The majority of taxa were recorded within the Fabaceae family (11 taxa).

The desktop survey identified four Threatened and four Priority flora species had the potential to occur within the survey area; however, no Threatened flora species pursuant to Schedule 1 of the WC Act and as listed by Parks and Wildlife (2015) were recorded during either of the field surveys. Additionally, no Priority flora species as listed by Western Australian Herbarium (1998-) were recorded.

Nine introduced (exotic) taxa were recorded within the survey area, including **Zantedeschia aethiopica*, which is a Declared Plant species in Western Australia pursuant to section 22 of the BAM Act. One individual of this species was recorded opportunistically during the 2016 survey.

Vegetation within the survey area comprises five vegetation types as well as cleared areas. VT1 – VT4 comprised *Eucalyptus marginata* (jarrah) – *Corymbia calophylla* (marri) woodland to forest over understoreys of varying composition. VT5 was dominated by *C. calophylla* and was associated with minor drainage lines. Vegetation condition ranged from Completely Degraded where vegetation had been cleared (approximately 45% of the survey area) to Very Good to Excellent (approximately 11% of the survey area) within intact patches of remnant vegetation.

One PEC, the Darling Scarp Granite Shrubland Community, is known from within 5 km of the survey area; however, vegetation within the survey area was not considered to represent any known TECs or PECs.

Vegetation recorded within the survey area is well represented in nearby nature reserves, including John Forrest National Park, approximately 2.5 km to the west.

5.2 Fauna habitat

There is potential Black Cockatoo breeding habitat throughout the survey area (Appendix 6), with all quadrats supporting at least 2 Jarrah and Marri trees with a DBH \geq 500 mm (Appendix 6), however, only 3 trees when observed from the ground that had hollows considered large enough for nesting (DSEWPac 2012).

During the assessment, many FRTBC were observed foraging in Marri trees across the survey area and were observed flying overhead. Carnaby's Cockatoos were also recorded foraging in the survey area and flying above and evidence in the form of direct observation and indirect (chewed Marri nuts) was observed in many locations for both Black cockatoo species (Appendix 6). There are also several known roost sites from the 2017 Great Cocky count that are near the survey area, further indicating that the survey area provides foraging habitat.

There is unlikely to be Chuditch denning in the survey area, given no earth burrows were recorded, no suitable rock piles were present and there were only a few quadrats with suitable hollow logs on the ground. It is possible that Chuditch could forage across the site as some areas, particularly those that had not been burnt for several years, had lots of leaf litter where there is the potential for invertebrates, reptiles and small mammals on which to prey.

There is unlikely to be denning habitat in the survey area for the Phascogale given very few hollows in trees were observed in the quadrats. Of the hollows observed, very few would be considered suitable in size (mean hollow entrance width of 3.9 cm and length of 7.3cm) for Phascogales to den in (Rhind 1996).

This species is known to primarily forage in trees for invertebrates that occur on and underneath bark (Woinarski *et al.* 2014). The site is dominated by Jarrah and Marri both of which have bark that is likely to harbour such invertebrates. Phascogales are also known to eat nectar (Scarff *et al.* 1998) and Jarrah and Marri were the dominant vegetation on site, both of which produce nectar when flowering, therefore the survey area could be considered potential Phascogale foraging habitat.

The survey area is adjacent to other sizeable patches of vegetation, which potentially help facilitate the movement of fauna through the landscape, such as Chuditch which have relatively large home ranges (DEC 2012). Therefore, retaining these relatively large patches of Jarrah and Marri forest which are important foraging areas for Black Cockatoos, and potentially suitable foraging habitat for the Chuditch and Phascogale, is of some significance and worthy of retention.

6. Conclusion

The survey area encompassed 550 ha of which 204.5 ha contained remnant native vegetation. Native vegetation comprised five vegetation types, which was largely made up of woodland or forest of *Eucalyptus marginata* (jarrah) and *Corymbia calophylla* (marri).

Vegetation condition ranged from Completely Degraded where vegetation had been cleared (approximately 45 % of the survey area) to Very Good - Excellent (approximately 11% of the survey area) within intact patches of remnant vegetation.

A total of 89 native vascular plant taxa were recorded from quadrats within the survey area.

No Threatened flora species pursuant to Schedule 1 of the WC Act and as listed by Parks and Wildlife (2015) were recorded during either of the field surveys. Additionally, no Priority flora species as listed by Western Australian Herbarium (1998-) were recorded.

One Declared Pest plant (**Zantedeschia aethiopica*) listed under the BAM Act was recorded.

One PEC, the Darling Scarp Granite Shrubland Community, is known from within 5 km of the survey area; however, vegetation within the survey area was not considered to represent any known TECs or PECs.

Black Cockatoos do utilise the survey area as both FRTBC and Carnaby's Cockatoo were recorded foraging at multiple locations in the survey area during the assessment and foraging evidence was also noted at many locations. There is also potential breeding habitat across much of the survey area, however, nesting was not recorded and few suitable hollows were observed from the ground during the assessment.

The survey area has very limited to no denning sites for the Chuditch and Phascogale, however, the area is potential foraging habitat. The Jarrah and Marri forest proposed to be retained is worthy of retention because of their importance to Black Cockatoos as foraging habitat.

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Appendix 1
Conservation significant flora and
ecological community definitions

Conservation Codes for Western Australian Flora and Fauna (Parks and Wildlife 2017)

Specially protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such.

Categories of specially protected fauna and flora are:

T Threatened species

Published as Specially Protected under the Wildlife Conservation Act 1950, and listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).

Threatened fauna is that subset of 'Specially Protected Fauna' declared to be 'likely to become extinct' pursuant to section 14(4) of the Wildlife Conservation Act.

Threatened flora is flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F(2) of the Wildlife Conservation Act.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species

Threatened species considered to be facing an extremely high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

EN Endangered species

Threatened species considered to be facing a very high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

VU Vulnerable species

Threatened species considered to be facing a high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

EX Presumed extinct species

Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.

IA Migratory birds protected under an international agreement

Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice.

CD Conservation dependent fauna

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice.

OS Other specially protected fauna

Fauna otherwise in need of special protection to ensure their conservation. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

Priority Flora and Fauna

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

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

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

1 Priority 1: Poorly-known species

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

2 Priority 2: Poorly-known species

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

3 Priority 3: Poorly-known species

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

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

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

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for Vulnerable, but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Definition of Threatened Ecological Communities (DEC 2013)

A threatened ecological community (TEC) is one which is found to fit into one of the following categories; "presumed totally destroyed", "critically endangered", "endangered" or "vulnerable".

Presumed Totally Destroyed (PD)

An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

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

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

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

Critically Endangered (CR)

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

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

- * geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years)
- * modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.

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

- * geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years)
- * there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes
- * there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.

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

Endangered (EN)

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

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

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

- * the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years)
- * modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

B) Current distribution is limited, and one or more of the following apply”

- * geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years)
- * there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes
- * there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.

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

Vulnerable (VU)

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

An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium (within approximately 50 years) to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C):

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

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

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

Definition of Priority Ecological Communities (DEC 2013)

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Priority One: Poorly-known ecological communities

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

Priority Two: Poorly-known ecological communities

Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities

- Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation
- communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat
- communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.

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

Priority Four

Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. These include:

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

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

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

Priority Five: Conservation Dependent ecological communities

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

Appendix 2
Flora Desktop Assessment Results

NatureMap Species Report

Created By Daniel Panickar on 07/11/2016

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 116° 08' 47" E, 31° 51' 14" S
Buffer 5km
Group By Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	318	581
Priority 3	4	9
Priority 4	3	5
Rare or likely to become extinct	2	9
TOTAL	327	604

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Rare or likely to become extinct				
1.	3220 <i>Acacia aphylla</i> (Leafless Rock Wattle)		T	
2.	2007 <i>Grevillea flexuosa</i> (Tangled Grevillea)		T	
Priority 3				
3.	14129 <i>Acacia oncinophylla</i> subsp. <i>oncinophylla</i>		P3	
4.	13451 <i>Grevillea manglesii</i> subsp. <i>dissectifolia</i>		P3	
5.	1086 <i>Lepyrodia heleocharoides</i>		P3	
6.	4540 <i>Tetratheca pilifera</i>		P3	
Priority 4				
7.	13086 <i>Grevillea pimeleoides</i>		P4	
8.	5260 <i>Pimelea rara</i> (Summer Pimelea)		P4	
9.	14714 <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>		P4	
Non-conservation taxon				
10.	15429 <i>Acacia alata</i> var. <i>alata</i>			
11.	15466 <i>Acacia applanata</i>			
12.	3233 <i>Acacia barbinervis</i>			
13.	15469 <i>Acacia barbinervis</i> subsp. <i>barbinervis</i>			
14.	11661 <i>Acacia drummondii</i> subsp. <i>drummondii</i>			
15.	3331 <i>Acacia extensa</i> (Wiry Wattle)			
16.	15483 <i>Acacia pulchella</i> var. <i>pulchella</i>			
17.	3557 <i>Acacia stenoptera</i> (Narrow Winged Wattle)			
18.	3602 <i>Acacia willdenowiana</i> (Grass Wattle)			
19.	6205 <i>Actinotus leucocephalus</i> (Flannel Flower)			
20.	14970 <i>Adenanthos barbiger</i>			
21.	184 <i>Aira caryophyllea</i> (Silvery Hairgrass)	Y		
22.	1732 <i>Allocasuarina humilis</i> (Dwarf Sheoak)			
23.	2648 <i>Alternanthera denticulata</i> (Lesser Joyweed)			
24.	194 <i>Amphipogon amphipogonoides</i>			
25.	197 <i>Amphipogon debilis</i>			
26.	198 <i>Amphipogon laguroides</i>			
27.	20184 <i>Amphipogon laguroides</i> subsp. <i>laguroides</i>			
28.	199 <i>Amphipogon strictus</i> (Greybeard Grass)			
29.	200 <i>Amphipogon turbinatus</i>			
30.	6314 <i>Andersonia lehmanniana</i>			
31.	1411 <i>Anigozanthos manglesii</i> (Mangles Kangaroo Paw, Kurulbrang)			
32.	1416 <i>Anigozanthos viridis</i> (Green Kangaroo Paw, Kurulbardang)			
33.	1116 <i>Aphelia brizula</i>			
34.	7838 <i>Arctotheca calendula</i> (Cape Weed, African Marigold)	Y		
35.	20249 <i>Astartea leptophylla</i>			
36.	<i>Asterella drummondii</i>			
37.	6334 <i>Astroloma pallidum</i> (Kick Bush)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
38.	17233 <i>Austrostipa campylachne</i>			
39.	17241 <i>Austrostipa hemipogon</i>			
40.	17245 <i>Austrostipa mollis</i>			
41.	37421 <i>Austrostipa</i> sp. <i>Marchagee</i> (B.R. Maslin 1407)			
42.	17257 <i>Austrostipa variabilis</i>			
43.	36441 <i>Babingtonia camphorosmae</i> (Camphor Myrtle)			
44.	1819 <i>Banksia grandis</i> (Bull Banksia, Pulgarla)			
45.	32054 <i>Banksia undata</i> var. <i>undata</i>			
46.	15037 <i>Bartsia trixago</i>	Y		
47.	743 <i>Baumea juncea</i> (Bare Twigrush)			
48.	747 <i>Baumea rubiginosa</i>			
49.	3157 <i>Billardiera floribunda</i> (White-flowered Billardiera)			
50.	25788 <i>Billardiera fraseri</i> (Elegant Pronaya)			
51.	25798 <i>Billardiera fusiformis</i> (Australian Bluebell)			
52.	4432 <i>Boronia ovata</i>			
53.	11381 <i>Boronia ramosa</i> subsp. <i>anethifolia</i>			
54.	4443 <i>Boronia subsessilis</i>			
55.	1273 <i>Borya sphaerocephala</i> (Pincushions)			
56.	3710 <i>Bossiaea eriocarpa</i> (Common Brown Pea)			
57.	3717 <i>Bossiaea pulchella</i>			
58.	18497 <i>Bossiaea</i> sp. <i>Waroona</i> (B.J. Keighery & N. Gibson 229)			
59.	7878 <i>Brachyscome iberidifolia</i>			
60.	244 <i>Briza maxima</i> (Blowfly Grass)	Y		
61.	245 <i>Briza minor</i> (Shivery Grass)	Y		
62.	12770 <i>Burchardia congesta</i>			
63.	1276 <i>Caesia micrantha</i> (Pale Grass Lily)			
64.	1603 <i>Caladenia longiclavata</i> (Clubbed Spider Orchid)			
65.	15377 <i>Caladenia reptans</i> subsp. <i>reptans</i>			
66.	5485 <i>Calytrix variabilis</i>			
67.	2952 <i>Cassytha glabella</i> (Tangled Dodder Laurel)			
68.	2956 <i>Cassytha pomiformis</i> (Dodder Laurel)			
69.	2957 <i>Cassytha racemosa</i> (Dodder Laurel)			
70.	1121 <i>Centrolepis aristata</i> (Pointed Centrolepis)			
71.	18156 <i>Chamaecytisus palmensis</i> (Tagasaste)	Y		
72.	1280 <i>Chamaescilla corymbosa</i> (Blue Squill)			
73.	31 <i>Cheilanthes austrotenuifolia</i>			
74.	12818 <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>			
75.	3753 <i>Chorizema dicksonii</i> (Yellow-eyed Flame Pea)			
76.	6543 <i>Cicendia filiformis</i> (Slender Cicendia)	Y		
77.	4564 <i>Comesperma virgatum</i> (Milkwort)			
78.	1875 <i>Conospermum huegelii</i> (Slender Smokebush)			
79.	12035 <i>Conostylis caricina</i> subsp. <i>caricina</i>			
80.	1454 <i>Conostylis setigera</i> (Bristly Cottonhead)			
81.	11597 <i>Conostylis setigera</i> subsp. <i>setigera</i>			
82.	1455 <i>Conostylis setosa</i> (White Cottonhead)			
83.	17104 <i>Corymbia calophylla</i> (Marn)			
84.	3139 <i>Crassula exserta</i>			
85.	20271 <i>Crassula extrorsa</i>			
86.	13470 <i>Cryptandra arbutiflora</i> var. <i>arbutiflora</i>			
87.	4802 <i>Cryptandra mutila</i>			
88.	15404 <i>Cyanicula sericea</i>			
89.	768 <i>Cyathochaeta avenacea</i>			
90.	7420 <i>Dampiera alata</i> (Winged-stem Dampiera)			
91.	7428 <i>Dampiera coronata</i> (Wedge-leaved Dampiera)			
92.	7454 <i>Dampiera linearis</i> (Common Dampiera)			
93.	3793 <i>Daviesia angulata</i>			
94.	3799 <i>Daviesia cordata</i> (Bookleaf)			
95.	3805 <i>Daviesia decurrens</i> (Prickly Bitter-pea)			
96.	3835 <i>Daviesia preissii</i>			
97.	3839 <i>Daviesia rhombifolia</i>			
98.	17691 <i>Desmocladius fasciculatus</i>			
99.	299 <i>Deyeuxia quadriseta</i> (Reed Bentgrass)			
100.	306 <i>Dichelachne crinita</i> (Longhair Plumegrass)			
101.	1287 <i>Dichopogon capillipes</i>			
102.	3092 <i>Drosera bulbosa</i> (Red-leaved Sundew)			
103.	3095 <i>Drosera erythrorhiza</i> (Red Ink Sundew)			
104.	13211 <i>Drosera erythrorhiza</i> subsp. <i>collina</i>			
105.	3109 <i>Drosera menziesii</i> (Pink Rainbow)			
106.	13216 <i>Drosera menziesii</i> subsp. <i>penicillaris</i>			
107.	3113 <i>Drosera neesii</i> (Jewel Rainbow)			

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108.	3118 <i>Drosera pallida</i> (Pale Rainbow)			
109.	29178 <i>Drosera porrecta</i>			
110.	3125 <i>Drosera pycnoblata</i> (Pearly Sundew)			
111.	8911 <i>Drosera rosulata</i>			
112.	3131 <i>Drosera stolonifera</i> (Leafy Sundew)			
113.	373 <i>Eragrostis brownii</i> (Brown's Lovegrass)			
114.	379 <i>Eragrostis elongata</i> (Clustered Lovegrass)			
115.	15412 <i>Eriochilus dilatatus</i> subsp. <i>multiflorus</i>			
116.	5708 <i>Eucalyptus marginata</i> (Jarrah, Djara)			
117.	13548 <i>Eucalyptus marginata</i> subsp. <i>thalassica</i> (Blue-leaved Jarrah)			
118.	5739 <i>Eucalyptus patens</i> (Swan River Blackbutt, Dwuda)			
119.	11445 <i>Ferraria crispa</i> subsp. <i>crispa</i>	Y		
120.	<i>Fossombronia pusilla</i>			
121.	<i>Fossombronia wondraczekii</i>			
122.	18392 <i>Freesia alba</i> x <i>leichtlinii</i>	Y		
123.	2969 <i>Fumaria capreolata</i> (Whiteflower Fumitory)	Y		
124.	3895 <i>Gastrolobium calycinum</i> (York Road Poison)			
125.	20475 <i>Gastrolobium capitatum</i>			
126.	20513 <i>Gastrolobium dilatatum</i>			
127.	3933 <i>Gastrolobium villosum</i> (Crinkle-leaved Poison)			
128.	3951 <i>Gompholobium marginatum</i>			
129.	3954 <i>Gompholobium polymorphum</i>			
130.	3956 <i>Gompholobium shuttleworthii</i>			
131.	6149 <i>Gonocarpus cordiger</i>			
132.	6159 <i>Gonocarpus nodulosus</i>			
133.	12520 <i>Goodenia fasciculata</i>			
134.	12551 <i>Goodenia micrantha</i>			
135.	1964 <i>Grevillea bipinnatifida</i> (Fuchsia Grevillea)			
136.	19628 <i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>			
137.	13429 <i>Grevillea diversifolia</i> subsp. <i>diversifolia</i>			
138.	13450 <i>Grevillea manglesii</i> subsp. <i>manglesii</i>			
139.	2066 <i>Grevillea pilulifera</i> (Woolly-flowered Grevillea)			
140.	2101 <i>Grevillea synapheae</i> (Catkin Grevillea)			
141.	14421 <i>Grevillea synapheae</i> subsp. <i>synapheae</i>			
142.	1465 <i>Haemodorum discolor</i>			
143.	1468 <i>Haemodorum laxum</i>			
144.	1472 <i>Haemodorum simplex</i>			
145.	1474 <i>Haemodorum sparsiflorum</i>			
146.	2128 <i>Hakea amplexicaulis</i> (Prickly Hakea)			
147.	2149 <i>Hakea cristata</i> (Snail Hakea)			
148.	2152 <i>Hakea cyclocarpa</i> (Ramshorn)			
149.	2158 <i>Hakea erinacea</i> (Hedge-hog Hakea)			
150.	2175 <i>Hakea lissocarpha</i> (Honey Bush)			
151.	2203 <i>Hakea ruscifolia</i> (Candle Hakea)			
152.	2206 <i>Hakea stenocarpa</i> (Narrow-fruited Hakea)			
153.	2214 <i>Hakea trifurcata</i> (Two-leaf Hakea)			
154.	2215 <i>Hakea undulata</i> (Wavy-leaved Hakea)			
155.	5108 <i>Hibbertia acerosa</i> (Needle Leaved Guinea Flower)			
156.	5114 <i>Hibbertia commutata</i>			
157.	5134 <i>Hibbertia huegelii</i>			
158.	5135 <i>Hibbertia hypericoides</i> (Yellow Buttercups)			
159.	45534 <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>			
160.	5169 <i>Hibbertia serrata</i> (Serrate Leaved Guinea Flower)			
161.	5172 <i>Hibbertia stellaris</i> (Orange Stars)			
162.	3964 <i>Hovea chorizemifolia</i> (Holly-leaved Hovea)			
163.	3968 <i>Hovea trisperma</i> (Common Hovea)			
164.	12741 <i>Hyalosperma cotula</i>			
165.	12007 <i>Hybanthus floribundus</i> subsp. <i>floribundus</i>			
166.	6223 <i>Hydrocotyle alata</i>			
167.	6226 <i>Hydrocotyle callicarpa</i> (Small Pennywort)			
168.	5817 <i>Hypocalymma angustifolium</i> (White Myrtle, Kudjid)			
169.	5825 <i>Hypocalymma robustum</i> (Swan River Myrtle)			
170.	8086 <i>Hypochaeris glabra</i> (Smooth Catsear)	Y		
171.	917 <i>Isolepis marginata</i> (Coarse Club-rush)			
172.	2237 <i>Isopogon sphaerocephalus</i> (Drumstick Isopogon)			
173.	7396 <i>Isotoma hypocrateriformis</i> (Woodbridge Poison)			
174.	1178 <i>Juncus bufonius</i> (Toad Rush)	Y		
175.	1179 <i>Juncus caespiticius</i> (Grassy Rush)			
176.	1180 <i>Juncus capitatus</i> (Capitate Rush)	Y		
177.	1195 <i>Juncus subsecundus</i> (Finger Rush)			

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178.	4037 <i>Kennedia coccinea</i> (Coral Vine)			
179.	4044 <i>Kennedia prostrata</i> (Scarlet Runner)			
180.	3667 <i>Labichea lanceolata</i> (Tall Labichea)			
181.	3669 <i>Labichea punctata</i> (Lance-leaved Cassia)			
182.	20019 <i>Lachnagrostis filiformis</i>			
183.	45082 <i>Lasiopetalum glutinosum</i> subsp. <i>latifolium</i>			
184.	7568 <i>Lechenaultia biloba</i> (Blue Leschenaultia)			
185.	940 <i>Lepidosperma pubisquameum</i>			
186.	<i>Lepidosperma</i> sp.			
187.	949 <i>Lepidosperma tuberculatum</i>			
188.	2342 <i>Leptomeria cunninghamii</i>			
189.	1088 <i>Lepyrodia macra</i> (Large Scale Rush)			
190.	1090 <i>Lepyrodia muirii</i>			
191.	15562 <i>Lepyrodia riparia</i>			
192.	6367 <i>Leucopogon capitellatus</i>			
193.	44227 <i>Leucopogon darlingensis</i> subsp. <i>darlingensis</i>			
194.	6400 <i>Leucopogon gracillimus</i>			
195.	6416 <i>Leucopogon nutans</i> (Drooping Leucopogon)			
196.	6436 <i>Leucopogon propinquus</i>			
197.	6439 <i>Leucopogon pulchellus</i> (Beard-heath)			
198.	28302 <i>Leucopogon</i> sp. <i>Parkerville</i> (A. Meebold 11654)			
199.	6444 <i>Leucopogon sprengeloides</i>			
200.	6447 <i>Leucopogon strictus</i>			
201.	7676 <i>Levenhookia pusilla</i> (Midget Stylewort)			
202.	7677 <i>Levenhookia stipitata</i> (Common Stylewort)			
203.	476 <i>Lolium perenne</i> (Perennial Ryegrass)	Y		
204.	1222 <i>Lomandra brittanii</i>			
205.	1223 <i>Lomandra caespitosa</i> (Tufted Mat Rush)			
206.	1228 <i>Lomandra hermaphrodita</i>			
207.	1229 <i>Lomandra integra</i>			
208.	1234 <i>Lomandra nigricans</i>			
209.	1236 <i>Lomandra odora</i> (Tiered Matrush)			
210.	1239 <i>Lomandra preissii</i>			
211.	1243 <i>Lomandra sericea</i> (Silky Mat Rush)			
212.	1246 <i>Lomandra suaveolens</i>			
213.	4059 <i>Lotus angustissimus</i> (Narrowleaf Trefoil)	Y		
214.	1092 <i>Loxocarya cinerea</i>			
215.	1656 <i>Lyperanthus serratus</i> (Rattle Beak Orchid)			
216.	17636 <i>Marianthus coeruleopunctatus</i> (Blue-spotted Marianthus)			
217.	957 <i>Mesomelaena tetragona</i> (Semaphore Sedge)			
218.	4100 <i>Mirbelia spinosa</i>			
219.	7085 <i>Misopates orontium</i> (Lesser Snapdragon)	Y		
220.	7410 <i>Monopsis debilis</i>	Y		
221.	6199 <i>Myriophyllum tillaeoides</i>			
222.	492 <i>Neurachne alopecuroidea</i> (Foxtail Mulga Grass)			
223.	46255 <i>Orianthera campanulata</i>			
224.	11749 <i>Orthrosanthus laxus</i> var. <i>laxus</i> (Morning Iris)			
225.	4354 <i>Oxalis incamata</i>	Y		
226.	7089 <i>Parentucella latifolia</i> (Common Bartsia)	Y		
227.	1546 <i>Patersonia juncea</i> (Rush Leaved Patersonia)			
228.	1550 <i>Patersonia occidentalis</i> (Purple Flag, Koma)			
229.	14433 <i>Patersonia rudis</i> subsp. <i>rudis</i>			
230.	6245 <i>Pentapeltis peltigera</i>			
231.	11052 <i>Persicaria prostrata</i>			
232.	2262 <i>Persoonia elliptica</i> (Spreading Snottygobble)			
233.	2284 <i>Petrophile biloba</i> (Granite Petrophile)			
234.	2297 <i>Petrophile heterophylla</i> (Variable-leaved Cone Bush)			
235.	2308 <i>Petrophile seminuda</i>			
236.	2312 <i>Petrophile striata</i>			
237.	20460 <i>Pheladenia deformis</i>			
238.	1173 <i>Philydrella pygmaea</i> (Butterfly Flowers)			
239.	4675 <i>Phyllanthus calycinus</i> (False Boronia)			
240.	11402 <i>Pimelea imbricata</i> var. <i>piligera</i>			
241.	5259 <i>Pimelea preissii</i>			
242.	12041 <i>Pimelea suaveolens</i> subsp. <i>suaveolens</i>			
243.	5269 <i>Pimelea sylvestris</i>			
244.	557 <i>Piptatherum miliaceum</i> (Rice Millet)	Y		
245.	18352 <i>Pithocarpa pulchella</i> var. <i>melanostigma</i>			
246.	573 <i>Poa drummondiana</i> (Knotted Poa)			
247.	582 <i>Polypogon monspeliensis</i> (Annual Beardgrass)	Y		

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248.	1671 <i>Prasophyllum elatum</i> (Tall Leek Orchid)			
249.	13255 <i>Pterochaeta paniculata</i>			
250.	1686 <i>Pterostylis barbata</i> (Bird Orchid)			
251.	1693 <i>Pterostylis recurva</i> (Jug Orchid)			
252.	12217 <i>Pterostylis sanguinea</i>			
253.	2742 <i>Ptilotus manglesii</i> (Pom Poms, Mulamula)			
254.	8195 <i>Quinetia urvillei</i>			
255.	13300 <i>Rhodanthe citrina</i>			
256.	1556 <i>Romulea rosea</i> (Guildford Grass)	Y		
257.	11544 <i>Romulea rosea</i> var. <i>australis</i> (Guildford Grass)	Y		
258.	20506 <i>Rubus anglocandicans</i>	Y		
259.	20496 <i>Rubus laudatus</i>	Y		
260.	40431 <i>Rytidosperma acerosum</i>			
261.	40430 <i>Rytidosperma pilosum</i>			
262.	40427 <i>Rytidosperma setaceum</i>			
263.	7602 <i>Scaevola calliptera</i>			
264.	7636 <i>Scaevola platyphylla</i> (Broad-leaved Fanflower)			
265.	1002 <i>Schoenus nanus</i> (Tiny Bog Rush)			
266.	1026 <i>Schoenus unispiculatus</i>			
267.	6 <i>Selaginella gracillima</i> (Tiny Clubmoss)			
268.	19453 <i>Setaria parviflora</i>	Y		
269.	8225 <i>Siloxerus humifusus</i> (Procumbent Siloxerus)			
270.	1558 <i>Sparaxis bulbifera</i>	Y		
271.	4207 <i>Sphaerolobium medium</i>			
272.	9070 <i>Stackhousia pubescens</i> (Downy Stackhousia)			
273.	7681 <i>Stylidium affine</i> (Queen Triggerplant)			
274.	7684 <i>Stylidium amoenum</i> (Lovely Triggerplant)			
275.	7693 <i>Stylidium brunonianum</i> (Pink Fountain Triggerplant)			
276.	7694 <i>Stylidium bulbiferum</i> (Circus Triggerplant)			
277.	7699 <i>Stylidium carnosum</i> (Fleshy-leaved Triggerplant)			
278.	7702 <i>Stylidium ciliatum</i> (Golden Triggerplant)			
279.	7713 <i>Stylidium dichotomum</i> (Pins-and-needles)			
280.	7716 <i>Stylidium diuroides</i> (Donkey Triggerplant)			
281.	7736 <i>Stylidium hispidum</i> (White Butterfly Triggerplant)			
282.	7752 <i>Stylidium lineatum</i> (Sunny Triggerplant)			
283.	7773 <i>Stylidium petiolare</i> (Horn Triggerplant)			
284.	7781 <i>Stylidium pubigerum</i> (Yellow Butterfly Triggerplant)			
285.	7783 <i>Stylidium pycnostachyum</i> (Downy Triggerplant)			
286.	6476 <i>Styphelia tenuiflora</i> (Common Pinheath)			
287.	12914 <i>Synaphea decorticans</i>			
288.	2323 <i>Synaphea gracillima</i>			
289.	2325 <i>Synaphea pinnata</i> (Helena Synaphea)			
290.	16839 <i>Syringa vulgaris</i>	Y		Y
291.	4251 <i>Templetonia drummondii</i>			
292.	1036 <i>Tetraria octandra</i>			
293.	667 <i>Tetrarrhena laevis</i> (Forrest Ricegrass)			
294.	4535 <i>Tetradlea hirsuta</i> (Black Eyed Susan)			
295.	1701 <i>Thelymitra antennifera</i> (Vanilla Orchid)			
296.	10856 <i>Thelymitra benthamiana</i> (Leopard Orchid)			
297.	1705 <i>Thelymitra crinita</i> (Blue Lady Orchid)			
298.	11053 <i>Thelymitra macrophylla</i>			
299.	1328 <i>Thysanotus dichotomus</i> (Branching Fringe Lily)			
300.	1338 <i>Thysanotus manglesianus</i> (Fringed Lily)			
301.	1351 <i>Thysanotus sparteus</i>			
302.	1354 <i>Thysanotus tenellus</i>			
303.	6280 <i>Trachymene pilosa</i> (Native Parsnip)			
304.	11112 <i>Tribolium uniolae</i>	Y		
305.	1483 <i>Tribonanthes longipetala</i>			
306.	8251 <i>Trichocline spathulata</i> (Native Gerbera)			
307.	1361 <i>Tricoryne elatior</i> (Yellow Autumn Lily)			
308.	1362 <i>Tricoryne humilis</i>			
309.	33677 <i>Triglochin centrocarpa</i>			
310.	4737 <i>Tripterococcus brunonis</i> (Winged Stackhousia)			
311.	13479 <i>Trymalium ledifolium</i> var. <i>rosmarinifolium</i>			
312.	8255 <i>Ursinia anthemoides</i> (Ursinia)	Y		
313.	7107 <i>Verbascum virgatum</i> (Twiggy Mullein)	Y		
314.	7111 <i>Veronica persica</i> (Creeping Speedwell)	Y		
315.	6088 <i>Verticordia huegelii</i> (Variegated Featherflower)			
316.	12429 <i>Verticordia huegelii</i> var. <i>decumbens</i>			
317.	15618 <i>Verticordia plumosa</i> var. <i>plumosa</i>			

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318.	4325 <i>Viminaria juncea</i> (Swishbush, Koweda)			
319.	724 <i>Vulpia myuros</i> (Rat's Tail Fescue)	Y		
320.	13103 <i>Watsonia borbonica</i>	Y		
321.	1253 <i>Xanthorrhoea gracilis</i> (Graceful Grass Tree, Mimidi)			
322.	1256 <i>Xanthorrhoea preissii</i> (Grass tree, Palga)			
323.	6283 <i>Xanthosia atkinsoniana</i>			
324.	6284 <i>Xanthosia candida</i>			
325.	6289 <i>Xanthosia huegelii</i>			
326.	44861 <i>Xerochrysum macranthum</i>			
327.	1049 <i>Zantedeschia aethiopica</i> (Arum Lily)	Y		

Conservation Codes

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

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



EPBC Act Protected Matters Report

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

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

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

Report created: 07/11/16 10:59:23

[Summary](#)

[Details](#)

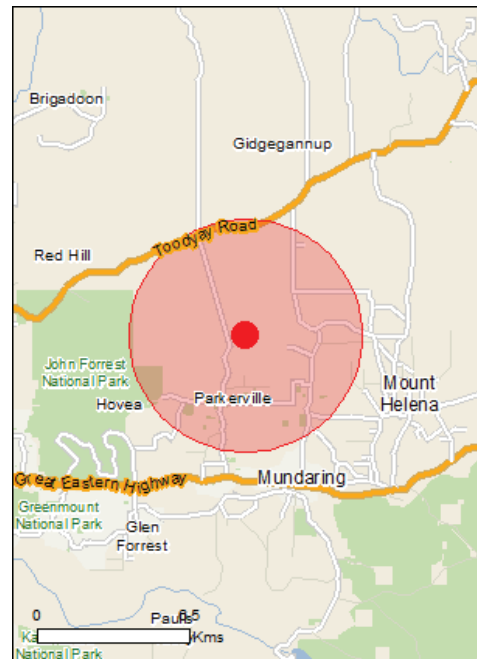
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are
©Commonwealth of Australia
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[Coordinates](#)

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	18
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	2
Regional Forest Agreements:	1
Invasive Species:	32
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [\[Resource Information \]](#)

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

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain	Endangered	Community may occur within area

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

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

Birds

Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
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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, Baudin's Black-Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Roosting known to occur within area
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Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
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Leipoa ocellata Malleefowl [934]	Vulnerable	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
---	-----------------------	--

Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
--	------------	--

Mammals

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

Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat likely to occur within area
--	------------	--

Plants

Acacia aphylla Leafless Rock Wattle [13553]	Vulnerable	Species or species habitat likely to occur within area
--	------------	--

Name	Status	Type of Presence
Anthocercis gracilis Slender Tailflower [11103]	Vulnerable	Species or species habitat likely to occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat may occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area
Grevillea christineae Christine's Grevillea [64520]	Endangered	Species or species habitat likely to occur within area
Grevillea flexuosa Zig Zag Grevillea [2957]	Vulnerable	Species or species habitat likely to occur within area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat likely to occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat 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		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat 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 -

Listed Marine Species

[\[Resource Information \]](#)

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

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
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
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [\[Resource Information \]](#)

Name	State
John Forrest	WA
Parkerville	WA

Regional Forest Agreements [\[Resource Information \]](#)

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

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

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

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
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

Name	Status	Type of Presence
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		habitat likely to occur within area Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
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 asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
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
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

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

Caveat

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-31.853 116.14685

Acknowledgements

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

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

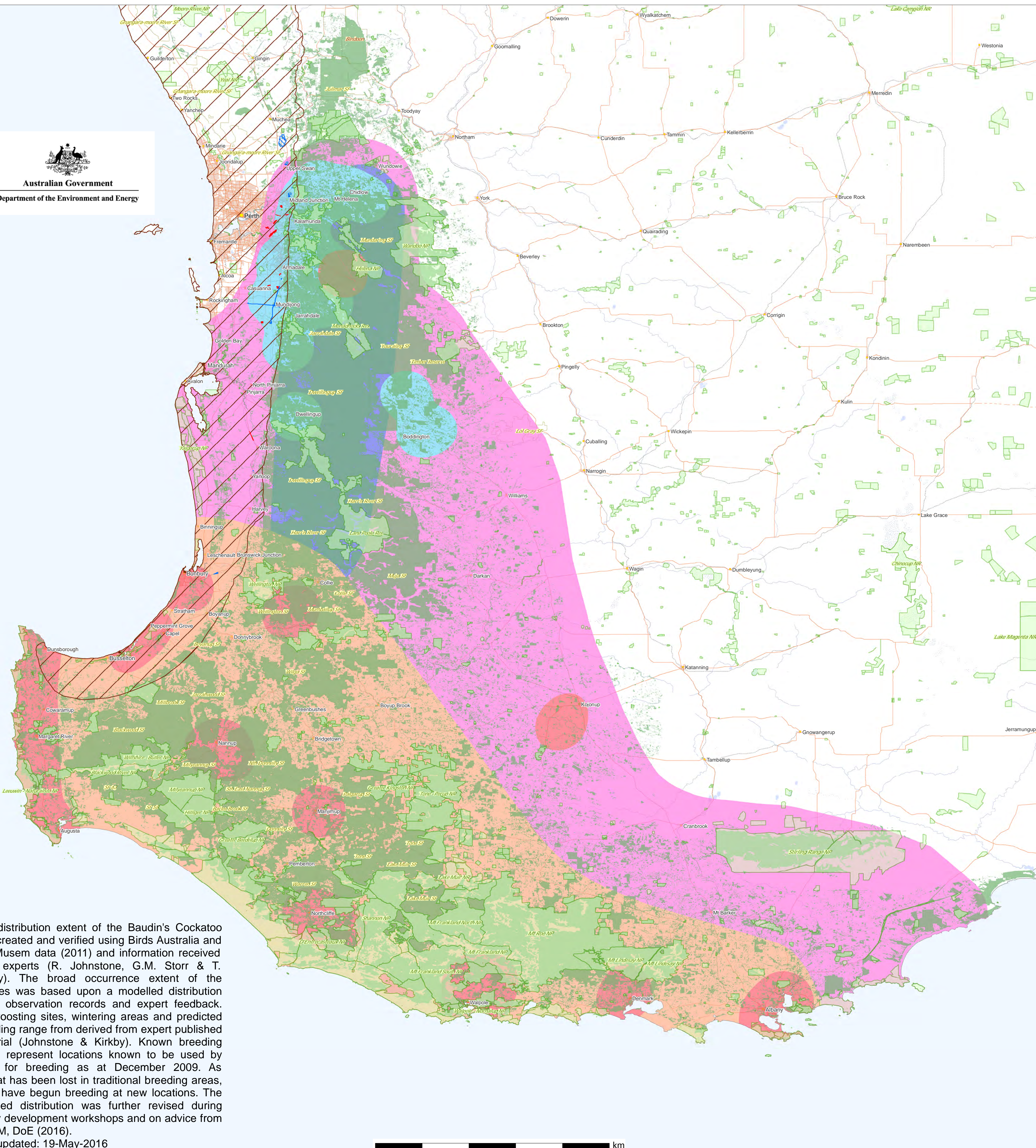
The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

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

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Appendix 3
Black Cockatoo Distribution Maps

Map 2: Modelled distribution for Baudin's Cockatoo (*Calyptorhynchus baudinii*)



The distribution extent of the Baudin's Cockatoo was created and verified using Birds Australia and WA Museum data (2011) and information received from experts (R. Johnstone, G.M. Storr & T. Kirkby). The broad occurrence extent of the species was based upon a modelled distribution using observation records and expert feedback. The roosting sites, wintering areas and predicted breeding range from derived from expert published material (Johnstone & Kirkby). Known breeding areas represent locations known to be used by birds for breeding as at December 2009. As habitat has been lost in traditional breeding areas, birds have begun breeding at new locations. The mapped distribution was further revised during policy development workshops and on advice from WHaM, DoE (2016).
Last updated: 19-May-2016



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INDICATIVE MAP ONLY: For the latest departmental information, please refer to the Protected Matters Search Tool and the Species Profiles & Threats Database at <http://www.environment.gov.au/biodiversity/threatened/index.html>

Produced by:
Environmental Resources Information Network 2016

Contextual data source:
National Vegetation Information System (NVIS 4.2) 2016
Interim Biogeographic Regionalisation for Australia (IBRA) version 7 2012
Collaborative Australian Protected Area Database (CAPAD) 2014
Geoscience Australia GEODATA TOPO 250K Topographic Data Series 3 2006

Projection: Geographic
Datum: GDA94

Ecological Communities

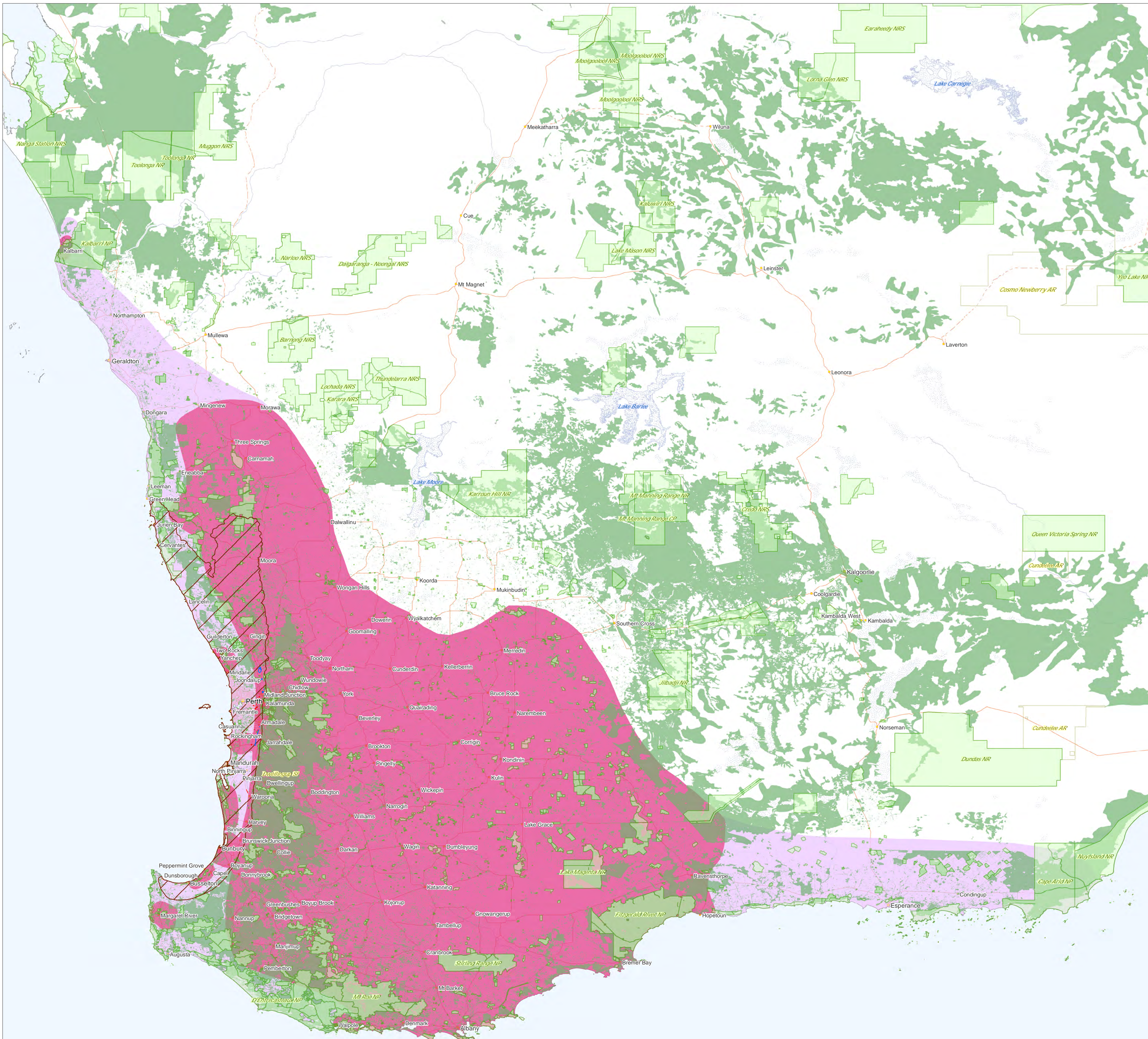
- Corymbia calophylla - Xanthorrhoea preissii woodlands and shrublands of the Swan Coastal Plain
- Corymbia calophylla - Kingia australis woodlands on heavy soils of the Swan Coastal Plain
- Banksia Woodlands of the Swan Coastal Plain
- Conservation Areas
- Jarrah, Karri and Marri (NVIS 4.2)

Species

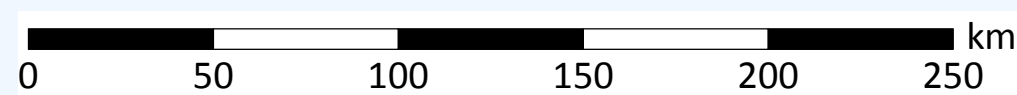
- Known Breeding Areas
- Predicted Breeding Range
- Known Foraging Areas
- Main Wintering Area
- Species Likely to Occur

- Cities & Towns
- Roads (sealed)
- Roads (unsealed)
- Railways
- State Border
- Major Rivers
- Lakes/Reservoirs
- Non-perennial Lakes

Map 3: Modelled distribution for Carnaby's Cockatoo (*Calyptorhynchus latirostris*)



The distribution extent of the Carnaby's Cockatoo was created and verified using Birds Australia and WA Museum data (2016) and information received from experts (R. Johnstone, 2011). The broad occurrence extent of the species was based upon a modelled distribution using observation records and expert feedback. The mapped distribution was revised during policy development workshops and on advice from WHaM, DoE (2016). Last updated: 19-May-2016.



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INDICATIVE MAP ONLY: For the latest departmental information, please refer to the Protected Matters Search Tool and the Species Profiles & Threats Database at <http://www.environment.gov.au/biodiversity/threatened/index.html>

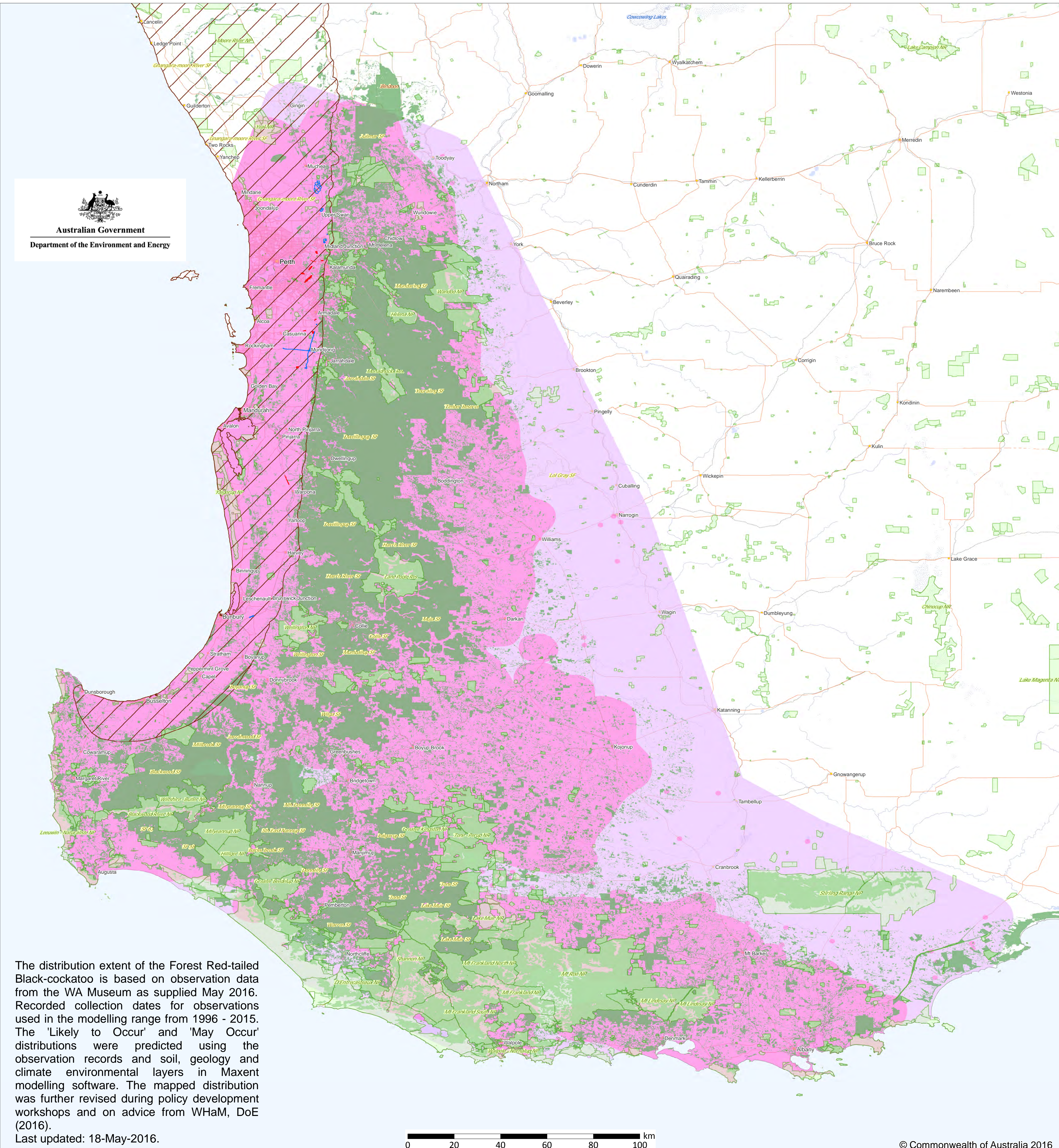
Produced by:
Environmental Resources Information Network 2016

Contextual data source:
National Vegetation Information System (NVIS 4.2) 2016
Interim Biogeographic Regionalisation for Australia (IBRA) version 7 2012
Collaborative Australian Protected Area Database (CAPAD) 2014
Geoscience Australia GEODATA TOPO 250K Topographic Data Series 3 2006

Projection: Geographic
Datum: GDA94

- | | |
|--|---------------------|
| Conservation Areas | Cities & Towns |
| Jarrah, Karri, Marri, Salmon Gum, Wandoo, Banksia, Grevillea, Dryandra and Hakea (NVIS 4.2) | Roads (sealed) |
| Species | Roads (unsealed) |
| Breeding Range | State Border |
| Non-breeding Range | Major Rivers |
| Ecological Communities | Lakes/Reservoirs |
| <i>Corymbia calophylla</i> - <i>Xanthorrhoea preissii</i> woodlands and shrublands of the Swan Coastal Plain | Non-perennial Lakes |
| <i>Corymbia calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils of the Swan Coastal Plain | |
| Banksia Woodlands of the Swan Coastal Plain | |

Map 4: Modelled distribution for Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*)

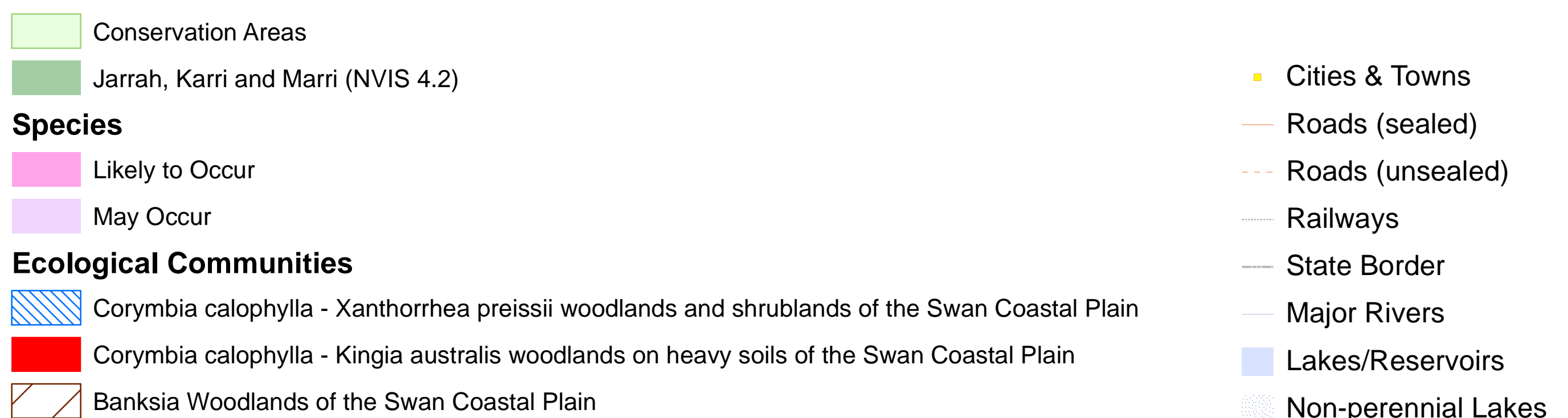


INDICATIVE MAP ONLY: For the latest departmental information, please refer to the Protected Matters Search Tool and the Species Profiles & Threats Database at <http://www.environment.gov.au/biodiversity/threatened/index.html>

Produced by:
Environmental Resources Information Network 2016

Contextual data source:
National Vegetation Information System (NVIS 4.2) 2016
Interim Biogeographic Regionalisation for Australia (IBRA) version 7 2012
Collaborative Australian Protected Area Database (CAPAD) 2014
Geoscience Australia GEODATA TOPO 250K Topographic Data Series 3 2006

Projection: Geographic
Datum: GDA94



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Appendix 4

Quadrat data and site photographs

Year: 2016

Site: 1

GPS co-ordinate

50H 419271 mE; 6476851 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Sandy loam gravel
Outcrop Laterite
Ground cover Bare ground: 4%
Litter: 40%
Condition Very Good
Fire age Not recorded

Vegetation

Eucalyptus marginata, *Corymbia calophylla* and *Banksia grandis* mid woodland to mid open forest over *Xanthorrhoea preissii*, *Leucopogon propinquus* and *Hakea amplexicaulis* sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Eucalyptus marginata</i>		40
<i>Corymbia calophylla</i>		30
<i>Persoonia elliptica</i>		3
<i>Xanthosia candida</i>		0.4
<i>Stylidium piliferum</i>		0.2
<i>Aira caryophyllea</i>		0.3
<i>Hypochaeris glabra</i>		0.3
<i>Gompholobium knightianum</i>		0.1
<i>Trachymene pilosa</i>		0.3
<i>Opercularia vaginata</i>		0.3
<i>Tetralix capillaris</i>		0.1
<i>Pentapeltis peltigera</i>		0.1
<i>Dampiera linearis</i>		0.1
<i>Thysanotus</i> sp.		0.1
<i>Hyalosperma cotula</i>		0.2
<i>Xanthosia candida</i>		0.1
<i>Lobelia</i> sp.		0.1
<i>Trifolium campestre</i>		0.05
<i>Kennedia coccinea</i>		0.05
<i>Gompholobium</i> sp.		0.2
Asteraceae sp.		0.3
<i>Levenhookia pusilla</i>		0.1

Year: 2016

Site: 2

GPS co-ordinate

50H 419901 mE; 6476542 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Sandy loam gravel
Outcrop Laterite gravel
Ground cover Bare ground: 2%
Litter: 65%
Condition Good - Very Good
Fire age Not recorded

Vegetation

Eucalyptus marginata, *Corymbia calophylla* and *Banksia grandis* mid woodland to mid open forest over *Xanthorrhoea preissii*, *Leucopogon propinquus* and *Hakea amplexicaulis* sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
Hakea amplexicaulis		4
Corymbia calophylla		25
Eucalyptus marginata		30
Ursinia anthemoides		0.8
Craspedia variabilis		0.05
Persoonia elliptica		5
Banksia grandis		3
Fabaceae sp.		0.01
Trachymene pilosa		0.2
Platysace compressa		0.05
Hibbertia huegelii		0.2
Hypochoeris glabra		0.3
Kennedia coccinea		0.05
Thysanotus sp.		0.01
Lagenophora huegelii		0.01
Acacia iteaphylla		2
Lomandra ?brittaniai		0.5

Year: 2016

Site: 3

GPS co-ordinate

50H 418663 mE; 6476200 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Sandy loam gravel
Outcrop Laterite gravel
Ground cover Bare ground: 0%
Litter: 8%
Condition Very Good - Excellent
Fire age Not recorded

Vegetation *Eucalyptus marginata*, *Corymbia calophylla* and *Banksia grandis* mid woodland to mid open forest over *Xanthorrhoea preissii*, *Leucopogon propinquus* and *Hakea amplexicaulis* sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
Corymbia calophylla		20
Eucalyptus marginata		15
Xanthorrhoea preissii		5
Grevillea wilsonii		3.5
Xanthorrhoea gracilis		60
Thysanotus sp.		0.8
Cyathochaeta avenacea		1
Haemodorum sp.		0.01
Lagenophora huegelii		0.01
Lepidosperma ?pubisquameum		0.05
Lepidosperma ?leptostachyum		0.05

Year: 2016 Site: 4
GPS co-ordinate 50H 419375 mE; 6475735 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Sandy loam gravel
Outcrop Laterite gravel, pebbles and boulders
Ground cover Bare ground: 4%
Litter: 55%
Condition Good
Fire age Not recorded

Vegetation *Eucalyptus marginata*, *Corymbia calophylla* and *Banksia grandis* mid woodland to mid open forest over *Xanthorrhoea preissii*, *Leucopogon propinquus* and *Hakea amplexicaulis* sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Eucalyptus marginata</i>		30
<i>Corymbia calophylla</i>		12
<i>Banksia grandis</i>		3
<i>Allocasuarina fraseriana</i>		4.5
<i>Leucopogon propinquus</i>		0.3
<i>Thysanotus</i> sp.		0.1
<i>Macrozamia riedlei</i>		0.4
<i>Hibbertia commutata</i>		1
<i>Hibbertia huegelii</i>		0.5
<i>Trachymene pilosa</i>		0.2
<i>Aira caryophyllea</i>		0.1
<i>Gompholobium knightianum</i>		0.01
<i>Levenhookia pusilla</i>		0.1
Asteraceae sp.		0.01
<i>Lomandra sanderi</i>		0.01
? <i>Chorizema ilicifolium</i>		0.05
<i>Pimelea</i> sp.		0.02
<i>Xanthorrhoea preissii</i>		6
Fabaceae sp.		0.01
<i>Tetragia capillaris</i>		0.02

Year: 2016 Site: 5
GPS co-ordinate 50H 418789 mE; 6475553 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Sandy loam gravel
Outcrop Laterite gravel
Ground cover Bare ground: 3%
Litter: 40%
Condition Good
Fire age Not recorded
Eucalyptus marginata, *Corymbia calophylla* mid woodland to mid open forest over sparse mixed shrubland.

Vegetation

Species List

Taxon	Height	Cover (%)
<i>Corymbia calophylla</i>		25
<i>Eucalyptus marginata</i>		50
<i>Xanthorrhoea preissii</i>		35
<i>Xanthorrhoea gracilis</i>		15
<i>Cyathochaeta avenacea</i>		10
<i>Hypochaeris glabra</i>		0.5
<i>Lagenophora huegelii</i>		0.05
<i>Trachymene pilosa</i>		0.5
<i>Hibbertia commutata</i>		0.5
<i>Briza maxima</i>		0.5
<i>Thelymitra</i> sp.		0.01
<i>Levenhookia pusilla</i>		0.1
<i>Aira caryophyllea</i>		0.5
<i>Haemodorum</i> sp.		0.01
Asteraceae sp.		0.05
<i>Ursinia anthemoides</i>		0.5
<i>Hordeum</i> sp.		0.05

Year: 2016

Site: 6

GPS co-ordinate

50H 418758 mE; 6474649 mN



Landform Plain

Slope N/A

Aspect N/A

Soils Sandy loam gravel

Outcrop Laterite gravel

Ground cover Bare ground: 0%

Litter: 75%

Condition Good

Fire age Not recorded

Eucalyptus marginata, *Corymbia calophylla* mid woodland to mid open forest over sparse mixed shrubland.

Vegetation

Species List

Taxon	Height	Cover (%)
Corymbia calophylla		35
Eucalyptus marginata		35
Hibbertia commutata		0.8
Tetragia capillaris		0.4
Xanthorrhoea preissii		4.5
Hypochaeris glabra		0.1
Briza maxima		1
Trachymene pilosa		0.5
Aira caryophyllea		0.2
Macrozamia riedlei		0.2
Lagenophora huegelii		0.08
Thysanotus sp.		0.05
Thelymitra sp.		0.01

Year: 2016

Site: 7

GPS co-ordinate

50H 420145 mE; 6474995 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Sandy loam gravel
Outcrop Laterite gravel
Ground cover Bare ground: 0%
Litter: 50%
Condition Good
Fire age Not recorded

Eucalyptus marginata, *Corymbia calophylla* mid woodland to mid open forest over *Persoonia elliptica* and *Banksia sessilis* tall sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Banksia dallanneyi* and *Desmocladius fascicularis* low herbland.

Vegetation

Species List

Taxon	Height	Cover (%)
Eucalyptus marginata		30
Corymbia calophylla		20
Xanthorrhoea preissii		12
Persoonia elliptica		3
Xanthorrhoea gracilis		5
Thysanotus sp.		0.1
Fabaceae sp.		0.01
Lechenaultia biloba		0.01
Macrozamia riedlei		0.1
Pentapeltis peltigera		0.02
Hibbertia huegelii		0.05
Hibbertia commutata		0.05
Banksia grandis		2
Tetraria capillaris		0.02

Year: 2016

Site: 8

GPS co-ordinate

50H 449976 mE; 6474909 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Sandy loam gravel
Outcrop Laterite gravel
Ground cover Bare ground: 2%
Litter: 20%
Condition Very Good - Excellent
Fire age Not recorded

Vegetation

Eucalyptus marginata, *Corymbia calophylla* and *Banksia grandis* mid woodland to mid open forest over *Xanthorrhoea preissii*, *Leucopogon propinquus* and *Hakea amplexicaulis* sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover
Eucalyptus marginata		30
Corymbia calophylla		20
Xanthorrhoea preissii		15
Clematis pubescens		0.1
Stylidium piliferum		0.1
Stylidium amoenum		0.01
Stylidium calcaratum		0.4
Grevillea wilsonii		
Cyathochaeta avenacea		0.5
Tetratheca hirsuta		0.01
Hibbertia hypericoides		6
Hibbertia commutata		2.5
Aira caryophyllea		0.3
Lagenophora huegelii		0.05
Trachymene pilosa		0.05
Hakea lissocarpha		0.2
Hibbertia huegelii		0.1
Fabaceae sp.		0.05
Opercularia vaginata		0.02
Xanthosia candida		0.05
Boronia ?ovata		0.01
Pentapeltis peltigera		0.04
Lechenaultia biloba		0.05
Dampiera linearis		0.01
Banksia dallanneyi		0.1
Isotoma hypocrateriformis		

Year: 2017

Site: QT01

GPS co-ordinate

50H 419062 mE; 6476377 mN



Landform	Plain
Slope	N/A
Aspect	N/A
Soils	Sandy loam gravel
Outcrop	Laterite
Ground cover	Bare ground: 1% Litter: 45%
Condition	Excellent
Fire age	>5 years
Disturbance notes	N/A

Vegetation

Eucalyptus marginata, *Corymbia calophylla* and *Banksia grandis* mid woodland to mid open forest over *Xanthorrhoea preissii*, *Leucopogon propinquus* and *Hakea amplexicaulis* sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Acacia stenoptera</i>	0.1	0
<i>Adenanthos barbiger</i>	0.2	0
<i>Allocasuarina fraseriana</i>	10	5
<i>Banksia dallanneyi</i>	0.2	1
<i>Banksia grandis</i>	6	10
<i>Bossiaea ornata</i>	0.1	0
<i>Chorizema ilicifolium</i>	0.1	0
<i>Corymbia calophylla</i>	20	5
<i>Dampiera linearis</i>	0.1	0
<i>Eucalyptus marginata</i>	25	25
<i>Hibbertia huegelii</i>	0.1	0
<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>	0.4	10
<i>Lomandra sonderi</i>	0.5	1
<i>Pentapeltis peltigera</i>	0.1	0
<i>Phyllanthus calycinus</i>	0.2	1
<i>Tetraria capillaris</i>	0.4	0
<i>Xanthorrhoea gracilis</i>	0.5	2
<i>Xanthorrhoea preissii</i>	1.3	2

Year: 2017

Site: QT02

GPS co-ordinate

50H 418924 mE; 6476457 mN



Landform	Plain
Slope	N/A
Aspect	N/A
Soils	Sandy loam gravel
Outcrop	Laterite
Ground cover	Bare ground: 1% Litter: 45%
Condition	Excellent
Fire age	>5 years
Disturbance notes	N/A

Vegetation

Eucalyptus marginata, *Corymbia calophylla* and *Banksia grandis* mid woodland to mid open forest over *Xanthorrhoea preissii*, *Leucopogon propinquus* and *Hakea amplexicaulis* sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Austrostipa variabilis</i>	0.3	0
<i>Banksia dallanneyi</i>	0.2	3
<i>Boronia ovata</i>	0.3	0
<i>Corymbia calophylla</i>	15	10
<i>Eucalyptus marginata</i>	20	20
<i>Gastrolobium capitatum</i>	0.2	0
<i>Grevillea wilsonii</i>	0.4	2
<i>Hakea amplexicaulis</i>	0.5	1
<i>Hibbertia huegelii</i>	0.2	0
<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>	0.4	25
<i>Lepidosperma ?leptostachyum</i>	0.4	0
<i>Leucopogon propinquus</i>	1.3	1
<i>Lomandra ?brittanii</i>	0.2	0
<i>Lomandra caespitosa</i>	0.3	1
<i>Lomandra sonderi</i>	0.3	1
<i>Neurachne alopecuroidea</i>	0.3	1
<i>Patersonia occidentalis</i>	0.5	0
<i>Persoonia elliptica</i>	6	5
<i>Phyllanthus calycinus</i>	0.3	2
<i>Pimelea suaveolens</i> subsp. <i>suaveolens</i>	0.4	0
<i>Scaevola calliptera</i>	0.2	0
<i>Styphelia tenuiflora</i>	0.2	1
<i>Tetraria capillaris</i>	0.3	1
<i>Tetraria octandra</i>	0.3	0
<i>Xanthorrhoea gracilis</i>	1	3

Year: 2017

Site: QT03

GPS co-ordinate

50H 418901 mE; 6476595 mN



Landform	Plain
Slope	N/A
Aspect	N/A
Soils	Sandy loam gravel
Outcrop	Laterite
Ground cover	Bare ground: 3% Litter: 50%
Condition	Excellent
Fire age	>5 years
Disturbance notes	N/A

Vegetation

Eucalyptus marginata, *Corymbia calophylla* and *Banksia grandis* mid woodland to mid open forest over *Xanthorrhoea preissii*, *Leucopogon propinquus* and *Hakea amplexicaulis* sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Banksia dallanneyi</i>	0.2	1
<i>Corymbia calophylla</i>	20	15
<i>Eucalyptus marginata</i>	15	15
<i>Gastrolobium capitatum</i>	0.2	0
<i>Gastrolobium capitatum</i>	0.2	1
<i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>	0.2	0
<i>Grevillea wilsonii</i>	0.3	1
<i>Hakea amplexicaulis</i>	0.4	1
<i>Hakea lissocarpha</i>	0.3	1
<i>Hibbertia huegelii</i>	0.1	0
<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>	0.3	25
<i>Phyllanthus calycinus</i>	0.2	1
<i>Pimelea suaveolens</i> subsp. <i>suaveolens</i>	0.4	1
<i>Stylidium piliferum</i>	0.1	0
<i>Styphelia tenuiflora</i>	0.2	0
<i>Tetraria capillaris</i>	0.2	0
<i>Xanthorrhoea gracilis</i>	0.5	3
<i>Xanthorrhoea preissii</i>	1.3	4

Year: 2017

Site: QT04

GPS co-ordinate

50H 418688 mE; 6476787 mN



Landform	Plain
Slope	N/A
Aspect	N/A
Soils	Sandy loam gravel
Outcrop	Laterite
Ground cover	Bare ground: 5% Litter: 60%
Condition	Excellent
Fire age	>5 years
Disturbance notes	Some isolated bare areas, possible historical clearing

Vegetation *Eucalyptus marginata*, *Corymbia calophylla* and *Banksia grandis* mid woodland to mid open forest over *Xanthorrhoea preissii*, *Leucopogon propinquus* and *Hakea amplexicaulis* sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Acacia stenoptera</i>	0.1	0
<i>Banksia dallanneyi</i>	0.2	1
<i>Boronia ovata</i>	0.1	0
<i>Conostylis setosa</i>	0.1	0
<i>Corymbia calophylla</i>	15	8
<i>Dampiera linearis</i>	0.1	0
<i>Eucalyptus marginata</i>	20	20
<i>Gastrolobium capitatum</i>	0.2	1
<i>Gompholobium polymorphum</i>	0.1	0
<i>Hakea amplexicaulis</i>	0.4	1
<i>Hakea lissocarpha</i>	0.4	2
<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>	0.4	15
<i>Lomandra ?brittanii</i>	0.2	0
<i>Lomandra caespitosa</i>	0.3	1
<i>Lomandra sonderi</i>	0.4	2
<i>Neurachne alopecuroidea</i>	0.3	0
<i>Pentapeltis peltigera</i>	0.1	0
<i>Phyllanthus calycinus</i>	0.2	1
<i>Scaevola calliptera</i>	0.2	0
<i>Stylidium piliferum</i>	0.1	0
<i>Tetragia capillaris</i>	0.4	2
<i>Xanthorrhoea gracilis</i>	0.6	1
<i>Xanthorrhoea preissii</i>	1.3	5

Year: 2017 Site: QT05
 GPS co-ordinate 50H 418509 mE; 6477084 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Sandy loam gravel
Outcrop Laterite
Ground cover Bare ground: 5%
 Litter: 60%
Condition Very Good
Fire age >5 years
Disturbance notes Historical clearing

Vegetation *Eucalyptus marginata*, *Corymbia calophylla* and *Banksia grandis* mid woodland to mid open forest over *Xanthorrhoea preissii*, *Leucopogon propinquus* and *Hakea amplexicaulis* sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Banksia dallanneyi</i>	0.2	2
<i>Corymbia calophylla</i>	15	8
<i>Desmocladius fasciculatus</i>	0.1	3
<i>Eucalyptus marginata</i>	15	20
<i>Gastrolobium capitatum</i>	0.2	0
<i>Grevillea wilsonii</i>	0.3	2
<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>	0.3	10
<i>Lepidosperma ?leptostachyum</i>	0.5	0
<i>Lomandra caespitosa</i>	0.2	1
<i>Lomandra hermaphrodita</i>	0.2	0
<i>Lomandra sonderi</i>	0.3	1
<i>Neurachne alopecuroidea</i>	0.2	0
<i>Pentapeltis peltigera</i>	0.1	0
<i>Scaevola calliptera</i>	0.2	1
<i>Thysanotus</i> sp.	0.3	0
<i>Xanthorrhoea gracilis</i>	1	2
<i>Xanthorrhoea preissii</i>	1.3	5

Year: 2017 Site: QT06
 GPS co-ordinate 50H 418326 mE; 6477057 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Sandy loam gravel
Outcrop Laterite
Ground cover Bare ground: 5%
 Litter: 65%
Condition Excellent
Fire age >5 years
Disturbance notes N/A

Vegetation *Eucalyptus marginata*, *Corymbia calophylla* mid woodland to mid open forest over *Persoonia elliptica* and *Banksia sessilis* tall sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Banksia dallanneyi* and *Desmocladius fascicularis* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Corymbia calophylla</i>	15	10
<i>Eucalyptus marginata</i>	15	20
<i>Persoonia elliptica</i>	5	5
<i>Banksia sessilis</i>	3	5
<i>Xanthorrhoea gracilis</i>	1	2
<i>Xanthorrhoea preissii</i>	1	10
<i>Lepidosperma ?leptostachyum</i>	0.5	1
<i>Macrozamia riedlei</i>	0.5	1
<i>Pimelea suaveolens</i> subsp. <i>suaveolens</i>	0.4	0
<i>Styphelia tenuiflora</i>	0.4	1
<i>Cyathochaeta avenacea</i>	0.3	0
<i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>	0.3	1
<i>Grevillea wilsonii</i>	0.3	0
<i>Lomandra sonderi</i>	0.3	0
<i>Banksia dallanneyi</i>	0.2	2
<i>Hibbertia commutata</i>	0.2	0
<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>	0.2	5
<i>Lechenaultia biloba</i>	0.2	1
<i>Lomandra ?brittanii</i>	0.2	0
<i>Neurachne alopecuroidea</i>	0.2	1
<i>Scaevola calliptera</i>	0.2	0
<i>Tetragia capillaris</i>	0.2	1
<i>Desmocladius fasciculatus</i>	0.1	1
<i>Pentapeltis peltigera</i>	0.1	0
<i>Xanthosia candida</i>	0.1	0

Year: 2017

Site: QT07

GPS co-ordinate

50H 418373 mE; 6476719 mN



Landform	Plain
Slope	N/A
Aspect	N/A
Soils	Sandy loam gravel
Outcrop	Laterite
Ground cover	Bare ground: 2% Litter: 60%
Condition	Excellent
Fire age	>5 years
Disturbance notes	N/A

Vegetation

Eucalyptus marginata, *Corymbia calophylla* mid woodland to mid open forest over *Persoonia elliptica* and *Banksia sessilis* tall sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Banksia dallanneyi* and *Desmocladius fascicularis* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Eucalyptus marginata</i>	20	20
<i>Corymbia calophylla</i>	15	10
<i>Banksia sessilis</i>	3	2
<i>Xanthorrhoea preissii</i>	1.3	8
<i>Lepidosperma ?pubisquameum</i>	0.7	0
<i>Cyathochaeta avenacea</i>	0.5	5
<i>Hakea amplexicaulis</i>	0.5	1
<i>Patersonia occidentalis</i>	0.4	0
<i>Lomandra sonderi</i>	0.3	1
<i>Platysace compressa</i>	0.3	0
<i>Tetraria capillaris</i>	0.3	1
<i>Banksia dallanneyi</i>	0.2	1
<i>Conostylis setosa</i>	0.2	0
<i>Desmocladius fasciculatus</i>	0.2	2
<i>Gastrolobium capitatum</i>	0.2	1
<i>Loxocarya cinerea</i>	0.2	5
<i>Pentapeltis peltigera</i>	0.1	0
<i>Stylidium amoenum</i>	0.1	0
<i>Stylidium piliferum</i>	0.1	8

Year: 2017

Site: QT08

GPS co-ordinate

50H 418527 mE; 6476524 mN



Landform	Plain
Slope	N/A
Aspect	N/A
Soils	Sandy loam gravel
Outcrop	Laterite
Ground cover	Bare ground: 5% Litter: 50%
Condition	Excellent
Fire age	>5 years
Disturbance notes	N/A

Vegetation *Eucalyptus marginata*, *Corymbia calophylla* and *Banksia grandis* mid woodland to mid open forest over *Xanthorrhoea preissii*, *Leucopogon propinquus* and *Hakea amplexicaulis* sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Eucalyptus marginata</i>	18	20
<i>Corymbia calophylla</i>	15	5
<i>Xanthorrhoea preissii</i>	1.3	10
<i>Xanthorrhoea gracilis</i>	1	5
<i>Styphelia tenuiflora</i>	0.5	1
<i>Cyathochaeta avenacea</i>	0.4	5
<i>Grevillea wilsonii</i>	0.4	2
<i>Lomandra sonderi</i>	0.4	1
<i>Banksia dallanneyi</i>	0.2	2
<i>Phyllanthus calycinus</i>	0.2	1
<i>Ptilotus drummondii</i>	0.2	8
<i>Gastrolobium capitatum</i>	0.1	0
<i>Grevillea synapheae</i> subsp. <i>synapheae</i>	0.1	0
<i>Stylidium amoenum</i>	0.1	0
<i>Templetonia drummondii</i>	0	0

Year: 2017

Site: QT09

GPS co-ordinate

50H 418527 mE; 6476307 mN



Landform	Plain
Slope	N/A
Aspect	N/A
Soils	Sandy loam gravel
Outcrop	Laterite
Ground cover	Bare ground: 5% Litter: 60%
Condition	Very Good - Excellent
Fire age	>5
Disturbance notes	N/A

Vegetation

Eucalyptus marginata, *Corymbia calophylla*, *Allocasuarina fraseriana* mid woodland to mid open forest over *Xanthorrhoea preissii* and *Xanthorrhoea gracilis* sparse low shrubland over *Grevillea wilsonii*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Corymbia calophylla</i>	15	5
<i>Eucalyptus marginata</i>	15	15
<i>Allocasuarina fraseriana</i>	10	10
<i>Xanthorrhoea gracilis</i>	1	5
<i>Austrostipa campylachne</i>	0.5	0
<i>Cyathochaeta avenacea</i>	0.5	1
<i>Grevillea wilsonii</i>	0.4	2
<i>Lomandra sonderi</i>	0.4	2
<i>Phyllanthus calycinus</i>	0.4	3
<i>Platysace compressa</i>	0.3	0
<i>Tetraria capillaris</i>	0.3	1
<i>Thysanotus sp.</i>	0.3	0
<i>Adenanthos barbiger</i>	0.2	1
<i>Hibbertia commutata</i>	0.2	0
<i>Templetonia drummondii</i>	0.1	0
<i>Pentapeltis peltigera</i>	0	0
<i>Stylidium amoenum</i>	0	0

Year: 2017

Site: QT10

GPS co-ordinate

50H 419228 mE; 6476637 mN



Landform	Plain
Slope	N/A
Aspect	N/A
Soils	Sandy loam gravel
Outcrop	Laterite
Ground cover	Bare ground: 30% Litter: 40%
Condition	Very Good
Fire age	2
Disturbance notes	Possible dieback and recent fire

Vegetation *Eucalyptus marginata*, *Corymbia calophylla* and *Banksia grandis* mid woodland to mid open forest over *Xanthorrhoea preissii*, *Leucopogon propinquus* and *Hakea amplexicaulis* sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Corymbia calophylla</i>	15	10
<i>Eucalyptus marginata</i>	15	20
<i>Banksia grandis</i>	4	5
<i>Xanthorrhoea preissii</i>	1.3	5
<i>Xanthorrhoea gracilis</i>	1	3
<i>Hakea amplexicaulis</i>	0.4	1
<i>Adenanthos barbiger</i>	0.3	1
<i>Grevillea wilsonii</i>	0.3	1
<i>Platysace compressa</i>	0.3	0
<i>Banksia dallanneyi</i>	0.2	5
<i>Chorizema ilicifolium</i>	0.2	0
<i>Gastrolobium capitatum</i>	0.2	0
<i>Hibbertia huegelii</i>	0.2	0
<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>	0.2	3
<i>Opercularia vaginata</i>	0.2	1
<i>Scaevola calliptera</i>	0.2	0
<i>Tetrarrhena laevis</i>	0.2	0
<i>Conostylis setosa</i>	0.1	0
<i>Desmocladius fasciculatus</i>	0.1	1
<i>Gompholobium polymorphum</i>	0.1	0
<i>Pentapeltis peltigera</i>	0.1	0
<i>Kennedia coccinea</i>	0	0
<i>Stylidium piliferum</i>	0	0

Year: 2017

Site: QT11

GPS co-ordinate

50H 419347 mE; 6476470 mN



Landform	Plain
Slope	N/A
Aspect	N/A
Soils	Sandy loam gravel
Outcrop	Laterite
Ground cover	Bare ground: 25% Litter: 45%
Condition	Very Good
Fire age	2
Disturbance notes	Possible dieback and recent fire

Vegetation *Eucalyptus marginata*, *Corymbia calophylla* mid woodland to mid open forest over *Persoonia elliptica* and *Banksia sessilis* tall sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Banksia dallanneyi* and *Desmocladus fascicularis* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Corymbia calophylla</i>	15	10
<i>Eucalyptus marginata</i>	15	20
<i>Banksia grandis</i>	4	7
<i>Persoonia elliptica</i>	4	2
<i>Hibbertia commutata</i>	0.3	1
<i>Banksia dallanneyi</i>	0.2	3
<i>Gastrolobium capitatum</i>	0.2	0
<i>Lomandra caespitosa</i>	0.2	1
<i>Neurachne alopecuroidea</i>	0.2	0
<i>Opercularia vaginata</i>	0.2	2
<i>Phyllanthus calycinus</i>	0.2	1
<i>Platysace compressa</i>	0.2	1
<i>Tetragia capillaris</i>	0.2	1
<i>Pentapeltis peltigera</i>	0.1	0
<i>Stylidium piliferum</i>	0.1	0
<i>Tettrarrhena laevis</i>	0.1	0
<i>Tetratea hirsuta</i> subsp. <i>hirsuta</i>	0.1	0
<i>Stylidium amoenum</i>	0	0

Year: 2017

Site: QT12

GPS co-ordinate

50H 419389 mE; 6476350 mN



Landform	Plain
Slope	N/A
Aspect	N/A
Soils	Sandy loam gravel
Outcrop	Laterite
Ground cover	Bare ground: 20% Litter: 50%
Condition	Very Good
Fire age	2
Disturbance notes	Possible dieback and recent fire

Vegetation *Eucalyptus marginata*, *Corymbia calophylla*, *Allocasuarina fraseriana* mid woodland to mid open forest over *Xanthorrhoea preissii* and *Xanthorrhoea gracilis* sparse low shrubland over *Grevillea wilsonii*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Eucalyptus marginata</i>	18	30
<i>Allocasuarina fraseriana</i>	10	15
<i>Banksia grandis</i>	5	6
<i>Trymalium ledifolium</i> var. <i>rosmarinifolium</i>	0.5	1
<i>Hibbertia commutata</i>	0.4	1
<i>Lomandra sonderi</i>	0.3	1
<i>Platysace compressa</i>	0.3	1
<i>Tetragia capillaris</i>	0.3	1
<i>Gastrolobium capitatum</i>	0.2	1
<i>Hibbertia huegelii</i>	0.2	1
<i>Opercularia vaginata</i>	0.2	2
<i>Scaevola calliptera</i>	0.2	8
<i>Tetrarrhena laevis</i>	0.2	0
<i>Dampiera linearis</i>	0.1	0
<i>Trichocline spathulata</i>	0	0

Year: 2017

Site: QT13

GPS co-ordinate

50H 419604 mE; 6476315 mN



Landform	Plain
Slope	N/A
Aspect	N/A
Soils	Sandy loam gravel
Outcrop	Laterite
Ground cover	Bare ground: 15% Litter: 65%
Condition	Very Good
Fire age	3
Disturbance notes	N/A

Vegetation

Eucalyptus marginata, *Corymbia calophylla* and *Banksia grandis* mid woodland to mid open forest over *Xanthorrhoea preissii*, *Leucopogon propinquus* and *Hakea amplexicaulis* sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Corymbia calophylla</i>	15	10
<i>Eucalyptus marginata</i>	15	20
<i>Xanthorrhoea gracilis</i>	0.7	5
<i>Austrostipa campylachne</i>	0.4	0
<i>Lomandra caespitosa</i>	0.3	1
<i>Platysace compressa</i>	0.3	0
<i>Hibbertia lasiopus</i>	0.2	0
<i>Hypochaeris glabra</i>	0.2	0
<i>Lechenaultia biloba</i>	0.2	0
<i>Scaevola calliptera</i>	0.2	1
<i>Gompholobium polymorphum</i>	0.1	0
<i>Neurachne alopecuroidea</i>	0.1	0
<i>Opercularia vaginata</i>	0.1	1
<i>Stylidium piliferum</i>	0.1	0
<i>Tetrarrhena laevis</i>	0.1	1

Year: 2017

Site: QT14

GPS co-ordinate

50H 419772 mE; 6476307 mN



Landform	Plain
Slope	N/A
Aspect	N/A
Soils	Sandy loam gravel
Outcrop	Laterite
Ground cover	Bare ground: 20%
	Litter: 60%
Condition	Very Good
Fire age	3
Disturbance notes	Potential dieback and recent fire

Vegetation *Eucalyptus marginata*, *Corymbia calophylla*, *Allocasuarina fraseriana* mid woodland to mid open forest over *Xanthorrhoea preissii* and *Xanthorrhoea gracilis* sparse low shrubland over *Grevillea wilsonii*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Allocasuarina fraseriana</i>	10	7
<i>Banksia grandis</i>	5	7
<i>Chorizema ilicifolium</i>	0.2	0
<i>Corymbia calophylla</i>	15	2
<i>Eucalyptus marginata</i>	15	20
<i>Hakea lissocarpa</i>	0.3	0
<i>Hibbertia lasiopus</i>	0.1	0
<i>Lomandra ?brittanii</i>	0.2	0
<i>Opercularia vaginata</i>	0.2	1
<i>Pimelea suaveolens</i> subsp. <i>suaveolens</i>	0.3	0
<i>Platysace compressa</i>	0.4	1
<i>Tetrarrhena laevis</i>	0.3	1
<i>Trichocline spathulata</i>	0.1	0
<i>Trymalium ledifolium</i> var. <i>rosmarinifolium</i>	0.4	2
<i>Xanthorrhoea preissii</i>	1	2
<i>Xanthosia candida</i>	0	0

Year: 2017

Site: QT15

GPS co-ordinate

50H 418658 mE; 6474653 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Brown sandy loam
Outcrop N/A
Ground cover Bare ground: 1%
Litter: 95%
Condition Degraded - Completely Degraded
Fire age 5
Disturbance notes No understorey - grazing

Vegetation *Eucalyptus marginata*, *Corymbia calophylla*, *Allocasuarina fraseriana* mid woodland to mid open forest over *Xanthorrhoea preissii* and *Xanthorrhoea gracilis* sparse low shrubland over *Grevillea wilsonii*, *Lomandra sonderi* and *Phyllanthus calycinus* low herbland.

Species List

Taxon	Height	Cover (%)
<i>Allocasuarina fraseriana</i>	10	25
<i>Corymbia calophylla</i>	18	10
<i>Eucalyptus marginata</i>	20	20
<i>Trichocline spathulata</i>	0.1	0
<i>Xanthorrhoea preissii</i>	1.5	1

Year: 2017

Site: QT16

GPS co-ordinate

50H 418728 mE; 6474664 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Brown sandy loam
Outcrop Laterite
Ground cover Bare ground: 1%
Litter: 95%
Condition Degraded - Completely Degraded
Fire age 5
Disturbance notes No understorey - grazing

Vegetation *Eucalyptus marginata*, *Corymbia calophylla* mid woodland to mid open forest over sparse mixed shrubland.

Species List

Taxon	Height	Cover (%)
<i>Briza maxima</i>	0.1	1
<i>Corymbia calophylla</i>	15	15
<i>Eucalyptus marginata</i>	15	15
<i>Hibbertia commutata</i>	0.3	1
<i>Hypochaeris glabra</i>	0	0
<i>Lomandra ?brittanii</i>	0.2	0

Year: 2017

Site: QT17

GPS co-ordinate

50H 418873 mE; 6474904 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Brown sandy loam gravel
Outcrop Laterite
Ground cover Bare ground: 15%
Litter: 80%
Condition Degraded - Completely Degraded
Fire age 5
Disturbance notes No understorey - grazing

Vegetation *Eucalyptus marginata*, *Corymbia calophylla* mid woodland to mid open forest over sparse mixed shrubland.

Species List

Taxon	Height	Cover (%)
<i>Eucalyptus marginata</i>	15	25
<i>Corymbia calophylla</i>	12	6
<i>Banksia grandis</i>	7	5
<i>Xanthorrhoea preissii</i>	1.5	2
<i>Macrozamia riedlei</i>	0.4	0
<i>Hibbertia commutata</i>	0.2	2
<i>Neurachne alopecuroidea</i>	0.1	0
<i>Clematis pubescens</i>	0	1

Year: 2017

Site: QT18

GPS co-ordinate

50H 419003 mE; 6474909 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Brown sandy loam gravel
Outcrop Laterite
Ground cover Bare ground: 20%
Litter: 75%
Condition Degraded - Completely Degraded
Fire age 5
Disturbance notes No understorey - grazing

Vegetation *Eucalyptus marginata*, *Corymbia calophylla* mid woodland to mid open forest over sparse mixed shrubland.

Species List

Taxon	Height	Cover (%)
<i>Corymbia calophylla</i>	15	5
<i>Eucalyptus marginata</i>	15	25
<i>Hibbertia commutata</i>	0.2	1
<i>Lomandra caespitosa</i>	0.3	0
<i>Macrozamia riedlei</i>	0.5	1
<i>Neurachne alopecuroidea</i>	0.1	1
<i>Stylidium amoenum</i>	0.1	0
<i>Tetrarrhena laevis</i>	0.2	0

Year: 2017 Site: QT19
GPS co-ordinate 50H 419283 mE; 6474461 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Brown sandy loam gravel
Outcrop Laterite
Ground cover Bare ground: 45%
 Litter: 40%
Condition Good - Degraded
Fire age 0
Disturbance notes Cleared understorey in parts

Vegetation *Eucalyptus marginata*, *Corymbia calophylla* mid woodland to mid open forest over sparse mixed shrubland.

Species List

Taxon	Height	Cover (%)
<i>Eucalyptus marginata</i>	18	20
<i>Corymbia calophylla</i>	15	15
<i>Xanthorrhoea preissii</i>	1.3	5
<i>Macrozamia riedlei</i>	0.5	1
<i>Lomandra sonderi</i>	0.4	1
<i>Adenanthos barbiger</i>	0.3	0
<i>Neurachne alopecuroidea</i>	0.3	1
<i>Opercularia vaginata</i>	0.3	8
<i>Tetraria capillaris</i>	0.3	1
<i>Briza maxima</i>	0.2	1
<i>Hypochaeris glabra</i>	0.2	0
<i>Kennedia prostrata</i>	0	1

Year: 2017

Site: QT20

GPS co-ordinate

50H 419493 mE; 6474804 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Brown sandy loam gravel
Outcrop Laterite
Ground cover Bare ground: 2%
Litter: 93%
Condition Degraded - Completely Degraded
Fire age 5
Disturbance notes N/A

Vegetation *Eucalyptus marginata*, *Corymbia calophylla* mid woodland to mid open forest over sparse mixed shrubland.

Species List

Taxon	Height	Cover (%)
<i>Corymbia calophylla</i>	15	25
<i>Eucalyptus marginata</i>	18	15
<i>Haemodorum</i> sp.	0.3	1
<i>Hakea lissocarpa</i>	0.5	3
<i>Hordeum</i> sp.	0.2	1
<i>Tetraria capillaris</i>	0.3	1

Year: 2017

Site: QT21

GPS co-ordinate

50H 419615 mE; 6474806 mN



Landform Plain
Slope N/A
Aspect N/A
Soils Red-brown loam
Outcrop N/A
Ground cover Bare ground: 20%
Litter: 60%
Condition Degraded
Fire age 5
Disturbance notes N/A

Vegetation

Eucalyptus marginata, *Corymbia calophylla* mid woodland to mid open forest over sparse mixed shrubland.

Species List

Taxon	Height	Cover (%)
<i>Briza maxima</i>	0.1	1
<i>Corymbia calophylla</i>	18	20
<i>Cynodon dactylon</i>	0	10
<i>Taxandria linearifolia</i>	2.5	40

Appendix 5
Vascular plant taxa recorded from
quadrats within the survey area

Family	Species
Amaranthaceae	<i>Ptilotus drummondii</i>
Apiaceae	<i>Pentapeltis peltigera</i>
Amaranthaceae	<i>Ptilotus drummondii</i>
Apiaceae	<i>Pentapeltis peltigera</i>
	<i>Platysace compressa</i>
	<i>Xanthosia candida</i>
Apocynaceae	* <i>Gomphocarpus fruticosus</i>
Araceae	* <i>Zantedeschia aethiopica</i>
Araliaceae	<i>Trachymene pilosa</i>
Asparagaceae	<i>Lomandra ?brittanii</i>
	<i>Lomandra caespitosa</i>
	<i>Lomandra hermaphrodita</i>
	<i>Lomandra sonderi</i>
	<i>Thysanotus</i> sp.
Asteraceae	* <i>Craspedia variabilis</i>
	<i>Hyalosperma cotula</i>
	* <i>Hypochaeris glabra</i>
	<i>Lagenophora huegelii</i>
	<i>Trichocline spathulata</i>
	* <i>Ursinia anthemoides</i>
Campanulaceae	<i>Isotoma hypocrateriformis</i>
	<i>Lobelia</i> sp.
Casuarinaceae	<i>Allocasuarina fraseriana</i>
Cyperaceae	<i>Cyathochaeta avenacea</i>
	<i>Lepidosperma ?leptostachyum</i>
	<i>Lepidosperma ?pubisquameum</i>
	<i>Tetralia capillaris</i>
	<i>Tetralia octandra</i>
Dilleniaceae	<i>Hibbertia commutata</i>
	<i>Hibbertia huegelii</i>
	<i>Hibbertia hypericoides</i>
	<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>
	<i>Hibbertia lasiopus</i>
Elaeocarpaceae	<i>Tetralia hirsuta</i>
	<i>Tetralia hirsuta</i> subsp. <i>hirsuta</i>
Ericaceae	<i>Leucopogon propinquus</i>
	<i>Styphelia tenuiflora</i>
Fabaceae	<i>Acacia stenoptera</i>
	* <i>Acacia iteaphylla</i>
	<i>Bossiaea ornata</i>
	<i>Chorizema ilicifolium</i>

Family	Species
	<i>Gastrolobium capitatum</i>
	<i>Gompholobium polymorphum</i>
	<i>Kennedia coccinea</i>
	<i>Kennedia prostrata</i>
	<i>Templetonia drummondii</i>
	* <i>Trifolium campestre</i>
Goodeniaceae	<i>Dampiera linearis</i>
	<i>Lechenaultia biloba</i>
	<i>Scaevola calliptera</i>
Haemodoraceae	<i>Conostylis setosa</i>
	<i>Haemodorum</i> sp.
Iridaceae	<i>Patersonia occidentalis</i>
Myrtaceae	<i>Corymbia calophylla</i>
	<i>Eucalyptus marginata</i>
	<i>Taxandria linearifolia</i>
Orchidaceae	<i>Thelymitra</i> sp.
Phyllanthaceae	<i>Phyllanthus calycinus</i>
Poaceae	* <i>Aira caryophyllea</i>
	* <i>Briza maxima</i>
	<i>Austrostipa campylachne</i>
	<i>Austrostipa variabilis</i>
	<i>Cynodon dactylon</i>
	<i>Hordeum</i> sp.
	<i>Neurachne alopecuroidea</i>
	<i>Tetrarrhena laevis</i>
Proteaceae	<i>Adenanthos barbiger</i>
	<i>Banksia dallanneyi</i>
	<i>Banksia grandis</i>
	<i>Banksia sessilis</i>
	<i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>
	<i>Grevillea synapheae</i> subsp. <i>synapheae</i>
	<i>Grevillea wilsonii</i>
	<i>Hakea amplexicaulis</i>
	<i>Hakea lissocarpha</i>
	<i>Persoonia elliptica</i>
Ranunculaceae	<i>Clematis pubescens</i>
Restionaceae	<i>Desmocladius fasciculatus</i>
	<i>Loxocarya cinerea</i>
	<i>Macrozamia riedlei</i>
Rhamnaceae	<i>Trymalium ledifolium</i> var. <i>rosmarinifolium</i>
Rubiaceae	<i>Opercularia vaginata</i>

Family	Species
Rutaceae	<i>Boronia ovata</i>
Stylidiaceae	<i>Levenhookia pusilla</i>
	<i>Stylidium amoenum</i>
	<i>Stylidium calcaratum</i>

Appendix 6
Fauna habitat assessment sheets

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA1

Project Number: SPG17482

Date: 30/10/2017

Easting: 418243

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing:6477046

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Marri, Jarrah		16	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey	<i>Banksia sessilis</i>		3	0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover	<i>Xanthorrhoea preissi</i>		1.5	0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	
Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%						

MICROHABITATS									
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Prescence	0 none	1 rare	2 moderate	3 common
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common

SPECIES			
Black Cockatoo Foraging Habitat			
Species:	% cover		Hollows:
3 x Jarrah > 500mm DBH			Small (<120mm) 0
1 x Marri > 500mm DBH			Large (>120mm) 0
Birds	Mammals		Reptiles
Chewed Marri nuts (FRTBC)			

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA2

Project Number: SPG17482

Date: 30/10/2017

Easting: 418623

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6476689

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Marri, Jarrah						
				16	0 <5%	1 <20%	2 20-60%	3 60-100%	
	Other Grassland	Midstorey	<i>Allocasuarina fraseriana,</i> <i>Banksia sessilis</i>	3	0 <5%	1 <20%	2 20-60%	3 60-100%	
	Euc Woodland	Ground Cover	<i>Xanthorrhoea preissi</i>	1.5	0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%					
MICROHABITATS									
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common
SPECIES									
Black Cockatoo Foraging Habitat									
Species:			% cover			Hollows:			
4 x Jarrah > 500mm DBH						Small (<120mm)		1	
4 x Marri > 500mm DBH			Foraging evidence (FRTBC)						
						Large (>120mm)		0	
Birds			Mammals				Reptiles		

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA3

Project Number: SPG17482

Date: 30/10/2017

Easting: 418503

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6476369

E

SE

W

N/A



Soil Texture

sand

sandy-loam

loam

cracking clay

clay

VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah						
				15	0 <5%	1 <20%	2 20-60%	3 60-100%	
	Other Grassland	Midstorey	<i>Allocasuarina fraseriana</i> , <i>Banksia sessilis</i>		6	0 <5%	1 <20%	2 20-60%	3 60-100%
	Euc Woodland	Ground Cover	<i>Xanthorrhoea preissi</i>		1.5	0 <5%	1 <20%	2 20-60%	3 60-100%

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild (Fire)	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Log have no hollows					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common	
SPECIES										
Black Cockatoo Foraging Habitat										
Species:					% cover			Hollows:		
5 x Jarrah > 500mm DBH								Small (<120mm)		0
								Large (>120mm)		0
Birds					Mammals				Reptiles	

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA4

Project Number: SPG17482

Date: 30/10/2017

Easting: 418593

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6476411

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah		16	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey	<i>Allocasuarina fraseriana, Banksia sessilis, Banksia grandis</i>	3	0 <5%	1 <20%	2 20-60%	3 60-100%		
Euc Woodland	Ground Cover	<i>Xanthorrhoea preissi</i>	1.5	0 <5%	1 <20%	2 20-60%	3 60-100%		

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

0 heavy	1 medium	2 mild	3 none	0 heavy	1 medium	2 mild	3 none
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Log have no hollows					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common	
SPECIES										
Black Cockatoo Foraging Habitat										
Species:			% cover			Hollows:				
2 x Jarrah > 500mm DBH						Small (<120mm)		0		
						Large (>120mm)		0		
Birds			Mammals				Reptiles			

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA5

Project Number: SPG17482

Date: 30/10/2017

Easting: 418909

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6476395

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah and Marri		15	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey	Banksia sp.		3	0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover	<i>Xanthorrhoea preissi</i>			0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Log have no hollows					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common	
SPECIES										
Black Cockatoo Foraging Habitat										
Species:			% cover			Hollows:				
6 x Jarrah > 500mm DBH						Small (<120mm)		0		
1 x Marri > 500mm DBH						Large (>120mm)		0		
Birds			Mammals				Reptiles			

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA6

Project Number: SPG17482

Date: 30/10/2017

Easting: 418585

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6475943

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah and Marri		15	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey				0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover	<i>Xanthorrhoea preissi</i>		1.5	0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Log have no hollows					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common	
SPECIES										
Black Cockatoo Foraging Habitat										
Species:			% cover			Hollows:				
2 x Jarrah > 500mm DBH						Small (<120mm)		0		
3 x Marri > 500mm DBH						Large (>120mm)		0		
Birds			Mammals				Reptiles			

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA7

Project Number: SPG17482

Date: 30/10/2017

Easting: 418919

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6474930

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah and Marri		16	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey				0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover				0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Log have no hollows					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Prescence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common	
SPECIES										
Black Cockatoo Foraging Habitat										
Species:			% cover			Hollows:				
6 x Jarrah > 500mm DBH						Small (<120mm)		2		
4 x Marri > 500mm DBH						Large (>120mm)		3		
Birds			Mammals				Reptiles			
Cockatoos overhead (FRTBC) and chewed marri nuts										

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA8

Project Number: SPG17482

Date: 30/10/2017

Easting: 418745

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6474711

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah and Marri		16	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey				0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover				0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Log have no hollows					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common	
SPECIES										
Black Cockatoo Foraging Habitat										
Species:					% cover			Hollows:		
1 x Jarrah > 500mm DBH								Small (<120mm)		0
1 x Marri > 500mm DBH								Large (>120mm)		0
Birds					Mammals				Reptiles	
Carnabys Black Cockatoo overhead										

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA9

Project Number: SPG17482

Date: 30/10/2017

Easting: 419049

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6474290

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah and Marri		16	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey	Sapplings			0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover	Weedy grass			0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

0 heavy	1 medium (Burnt)	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Log have no hollows				
MICROHABITATS									
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common
SPECIES									
Black Cockatoo Foraging Habitat									
Species:			% cover			Hollows:			
1 x Jarrah > 500mm DBH						Small (<120mm)		0	
4 x Marri > 500mm DBH						Large (>120mm)		3 (bees in one hollow)	
Birds			Mammals				Reptiles		
Carnabys BC flying nearby									
FRTBC flying nearby (at entrance near school)									

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA10

Project Number: SPG17482

Date: 30/10/2017

Easting: 419421

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6474495

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Marri		16	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey	-		0 <5%	1 <20%	2 20-60%	3 60-100%		
Euc Woodland	Ground Cover	-		0 <5%	1 <20%	2 20-60%	3 60-100%		

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy (Fire)	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Log have no hollows					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Prescense	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common	
SPECIES										
Black Cockatoo Foraging Habitat										
Species:			% cover			Hollows:				
						Small (<120mm)		0		
2 x Marri > 500mm DBH						Large (>120mm)		0		
Birds			Mammals				Reptiles			
Cockatoos (FRTBC) in distance										

Notes: Rock piles too small; burnt

Apart from burnt areas there is loads of leaf litter. This is good for herps. Good for carnivorous Quoll and phascogale.

Most of the logs on the ground have been sawn off, do not have any hollows

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA11

Project Number: SPG17482

Date: 30/10/2017

Easting: 419330

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6474769

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Marri and Jarrah		15	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey	<i>Banksia sessilis</i>		3	0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover				0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Logs have no hollows				
MICROHABITATS									
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common
SPECIES									
Black Cockatoo Foraging Habitat									
Species:			% cover			Hollows:			
						Small (<120mm)		0	
6 x Marri > 500mm DBH						Large (>120mm)		0	
Birds			Mammals				Reptiles		

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA12

Project Number: SPG17482

Date: 30/10/2017

Easting: 419427

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6475253

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Marri and Jarrah		16	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey	<i>Allocasuarina fraseriana</i> , <i>Banksia sessilis</i>		6	0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover				0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Logs have no hollows					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common	
SPECIES										
Black Cockatoo Foraging Habitat										
Species:				% cover			Hollows:			
4 x Jarrah > 500mm DBH							Small (<120mm)		0	
3 x Marri > 500mm DBH							Large (>120mm)		0	
Birds				Mammals				Reptiles		

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA13

Project Number: SPG17482

Date: 31/10/2017

Easting: 419224

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6477133

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Marri and Jarrah		0 <5%	1 <20%	2 20-60%	3 60-100%	
Other Grassland	Midstorey	<i>Banksia sp.</i> <i>Acacia sp.</i>		0 <5%	1 <20%	2 20-60%	3 60-100%		
Euc Woodland	Ground Cover	<i>Xanthorrhoea preissi</i>		0 <5%	1 <20%	2 20-60%	3 60-100%		

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

0 heavy	1 medium	2 mild	3 none	0 heavy	1 medium	2 mild	3 none
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%

Logs >10cm	0 <5% (10%)	1 <20%	2 20-60%	3 60-100%	1x hollow (wood)					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common	
SPECIES										
Black Cockatoo Foraging Habitat										
Species:					% cover			Hollows:		
1 x Jarrah > 500mm DBH								Small (<120mm)		0
5 x Marri > 500mm DBH								Large (>120mm)		0
Birds					Mammals				Reptiles	
Old FRTBC chewed Marri nuts										

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA14

Project Number: SPG17482

Date: 31/10/2017

Easting: 419177

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6476764

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Marri and Jarrah		0 <5%	1 <20%	2 20-60%	3 60-100%	
Other Grassland	Midstorey	Banksia sp.		0 <5%	1 <20%	2 20-60%	3 60-100%		
Euc Woodland	Ground Cover			0 <5%	1 <20%	2 20-60%	3 60-100%		

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy (very burnt Banksia)	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5% (10%)	1 <20%	2 20-60%	3 60-100%	Logs have no hollows					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common	
SPECIES										
Black Cockatoo Foraging Habitat										
Species:			% cover			Hollows:				
						Small (<120mm)		0		
2 x Marri > 500mm DBH						Large (>120mm)		0		
Birds			Mammals				Reptiles			
Old FRTBC chewed Marri nuts										

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA15

Project Number: SPG17482

Date: 31/10/2017

Easting: 419362

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6476543

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Marri, Jarrah			0	<5%	1 <20%	2 20-60%
Other Grassland	Midstorey	<i>Allocasuarina fraseriana</i>		0	<5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover	<i>Xanthorrhoea preissi</i>		0	<5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

0 heavy	1 medium (Fire)	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%
Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Log have no hollows				

MICROHABITATS									
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Prescence	0 none	1 rare	2 moderate	3 common
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common

SPECIES			
Black Cockatoo Foraging Habitat			
Species:	% cover		Hollows:
4 x Jarrah > 500mm DBH			Small (<120mm) 0
1 x Marri > 500mm DBH			Large (>120mm) 0
Birds	Mammals		Reptiles
No foraging evidence			

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA16

Project Number: SPG17482

Date: 31/10/2017

Easting: 419596

Aspect

N	NE	SW	NW
E	SE	W	N/A

Quadrat Size: 50 x 50

Northing: 6476389



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Marri, Jarrah		30%	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey	<i>Allocasuarina fraseriana</i>		5%	0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover				0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium (Fire)	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Log have no hollows					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common	
SPECIES										
Black Cockatoo Foraging Habitat										
Species:			% cover			Hollows:				
4 x Jarrah > 500mm DBH						Small (<120mm)		0		
1 x Marri > 500 mm DBH						Large (>120mm)		0		
Birds			Mammals				Reptiles			
No foraging evidence										

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA17

Project Number: SPG17482

Date: 31/10/2017

Easting: 419728

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6476321

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah and Marri		17	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey	<i>Banksia sp.</i>		3	0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover	<i>Xanthorrhoea preissi</i>		1.5	0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild (Fire)	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Log have no hollows					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common	
SPECIES										
Black Cockatoo Foraging Habitat										
Species:			% cover			Hollows:				
2 x Jarrah > 500mm DBH						Small (<120mm)		0		
2 x Marri > 500mm DBH						Large (>120mm)		0		
Birds			Mammals				Reptiles			

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA18

Project Number: SPG17482

Date: 31/10/2017

Easting: 418648

Aspect

N	NE	SW	NW
E	SE	W	N/A

Quadrat Size: 50 x 50

Northing: 6477093



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah and Marri		0 <5%	1 <20%	2 20-60%	3 60-100%	
Other Grassland	Midstorey	<i>Banksia sp.</i>		0 <5%	1 <20%	2 20-60%	3 60-100%		
Euc Woodland	Ground Cover	<i>Xanthorrhoea preissi</i>		0 <5%	1 <20%	2 20-60%	3 60-100%		

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Log have no hollows				
MICROHABITATS									
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common
SPECIES									
Black Cockatoo Foraging Habitat									
Species:			% cover			Hollows:			
6 x Jarrah > 500mm DBH						Small (<120mm)		0	
4 x Marri > 500mm DBH						Large (>120mm)		0	
Birds			Mammals				Reptiles		
FRTBC observed									

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA19

Project Number: SPG17482

Date: 31/10/2017

Easting: 419485

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6477119

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah and Marri		17	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey	Banksia sp.		3	0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover				0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Log have no hollows				
MICROHABITATS									
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common
SPECIES									
Black Cockatoo Foraging Habitat									
Species:			% cover			Hollows:			
4 x Jarrah > 500mm DBH						Small (<120mm)		0	
5 x Marri > 500mm DBH						Large (>120mm)		0	
Birds			Mammals				Reptiles		

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA20

Project Number: SPG17482

Date: 31/10/2017

Easting: 421125

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6474633

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah and Marri		16	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey	Acacia sp.		1.5	0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover	Xanthorrhoea preissi		1.5	0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Log have no hollows					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common	
SPECIES										
Black Cockatoo Foraging Habitat										
Species:			% cover			Hollows:				
1 x Jarrah > 500 mm DBH						Small (<120mm)		0		
5 x Marri > 500mm DBH						Large (>120mm)		0		
Birds			Mammals				Reptiles			
FRTBC seen foraging										

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA21

Project Number: SPG17482

Date: 31/10/2017

Easting: 420769

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6474530

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah and Marri		17	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey	Sapplings		6	0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover				0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	No suitable hollows in logs					
MICROHABITATS										
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common	
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common	
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common	
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common	
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 5km	2 500m - 2km	3 <500m	
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common	
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common	
SPECIES										
Black Cockatoo Foraging Habitat										
Species:			% cover			Hollows:				
1 x Jarrah > 500mm DBH (few small hollows)						Small (<120mm)		<3		
1 x Marri > 500mm DBH (one possible hollow)						Large (>120mm)		1		
Birds			Mammals				Reptiles			

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA22

Project Number: SPG17482

Date: 31/10/2017

Easting: 420404

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6474494

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah and Marri		16	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey	Sapplings		5	0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover	<i>Xanthorrhoea preissi</i>		1.5	0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	Logs have no hollows				
MICROHABITATS									
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 2-5km	2 500m - 2km	3 <500m
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common
SPECIES									
Black Cockatoo Foraging Habitat									
Species:			% cover			Hollows:			
2x Jarrah > 500mm DBH						Small (<120mm)		0	
4 x Marri > 500mm DBH						Large (>120mm)		0	
Birds			Mammals				Reptiles		

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA23

Project Number: SPG17482

Date: 31/10/2017

Easting: 420169

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 6474912

E

SE

W

N/A



Soil Texture

sand

sandy-loam

loam

cracking clay

clay

VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah and Marri		17	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey				0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover	<i>Xanthorrhoea preissi</i>		1.5	0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	No suitable hollows				
MICROHABITATS									
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 2-5km	2 500m - 2km	3 <500m
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common
SPECIES									
Black Cockatoo Foraging Habitat									
Species:			% cover			Hollows:			
3x Jarrah > 500mm DBH						Small (<120mm)		0	
						Large (>120mm)		0	
Birds			Mammals				Reptiles		

FAUNA HABITAT ASSESSMENT SHEET - STRATEGEN ENVIRONMENTAL

(South West)

Location: Lot 48 Stoneville Road, Stoneville

Site Number: HA24

Project Number: SPG17482

Date: 31/10/2017

Easting: 420003

Aspect

N

NE

SW

NW

Quadrat Size: 50 x 50

Northing: 64745600

E

SE

W

N/A



Soil Texture	sand	sandy-loam	loam	cracking clay	clay
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VEGETATION

Vegetation Description	Hummock Grassland	Other: Marri woodland		Average Height in m	Cover				
	Acacia Shrubland	Stratum			Scattered Plants	Sparse	Moderate	Thick	
	Riverine Woodland	Overstorey	Jarrah and Marri		16	0 <5%	1 <20%	2 20-60%	3 60-100%
Other Grassland	Midstorey				0 <5%	1 <20%	2 20-60%	3 60-100%	
Euc Woodland	Ground Cover	<i>Xanthorrhoea preissi</i>		1.5	0 <5%	1 <20%	2 20-60%	3 60-100%	

CONDITION

LAST FIRE

Scale:	5 Pristine	4 Excellent	3 Very Good	2 Good	1 Degraded	0 Completely Degraded	0 <1 year	1 1-3 Yr	2 4-5 Yr	3 >5 Yr
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(general)

DISTURBANCE

(cattle)

	0 heavy	1 medium	2 mild	3 none		0 heavy	1 medium	2 mild	3 none	
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GROUND COVER

Bare Ground	0 <5%	1 <20%	2 20-60%	3 60-100%	Hummock Grass	0 <5%	1 <20%	2 20-60%	3 60-100%	
Rock	0 <5%	1 <20%	2 20-60%	3 60-100%	Other Grass	0 <5%	1 <20%	2 20-60%	3 60-100% *	
Leaf Litter	0 <5%	1 <20%	2 20-60%	3 60-100%	Herbs	0 <5%	1 <20%	2 20-60%	3 60-100%	

Logs >10cm	0 <5%	1 <20%	2 20-60%	3 60-100%	No hollows				
MICROHABITATS									
Burrowing Suitability	0 Rock	1 Stony	2 Sandy Loam	3 Sand	Peeling Bark	0 none	1 rare	2 moderate	3 common
Pebbles Stones	0 none	1 0-30%	2 30-70%	3 70-100%	Large Hollows	0 none	1 rare	2 moderate	3 common
Exfoliating Slabs	0 none	1 0-30%	2 30-70%	3 70-100%	Small Hollows	0 none	1 rare	2 moderate	3 common
Rock Crevices	0 none	1 0-30%	2 30-70%	3 70-100%	Water Presence	0 none	1 rare	2 moderate	3 common
Boulders	0 none	1 0-30%	2 30-70%	3 70-100%	Distance to Water	0 >5km	1 2-5km	2 500m - 2km	3 <500m
Suitability for Bats	YES		NO		Termite Mounds	0 none	1 rare	2 moderate	3 common
Caves	Absent	Present			Woody Debris	0 none	1 rare	2 moderate	3 common
SPECIES									
Black Cockatoo Foraging Habitat									
Species:					% cover			Hollows:	
3x Jarrah > 500mm DBH								Small (<120mm)	0
5x Marri > 500mm DBH								Large (>120mm)	0
Birds					Mammals			Reptiles	
Bees									

Appendix 2
Naturemap and Protected Matters
search reports



EPBC Act Protected Matters Report

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

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

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

Report created: 09/11/18 15:27:53

[Summary](#)

[Details](#)

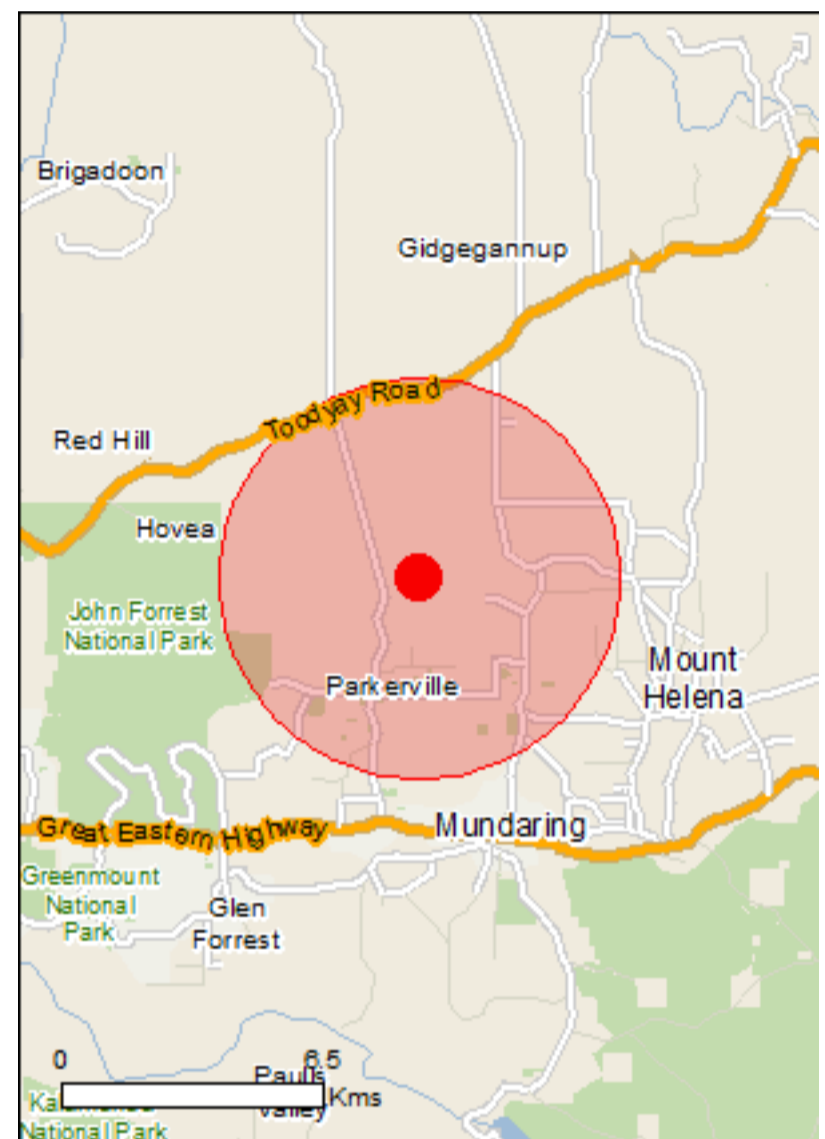
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

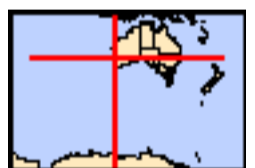
[Acknowledgements](#)



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

[Coordinates](#)

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	20
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:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	14
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	2
Regional Forest Agreements:	1
Invasive Species:	32
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities

[[Resource Information](#)]

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

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community may occur within area

Listed Threatened Species

[[Resource Information](#)]

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

Birds

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

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	Roosting known 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 may 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
--	------------	--

Mammals

Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat likely to occur within area
---	------------	--

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

Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat likely to occur within area
--	------------	--

Other

Name	Status	Type of Presence
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
Plants		
Acacia aphylla Leafless Rock Wattle [13553]	Vulnerable	Species or species habitat likely to occur within area
Anthocercis gracilis Slender Tailflower [11103]	Vulnerable	Species or species habitat likely to occur within area
Diplolaena andrewsii [6601]	Endangered	Species or species habitat may occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area
Grevillea christineae Christine's Grevillea [64520]	Endangered	Species or species habitat likely to occur within area
Grevillea flexuosa Zig Zag Grevillea [2957]	Vulnerable	Species or species habitat likely to occur within area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat likely to occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat likely to occur within area
Listed Migratory Species [Resource Information]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

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

Name
Commonwealth Land -

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

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within

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

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
John Forrest	WA
Parkerville	WA

Regional Forest Agreements	[Resource Information]
----------------------------	--

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

Invasive Species	[Resource Information]
------------------	--

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

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
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

Name	Status	Type of Presence
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 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 asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
<p>Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]</p>		Species or species habitat likely to occur within area
<p>Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]</p>		Species or species habitat likely to occur within area
<p>Genista sp. X Genista monspessulana Broom [67538]</p>		Species or species habitat may occur within area
<p>Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]</p>		Species or species habitat likely to occur within area
<p>Lycium ferocissimum African Boxthorn, Boxthorn [19235]</p>		Species or species habitat likely to occur within area
<p>Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]</p>		Species or species habitat may occur within area
<p>Rubus fruticosus aggregate Blackberry, European Blackberry [68406]</p>		Species or species habitat likely to occur within area
<p>Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]</p>		Species or species habitat likely to occur within area
<p>Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]</p>		Species or species habitat likely to occur within area

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-31.85282 116.14814

Acknowledgements

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

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

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

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

NatureMap Species Report

Created By Guest user on 09/11/2018

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 116° 08' 50" E, 31° 51' 13" S
Buffer 5km
Group By Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	190	5819
Other specially protected fauna	3	5
Priority 4	2	86
Protected under international agreement	1	1
Rare or likely to become extinct	6	485
TOTAL	202	6396

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Rare or likely to become extinct				
1.	24731 <i>Calyptorhynchus banksii subsp. naso</i> (Forest Red-tailed Black Cockatoo)		T	
2.	24733 <i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo, White-tailed Long-billed Black Cockatoo)		T	
3.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)		T	
4.	48400 <i>Calyptorhynchus sp.</i> (white-tailed black cockatoo)		T	
5.	24092 <i>Dasyurus geoffroii</i> (Chuditch, Western Quoll)		T	
6.	34113 <i>Westralunio carteri</i> (Carter's Freshwater Mussel)		T	
Protected under international agreement				
7.	25554 <i>Apus pacificus</i> (Fork-tailed Swift, Pacific Swift)		IA	
Other specially protected fauna				
8.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
9.	24098 <i>Phascogale calura</i> (Red-tailed Phascogale, Kenngoor)		S	
10.	48070 <i>Phascogale tapoatafa subsp. wambenger</i> (South-western Brush-tailed Phascogale, Wambenger)		S	
Priority 4				
11.	48588 <i>Isoodon fusciventer</i> (Quenda, southwestern brown bandicoot)		P4	
12.	24328 <i>Oxyura australis</i> (Blue-billed Duck)		P4	
Non-conservation taxon				
13.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
14.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
15.	24262 <i>Acanthiza inornata</i> (Western Thornbill)			
16.	24560 <i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
17.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
18.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
19.	25755 <i>Acrocephalus australis</i> (Australian Reed Warbler)			
20.	25544 <i>Aegotheles cristatus</i> (Australian Owlet-nightjar)			
21.	<i>Aname mainae</i>			
22.	24312 <i>Anas gracilis</i> (Grey Teal)			
23.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
24.	47414 <i>Anhinga novaehollandiae</i> (Australasian Darter)			
25.	24088 <i>Antechinus flavipes subsp. leucogaster</i> (Yellow-footed Antechinus, Mardo)			
26.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
27.	24562 <i>Anthochaera lunulata</i> (Western Little Wattlebird)			
28.	24990 <i>Aprasia pulchella</i> (Granite Worm-lizard)			
29.	24991 <i>Aprasia repens</i> (Sand-plain Worm-lizard)			
30.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
31.	<i>Araneus eburniventris</i>			
32.	<i>Araneus senicaudatus</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
33.	41324 <i>Ardea modesta</i> (great egret, white egret)			
34.	24340 <i>Ardea novaehollandiae</i> (White-faced Heron)			
35.	<i>Argiope protensa</i>			
36.	<i>Argiope trifasciata</i>			
37.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
38.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
39.	<i>Artonia impedita</i>			
40.	<i>Austracantha minax</i>			
41.	<i>Backobourkia brounii</i>			
42.	<i>Backobourkia heroine</i>			
43.	<i>Barnardius zonarius</i>			
44.	24319 <i>Biziura lobata</i> (Musk Duck)			
45.	42381 <i>Brachyurophis semifasciatus</i> (Southern Shovel-nosed Snake)			
46.	25713 <i>Cacatua galerita</i> (Sulphur-crested Cockatoo)			
47.	25714 <i>Cacatua pastinator</i> (Western Long-billed Corella)			
48.	25715 <i>Cacatua roseicapilla</i> (Galah)			
49.	25716 <i>Cacatua sanguinea</i> (Little Corella)			
50.	24729 <i>Cacatua tenuirostris</i> (Eastern Long-billed Corella)	Y		
51.	25598 <i>Cacomantis flabelliformis</i> (Fan-tailed Cuckoo)			
52.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
53.	25717 <i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
54.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
55.	<i>Cercophonius squama</i>			
56.	<i>Cercophonius sulcatus</i>			
57.	<i>Cethegus fugax</i>			
58.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattle Bat)			
59.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
60.	<i>Chroicocephalus novaehollandiae</i>			
61.	25601 <i>Chrysococcyx lucidus</i> (Shining Bronze Cuckoo)			
62.	24432 <i>Chrysococcyx lucidus</i> subsp. <i>plagosus</i> (Shining Bronze Cuckoo)			
63.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
64.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
65.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
66.	<i>Cormocephalus turneri</i>			
67.	25592 <i>Corvus coronoides</i> (Australian Raven)			
68.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
69.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
70.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
71.	25456 <i>Crenadactylus ocellatus</i> (Clawless Gecko)			
72.	24918 <i>Crenadactylus ocellatus</i> subsp. <i>ocellatus</i> (Clawless Gecko)			
73.	25398 <i>Crinia georgiana</i> (Quacking Frog)			
74.	25399 <i>Crinia glauerti</i> (Clicking Frog)			
75.	25401 <i>Crinia pseudinsignifera</i> (Bleating Froglet)			
76.	30893 <i>Cryptoblepharus buchananii</i>			
77.	25039 <i>Ctenotus fallens</i>			
78.	25049 <i>Ctenotus labillardieri</i>			
79.	24322 <i>Cygnus atratus</i> (Black Swan)			
80.	30901 <i>Dacelo novaeguineae</i> (Laughing Kookaburra)	Y		
81.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			
82.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
83.	<i>Dinocambala ingens</i>			
84.	25469 <i>Diplodactylus granariensis</i>			
85.	24939 <i>Diplodactylus polyophthalmus</i>			
86.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
87.	<i>Egretta novaehollandiae</i>			
88.	<i>Elanus axillaris</i>			
89.	<i>Eolophus roseicapillus</i>			
90.	24652 <i>Eopsaltria georgiana</i> (White-breasted Robin)			
91.	<i>Eriophora biapicata</i>			
92.	<i>Eupograptus kottae</i>			
93.	25621 <i>Falco berigora</i> (Brown Falcon)			
94.	25622 <i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
95.	25623 <i>Falco longipennis</i> (Australian Hobby)			
96.	24041 <i>Felis catus</i> (Cat)	Y		
97.	25727 <i>Fulica atra</i> (Eurasian Coot)			
98.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
99.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
100.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
101.	25474 <i>Hemiergis initialis</i>			
102.	25115 <i>Hemiergis initialis</i> subsp. <i>initialis</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
103.	47965 <i>Hieraaetus morphnoides</i> (Little Eagle)			
104.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
105.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
106.	<i>Hoggicosa storri</i>			
107.	<i>Isopeda leishmanni</i>			
108.	24367 <i>Lalage tricolor</i> (White-winged Triller)			
109.	<i>Latrodectus hasseltii</i>			
110.	25131 <i>Lerista distinguenda</i>			
111.	25005 <i>Lialis burtonis</i>			
112.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
113.	25415 <i>Limnodynastes dorsalis</i> (Western Banjo Frog)			
114.	25378 <i>Litoria adelaidensis</i> (Slender Tree Frog)			
115.	25388 <i>Litoria moorei</i> (Motorbike Frog)			
116.	<i>Lophoictinia isura</i>			
117.	24132 <i>Macropus fuliginosus</i> (Western Grey Kangaroo)			
118.	25650 <i>Malurus elegans</i> (Red-winged Fairy-wren)			
119.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
120.	47997 <i>Melanodryas cucullata</i> (Hooded Robin)			
121.	25663 <i>Melithreptus brevirostris</i> (Brown-headed Honeyeater)			
122.	24587 <i>Melithreptus chloropsis</i> (Western White-naped Honeyeater)			
123.	25184 <i>Menetia greyii</i>			
124.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)			
125.	<i>Microcarbo melanoleucos</i>			
126.	25693 <i>Microeca fascinans</i> (Jacky Winter)			
127.	25542 <i>Milvus migrans</i> (Black Kite)			
128.	<i>Missulena granulosa</i>			
129.	<i>Missulena hoggi</i>			
130.	<i>Missulena occatoria</i>			
131.	25192 <i>Morethia obscura</i>			
132.	48005 <i>Mormopterus kitcheneri</i> (South-western Free-tailed Bat)			
133.	24223 <i>Mus musculus</i> (House Mouse)	Y		
134.	25426 <i>Neobatrachus pelobatoides</i> (Humming Frog)			
135.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
136.	<i>Nicodamus mainae</i>			
137.	24742 <i>Nymphicus hollandicus</i> (Cockatiel)			
138.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
139.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
140.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
141.	25253 <i>Parasuta gouldii</i>			
142.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
143.	24626 <i>Pardalotus punctatus</i> subsp. <i>xanthopyge</i> (Yellow-rumped Pardalote)			
144.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
145.	24648 <i>Pelecanus conspicillatus</i> (Australian Pelican)			
146.	48060 <i>Petrochelidon ariel</i> (Fairy Martin)			
147.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
148.	48066 <i>Petroica boodang</i> (Scarlet Robin)			
149.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
150.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
151.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
152.	25587 <i>Phaps elegans</i> (Brush Bronzewing)			
153.	<i>Phryganoporus nigrinus</i>			
154.	48071 <i>Phylidonyris niger</i> (White-cheeked Honeyeater)			
155.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
156.	24841 <i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
157.	25720 <i>Platycercus icterotis</i> (Western Rosella)			
158.	24747 <i>Platycercus spurius</i> (Red-capped Parrot)			
159.	25721 <i>Platycercus zonarius</i> (Australian Ringneck, Ring-necked Parrot)			
160.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
161.	24679 <i>Podargus strigoides</i> subsp. <i>brachypterus</i> (Tawny Frogmouth)			
162.	25704 <i>Podiceps cristatus</i> (Great Crested Grebe)			
163.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
164.	25731 <i>Porphyrio porphyrio</i> (Purple Swamphen)			
165.	25511 <i>Pseudonaja affinis</i> (Dugite)			
166.	25259 <i>Pseudonaja affinis</i> subsp. <i>affinis</i> (Dugite)			
167.	42416 <i>Pseudonaja mengdeni</i> (Western Brown Snake)			
168.	<i>Purpurecephalus spurius</i>			
169.	24245 <i>Rattus rattus</i> (Black Rat)	Y		
170.	48096 <i>Rhipidura albiscapa</i> (Grey Fantail)			
171.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
172.	<i>Scolopendra laeta</i>			

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173.	25534 <i>Sericornis frontalis</i> (White-browed Scrubwren)			
174.	30948 <i>Smicronis brevirostris</i> (Weebill)			
175.	<i>Storosa tetrica</i>			
176.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
177.	25589 <i>Streptopelia chinensis</i> (Spotted Turtle-Dove)	Y		
178.	25590 <i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
179.	25518 <i>Strophurus spinigerus</i>			
180.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
181.	24207 <i>Tachyglossus aculeatus</i> (Short-beaked Echidna)			
182.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
183.	24167 <i>Tarsipes rostratus</i> (Honey Possum, Noolbenger)			
184.	<i>Tasmanicosa leuckartii</i>			
185.	<i>Tetragnatha demissa</i>			
186.	<i>Tetragnatha nitens</i>			
187.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
188.	25519 <i>Tiliqua rugosa</i>			
189.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
190.	25723 <i>Trichoglossus haematodus</i> (Rainbow Lorikeet)			
191.	25521 <i>Trichosurus vulpecula</i> (Common Brushtail Possum)			
192.	24158 <i>Trichosurus vulpecula</i> subsp. <i>vulpecula</i> (Common Brushtail Possum)			
193.	25764 <i>Tyto novaehollandiae</i> (Masked Owl)			
194.	24983 <i>Underwoodisaurus milii</i> (Barking Gecko)			
195.	<i>Urodacus novaehollandiae</i>			
196.	25218 <i>Varanus gouldii</i> (Bungarra or Sand Monitor)			
197.	25526 <i>Varanus tristis</i> (Racehorse Monitor)			
198.	<i>Venator immansueta</i>			
199.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
200.	24040 <i>Vulpes vulpes</i> (Red Fox)	Y		
201.	<i>Zachria flavicoma</i>			
202.	25765 <i>Zosterops lateralis</i> (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 wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

