Targeted Fauna Survey

&

Habitat Tree Assessment

of

Proposed Dam Area

Northcliffe Recreation Grounds

Shire of Manjimup

October 2024

Version 1

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SHIRE OF MANJIMUP
Manjimup • Northcliffe • Pemberton • Walpole

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SUMMARY

This report details the results of a targeted fauna survey and a black cockatoo habitat tree assessment carried out over sections of the Northcliffe Recreation Grounds on behalf of the Shire of Manjimup (the Shire).

The Shire is proposing to expand the size of the existing dam at the grounds and the clearing of some native remnant vegetation will be required. The existing dam has a footprint of about 0.47 hectares and up to about 0.89ha of clearing surrounding this area will be required (the survey area)(Figure 1).

In the near future the Shire will be applying for a clearing permit from the Department of Water and Environmental Regulation (DWER). It is anticipated that DWER will, among other things, require surveys be carried out and reported on to determine the impacts on conservation significant fauna which may inhabit the area the area.

The assessment has included a habitat assessment in addition to a series of day and night transects across the survey area while searching for and recording any evidence of presence of the target species (i.e. calls, tracks, scats, runnels, dreys, tree hollows, individuals).

A day and night survey of the survey area was carried out by Greg Harewood (Zoologist – 21 years' experience) on the 13 September 2024.

KEY FINDINGS

No evidence of any fauna species of conservation significance was recorded within the survey area during the course of the survey.

The remnant bushland consists of two woodland areas. To the west of the existing dam the main vegetation unit present is a blackbutt (Eucalyptus patens) dominated open woodland over an open shrubland. This area has been subject to a recent fire and the overall structure of the vegetation has obviously changed as a consequence. There are areas of what would have been dense tall shrubland and shrubland.

To the east of the east dam an open woodland dominated by marri over a mostly dense tall shrubland with some more open areas is present. This area has also been subject to a relatively recent fire.

Superficially, all of the vegetated sections of the survey area appear marginal for western ringtail possums given the discontinuous canopy and lack of dense midstorey species.

Despite the recent fires there appears to be some suitable habitat for quenda, where ground cover was not burnt or has regrown and is densest however this is limited in extent within the survey area.

Habitat suitable for the south-western brush-tailed phascogales also appears to be present though there is an obvious paucity of hollow bearing trees which the species requires for daytime

refuge and breeding. Some sections of the vegetation appears superficially to be suitable for quokkas where ground cover was not burnt or has regrown and is densest however this is limited in extent within the survey area.

Some small areas of habitat also superficially appear suitable for the short-nosed snake (i.e. very dense understory), though as mentioned much of this has been compromised by recent fire.

With respect to black cockatoos no large hollows that may represent potential breeding habitat were identified. Quality foraging habitat is present in the form of marri and jarrah however these two plant species are only represented by a relatively small number of specimens. Some trees may represent potential roosting habitat.

Given the relatively small size of the survey area (~0.89 ha) and the large expanses of native bushland in surrounding areas it is the Authors opinion that that clearing can be carried out without significantly impacting on the status fauna species of conservation significance or existing black cockatoo breeding/foraging/roosting habitat.

It is recommended that, if and when clearing is undertaken, a suitably qualified and experience “fauna spotter” be employed to minimise the likelihood of animals being killed or injured during site works.

This report should be forwarded to DWER for their consideration.

1. INTRODUCTION

This report details the results of a targeted fauna survey and a black cockatoo habitat tree assessment carried out over sections of the Northcliffe Recreation Grounds on behalf of the Shire of Manjimup (the Shire).

The Shire is proposing to expand the size of the existing dam at the grounds and the clearing of some native remnant vegetation will be required. The existing dam has a footprint of about 0.47 hectares and up to about 0.89ha of clearing surrounding this area will be required (the survey area)(Figure 1).

In the near future the Shire will be applying for a clearing permit from the Department of Water and Environmental Regulation (DWER). It is anticipated that DWER will, among other things, require surveys be carried out and reported on to determine the impacts on conservation significant fauna which may inhabit the area the area.

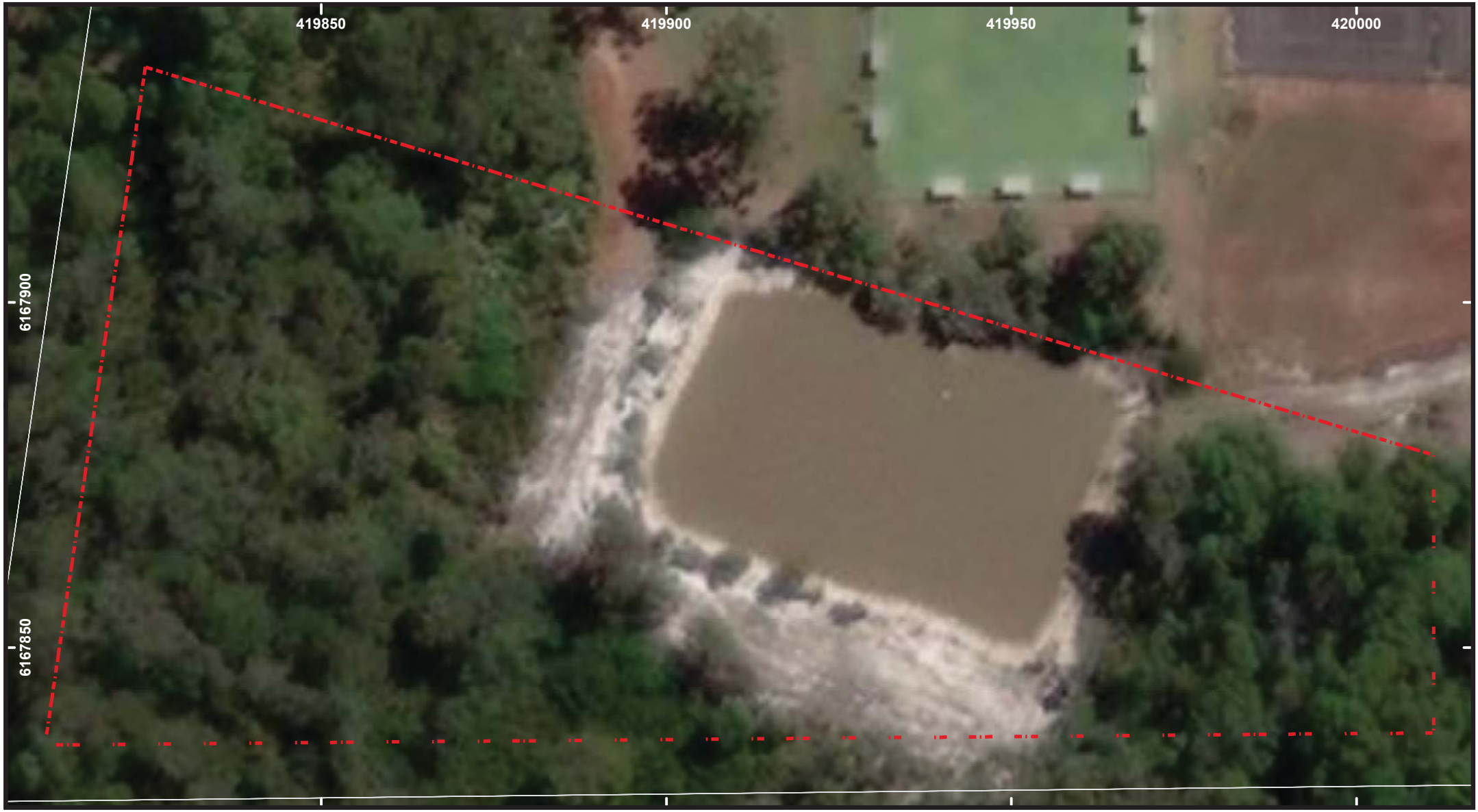
To fulfill this anticipated requirement the following fauna survey and habitat tree assessment of the survey area has been carried out.

2. SCOPE OF WORKS

Based on previous nearby clearing permit surveys the following scope of works from DWER is anticipated:

- A fauna survey is required of the area proposed to be cleared – Target species include:
  - western ringtail possum (*Pseudocheirus occidentalis*)
  - quokka (*Setonix brachyurus*)
  - south-western brush-tailed phascogale (*Phascogale tapoatafa wambenger*)
  - quenda (*Isoodon fusciventer*)
  - short-nosed snake (*Elapognathus minor*)
- A black cockatoo habitat assessment survey is required for the area proposed to be cleared.

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



Legend

Survey Area

N

0 10 20 30 40 50

Metres

Fauna Survey

Drawn: G Harewood

Date: 01-Oct-24

Scale: 1:750

Projection/Coordinate System: UTM/MGA Zone 50

Figure: 1

Proposed Dam Area
Northcliffe Recreation Grounds
Shire of Manjimup

Survey Area Aerial Photograph

3. METHODS

A day and night survey of the survey area was carried out by Greg Harewood (Zoologist – 21 years' experience) on the 13 September 2024.

3.1 TARGETED FAUNA SURVEY

A variety of methods were used in an attempt to determine if the survey area was occupied by the fauna species of conservation significance identified by DWER as having the potential of being present (i.e. western ringtail possum, south-western brush-tailed phascogale, quenda, quokka and short-nosed snake).

The methods directed at detecting each species are detailed below:

3.1.1 Habitat Assessment

Vegetation units, landforms and soils observed during the field survey have been used to define broad fauna habitat types across the survey area.

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

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

3.1.2 Day and Night Surveys

One day survey and one night survey were undertaken. The day survey included a series of transects across the survey area while searching for and recording any evidence of presence of the target species (i.e. calls, tracks, scats, runnels, dreys, tree hollows, individuals) concurrent with the habitat assessment.

The night survey involved a series of transects across the survey area using a LED head torch with the aim of detecting some of the nocturnal target species by way of eye shine.

The day survey had the potential to detect individuals and/or secondary signs of all of the listed fauna species of conservation significance identified as potentially occurring.

The night survey specifically targeted the nocturnal mammal species (i.e. western ringtail possum, south-western brush-tailed phascogale, quenda and quokka).

3.2 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 and 2022) 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 10 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.

3.2.1 Breeding Habitat Assessment

The black cockatoo breeding habitat assessment identified all suitable breeding tree species within the survey area that have a diameter at breast height (DBH) equal to or greater than 30cm. The DBH of each tree was estimated using a pre-made "caliper".

Target tree species included blackbutt, marri, jarrah, and flooded gum or any other *Corymbia/Eucalyptus* species of a suitable size that was present. Peppermints, *Banksia*, sheoak and *Melaleuca* tree species (for example) were not assessed as they typically do not develop hollows used by black cockatoos.

The location of each tree identified as being over the threshold DBH will be recorded with a GPS and details on tree species, number and size of hollows (if any) noted. Trees observed to contain hollows (of any size/type) will be marked with "H" using spray paint.

Hollow/potential hollows were placed into one of four categories, based on the size of the apparent hollow entrance, these being:

- Small = ~<5cm diameter (i.e. entrance too small for a black cockatoo);
- Medium = ~5cm-10cm diameter (i.e. entrance too small for a black cockatoo);
- Large = ~>10cm diameter (entrance large enough for a black cockatoo but hollow appears unsuitable for nesting i.e. wrong orientation, appears too small, too low or too shallow); or
- Large (cockatoo) = ~>10cm diameter (entrance and apparent hollow appear big enough and suitably sized/orientated for a black cockatoo to use for nesting).

Based on this assessment, trees present within the survey area were placed into one of five categories these being:

- **Not a potential or suitable nesting tree** - Tree <30cm DBH or an unsuitable species (these were not recorded);
- **Potential nesting tree** - Tree ≥30cm DBH, no hollows seen;
- **Potential nesting tree** - Tree ≥30cm DBH, one or more hollows seen, none of which were considered suitable for black cockatoos to use for nesting; or
- **Suitable nesting tree** -Tree ≥30cm DBH, one or more hollows seen, with at least one considered suitable for black cockatoos to use for nesting, but with no evidence of use.
- **Known nesting tree** - Tree ≥30cm DBH, one or more hollows seen, where black cockatoo breeding has been recorded or which demonstrates evidence of breeding (i.e. showing evidence of use through scratches, chew marks or feathers).

For the purposes of this assessment, a tree containing a potential black cockatoo nest hollow was defined as:

Generally, any tree which is alive or dead that contains one or more visible hollows (cavities within the trunk or branches) or possible hollows potentially suitable for occupation by black cockatoo for the purpose of nesting/breeding. Hollows or possible hollows that had an entrance greater than about 10cm in diameter and would allow the entry of a black cockatoo into a suitably orientated and sized branch/trunk, were recorded as a "potential nest hollow".

Identified hollows, if observed, were to be examined using binoculars for evidence of actual use by black cockatoos (e.g. chewing around hollow entrance, scarring and scratch marks on trunks and branches). Details recorded included hollow size, height, type, orientation, comments on suitability and any evidence of use.

3.2.2 Foraging Habitat Assessment

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.

In addition to the vegetation/habitat mapping, the specific plant species present that represent potential foraging habitat have been documented. The location and nature of black cockatoo foraging activity (e.g. chewed fruits around base of trees) observed during the field survey was also recorded.

3.2.3 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).

4. SURVEY CONSTRAINTS

No seasonal sampling has been 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 also be recognised that site conditions can change with time.

During the black cockatoo habitat survey 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, though to a certain extent some of these limitations can be overcome by using a drone or pole camera to examine possible hollows in more detail (where considered warranted and feasible).

5. RESULTS

5.1 TARGETED FAUNA SURVEY

5.1.1 Habitat Assessment

The survey area has a total extent of about 1.36 ha. About 0.47 ha is represented by the existing, largely cleared dam area, with the balance (0.89 ha) being made up of remnant native bushland.

The remnant bushland consists of two woodland areas. To the west of the existing dam the main vegetation unit present is a blackbutt (*Eucalyptus patens*) dominated open woodland over an open shrubland. This area has been subject to a recent fire and the overall structure of the vegetation has obviously changed as a consequence. There are areas of what would have been dense tall shrubland and shrubland.

To the east of the east dam an open woodland dominated by marri over a mostly dense tall shrubland with some more open areas is present. This area has also been subject to a relatively recent fire.

Superficially, all of the vegetated sections of the survey area appear marginal for western ringtail possums given the discontinuous canopy and lack of dense midstorey species.

Despite the recent fires there appears to be some suitable habitat for quenda, where ground cover was not burnt or has regrown and is densest however this is limited in extent within the survey area.

Habitat suitable for the south-western brush-tailed phascogales also appears to be present though there is an obvious paucity of hollow bearing trees which the species requires for daytime refuge and breeding. Some sections of the vegetation appears superficially to be

suitable for quokkas where ground cover was not burnt or has regrown and is densest however this is limited in extent within the survey area.

Some small areas of habitat also superficially appear suitable for the short-nosed snake (i.e. very dense understory), though as mentioned much of this has been compromised by recent fire.

With respect to black cockatoos no large hollows that may represent potential breeding habitat were identified. Quality foraging habitat is present in the form of marri and jarrah however these two plant species are only represented by a relatively small number of specimens. Some trees may represent potential roosting habitat.

Example images of the various fauna habitats present are provided in Table 1. This table also provides a brief assessment of the fauna habitat values of the various broad habitat types identified. Additional details on each fauna species can be found in Appendix A.

Table 1: Example Images of the fauna habitats within the survey area

Fauna Habitat Description: Scattered trees (mainly blackbutt with minor marri and jarrah) over an open shrubland with grasstrees and bracken ferns emerging after recent fire. There are some scattered areas of dense tall shrubland that has mostly died during the fire. Makes up about 48 % (~0.66 ha) of the survey area.
Black Cockatoo Habitat Value: Relatively low value given paucity of favoured foraging trees (marri/jarrah/banksia), no hollow bearing trees with limited opportunity for roosting. No evidence of these species seen in this section of the survey area.
Western Ringtail Possum Habitat Value: Superficially appears to be of marginal value given absence of strong continuous midstory vegetation. No evidence of these species seen in this section of the survey area.
Quenda Habitat Value: Some value given presence of some groundcover vegetation most of which was compromised by fire. May have some value as foraging habitat but open nature leaves individuals prone to predation. No evidence of these species seen in this section of the survey area.
South-Western Brush-tailed Phascogale: Negligible/Low value given absence of hollow bearing trees. May have some value as foraging habitat but open nature leaves individuals prone to predation. No evidence of these species seen in this section of the survey area.
Quokka Habitat Value: Some value given presence of some groundcover vegetation most of which was compromised by fire. No evidence of these species seen in this section of the survey area.
Short-nosed Snake Habitat Value: Some value given presence of some groundcover vegetation most of which was compromised by fire. No evidence of these species seen in this section of the survey area.

Fauna Habitat Description: Open woodland dominated by marri over a mostly dense tall shrubland . Many of the trees appear to be relatively young regrowth. Makes up about 17 % (~0.23 ha) of the survey area.

Black Cockatoo Habitat Value: Moderate value given precent of favoured foraging tree (marri), no hollow bearing trees with limited opportunity for roosting. No evidence of these species seen in this section of the survey area.

Western Ringtail Possum Habitat Value: Superficially appears to be of marginal value given absence of strong continuous midstory vegetation. No evidence of these species seen in this section of the survey area.

Quenda Habitat Value: Some value given presence of some groundcover vegetation most of which was compromised by fire. May have some value as foraging habitat but open nature leaves individuals prone to predation. No evidence of these species seen in this section of the survey area.

South-Western Brush-tailed Phascogale: Negligible/Low value given absence of hollow bearing trees. May have some value as foraging habitat but open nature leaves individuals prone to predation. No evidence of these species seen in this section of the survey area.

Quokka Habitat Value: Some value given presence of some groundcover vegetation most of which was compromised by fire. No evidence of these species seen in this section of the survey area.

Short-nosed Snake Habitat Value: Some value given presence of some groundcover vegetation most of which was compromised by fire. No evidence of these species seen in this section of the survey area.

5.1.2 Day and Night Surveys

Twenty-one fauna species were recorded during the course of the day survey, these are listed in Appendix B.

All the fauna recorded are common widespread species, four are introduced species.

Besides frogs (also recorded during the day survey) no fauna species were recorded during the nocturnal survey.

5.2 BLACK COCKATOO HABITAT ASSESSMENT

5.3 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:

- Blackbutt – *Eucalyptus patens*.
- Marri – *Corymbia calophylla*.
- Jarrah – *Eucalyptus marginata*

A summary of the habitat trees observed is provided in Table 2. The locations of habitat trees are shown in Figure 2.

Table 2: Summary of habitat trees (DBH ≥30cm) recorded.

Total Number of Habitat Trees DBH >30cm	Number of Habitat Trees DBH >50cm	Number of Habitat Trees DBH 30 to 50cm	Number of Habitat Trees with Possible Hollows considered Unsuitable for Black Cockatoos	Number of Habitat Trees with Possible Hollows considered Potentially suitable for Black Cockatoos	Tree Species			
					Blackbutt	Marri	Jarrah	Dead unknown
61	20	41	1	0	41	15	4	1

The assessment identified a total of 61 trees within the survey area with a DBH of ≥30cm.

Most of the identified habitat trees (60) did not appear to contain hollows of any size. One tree appeared to contain one possible hollow but this was assessed as being unsuitable for black cockatoo to use for nesting purposes due to being too shallow/small. This possible hollows was examined using a drone and did not show any evidence (e.g. chew marks) of ever having been used by fauna of any type.

Additional details on each habitat tree observed can be found in Appendix C.

5.3.1 Foraging Habitat Assessment

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

- Blackbutt – *Eucalyptus patens*.
- Marri – *Corymbia calophylla.*
- Jarrah – *Eucalyptus marginata*
- Grasstree – *Xanthorrhoea preissii*

It should be noted that some of the above-mentioned species (e.g. blackbutt and grasstrees) 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 and jarrah) which only make up a small proportion of the vegetation present.

No foraging evidence was found within the survey area during the survey period.

It is estimated (based on canopy coverage visible in air photo) that the survey area contains about ~0.2 hectares of quality foraging habitat in the form of marri open woodland.

5.3.2 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.

6. CONCLUSION

The assessment reported on here was primarily undertaken to determine if any fauna species of conservation significance were present and to identify trees within the survey area that contain hollows suitable for use by black cockatoos for nesting purposes.

No evidence of any fauna species of conservation significance were recorded within the survey area during the course of the survey.

Superficially sections of the survey area containing remnant native vegetation, appears to represent habitat that could be regarded as suitable for some species of conservation significance. The presence of western ringtail possums and the quokka are generally easy to determine and the lack of evidence of these species suggest they were at the time of the survey, absent from the survey area.

South-Western brush-tailed phascogales can be difficult to detect even if present and also have relatively large home ranges. While not detected they may still frequent the survey area at times though the number of hollow bearing trees (which they use for daytime refuge and breeding) appear to be very limited in number.

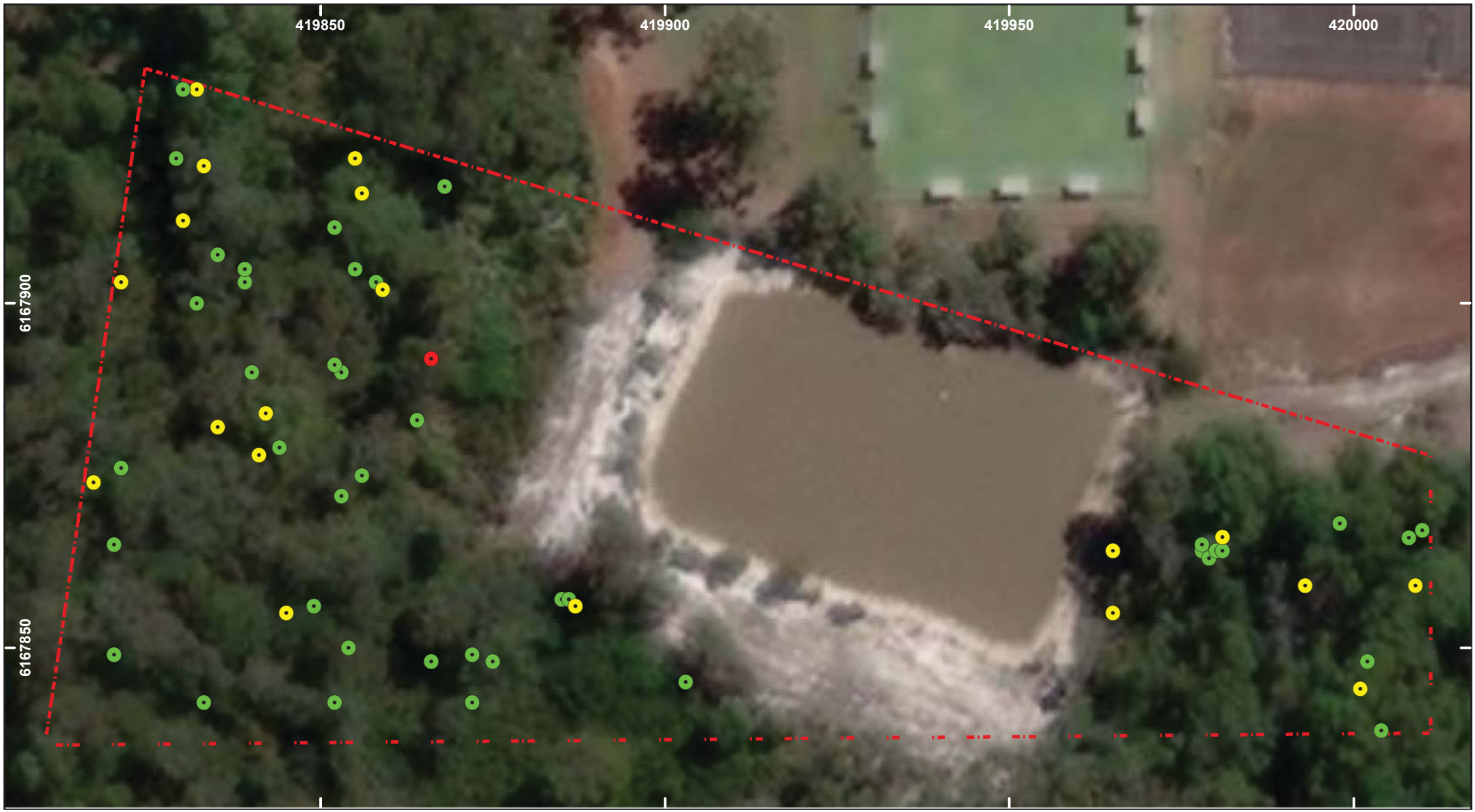
Short-nosed snakes are very cryptic and their presence/absence is very difficult to determine. The dense groundcover present in the remnant bushland appears suitable habitat so their remains some probability that this species may occur.

With respect to black cockatoos there were no actual hollow bearing trees suitable for this species to use present within the survey area. Quality foraging habitat (marri woodland) makes up less than half of the remnant vegetation present. There is some potential roosting habitat, though no evidence of roosting activity by black cockatoos was observed.

Given the relatively small extent of vegetation remaining within the survey area (~0.89 ha) and the large expanses of native bushland in surrounding areas it is the Authors opinion that that clearing can be carried out without significantly impacting on the status fauna species of conservation significance or existing black cockatoo breeding/foraging/roosting habitat.

It is recommended that, if and when clearing is undertaken, a suitably qualified and experience “fauna spotter” be employed to minimise the likelihood of animals being killed or injured during site works.

This report should be forwarded to DWER for their consideration.



Legend

- Survey Area
- DBH 30 to 50cm - No Hollows Observed (41)
- DBH >50cm - No Hollows Observed (19)
- DBH >50cm - One or More Hollows Observed
  None Suitable for Black Cockatoos (1)

N

0 10 20 30 40 50

Metres

Fauna Survey

Drawn: G Harewood
Date: 01-Oct-24
Scale: 1:750
Projection/Coordinate System: UTM/MGA Zone 50

Proposed Dam Area
Northcliffe Recreation Grounds
Shire of Manjimup

Survey Area
Habitat Trees
(DBH >30cm)

Figure: 2

7. REFERENCES

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APPENDIX A

Species Profiles

Short-nosed Snake *Elapognathus minor*

Status and Distribution: Listed as Priority 2 by DBCA. Found north to Busselton and east to Two Peoples Bay (Storr *et al.* 2002). Secretive, poorly known and probably genuinely uncommon (Wilson and Swan 2021).

Habitat: Restricted to the humid coastal plains of the deep south west (Storr *et al.* 2002). Inhabits heaths edging swamps though also known to inhabit wet sclerophyll forest. Shelters in low dense vegetation such as tussocks and sedges (Wilson and Swan 2021)

Likely presence in survey area: Status in the survey area is difficult to determine, however given the limited extent of vegetation it is unlikely to represent habitat of significance to the species.

Potential impact of proposed clearing: Modification/loss of a very small area of possible habitat. Impacts are highly unlikely to be significant given the small impact area and the large areas of adjoining habitat.

Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*

Status and Distribution: Listed as Vulnerable under the *BC Act* and the *EPBC Act*. Found in the humid and subhumid south west, mainly hilly interior, north to Gingin and east to Mt Helena, Christmas Tree Well, North Bannister, Mt Saddleback, Rock Gully and the upper King River (Johnstone and Storr 1998).

Habitat: Eucalypt forests, feeds on marri, jarrah, blackbutt, karri, sheoak and snottygobble. The forest red-tailed black cockatoo nests in the large hollows of marri, jarrah and karri (Johnstone and Kirkby 1999). In marri, the nest hollows of the forest red-tailed black cockatoo range from 8-14m above ground, the entrance is 12 – 41cm in diameter and the depth is one to five metres (Johnstone and Storr 1998).

Breeding commences in winter/spring. There are few records of breeding in the forest red-tailed black cockatoo, but eggs are laid in October and November (Johnstone and Storr 1998). Recent data however indicates that breeding in all months of the year occurs with peaks in spring and autumn–winter (Ron Johnstone pers comms). Incubation period 29 – 31 days. Young fledge at 8 to 9 weeks (Simpson and Day 2004).

J	F	M	A	M	J	J	A	S	O	N	D

Period in which breeding is most likely to commence
Period in which fledging could extend through

Likely presence in survey area: No evidence of this species observed during the survey period but likely to be present in the general area at times. All blackbutt, marri, and jarrah trees and a range of other plant species within the survey area represent potential foraging habitat for this species. Larger trees (≥30cm DBH) are considered potential breeding habitat by DCCEEW (Commonwealth of Australia 2012, 2020). No existing breeding trees present. No evidence of roosting observed.

Potential impact of proposed clearing: Modification/loss of a very small area of possible habitat. Impacts are highly unlikely to be significant given the small impact area and the large areas of adjoining habitat.

Baudin's Cockatoo *Zanda baudinii*

Status and Distribution: Listed as Endangered under the *BC Act* and the *EPBC Act*. Confined to the south-west of Western Australia, north to Gidgegannup, east to Mt Helena, Wandering, Quindanning, Kojonup, Frankland and King River and west to the eastern strip of the Swan Coastal Plain including West Midland, Byford, Nth Dandalup, Yarloop, Wokalup and Bunbury (Johnstone and Storr 1998). On the southern Swan Coastal Plain this cockatoo is in some areas resident but mainly a migrant moving from the deep south-west to the central and northern Darling Range. Between March and September most flocks move north and are concentrated in the northern parts of the Darling Range. During this period birds forage well out onto the southern Swan Coastal Plain to areas such as Harvey, Myalup, Bunbury, Capel, Dunsborough and Meelup. While generally more common in the Darling Range this species can also be common on parts of the southern Swan Coastal Plain especially in mid-August – September when flocks begin to return to their breeding quarters (Johnstone 2008).

Habitat: Mainly eucalypt forests where it feeds primarily on the marri seeds, (Morcombe 2004), *Banksia, Hakea* and *Erodium* sp. Also strips bark from trees in search of beetle larvae (Johnstone and Storr 1998). This species of cockatoo nests in large tree hollows, 30–40 cm in diameter and more than 30 cm deep (Saunders 1974).

Baudin's cockatoo breeds in late winter and spring, from August to November or December (Saunders 1974). Eggs laid in October (Johnstone and Storr 1998). Based on observations at currently known nest sites breeding mainly occurs within the October-December period (Ron Johnstone pers comms). Incubation is 28 – 30 days. Young fledge at 8 to 9 weeks (Simpson and Day 2004).

J	F	M	A	M	J	J	A	S	O	N	D

Period in which breeding is most likely to commence
Period in which fledging could extend through

Likely presence in survey area: No evidence of this species observed during the survey period but likely to be present in the general area at times. All blackbutt, marri, and jarrah trees and a range of other plant species within the survey area represent potential foraging habitat for this species. Larger trees (>30cm DBH) are considered potential breeding habitat by DCCEEW (Commonwealth of Australia 2012, 2020). No existing breeding trees present. No evidence of roosting observed.

Potential impact of proposed clearing: Modification/loss of a very small area of possible habitat. Impacts are highly unlikely to be significant given the small impact area and the large areas of adjoining habitat.

Carnaby's Cockatoo *Zanda latirostris*

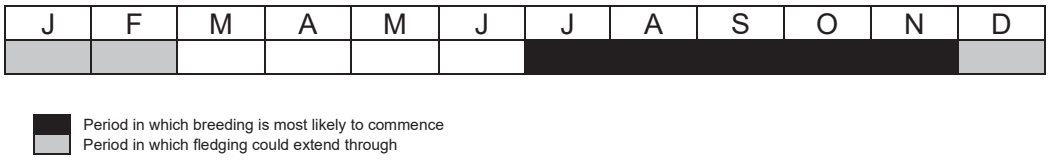
Status and Distribution: Carnaby's cockatoo is listed as Endangered under the *BC Act* and the *EPBC Act*. Confined to the south-west of Western Australia, north to the lower Murchison River and east to Nabawa, Wilroy, Waddi Forest, Nugadong, Manmanning, Durokoppin, Noongar (Moorine Rock), Lake Cronin, Ravensthorpe Range, head of Oldfield River, 20 km ESE of Condingup and Cape Arid; also casual on Rottnest Island (Johnstone and Storr 1998).

Habitat: Forests, woodlands, heathlands, farms; feeds on *Banksia, Hakea* and Marri. Carnaby's cockatoo has specific nesting site requirements. Nests are mostly in smoothed-barked eucalypts with the nest hollows ranging from 2.5 to 12m above the ground, an entrance from 23-30cm diameter and a depth of 0.1-2.5m (Johnstone and Storr 1998).

Breeding occurs in winter/spring mainly in eastern forest and wheatbelt where they can find mature hollow bearing trees to nest in (Morcombe 2004). Judging from records in the Storr-Johnstone Bird Data Bank, this species is currently expanding its breeding range westward and south into the jarrah – marri forest of

the Darling Scarp and into the Tuart forests of the Swan Coastal Plain including the region between Mandurah and Bunbury. Carnaby's Black Cockatoo has been known to breed close to the town of Mandurah, as well as at Dawesville, Lake Clifton and Baldivis (pers. comm., Ron Johnstone, WA Museum) and there are small resident populations on the southern Swan Coastal Plain near Mandurah, Lake Clifton and near Bunbury. At each of these sites the birds forage in remnant vegetation and adjacent pine plantations (Johnstone 2008).

Carnaby's cockatoo lays eggs from July or August to October or November, with most clutches being laid in August and September (Saunders 1986). Most of the breeding is in September through to December (Ron Johnstone pers comms). Birds in inland regions may begin laying up to three weeks earlier than those in coastal areas (Saunders 1977). The female incubates the eggs over a period of 28-29 days. The young depart the nest 10–12 weeks after hatching (Saunders 1977; Smith & Saunders 1986).



Likely presence in survey area: No evidence of this species observed during the survey period but likely to be present in the general area at times. All blackbutt, marri, and jarrah trees and a range of other plant species within the survey area represent potential foraging habitat for this species. Larger trees (>30cm DBH) are considered potential breeding habitat by DCCEEW (Commonwealth of Australia 2012, 2020). No existing breeding trees present. No evidence of roosting observed.

Potential impact of proposed clearing: Modification/loss of a very small area of possible habitat. Impacts are highly unlikely to be significant given the small impact area and the large areas of adjoining habitat.

South-western Brush-tailed Phascogale *Phascogale tapoatafa wambenger*

Status and Distribution: Listed as Conservation Dependant (Scheduled 6) under the *BC Act*. Present distribution is believed to have been reduced to approximately 50 per cent of its former range. Now known from Perth and south to Albany, west of Albany Highway. Occurs at low densities in the northern Jarrah forest. Highest densities occur in the Perup/Kingston area, Collie River

valley, and near Margaret River and Busselton (DBCA information pamphlet). Records are less common from wetter forests.

Habitat: This subspecies has been observed in dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover. A nocturnal carnivore relying on tree hollows as nest sites. The home range for a female Brush-tailed Phascogale is estimated at between 20 and 70 ha, whilst that for males is given as twice that of females. In addition, they tend to utilise a large number of different nest sites (~ 20) throughout their range (Soderquist 1995).

Likely presence in survey area: Status in the survey area is difficult to determine as it was not detected however given the limited extent of vegetation remaining and the almost complete absence of hollow bearing trees it is unlikely to represent habitat of significance to the species.

Potential impact of proposed clearing: Modification/loss of a very small area of possible habitat. Impacts are highly unlikely to be significant given the small impact area and the large areas of adjoining habitat. Some potential for individuals to be killed or injured during clearing if present.

Quenda *Isoodon fusciventer*

Status and Distribution: Listed as Priority 4 by DBCA. Widely distributed in the south west from near Cervantes north of Perth to east of Esperance, patchy distribution through the Jarrah and Karri forest and on the Swan Coastal Plain, and inland as far as Hyden. Has been translocated to Julimar State Forest, Hills Forest Mundaring, Tutanning Nature Reserve, Boyagin Nature Reserve, Dongolocking Nature Reserve, Leschenault Conservation Park, and Karakamia and Paruna Sanctuaries (DBCA information pamphlet - ND) and Nambung National Park (DBCA pers. comm.)

Habitat: Dense scrubby, often swampy, vegetation with dense cover up to one metre high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Populations inhabiting jarrah and wandoo forests are usually associated with watercourses. Quendas can thrive in more open habitat subject to exotic predator control (DBCA information pamphlet - ND).

Likely presence in survey area: No evidence of this species detected.

Potential impact of proposed clearing: Modification/loss of a very small area of possible habitat. Impacts are highly unlikely to be significant given the small

impact area and the large areas of adjoining habitat. Some potential for individuals to be killed or injured during clearing if present.

Western Ringtail Possum *Pseudocheirus occidentalis*

Status and Distribution: Listed as Critically Endangered under the *BC Act* and the *EPBC Act.* Common in suitable habitat (de Tores 2008). The highest densities of this species are recorded in peppermint tree habitat near Busselton area; relatively high densities are found in jarrah/marri forest at Perup (de Tores 2008). The species is also widespread and relatively common in vegetated remnants within the southern Swan Coastal Plain and along the Whicher Scarp between Bunbury and Busselton (G. Harewood per. obs.). Recent surveys have found the species to be more widespread and common than previously thought. With good populations recorded at various locations from Dawesville to Albany (Biota 2020).

The western ringtail was formerly more widespread: in the 1970s it was known from Casuarina woodlands in the wheatbelt near Pingelly (south-east of Perth), and it is thought to have once occurred throughout much of south-western Western Australia (but not necessarily continuously distributed) (Maxwell *et al*. 1996; de Tores 2008). Recent surveys have found the species to be more widespread and common than previously thought. With good populations recorded at various locations from Dawesville to Albany (Biota 2020).

Habitat: The western ringtail possum occurs in a variety of habitats including coastal peppermint, coastal peppermint-tuart, jarrah-marri associations, sheoak woodland, and eucalypt woodland and mallee. Coastal populations mostly inhabit peppermint-tuart associations with highest densities in habitats with dense, relatively lush vegetation. In these areas the main determinants of suitable habitat for WRPs appears to be the presence of *Agonis flexuosa* either as the dominant tree or as an understorey component of eucalypt forest or woodland (Jones *et al*. 1994a). In other inland areas the peppermint tree is naturally absent and jarrah-marri associations constitute the species refuge and foraging habitat. In areas where peppermint is absent or rare WRPs have been observed feeding predominately on young jarrah, *Nuytsia floribunda* and *Allocasuarina fraseriana* (G Harewood pers. obs.).

Likely presence in survey area: No evidence of this species was found within the bounds of the survey area during the day or night survey which suggests that the individuals were not present during the survey period. Habitat appears marginal in quality.

Potential impact of proposed development: Modification/loss of a very small area of possible habitat. Impacts are highly unlikely to be significant given the small impact area and the large areas of adjoining habitat. Some potential for individuals to be killed or injured during clearing if present.

Quokka *Setonix brachyurus*

Status and Distribution: Listed as Vulnerable under the *BC Act* and the *EPBC Act*. Rare and restricted in south west W.A. from south of Perth to Two Peoples Bay. The distribution of the quokka includes Rottnest and Bald Islands, and at least 25 known sites on the mainland, including Two Peoples Bay Nature Reserve, Torndirrup National Park, Mt Manypeaks National Park, Walpole-Nornalup National Park, and various swamp areas through the south-west forests from Jarrahdale to Walpole.

Habitat: Mainland populations of this species are currently restricted to densely vegetated coastal heaths, swamps, riverine habitats including tea-tree thickets on sandy soils along creek systems where they are less vulnerable to predation. The species is nocturnal.

Likely presence in survey area: No evidence of this species was found within the bounds of the survey area during the day or night survey which suggests that the individuals were not present during the survey period. Superficially some of the habitat present appears to be suitable given dense shrub layer in unburnt areas however the species is considered highly unlikely to occur.

Potential impact of proposed development: No impact on this species is anticipated as it is considered unlikely to be present.

APPENDIX B

Fauna Recorded

Fauna Observed During Survey Period

Northcliffe Recreational Centre - Dam Expansion Area

Compiled by Greg Harewood - Sept 2024

Class **Family** *Species*	Common Name	Conservation Status
Amphibia		
Myobatrachidae Ground or Burrowing Frogs		
Crinia glauerti	Clicking Frog	LC
Limnodynastes dorsalis	Western Banjo Frog	LC
Hylidae Tree or Water-Holding Frogs		
Litoria adelaidensis	Slender Tree Frog	LC
Litoria moorei	Motorbike Frog	LC
Aves		
Anatidae Geese, Swans, Ducks		
Anas superciliosa	Pacific Black Duck	LC
Chenonetta jubata	Australian Wood Duck	LC
Accipitridae Kites, Goshawks, Eagles, Harriers		
Aquila audax	Wedge-tailed Eagle	LC
Psittacidae Parrots		
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	LC
Platycercus zonarius	Australian Ringneck	LC
Halcyonidae Tree Kingfishers		
Dacelo novaeguinea	Laughing Kookaburra	Introduced
Acanthizidae Thornbills, Geryones, Fieldwrens & Whitefaces		
Gerygone fusca	Western Gerygone	LC

BC Act Status/EPBC Act Status - CR = Critically Endangered, EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory. LC = Least Concern

Class **Family** *Species*	Common Name	Conservation Status
Pardalotidae Pardalotes		
Pardalotus striatus	Striated Pardalote	LC
Meliphagidae Honeyeaters, Chats		
Anthochaera carunculata	Red Wattlebird	LC
Phylidonyris novaehollandiae	New Holland Honeyeater	LC
Dicruridae Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo		
Rhipidura fuliginosa	Grey Fantail	LC
Rhipidura leucophrys	Willie Wagtail	LC
Cracticidae Currawongs, Magpies & Butcherbirds		
Cracticus tibicen	Australian Magpie	LC
Mammalia		
Macropodidae Kangaroos, Wallabies		
Macropus fuliginosus	Western Grey Kangaroo	LC
Canidae Dogs, Foxes		
Vulpes vulpes	Red Fox	Introduced
Suidae Pigs		
Sus scrofa	Pig	Introduced
Leporidae Rabbits, Hares		
Oryctolagus cuniculus	Rabbit	Introduced

BC Act Status/EPBC Act Status - CR = Critically Endangered, EN = Endangered, VU = Vulnerable, EX = Extinct, Mig = Migratory. LC = Least Concern

APPENDIX C

Details of Habitat Trees

Habitat Trees
DBH >30cm
Datum - GDA94
Entrance Size Ranges - Small = >5cm, Medium = 5 to 10cm, Large = >10cm

Waypoint Number	Zone	mE	mN	Tree Species	DBH (cm)	Tree Height (m)	Number of Hollows	Estimated Hollow Entrance Size	Occupancy	Chew Marks	Potential Cockatoo Nest Hollow	Comments
wpt001	50H	419868	6167917	Blackbutt	30-50	10-15	0					
wpt002	50H	419856	6167916	Blackbutt	>50	10-15	0					
wpt003	50H	419855	6167921	Blackbutt	>50	15-20	0					
wpt004	50H	419832	6167931	Marri	>50	10-15	0					
wpt005	50H	419830	6167931	Blackbutt	30-50	10-15	0					
wpt006	50H	419829	6167921	Dead Unknown	30-50	0-5	0					
wpt007	50H	419833	6167920	Marri	>50	10-15	0					
wpt008	50H	419830	6167912	Marri	>50	15-20	0					
wpt009	50H	419821	6167903	Blackbutt	>50	10-15	0					
wpt010	50H	419832	6167900	Blackbutt	30-50	10-15	0					
wpt011	50H	419817	6167874	Blackbutt	>50	10-15	0					
wpt012	50H	419821	6167876	Blackbutt	30-50	10-15	0					
wpt013	50H	419820	6167865	Blackbutt	30-50	10-15	0					
wpt014	50H	419820	6167849	Blackbutt	30-50	10-15	0					
wpt015	50H	419833	6167842	Blackbutt	30-50	10-15	0					
wpt016	50H	419852	6167842	Blackbutt	30-50	10-15	0					
wpt017	50H	419854	6167850	Blackbutt	30-50	10-15	0					
wpt018	50H	419845	6167855	Blackbutt	>50	10-15	0					
wpt019	50H	419849	6167856	Blackbutt	30-50	10-15	0					
wpt020	50H	419866	6167848	Blackbutt	30-50	10-15	0					
wpt021	50H	419872	6167842	Blackbutt	30-50	10-15	0					Four Trunks
wpt022	50H	419875	6167848	Blackbutt	30-50	10-15	0					
wpt023	50H	419872	6167849	Blackbutt	30-50	10-15	0					
wpt024	50H	419885	6167857	Dead Blackbutt	30-50	10-15	0					
wpt025	50H	419886	6167857	Blackbutt	30-50	10-15	0					
wpt026	50H	419887	6167856	Blackbutt	>50	15-20	0					
wpt027	50H	419903	6167845	Blackbutt	30-50	15-20	0					
wpt028	50H	419856	6167875	Blackbutt	30-50	10-15	0					
wpt029	50H	419853	6167872	Blackbutt	30-50	10-15	0					
wpt030	50H	419844	6167879	Blackbutt	30-50	10-15	0					
wpt031	50H	419841	6167878	Blackbutt	>50	10-15	0					
wpt032	50H	419842	6167884	Blackbutt	>50	10-15	0					
wpt033	50H	419835	6167882	Blackbutt	>50	10-15	0					
wpt034	50H	419840	6167890	Blackbutt	30-50	10-15	0					

Waypoint Number	Zone	mE	mN	Tree Species	DBH (cm)	Tree Height (m)	Number of Hollows	Estimated Hollow Entrance Size	Occupancy	Chew Marks	Potential Cockatoo Nest Hollow	Comments
wpt035	50H	419839	6167903	Blackbutt	30-50	15-20	0					
wpt036	50H	419839	6167905	Blackbutt	30-50	10-15	0					
wpt037	50H	419835	6167907	Blackbutt	30-50	10-15	0					
wpt038	50H	419852	6167911	Blackbutt	30-50	10-15	0					
wpt039	50H	419855	6167905	Blackbutt	30-50	10-15	0					
wpt040	50H	419858	6167903	Blackbutt	30-50	10-15	0					
wpt041	50H	419859	6167902	Blackbutt	>50	10-15	0					
wpt042	50H	419866	6167892	Jarrah	>50	15-20	1	Small	No Signs	No Signs	No	Examined with drone.
wpt043	50H	419864	6167883	Blackbutt	30-50	10-15	0					Two Trunks
wpt044	50H	419853	6167890	Blackbutt	30-50	10-15	0					
wpt045	50H	419852	6167891	Blackbutt	30-50	10-15	0					
wpt046	50H	420004	6167838	Jarrah	30-50	15-20	0					
wpt047	50H	420001	6167844	Jarrah	>50	15-20	0					
wpt048	50H	420002	6167848	Marri	30-50	10-15	0					
wpt049	50H	419965	6167855	Marri	>50	10-15	0					
wpt050	50H	419965	6167864	Marri	>50	20+	0					
wpt051	50H	419978	6167864	Marri	30-50	15-20	0					
wpt052	50H	419979	6167863	Marri	30-50	15-20	0					
wpt053	50H	419978	6167865	Marri	30-50	10-15	0					
wpt054	50H	419980	6167864	Marri	30-50	10-15	0					
wpt055	50H	419981	6167864	Marri	30-50	10-15	0					
wpt056	50H	419981	6167866	Marri	>50	10-15	0					
wpt057	50H	419993	6167859	Marri	>50	10-15	0					
wpt058	50H	419998	6167868	Marri	30-50	10-15	0					
wpt059	50H	420010	6167867	Marri	30-50	10-15	0					
wpt060	50H	420008	6167866	Blackbutt	30-50	10-15	0					
wpt061	50H	420009	6167859	Jarrah	>50	15-20	0					

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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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