



ENVIRONMENTAL OFFSET PROPOSAL

**LOT 81 AND LOT 2 BANKSIA ROAD, CROOKED
BROOK**

AUGUST 2021

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Document Control

Version	Date	Author	Reviewer
V1	18/05/2018	KMT	AJM
V2	27/04/2021	KMT	AJM
V3	25/07/21	KMT	SB
V4	28/07/2021	KMT	SB
Filename	P1738_Offset Proposal		

Contents

1	INTRODUCTION	1
1.1	BACKGROUND.....	1
1.2	DOCUMENT PURPOSE	1
1.3	BLACK COCKATOO HABITAT ASSESSMENT	2
1.3.1	Lot 81 Banksia Road.....	2
1.3.2	Lot 2 Banksia Road.....	2
2	AVOIDANCE AND MITIGATION MEASURES.....	4
2.1	AVOIDANCE MEASURES	4
2.2	MITIGATION MEASURES	4
3	OFFSET PROPOSAL	7
3.1	OFFSET PROPOSAL.....	7
3.1.1	Direct Offset 1	7
3.1.2	Direct Offset 2.....	8
3.1.3	Direct Offset 3.....	10
	REFERENCES	14
	FIGURES	15
	APPENDIX A – LOT 2 FAUNA ASSESSMENT	16
	APPENDIX B – FLORA, VEGETATION AND FAUNA ASSESSMENT FOR LOT 10.....	17
	APPENDIX C – BLACK COCKATOO HABITAT ASSESSMENT FOR LOT 2148	18
	APPENDIX D - EPBC ACT OFFSET CALCULATIONS	19

Tables

Table 1. Summary of offset calculations.	12
Table 2. Comparison of the proposed offsets with the EPBC Act Offsets Policy.....	12

Figures

- Figure 1. Clearing Footprint and Black Cockatoo habitat trees
- Figure 2. Direct Offset 1
- Figure 3. Direct Offset 2

1 INTRODUCTION

1.1 Background

J and P Corporation (the proponent) are proposing to clear 10.75 hectares (ha) on Lot 81 on Plan 403943 Banksia Road, Crooked Brook (herein referred to as Lot 81) and 6.06 ha on Lot 2 on Diagram 65861 Banksia Road, Crooked Brook (herein referred to as Lot 2). The total clearing footprint equates to 16.81 ha.

Within Lot 81, the proposed clearing is required to enable development for a sand and gravel extraction operation. Upon completion of the extraction operation, the pit will subsequently be used as landfill cells (as per the current zoning).

Within Lot 2, the clearing is required to:

- Enable the expansion of the current Class III putrescible landfill operation;
- Achieve optimum utilisation of airspace and remain a best practice operated landfill for a longer term to service the community; and
- Utilise in-situ sand for daily cover and internal roads during the winter months, and gravel material for the construction of internal drains and stormwater infrastructure.

A Development Approval application for the abovementioned works within Lot 2 has been submitted to the Shire of Dardanup and approval is pending.

Lot 81 and Lot 2 are zoned “Rural” under the Greater Bunbury Region Scheme and “General Farming” pursuant to the Town Planning Scheme (TPS) No. 3. In accordance with the Shire of Dardanup’s Local Planning Strategy, Lot 81 and Lot 2 are zoned ‘Waste Disposal/Processing’. Currently, Lot 2 is operated as a waste facility to meet the waste needs of the southwest region. A report commissioned by the Shire of Dardanup which involved community and government agency engagement determined that suitable land uses for Lot 81 and Lot 2 included waste storage facility, waste disposal facility and Industry – Extractive (Urbaqua 2020). This determination was made in consideration of environmental, planning and social impacts with consultation undertaken between the Department of Planning, Land and Heritage (DPLH), Department of Water and Environmental Regulation (DWER) and Department of Biodiversity, Conservation and Attractions (DBCA).

A black cockatoo (Baudin’s black-cockatoo (*Calyptorhynchus baudinii*), Carnaby’s black cockatoo (*Calyptorhynchus latirostris*) and the forest red-tailed black-cockatoo (*Calyptorhynchus banksii naso*)) assessment (Harewood 2015 and Harewood 2021a) was undertaken whereby it was identified that the vegetation present within Lot 81 and Lot 2 contains potential black cockatoo breeding habitat in addition to identified foraging and roosting habitat. Accordingly, environmental offsets are required to compensate for the residual adverse impacts of the proposed action on black cockatoo habitat.

1.2 Document Purpose

This Offset Proposal applies only to the proposed clearing at Lot 81 and Lot 2 Banksia Road, Crooked Brook. It addresses the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* and the *Environmental Offsets Policy* (October 2012). This Proposal applies the offset requirements of the Department of Agriculture, Water and the Environment (DAWE) EPBC Act offsets policy and calculator.

The environmental offset is directed at the residual impacts on the three threatened species of black cockatoo from the proposed action.

The objectives of this Plan are to:

- Mitigate significant and unavoidable adverse environmental impacts by a positive environmental gain, with an aspirational goal of achieving a 'net environmental benefit';
- Apply actions for implementation as other options to avoid and mitigate environmental impacts have been considered and exhausted;
- Target the stated matters with significant residual impacts resulting from the implementation of the proposed action;
- Deliver the offset in a timely manner and be long lasting; and
- Monitor and audit the implementation of the proposed offsets.

1.3 Black Cockatoo Habitat Assessment

1.3.1 Lot 81 Banksia Road

The black cockatoo assessment (Harewood 2015) identified 24 habitat trees (DBH of >50cm) with hollows potentially suitable for nesting within the Lot 81 clearing footprint (refer to **Figure 1**). No actual evidence of any hollows being used by black cockatoos for nesting (currently or previously) was recorded (Harewood 2015).

The following represents a list of the observed plant species present within Lot 81 known to be used by one or more of the black cockatoo species as a food source (i.e. foraging habitat):

- Marri – *C. calophylla*/Mountain Marri *C. haematoxylon* - flowers, seeds, nectar, grubs.
- Jarrah – *E. marginata* – seeds.
- Bull banksia – *B. grandis* - flowers, seeds, grubs.
- Snottygobble - *P. longifolia* – seeds.

Evidence of two species of black cockatoos foraging onsite was observed during the field survey in the form of numerous examples of chewed jarrah fruits and to a lesser extent chewed marri/mountain marri fruits and banksia cones. This majority of this evidence (jarrah and marri/mountain marri fruits) was attributed to the forest red-tailed black cockatoo, a species which appears to be relatively common in the area. Foraging evidence attributed to Baudin's black cockatoo (marri and banksia cones) was less commonly recorded. With the dominance of jarrah and marri/mountain marri, the vegetation present within Lot 81 can be regarded as quality foraging habitat for black cockatoos (Harewood 2015).

1.3.2 Lot 2 Banksia Road

A black cockatoo habitat assessment (Harewood 2021a, refer to **Appendix A**) identified two habitat trees (DBH of >50cm) with hollows potentially suitable for nesting within the Lot 2 clearing footprint. Hollows in other trees were assessed as being unsuitable (i.e. too small or with an unfavourable orientation) or in some cases no hollow was found to be present. Within the clearing footprint, no actual evidence of any hollows being used by black cockatoos for nesting (currently or previously) was recorded (Harewood 2021a). Within the vegetation retention buffer, one tree assessed as having hollows possibly suitable for black cockatoos to use for nesting purposes showed evidence of past use. This evidence was in the form of significant chewing around the hollows entrance. This tree will be retained within the vegetation buffer denoting that only two habitat trees with hollows potentially suitable for nesting will be impacted within Lot 2 (Harewood 2021a).

The following flora species are known to be or are potentially used as a direct food source (e.g. seeds, flowers, nectar, bark or grubs) by one or more species of black cockatoo and have been recorded within Lot 2:

- Marri – *Corymbia calophylla*;
- Jarrah – *Eucalyptus marginata*;
- Couch Honeypot Dryandra - *Banksia dallanneyi*;
- Honeybush - *Hakea lissocarpha*;
- Kingia - *Kingia australis*;
- Snottygoble - *Persoonia longifolia*; and
- Peppermint – *Agonis flexuosa*.

During the assessment, evidence of black cockatoos foraging was observed at a few locations (Harewood 2021a). This evidence was mainly in the form of chewed fruits from marri. This foraging activity was attributed to the forest red-tailed black cockatoo. Given the dominance of jarrah and marri across the site, the vegetation can be regarded as representing quality foraging habitat (Harewood 2021a).

No evidence of black cockatoos roosting within trees located within the survey area was observed during the survey period (Harewood 2021a).

2 AVOIDANCE AND MITIGATION MEASURES

2.1 Avoidance Measures

The proponent has considered alternative locations for the proposed action within Lot 81 and Lot 2. However, regarding Lot 81, the gravel resource is restricted to the nominated clearing footprint. Previously cleared areas within Lot 81 either do not contain sufficient resource to warrant the proposed extractive industry or are considered unfeasible due to depth to groundwater.

In relation to Lot 2, the topographic relief in certain areas, and proximity to groundwater in the western portions of the Lot render the proposed clearing footprint as the only feasible location for the extension of the existing landfill. Locating the landfill cells towards the east of the Lot is considered best practice due to sustainable use of in-situ soil and lower risk of environmental impacts due to the depth to groundwater table being approximately 20 m below base of expanded landfill. The material balance needed to excavate and cover the landfill would not be available if the landfill was expanded to the west instead of to the east as proposed. The Shire's long-term land use expectations for the both Lots is waste disposal which is reflected by the zoning. No other properties within the local government area are zoned for waste disposal.

To avoid any potential impacts to the adjacent Dardanup Conservation Park from the proposed action, a 50 m and 100 m buffer of vegetation will be established from the internal firebreak within Lot 2 and Lot 81, respectively. This will involve the application of a conservation covenant over the vegetation to enable protection in perpetuity. This will also ensure that the identified black cockatoo roosting tree (Harewood 2015) on the northern boundary of Lot 81 will be retained, in addition to the tree containing a hollow with evidence of historical use within Lot 2 (Harewood 2021a).

Given that the clearing area has historically been subject to livestock grazing (resulting in a reduced mid and understorey), the key environmental attributes are the mature habitat trees. These are interspersed throughout the clearing footprint and therefore areas of increased environmental value could not be reasonably isolated.

It is considered that no other feasible avoidance measures can be implemented within the clearing footprint.

2.2 Mitigation Measures

Historically, there have been some impacts to the Dardanup Conservation Park associated with the existing land use within Lot 2 (landfill). This has included wind-blown litter and inadequate stormwater management. Over the last two years, these two issues have been targeted resulting in the following:

- The installation of 3 m high cyclone fencing around the periphery of waste cells and 2 m high fencing around the property boundary to prevent wind-blown litter (refer to **Plates 1 and 2**);
- A full time litter picker has been employed to collect litter throughout the site for five days a week; and
- Significant upgrades to stormwater infrastructure have been implemented to ensure that there is no direct discharge of stormwater into the Dardanup Conservation Park.



Plate 1. Cyclone fencing on southern property boundary and upgraded stormwater infrastructure.



Plate 2. Cyclone fencing on the periphery of a waste cell.

In order to further reduce the impacts from the proposed action, a series of management plans will be implemented as described below.

Flora and Vegetation Management

The management objectives for vegetation and flora are:

- Restrict vegetation clearing to a practical minimum;
- Prevent unauthorised clearing of native vegetation outside of the clearing footprint; and
- Minimise disturbance to remaining vegetation to retain health and integrity.

Management actions to minimise disturbance to vegetation include:

- Peg/flag areas to be cleared to avoid any unnecessary disturbance to adjacent vegetation;
- Create strategic firebreaks where necessary; and
- Restrict vehicle movement to designated access tracks, to prevent vegetation damage and erosion.

Fauna Management

The proposed management actions to mitigate potential impacts to fauna include:

- Plan clearing such that it does not result in the creation of isolated remnants of native vegetation that have no ecological corridors to allow fauna movement to adjacent areas;
- Restrict all vehicle use to designated roads and access tracks;
- Enforce compliance with onsite speed limits at all times;
- General housekeeping procedures such as litter removal at the perimeter of the Lots will be maintained to discourage fauna from entering the site from the adjacent Dardanup Conservation Park;
- Investigate methods for removing European honey bee hives from the clearing footprint;
- During clearing, a qualified fauna expert will be present to direct clearing operators, particularly when clearing trees that are occupied by fauna, to ensure that these are cleared in a way that allows the animals to safely mobilise to adjacent areas. In addition, they will supervise any animal handling and the rescue of injured animals should this be required;
- No stockpiling of topsoil or other material is to occur outside of the clearing boundary;
- If clearing during black cockatoo breeding season (i.e. August to May), check potential habitat trees (i.e. DBH in excess of 50 cm) for nesting hollows; and
- If active black cockatoo nests are located in the clearing footprint, do not clear until fledglings have left the nest.

Weed and Pathogen Management

The proposed management actions to mitigate potential impacts associated with weeds and pathogens include:

- All earthmoving and ground engaging equipment will be inspected and cleaned of vegetation, mud and soil prior to entry and exit of the impact area.

In addition to the proposed management measures, within Lot 81 the 10.76 ha will be cleared progressively over approximately five years. Subsequently, it is not proposed that the entire 10.76 ha will be cleared as a single exercise but rather at an approximate rate of four hectares per annum. For both Lots, clearing will commence in a west to east direction, which will enable fauna to naturally disperse into the adjoining Dardanup Conservation Park.

Based on the above, the proposed clearing is unlikely to impact on the persistence of the species', however the action will result in a residual impact of clearing 16.81 ha of black cockatoo habitat.

3 OFFSET PROPOSAL

3.1 Offset Proposal

This Offset Proposal addresses the significant residual impacts to black cockatoos from the impact of clearing 16.81 ha of known foraging habitat and potential breeding habitat.

The proponent proposes the following offsets to counterbalance the residual environmental impacts associated with the proposed clearing:

- Direct Offset 1: Conservation in perpetuity of 5.22 ha of non-secure remnant native vegetation within Lot 10 Temple Road, East Picton (Lot on Survey P070159 10) (refer to **Figure 2**);
- Direct Offset 2: Conservation in perpetuity of 38 ha of non-secure remnant native vegetation in Lot 2148 Ferguson Road, Ferguson (refer to **Figure 3**); and
- Direct Offset 3: Retention and improvement of 7.86 ha of black cockatoo foraging and breeding habitat within the vegetation buffer (refer to **Figure 1**).

3.1.1 Direct Offset 1

Lot 10 is located approximately 12 km north-west of the clearing footprint. The vegetation has been mapped as Beard Vegetation Association 1000. This vegetation is described as medium forest consisting of jarrah and marri low woodland and banksia low forest with teatree (*Melaleuca* spp.) (Shepherd *et al.*, 2001). It is also mapped as Southern River complex which is described as predominately open woodland of marri, jarrah and banksia sp., with fringing woodland of *Eucalyptus rudis* and *Melaleuca raphiophylla* (swamp paperbark) along creek beds (Hedde *et al.*, 1980).

A flora vegetation and fauna survey was undertaken within Lot 10 to determine the quality and extent of black cockatoo habitat (GHD 2021) (refer to **Appendix B**). The proposed offset area (5.22 ha) was identified to contain four fauna habitat types, namely Marri-Banksia woodland (Habitat 1), Banksia Nuytsia woodland (Habitat 2), Marri Peppermint woodland (Habitat 4) and *Melaleuca raphiophylla* wetland (Habitat 7) (refer to **Plates 3** and **4**). A detailed foraging habitat assessment using the foraging habitat scoring tool (DotEE 2017) was undertaken to determine the value of the vegetation within the offset area for black cockatoos. This resulted in a classification of 'Very High' quality foraging habitat for Habitats 1, 2 and 4. In addition, along surveyed transects (not within the entire area), 18 potential black cockatoo habitat trees were identified within the proposed offset area (GHD 2021).

The survey also identified the presence of one Western Ringtail Possum (*Pseudocheirus occidentalis*), listed as Critically Endangered under the EPBC Act and BC Act, within adjoining vegetation (GHD 2021).

Based on the results of the desktop searches, dominant species, landform features and field observations three conservation significant ecological community were identified within the proposed offset area. These communities cover the same extent and are associated with Marri, Jarrah, Banksia woodlands. The communities are:

- EPBC Act Threatened Ecological Community (TEC) Banksia Woodlands of the Swan Coastal Plain ecological community (Endangered);
- BC Act Priority Ecological Community (PEC) Southern *Banksia attenuata* woodlands FCT 21b (Priority 3);
- BC Act PEC Banksia dominated woodlands of the Swan Coastal Plain IBRA region Priority 3 Priority Ecological Community (PEC) listed by DBCA).

Lot 10 is currently owned by the proponent. It is zoned “Rural” under the Greater Bunbury Region Scheme and “General Farming” pursuant to the Town Planning Scheme (TPS) No. 3.

To protect the 5.22 ha of vegetation, the proponent will enter into a conservation covenant (voluntary written agreement) with the Commissioner of Soil and Land Conservation under section 3 of the *Soil and Land Conservation Act 1945*. The purpose of the conservation covenant is to protect and manage the native vegetation in such a way as to retain and promote its growth. The term of the conservation covenant will be in perpetuity and will bind the landowner and all successive landowners through registration as a memorial on the property’s certificate of title.



Plate 3. Remnant vegetation within Lot 10, Direct Offset 1.



Plate 4. Remnant vegetation within Lot 10, Direct Offset 1.

3.1.2 Direct Offset 2

For Direct Offset 2 it is proposed to conserve in perpetuity 38 ha of remnant vegetation within Lot 2148 Ferguson Road, Ferguson. Lot 2148 is located approximately 14 km east of the clearing footprint and is

situated on private property that is surrounded by 28,000 ha of State Forest, forest conservation zones, conservation parks, proposed conservation parks, and Crown reserves.

Within Lot 2148, the vegetation has been mapped as Beard Vegetation Association 3. This vegetation is described as medium forest consisting of jarrah and marri (Shepherd *et al.*, 2001) (refer to **Plates 5 and 6**). It is also mapped as Yarragil complex which is described as open forest of *Eucalyptus marginata subsp. Marginata-Corymbia calophylla* on slopes with mixtures of *Eucalyptus patens* and *Eucalyptus megacarpa* (Hedde *et al.*, 1980).

A black cockatoo habitat survey (Harewood 2021b) was undertaken within the proposed offset area to provide an estimate of the number of black cockatoo breeding habitat trees present. To estimate the number of trees with a DBH of >50cm present, six 100 metre by 100 metre quadrats (1 ha each) were established and the number of trees with a DBH >50cm present counted. These figures were then used to estimate the total number of trees with a DBH >50cm present in the total survey area. Based on the habitat tree survey, it was estimated that the offset area contains approximately 1,286 habitat trees (refer to **Appendix C**).

Vegetation across the entire Lot can be considered as representing black cockatoo foraging habitat given the dominance of marri and jarrah. Foraging evidence was observed at several location. This evidence was attributed to either the forest redtailed black cockatoo (marri, jarrah and blackbutt debris) and Baudin's black cockatoo (marri debris) depending on the nature of the evidence observed (Harewood 2021b).

No evidence of black cockatoos roosting with the offset area was observed however it may be used for this purpose at times (Harewood 2021b).

Lot 2148 is zoned "Rural" under the Greater Bunbury Region Scheme and "General Farming" pursuant to the Town Planning Scheme (TPS) No. 3.

To protect the 38 ha of vegetation, the proponent has purchased the property and will enter into a conservation covenant (voluntary written agreement) with the Commissioner of Soil and Land Conservation under section 3 of the *Soil and Land Conservation Act 1945*. The purpose of the conservation covenant is to protect and manage the native vegetation within the offset in such a way as to retain and promote its growth. The term of the conservation covenant will be in perpetuity and will bind the landowner and all successive landowners through registration as a memorial on the property's certificate of title.



Plate 5. Remnant vegetation within Lot 2148, Direct Offset 2.



Plate 6. Remnant vegetation within Lot 2148, Direct Offset 2.

3.1.3 Direct Offset 3

Direct Offset 3 involves the conservation in perpetuity of 7.86 ha of remnant vegetation within Lot 81 and Lot 2 Banksia Road, Crooked Brook. This vegetation will provide a 50 m and 100 m buffer of vegetation from the internal firebreak to the Dardanup Conservation Park within Lot 2 and Lot 81, respectively. This will involve the application of a conservation covenant over the vegetation to enable protection in perpetuity. This will also ensure that the identified black cockatoo roosting tree (Harewood 2015) on the

northern boundary of Lot 81 will be retained, in addition to the tree containing a hollow with evidence of historical use within Lot 2 (Harewood 2021).

The vegetation buffer is zoned “Rural” under the Greater Bunbury Region Scheme and “General Farming” pursuant to the Town Planning Scheme (TPS) No. 3. In accordance with the Shire of Dardanup’s Local Planning Strategy, it is zoned ‘Waste Disposal/Processing’. Accordingly, without protection this vegetation would likely be subject to clearing to accommodate the expansion of the current waste facility.

To protect the vegetation buffer, the proponent will enter into a conservation covenant (voluntary written agreement) with the Commissioner of Soil and Land Conservation under section 3 of the *Soil and Land Conservation Act 1945*. The purpose of the conservation covenant is to protect and manage the native vegetation within the offset in such a way as to retain and promote its growth. The term of the conservation covenant will be in perpetuity and will bind the landowner and all successive landowners through registration as a memorial on the property’s certificate of title.

The vegetation within the proposed buffer does contain areas of significant weed infestation and vegetation that has been structurally degraded as result of historical and recent anthropogenic impacts. It is therefore proposed to implement a rehabilitation program which will involve intensive weed control and infill planting with suitable native species. Furthermore, to prevent access to the proposed buffer from unauthorised vehicles and foxes, ring-lock fencing will be installed along its boundary. These management measures will be documented in a Buffer Management Plan (discussed further below).

Buffer Management Plan

A key design objective for the *Concept Plan* was the protection of the subject site’s existing biodiversity values. This has been achieved through the retention of 7.87 ha of strategically selected remnant vegetation within a vegetation buffer. Areas of vegetation retention have been intentionally located to retain quality habitat for black cockatoos while also providing ecological linkages throughout the subject site and to adjoining areas.

In addition, within the buffer, it is proposed to conduct infill planting in degraded areas, weed control and access control. Species associated with black cockatoo habitat will be utilised for revegetation. This will significantly enhance the value of this remnant vegetation.

The proponent will implement a Buffer Management Plan which will include weed management, revegetation, access control and general maintenance. The objective of the Buffer Management Plan is to enhance the existing habitat for black cockatoos by minimising the current indirect impacts which include:

- Uncontrolled access – currently vehicles, motorbikes and pedestrians have unfettered access to the buffer. This is resulting in vegetation destruction (through the creation of new tracks, paths etc.), rubbish dumping, fire risks and the spread/introduction of weeds and dieback.
- Weed and disease spread/introduction – weeds are prolific throughout some areas as a result of previous and ongoing anthropogenic impacts. There are currently no mechanisms for the control of weeds and disease within this area.
- Feral and domestic animal management – the buffer areas are completely unmanaged and therefore in consideration of the surrounding rural environment, provide a sanctuary for feral and animals.

The Buffer Management Plan will be prepared in consultation with the DBCA. It will provide the following:

- Location of key natural area and its environmental attributes;
- Identification of areas to be rehabilitated;
 - The objectives of the revegetation and completion criteria;

- Supplementary planting program;
- Weed control;
- Implementation of management program including controlling public access, rubbish collection, weeds, pests and fire management; and
- Monitoring program and contingency actions.

3.2 EPBC Act Offset Policy

3.2.1 Background

The *EPBC Act Environmental Offsets Policy* (October 2012) (referred to as the EPBC Act Offset Policy) requires the delivery of an “overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environmental law and affected by the proposed action”. The Commonwealth environmental offset is a measure that compensates for the residual adverse impacts of an impact on the environment, whereby offsets are only necessary where the residual impacts are significant. The *EPBC Act Offsets Policy* provides for the application of direct offsets and other compensatory measures as follows:

- Direct offsets are defined as those actions that provide a measurable conservation gain for an impacted protected matter. A minimum of 90% of an offset must be a direct offset; and
- Other compensatory measures are defined as those actions that do not directly offset impacts but are anticipated to lead to benefits for the impacted protected matter.

3.2.2 Calculations

In order to determine the acceptability of the proposed offsets in regard to the *EPBC Act Offsets Policy*, the associated calculator has been used for the Carnaby’s Black Cockatoo (given that it has the highest conservation rating of the three species of black cockatoo (i.e. Endangered)). This appraisal is based on habitat using the average for each rating of impact, habitat quality, offset start quality and future quality, to ascertain an initial comparison. A summary of the results is provided within **Table 1** which demonstrates that the proposed offsets are adequate to meet the minimum direct offset requirements (refer to **Appendix D** for specific calculations).

Table 1. Summary of offset calculations.

Species	Protected Matter Attribute	Quantum of Impact	% of Impact Offset	Direct Offset Adequate
Carnaby’s Black Cockatoo	Area of habitat	11.76 ha	100.69%	Yes

3.2.3 Policy Compliance

In order to determine the consistency of the proposed offset approach with the eight principles of the *EPBC Act Offsets Policy*, an assessment has been conducted as provided within **Table 2**.

Table 1. Comparison of the proposed offsets with the EPBC Act Offsets Policy.

No.	EPBC Offset Principle	Current Project
1	Must deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by	The offset proposed will increase the representation of foraging and potential breeding habitat for black cockatoos within conservation. This protection will,

	national environment law and affected by the proposed action	at a minimum, assist in maintaining the viability of the protected matter.
2	Must be built around direct offsets but may include other compensatory measures	The proposal achieves the 100% direct offset target.
3	Must be in proportion to the level of statutory protection that applies to the protected matter	The offsets proposed are considered appropriate and consistent with the DAWE policy given that they adequately offset the impact as identified through the offset calculator.
4	Must be of a size and scale proportionate to the residual impacts on the protected matter	The proposed offsets will be proportionate to the residual impacts on habitat within the application area as reflected through the offset calculator.
5	Must effectively account for and manage the risks of the offset not succeeding	Given the land is vegetated and will be protected by a legal mechanism there is a very low risk of the offset not succeeding. This has been reflected in the inputs used in the EPBC Offset Guide to calculate the offset required.
6	Must be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action, see section 7.6)	The proposed offsets package for the 'Matters of National Environmental Significance' have been developed to satisfy the requirements of the Commonwealth EPBC Act only.
7	Must be efficient, effective, timely, transparent, scientifically robust and reasonable	The proposed offset is considered to be effective and efficient as the offset sites will be legally protected. The offset is considered to meet the timeliness requirement as the covenants will be implemented prior to the commencement of clearing, and the offset sites are already vegetated and provide foraging and potential breeding habitat for black cockatoos. Habitat for the species has been thoroughly defined by a number of studies and reports. The offset has been calculated using the EPBC Offset Guide and is therefore considered reasonable.
8	Must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	Offsets will be monitored and reported annually through the Annual Environmental Report (AER).

REFERENCES

GHD (2021). *Part Lot 2 and 10, Temple Rd Picton Biological Survey Report. Report prepared for J and P Group.*

Harewood (2015). *Fauna Assessment. Lot 81 Banksia Road, Dardanup.*

Harewood (2021a). *Fauna Assessment. Lot 2 Banksia Road, Dardanup.*

Harewood (2021b). *Habitat Tree Survey - Lot 2148 Ferguson Road – Wellington Forest.*

Urbaqua (2020). *Community Engagement and Advice on Shire of Dardanup Waste Precinct – Local Planning Scheme No. 9 Report.*

FIGURES



PROJECT Lot 1 Banksia Road, Crooked Brook

DRAWING TITLE Figure 1 - Habitat trees with one or more hollows possibly suitable for black cockatoos

CLIENT J + P Group




PO Box 5178
West Busselton
Western Australia 6280
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Project Number 1901
Drawing Number Figure 1
Revision C
Date 28/7/2021
Sheet 1 of 1

Designed PN
Drawn PN
Checked
Approved
Local Authority Shire of Dardanup

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 Vegetation to be Retained (5.2254ha)

BUNBURY OFFICE:
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ALBANY | BUNBURY | BUSSELTON | FORRESTDALE | PERTH

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D	Updated Vegetation Area	21/07/21	plan type
C	Updated Vegetation Area	18/05/21	
B	Updated Vegetation area	22/04/21	
A	Original drawing	SB 02/12/20	
rev	details	approved date	
survey	N/A	cad file	22869-01C.dgn
drawn	NP 02/12/20	checked	SB 02/12/20
horiz datum	MGA 94	level datum	N/A
scale at A3	all distances are in metres		
1: 2500			

figure 2. Direct offset 1	
description	
Lot 10 on D 70159 Temple Road PICTON EAST	
client	drawing no
J & P Corporation	22869-01C




Harley Dykstra
 PLANNING & SURVEY SOLUTIONS



PROJECT Lot **2148 Ferguson Road**
 DRAWING TITLE **FIGURE 3 -Direct Offset 2**
 CLIENT **J & P Group**

Legend

 Direct Offset 2



PO Box 5178
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1516
 Designed KMT
 Drawn PN
 Local Authority Shire of Dardanup

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 Sheet 1 of 1

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APPENDIX A – Lot 2 Fauna Assessment

Fauna Assessment



Lot 2 Banksia Road

Dardanup

April 2021

V1

On behalf of:

Cleanaway Solid Waste Pty Ltd
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TABLE OF CONTENTS

SUMMARY	
1.	INTRODUCTION 1
2.	SCOPE OF WORKS..... 1
3.	METHODS 2
3.1	LITERATURE REVIEW – FAUNA SPECIES OF CONSERVATION SIGNIFICANCE..... 2
3.2	FIELD SURVEYS..... 2
3.2.1	FAUNA HABITAT ASSESSMENT 2
3.2.2	FAUNA OBSERVATIONS..... 3
3.2.3	BLACK COCKATOO HABITAT ASSESSMENT 4
3.2.3.1	Breeding Habitat Assessment 4
3.2.3.2	Foraging Habitat Assessment 5
3.2.3.3	Night Roosting Habitat Assessment 6
3.2.4	WESTERN RINGTAIL POSSUM ASSESSMENT..... 6
3.2.4.1	Daytime Survey 6
3.2.4.2	Night Time Survey 6
3.2.4.3	Habitat Assessment..... 6
4.	SURVEY LIMITATIONS 6
5.	RESULTS 7
5.1	LITERATURE REVIEW – FAUNA SPECIES OF CONSERVATION SIGNIFICANCE..... 7
5.2	FIELD SURVEYS..... 8
5.2.1	FAUNA HABITAT ASSESSMENT 8
5.2.2	FAUNA OBSERVATIONS..... 10
5.2.3	BLACK COCKATOO HABITAT ASSESSMENT 10

5.2.3.1	Breeding Habitat Assessment	10
5.2.3.2	Foraging Habitat Assessment	12
5.2.3.3	Night Roosting Habitat Assessment	14
5.2.4	WESTERN RINGTAIL POSSUM ASSESSMENT.....	14
5.2.4.1	Daytime Survey	14
5.2.4.2	Night Time Survey	14
5.2.4.3	Habitat Assessment.....	14
6.	CONSERVATION SIGNIFICANT FAUNA SPECIES.....	15
7.	CONCLUSION.....	20
8.	REFERENCES	23

FIGURES

- FIGURE 1: Survey Area & Surrounds
- FIGURE 2: Survey Area – Aerial Photograph
- FIGURE 3: Recording Locations
- FIGURE 4: Fauna Habitats & Habitat Trees (DBH \geq 50cm)

TABLES

- TABLE 1: Conservation significant fauna previously recorded or potentially occurring within in the general vicinity of survey area
- TABLE 2: Example images of the fauna habitats within the survey area
- TABLE 3: Summary – Habitat Tree Review
- TABLE 4: Foraging evidence examples
- TABLE 5: Likelihood of occurrence – fauna species of conservation significance

APPENDICES

APPENDIX A: Conservation Categories

APPENDIX B: NatureMap Database Search and Protected Matters Search Tool Results

APPENDIX C: Observed Fauna Listing

APPENDIX D: Habitat Tree Details/Hollow Photographs

SUMMARY

This report details the results of a fauna assessment over an area of land within the Banksia Road Waste Disposal Facility operated by Cleanaway Waste Management Pty Ltd (Cleanaway) (Figure 1).

Cleanaway are proposing to clear about 7.4 hectares of remnant native vegetation at the eastern end of the property (Lot 2 Banksia Road) to enable the expansion of the current Class III putrescible landfill operation. Cleanaway have requested that a previous fauna assessment (Astron 2014) be reviewed and updated using current data. This report details the results of this review.

The defined survey area is comprised of the proposed clearing area in addition to a 50 metre buffer (to be retained) along the eastern boundary of Lot 2 and the Dardanup Conservation Park (Figure 2). The survey area has a total extent of about 8.7 ha.

The assessment has included a literature review, a daytime reconnaissance survey (including the use of camera traps and a bat detector), and a nocturnal spotlighting survey carried out in March 2021.

Key Findings

Astron identified one broad fauna habitat type within the survey area which is described as a “jarrah-marri woodland on the mid to upper slopes” (Astron 2014). More specifically the vegetation consists of a woodland/low woodland of jarrah and marri over an open/tall open shrubland over an open/low open shrubland over grassland/open sedgeland on a dark brown to lateritic loam. The vegetation present is similar in composition and are contiguous with the adjacent Dardanup Conservation Park, though in a more degraded in condition (Astron 2014).

Overall, the single broadly defined fauna habitat present appears to be degraded from its original natural state, a consequence of historical livestock grazing, logging activities and frequent fires with much of the vegetation being regrowth, with many relatively small trees/saplings being present. The total fauna assemblage within the survey area itself is therefore likely to be depauperate as a consequence. As this relatively small parcel of vegetation directly adjoins the Dardanup Conservation Park/State Forest it may nonetheless be utilised (if only infrequently) by a range of fauna species that would otherwise not persist in such a small, degraded remnant.

Foraging debris attributed to the forest red-tailed black cockatoo (vulnerable) and Carnaby’s black cockatoo (endangered) have been observed at several locations with the survey area during the various assessments (2014 and/or 2021) and both species have been heard/and or seen within or nearby the survey area also.

Calls of the western false pipistrelle (DBCA Priority 4 species) were recorded during the bat survey carried out in March 2021 (along with five other bat species).

The south-western brush-tailed phascogale (Schedule 6 – BC Act) was recorded at several locations during the camera trap survey carried out in March 2021 (along with five other fauna species).

No evidence of any other fauna species of conservation significance was observed. However, this does not eliminate the potential for some species to still occur, if only infrequently.

A total of 81 potential black cockatoo breeding “habitat trees” (i.e. those with a DBH >50cm) have been identified within the survey area. Three of these trees were found to contain hollows possibly suitable for black cockatoos to use for nesting purposes. Hollows in other trees were assessed as being unsuitable (i.e. too small or with an unfavourable orientation) or in some cases no hollow was found to be present.

Of the three trees assessed as having hollows possibly suitable for black cockatoos to use for nesting purposes only one showed any evidence of past use (Tree 29). This evidence was in the form of significant chewing around the hollows entrance. This particular tree is situated outside of the currently proposed clearing footprint and therefore will not be directly impacted on.

Given the dominance of jarrah and marri across almost the entire survey area all of the site can be regarded as representing quality foraging habitat (~8.7 ha in total, ~7.4 ha within the proposed clearing area). No black cockatoo roost sites were identified within the survey area with the closest a documented roost site being located about 2.1 km east of the survey area.

No evidence of the western ringtail possum was found despite targeted day and night surveys. Habitat for the species within the survey area appears marginal in quality given the absence of a coherent midstory element.

In summary four vertebrate fauna species of conservation significance were positively identified as utilising the survey area:

- Forest Red-tailed Black Cockatoo – Vulnerable (WA/Federal);
- Carnaby’s Black Cockatoo – Endangered (WA/Federal);
- South-western Brush-tailed Phascogale - Schedule 6 (WA);
- Western False Pipistrelle – Priority 4 (DBCA Priority Species).

Several additional species of conservation significance may also utilise the survey area, though, as no evidence of their presence was identified during the field survey, their status in the area remains uncertain. In most cases the species in question probably only occurs occasionally and/or for brief periods:

- Peregrine Falcon – Schedule 7 (WA);
- Masked Owl – Priority 3 (DBCA Priority Species);
- Baudin’s Black Cockatoo – Endangered (WA/Federal);

- Chuditch - Vulnerable (WA/Federal);
- Western Brush Wallaby – Priority 4 (DBCA Priority Species)

Potential impacts on these fauna species and fauna in general are anticipated to be low primarily due to the degraded nature of the remnant vegetation present (and anticipated low fauna population densities), and the relatively small area of clearing required. Nonetheless ongoing planning should consider the potential presence of fauna so that any impacts can be further minimised where considered reasonable and practicable.

Given the confirmed presence of several fauna species of conservation significance (and other fauna in general) residing within the of proposed clearing footprint (e.g. south-western brush-tailed phascogale and common brushtail possum) it is recommended that appropriate management measures (e.g. trapping) be employed prior to and during clearing operations.

1. INTRODUCTION

This report details the results of a fauna assessment over an area of land within the Banksia Road Waste Disposal Facility operated by Cleanaway Waste Management Pty Ltd (Cleanaway) (Figure 1).

Cleanaway are proposing to clear about 7.4 hectares (ha) of remnant native vegetation at the eastern end of the property (Lot 2 Banksia Road) to enable the expansion of the current Class III putrescible landfill operation. In 2014 Astron Environmental Services undertook a Level 1 fauna assessment (and a Level 2 flora and vegetation survey) of the proposed clearing area. At the time, approval to clear the vegetation was not finalised and so, given the time lapse since the previous survey work, Cleanaway have requested that the previous fauna assessment be reviewed and updated using current data. This report details the results of this review.

The defined survey area is comprised of the proposed clearing area in addition to a 50 metre buffer (to be retained) along the eastern boundary of Lot 2 and the Dardanup Conservation Park (Figure 2). The survey area has a total extent of about 8.7 ha.

Information obtained as part of this fauna assessment report will be used in conjunction with other environmental investigations to guide project planning and will also be used in the formulation of management plans, both of which will aim to minimise potential environmental impacts. The information presented may also be used by regulatory authorities to assess the potential impact of the proposal on fauna and fauna habitats at the site during the project evaluation and approval process as required.

2. SCOPE OF WORKS

The scope of works was defined as:

- A general assessment of the presence/potential occurrence of specially protected fauna species;
- Black Cockatoo Habitat Assessment
 - Black Cockatoo Breeding Habitat – confirm the number of previously identified potential habitat trees with hollows (based on findings of the 2014 Astron report). Within trees identified as containing hollows, confirm if there is any actual evidence of use by black cockatoos.
 - Black Cockatoo Foraging habitat – discuss quality of foraging habitat and evidence of use by black cockatoos.
 - Black Cockatoo Roosting – confirm if there is any evidence of black cockatoos roosting within trees on site.

- Western Ringtail Possum Assessment
 - Carry out a targeted day and night survey for evidence of western ringtail possum (dreys, scats and individuals);
- Compile a report detailing methods and results.

Note: For the purposes of this proposal the term black cockatoo is in reference to Baudin's black cockatoo *Calyptorhynchus baudinii*, Carnaby's black cockatoo *Calyptorhynchus latirostris* and the forest red-tailed black cockatoo *Calyptorhynchus banksii naso*.

3. METHODS

3.1 LITERATURE REVIEW – FAUNA SPECIES OF CONSERVATION SIGNIFICANCE

A list of conservation significant fauna recorded or likely to occur within the survey area has been compiled by a review of available databases and literature including, but not limited to the following data sources:

- Department of Biodiversity, Conservation and Attractions (DBCA) Threatened Fauna Database (NatureMap) (DBCA 2021). A 15 km buffer around the survey area was applied to capture previous fauna records within the immediate vicinity;
- *EPBC Act* Protected Matters database for fauna of national environmental significance (DAWE 2021). The minimum buffer (1 km) was applied to this search as the databases contains distribution data (areas) and not actual fauna records; and
- Literature search and review of other fauna surveys in the vicinity.

The conservation status of each species has been based on current lists produced under Federal and State Acts (*EPBC Act* and the *Biodiversity Conservation Act 2016 (BC Act)*), those species recognised under international treaties (CAMBA, JAMBA and the Bonn Convention) and Priority Fauna (as listed by the DBCA).

3.2 FIELD SURVEYS

The field component of the fauna assessment was carried out by Greg Harewood (Zoologist) and consisted of a daytime reconnaissance survey (24 March 2021) and nocturnal spotlighting (31 March 2021) as described in the sections below.

3.2.1 FAUNA HABITAT ASSESSMENT

The objective of the habitat assessment was to assess if it were likely that species of conservation significance would utilise the habitats identified within the survey area.

During the field survey, fauna habitats within the survey area were assessed, and specific elements identified, which informed the likelihood of listed conservation significant species utilising the area and fauna habitat significance.

Vegetation units, landforms and soils observed during the site reconnaissance survey were used to define broad fauna habitat types across the survey area.

3.2.2 FAUNA OBSERVATIONS

The aim of this part of the assessment was to obtain enough information to assess the likely significance of the survey area to fauna species of conservation significance.

Based on the results of the literature review, evidence of the presence or likely presence of fauna species of conservation significance known to or likely to frequent the general area was searched for and recorded during the field survey.

This included but was not limited to:

- Undertaking a series of transects across the survey area.
- Searching for evidence (i.e. individuals, tracks, scats, calls) of potential conservation significant species under logs, rocks and leaf litter.
- Observing bird species with binoculars.

These observations were supplemented with the use of motion sensing, infrared “camera traps” and a “bat detector” as described below.

Ten motion sensing, infrared “camera traps” (Acorn model LTI 5210A) were placed within the survey area on the 24 March 2021. These were retrieved on the 31 March 2021 (eight days of deployment). The camera traps were set to take three consecutive pictures when triggered, with a five second time lapse before any subsequent trigger event. The location of each camera trap is shown in Figure 3.

All pictures were examined and fauna species, where possible, identified. Only one image of each species taken on any one day was documented as a record.

Two nights (23 and 24 March 2021) of acoustic bat call recordings were undertaken using a Wildlife Acoustics SM2+ Bat Detector. The recordings were commenced at sunset and continued until sunrise the following day. The recording locations are shown in Figure 3.

The bat detector converts ultrasonic echolocation signals produced by bats into audible electronic signals that are then recorded. The recordings were later processed by Bob Bullen (Bat Call WA Pty Ltd) to determine the presence of species-specific calls.

Fauna observations made by Astron during their field survey work in November 2014 (Astron 2014) have also been incorporated into the data set.

3.2.3 BLACK COCKATOO HABITAT ASSESSMENT

The following methods were employed to comply with the defined scope of works and are based on Commonwealth of Australia (2012) guidelines which state that surveys for Carnaby's, Baudin's and forest red-tailed black cockatoo habitat should:

- be done by a suitably qualified person with experience in vegetation or cockatoo surveys, depending on the type of survey being undertaken;
- maximise the chance of detecting the species' habitat and/or signs of use;
- determine the context of the site within the broader landscape—for example, the amount and quality of habitat nearby and in the local region (for example, within 12 km);
- account for uncertainty and error (false presence and absences); and
- include collation of existing data on known locations of breeding and feeding birds and night roost locations.

The Commonwealth of Australia (2012) places habitats used by Black Cockatoos into the following three categories:

- Breeding Habitat;
- Foraging Habitat; and
- Night Roosting Habitat.

3.2.3.1 Breeding Habitat Assessment

As part of this assessment all previously identified habitat trees containing possible large hollows (17 in total) deemed “potentially suitable for breeding purposes” (Astron 2014) were re-inspected and specific details on any hollows present recorded. Some additional trees that appeared to contain possible large hollows were also reviewed (three in total). The assessment included but was not limited to recording specific details on any evidence of actual use (e.g. significant chew marks around hollow entrances).

Where practical to do so a drone (DJI Mavic Air) was used to examine and photograph each potential hollow at close range to assist in determining suitability and to aid in identifying any signs of current or previous use by black cockatoos.

Identified hollows have initially been placed into one of three categories based on the type of hollow entry (Birdlife Australia 2018):

- Chimney: the hollow entry faces directly upwards in the end of the trunk;
- Spout: hollow entry which is at the end of a broken branch; or
- Side: the entry is directly into the side of the trunk or a branch with no protrusions.

For the purpose of this review, hollows have then been placed into one of seven categories based on the observable characteristics of each hollow. The categories used were:

- **Confirmed Hollow:** Black cockatoos observed utilising the hollow for breeding purposes;
- **Chewed Hollow:** The hollow shows signs of chewing (“chipping” around or near entrance and/or internally) attributed to black cockatoo activity (in most cases indicating nesting activity, but in some cases possibly marks left by black cockatoos investigating (“prospecting”) hollows);
- **Unused Hollow:** The hollow appears to be of a suitable size for black cockatoos to use for nesting, but no conclusive evidence of this activity seen. It should be noted that chew marks/chipping are not always evident or present on some hollows that have been used for nesting. Hollows classified as “unused” may therefore have been used for nesting but cannot be specifically classified as such. Alternatively, some “unused” hollows may not be suitable for black cockatoos as a range of characteristics, not all of which can be seen or measured, ultimately determined if a hollow will ever actually be used;
- **Unsuitable Hollow:** The hollow has been assessed, based on information obtained, as being unlikely to be suitable for black cockatoos (generally because of the entrance appearing to be too small or because the actual hollow or accommodating branch/tree trunk appears to be too small or as having an unfavourable orientation);
- **No Hollow:** The tree was not observed to contain any hollows. Generally, this would be due to mis-identification from ground level during the initial assessment where a feature of the tree appeared to possibly represent a hollow but upon closer inspection was found not to qualify as such;
- **No Tree Present:** A standing tree is no longer present i.e. the original tree has fallen over, been burnt or has been removed/felled.
- **Status Unknown:** The tree could not be found or was not revisited.

A review of available literature was carried out to determine the location/extent of any known/likely black cockatoo breeding habitat areas in the vicinity of the survey area.

3.2.3.2 Foraging Habitat Assessment

The location and nature of black cockatoo foraging evidence (e.g. chewed fruits around base of trees) observed during the field survey was recorded. The nature and extent of potential foraging habitat present was also documented irrespective of the presence of any actual foraging evidence. Foraging habitat is represented by plant species that are known to provide a food source for black cockatoos. This can be in the form of seeds, flowers and also boring grubs that are extracted from some plant species.

A review of available literature was carried out to determine the location/extent of any known/likely Black Cockatoo foraging habitat areas in the vicinity.

3.2.3.3 Night Roosting Habitat Assessment

Direct and indirect evidence of black cockatoos roosting within trees on site was noted where observed (e.g. branch clippings, droppings or moulted feathers).

A review of available literature was carried out to determine the location/extent of any known/likely black cockatoo roosting habitat areas in the vicinity.

3.2.4 WESTERN RINGTAIL POSSUM ASSESSMENT

3.2.4.1 Daytime Survey

A day time survey to locate and record dreys, obvious tree hollows, scats and individual WRPs was carried out concurrent with the site reconnaissance survey/black cockatoo habitat assessment and involved a series of close spaced traverses on foot across the survey area.

3.2.4.2 Night Time Survey

A single night time survey to locate and record individual WRPs was carried out. This involved a series of transect across the survey area, on foot using a LED head torch.

3.2.4.3 Habitat Assessment

Description and comments on the amount and quality of WRP habitat within the survey area are provided based on observations made during the site surveys.

4. SURVEY LIMITATIONS

No seasonal sampling was carried out as part of this fauna assessment. The conclusions presented are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of the field assessments. It should be recognised that site conditions can change with time.

Lack of observational data on some species should also not necessarily be taken as an indication that a species is absent from the site or does not utilise it for some purpose at times.

During the survey, habitat trees with hollows were searched for. It should be noted that identifying hollows suitable for fauna species from ground level has limitations. Generally, the full characteristics of any hollow seen are not fully evident (e.g. internal dimensions). It is also difficult to locate all hollows within all trees as some are not observable from ground level.

The location of observations was recorded using a handheld GPS. The accuracy of the GPS cannot be guaranteed above a level of about 5 to 10 metres, though it should be noted that in some circumstance the accuracy can increase or decrease beyond this range.

5. RESULTS

5.1 LITERATURE REVIEW – FAUNA SPECIES OF CONSERVATION SIGNIFICANCE

The literature review identified multiple fauna species of conservation significance as potentially occurring in the general area as listed in Table 1. The NatureMap (DBCA 2021) and Protected Matter Search Tool (DAWE 2021) results, used as a primary source for compiling this listing, are held within Appendix B.

Table 1: Conservation significant fauna previously recorded or potentially occurring within the general vicinity of survey area.

Species	Conservation Status ¹	
	BC Act/ DBCA Priority	EPBC Act
Pouched Lamprey <i>Geotria australis</i>	P3	-
Carter's Freshwater Mussel <i>Westralunio carteri</i>	S3	VU
Swan Coastal Plain Shield-backed Trapdoor Spider <i>Idiosoma sigillatum</i>	P3	-
Western Pygmy Trapdoor Spider <i>Bertmainius opimus</i>	P3	-
Coastal Plains Skink <i>Ctenotus ora</i>	P3	-
Australasian Bittern <i>Botaurus poiciloptilus</i>	S2	EN
Migratory Shorebirds/Marine Species/Wetland Species	Various	Various
Eastern Osprey <i>Pandion cristatus</i>	S5	Mig, Ma
Peregrine Falcon <i>Falco peregrinus</i>	S7	-
Grey Falcon <i>Falco hypoleucos</i>	S3	VU
Masked Owl <i>Tyto novaehollandiae novaehollandiae</i>	P3	-
Barking Owl <i>Ninox connivens connivens</i>	P3	-

¹ See Appendix A for conservation status codes

Species	Conservation Status ¹	
	BC Act/ DBCA Priority	EPBC Act
Blue-billed Duck <i>Oxyura australis</i>	P4	-
Carnaby's Black Cockatoo <i>Calyptorhynchus latirostris</i>	S2	EN
Baudin's Black Cockatoo <i>Calyptorhynchus baudinii</i>	S2	EN
Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i>	S3	VU
Fork-tailed Swift <i>Apus pacificus</i>	S5	Mig
Grey Wagtail <i>Motacilla cinerea</i>	S5	Mig
Chuditch <i>Dasyurus geoffroii</i>	S3	VU
Quenda <i>Isoodon fusciventer</i>	P4	-
South-western Brush-tailed Phascogale <i>Phascogale tapoatafa wambenger</i>	S6	-
Western Ringtail Possum <i>Pseudocheirus occidentalis</i>	S1	CR
Quokka <i>Setonix brachyurus</i>	S3	VU
Woylie <i>Bettongia penicillata ogilbyi</i>	S1	EN
Western Brush Wallaby <i>Notamacropus irma</i>	P4	-
Water Rat <i>Hydromys chrysogaster</i>	P4	-
Western False Pipistrelle <i>Falsistrellus mackenziei</i>	P4	-


5.2 FIELD SURVEYS

5.2.1 FAUNA HABITAT ASSESSMENT

The survey area has a total extent of about 8.7 ha most of which contains vegetation of some type (Figure 2). Astron identified one broad fauna habitat type within the survey area which is described as a "jarrah-marri woodland on the mid to upper slopes" (Astron 2014). More specifically the vegetation consists of a woodland/low woodland of jarrah and marri over an open/tall open shrubland over an open/low open shrubland over grassland/open sedgeland on a dark brown to lateritic loam. The vegetation present is similar in composition and are contiguous with the adjacent Dardanup Conservation Park, though in a more degraded in condition (Astron 2014).

Example images of the fauna habitat present are provided in Table 2.

Table 2: Example Images of the Fauna Habitat within the Survey Area

Fauna Habitat Description	Example Images
<p>Woodland/low woodland of Jarrah and Marri over an open to tall open shrubland over an open to low open shrubland over grassland/open sedgeland on dark brown to lateritic loam</p>	

Overall, the single broadly defined fauna habitat present appears to be degraded from its original natural state, a consequence of historical livestock grazing, logging activities and frequent fires with much of the vegetation being regrowth, with many relatively small trees/saplings being present. There is also a distinct lack of midstorey vegetation such as banksia, peppermint and other low woodland species generally found in similar vegetation types which lower the sites habitat value to some species.

The total fauna assemblage within the survey area itself is therefore likely to be depauperate as a consequence. As this relatively small parcel of vegetation directly adjoins the Dardanup Conservation Park/State Forest it may nonetheless be utilised (if only infrequently) by a range of fauna species that would otherwise not persist in such a small, degraded remnant.

5.2.2 FAUNA OBSERVATIONS

To date 38 fauna species have been recorded within the survey area during the various assessments carried out (i.e. Astron in November 2014 and this assessment - March 2021) either by direct observation during day and night surveys, secondary signs (e.g. tracks/scats) camera trap records or from bat call recordings.

A full listing of the species observed is held on Appendix C. The majority of fauna recorded are common bird species.

Foraging debris attributed to the forest red-tailed black cockatoo (vulnerable) and Carnaby's black cockatoo (endangered) have been observed at several locations with the survey area during the various assessments and both species have been heard/and or seen. (Note: Astron (2014) report finding foraging debris (chewed marri fruits) which they erroneously attributed to Baudin's black cockatoo, when in fact it is typical of Carnaby's black cockatoo).

Calls of the western false pipistrelle (DBCA Priority 4 species) were recorded during the bat survey carried out in March 2021 (along with five other bat species).

The south-western brush-tailed phascogale (Schedule 6 – BC Act) was recorded at several locations during the camera trap survey carried out in March 2021 (along with five other fauna species).

No evidence of any other fauna species of conservation significance was observed. However, this does not eliminate the potential for some species to still occur, if only infrequently (see Table 5 for an assessment of likelihood of occurrence).

5.2.3 BLACK COCKATOO HABITAT ASSESSMENT

5.2.3.1 Breeding Habitat Assessment

Trees considered potentially suitable for black cockatoos to use as nesting habitat (subject to a suitable hollow being present and other factors) found within the survey area comprised the following species:

- Marri – *Corymbia calophylla*;
- Jarrah – *Eucalyptus marginata*; and
- Dead Unidentified - *Eucalyptus* spp.

Astron (2014) identified 80 habitat trees within the survey area (i.e. trees with a DBH >50cm). Of the 80 trees recorded, Astron assessed 17 as possibly containing hollows potentially suitable for black cockatoos. (Note One additional habitat tree, not previously recorded has been added to the data set – making 81 habitat trees in total).

These 17 trees and three additional trees were examined in detail with a drone (where possible). The results of this review are summarised in the table below. Additional details

and photographs are contained in appendix D. The locations of habitat trees are shown in Figure 4.

Table 3: Summary – Habitat Tree Review

Tree ID	Review Status (BC Hollow)	Justification
5	Unsuitable Hollows.	Dead marri with a side entry hollow. The hollow has a relatively large entrance but appears to be too small internally for a black cockatoo to use for nesting purposes. No evidence of use by fauna of any type.
13	Unsuitable Hollows.	Marri with a possible side entry/spout type hollow and a possible large side entry hollow. Neither hollow appeared suitable with one appearing to be too small and the other having no depth. No evidence of use by fauna of any type.
18	Unsuitable Hollow.	Marri with a possible upward facing spout type hollow. The hollow was found to have two entrances, both of which are too small for black cockatoos. No evidence of use by fauna of any type
24	Unsuitable Hollow.	Marri with sever possible side entry hollows. All but one hollow was found to be non-existent. The single side entry hollow's entrance appears to be too small for black cockatoos. Some chew marks suggest possible galah activity though not conclusive.
29	Chewed Hollow.	Marri with possible side entry/spout type hollow. The hollow was found to have depth and also appeared to have chew marks near the entrance suggesting black cockatoo activity.
37	Unsuitable Hollow/No Hollow.	Large near dead jarrah with possible large chimney/spout type hollow. The hollow was however found to have no depth when examined with a drone. Several much smaller possible spout type hollows in dead branches. No evidence of use by fauna of any type.
40	Unsuitable Hollow.	Marri with near horizontal spout type hollows. The hollow appears to have some depth but the fact that it is horizontal makes it unfavourable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
41	Unsuitable Hollow.	Jarrah with a side entry/spout type hollow. The hollow appears to have some depth but only provides entry into a relatively small branch/trunk of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
42	Unsuitable Hollow.	Marri with a side entry/spout type hollow. The hollow appears to have some depth but only provides entry into a relatively small trunk of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
43	Unsuitable Hollow.	Marri with a side entry type hollow. The hollow only provides entry into a relatively small branch of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
45	Unsuitable Hollows.	Jarrah with two side entry type hollows. Both hollows only provide entry into a relatively small branch of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
46	Unsuitable Hollow.	Marri with a spout type hollow created recently when a branch of the tree broke off. The hollow appears to have a large entrance and some depth but appears too small internally to be considered suitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
47	No Hollow.	Marri with a possible side entry hollow. The hollow was found to be non-existent when examined with a drone.
59	No Hollow.	Jarrah with possible chimney type hollow. The hollow was found to be non-existent when examined with the drone.
62	Unsuitable Hollow.	Marri with a chimney type hollow. The hollow appears to be very shallow/open and is therefore considered unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.

Tree ID	Review Status (BC Hollow)	Justification
69	Unsuitable Hollow.	Marri with a chimney type hollow. The hollow appears to be very shallow/open and is therefore considered unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
74	Unused Hollow	Marri with a chimney type hollow. The hollow has a large entrance and appears to be quite deep and therefore it must be considered potentially suitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
77	Unsuitable Hollow	Marri with a chimney type hollow. The hollow appears to be very shallow/open and is therefore considered unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
78	Unused Hollows	Marri with a two possible side entry type hollows possibly joined. Both hollows appear to be suitable (size and orientation) to be classified as potentially suitable for black cockatoos to use for nesting purposes. No evidence of use.
81	Unsuitable Hollows	Near dead jarrah with a possible chimney type hollow. This hollow was found to be non-existent when examined with a drone. Several much smaller possible spout type hollows in dead branches.

Of the 20 trees examined only three appeared to contain hollows possibly suitable for black cockatoos to use for nesting purposes. Hollows in other trees were assessed as being unsuitable (i.e. too small or with an unfavourable orientation) or in some cases no hollow was found to be present.

Of the three trees assessed as having hollows possibly suitable for black cockatoos to use for nesting purposes only one showed any evidence of past use (Tree 29). This evidence was in the form of significant chewing around the hollows entrance.

It should be noted that not all the identified habitat trees will necessarily require clearing as the survey area is larger than the currently proposed clearing footprint. For example, Tree 29, which shows evidence of use by black cockatoos is outside the proposed clearing footprint and therefore will not be directly impacted on.

Based on available mapping, there is approximately 18,800 ha of remnant native vegetation within 12 km of the survey area (DPIRD 2020). Much of this is likely to contain “potential” breeding habitat as defined by DAWE (i.e. suitable tree species with a DBH ≥ 50 cm).

5.2.3.2 Foraging Habitat Assessment

The following flora species are known to be or are potentially used as a direct food source (e.g. seeds, flowers, nectar, bark or grubs) by one or more species of black cockatoo and have been recorded within the survey area:

- Marri – *Corymbia calophylla*;
- Jarrah – *Eucalyptus marginata*;
- Couch Honeypot Dryandra - *Banksia dallanneyi*;

- Honeybush - *Hakea lissocarpha*;
- Kingia - *Kingia australis*;
- Snottygoble - *Persoonia longifolia*
- Peppermint – *Agonis flexuosa*; and



It should be noted that some of the above-mentioned species (e.g. Kingia and peppermint) while foraged upon on occasions would make up only a small proportion of any one bird’s diet relative to more favoured plant species such as marri. Some plant species are also only represented by a small number of specimens and therefore do not contribute to the overall foraging resource to a significant degree.

During the March 2021 assessment evidence of black cockatoos foraging was observed at a small number of locations. This evidence was mainly in the form of chewed fruits from marri. This foraging activity was attributed to the forest red-tailed black cockatoo.

During their assessment in the spring of 2014 Astron also recorded foraging evidence which was attributed to the forest red-tailed black cockatoo and Carnaby’s black cockatoo.

Examples of the foraging debris observed are provided in Table 4.

Table 4: Foraging Evidence Examples

Foraging Evidence Description	Example Image
<p>Marri fruits – foraging activity attributed to the Forest Red-tailed Black Cockatoo (recorded March 2021).</p>	
<p>Marri fruits – foraging activity attributed to Carnaby’s Black Cockatoo (recorded Nov 2014 – Astron).</p>	

Given the dominance of jarrah and marri across almost the entire survey area all of the site can be regarded as representing quality foraging habitat (~8.7 ha in total, ~7.4 ha within the proposed clearing area).

Based on available mapping there is about 18,800 ha of remnant native vegetation within 12 km of the survey area (DPIRD 2020). Much of this is likely to represent black cockatoo foraging habitat of some type.

5.2.3.3 Night Roosting Habitat Assessment

No evidence of black cockatoos roosting within trees located within the survey area was observed during the survey period. It is difficult to determine if trees or groves of trees within the survey area represent potential roosting habitat as a range of factors, not all of which can be observed, determine suitability. Some of the larger trees may be suitable for roosting but as indicated no actual evidence of use was seen.

A review of the 2019 Great Cocky Count database shows no documented roost sites within the survey area. The 2019 Great Cocky Count recorded the closest active roost, approximately 2.1 kilometres east of the survey area (Site ID: CAPFERR001). This roost was being used by 34 forest red-tailed black cockatoos during the April 2019 survey (Peck *et al.* 2019). Another six documented roost sites (but not necessarily in current use) occur within 12 km of the survey area.

5.2.4 WESTERN RINGTAIL POSSUM ASSESSMENT

5.2.4.1 Daytime Survey

No evidence of western ringtail possums (scats, dreys or individuals) was observed during the day survey within the survey area.

5.2.4.2 Night Time Survey

No western ringtail possums were detected during the nocturnal survey. Two common brush-tailed possums were observed.

5.2.4.3 Habitat Assessment

The survey area is comprised of a jarrah marri woodland which shows a distinct lack of associated midstory vegetation such as peppermint, banksia, and sheoak. Western ringtail possums show a preference for relatively dense midstory vegetation and as such the survey area appears to represent marginal habitat for the species which in part explains their apparent absence from the survey area. Western ringtail possums are known from nearby surrounding areas (Greg Harewood pers. obs.) and therefore it is possible that individuals of the species may occur on occasions despite the apparent poor quality of the habitat present.

6. CONSERVATION SIGNIFICANT FAUNA SPECIES

Based on the information gathered during the site reconnaissance survey and the documented distribution and habitat preferences of the species of conservation significance identified as potentially being present in the general area, their likelihood of occurrence has been assessed. A summary of this assessment is presented in Table 5.

Table 5: Likelihood of Occurrence – Fauna Species of Conservation Significance

Species	Conservation Status		Habitat Preferences	Habitat Present	Likelihood of Occurrence	Comments/Possible Impacts
	BC Act/ DBCA Priority	EPBC Act				
Pouched Lamprey <i>Geotria australis</i>	P3	-	This species lives in mud burrows in the upper reaches of coastal streams for the first 4 years of life until migrating to the sea. Adults migrate up to 60km upstream during spawning.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Carter's Freshwater Mussel <i>Westralunio carteri</i>	S3	VU	Occurs in greatest abundance in slower flowing streams with stable sediments that are soft enough for burrowing amongst woody debris and exposed tree roots.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Swan Coastal Plain Shield-backed Trapdoor Spider <i>Idiosoma sigillatum</i>	P3	-	Burrows of this species usually found in <i>Banksia</i> woodland and heathland on sandy soils.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Western Pygmy Trapdoor Spider <i>Bertmainius opimus</i>	P3	-	Poorly documented - Found in mesic habitats. The species makes shallow burrows in the bark of trees and in the mossy banks of creeks.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Coastal Plains Skink <i>Ctenotus ora</i>	P3	-	Sandy substrates with low vegetation (including heath) in open <i>Eucalyptus/Corymbia</i> woodland over <i>Banksia</i> .	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Australasian Bittern <i>Botaurus poiciloptilus</i>	S1	EN	Freshwater wetlands, occasionally estuarine; prefers heavy vegetation such as beds of tall dense <i>Typha</i> , <i>Baumea</i> and sedges in freshwater swamps.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Migratory Shorebirds/Wetland Species/Marine Species (various reptiles, birds and mammals)	S5, Various	Ma, Mig, Various	Varies between species but includes open ocean, and permanent/temporary wetlands varying from billabongs, swamps, lakes, floodplains, sewerage farms, saltwork ponds, estuaries, lagoons, mudflats sandbars, pastures, airfields, sports fields and lawns.	No	Would Not Occur.	No suitable habitat. No impact on these species will occur.
Blue-billed Duck <i>Oxyura australis</i>	P4	-	Well vegetated freshwater swamps, large dams and lakes, winters on more open water. Occasionally salt lakes and estuaries freshened by floodwaters.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Eastern Osprey <i>Pandion haliaetus</i>	S5	Ma, Mig	Coasts, estuaries, bays, inlets, islands, and surrounding waters, coral atolls, reefs, lagoons, rock cliffs and stacks. Ascends larger rivers.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Peregrine Falcon <i>Falco peregrinus</i>	S7	-	Diverse from rainforest to arid shrublands, from coastal heath to alpine Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes.	Yes	Possibly Occurs.	This species is uncommon but the survey area may represent part of a larger home range used by individuals of this species. No significant impact on this species anticipated.

Grey Falcon <i>Falco hypoleucos</i>	S3	VU	Frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses mainly where annual rainfall is less than 500 mm	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Masked Owl (SW population) <i>Tyto n. novaehollandiae</i>	P3	-	Roosts and nests in heavy forest, hunts over open woodlands and farmlands.	Yes	Possibly Occurs.	This species is uncommon but may occur, if only occasionally. No significant impact on this species anticipated.
Barking Owl <i>Ninox connivens connivens</i>	P3	-	Dense vegetation, especially forest and thickets of waterside vegetation such as melaleucas. Roosts in tree hollows.	No/Marginal	Unlikely to Occur,	No suitable/very marginal habitat. No impact on this species will occur.
Carnaby's Black Cockatoo <i>Calyptorhynchus latirostris</i>	S2	EN	Forests, woodlands, heathlands, farms; feeds on <i>Banksia</i> , <i>Hakea</i> and Marri.	Yes	Known to Occur.	Loss/modification of very small areas of habitat. Negligible impact.
Baudin's Black Cockatoo <i>Calyptorhynchus baudinii</i>	S2	EN	Mainly eucalypt forests where it feeds primarily on the Marri seeds.	Yes	Possibly Occurs.	Loss/modification of very small areas of habitat. Negligible impact.
Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i>	S3	VU	Eucalypt forests, feeds on Marri, Jarrah, Blackbutt, Karri, Sheoak and Snottygobble.	Yes	Known to Occur.	Loss/modification of very small areas of habitat. Negligible impact.
Fork-tailed Swift <i>Apus pacificus</i>	S5	Mig, Ma	Low to very high airspace over varied habitat from rainforest to semi desert.	Yes	Unlikely to Occur, Flyover only on very rare occasions.	May occur very occasionally for brief periods. Entirely aerial. No impact on this species will occur.
Grey Wagtail <i>Motacilla cinerea</i>	S5	Mig, Ma	In Australia, near running water in disused quarries, sandy, rocky streams in escarpments and rainforest, sewerage ponds, ploughed fields and airfields.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Chuditch <i>Dasyurus geoffroii</i>	S3	VU	Forest, mallee shrublands, woodland and desert. The densest populations have been found in riparian jarrah forest.	Yes/Marginal	Possibly Occurs.	May occur very occasionally for brief periods. Habitat marginal in quality. Negligible impact on species status anticipated.
Quenda <i>Isodon fusciventer</i>	P4	-	Dense scrubby, often swampy, vegetation with dense cover.	No/Marginal	Unlikely to Occur.	The generally sparse groundcover across the survey area suggests this species is unlikely to persist. No impact on this species anticipated.
South-western Brush-tailed <i>Phascogale Phascogale tapoatafa wambenger</i>	S6	-	Dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover.	Yes	Known to Occur.	Loss/modification of small areas of habitat. Negligible impact on species status anticipated.
Western Ringtail Possum <i>Pseudocheirus occidentalis</i>	S1	CR	Coastal peppermint, Tuart, Jarrah-Marri associations, Sheoak woodland, Eucalypt woodland and Mallee.	No/Marginal	Unlikely to Occur.	Habitat for this species is marginal. Occasional transient individuals only Negligible impact on species status anticipated.
Quokka <i>Setonix brachyurus</i>	S3	VU	Currently restricted to densely vegetated coastal heaths, swamps, riverine habitats including tea-tree thickets on sandy soils along creek systems.	No	Would Not Occur.	This species is locally extinct. No impact on this species will occur.

Woylie <i>Bettongia penicillata ogilbyi</i>	S1	EN	Open sclerophyll forest and woodland with a low, dense, understorey of tussock grasses or woody scrub.	No	Would Not Occur.	This species is locally extinct. No impact on this species will occur.
Western Brush Wallaby <i>Notamacropus irma</i>	P4	-	Open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets.	Yes/Marginal	Possibly Occurs.	May occur very occasionally for brief periods. Habitat marginal in quality. Negligible impact on species status anticipated.
Water Rat <i>Hydromys chrysogaster</i>	P4	-	Permanent water, fresh, brackish or marine.	No	Would Not Occur.	There is no suitable habitat for this species in the survey area. No impact on this species will occur.
Western False Pipistrelle <i>Falsistrellus mackenziei</i>	P4	-	Wet sclerophyll forest dominated by karri and in high rainfall zones of the jarrah and marri forest.	Yes	Know to Occur.	Loss/modification of small areas of habitat. Negligible impact on species status.

See Appendix A for conservation status codes

Four vertebrate fauna species of conservation significance (listed as State or Federal threatened/migratory species or as DBCA priority species) were positively identified as utilising the survey area for some purpose during the survey period (or during Astron's Survey – 2014):

- Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* – S3 (BC Act), Vulnerable (EPBC Act). Several individuals and some foraging evidence attributed to this species was found during the surveys (chewed marri fruits). The survey area contains potential black cockatoo breeding habitat (trees with a DBH >50cm) and the majority of the native vegetation within the survey area represents potential foraging habitat for this species. No evidence of roosting observed.
- Carnaby's Black-Cockatoo *Calyptorhynchus latirostris* – S2 (BC Act), Endangered (EPBC Act). Several individuals and some foraging evidence attributed to this species was found during the 2014 survey (chewed marri fruits). The survey area contains potential black cockatoo breeding habitat (trees with a DBH >50cm) and the majority of the native vegetation within the survey area represents potential foraging habitat for this species. No evidence of roosting observed.
- South-western Brush-tailed Phascogale *Phascogale tapoatafa wambenger* – S6 (BC Act). This species was recorded at several locations during the camera trap survey undertaken in March 2021. Utilises hollow bearing trees for daytime refuge.
- Western False Pipistrelle *Falsistrellus mackenziei* – P4 (DBCA Priority Species) Recorded during the bat call survey. All sections of the survey area represent potential foraging habitat for this species and any hollow bearing trees represent possible day time roost sites.

Several additional species of conservation significance may utilise the survey area for some purpose at times, but their status on-site and/or in the general area is difficult to determine because they were not sighted during the field survey, or evidence of use was not observed. In most cases the species in question probably only occurs occasionally and/or for brief periods:

- Peregrine Falcon *Falco peregrinus* – S7 (BC Act)
This species potentially utilises some sections of the survey area as part of a much larger home range though only likely to occur infrequently. All areas represent potential foraging habitat for this species. Listed as a potential species based on available information.
- Masked Owl *Tyto novaehollandae* – P3 (DBCA Priority Species)
Status in the general area is difficult to determine. May utilise woodland areas within and near the survey area for roosting and may forage in more open areas. Probably only present occasionally and for short periods. Listed as a potential species based on available information.

- Baudin's Black-Cockatoo *Calyptorhynchus baudinii* – S2 (BC Act), Endangered (EPBC Act).
Possibly occurs. The survey area contains potential black cockatoo breeding habitat (trees with a DBH >50cm) and the majority of the native vegetation within the survey area represents potential foraging habitat for this species. No evidence of roosting observed. No evidence of roosting observed. Listed as a potential species based on available information.
- Chuditch *Dasyurus geoffroii* - S3 (BC Act), Vulnerable (EPBC Act)
Habitat with the survey area itself appears marginal for this species however given the proximity of the Dardanup Conservation Park it may occur occasionally but is unlikely to be specifically attracted to the site.
- Western Brush Wallaby *Notamacropus irma* – P4 (DBCA Priority Species)
Habitat with the survey area itself appears marginal for this species however given the proximity of the Dardanup Conservation Park it may occur occasionally but is unlikely to be specifically attracted to the site.

A number of other species of conservation significance (as listed in Table 5), while possibly present in the larger bush remnants in the wider area (e.g. Dardanup Conservation park) are not listed as potentially occurring within the survey area primarily due to a complete lack of suitable habitat (quality and extent) and/or known local/regional extinction.

In cases where some habitat is present and available information indicates at least some probability of the species occurrence, likely impacts are anticipated to be low primarily due to likely low population densities and the relatively small area of clearing required. No overall change in the conservation status of any fauna species currently utilising the survey area is therefore anticipated. While some small, localised residual loss of fauna habitat may occur for some species, regional impacts on the status of any one species are anticipated to be negligible/non-existent.

In this instance impacts are most likely to be related to the loss of a relatively small area habitat (which is relatively common in the wider area) and the potential for some species to be killed or injured during clearing.

7. CONCLUSION

The fauna assessment within the survey area was primarily undertaken to document black cockatoo habitat and to determine the possible presence of western ringtail possums and other conservation significant fauna species and/or their habitat.

Overall, the single broadly defined fauna habitat present appears to be degraded from its original natural state, a consequence of historical livestock grazing, logging activities and frequent fires with much of the vegetation being regrowth, with many relatively small trees/saplings being present. The total fauna assemblage within the survey area itself is therefore likely to be depauperate as a consequence. As this relatively small parcel of vegetation directly adjoins the Dardanup Conservation Park/State Forest it may

nonetheless be utilised (if only infrequently) by a range of fauna species that would otherwise not persist in such a small, degraded remnant.

Foraging debris attributed to the forest red-tailed black cockatoo (vulnerable) and Carnaby's black cockatoo (endangered) have been observed at several locations within the survey area during the various assessments (2014 and/or 2021) and both species have been heard/and or seen within or nearby the survey area also.

Calls of the western false pipistrelle (DBCA Priority 4 species) were recorded during the bat survey carried out in March 2021 (along with five other bat species).

The south-western brush-tailed phascogale (Schedule 6 – BC Act) was recorded at several locations during the camera trap survey carried out in March 2021 (along with five other fauna species).

No evidence of any other fauna species of conservation significance was observed. However, this does not eliminate the potential for some species to still occur, if only infrequently.

A total of 81 potential black cockatoo breeding "habitat trees" (i.e. those with a DBH >50cm) have been identified within the survey area. Three of these trees were found to contain hollows possibly suitable for black cockatoos to use for nesting purposes. Hollows in other trees were assessed as being unsuitable (i.e. too small or with an unfavourable orientation) or in some cases no hollow was found to be present.

Of the three trees assessed as having hollows possibly suitable for black cockatoos to use for nesting purposes only one showed any evidence of past use (Tree 29). This evidence was in the form of significant chewing around the hollows entrance. This particular tree is situated outside of the currently proposed clearing footprint and therefore will not be directly impacted on.

Given the dominance of jarrah and marri across almost the entire survey area all of the site can be regarded as representing quality foraging habitat (~8.7 ha in total, ~7.4 ha within the proposed clearing area). No black cockatoo roost sites were identified within the survey area with the closest a documented roost site being located about 2.1 km east of the survey area.

No evidence of the western ringtail possum was found despite targeted day and night surveys. Habitat for the species within the survey area appears marginal in quality given the absence of a coherent midstorey element.

In summary four vertebrate fauna species of conservation significance were positively identified as utilising the survey area:

- Forest Red-tailed Black Cockatoo – Vulnerable (WA/Federal);
- Carnaby's Black Cockatoo – Endangered (WA/Federal);
- South-western Brush-tailed Phascogale - Schedule 6 (WA);

- Western False Pipistrelle – Priority 4 (DBCA Priority Species).

Several additional species of conservation significance may also utilise the survey area, though, as no evidence of their presence was identified during the field survey, their status in the area remains uncertain. In most cases the species in question probably only occurs occasionally and/or for brief periods:

- Peregrine Falcon – Schedule 7 (WA);
- Masked Owl – Priority 3 (DBCA Priority Species);
- Baudin's Black Cockatoo – Endangered (WA/Federal);
- Chuditch - Vulnerable (WA/Federal);
- Western Brush Wallaby – Priority 4 (DBCA Priority Species)

Potential impacts on these fauna species and fauna in general are anticipated to be low primarily due to the degraded nature of the remnant vegetation present (and anticipated low fauna population densities), and the relatively small area of clearing required. Nonetheless ongoing planning should consider the potential presence of fauna so that any impacts can be further minimised where considered reasonable and practicable.

Given the confirmed presence of several fauna species of conservation significance (and other fauna in general) residing within the of proposed clearing footprint (e.g. south-western brush-tailed phascogale and common brushtail possum) it is recommended that appropriate management measures (e.g. trapping) be employed prior to and during clearing operations.

8. REFERENCES

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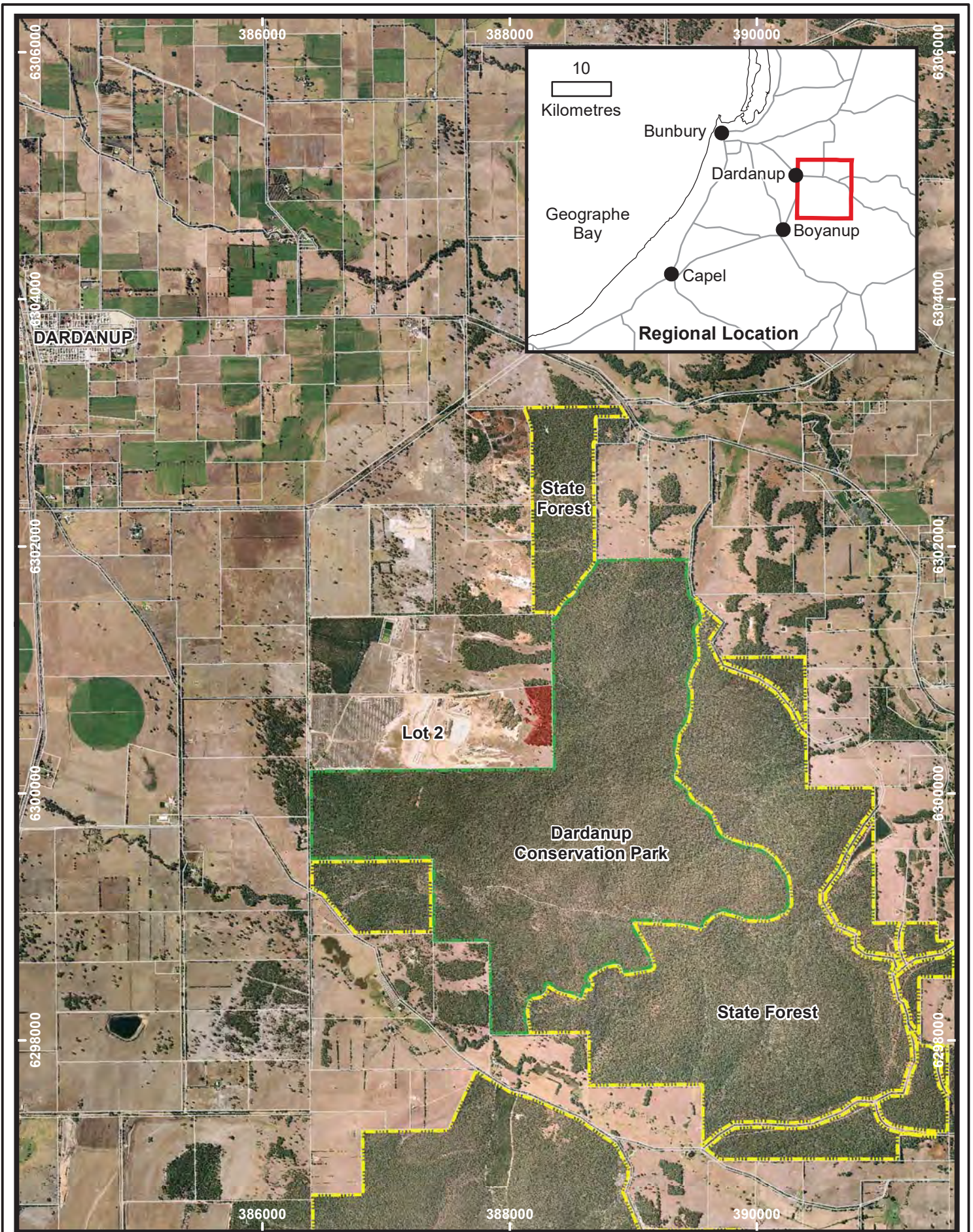
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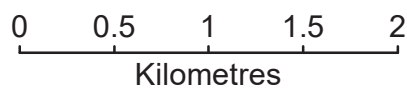
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FIGURES



Legend

- Lot 2 Survey Area
- Conservation Park
- State Forest




Drawn: G. Harewood
 Date: March 2021
 Scale: 1:40,000

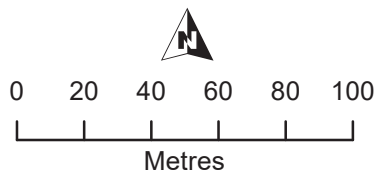
Cleanaway Solid Waste Pty Ltd
 Lot 2 Banksia Road Dardanup

Subject Site and Surrounds



Legend

 Survey Area



Drawn: G. Harewood

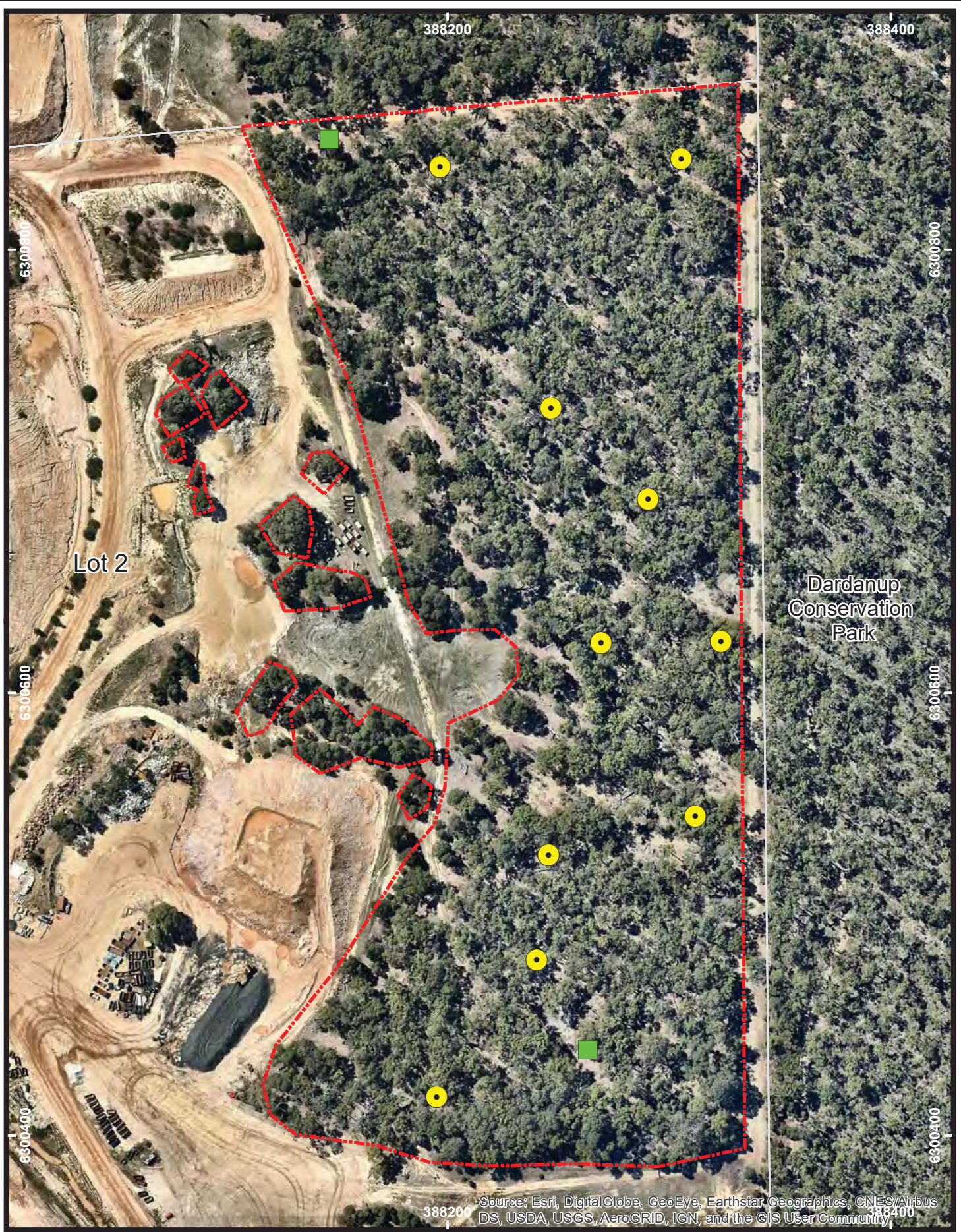
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Scale: 1:2,250




Projection/Coordinate System: UTM/MGA Zone 50

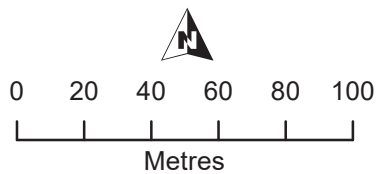
Cleanaway Solid Waste Pty Ltd
Lot 2 Banksia Road Dardanup

**Survey Area
Aerial Photograph**



Legend

-  Survey Area
-  Bat Detector
-  Camera Trap



Drawn: G. Harewood

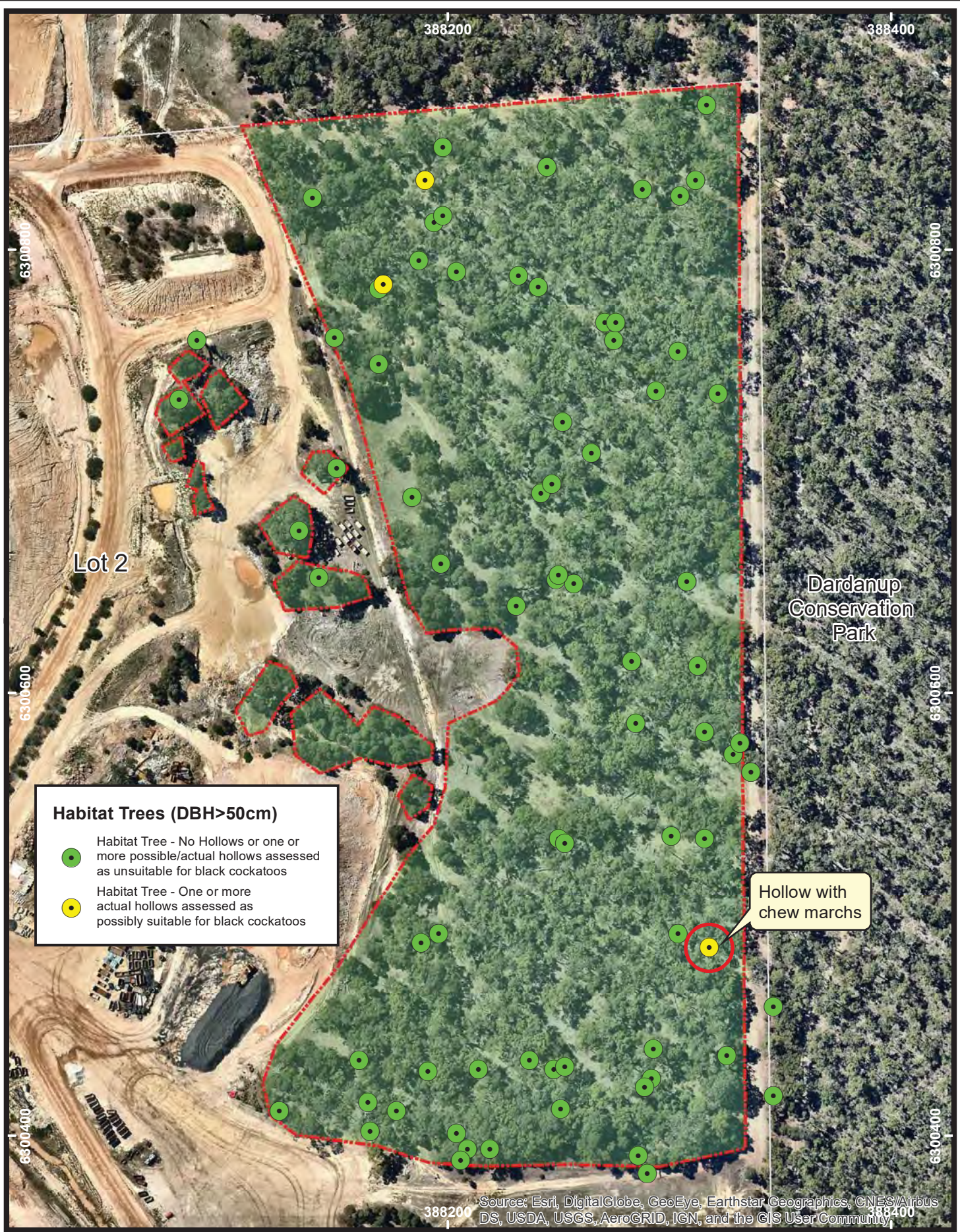
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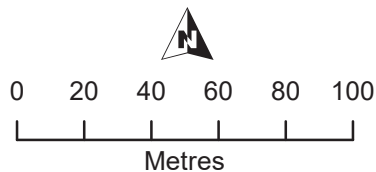
Cleanaway Solid Waste Pty Ltd
Lot 2 Banksia Road Dardanup

Recording Locations



Legend

- Survey Area
- Jarrah/Marri Woodland



Drawn: G. Harewood

Date: March 2021

Scale: 1:2,250

Projection/Coordinate System: UTM/MGA Zone 50

Figure: 4

Cleanaway Solid Waste Pty Ltd
Lot 2 Banksia Road Dardanup

Fauna Habitats & Habitat Trees (DBH >50cm)

APPENDIX A

CONSERVATION CATEGORIES

EPBC Act (1999) Threatened Fauna Categories

Threatened fauna may be listed under Section 178 of the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* in any one of the following categories:

Category	Code	Description
Extinct	E	There is no reasonable doubt that the last member of the species has died.
*Extinct in the wild	EW	A species (a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
*Critically Endangered	CE	A species is facing an extremely high risk of extinction in the wild in the immediate future.
*Endangered	EN	A species: (a) is not critically endangered; and (b) is facing a very high risk of extinction in the wild in the near future.
*Vulnerable	VU	A species (a) is not critically endangered or endangered; and (b) is facing a high risk of extinction in the wild in the medium-term future.
Conservation Dependent	CD	A species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered
*Migratory	Migratory	(a) all migratory species that are: (i) native species; and (ii) from time to time included in the appendices to the Bonn Convention; and (b) all migratory species from time to time included in annexes established under JAMBA, CAMBA and ROKAMBA; and (c) all native species from time to time identified in a list established under, or an instrument made under, an international agreement approved by the Minister.
Marine	Ma	Species in the list established under s248 of the <i>EPBC Act</i>

Note: Only species in those categories marked with an asterisk are matters of national environmental significance (NES) under the *EPBC Act*.

Wildlife Conservation (Specially Protected Fauna) Notice 2018 Categories

Published as Specially Protected under the *Wildlife Conservation Act 1950*, and listed under Schedules 1 to 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

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.

Category	Code	Description
Schedule 1 (S1) Critically Endangered species	CR	Threatened species considered to be facing an extremely high risk of extinction in the wild in the immediate future.
Schedule 2 (S2) Endangered species	EN	Threatened species considered to be facing a very high risk of extinction in the wild in the near future.
Schedule 3 (S3) Vulnerable species	VU	Threatened species considered to be facing a high risk of extinction in the wild in the medium-term future.
Schedule 4 (S4) Presumed extinct species	EX	Species which have been adequately searched for and there is no reasonable doubt that the last member of the species has died.
Schedule 5 (S5) Migratory birds protected under an international agreement	MI	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or 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.
Schedule 6 (S6) Fauna that is of special conservation need as conservation dependent fauna	CD	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Schedule 7 (S7) Other specially protected fauna.	OS	Fauna otherwise in need of special protection to ensure their conservation.

Western Australian DBCA Priority Fauna Categories

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna 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.

Category	Code	Description
Priority 1 (P1) Poorly Known Species.	P1	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.
Priority 2 (P2) Poorly Known Species.	P2	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.
Priority 3 (P3) Poorly Known Species.	P3	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.
Priority 4 (P4) Rare, Near Threatened and other species in need of monitoring.	P4	(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.

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

IUCN Red List Threatened Species Categories

The *IUCN Red List of Threatened Species™* is a checklist of taxa that have undergone an extinction risk assessment using the *IUCN Red List Categories and Criteria*.

Categories are summarized below.

Category	Code	Description
Extinct	EX	Taxa for which there is no reasonable doubt that the last individual has died.
Extinct in the Wild	EW	Taxa which is known only to survive in cultivation, in captivity or and as a naturalised population well outside its past range and it has not been recorded in known or expected habitat despite exhaustive survey over a time frame appropriate to its life cycle and form.
Critically Endangered	CR	Taxa facing an extremely high risk of extinction in the wild.
Endangered	EN	Taxa facing a very high risk of extinction in the wild.
Vulnerable	VU	Taxa facing a high risk of extinction in the wild.
Near Threatened	NT	Taxa which has been evaluated but does not qualify for CR, EN or VU now but is close to qualifying or likely to qualify in the near future.
Least Concern	LC	Taxa which has been evaluated but does not qualify for CR, EN, VU, or NT but is likely to qualify for NT in the near future.
Data Deficient	DD	Taxa for which there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status.
Not Evaluated	NE	Taxa which has not been evaluated.

A full list of categories and their meanings are available at:

<http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria>

APPENDIX B
NATUREMAP DATABASE SEARCH
AND
PROTECTED MATTERS SEARCH TOOL RESULTS

NatureMap Species Report

Created By Greg Harewood on 29/03/2021

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 115° 47' 53" E, 33° 25' 39" S
Buffer 15km
Group By Species Group

Species Group	Species	Records
Amphibian	10	84
Bird	153	5605
Fish	3	19
Invertebrate	87	305
Mammal	32	2615
Reptile	33	172
TOTAL	318	8800

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
Amphibian				
1.	25398 <i>Crinia georgiana</i> (Quacking Frog)			
2.	25399 <i>Crinia glauerti</i> (Clicking Frog)			
3.	25400 <i>Crinia insignifera</i> (Squelching Froglet)			
4.	25401 <i>Crinia pseudinsignifera</i> (Bleating Froglet)			
5.	25404 <i>Geocrinia leai</i> (Ticking Frog)			
6.	25410 <i>Heleioporus eyrei</i> (Moaning Frog)			
7.	25411 <i>Heleioporus inornatus</i> (Whooping Frog)			
8.	25415 <i>Limnodynastes dorsalis</i> (Western Banjo Frog)			
9.	25378 <i>Litoria adelaidensis</i> (Slender Tree Frog)			
10.	25388 <i>Litoria moorei</i> (Motorbike Frog)			
Bird				
11.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
12.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
13.	24262 <i>Acanthiza inornata</i> (Western Thornbill)			
14.	24560 <i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
15.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
16.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
17.	25537 <i>Accipiter novaehollandiae</i> (Grey Goshawk)			
18.	25755 <i>Acrocephalus australis</i> (Australian Reed Warbler)			
19.	41323 <i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
20.	25544 <i>Aegotheles cristatus</i> (Australian Owlet-nightjar)			
21.	24301 <i>Aegotheles cristatus</i> subsp. <i>cristatus</i> (Australian Owlet-nightjar)			
22.	24310 <i>Anas castanea</i> (Chestnut Teal)			
23.	24312 <i>Anas gracilis</i> (Grey Teal)			
24.	24313 <i>Anas platyrhynchos</i> (Mallard)			
25.	<i>Anas platyrhynchos</i> subsp. <i>domesticus</i>			
26.	24315 <i>Anas rhynchotis</i> (Australasian Shoveler)			
27.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
28.	47414 <i>Anhinga novaehollandiae</i> (Australasian Darter)			
29.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
30.	24562 <i>Anthochaera lunulata</i> (Western Little Wattlebird)			
31.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
32.	41324 <i>Ardea modesta</i> (great egret, white egret)			
33.	24340 <i>Ardea novaehollandiae</i> (White-faced Heron)			
34.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
35.	24610 <i>Ardeotis australis</i> (Australian Bustard)			
36.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
37.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
38.	24318 <i>Aythya australis</i> (Hardhead)			
39.	<i>Barnardius zonarius</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
40.	24319 <i>Biziura lobata</i> (Musk Duck)			
41.	25714 <i>Cacatua pastinator</i> (Western Long-billed Corella)			
42.	25716 <i>Cacatua sanguinea</i> (Little Corella)			
43.	25598 <i>Cacomantis flabelliformis</i> (Fan-tailed Cuckoo)			
44.	24784 <i>Calidris ferruginea</i> (Curlew Sandpiper)		T	
45.	25717 <i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
46.	24731 <i>Calyptorhynchus banksii</i> subsp. <i>naso</i> (Forest Red-tailed Black Cockatoo)		T	
47.	24733 <i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo, White-tailed Long-billed Black Cockatoo)		T	
48.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)		T	
49.	48400 <i>Calyptorhynchus</i> sp. (white-tailed black cockatoo)		T	
50.	24377 <i>Charadrius ruficapillus</i> (Red-capped Plover)			
51.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
52.	<i>Chroicocephalus novaehollandiae</i>			
53.	24432 <i>Chrysococcyx lucidus</i> subsp. <i>plagosus</i> (Shining Bronze Cuckoo)			
54.	24288 <i>Circus approximans</i> (Swamp Harrier)			
55.	24774 <i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
56.	47915 <i>Climacteris rufus</i> (Black-tailed Treecreeper)			
57.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
58.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
59.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
60.	25592 <i>Corvus coronoides</i> (Australian Raven)			
61.	<i>Corvus splendens</i> subsp. <i>protegatus</i>			
62.	24671 <i>Coturnix pectoralis</i> (Stubble Quail)			
63.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
64.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
65.	<i>Cracticus torquatus</i>			
66.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
67.	24322 <i>Cygnus atratus</i> (Black Swan)			
68.	30901 <i>Dacelo novaeguineae</i> (Laughing Kookaburra)	Y		
69.	25673 <i>Daphoenositta chrysoptera</i> (Varied Sittella)			
70.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
71.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
72.	<i>Egretta garzetta</i>			
73.	<i>Egretta novaehollandiae</i>			
74.	<i>Elanus axillaris</i>			
75.	47937 <i>Elseomyias melanops</i> (Black-fronted Dotterel)			
76.	<i>Eolophus roseicapillus</i>			
77.	24652 <i>Eopsaltria georgiana</i> (White-breasted Robin)			
78.	24567 <i>Epthianura albifrons</i> (White-fronted Chat)			
79.	25621 <i>Falco berigora</i> (Brown Falcon)			
80.	25622 <i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
81.	24472 <i>Falco cenchroides</i> subsp. <i>cenchrionides</i> (Australian Kestrel, Nankeen Kestrel)			
82.	25623 <i>Falco longipennis</i> (Australian Hobby)			
83.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)			S
84.	24616 <i>Falculunulus frontatus</i> subsp. <i>leucogaster</i> (Western Shrike-tit, Crested Shrike-tit)			
85.	25727 <i>Fulica atra</i> (Eurasian Coot)			
86.	24761 <i>Fulica atra</i> subsp. <i>australis</i> (Eurasian Coot)			
87.	25729 <i>Gallinula tenebrosa</i> (Dusky Moorhen)			
88.	24763 <i>Gallinula tenebrosa</i> subsp. <i>tenebrosa</i> (Dusky Moorhen)			
89.	24765 <i>Gallirallus philippensis</i> subsp. <i>mellori</i> (Buff-banded Rail)			
90.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
91.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
92.	24487 <i>Haematopus longirostris</i> (Pied Oystercatcher)			
93.	24293 <i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)			
94.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
95.	47965 <i>Hieraaetus morphnoides</i> (Little Eagle)			
96.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
97.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
98.	48587 <i>Hydroprogne caspia</i> (Caspian Tern)		IA	
99.	24511 <i>Larus novaehollandiae</i> subsp. <i>novaehollandiae</i> (Silver Gull)			
100.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
101.	24326 <i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
102.	25650 <i>Malurus elegans</i> (Red-winged Fairy-wren)			
103.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
104.	25758 <i>Megalurus gramineus</i> (Little Grassbird)			
105.	47997 <i>Melanodryas cucullata</i> (Hooded Robin)			
106.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)			
107.	<i>Microcarbo melanoleucos</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
108.	25610 <i>Myiagra inquieta</i> (Restless Flycatcher)			
109.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
110.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
111.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
112.	24328 <i>Oxyura australis</i> (Blue-billed Duck)		P4	
113.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
114.	48591 <i>Pandion cristatus</i> (Osprey, Eastern Osprey)		IA	
115.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
116.	24626 <i>Pardalotus punctatus</i> subsp. <i>xanthopyge</i> (Yellow-rumped Pardalote)			
117.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
118.	24648 <i>Pelecanus conspicillatus</i> (Australian Pelican)			
119.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
120.	48066 <i>Petroica boodang</i> (Scarlet Robin)			
121.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
122.	25697 <i>Phalacrocorax carbo</i> (Great Cormorant)			
123.	25698 <i>Phalacrocorax melanoleucos</i> (Little Pied Cormorant)			
124.	24667 <i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
125.	25699 <i>Phalacrocorax varius</i> (Pied Cormorant)			
126.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
127.	25587 <i>Phaps elegans</i> (Brush Bronzewing)			
128.	48071 <i>Phylidonyris niger</i> (White-cheeked Honeyeater)			
129.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
130.	24841 <i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
131.	25720 <i>Platycercus icterotis</i> (Western Rosella)			
132.	24745 <i>Platycercus icterotis</i> subsp. <i>icterotis</i> (Western Rosella)			
133.	24843 <i>Plegadis falcinellus</i> (Glossy Ibis)		IA	
134.	24383 <i>Pluvialis squatarola</i> (Grey Plover)		IA	
135.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
136.	25704 <i>Podiceps cristatus</i> (Great Crested Grebe)			
137.	24681 <i>Poliiocephalus poliocephalus</i> (Hoary-headed Grebe)			
138.	25722 <i>Polytelis anthopeplus</i> (Regent Parrot)			
139.	25731 <i>Porphyrio porphyrio</i> (Purple Swamphen)			
140.	24767 <i>Porphyrio porphyrio</i> subsp. <i>bellus</i> (Purple Swamphen)			
141.	24771 <i>Porzana tabuensis</i> (Spotless Crake)			
142.	<i>Purpureicephalus spurius</i>			
143.	24776 <i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
144.	48096 <i>Rhipidura albiscapa</i> (Grey Fantail)			
145.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
146.	25534 <i>Sericornis frontalis</i> (White-browed Scrubwren)			
147.	30948 <i>Smicronis brevirostris</i> (Weebill)			
148.	24645 <i>Stagonopleura oculata</i> (Red-eared Firetail)			
149.	48594 <i>Sternula nereis</i> (Fairy Tern)			
150.	24329 <i>Stictonetta naevosa</i> (Freckled Duck)			
151.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
152.	25590 <i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
153.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
154.	24682 <i>Tachybaptus novaehollandiae</i> subsp. <i>novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
155.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
156.	48597 <i>Thalasseus bergii</i> (Crested Tern)		IA	
157.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
158.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
159.	24309 <i>Todiramphus sanctus</i> subsp. <i>sanctus</i> (Sacred Kingfisher)			
160.	24808 <i>Tringa nebularia</i> (Common Greenshank, greenshank)		IA	
161.	48147 <i>Turnix varius</i> (Painted Button-quail)			
162.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
163.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			

Fish

164.	34028 <i>Galaxias occidentalis</i> (Western Minnow)			
165.	34030 <i>Geotria australis</i> (Pouched Lamprey)		P3	
166.	<i>Nannoperca vittata</i>			

Invertebrate

167.	<i>Acariformes</i> sp.			
168.	<i>Aeshnidae</i> sp.			
169.	<i>Akamptogonus novarae</i>			
170.	<i>Allothereua maculata</i>			
171.	<i>Aname mainae</i>			
172.	<i>Aname tepperi</i>			
173.	<i>Ancylidae</i> sp.			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
174.	<i>Antichiropus nanus</i>			
175.	<i>Arachnura higginsii</i>			
176.	<i>Araneus senicaudatus</i>			
177.	<i>Argiope protensa</i>			
178.	<i>Arkys walckenaeri</i>			
179.	<i>Artoriopsis expolita</i>			
180.	<i>Athericidae sp.</i>			
181.	<i>Austracantha minax</i>			
182.	<i>Backobourkia brounii</i>			
183.	<i>Badumna insignis</i>			
184.	<i>Baetidae sp.</i>			
185.	<i>Baiami tegenarioides</i>			
186.	<i>Baiami volucripes</i>			
187.	47873 <i>Bertmainius opimus</i> (western pygmy trapdoor spider)		P3	
188.	<i>Brentidae sp.</i>			
189.	<i>Caenidae sp.</i>			
190.	<i>Carabidae sp.</i>			
191.	<i>Ceratopogonidae sp.</i>			
192.	<i>Cercophonius sulcatus</i>			
193.	33939 <i>Cherax cainii</i> (Marron)			
194.	<i>Cherax quinquecarinatus</i>			
195.	<i>Chironominae sp.</i>			
196.	<i>Corduliidae sp.</i>			
197.	<i>Corixidae sp.</i>			
198.	<i>Cormocephalus aurantiipes</i>			
199.	<i>Cormocephalus hartmeyerii</i>			
200.	<i>Cryptoerithus quobba</i>			
201.	<i>Culicidae sp.</i>			
202.	<i>Cyclosa trilobata</i>			
203.	<i>Dytiscidae sp.</i>			
204.	<i>Ecnomidae sp.</i>			
205.	<i>Empididae sp.</i>			
206.	<i>Erigone prominens</i>			
207.	<i>Eriophora biapicata</i>			
208.	<i>Gripopterygidae sp.</i>			
209.	<i>Gyrinidae sp.</i>			
210.	<i>Hydrobiosidae sp.</i>			
211.	<i>Hydrophilidae sp.</i>			
212.	<i>Hydropsychidae sp.</i>			
213.	48935 <i>Idiosoma sigillatum</i> (Swan Coastal Plain shield-backed trapdoor spider)		P3	
214.	<i>Isopeda leishmanni</i>			
215.	<i>Isopedella castanea</i>			
216.	<i>Lagynochthonius australicus</i>			
217.	<i>Lampona brevipes</i>			
218.	<i>Lampona cylindrata</i>			
219.	<i>Lampona punctigera</i>			
220.	<i>Latrodectus hasseltii</i>			
221.	<i>Leptoceridae sp.</i>			
222.	<i>Leptophlebiidae sp.</i>			
223.	<i>Missulena granulosa</i>			
224.	<i>Missulena occatoria</i>			
225.	<i>Mitullodon tarantulinus</i>			
226.	<i>Mitzoruga insularis</i>			
227.	<i>Neoniphargidae sp.</i>			
228.	<i>Nephila edulis</i>			
229.	<i>Nicodamus mainae</i>			
230.	<i>Nunciella aspera</i>			
231.	<i>Oligochaeta sp.</i>			
232.	<i>Ommatoiulus moreletii</i>			
233.	<i>Oniscidae sp.</i>			
234.	<i>Orthocladinae sp.</i>			
235.	<i>Palaemonidae sp.</i>			
236.	<i>Paramelitidae sp.</i>			
237.	<i>Parastacidae sp.</i>			
238.	<i>Perthiidae sp.</i>			
239.	<i>Philopotamidae sp.</i>			
240.	<i>Pholcus phalangioides</i>			
241.	<i>Platorish gelorup</i>			
242.	<i>Scirtidae sp.</i>			
243.	<i>Scutigera indecisa</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
244.	<i>Simuliidae</i> sp.			
245.	<i>Staphylinidae</i> sp.			
246.	<i>Tanypodinae</i> sp.			
247.	<i>Tasmanicos leuckartii</i>			
248.	<i>Telephlebiidae</i> sp.			
249.	<i>Tipulidae</i> sp.			
250.	<i>Urodacus novaehollandiae</i>			
251.	<i>Velliidae</i> sp.			
252.	<i>Venatrix pullastra</i>			
253.	34113 <i>Westralunio carteri</i> (Carter's Freshwater Mussel)		T	
Mammal				
254.	25449 <i>Antechinus flavipes</i> (Yellow-footed Antechinus)			
255.	24088 <i>Antechinus flavipes</i> subsp. <i>leucogaster</i> (Yellow-footed Antechinus, Mardo)			
256.	24162 <i>Bettongia penicillata</i> subsp. <i>ogilbyi</i> (Woylie, Brush-tailed Bettong)		T	
257.	24251 <i>Bos taurus</i> (European Cattle)	Y		
258.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
259.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattle Bat)			
260.	24187 <i>Chalinolobus morio</i> (Chocolate Wattle Bat)			
261.	24092 <i>Dasyurus geoffroi</i> (Chuditch, Western Quoll)		T	
262.	24189 <i>Falsistrellus mackenziei</i> (Western False Pipistrelle, Western Falsistrelle)		P4	
263.	24041 <i>Felis catus</i> (Cat)	Y		
264.	24215 <i>Hydromys chrysogaster</i> (Water-rat, Rakali)		P4	
265.	48588 <i>Isoodon fusciventer</i> (Quenda, southwestern brown bandicoot)		P4	
266.	24132 <i>Macropus fuliginosus</i> (Western Grey Kangaroo)			
267.	48005 <i>Mormopterus kitcheneri</i> (South-western Free-tailed Bat)			
268.	24223 <i>Mus musculus</i> (House Mouse)	Y		
269.	48022 <i>Notamacropus irma</i> (Western Brush Wallaby)		P4	
270.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
271.	25508 <i>Phascogale tapoatafa</i> (Brush-tailed Phascogale)		S	
272.	48070 <i>Phascogale tapoatafa</i> subsp. <i>wambenger</i> (South-western Brush-tailed Phascogale, Wambenger)		S	
273.	24166 <i>Pseudocheirus occidentalis</i> (Western Ringtail Possum, ngwayir)		T	
274.	24243 <i>Rattus fuscipes</i> (Western Bush Rat)			
275.	24244 <i>Rattus norvegicus</i> (Brown Rat)	Y		
276.	24245 <i>Rattus rattus</i> (Black Rat)	Y		
277.	24145 <i>Setonix brachyurus</i> (Quokka)		T	
278.	24259 <i>Sus scrofa</i> (Pig)	Y		
279.	24207 <i>Tachyglossus aculeatus</i> (Short-beaked Echidna)			
280.	24167 <i>Tarsipes rostratus</i> (Honey Possum, Noolbenger)			
281.	25521 <i>Trichosurus vulpecula</i> (Common Brushtail Possum)			
282.	24158 <i>Trichosurus vulpecula</i> subsp. <i>vulpecula</i> (Common Brushtail Possum)			
283.	30954 <i>Tursiops aduncus</i> (Indo-Pacific Bottlenose Dolphin)			
284.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
285.	24040 <i>Vulpes vulpes</i> (Red Fox)	Y		
Reptile				
286.	42368 <i>Acritoscincus trilineatus</i> (Western Three-lined Skink)			
287.	24990 <i>Aprasia pulchella</i> (Granite Worm-lizard)			
288.	43380 <i>Chelodina colliei</i> (South-western Snake-necked Turtle)			
289.	24980 <i>Christinus marmoratus</i> (Marbled Gecko)			
290.	30893 <i>Cryptoblepharus buchananii</i>			
291.	25047 <i>Ctenotus impar</i>			
292.	25049 <i>Ctenotus labillardieri</i>			
293.	41641 <i>Ctenotus ora</i> (Coastal Plains Skink)		P3	
294.	24939 <i>Diplodactylus polyophthalmus</i>			
295.	25096 <i>Egernia kingii</i> (King's Skink)			
296.	25100 <i>Egernia napoleonis</i>			
297.	25250 <i>Elapognathus coronatus</i> (Crowned Snake)			
298.	25115 <i>Hemiergis initialis</i> subsp. <i>initialis</i>			
299.	25118 <i>Hemiergis peronii</i> subsp. <i>tridactyla</i>			
300.	25119 <i>Hemiergis quadrilineata</i>			
301.	25131 <i>Lerista distinguenda</i>			
302.	25133 <i>Lerista elegans</i>			
303.	25005 <i>Lialis burtonis</i>			
304.	25184 <i>Menetia greyii</i>			
305.	25191 <i>Morethia lineocellata</i>			
306.	25192 <i>Morethia obscura</i>			
307.	25252 <i>Notechis scutatus</i> (Tiger Snake)			
308.	25253 <i>Parasuta gouldii</i>			
309.	25255 <i>Parasuta nigriceps</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
310.	25510 <i>Pogona minor</i> (Dwarf Bearded Dragon)			
311.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
312.	25511 <i>Pseudonaja affinis</i> (Dugite)			
313.	25259 <i>Pseudonaja affinis</i> subsp. <i>affinis</i> (Dugite)			
314.	25266 <i>Simoselaps bertholdi</i> (Jan's Banded Snake)			
315.	25519 <i>Tiliqua rugosa</i>			
316.	24983 <i>Underwoodisaurus milii</i> (Barking Gecko)			
317.	25218 <i>Varanus gouldii</i> (Bungarra or Sand Monitor)			
318.	25225 <i>Varanus rosenbergi</i> (Heath Monitor)			

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: 29/03/21 17:41:49

[Summary](#)

[Details](#)

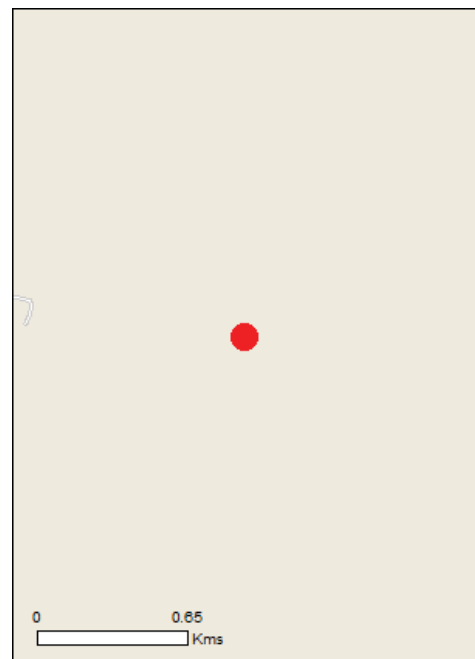
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 0.0Km



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:	15
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	12
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	1
Invasive Species:	20
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

[Botaurus poiciloptilus](#)

Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
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[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 likely to occur within area
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[Calyptorhynchus baudinii](#)

Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Breeding likely to occur within area
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[Calyptorhynchus latirostris](#)

Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
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[Falco hypoleucos](#)

Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
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[Numenius madagascariensis](#)

Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
--	-----------------------	--

Mammals

[Dasyurus geoffroi](#)

Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
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[Pseudocheirus occidentalis](#)

Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat may occur within area
--	-----------------------	--

Plants

[Diuris drummondii](#)

Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat may occur within area
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[Diuris micrantha](#)

Dwarf Bee-orchid [55082]	Vulnerable	Species or species
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Name	Status	Type of Presence
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	habitat likely to occur within area Species or species habitat may occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area
Synaphea sp. Pinjarra Plain (A.S. George 17182) [86878]	Endangered	Species or species habitat may occur within area
Synaphea stenoloba Dwellingup Synaphea [66311]	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

[Numenius madagascariensis](#)

Eastern Curlew, Far Eastern Curlew [847]

Critically Endangered

Species or species habitat may occur within area

[Pandion haliaetus](#)

Osprey [952]

Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat 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 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

Extra Information

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
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
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		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

Name	Status	Type of Presence
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		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
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area

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

-33.42761 115.79802

Acknowledgements

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

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

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

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

APPENDIX C

OBSERVED FAUNA LISTING

Fauna Observed

Lot 2 Banksia Road, Dardanup

Compiled from data collected by Astron (Nov 2014) and Greg Harewood (March 2021)

Class Family Species	Common Name	Conservation Status
Amphibia		
Myobatrachidae Ground or Burrowing Frogs		
<i>Heleioporus eyrei</i>	Moaning Frog	LC
Reptilia		
Pygopodidae Legless Lizards		
<i>Lialis burtonis</i>	Burton's Legless Lizard	LC
Scincidae Skinks		
<i>Cryptoblepharus buchananii</i>	Fence Skink	LC
<i>Morethia lineocellata</i>	West Coast Pale-flecked Morethia	LC
Aves		
Threskiornithidae Ibises, Spoonbills		
<i>Threskiornis molucca</i>	Australian White Ibis	LC
Accipitridae Kites, Goshawks, Eagles, Harriers		
<i>Elanus caeruleus</i>	Black-shouldered Kite	LC
Columbidae Pigeons, Doves		
<i>Phaps chalcoptera</i>	Common Bronzewing	Bh LC

BC Act Status - S1 to S7, EPBC Act Status - CR = Critically Endangered, EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions LC = Least Concern - see <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status
Psittacidae		
Parrots		
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black-Cockatoo	S3 VU Bp LC
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo	S2 EN Bp EN
<i>Platycercus spurius</i>	Red-capped Parrot	LC
<i>Platycercus zonarius</i>	Australian Ringneck	LC
Halcyonidae		
Tree Kingfishers		
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	Introduced
<i>Todiramphus sanctus</i>	Sacred Kingfisher	LC
Meropidae		
Bee-eaters		
<i>Merops ornatus</i>	Rainbow Bee-eater	LC
Maluridae		
Fairy Wrens, GrassWrens		
<i>Malurus splendens</i>	Splendid Fairy-wren	Bh LC
Acanthizidae		
Thornbills, Geryones, Fieldwrens & Whitefaces		
<i>Acanthiza apicalis</i>	Broad-tailed Thornbill	Bh LC
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	LC
<i>Gerygone fusca</i>	Western Gerygone	LC
<i>Sericornis maculatis</i>	Spotted Scrubwren	Bh LC
<i>Smicrornis brevirostris</i>	Weebill	LC
Meliphagidae		
Honeyeaters, Chats		
<i>Lichenostomus virescens</i>	Singing Honeyeater	LC
<i>Lichmera indistincta</i>	Brown Honeyeater	LC

BC Act Status - S1 to S7, EPBC Act Status - CR = Critically Endangered, EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions LC = Least Concern - see <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status
Dicruridae Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo		
<i>Rhipidura fuliginosa</i>	Grey Fantail	LC
Cracticidae Currawongs, Magpies & Butcherbirds		
<i>Cracticus tibicen</i>	Australian Magpie	LC
Corvidae Ravens, Crows		
<i>Corvus coronoides</i>	Australian Raven	LC
Hirundinidae Swallows, Martins		
<i>Hirundo neoxena</i>	Welcome Swallow	LC
Zosteropidae White-eyes		
<i>Zosterops lateralis</i>	Silvereye	LC
Mammalia		
Dasyuridae Carnivorous Marsupials		
<i>Antechinus flavipes</i>	Yellow-footed Antechinus, Mardo	LC
<i>Phascogale tapoatafa wambenger</i>	South-western Brush-tailed Phascogal	S6 NT
Phalangeridae Brush-tail Possums, Cuscuses		
<i>Trichosurus vulpecula vulpecula</i>	Common Brushtail Possum	LC
Macropodidae Kangaroos, Wallabies		
<i>Macropus fuliginosus</i>	Western Grey Kangaroo	LC
Molossidae Freetail Bats		
<i>Ozimops kitcheneri</i>	Southern Freetail-bat	LC

BC Act Status - S1 to S7, EPBC Act Status - CR = Critically Endangered, EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions LC = Least Concern - see <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status
Vespertilionidae		
Ordinary Bats		
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	LC
<i>Chalinolobus morio</i>	Chocolate Wattled Bat	LC
<i>Falsistrellus mackenziei</i>	Western False Pipistrelle	P4 VU
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	LC
<i>Vespadelus regulus</i>	Southern Forest Bat	LC
Canidae		
Dogs, Foxes		
<i>Vulpes vulpes</i>	Red Fox	Introduced

BC Act Status - S1 to S7, EPBC Act Status - CR = Critically Endangered, EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions LC = Least Concern - see <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

APPENDIX D

HABITAT TREE DETAILS/HOLLOW PHOTOGRAPHS

Habitat Trees (DBH >50cm)

Modified from Astron (2014)

Datum - GDA94

Tree No.	mE	mN	Tree species	Tree height (m)	No. of possible large hollows visible	Hollow height (m)	Diameter of branch (cm)	Status of branch (living/dead)	Hollow entrance diameter	Possibly Suitable For Cockatoos	Evidence of past or current breeding (Yes/No)
1	388208	6300213	Eucalyptus marginata	20	-	-	-	-	-	No	No
2	388192	6300268	Eucalyptus marginata	20	-	-	-	-	-	No	No
3	388229	6300333	Eucalyptus marginata	22	-	-	-	-	-	No	No
4	388292	6300426	Corymbia calophylla	30	-	-	-	-	-	No	No
5	388290	6300383	Corymbia calophylla	25	1	15	30	Dead	?	No	No
6	388286	6300391	Corymbia calophylla	15	-	-	-	-	-	No	No
7	388251	6300412	Corymbia calophylla	30	-	-	-	-	-	No	No
8	388209	6300394	Eucalyptus marginata	25	-	-	-	-	-	No	No
9	388204	6300401	Eucalyptus marginata	25	-	-	-	-	-	No	No
10	388219	6300394	Eucalyptus marginata	25	-	-	-	-	-	No	No
11	388206	6300389	Eucalyptus marginata	30	-	-	-	-	-	No	No
12	388177	6300411	Corymbia calophylla	30	-	-	-	-	-	No	No
13	388165	6300402	Corymbia calophylla	30	2	15; 30	25; 40	Living	20; ?	No	No
14	388164	6300415	Corymbia calophylla	20	-	-	-	-	-	No	No
15	388124	6300411	Eucalyptus marginata	30	-	-	-	-	-	No	No
16	388160	6300434	Corymbia calophylla	25	-	-	-	-	-	No	No
17	388191	6300429	Corymbia calophylla	15	-	-	-	-	-	No	No
18	388214	6300430	Corymbia calophylla	20	1	15	-	Living	35	No	No
19	388237	6300434	Corymbia calophylla	25	-	-	-	-	-	No	No
20	388248	6300430	Eucalyptus marginata	25	-	-	-	-	-	No	No
21	388289	6300422	Corymbia calophylla	27	-	-	-	-	-	No	No
22	388253	6300431	Eucalyptus marginata	25	-	-	-	-	-	No	No
23	388347	6300418	Corymbia calophylla	30	-	-	-	-	-	No	No
24	388326	6300436	Corymbia calophylla	35	3	10; 20; 20	35; 35; 40	Living	20; ?; ?	No	No
25	388293	6300439	Corymbia calophylla	25	-	-	-	-	-	No	No
26	388188	6300487	Eucalyptus marginata	18	-	-	-	-	-	No	No
27	388196	6300491	Eucalyptus marginata	18	-	-	-	-	-	No	No
28	388347	6300458	Eucalyptus marginata	25	-	-	-	-	-	No	No
29	388318	6300485	Corymbia calophylla	25	1	25	35	Living	30	Yes	Yes; potential
30	388304	6300491	Eucalyptus marginata	20	-	-	-	-	-	No	No

Tree No.	mE	mN	Tree species	Tree height (m)	No. of possible large hollows visible	Hollow height (m)	Diameter of branch (cm)	Status of branch (living/dead)	Hollow entrance diameter	Possibly Suitable For Cockatoos	Evidence of past or current breeding (Yes/No)
31	388250	6300534	Corymbia calophylla	25	-	-	-	-	-	No	No
32	388253	6300532	Eucalyptus marginata	25	-	-	-	-	-	No	No
33	388301	6300535	Eucalyptus marginata	27	-	-	-	-	-	No	No
34	388316	6300534	Corymbia calophylla	25	-	-	-	-	-	No	No
35	388337	6300564	Corymbia calophylla	30	-	-	-	-	-	No	No
36	388329	6300572	Eucalyptus marginata	20	-	-	-	-	-	No	No
37	388332	6300577	Eucalyptus marginata	30	1	20	40	Dead	~35?	No	No
38	388316	6300582	Corymbia calophylla	25	-	-	-	-	-	No	No
39	388285	6300586	Corymbia calophylla	25	-	-	-	-	-	No	No
40	388283	6300614	Corymbia calophylla	20	1	10	30	Dead	~30?	No	No
41	388313	6300612	Eucalyptus marginata	25	1	11	31	Living	~25?	No	No
42	388308	6300650	Corymbia calophylla	24	1	14	20	Dead	~15?	No	No
43	388249	6300651	Corymbia calophylla	20	1	18	35	Dead	?	No	No
44	388257	6300649	Eucalyptus marginata	15	-	-	-	-	-	No	No
45	388250	6300653	Eucalyptus marginata	20	2	17; 17	~30; 35	Dead	~20??	No	No
46	388231	6300639	Corymbia calophylla	25	1	19	40	Dead	20	No	No
47	388197	6300658	Corymbia calophylla	26	-	-	-	-	-	No	No
48	388184	6300688	Eucalyptus marginata	30	-	-	-	-	-	No	No
49	388142	6300652	Corymbia calophylla	30	-	-	-	-	-	No	No
50	388133	6300673	Corymbia calophylla	28	-	-	-	-	-	No	No
51	388150	6300701	Corymbia calophylla	28	-	-	-	-	-	No	No
52	388242	6300690	Corymbia calophylla	20	-	-	-	-	-	No	No
53	388247	6300694	Corymbia calophylla	20	-	-	-	-	-	No	No
54	388265	6300708	Corymbia calophylla	25	-	-	-	-	-	No	No
55	388322	6300735	Eucalyptus marginata	20	-	-	-	-	-	No	No
56	388304	6300754	Corymbia calophylla	20	-	-	-	-	-	No	No
57	388294	6300736	Corymbia calophylla	25	-	-	-	-	-	No	No
58	388252	6300722	Eucalyptus marginata	25	-	-	-	-	-	No	No
59	388275	6300759	Eucalyptus marginata	20	-	-	-	-	-	No	No
60	388271	6300767	Corymbia calophylla	25	-	-	-	-	-	No	No
61	388276	6300767	Corymbia calophylla	25	-	-	-	-	-	No	No
62	388241	6300783	Eucalyptus marginata	25	1	17	-	Living	~30??	No	No
63	388232	6300788	Eucalyptus marginata	25	-	-	-	-	-	No	No

Tree No.	mE	mN	Tree species	Tree height (m)	No. of possible large hollows visible	Hollow height (m)	Diameter of branch (cm)	Status of branch (living/dead)	Hollow entrance diameter	Possibly Suitable For Cockatoos	Evidence of past or current breeding (Yes/No)
64	388204	6300790	Eucalyptus marginata	18	-	-	-	-	-	No	No
65	388149	6300760	Eucalyptus marginata	30	-	-	-	-	-	No	No
66	388169	6300748	Corymbia calophylla	30	-	-	-	-	-	No	No
67	388169	6300782	Corymbia calophylla	30	-	-	-	-	-	No	No
68	388194	6300812	Corymbia calophylla	25	-	-	-	-	-	No	No
69	388288	6300827	Eucalyptus marginata	20	1	18	40	Dead	??	No	No
70	388312	6300831	Corymbia calophylla	28	-	-	-	-	-	No	No
71	388305	6300824	Corymbia calophylla	20	-	-	-	-	-	No	No
72	388317	6300865	Corymbia calophylla	26	-	-	-	-	-	No	No
73	388245	6300837	Eucalyptus marginata	20	-	-	-	-	-	No	No
74	388190	6300831	Corymbia calophylla	30	1	20	35	Dead	??	Yes	No
75	388198	6300846	Corymbia calophylla	25	-	-	-	-	-	No	No
76	388198	6300815	Corymbia calophylla	25	-	-	-	-	-	No	No
77	388187	6300795	Corymbia calophylla	15	-	-	-	-	-	No	No
78	388171	6300784	Corymbia calophylla	30	1	20	45	Dead	40	Yes	No
79	388139	6300823	Corymbia calophylla	20	-	-	-	-	-	No	No
80	388079	6300732	Corymbia calophylla	30	-	-	-	-	-	No	No
81	388087	6300759	Eucalyptus marginata	25	-	-	-	-	-	No	No

WPT	Coordinates (MGA 94/Z50)	388289 mE	6300382 mN	Tree Species	Dead (Marri)	Survey Date	24/03/2021
5	Comments	Dead marri with a side entry hollow. The hollow has a relatively large entrance but appears to be too small internally for a black cockatoo to use for nesting purposes. No evidence of use by fauna of any type. Several smaller possible spout type hollows.			Classification	Unsuitable Hollows.	



WPT	Coordinates (MGA 94/Z50)	388164 mE	6300402 mN	Tree Species	Marri	Survey Date	24/03/2021
13	Comments	Marri with a possible side entry/spout type hollow and a possible large side entry hollow. Neither hollow appeared suitable with one appearing to be too small and the other having no depth. No evidence of use by fauna of any type.			Classification	Unsuitable Hollows.	



WPT	Coordinates (MGA 94/Z50)	388213 mE	6300429 mN	Tree Species	Marri	Survey Date	24/03/2021
18	Comments	Marri with a possible upward facing spout type hollow. The hollow was found to have two entrances, both of which are too small for black cockatoos. No evidence of use by fauna of any type.			Classification	Unsuitable Hollow.	



WPT	Coordinates (MGA 94/Z50)	388326 mE	6300436 mN	Tree Species	Marri	Survey Date	24/03/2021
24	Comments	Marri with sever possible side entry hollows. All but one hollow was found to be non-existent. The single side entry hollow's entrance (pictured below) appears to be too small for black cockatoos. Some chew marks suggest possible galah activity though not conclusive.				Classification	Unsuitable Hollow.



WPT	Coordinates (MGA 94/Z50)	388318 mE	6300485 mN	Tree Species	Marri	Survey Date	24/03/2021
29	Comments	Marri with possible side entry/spout type hollow. The hollow was found to have depth and also appeared to have chew marks near the entrance (see picture below) suggesting black cockatoo activity.			Classification	Chewed Hollow.	



WPT	Coordinates (MGA 94/Z50)	388332 mE	6300577 mN	Tree Species	Jarrah	Survey Date	24/03/2021
37	Comments	Large near dead jarrah with possible large chimney/spout type hollow. The hollow was however found to have no depth when examined with a drone. Several much smaller possible spout type hollows in dead branches. No evidence of use by fauna of any type.				Classification	Unsuitable Hollow/No Hollow.



WPT	Coordinates (MGA 94/Z50)	388283 mE	6300614 mN	Tree Species	Marri	Survey Date	24/03/2021
40	Comments	Marri with near horizontal spout type hollows. The hollow appears to have some depth but the fact that it is horizontal makes it unfavourable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.			Classification	Unsuitable Hollow.	



WPT	Coordinates (MGA 94/Z50)	388313 mE	6300611 mN	Tree Species	Jarrah	Survey Date	24/03/2021
41	Comments	Jarrah with a side entry/spout type hollow. The hollow appears to have some depth but only provides entry into a relatively small branch/trunk of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.			Classification	Unsuitable Hollow.	



WPT	Coordinates (MGA 94/Z50)	388307 mE	6300650 mN	Tree Species	Marri	Survey Date	24/03/2021
42	Comments	Marri with a side entry/spout type hollow. The hollow appears to have some depth but only provides entry into a relatively small trunk of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.				Classification	Unsuitable Hollow.



WPT	Coordinates (MGA 94/Z50)	388249 mE	6300650 mN	Tree Species	Marri	Survey Date	24/03/2021
43	Comments	Marri with a side entry type hollow. The hollow only provides entry into a relatively small branch of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.				Classification	Unsuitable Hollow.



WPT	Coordinates (MGA 94/Z50)	388250 mE	6300652 mN	Tree Species	Jarrah	Survey Date	24/03/2021
45	Comments	Jarrah with two side entry type hollows. Both hollows only provide entry into a relatively small branch of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.			Classification	Unsuitable Hollows.	



WPT	Coordinates (MGA 94/Z50)	388230 mE	6300639 mN	Tree Species	Marri	Survey Date	24/03/2021
46	Comments	Marri with a spout type hollow created recently when a branch of the tree broke off. The hollow appears to have a large entrance and some depth but appears too small internally to be considered suitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.			Classification	Unsuitable Hollow.	



WPT	Coordinates (MGA 94/Z50)	388197 mE	6300657 mN	Tree Species	Marri	Survey Date	24/03/2021
47	Comments	Marri with a possible side entry hollow. The hollow was found to be non-existent when examined with a drone.			Classification	No Hollow.	



WPT	Coordinates (MGA 94/Z50)	388275 mE	6300758 mN	Tree Species	Jarrah	Survey Date	24/03/2021
59	Comments	Jarrah with possible chimney type hollow. The hollow was found to be non-existent when examined with the drone.				Classification	No Hollow.



WPT	Coordinates (MGA 94/Z50)	388241 mE	6300782 mN	Tree Species	Marri	Survey Date	24/03/2021
62	Comments	Marri with a chimney type hollow. The hollow appears to be very shallow/open and is therefore considered unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.			Classification	Unsuitable Hollow.	



WPT	Coordinates (MGA 94/Z50)	388288 mE	6300827 mN	Tree Species	Jarrah	Survey Date	24/03/2021
69	Comments	Marri with a chimney type hollow. The hollow appears to be very shallow/open and is therefore considered unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.			Classification	Unsuitable Hollow.	



WPT	Coordinates (MGA 94/Z50)	388189 mE	6300830 mN	Tree Species	Marri	Survey Date	24/03/2021
74	Comments	Marri with a chimney type hollow. The hollow has a large entrance and appears to be quite deep and therefore it must be considered potentially suitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.			Classification	Unused Hollow.	



WPT	Coordinates (MGA 94/Z50)	388187 mE	6300795 mN	Tree Species	Marri	Survey Date	24/03/2021
77	Comments	Marri with a chimney type hollow. The hollow appears to be very shallow/open and is therefore considered unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.			Classification	Unsuitable Hollow.	



WPT	Coordinates (MGA 94/Z50)	388170 mE	6300784 mN	Tree Species	Marri	Survey Date	24/03/2021
78	Comments	Marri with a two possible side entry type hollows possibly joined. Both hollows appear to be suitable (size and orientation) to be classified as potentially suitable for black cockatoos to use for nesting purposes. No evidence of use.			Classification	Unused Hollows.	



WPT	Coordinates (MGA 94/Z50)	388087 mE	6300759 mN	Tree Species	Jarrah	Survey Date	24/03/2021
81	Comments	Near dead jarrah with a possible chimney type hollow. This hollow was found to be non-existent when examined with a drone. Several much smaller possible spout type hollows in dead branches.			Classification	Unsuitable Hollows.	



DISCLAIMER

This fauna assessment report (“the report”) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Greg Harewood (“the Author”). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints. In accordance with the scope of services, the Author has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

The conclusions are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of preparing the report. Also it should be recognised that site conditions, can change with time.

Within the limitations imposed by the scope of services, the field assessment and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

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The Author will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

APPENDIX B – Flora, Vegetation and Fauna Assessment for Lot 10

APPENDIX C – Black Cockatoo Habitat Assessment for Lot 2148

**Greg Harewood
Zoologist
PO Box 755
BUNBURY WA 6231
18 May 2021**

**Cleanaway Solid Waste Pty Ltd
Lot 2 Banksia Rd
DARDANUP WA 6236
E: sally.carlton@cleanaway.com.au**

Dear Sally

RE: Habitat Tree Survey - Lot 2148 Ferguson Road – Wellington Forest

The letter report details the results of a black cockatoo breeding habitat survey carried out over Lot 2148 Ferguson Road. Lot 2148 has an area of about 37 hectares (ha) and contains jarrah and marri forest. The area is being considered as an offset for proposed clearing to be undertaken at Cleanaway's Dardanup landfill site.

The aim of the survey was primarily to provide an estimate of the number of black cockatoo breeding habitat trees present within the Lot. The Department of Agriculture, Water and the Environment (DAWE) have defined black cockatoo breeding habitat as any suitable tree species with a Diameter at Breast Height (DBH) of over 50 centimetres (cm) (Commonwealth of Australia 2012). Due to the total size of the survey area and the likely large number of trees involved it was deemed impractical to record all trees present that have a DBH >50cm. Therefore, to estimate the number of trees with a DBH of >50cm present, six 100 metre by 100 metre quadrats (1 ha each) were established across area and the number of trees with a DBH >50cm present counted. These figures were then used to estimate the total number of trees with a DBH >50cm present in the total survey area. The DBH of each tree within each quadrat was estimated using a pre-made 50 cm "caliper".

Comments of the value of the site as foraging and roosting habitat are also provided in addition to the likely presence of other fauna of conservation significance known to frequent the wider area.

The habitat tree survey was carried out by Greg Harewood (Zoologist) and Kurtis Harewood (Field Assistant) on the 19 April 2021.

The result of the habitat tree survey is shown in the attached figure. Based on the results it is estimated that Lot 2148 contains about 1,286 habitat trees (i.e. trees with a DBH >50cm). Most of the trees present appear to be regrowth from historical logging. Given their relatively young age very few appear to contain hollows of any size though exceptions are present and some appear to have large hollows that may represent existing potential black cockatoo breeding trees.



Vegetation across the entire Lot can be considered as representing black cockatoo foraging habitat given the dominance of marri and jarrah. Foraging evidence was observed at several location. This evidence was attributed to either the forest red-tailed black cockatoo (marri, jarrah and blackbutt debris) and Baudin's black cockatoo (marri debris) depending on the nature of the evidence observed.

No evidence of black cockatoos roosting with the Lot was observed however it may be used for this purpose at times.

With represent to overall fauna habitat values and despite the Lots logging history the area appears to contain relatively good fauna habitat which is supplemented by the presence of large areas of similar vegetation directly adjoining.

Based on the habitat present and the current documented distributions the following fauna species of conservation significance are considered as having the potential to be utilise Lot 2148 at times, if only infrequently:

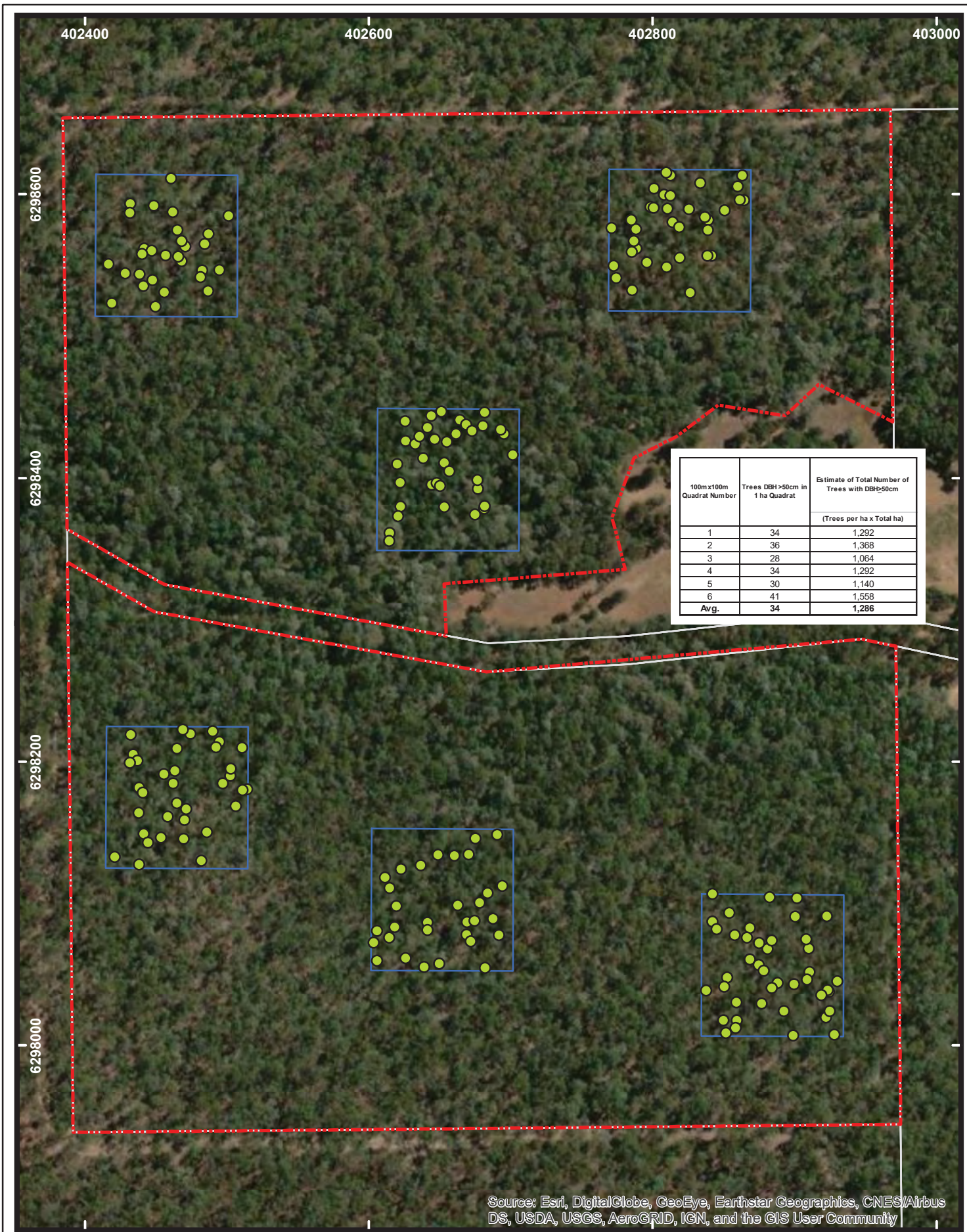
- Baudin's Black Cockatoo – Endangered (WA/Federal);
- Carnaby's Black Cockatoo – Endangered (WA/Federal);
- Forest Red-tailed Black Cockatoo – Vulnerable (WA/Federal);
- Quenda – P4 (DBCA Priority Species);
- Western Brush Wallaby – P4 (DBCA Priority Species); and
- Western False Pipistrelle – P4 (DBCA Priority Species)
- Darling Range Heath Ctenotus – P4 (DBCA Priority Species);
- Peregrine Falcon – Schedule 7 (WA);
- Masked Owl – P3 (DBCA Priority Species);
- South-western Brush-tailed Phascogale - Schedule 6 (WA);
- Chuditch - Vulnerable (WA/Federal);
- Western Ringtail Possum – Critically Endangered (WA/Federal).



If you have any questions or queries relating the information provided here, please contact the undersigned on 0402 141 197 / gharewood@iinet.net.au




GHarewood
Greg Harewood
Zoologist

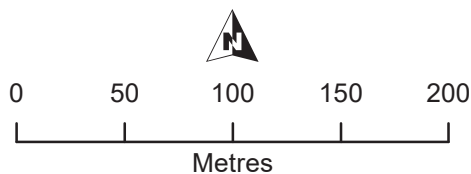




Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

-  Offset Area
-  Offset Quadrats
-  Habitat Trees



Drawn: G. Harewood

Date: April 2021

Scale: 1:3,500

Projection/Coordinate System: UTM/MGA Zone 50

Cleanaway Solid Waste Pty Ltd
Lot 2148 Ferguson Road

Quadrats and Habitat Trees (DBH > 50cm)

Figure: 1

APPENDIX D - EPBC Act Offset Calculations

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	
EPBC Act status	Endangered
Annual probability of extinction <small>Based on IUCN category definitions</small>	1.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator						
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
<i>Ecological communities</i>						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
<i>Threatened species habitat</i>						
Area of habitat	Yes		Area	16.8	Hectares	
			Quality	7	Scale 0-10	
			Total quantum of impact	11.76	Adjusted hectares	
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Number of features <small>e.g. Nest hollows, habitat trees</small>	No					
Condition of habitat <small>Change in habitat condition, but no change in extent</small>	No					
<i>Threatened species</i>						
Birth rate <small>e.g. Change in nest success</small>	No					
Mortality rate <small>e.g. Change in number of road kills per year</small>	No					
Number of individuals <small>e.g. Individual plants/animals</small>	No					

Offset calculator																					
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality	Future area and quality without offset	Future area and quality with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source					
<i>Ecological Communities</i>																					
Area of community	No				Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (% without offset)	Risk of loss (% with offset)													
					Time until ecological benefit	Start quality (scale of 0-10)	Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0											
							Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)												
<i>Threatened species habitat</i>																					
Area of habitat	Yes	11.76	Adjusted hectares	Lot 10 Temple Road, East Picton	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	5.22	Risk of loss (% without offset)	30%	Risk of loss (% with offset)	5%	Raw gain	1.31	Confidence in result (%)	95%	Adjusted gain	1.24	Net present value	0.98	
					Time until ecological benefit	1	Start quality (scale of 0-10)	8	Future area without offset (adjusted hectares)	3.7	Future area with offset (adjusted hectares)	5.0	1.00	95%	0.95	0.94	1.12	9.56%	No		
							Future quality without offset (scale of 0-10)	7	Future quality with offset (scale of 0-10)	8											
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start value	Future value without offset	Future value with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source					
Number of features <small>e.g. Nest hollows, habitat trees</small>	No																				
Condition of habitat <small>Change in habitat condition, but no change in extent</small>	No																				
<i>Threatened species</i>																					
Birth rate <small>e.g. Change in nest success</small>	No																				
Mortality rate <small>e.g. Change in number of road kills per year</small>	No																				
Number of individuals <small>e.g. Individual plants/animals</small>	No																				

Summary							
Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost (\$)		
					Direct offset (\$)	Other compensatory measures (\$)	Total (\$)
					Birth rate	0	
Mortality rate	0				\$0.00	\$0.00	
Number of individuals	0				\$0.00	\$0.00	
Number of features	0				\$0.00	\$0.00	
Condition of habitat	0				\$0.00	\$0.00	
Area of habitat	11.76	1.12	9.56%	No	\$0.00	#DIV/0!	#DIV/0!
Area of community	0				\$0.00		\$0.00
					\$0.00	#DIV/0!	#DIV/0!

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	
EPBC Act status	Endangered
Annual probability of extinction <small>Based on IUCN category definitions</small>	1.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator						
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source	
<i>Ecological communities</i>						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
<i>Threatened species habitat</i>						
Area of habitat	Yes		Area	16.8	Hectares	
			Quality	7	Scale 0-10	
			Total quantum of impact	11.76	Adjusted hectares	
<i>Threatened species</i>						
Threatened species						
Birth rate <small>e.g. Change in nest success</small>	No					
Mortality rate <small>e.g. Change in number of road kills per year</small>	No					
Number of individuals <small>e.g. Individual plants/animals</small>	No					

Offset calculator																							
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality	Future area and quality without offset	Future area and quality with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source							
<i>Ecological Communities</i>																							
Area of community	No				Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (% without offset)	Risk of loss (% with offset)															
					Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0															
					Time until ecological benefit	Start quality (scale of 0-10)	Future quality without offset (scale of 0-10)	Future quality with offset (scale of 0-10)															
<i>Threatened species habitat</i>																							
Area of habitat	Yes	11.76	Adjusted hectares	Lot 2148 Ferguson Road	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	38	Risk of loss (% without offset)	30%	Risk of loss (% with offset)	5%	Raw gain	9.50	Confidence in result (%)	95%	Adjusted gain	9.03	Net present value	7.11			
					Future area without offset (adjusted hectares)	26.6	Future area with offset (adjusted hectares)	36.1															
					Time until ecological benefit	1	Start quality (scale of 0-10)	8	Future quality without offset (scale of 0-10)	7	Future quality with offset (scale of 0-10)	8	Raw gain	1.00	Confidence in result (%)	95%	Adjusted gain	0.95	Net present value	0.94	% of impact offset	69.60%	Minimum (90%) direct offset requirement met?
<i>Threatened species</i>																							
Threatened species																							
<i>Threatened species</i>																							
<i>Threatened species</i>																							
<i>Threatened species</i>																							
<i>Threatened species</i>																							

Carnaby's Black Cockatoo

EPBC Act Status: Endangered Annual Probability of Extinction: 1.2%

Impact Calculator					
Protected Matter Attributes	Attribute Relevant to Case	Description	Quantum of Impact		Information Source
Threatened Species Habitat					
Area of habitat	Yes	16.8 ha of remnant vegetation will be cleared.	Area	16.8 ha	<p>Quality is based on the following:</p> <p>Site condition: Vegetation condition within Lot 2 ranged from 'degraded' to 'very good to excellent' for the majority of the vegetated area (Astron 2014). For Lot 81, the habitat quality was identified as being 'good' to 'very good' (Harewood 2015). A rating of 7 is provided.</p> <p>Site context: The clearing footprint does provide suitable foraging habitat for Carnaby's Cockatoo which is supported by evidence of foraging obtained during recent surveys (Astron 2014 and Harewood 2015). While no breeding was recorded within the clearing footprint, it is located within the breeding range for the species and potential habitat trees suitable for black cockatoos have been identified (Harewood 2015 and Astron 2014). However, extensive areas of preferential foraging, nesting and roosting habitat are available adjacent to the clearing footprint, indicating that the subject site is likely to be of limited significance for the species. The current ongoing threat associated with the degradation of the subject site is the current land use (waste facility). A rating of 5 is provided.</p> <p>Species Stocking Rate: Evidence of the species foraging within the clearing footprint has been recorded (Astron 2014 and Harewood 2015) however, no breeding was recorded within the clearing footprint. The species stocking rate is unlikely to be high (given that availability of more suitable habitat nearby), however the species has the potential to occur in the area in low numbers. A rating of 6 is provided.</p> <p>References: Harewood 2015. <i>Fauna Assessment – Lot Banksia Road, Dardanup</i>. Unpublished. Astron 2014, <i>Banksia Road Dardanup Level 2 Vegetation and Flora Survey and Level 1 Fauna Assessment</i> Unpublished.</p>
			Quality	7.0	
			Total Quantum of Impact	11.76 ha	

OFFSETS RATIONALE

Offset Area Rationale – 5.22 ha Offset Site		
Component	Value	Rationale
Time over which loss is averted	20	Provision of offset for protection in perpetuity.
Time until ecological benefit	1	Ecological benefit would be realised immediately as a direct offset would be provided.
Start quality	8	<p>Quality is based on the following:</p> <p>Site condition: 'Very High' quality foraging habitat for Habitats 1, 2 and 4 contained within offset area. In addition, along surveyed transects (not within the entire area), 51 potential black cockatoo habitat trees were identified within the proposed offset area (GHD 2021).</p> <p>Site context: The offset site provides preferential foraging and potential breeding habitat for the species in a highly cleared landscape. The current ongoing threat associated with the degradation of the Lot 10 is land development.</p> <p>Species Stocking Rate: The offset site does provide a high density of foraging resources (given the prevalence of Banksia spp.) hence 'Very High' quality foraging habitat rating.</p>
Risk of loss without offset	30%	The site is currently zoned "Rural" under the Greater Bunbury Region Scheme and "General Farming" pursuant to the Town Planning Scheme (TPS) No. 3. Without management activities the current land use increases the risk of damage to the site through grazing and weed incursion. Other potential risks to the site if left unmanaged include unsympathetic fire regimes and rural activities. These degrading processes will be expected to continue over time leading to progressive loss of habitat value and foraging.
Future quality without offset	7	With no active management (e.g. fire, weeds, grazing and expanding rural activities) the future quality of the site is likely to be reduced.
Risk of loss with offset	5%	Formal protection of the offset site will ensure that the risk of loss is minimised as much as possible.
Future quality with offset	8	Formal protection of the offset will ensure that the quality is maintained.
Confidence in Result	95%	A value of 95% has been selected as there is a very high probability that the introduction of a conservation covenant over the offset site would lead to the maintenance of the existing quality of habitat, and habitat quality would otherwise continue to decline over time without such protection.

Offset Area Rationale – 38 ha Offsite Vegetation Retention		
Component	Value	Rationale
Time over which loss is averted	20	Provision of offset for protection in perpetuity.
Time until ecological benefit	1	Ecological benefit would be realised immediately as a direct offset would be provided.
Start quality	8	Quality is based on the following: <u>Site condition:</u> This area is primarily in a 'Very Good' to 'Excellent' condition and is comprised of mature marri-jarrah forest. <u>Site context:</u> This area of remnant vegetation is likely to provide very high value habitat for Carnaby's. The current ongoing threat associated with the degradation of the site is rural activities. <u>Species Stocking Rate:</u> This vegetation is likely to have a very high capacity to support Carnaby's for foraging and breeding.
Risk of loss without offset	30%	The site is currently zoned "Rural" under the Greater Bunbury Region Scheme and "General Farming" pursuant to the Town Planning Scheme (TPS) No. 3. Without management activities the current land use increases the risk of damage to the site through grazing and weed incursion. Other potential risks to the site if left unmanaged include unsympathetic fire regimes and possible rural activities. These degrading processes will be expected to continue over time leading to progressive loss of habitat value and foraging.
Future quality without offset	7	With no active management (e.g. fire, weeds, grazing and expanding rural activities) the future quality of the site is likely to be significantly reduced. If grazing livestock is introduced into the vegetated areas this will substantially impact the quality of habitat.
Risk of loss with offset	5%	Formal protection of the offset site will ensure that the risk of loss is minimised as much as possible.
Future quality with offset	8	Formal protection of the offset will ensure that the quality is maintained.
Confidence in result	95%	A value of 95% has been selected as there is a very high probability that the introduction of a conservation covenant over the offset site would lead to the maintenance of the existing quality of habitat, and habitat quality would otherwise continue to decline over time without such protection.

Offset Area Rationale – 7.86 ha Onsite Vegetation Retention		
Component	Value	Rationale
Time over which loss is averted	20	Provision of offset for protection in perpetuity.
Time until ecological benefit	1	Ecological benefit would be realised immediately as a direct offset would be provided.
Start quality	7	<u>Site condition:</u> Vegetation condition within Lot 2 ranged from 'degraded' to 'very good to excellent' and 'very good' for the majority of the vegetated area (Astron 2014). For Lot 81, the habitat quality was identified as being 'good' to 'very good' (Harewood 2015). <u>Site context:</u> The clearing footprint does provide suitable foraging habitat for Carnaby's Cockatoo which is supported by evidence of foraging obtained during recent surveys (Astron 2014 and Harewood 2015). While no breeding was recorded within the clearing footprint, it is located within the breeding range for the species and potential habitat trees suitable for black cockatoos have been identified (Harewood 2015 and Astron 2014). However, extensive areas of preferential foraging, nesting and roosting habitat are available adjacent to the clearing footprint, indicating that the subject site is likely to be of limited significance for the species. The current ongoing threat associated with the degradation of the subject site is anthropogenic disturbances. <u>Species Stocking Rate:</u> Evidence of the species foraging within the clearing footprint has been recorded (Astron 2014 and Harewood 2015) however, no breeding was recorded within the clearing footprint. The species stocking rate is unlikely to be high (given that availability of more suitable habitat nearby), however the species has the potential to occur in the area in low numbers.
Risk of loss without offset	40%	The vegetation buffer is zoned "Rural" under the Greater Bunbury Region Scheme and "General Farming" pursuant to the Town Planning Scheme (TPS) No. 3. In accordance with the Shire of Dardanup's Local Planning Strategy, it is zoned "Waste Disposal/Processing". Accordingly, without protection this vegetation would likely be subject to clearing to accommodate the expansion of the current waste facility which is supported by Plans submitted to the Shire of Dardanup. A report commissioned by the Shire of Dardanup which involved community and government agency engagement determined that suitable land uses for Lot 81 and Lot 2 included waste storage facility, waste disposal facility and Industry – Extractive (Urbaqua 2020). This determination was made in consideration of environmental, planning and social impacts with consultation undertaken between the Department of Planning, Land and Heritage (DPLH), Department of Water and Environmental Regulation (DWER) and Department of Biodiversity, Conservation and Attractions (DBCA).
Future quality without offset	6	Without formal protection, it is likely that this area will be developed for the proposed land used (i.e. waste facility).

Risk of loss with offset	5%	Formal protection of the offset site will ensure that the risk of loss is minimised as much as possible.
Future quality with offset	8	Management measures will be implemented to improve the current condition of this vegetation. This will involve access control (fencing to prohibit vehicles and foxes), weed control and revegetation in disturbed areas. These management measures will be documented within the EMP. This value is consistent with previously approved values for areas where it is proposed to improve the condition of vegetation.
Confidence in result	95%	A value of 95% has been selected as there is a very high probability that the introduction of a conservation covenant over the offset site would lead to the maintenance of the existing quality of habitat, and habitat quality would otherwise continue to decline over time without such protection.