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**Lots 2 and 10 Rowley Road, Mandogalup - Targeted Black cockatoo foraging habitat assessment**

## 1. Background

This technical memorandum has been produced to support the development of Lots 2 and 10 Rowley Road, Mandogalup (the Survey Area).

## 2. Scope

The scope of work undertaken is as follows:

- Undertake a targeted Black Cockatoo habitat assessment
- prepare a report detailing the findings of the above.

## 3. Methods

The survey and analysis reported here have been conducted with strong reference to both the existing guidelines (DSEWPaC 2012) as well as the recently revised draft guidelines (DEE 2017). In addition, survey methodology followed the recommendations listed on the DAWE's Species Profile and Threats Database (DAWE 2020b).

Ecological values for black-cockatoos within the site were based on the definitions of foraging habitat as per the EPBC Act referral guidelines for black-cockatoos (DSEWPaC 2012), and were assessed using systems developed by Bamford Consulting.

It should be noted that only Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*) and Forest Red-tailed Black cockatoo (*Calyptorhynchus banksii*) are likely to occur within the project area, with discussion and assessment limited to these two species.

A foraging habitat assessment was conducted across the site by inspecting the vegetation and reviewing vegetation descriptions, and calculating a foraging score as outlined in Attachment A. The foraging score provides a numerical value that reflects the significance of vegetation as foraging habitat for black-cockatoos, and this numerical value is designed to provide the sort of information needed by the Federal Department of Agriculture, Water and the Environment (DAWE) to assess impact significance and offset requirements. The foraging value of the vegetation depends upon the type, density and condition of trees and shrubs in an area, and can be influenced by the context such as the availability of foraging habitat nearby. The Bamford (2018) scoring system for value of foraging habitat has three components as detailed in Attachment A. These three components are drawn from the DAWE offset calculator but with the scoring approach developed by Bamford:

- A score out of six for the vegetation composition, condition and structure.
- A score out of three for the context of the site.

- A score out of one for species density.

## 4. Results and Discussion

*Foraging Habitat*

There was approximately 44 ha of habitat assessed within the Survey area (Figure 1). Foraging species dominant within VT1, the dominant vegetation within the survey area, were *Eucalyptus marginata*, *Banksia attenuata, Banksia menziesii*, and *Xanthorrhoea preissii*. The breakdown of the scoring for each vegetation unit is presented in Table 4.1.

**Table 4.1: Foraging habitat quality**

| Vegetation description | Area (ha) | Vegetation composition score – Carnaby's Cockatoo | Vegetation composition score - FRTBC | Site Context score | Species density | Total score – Carnaby's Cockatoo | Total score – FRTBC |
|---|---|---|---|---|---|---|---|
| VT1 | 37.48 | 4 - Moderate foraging value | 3 - Low to Moderate foraging value | 1 | 1 | 6 | 5 |
| VT2 | 1.28 | 2 - Low foraging value | 0 - No foraging value | 0 | 0 | 2 | 0 |
| VT3 | 0.62 | 0 - No foraging value | 0 - No foraging value | 0 | 0 | 0 | 0 |
| C | 4.30 | 0 - No foraging value | 0 - No foraging value | 0 | 0 | 0 | 0 |

Based on the composition, structure and condition of the vegetation assessed, the foraging habitat identified within the Survey area was classified as moderate foraging value for Carnaby's cockatoo and low to moderate for the Forest Red-tailed black cockatoo. Using the scoring system developed by Bamford (2018), adding in site context and species presence, this habitat rates as a quality of 6 for Carnaby's cockatoo and 5 for the FRTBC, out of a maximum score of 10.

The remaining vegetation units and cleared areas were scored either low or no foraging value based on the presence of suitable foraging species.

## References


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Keighery B.,(1994). Bushland Plant Survey: A Guide to Plant Community Survey for the Community, Wildflower Society, Floreat.

Peck, A., Barrett, G. and Williams, M. (2016). The 2016 Great Cocky Count: A community-based survey for Carnaby's Black-Cockatoo (Calyptorhynchus latirostris) and Forest Red-tailed Black Cockatoo (Calyptorhynchus banksii naso). BirdLife Australia and Department of Parks and Wildlife, Perth, Western Australia.

**Legend:**

- Proposal area
- Conservation area

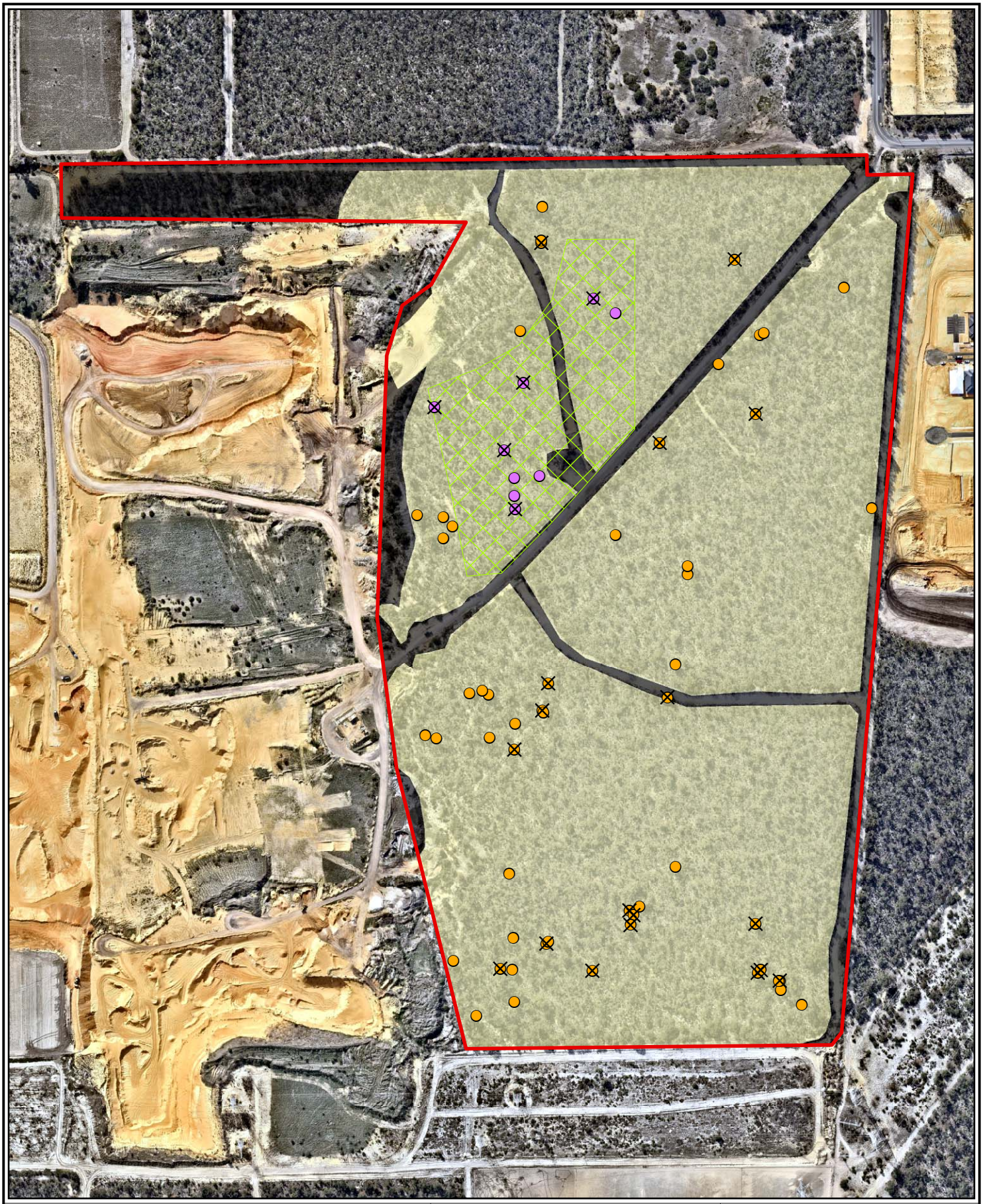
Fauna habitat

- Nil
- Low
- Moderate

- Significant trees to be removed (55)
- Significant trees to be retained (9)
- Hollows present (23)
- Local Road; Main Roads Controlled Path

| | | |
|---|---|---|
| Scale 1:5,000 at A4 (0, 50, 100 metres) | | **Lot 2 and 10 Rowley Road Mandogalup** |
| Coord. Sys. GDA 1994 MGA Zone 50 | | **FORAGING HABITAT (CARNABY'S COCKATOO)** |
| Job No: 56799 | | |
| Client: Qube | | **FIGURE 1** |
| Version: A | Date: 09-Nov-2020 | strategen JBS&G |
| Drawn By: cthatcher | Checked By: JH | |

File Name: W:\Projects\1)Open\Qube\56799 Approvals Rowley Road Mandogalup\GIS\Maps\R01_Rev_A\56799_06_1_ForagingHabitat.mxd
Image Reference: www.nearmap.com© - Imagery Date: 12 May 2020



**Legend:**

- Proposal area
- Conservation area

Fauna habitat

- Nil
- Low to moderate
- Significant trees to be removed (55)
- Significant trees to be retained (9)
- Hollows present (23)
- Roads

| | | |
|---|---|---|
| Scale 1:5,000 at A4 (0, 50, 100 metres) | | **Lot 2 and 10 Rowley Road Mandogalup** |
| Coord. Sys. GDA 1994 MGA Zone 50 | | **FORAGING HABITAT (FOREST RED-TAILED BLACK COCKATOO)** |
| Job No: 56799 | | |
| Client: Qube | | **FIGURE 2** |
| Version: A | Date: 09-Nov-2020 | strategen JBS&G |
| Drawn By: cthatcher | Checked By: JH | |

File Name: W:\Projects\1)Open\Qube\56799 Approvals Rowley Road Mandogalup\GIS\Maps\R01_Rev_A\56799_06_2_ForagingHabitat.mxd
Image Reference: www.nearmap.com© - Imagery Date: 12 May 2020

**Plate 1: Representative photograph of foraging habitat**

**Plate 2: Representative photograph of foraging habitat**

**Plate 3: Representative photograph of foraging habitat**

## Attachment A: Habitat scoring system (Bamford 2018)

Application of the Offset Assessment Guide (offsets guide) developed by the federal environment department for assessing black-cockatoo foraging habitat requires the calculation of a score out of 10. The following system has been developed by Bamford Consulting to provide an objective scoring system that is practical and can be used by trained field zoologists with experience in the environments frequented by the species.

Calculating the total score (out of 10) requires the following steps:

a. Determining a score out of six for the vegetation composition, condition and structure; plus

b. Determining a score out of three for the context of the site; plus

c. Determining a score out of one for species density.

d. Determining the total score out of 10, which may require moderation for context and species density with respect to the vegetation composition.

Calculation of scores and the moderation process are described in detail below.

**Vegetation composition, condition and structure scoring**

| Site Score | Description of Vegetation Values | | |
|---|---|---|---|
| | Carnaby's Black-Cockatoo | Baudin's Black-Cockatoo | Forest Red-tailed Black-Cockatoo |
| 0 | No foraging value. No Proteaceae, eucalypts or other potential sources of food. Examples:<br>Water bodies (e.g. salt lakes, dams, rivers);<br>Bare ground;<br>Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits). | No foraging value. No eucalypts or other potential sources of food. Examples:<br>Water bodies (e.g. dams, rivers);<br>Bare ground;<br>Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits). | No foraging value. No eucalypts or other potential sources of food. Examples:<br>Water bodies (e.g. dams, rivers);<br>Bare ground;<br>Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits). |
| 1 | Negligible to low foraging value. Examples:<br>Scattered specimens of known food plants but projected foliage cover of these is < 2%. This could include urban areas with scattered foraging trees;<br>Paddocks that are partly vegetated with melons or other known food-source weeds (e.g. *Erodium* spp.) that represent a short-term and/or seasonal food source;<br>Blue Gum plantations (foraging by Carnaby's Black-Cockatoos has been reported but appears to be unusual). | Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. This could include urban areas with scattered foraging trees. | Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. Could include urban areas with scattered foraging trees. |
| 2 | Low foraging value. Examples:<br>Shrubland in which species of foraging value, such as shrubby banksias, have < 10% projected foliage cover;<br>Woodland with tree banksias 2-5% projected foliage cover;<br>Open eucalypt woodland/mallee of small-fruited species;<br>Paddocks that are densely vegetated with melons or other known food-source weeds (e.g. *Erodium* spp.) that represent a short-term and/or seasonal food source. | Low foraging value. Examples:<br>Woodland with scattered specimens of known food plants (e.g. Marri and Jarrah) 1-5% projected foliage cover;<br>Urban areas with scattered foraging trees. | Low foraging value. Examples:<br>Woodland with scattered specimens of known food plants (e.g. Marri, Jarrah or Sheoak) 1-5% projected foliage cover;<br>Urban areas with scattered food plants such as Cape Lilac, *Eucalyptus caesia* and *E. erythrocorys*. |

| | | | |
|---|---|---|---|
| 3 | Low to Moderate foraging value.<br>Examples:<br>Shrubland in which species of foraging value, such as shrubby banksias, have 10-20% projected foliage cover;<br>Woodland with tree banksias 5-20% projected foliage cover;<br>Eucalypt Woodland/Mallee of small-fruited species;<br>Eucalypt Woodland with Marri < 10% projected foliage cover. | Low to Moderate foraging value.<br>Examples:<br>Eucalypt Woodland with known food plants (especially Marri) 5-20% projected foliage cover;<br>Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management);<br>Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability). | Low to Moderate foraging value.<br>Examples:<br>Eucalypt Woodland with known food plants (especially Marri and Jarrah) 5-20% projected foliage cover;<br>Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management);<br>Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability). |
| 4 | Moderate foraging value. Examples:<br>Woodland/forest with tree banksias 20-40% projected foliage cover;<br>Eucalypt Woodland/Forest with Marri 20-40% projected foliage cover. | Moderate foraging value.<br>Examples:<br>Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover;<br>Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths.<br>Eucalypt Woodland/Forest with diverse, healthy understorey and known food trees (especially Marri) 10-20% projected foliage cover.<br>Orchards with highly desirable food sources (e.g. apples, pears, some stone fruits). | Moderate foraging value.<br>Examples:<br>Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover;<br>Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths;<br>Sheoak Forest with 40-60% projected foliage cover. |
| 5 | Moderate to High foraging value.<br>Examples:<br>Banksia Forest with 40-60% projected foliage cover;<br>Banksia Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths;<br>Pine plantations with trees more than 10 years old. | Moderate to High foraging value.<br>Examples:<br>Marri-Jarrah Forest with 40-60% projected foliage cover;<br>Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths. | Moderate to High foraging value. Examples:<br>Marri-Jarrah Forest with 40-60% projected foliage cover;<br>Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths.<br>Sheoak Forest with > 60% projected foliage cover. |
| 6 | High foraging value. Example:<br>Banksia Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term). | High foraging value. Example:<br>Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term). | High foraging value. Example:<br>Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term). |

Vegetation structural class terminology follows Keighery (1994).

**Site context.**

The maximum score is given in situations where foraging habitat is supporting breeding birds. It can also be given in fragmented landscapes where there is little foraging habitat remaining and thus what is left has a high contextual value. The site context score is species-specific as it depends upon factors such as the vegetation type and extent, and the presence of breeding birds, and the following table, developed by Bamford consulting in conjunction with DEE, provides a *guide* to the

assignation of site context scores (note that 'local area' is defined as within a 15 km radius of the centre point of the study site).

| Site Context Score | Percentage of the existing native vegetation within the 'local' area that the study site represents. | |
|---|---|---|
| | 'Local' breeding known/likely | 'Local' breeding unlikely |
| 3 | > 5% | > 10% |
| 2 | 1 - 5% | 5 - 10% |
| 1 | 0.1 - 1% | 1 - 5% |
| 0 | < 0.1% | < 0.1% |

**Species density.**

Assignation of the species density score (0 or 1) is based upon the black-cockatoo species being either abundant or not abundant, and is species specific. A score of 1 is used where the species is seen or reported regularly and/or there is abundant foraging evidence. Regularly is when the species is seen at intervals of every few days or weeks for at least several months of the year. A score of 0 is used when the species is recorded or reported very infrequently and there is little or no foraging evidence.

Note that context and species density scores are affected by the vegetation score and this is discussed below.

**Moderation of scores for the calculation of a value out of 10.**

The foraging value score provides a numerical value that reflects the significance of vegetation as foraging habitat for Black-Cockatoos, and this numerical value is designed to provide the information needed by the Federal Department of the Environment and Energy (DoEE) to assess impact significance and offset requirements. The foraging value of the vegetation depends upon the type, density and condition of trees and shrubs in an area, and can be influenced by the context such as the availability of foraging habitat nearby. The BCE scoring system for value of foraging habitat has three components as detailed above. These three components are drawn from the DoEE offsets guide but the scoring approach was developed by Bamford Consulting Ecologists.

a. A score out of six for the vegetation composition, condition and structure
b. a score out of three for the context of the site
c. a score out of one for species density.

Foraging value can thus be assigned a score out of six, based upon site vegetation characteristics, or a score out of 10 if context and species density are considered. Assigning a score out of 10 represents step D and may require moderation rather than simple addition.

The score out of six for vegetation characteristics and value can be compared across a site, while a score out of 10 is the overall foraging value and is used for the purposes of aiding offset calculations. The calculation out of 10 requires the vegetation characteristics (out of 6) to be combined with the scores given for context and species density. It is considered that the context and density scores are not independent of vegetation characteristics; otherwise habitat of absolutely no value for black-cockatoo foraging (such as concrete or a wetland) could get a foraging score out of 10 as high as 4 if it occurred in an area where the species breed (context score of 3) and are abundant (species density score of 1). Similarly, vegetation of negligible or low characteristics which could not support black-cockatoos could be assigned a score as high as 6 out of 10. In that case, the score of 6 would be more a reflection of nearby vegetation of high characteristics than of the foraging value of the negligible to low scoring vegetation. The Black-Cockatoos would only be present because of vegetation of high characteristics, so applying the context and species density scores to vegetation of low characteristics would not give a true reflection of their foraging value.

For this reason, the context and species density scores need to be moderated for the vegetation characteristic score to prevent vegetation of little or no foraging value receiving an excessive score out of 10. A simple approach is assigning a context and species density score of zero to with a characteristic score of low (2), negligible (1) or none (0), on the basis that birds will not use such areas unless they are adjacent to at least low-moderate quality foraging habitat ($\geq$3). The approach to calculating a score out of 10 can be summarised as follows.

| vegetation composition, condition and structure score | context score | Species density score |
|---|---|---|
| 3-6 (low/moderate to high value) | Assessed as per B above | Assessed as per C above |
| 0-2 (no to low value) | 0 | 0 |