APPENDIX 9E

RE-ASSESSMENT BC NEST TREES (2024)

LOTS 20, 60, 62, 64, 201, 507 & 508

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Doral Mineral Sands Pty Ltd

Re-assessment of potential nest trees for black-cockatoos and comments on other conservation significant species in the Keysbrook project area

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Introduction

Doral Mineral Sands Pty Ltd (Doral) is proposing to expand its operations in the Keysbrook area, and has been undertaking investigations into fauna values as part of the environmental assessment and approvals process. These investigations have included surveys for potential nesting trees for black-cockatoos, and Doral has commissioned Bamford Consulting Ecologists (BCE) to undertake a re-assessment of potential nesting trees that have been identified in previous surveys. Doral has also requested BCE to comment on the likely value of the expansion areas for some other species of conservation significance as identified by the referral to DCCEEW: (Chuditch (Vulnerable), Quokka (Vulnerable) and Carter's Freshwater Mussel (Vulnerable), and in response to comments from the WA Department of Biodiversity, Conservation and Attractions (DBCA), the Quenda (Priority 4). The investigations also provided the opportunity to visit some areas that had not been included in previous surveys.

Sites and Methods

Black-cockatoo nest tree re-assessment

Investigations were carried out in Lots 20, 60, 62, 63, 64, 201, 507 and 508 (Figure 1). The work mostly involved revisiting trees previously ranked as 3 (based on the BCE black-cockatoo nest assessment system, see Appendix 1), as these are trees that may be suitable for nesting by black-cockatoos, but the assessment has been refined since the initial surveys were done, and in addition a pole camera was used on many trees to check for the actual presence of a hollow. The initial assessments were carried out from the ground and therefore the presence of a suitable hollow often had to be assumed on the basis of apparent structure of the tree Small areas of Lots 62, 63 and 507, not included in previous surveys, were visited to determine if any rank 3 (or better) nest trees were present, and to carry out a Habitat Suitability Assessment (HAS) in these additional areas.

Assessment for Chuditch, Quokka, Quenda and Carter's Freshwater Mussel

The approach taken for these species was to assess habitat suitability (HSA) and to interpret existing data. This is a preliminary step for such assessments, and can be followed with field surveys if it appears that survey data will be useful. This is consistent with survey guidelines for Australia's threatened fauna. For example, DCCEEW (2010) states that '*…a regional habitat analysis may be used to determine the importance of a site to the listed [species]*'. The guidelines also recognise that surveys cannot be expected to confirm absence, and that habitat evaluation can be used to predict presence. The Atlas of Living Australia, Dandjoo (formerly Naturemp) and species recovery plans (where available) were checked for information and location records for each species.

A Habitat Quality Score (HQS) was determined for each conservation significant species. This was based upon a system proposed by the DCCEEW for the Chuditch and interpreted for each of the significant species. The approach is outlined in

RESULTS and DISCUSSION

Black-cockatoo nest tree assessment

Previous studies (2021 and 2022; Bleby *et al.* 2022) identified over 100 trees ranked as either Rank 2 or Rank 3 in the project area; there were no Rank 1 trees. ABCS (2023a and 2023b) assessed 39 Rank 3 trees in Lot 63, 64, 201, 507 and 508 (trees with notes about hollows) and considered none to be suitable for nesting, and the remaining 106 trees were identified as requiring re-assessment and were revisited in June/July 2024. Details of these 106 trees, and for two additional trees, are presented in Appendix 2. The additional trees had probably been assigned a rank of 4 or 5 previously but were given a higher rank in 2024.

Of the 108 trees visited in 2024, the following observations were made:

- 16 (14.8%) of the trees had either fallen over, been felled or the hollow had collapsed. These were assigned a rank of 0.
- 59 (54.6%) of the trees were downgraded to Rank 4. The commonest reasons for this were hollow entrances being too small for black-cockatoos, or for the trunk below a hollow entrance being too narrow to contain a hollow of suitable internal diameter. In some trees, examination with the pole camera revealed that what appeared to be a hollow was only a shallow depression in the end of a trunk. A few trees had hollows that might have been suitable but were judged to be too low to be attractive to black-cockatoos in a region where tall trees with high hollows are moderately readily available. Two were isolated, dead paddock trees that had potentially suitable hollows, but their isolation from woodland was likely to have made them unattractive, and they were in poor condition and likely to collapse.
- 12 (11.1%) of the trees were downgraded to Rank 5. The majority (10) of these had no hollows visible. One tree was a tall stump and one tree was crumbling.
- 18 (17.7%) of the trees were assigned Rank 3; only 16 of these had originally been classed as Rank 3, with one a downgrade from Rank 2, and another was a tree that had not been listed previously. These 18 Rank 3 trees are plotted on Figure 1.

- 3 (2.8%) of the trees were assigned Rank 2. One of these had been identified as Rank 2 previously (tree ID B108), one was a former Rank 3 tree that was upgraded on the basis of chew marks around a hollow entrance (tree ID A631), and one was a tree presumably recorded previously as a Rank 4 or 5 (tree ID waypoint 1567). Of these three trees, only tree ID waypoint 1567 was very clearly a black-cockatoo nest tree, with clear and fresh chew marks around a high hollow entrance into a large, vertical trunk (see Figure 2). The hollow was too high to examine with the pole camera, but its appearance and presence of chew marks suggest recent black-cockatoo activity (but not confirmed breeding). The hollow appeared to be at the site of a recent branch-fall, so may not have been visible, or even accessible to black-cockatoos, previously.

All Rank 2 and 3 trees, as assessed in June/July 2024, are plotted on Figure 1. The majority are in the northern lots (Lots 201, 507 and 508).

Chuditch assessment

While the project area lies within the modern range of the Chuditch, the environment does not provide suitable habitat. The project area is farmland with scattered and occasional blocks of trees retained; these are grazed underneath by livestock and no understorey is present (see Figure 3 and Figure 4). There is also little coarse woody debris due to grazing and probably firewood collection. The nearest suitable habitat is in forests of the escarpment which appears in the distance in Figure 3. There are abundant records from these forests (Figure 5; see also Figure 6), while the National Recovery Plan for the species (DEC 2012) states that the Chuditch does not occur regularly on the Swan Coastal Plain. This plan does note that there are occasional records on the Plain, which means that, very occasionally, individual Chuditch may move through the Keysbrook area. The species can therefore be considered a vagrant in the project area.

A habitat quality score (HQS) for the Chuditch can be assigned to the project area based upon habitat characteristics (ie does it provide the necessary features to support the species, habitat context (extent, relationship with other areas of habitat) and species presence (is species present/likely to be present/likely to be absent). A simple HQS scoring system for the Chuditch is provided in Appendix 3. This suggests a HQS of 1/10. This is based on a low score for habitat characteristics, and scores of zero for context and species presence/abundance.

Quokka assessment

The project area lies outside the modern range of the Quokka according to the National Recovery Plan for the species (DEC 2013). It formerly occurred on the Swan Coastal Plain, generally in dense vegetation around wetlands, but in the vicinity of the project area is now confined to dense riparian thickets in forests of the Darling Escarpment. This decline is due to habitat loss (clearing) and predation by the Red Fox (DEC 2013). The Quokka can therefore be considered locally extinct in the project area. Figure 6 illustrates locations of Quokka records from the Atlas of Living Australia, with the nearest record 10km to the south-east and on the edge of the escarpment forest.

Due to the absence of the species from the project area and the extensive clearing, habitat quality score (HQS) of 0/10 can be assumed. Although the species does occur in forests of the Darling Escarpment probably within 10km of the project area, habitat loss, the presence of the Red Fox and the limited ability of the species to disperse across unsuitable habitat mean that it cannot access the project area even as a vagrant.

Carter's Freshwater Mussel Assessment

Carter's Freshwater Mussel is endemic to the South-West region and is largely confined to permanent and near-permanent freshwater streams with high water quality. It has declined and, in some cases, disappeared from streams of the Swan Coastal Plain where water quality has declined, being most common in streams in the forests of the Darling Escarpment (Morgan *et al.* 2011). There are minor, seasonal drainage lines within the project area, but these are in poor condition due to clearing (effectively no riparian vegetation) and trampling by livestock. Therefore, it is highly unlikely that the mussel persists in these watercourses. The drainage lines are part of the Serpentine River drainage system and the species does occur in the upper reaches of this catchment, on the Darling Escarpment, and in sections of the main river across the coastal plain where it is more or less permanent and riparian vegetation. This can be seen in the extract of records from the Atlas of Living Australia (Figure 6), with records on the coastal plain, to the north of the project area, representing the main section of the Serpentine River.

Due to the absence of the species from the project area and degradation of habitat, a habitat quality score (HQS) of 0/10 can be assumed. The drainage lines within and around the project area are too degraded to support the mussel, so it is almost certainly locally extinct.

Quenda

The Quenda is not listed as threatened under state or federal legislation, but is listed as Priority 4 by the DBCA as it is a species considered potentially at risk. It is endemic to the South-West region but has contracted in range and decreased in abundance due to factors such as habitat loss and predation by introduced species. It occurs mainly where there is dense, low vegetation to provide shelter and foraging habitat, largely irrespective of the overstorey stratum. For example, it can occur where there are dense, tall weeds, in dense heath and in dense understorey vegetation. It is often associated with dense, low vegetation around wetlands and watercourses, but also occurs in upland areas where there is dense, low vegetation.

The Quenda's modern distribution is somewhat patchy, which reflects the patchy distribution of suitable vegetation to provide habitat, particularly on the coastal plain. It is widely recorded on the western Swan Coastal Plain with only scattered records in the forests of the Darling Escarpment east of the project area (Figure 7). Although the distribution of records may reflect survey effort as much as abundance. For example, there are large numbers of records on the outskirts of Perth where the species is regularly recorded by residents. The nearest record to the project area is about 5km to the east and there are few other records in the vicinity, but it is present along sections of the Perth to Bunbury rail line where the rail reserve supports thick, low vegetation of introduced plant species (M. Bamford; pers obs). No evidence of the Quenda was found during the field investigations, and it is usually readily detected by the distinctive forging holes it excavates.

The project area supports very little suitable dense, low vegetation due to clearing and grazing. Ther is virtually no native understorey even where a tree stratum has been retained, and grazing means that even low weeds are short and do not provide the sort of shelter needed by the Quenda. Where grazing does not occur, such as along road verges, there is some dense, low vegetation of mostly weeds but some native shrubs, and these areas are potentially suitable for

the Quenda. The species may not be resident in such areas, but they may provide movement corridors for dispersing individuals. However, there is very little suitable habitat in the region and therefore there is unlikely to be a large local population of the Quenda, so even the presence of dispersing individuals will be infrequent.

The Quenda is expected to occur in the project area as an irregular visitor, with occasional animals dispersing along corridors of suitable habitat along roads and possibly moving into adjacent farmland, but not being resident. A habitat quality score (HQS) of 3/10 can be assigned, based upon the site environmental characteristics and site context and condition both being negligible to low, but the species status being moderate due to the likely presence of the Quenda in the vicinity, and to it being likely an irregular visitor at least along road verges within the project area.

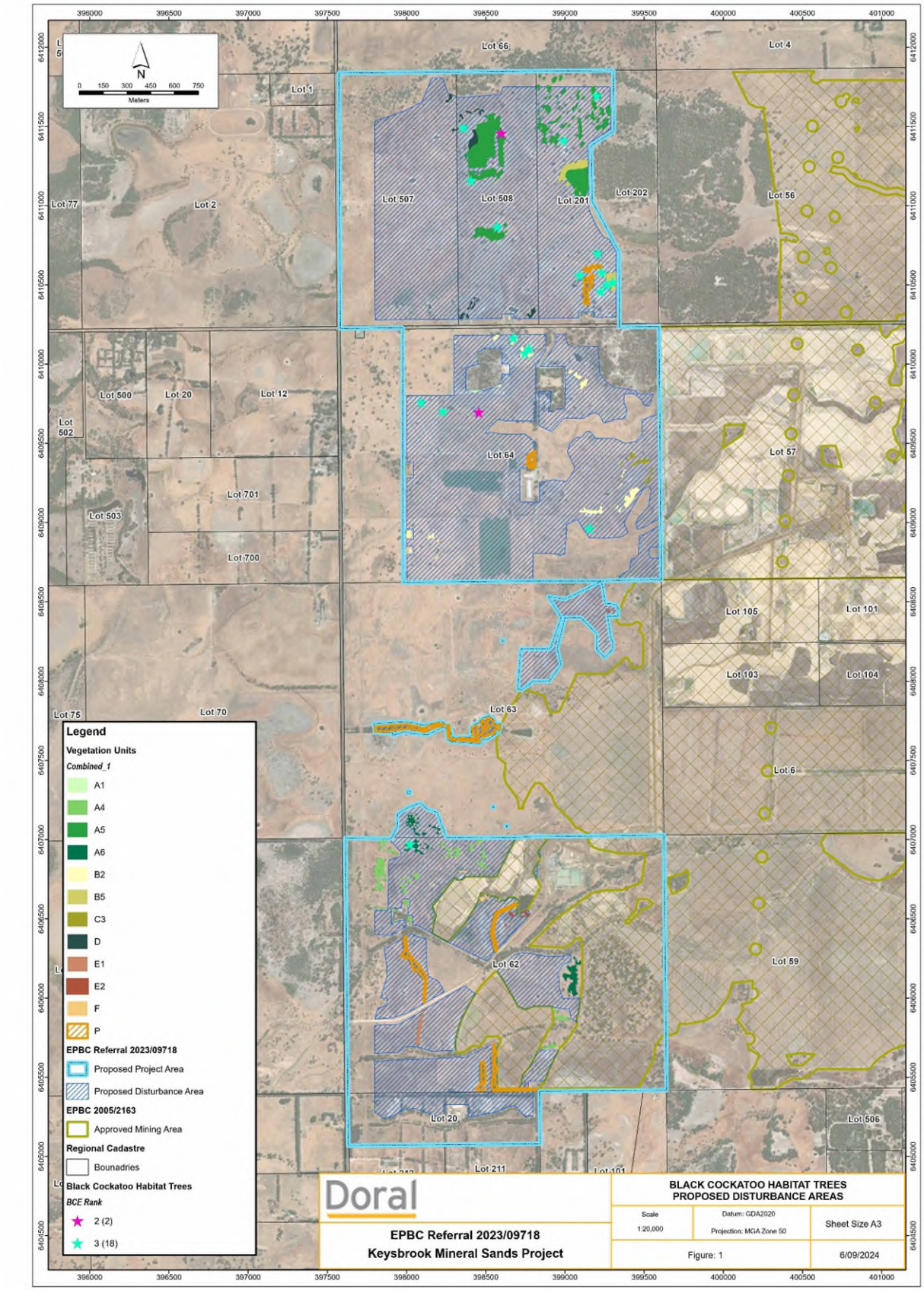

Figure 1. Layout of study area indicating locations of Rank 2 and 3 trees as assessed in June/July 2024.

Figure 2. Tree ID waypoint 1567; a Rank 2 black-cockatoo nest tree on lot 508, July 2024.

Figure 3. Remnant trees in pasture; burnt about one year previously. Note escarpment in background.

Figure 4. Parkland cleared pasture.

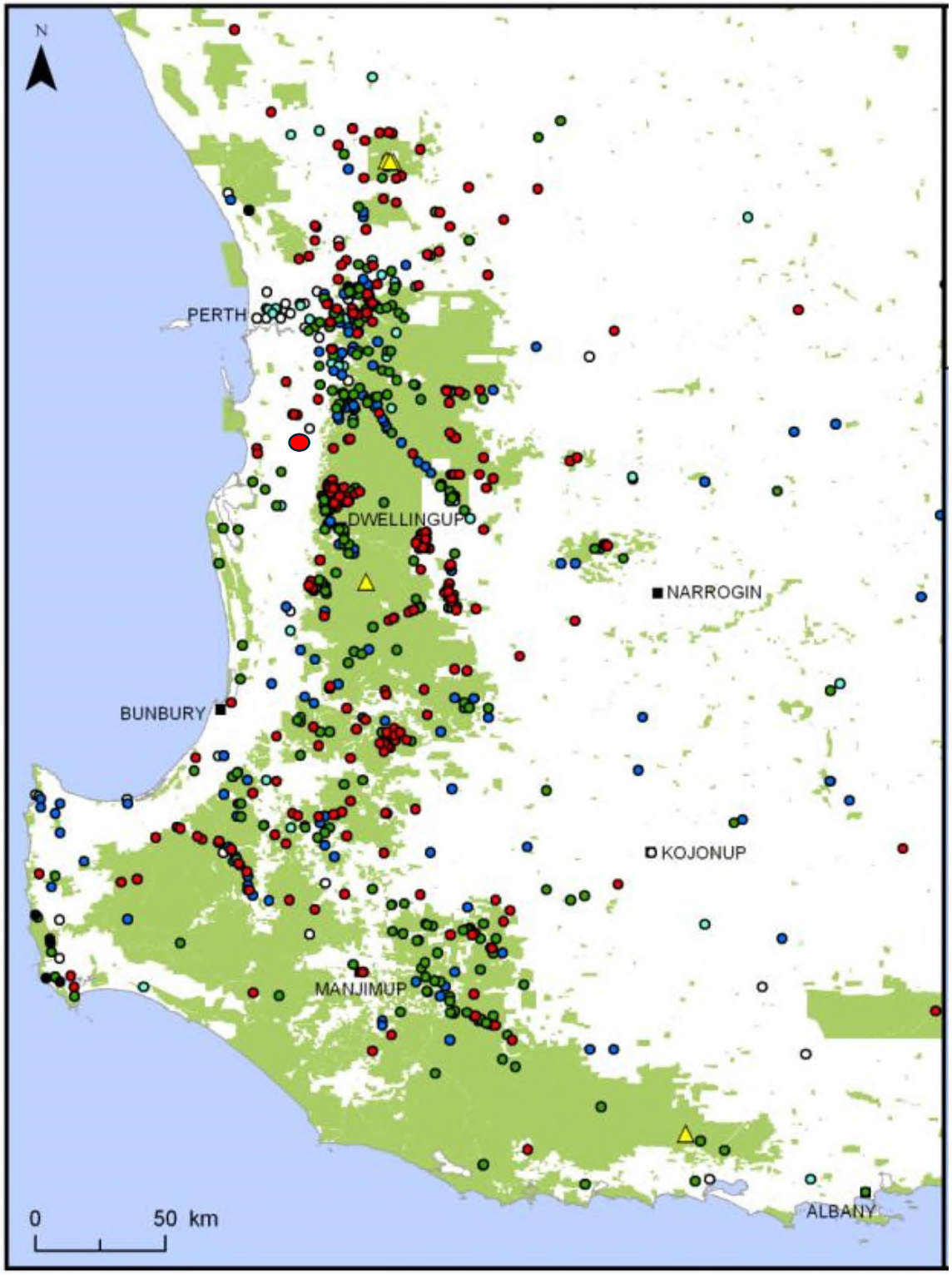

Figure 5. Locations of records of Chuditch across the South-West region (from DEC 2012). The red dot indicates the approximate location of the project area.

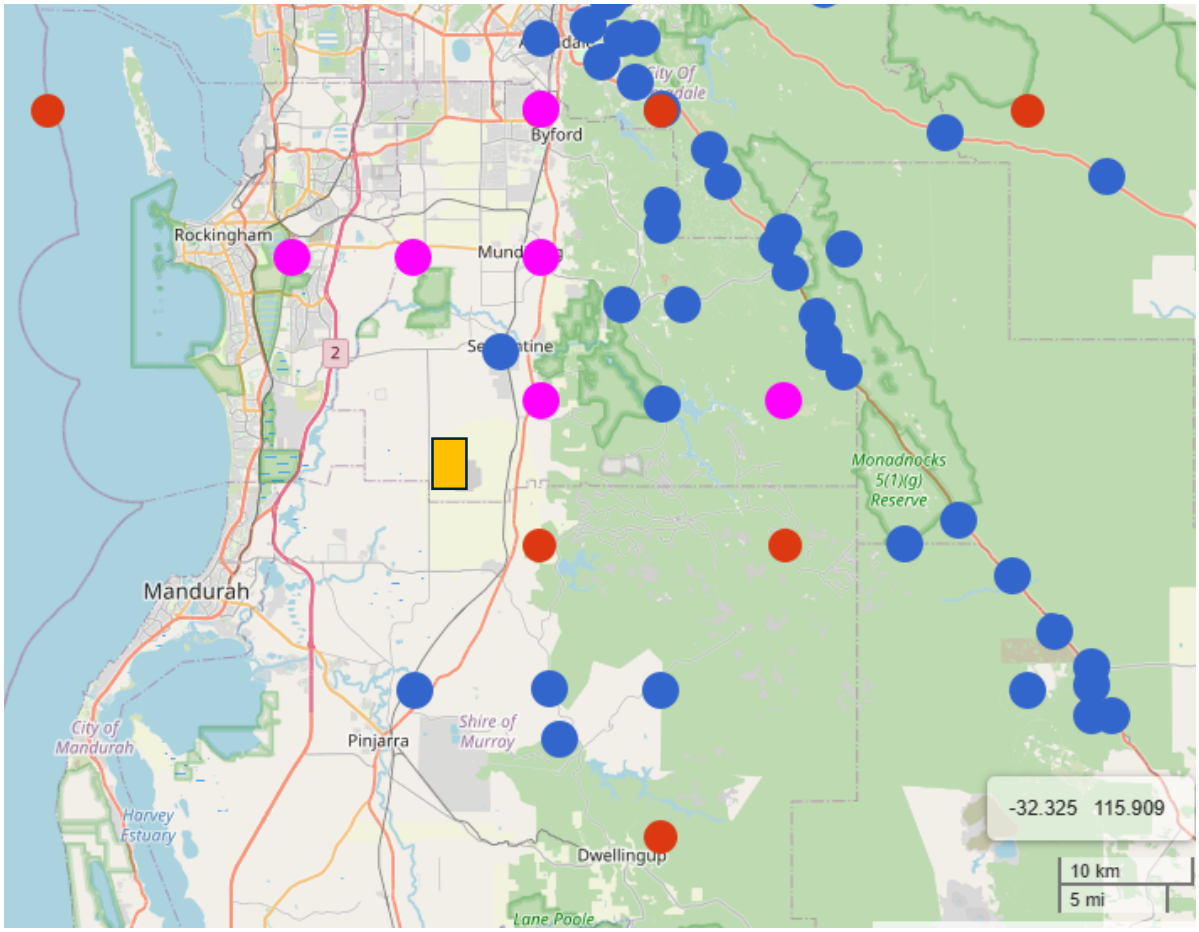

Figure 6. Locations of records of Quokka (red), Chuditch (blue) and Carter's Freshwater Mussel (pink) from the Atlas of Living Australia, accessed 6th September 2024; and DEC 92013). The orange rectangle indicates the approximate location of the project area. Green indicates the forests of the Darling Escarpment. The Quokka record in the west (over the ocean) is presumably an error.

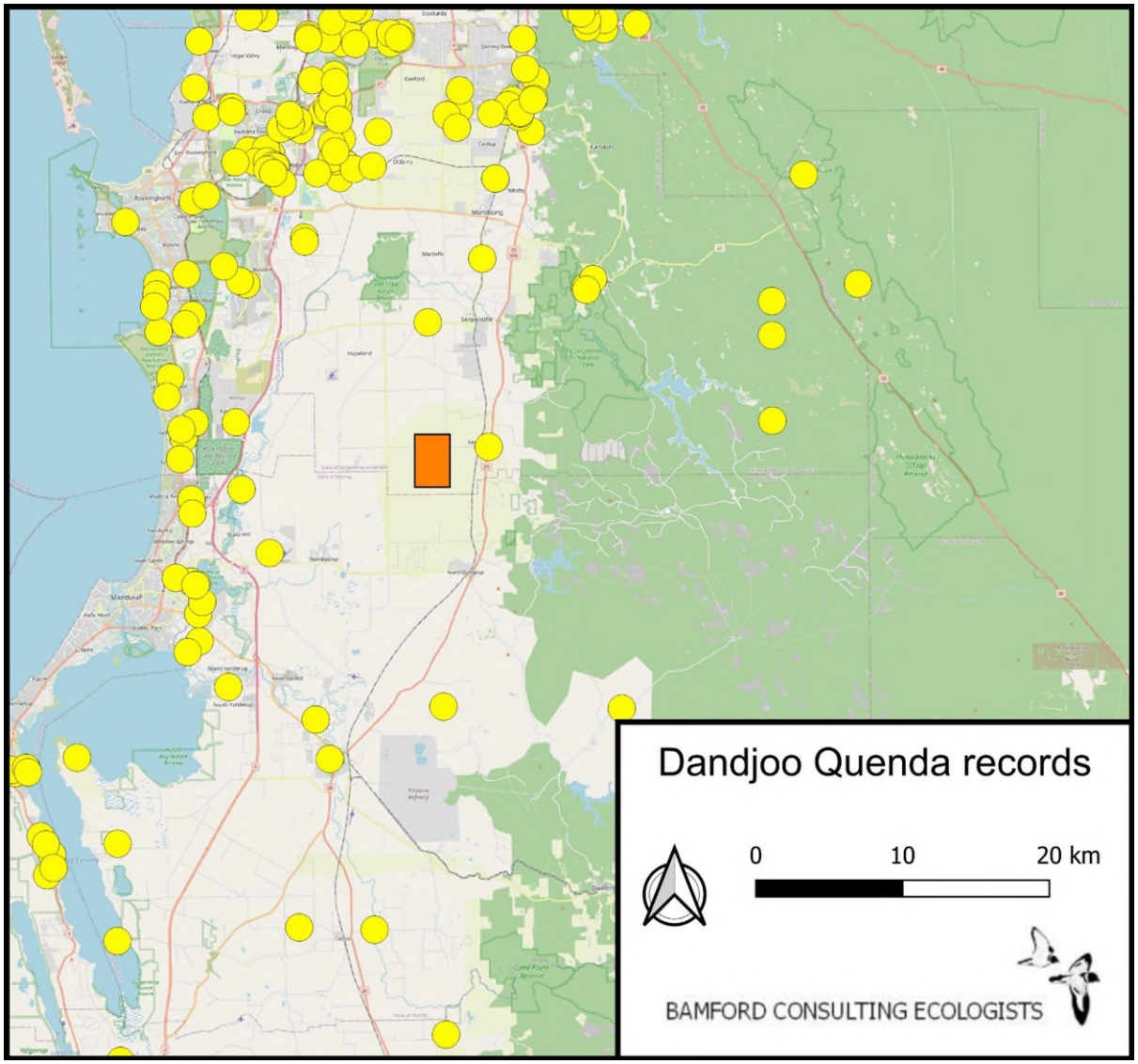

Figure 7. Locations of records of the Quenda from Dandjoo, accessed November 2024. The orange rectangle indicates the approximate location of the project area. Green indicates the forests of the Darling Escarpment.

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Appendix 1. Approach to the valuation of nesting habitat for black-cockatoos

Aim of the assessment is to identify the current value of a site for nesting by black-cockatoos. It is thus limited to trees with have a structure that is potentially suitable to contain a hollow that can be used by the birds. Before even looking to see if a tree might have a potentially suitable hollow, there are several factors that need to be considered.

- Size of tree. Studies have found that actual nest trees (ie trees with active nests in them and thus with suitable hollows) have a DBH (1.3m) >500mm (most tree species including Marri, Jarrah, Karri and Tuart), but that a few tree species form suitable hollows when the DBH is >300mm (Wandoo (three species) and Salmon Gum). It should be noted that this DBH criterion is only a guide. We have seen a Jarrah with a DBH of ca. 450mm but with black-cockatoo chew marks around the entrance to a hollow. Importantly, the tree species is not important; what is important is the presence of a hollow that is suitable for black-cockatoos. In theory, a she-oak could form a suitable hollow, as could non-native eucalypts (although non-native eucalypts in the SW of Western Australia are mostly too young to have formed large hollows). The tree can be alive or dead.
- Structure of tree. A tree with a large DBH also has to have stems of sufficient diameter, and at sufficient height, to contain a hollow attractive to black-cockatoos. Trees with a large DBH that branch close to the ground will not provide suitable hollows. The birds appear to favour high hollows, but this can be contextual. For example, in the Wheatbelt, there may be no suitable hollows >10m, whereas In the tall forests of the South-West, there may be suitable hollows >20m. Where there are suitable hollows at great height, low hollows are very unlikely to be used, but especially in the Wheatbelt where hollows of suitable size are a limited resource, very low hollows may be used. At a Wheatbelt site, J. Wadey (pers. comm.) has reported CBC using a hollow with an entrance at 2m. Such a hollow would almost certainly not be used in the tall forests, where a minimum suitable hollow height of 8m is suggested by studies. When assessing the suitability of a tree, its structure needs to be considered in the context of the surround nesting resource.
- Angle of nest-chamber. Black-cockatoos favour a vertical or near-vertical nest-chamber, but the entrance can either be at the top (a chimney), in the side or access may be gained through a horizontal spout.
- Size of nest-chamber. Black-cockatoos favour a wide and deep hollow. Depths of several metres have been reported, and the minimum depth, in an area with very few available hollows, is about 500mm. As with hollow height, hollow depth may be contextual with short hollows used in the Wheatbelt but not in the tall forests. Hollow internal diameter can be <300mm but is generally greater than this. Therefore, the trunk in which a possible hollow may be located needs to be at least 300mm in external diameter, and probably substantially more than this.
- Size of entrance. Black-cockatoos favour wide entrances; for example a chimney hollow may have the same internal diameter from the entrance to the nest-chamber. Active nests have, however, been recorded with an entrance of as little as ca. 100mm. Turpin and Cherriman (2013) report on an active nest (one chick successfully fledged) with an entrance about 100mm wide and 500mm long, entering a chamber 480mm in diameter and 1050mm in depth. It was in a Karri and 15m above ground level.

The above factors are considered in a system for ranking trees (see Table 1). It should be stressed that this is a system based usually upon ground inspection, with follow-up use of a pole camera and/or drone possible later, which can allow for reassessment. ANY level of inspection leaves some uncertainty. For example, if a hollow cannot be seen or is not suspected based upon the initial assessment, a follow-up with camera/drone will not take place. As there can be thousands of trees, inspecting them all is not practical. Furthermore, a concealed hollow may not be seen even with a pole camera or drone. Similarly, a camera and even a drone can only do so much, as not all hollows can be accessed with such devices. The assessment presented here provides a valuation of a site for cockatoo nesting.

Table 1. BCE ranking system for the assessment of potential nest trees for Black-Cockatoos (revised 5/01/24).

Ranks	Description of tree and hollows/activity
1	Activity at hollow observed; adult (or immature) bird seen entering or emerging from hollow. Can also be used for a known nest tree active in the previous 12 months (although this should be noted in the description). Note that activity at a hollow does not absolutely mean that breeding is occurring unless a young bird in hollow is observed.
2	Hollow of suitable size visible with chew marks around entrance. Record if chew-marks are recent or old.
3	Potentially suitable hollow visible but no chew marks present at entrance; or potentially suitable hollow suspected to be present - as suggested by structure of tree, such as large, vertical trunk broken off at a height of >8m; but note that hollow height is contextual. Carnaby's Black-Cockatoo will nest in hollows <5m so in a Wheatbelt breeding site a lower criterion may be more appropriate.
4	Tree with large hollows or broken branches that might contain large hollows but hollows or potential hollows are not vertical or near-vertical; thus a tree with or likely to have hollows of sufficient size but not to have hollows of the angle preferred by Black-Cockatoos. Trees with low but otherwise suitable hollows can also be assigned a rank or 4, depending on the species of black-cockatoo likely to be present.
5	Tree lacking large hollows or broken branches that might have large hollows; a tree with more or less intact branches and a spreading crown.

NB. Black-cockatoos favour vertical hollows for the nest chamber, but the hollow entrance may be vertical (a chimney hollow), have a side entrance or have a horizontal spout entrance.

Appendix 2. Observations on trees recorded in 2021 and 2022 when re-visited in June/July 2024.

ID	Easting	Northing	Tree sp.	Status (21/22)	DBH	Rank (21/22)	Rank (2024)	Notes
A323	398405.6	6411159	*Corymbia calophylla*	Alive	800	2	3	3 hollows; pair Galahs. BC chew marks doubtful
B108	398963.5	6406165	*Corymbia calophylla*	Dead	700	2	2	Small-ish hollow entrance in broken off trunk, c. 8 m high. Some recent chew marks on rim around hollow, and within hollow 'alcove'. Uncertain if black-cockatoo
A101	399205.2	6410698	*Eucalyptus marginata*	Alive	1100	3	3	vertical spout that looks like a potential hollow (very high)
A102	399198.4	6410685	*Eucalyptus marginata*	Alive	1000	3	4	small hollow; 4 Galahs in tree
A105	399140.2	6410471	*Eucalyptus marginata*	Alive	500	3	0	has been felled by tenant
A137	399073.6	6411273	*Corymbia calophylla*	Alive	700	3	4	Bees still present but hollow too small; trunk narrow. Tree now dead
A1411	399261.5	6410499	*Eucalyptus marginata*	Alive	600	3	3	Possibly suitable hollow but not confirmed with camera.
A1416	399302.1	6410516	*Eucalyptus marginata*	Alive	600	3	3	one possibly suitable hollow but not confirmed with camera
A1417	399246.2	6410699	*Eucalyptus marginata*	Dead	900	3	4	possibly suitable hollow at only 4m
A1418	399237.1	6410688	*Eucalyptus marginata*	Dead	800	3	4	possibly suitable hollow at only 4m
A1419	399120.6	6410639	*Eucalyptus marginata*	Alive	950	3	4	possibly suitable hollow at only 6m
A142	399090.8	6411258	*Eucalyptus sp.*	Dead	450	3	5	a dead stump about 5m high.
A1421	399129.8	6410609	*Eucalyptus marginata*	Dead	1400	3	0	trunk burnt out so no hollow
A1422	399093.7	6410560	*Eucalyptus marginata*	Dead	1000	3	3	bees present but one hollow without bees possibly suitable
A1423	399050.1	6410552	*Eucalyptus marginata*	Dead	900	3	0	fallen
A1425	398887.1	6410580	*Eucalyptus marginata*	Dead	1000	3	0	fallen
A1426	399225.3	6410457	*Eucalyptus marginata*	Dead	800	3	3	3 possibly suitable hollows but only just big enough
A1427	399232.9	6410578	*Eucalyptus marginata*	Dead	700	3	3	two or three possibly suitable hollows
A1428	399270.5	6410736	*Eucalyptus marginata*	Dead	700	3	0	fallen

ID	Easting	Northing	Tree sp.	Status (21/22)	DBH	Rank (21/22)	Rank (2024)	Notes
A1435	399058.5	6411179	*Eucalyptus marginata*	Dead	500	3	5	tree is crumbling
A1437	398997.6	6411167	*Corymbia calophylla*	Alive	800	3	4	possibly suitable hollow at about 4m
A1448	398997.2	6411087	*Corymbia calophylla*	Alive	900	3	4	no obvious hollows
A1451	399015	6411097	*Corymbia calophylla*	Alive	700	3	4	Trunk has split below hollow
A1456	399052.7	6411119	*Eucalyptus marginata*	Alive	600	3	5	Appears to be a Marri Corymbia calophylla with no suitable hollows
A1459	399100.4	6411154	*Eucalyptus marginata*	Alive	450	3	0	Not found; felled?
A1467	399051.2	6411331	*Corymbia calophylla*	Alive	1100	3	4	Hollow entrance too narrow
A147	399062.4	6411362	*Corymbia calophylla*	Alive	1350	3	4	possible hollow at end of tall trunk; about 7m
A1470	399192.5	6411439	*Eucalyptus marginata*	Alive	1000	3	4	Tree now dead. Possibly suitable hollow too low (ca. 5m)
A1474	399254.5	6411499	*Eucalyptus marginata*	Alive	700	3	4	Hollow too small as noted previously therefore can only be rank 4
A1475	399280.4	6411534	*Corymbia calophylla*	Alive	900	3	4	only small hollows
A1477	399245.8	6411537	*Corymbia calophylla*	Alive	900	3	4	only small hollows
A1478	399190.5	6411524	*Eucalyptus marginata*	Alive	700	3	4	only small hollows
A1482	399247.3	6411607	*Eucalyptus marginata*	Alive	650	3	4	hollow at 45 degrees and trunk too narrow to contain a suitable hollow
A1487	399265.6	6411635	*Eucalyptus marginata*	Dead	900	3	4	side entrance hollow too small
A1489	399235	6411652	*Corymbia calophylla*	Alive	700	3	4	hollow too low (5m) and entrance is on underside of a sloping stem
A1492	399201.1	6411693	*Eucalyptus marginata*	Alive	800	3	3	A dead Marri with DBH 700mm. Possibly suitable spout at 7m
A1499	399187.5	6411726	*Corymbia calophylla*	Alive	900	3	5	no suitable hollows visible
A1589	398369.9	6411659	*Corymbia calophylla*	Dead	600	3	4	Possible hollow only at 4m
A159	399133.2	6411499	*Eucalyptus sp.*	Dead	580	3	0	cut down
A1590	398383.5	6411630	*Corymbia calophylla*	Dead	600	3	5	several hollows but much too small
A1591	398455.7	6411567	*Eucalyptus marginata*	Dead	600	3	4	several hollows but too small
A1592	398376.7	6411508	*Eucalyptus marginata*	Dead	500	3	4	trunk too narrow below possibly suitable hollow. Galahs present

ID	Easting	Northing	Tree sp.	Status (21/22)	DBH	Rank (21/22)	Rank (2024)	Notes
A1593	398359.1	6411491	*Eucalyptus marginata*	Dead	500	3	3	potential hollow present. NB a second #1593 plotted on paddock but nothing there
A160	399005.9	6411508	*Corymbia calophylla*	Alive	1000	3	0	not found
A1601	398589.4	6411286	*Eucalyptus marginata*	Dead	600	3	0	Two stems each <500mm dbh
A163	398991.6	6411412	*Eucalyptus marginata*	Alive	650	3	3	Galahs in hollow that is just big enough for BC
A164	398986.8	6411420	*Eucalyptus marginata*	Alive	680	3	4	Hollow suitable for Galah at 4m
A172	398932	6411423	*Eucalyptus marginata*	Alive	600	3	4	Possibly suitable hollow at 4m
A175	398956	6411424	*Eucalyptus marginata*	Alive	750	3	4	Three hollows suitable only for Galah
A178	398951	6411393	*Eucalyptus marginata*	Alive	580	3	4	Possibly suitable side entrance hollow at 6m
A180	398948.6	6411365	*Eucalyptus marginata*	Alive	950	3	4	3 potential hollows and bees present. Highest hollow only 7m
A181	398879.5	6411398	*Eucalyptus marginata*	Alive	600	3	4	hollow entrance too small
A191	398896.8	6411495	*Eucalyptus marginata*	Dead	500	3	4	hollow entrance too small
A212	399062.3	6411618	*Corymbia calophylla*	Alive	770	3	4	2 possible hollows but appear to be solid
A213	399095.4	6411605	*Eucalyptus marginata*	Alive	800	3	5	no real hollows
A218	398972.8	6411615	*Corymbia calophylla*	Alive	850	3	5	no real hollows
A224	398872.5	6411622	*Eucalyptus marginata*	Alive	800, 700	3	5	Twin trunks; no real hollows
A225	398906.2	6411681	*Eucalyptus marginata*	Alive	1200	3	4	hollow entrance too small
A279	398548.5	6411460	*Eucalyptus marginata*	Alive	570	3	0	In paddock. Nothing there.
A281	398546.2	6411407	*Eucalyptus marginata*	Dead	500	3	4	Possibly suitable hollow but only at 2m. A second #281 plotted in paddock near a small tree
A282	398551.8	6411339	*Eucalyptus sp.*	Dead	670	3	4	Two potential spouts but not hollow (camera)
A287	398468.6	6411285	*Corymbia calophylla*	Dead	550	3	4	No suitable hollow
A289	398511.1	6411412	*Eucalyptus sp.*	Dead	450	3	4	Entrance of hollow too narrow
A290	398505.8	6411518	*Eucalyptus sp.*	Dead	500	3	5	No hollows. Second #290 in paddock no tree
A293	398464.9	6411504	*Eucalyptus sp.*	Dead	500	3	4	No suitable hollow
A294	398476	6411401	*Eucalyptus sp.*	Dead	530	3	4	stem below hollow too narrow
A300	398400.2	6411250	*Eucalyptus todtiana*	Alive	500	3	4	E. marginata not E. todtiana. No suitable hollow

ID	Easting	Northing	Tree sp.	Status (21/22)	DBH	Rank (21/22)	Rank (2024)	Notes
A312	398588.8	6411222	*Eucalyptus sp.*	Dead	530	3	5	no hollows
A319	398430.1	6411203	*Corymbia calophylla*	Dead	400	3	4	Stem probably too narrow and hollow too short (camera)
A320	398365.7	6411216	*Corymbia calophylla*	Alive	700	3	4	no hollow; a platform at top of stem (camera)
A324	398420.8	6411127	*Corymbia calophylla*	Dead	500	3	4	hollow very short (camera)
A330	398437.3	6410903	*Eucalyptus sp.*	Dead	500	3	4	top of dead 5m stump is a hollow that might be deep enough (camera) but too low
A331	398456.6	6410938	*Corymbia calophylla*	Dead	600	3	4	tree is resprouting. Galahs in small hollow
A338	398502.6	6410775	*Eucalyptus marginata*	Alive	800	3	4	hollow entrance too small
A339	398516.6	6410797	*Eucalyptus sp.*	Dead	450	3	4	two possible hollows but too shallow (camera)
A344	398572.8	6410866	*Eucalyptus sp.*	Dead	500	3	3	At least one potential hollow (camera). Galah flew into tree carrying bunch of euc foliage.
A345	398526.5	6410832	*Eucalyptus marginata*	Dead	630	3	4	Possible hollow but <500mm deep (camera)
A348	398475.8	6410863	*Corymbia calophylla*	Alive	600	3	4	hollow entrance too small
A350	398463.1	6410835	*Corymbia calophylla*	Alive	750	3	4	tree has died. Hollow entrance too small and hollow mostly horizontal
A353	398718.5	6410845	*Eucalyptus sp.*	Dead	900	3	4	hollow too shallow (camera)
A362	398623.8	6410868	*Corymbia calophylla*	Alive	600	3	5	no hollow
A363	398603.6	6410814	*Eucalyptus marginata*	Dead	450	3	4	Suitable hollow but only at 4m. Galahs present
A364	398603.4	6410800	*Eucalyptus todtiana*	Alive	650	3	4	E marginata not todtiana. Hollow too small.
A618	399350.9	6409084	*Corymbia calophylla*	Alive	700	3	4	now dead. No suitable hollow (camera)
A623	399153.7	6408962	*Eucalyptus sp.*	Dead	900	3	3	2 potentially suitable hollows. 3 prs Galah and 1 pr Australian Ringneck
A631	398455.4	6409695	*Eucalyptus sp.*	Dead	1000	3	2	Chew marks on hollow at 10m. 1 pr Australian Ringneck and 1 pr Little Corella.
A773	398093	6409758	*Corymbia calophylla*	Dead	1100	3	3	Two potentially suitable hollows, one possibly with chew marks. Pr Galah
A781	398230	6409701	*Corymbia calophylla*	Dead	800	3	3	Two high hollows that look potentially suitable; bees in one
B308	398147.6	6410728	*Unidentified species*	Dead	500	3	4	dead and decrepit paddock tree with possibly suitable hollow at 8m (camera).

ID	Easting	Northing	Tree sp.	Status (21/22)	DBH	Rank (21/22)	Rank (2024)	Notes
B311	398099.9	6410605	*Unidentified species*	Dead	650	3	4	dead and decrepit paddock tree with possibly suitable hollow at 8m (camera).
wypt 1567	398598	6411457	*Corymbia calophylla*	Alive	1000	NA	2	Not recorded previously. Chewed side-entrance hollow at 14m. Photos taken. Chews look fresh
B542	398687.2	6405397	*Unidentified species*	Dead	540	3	4	appears to have no suitable hollows
B549	398554.8	6405387	*Unidentified species*	Dead	750	3	5	No hollows
A144	399145.6	6411243	*Eucalyptus marginata*	Alive	780	3	0	dead and fallen
B170	398327.4	6406784	*Unidentified species*	Dead	600	3	0	dead and fallen
A809	398371	6408636	*Eucalyptus marginata*	Dead	500	3	0	dead and fallen
961 or 9?							4	apparently was rank 3 but camera check found no suitable hollow
965							0	fallen and burnt
B572	398069.7	6407112	*Unidentified species*	Dead	670	3	4	Pr Galahs and pr Australian Ringneck; but no suitable hollows for BC
B116	397981.2	6406944	*Unidentified species*	Dead	850	3	0	Fallen
new	398021	6406970	*Marri*	Alive	600	NA	3	Vertical hollow (spout) at 8m; pr Wood Duck may have emerged from hollow
A403	398746.8	6410069	*Eucalyptus marginata*	Dead	650	3	3	Marri? At least two potential hollows
A405	398772.5	6410095	*Corymbia calophylla*	Dead	550	3	3	One potential hollow
A419	398655.9	6410147	*Eucalyptus marginata*	Dead	550	3	4	A possibly suitable hollow but only 500mm deep (camera check)
A418	398673.9	6410164	*Eucalyptus marginata*	Alive	750	3	3	1 possible hollow that may be >500mm deep (camera check)
A417	398681.7	6410167	*Eucalyptus marginata*	Dead	1030	3	4	Hollow too shallow (camera check). A second hollow too high to check but appeared too small and in a narrow stem
A422	398690.9	6410156	*Eucalyptus marginata*	Dead	530	3	4	Hollow ca. 750mm deep but narrow (<200mm). Camera check.
A443	398608.1	6409884	*Eucalyptus sp.*	Dead	850	3	0	not found

Appendix 3. Calculation of Habitat Quality Scores (HQS) for MNES and other species of conservation significance. Calculation to be carried out only if a project area is within the known or predicted range of the species, and the species can be expected as at least a vagrant or irregular visitor. The system allows for a maximum score of 10. The system was developed for the Chuditch by DCCEEW, but is adapted below for other significant species.

Chuditch. This is based on a habitat scoring system proposed by DCCEEW but tries to be more specific for the valuation of the project area or site. For example, it considers site area as a proportion of the surrounding landscape in context, separates site characteristics from site condition (as condition can vary over short periods of time), and bases species presence on landscape interpretation rather than relying on survey data. Based on the biology of the species largely from the species recovery plan (DEC 2012). HQS in bold.

Site environmental characteristics (that provide habitat). Based upon dependence of species on structurally complex environments with abundant denning opportunities.

4. High. Structurally complex forest/woodland with abundant cover (fallen logs, tree hollows, rocky breakaways). More open vegetation if rocky landscapes and/or coarse woodland debris well-represented. High relief and riparian zones present.
3. Medium. Woodland to open woodland; shrublands. Cover of tree hollows, fallen logs and/or rocky breakaways limited in extent, and topography undulating. Limited riparian zones.
2. Low. Open woodland or shrubland with limited coarse woody debris and rocky areas for shelter; low relief. Drainage systems absent or intermittent.
1. Negligible. Sparse vegetation and little woody debris or rocky landscapes. Little or no landscape relief.
0. None. Little to no vegetation, no denning opportunities.

Site context and condition (condition related to factors such as degradation, weed invasion and fire history). Allowance needed for very large project areas in very extensively cleared landscapes. Site proportions indicated below are suggestions only and needed to be interpreted in different landscape types and extents. While fire history important for Chuditch, including time since fire in valuing a site means that the assessment become redundant as soon as a fire occurs.

3. High. Site >1% of a more or less continuous, extensive landscape of native vegetation within 15km and classed at least as Medium for environmental characteristics. Low level of degradation from grazing by introduced species. Introduced predators (particular the Red Fox) scarce.
2. Medium. Site <1% of more or less continuous, extensive landscape of native vegetation within 15km and classed at least Medium landscape based on environmental characteristics).

Landscape may be fragmented, with 'gaps' (due to clearing) <1km. Introduced predators (particular the Red Fox) uncommon.
1. Low. Site <0.1% of at least Medium landscape based on environmental characteristics, or up to 1% where the landscape is classed as Low for environmental characteristics. Red Fox may be common.
0. Negligible. A negligible proportion (<0.01% within 15km) of landscape ranked as lower than Medium based on environmental characteristics.

Species status (records and/or interpretation of records, distribution and habitat)

3. Species considered to be resident or regular visitor based on recent (last 10 years) records within 15km in similar environment.
2. Species considered to be an irregular visitor based on latest records within 15km >10 years previously but environment of at least medium quality.
1. Species considered to be a vagrant based on latest records within 15km >10 years previously and environment of low to marginal quality.
0. No record of species within 10km and environment not suitable.

<u>Quokka</u>

Site environmental characteristics (that provide habitat).
0. None. Little to no low, dense vegetation to provide shelter.

Site context and condition (condition related to factors such as degradation, weed invasion and fire history).
0. Negligible. A negligible proportion of surrounding landscape ranked as even of medium suitability for the species.

Species status (records and/or interpretation of records, distribution and habitat)
0. No record of species within 10km and environment not suitable

Carter's Freshwater Mussel

Site environmental characteristics (that provide habitat).
0. None. Little to no suitable habitat.

Site context and condition (condition related to factors such as degradation, weed invasion and fire history).
0. Negligible. A negligible proportion of surrounding landscape ranked as even of medium suitability for the species.

Species status (records and/or interpretation of records, distribution and habitat)

0. No record of species within 10km and environment not suitable

Quenda

Site environmental characteristics (that provide habitat).
0. None. Little to no vegetation in project area; some possibly suitable habitat on road verges.

Site context and condition (condition related to factors such as degradation, weed invasion and fire history).
1. Low. Some marginal habitat on road verges and extensive degradation in surrounding area suggests even this marginal habitat has some contextual value

Species status (records and/or interpretation of records, distribution and habitat)
2. Species considered to be an irregular visitor with some nearby records but limited suitable habitat.