# Shire of Dowerin

# Flora, Vegetation and Targeted Black Cockatoo Survey

## Spring 2023

Natural Area Holdings Pty Ltd
Whadjuk Country
57 Boulder Road, Malaga WA 6090
Ph: (08) 9209 2767
info@naturalarea.com.au
www.naturalarea.com.au








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Environmental management system registered to ISO 14001:2015
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# Executive Summary

Natural Area Consulting Management Services (Natural Area) was commissioned by the Shire of Dowerin to undertake two-phase flora and vegetation survey and targeted black cockatoo habitat assessment for an area adjacent to the intersection of Hindmarsh Back Road and Dowerin-Meckering Road, Dowerin. In July of 2023, Natural Area was then commissioned to undertake the second phase, a spring (in season) flora and vegetation survey. The outcomes of these surveys will be used to inform stakeholders of the environmental value of the site to assist with a Blackspot Project application.

The March 2023 and Spring 2023 surveys aimed to determine:

- flora species present (native and non-native)
- the extent and boundaries of vegetation type and condition
- the location of declared rare or priority flora, fauna and/or ecological communities
- habitat assessment for threatened black cockatoo habitat.

The March 2023 and Spring 2023 flora and vegetation surveys within the site confirmed:

- the presence of two vegetation types, *Eucalyptus loxophleba s*ubsp*. loxophleba* and *Eucalyptus longicornis* Open Woodland and *Tecticornia* Dampland
- a total of 68 flora species present from 20 families across both surveys
    - 36 introduced (weed) species and 32 native species
    - an additional 19 species were recorded (three native and 16 weed species) in spring
- no conservation significant flora species were present during the March and spring 2023 surveys
- no Declared Pests and Weed of National Significance (WoNS) were recorded
- vegetation condition throughout the site ranged from good to completely degraded, with the majority of the survey area in a degraded condition
- one Threatened Ecological Community (TEC) was identified as occurring within the site (*Eucalyptus Woodlands of the Western Australian Wheatbelt*).

The black cockatoo habitat assessment within the site identified:

- a total of 26 trees within the survey area that satisfied the Commonwealth guidelines for potential black cockatoo habitat trees (DBH ≥ 300 mm), seven of which contained hollows
- nine trees were located within the construction envelope, of which three trees contained hollows which were considered potentially suitable for use by black cockatoos
- no signs of hollow use, roosting or foraging were identified at the time of the survey.

# Contents

# 1.0 Introduction

The Shire of Dowerin (Shire) is proposing to undertake road upgrades to the intersection of Hindmarsh Back Road and Dowerin-Meckering Road, as part of the Australian Government Black Spot Program. The design process for this intersection began in 2021 and has been under discussion for the potential construction, with a focus on avoiding and mitigating environmental factors. Natural Area Consulting Management Services (Natural Area) have been commissioned to undertake flora, vegetation, and targeted black cockatoo habitat surveys of the site. Results from survey activities will inform environmental stakeholders of the values of the site and provide supporting information for a clearing permit application to the Department of Water and Environmental Regulation (DWER).

## 1.1 Location

The survey site is located within the Shire of Dowerin Local Government Area (LGA) and is approximately 8.5 km south of the Dowerin town centre (Figure 1). The survey site occurs at the intersection of Hindmarsh Back Road and Dowerin-Meckering Road. No environmentally sensitive areas are located within the site boundary (Government of Western Australia, 2023).

Since Natural Area conducted the flora and fauna surveys, the Shire have amended the project design by moving Hindmarsh Back Road north into the paddock to ensure the construction works impact the least amount of native vegetation as possible. The updated project design envelope of 1.395 hectares has been provided in Figure 1.

## 1.2 Scope

Activities undertaken by Natural Area included:

- desktop assessment activities to determine flora species, declared rare and priority listed species (DRF) and ecological communities with the potential to be present within the nominated area, including requests for Department of Biodiversity, Conservation and Attractions (DBCA) database searches for flora and ecological communities
- detailed flora surveys (March 2023 and September 2023) conducted that included the installation of quadrats based on the number of vegetation types present in the survey area, along with a targeted search for significant flora, in accordance with Environmental Protection Authority (EPA) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016)
- mapping of vegetation type and condition
- assessment of black cockatoo habitat in accordance with the '*Referral guideline for 3 WA threatened black cockatoo species*' (DAWE, 2022)
- presentation of findings in a formal report, including assessment against the clearing principles
- preparation of GIS shapefiles in IBSA format.

## 1.3 Objectives

The main objective of the survey was to collect sufficient data to adequately inform a project design and a clearing permit application to DWER, as required by clearing provisions under the *Environmental Protection Act 1986* (WA) (*EP Act 1986*) and *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (WA) (Regulations).

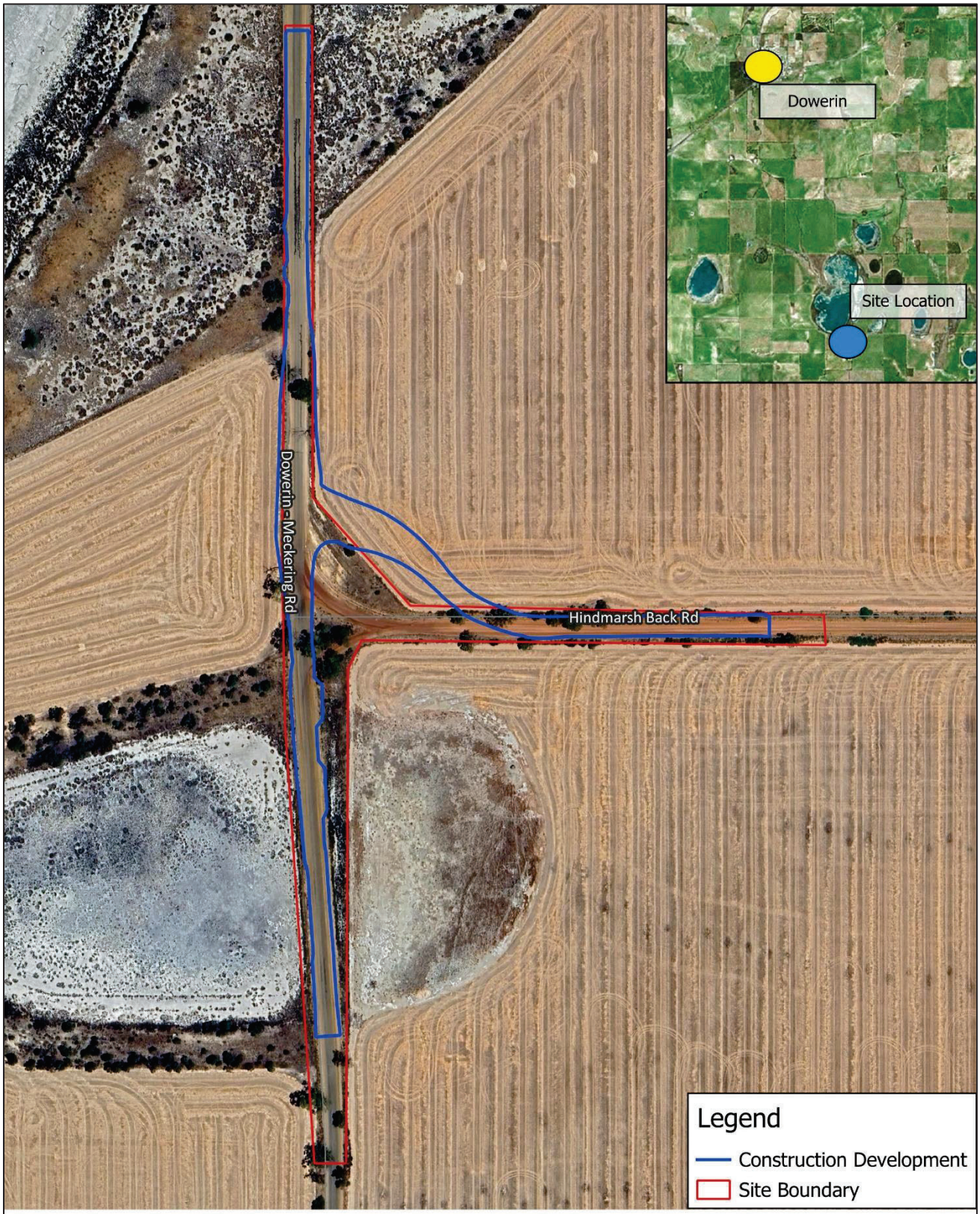


**Figure 1:**
Site Location
Dowerin-Meckering Rd, Dowerin

# 2.0 Site Characteristics

The characteristics of a site have a strong bearing on the flora, vegetation, fauna, and ecological communities present. Key characteristics of the site are outlined in this section.

## 2.1 Regional Context

The site is located within the northern portion of the Avon Wheatbelt 1 (AW1) IBRA region and the Merredin subregion (Department of Primary Industries and Regional Development (DPIRD), 2023). The Avon Wheatbelt 1 region is characterised by shrub and heathland dominated by Proteaceous species on upland and sandplain areas, mixed Eucalypt species, *Allocasuarina huegeliana* and Jam-York Gum Woodlands on alluvial/eluvial soils (Beecham, 2001).

## 2.2 Climate

The climate experienced in the area is Mediterranean, with dry, hot summers and cool, wet winters. According to the Bureau of Meteorology (2023); Goomalling WA, site number 010058, the region has an average:

- mean rainfall of 364.6 mm pa, with rain falling predominantly between June and July
- mean maximum temperatures ranging from 17.3 $^{o}$C in winter to 34.9 $^{o}$C in summer, with a maximum recorded temperature of 46.9 $^{o}$C
- mean minimum temperatures ranging from 6.3 $^{o}$C in winter to 17.4 $^{o}$C in summer, with a minimum recorded temperature of -1.5 $^{o}$C.

## 2.3 Topography and Soils

Using the NRInfo Portal, two soil types were identified on site (DPIRD, 2023). The survey site is relatively flat and ranges from 252 m Australian Height Datum (AHD) to 256 m AHD (DPRID, 2023). (Table 1 and Figure 2).

**Table 1:** Soil types within the survey site

| Name | Symbol | Description |
|---|---|---|
| Wallambin, Baandee salt lake Phase | 258WaBAsl | Salt lakes and deflationary features in north eastern wheatbelt valleys. |
| Wallambin, Baandee lake fringe Phase | 258WaBAlf | Lunettes and small saline drainage courses within salt lake chains of the north eastern wheatbelt. |

## 2.4 Vegetation Complex

One pre-European vegetation association occurs within the site, Goomalling 694, which is described as scrub/mixed heath with scattered tall shrubs, *Acacia* spp. And species from the Proteaceae and Myrtaceae families (Government of Western Australia, 2023). In close proximity to the site is the Goomalling 125 vegetation association (Figure 3). The pre-European extent of this vegetation complex (Goomalling 694) remaining is:

- 6.26% within the Avon Wheatbelt
- 5.72% within the Shire of Dowerin (Government of Western Australia, 2019).

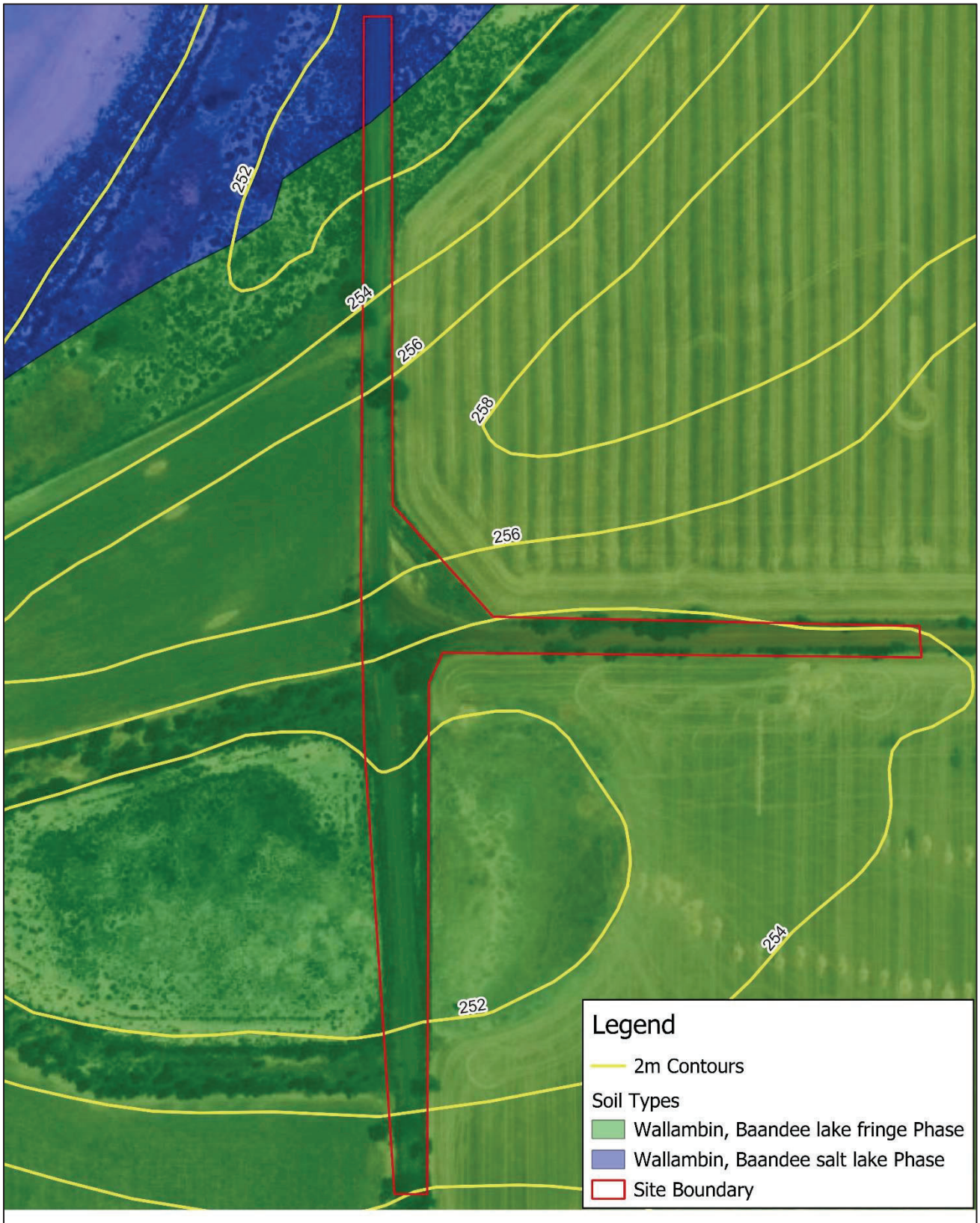


**Figure 2:**
Soil Types
Dowerin-Meckering Rd, Dowerin

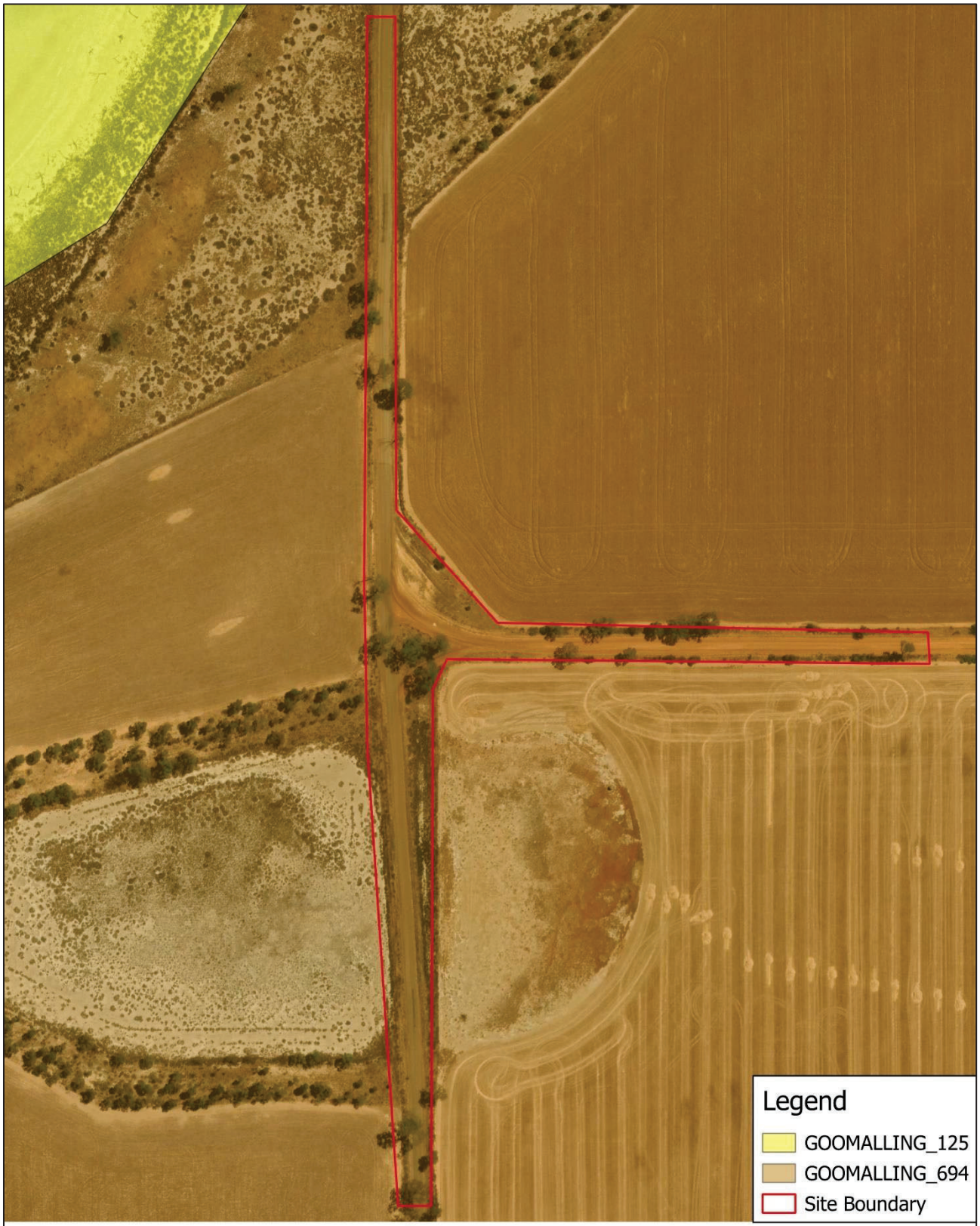


**Figure 3:**
Vegetation Complexes
Dowerin-Meckering Rd, Dowerin

## 2.5 Hydrology

The survey site occurs between two different named wetlands, Mortlock Basin 56a and Mortlock Basin 56b which are both described as peripheral (DBCA, 2023b). Other wetland associations are within close proximity to the site, details of the wetlands present are provided in Table 2 and Figure 4.

**Table 2**: Wetlands associated with the survey site

| Name | Type | Description |
|---|---|---|
| Mortlock_99_WQ01 | Peripheral | Close proximity to the site |
| Mortlock_basin_057b | | Occurs within the site |
| Mortlock_basin_057a | | Occurs within the site |
| Mortlock_basin_056b | | Close proximity to the site |
| Mortlock_basin_056a | | Close proximity to the site |

## 2.6 Heritage Values

According to the Aboriginal Heritage Inquiry System (DPLH, 2023) and the Heritage Council's inHerit (Government of Western Australia, 2023), no registered heritage places occur within the survey boundary.

## 2.7 Black Cockatoo Habitat Values

There is the potential for the three threatened black cockatoo species and their habitat to occur on site, including the Carnaby's Cockatoo (*Zanda latirostris*) and the Baudin's Black Cockatoo (*Zanda baudinii*), listed as Endangered under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cwlth) (*EPBC Act 1999*), and the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*) listed as Vulnerable under the *EPBC Act 1999*. All are listed as Threatened under the *Biodiversity Conservation Act 2016* (WA) (*BC Act 2016*). According to NationalMap, there are no registered roosting or breeding sites located within the survey site or within 12 km from the survey boundary (Government of Western Australia, 2023).

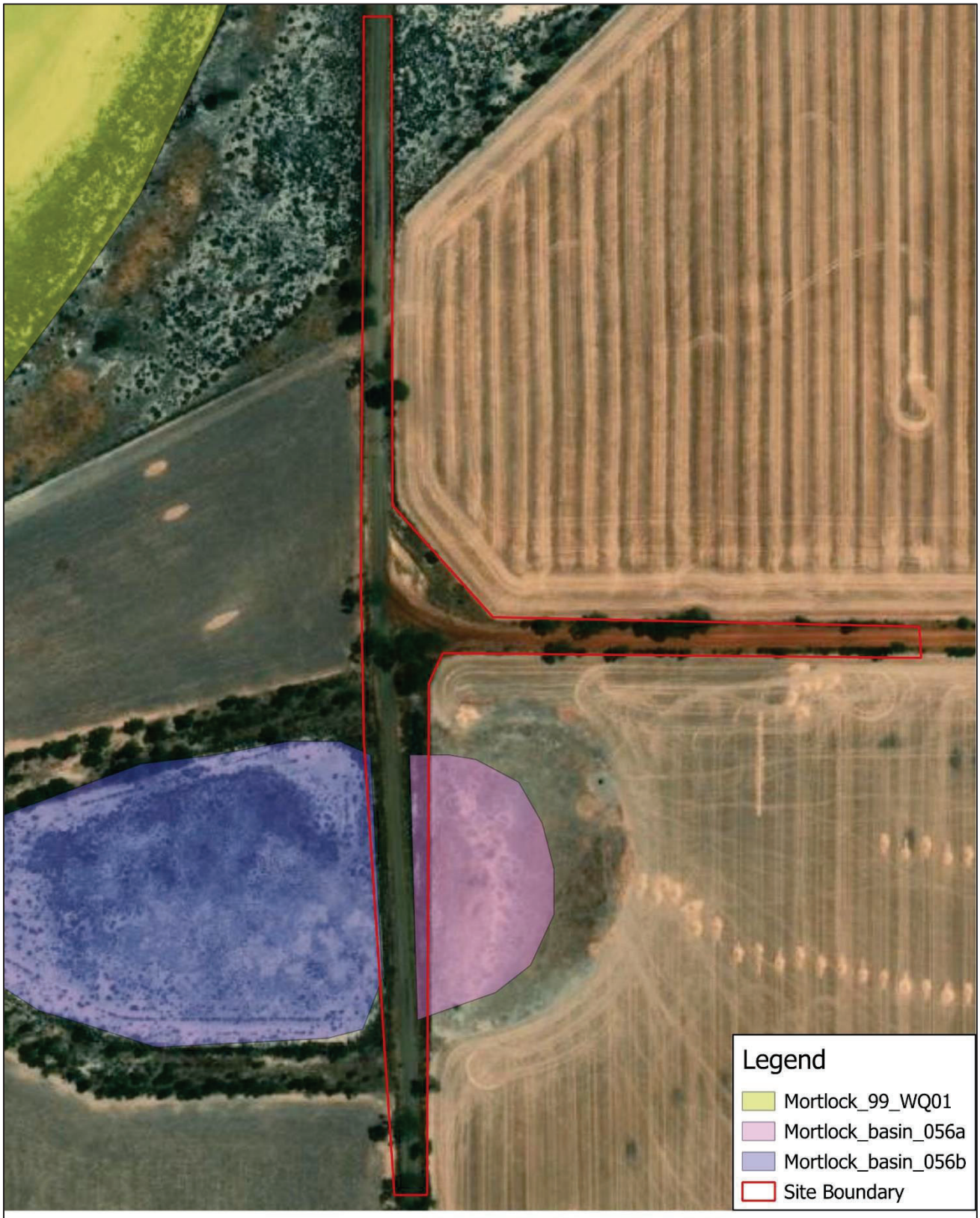


**Figure 4:**
Hydrology
Dowerin-Meckering Rd, Dowerin

# 3.0 Methodology

## 3.1 Desktop and Literature Review

The desktop survey included reviewing online databases to gather contextual knowledge and determine preliminary site characteristics including:

- likely native and non-native flora and fauna species present
- current extent of native vegetation
- general floristic community types
- likely presence of threatened or priority flora and fauna species
- likely presence of any threatened or priority ecological communities.

The following databases were accessed to obtain relevant information:

- NatureMap (DBCA, 2023)
- Protected Matters Search Tool (Department of Climate Change, Energy, the Environment and Water (DCCEEW), 2023) (Appendix 1)
- FloraBase (WA Herbarium, 1998-)
- Threatened and priority flora and ecological community database searches (DBCA, 2023a).

Information relating to potential conservation significant species from database searches were summarised into field reference guides to aid with on-ground flora and are provided in Appendix 2. Conservation code definitions for the State and Commonwealth is provided in Appendix 3.

## 3.2 On-ground Flora Survey

The flora and vegetation surveys were conducted in accordance with methodology described in *Technical Guidance-Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016). Samples were collected, or photographs taken of unfamiliar species to enable later identification.

Natural Area environmentalist scientists undertook an initial flora, vegetation and fauna survey on 27 March 2023, with key data recorded using Mappt software on a handheld tablet. The site was revisited on 26 September 2023 to undertake a spring flora and vegetation survey. Flora survey activities included:

- setting out a total of six 10 x 10 m quadrats across the two vegetation types present (Figure 5)
- photographing each quadrat in the north-west corner and recording GPS coordinates using GDA94 datum
- recording landscape characteristics including soil types/colour, aspect, slope, surface rock, topography and drainage using modified recording sheets based on the NAIA templates developed for the Perth Biodiversity Project
- determining leaf litter depth, percentage cover, and percentage of bare ground
- recording percentage cover, height, number alive/dead stems and life form for each flora species in the quadrats
- recording vegetation type including dominant over, middle and understorey species (Table 3) and condition using the scale attributed to Keighery (Table 4) (Government of Western Australia, 2000)
- the use of GPS to map significant species and boundaries of differing vegetation type and condition.

### 3.2.1 Vegetation Type

The vegetation type was determined using the structural classes described in *Bush Forever Volume 2* (Government of Western Australia, 2000), and records dominant over, middle and understorey species. A description of the various structural classes is provided in Table 3.

**Table 3:** Vegetation structural classes

| Life Form/Height Class | Canopy Percentage Cover | | | |
|---|---|---|---|---|
| | **100 – 70%** | **70 – 30%** | **30 – 10%** | **10 – 2 %** |
| Trees over 30 m | Tall closed forest | Tall open forest | Tall woodland | Tall open woodland |
| Trees 10 – 30 m | Closed forest | Open forest | Woodland | Open woodland |
| Trees under 10 m | Low closed forest | Low open forest | Low woodland | Low open woodland |
| Tree Mallee | Closed tree mallee | Tree mallee | Open tree mallee | Very open tree mallee |
| Shrub Mallee | Closed shrub mallee | Shrub mallee | Open shrub mallee | Very open shrub mallee |
| Shrubs over 2 m | Closed tall scrub | Tall open scrub | Tall shrubland | Tall open shrubland |
| Shrubs 1 – 2 m | Closed heath | Open heath | Shrubland | Open shrubland |
| Shrubs under 1 m | Closed low heath | Open low heath | Low shrubland | Low open shrubland |
| Grasses | Closed grassland | Grassland | Open grassland | Very open grassland |
| Herbs | Closed herbland | Herbland | Open herbland | Very open herbland |
| Sedges | Closed sedgeland | Sedgeland | Open sedgeland | Very open sedgeland |

Source: Government of Western Australia, 2000

### 3.2.2 Vegetation Condition

Vegetation condition was assessed using the rating scale attributed to Keighery in *Technical Guidance-Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016). Table 4 provides a description of the rating scale.

**Table 4:** Vegetation condition ratings

| Category | | Description |
|---|---|---|
| 1 | Pristine | Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement. |
| 2 | Excellent | Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks. |
| 3 | Very Good | Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing. |

| Category | | Description |
|---|---|---|
| 4 | Good | Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds, partial clearing, dieback and grazing. |
| 5 | Degraded | Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing. |
| 6 | Completely Degraded | The structure of the vegetation is no longer intact, and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs. |

Source: EPA, 2016


**Figure 5:**
Quadrat Locations
Dowerin-Meckering Rd, Dowerin

## 3.3 Targeted Black Cockatoo Habitat Survey

A targeted black cockatoo habitat survey was undertaken in March 2023. The black cockatoo habitat survey was completed in accordance with the '*Referral guideline for 3 WA threatened black cockatoo species*' (DAWE, 2022).

The survey recorded the following information:

- trees within the survey boundary as well as trees which have been previously recorded as 'to be removed' and 'retained' (information provided by the Shire) and recording:
  - species
  - GPS locations
  - condition and health
  - diameter at breast height (DBH) for all trees with a DBH ≥300 mm
  - presence, size of opening and type (chimney/side) of hollows
  - approximate height of hollows if present
  - recording evidence of breeding and roosting (e.g. chew marks, feathers, scats)
- evidence of foraging and roosting by black cockatoo in the form of chew nuts and cones
- presence of black cockatoos.

The black cockatoo foraging quality scoring tool (DAWE, 2022) was applied to the survey area to determine the quality of black cockatoo foraging habitat. This scoring tool assigns a habitat score between one and ten, with a score of ten representing the maximum possible score and very high-quality foraging habitat. Contextual adjustors (attributes that improve or reduce functionality of foraging habitat) such as tree species composition, distances from known breeding and roosting sites, distance from other foraging habitat, evidence of feeding debris, and presence of disease e.g. *Phytophthora* spp. or Marri Canker were used to evaluate habitat quality. The scoring tool template is provided in Table 5.

**Table 5:** Foraging quality scoring tool template

| Starting Score | Baudin's Cockatoo | Carnaby's Cockatoo | Forest Red-tailed Black-Cockatoo |
|---|---|---|---|
| 10 | Start at a score of 10 if your site is native eucalypt woodlands and forest, and proteaceous woodland and heath, particularly Marri, within the range of the species, including along roadsides and parkland cleared areas. Can include planted vegetation. This tool only applies to sites equal to or larger than 1 hectare in size. | Start at a score of 10 if your site is native shrubland, kwongan heathland or woodland, dominated by proteaceous plant species such as Banksia spp. (including Dryandra spp.), Hakea spp. and Grevillea spp., as well as native eucalypt woodland and forest that contains foraging species, within the range of the species, including along roadsides and parkland cleared areas. Also includes planted native vegetation. This tool only applies to sites equal to or larger than 1 hectare in size. | Start at a score of 10 if your site is Jarrah or Marri woodland and/or forest, or if it is on the edge of Karri forest, or if Wandoo and Blackbutt occur on the site, within the range of the subspecies, including along roadsides and parkland cleared areas. This tool only applies to sites equal to or larger than 1 hectare in size. |

| Attribute | Sub-tractions | Context adjustor (attributes reducing functionality of foraging habitat) | | |
|---|---|---|---|---|
| Foraging potential | -2 | Subtract 2 from your score if there is no evidence of feeding debris on your site. | Subtract 2 from your score if there is no evidence of feeding debris on your site. | Subtract 2 from your score if there is no evidence of feeding debris on your site. |
| Connectivity | -2 | Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site. | Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site. | Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site. |
| Proximity to breeding | -2 | Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat. | Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat. | Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat. |
| Proximity to roosting | -1 | Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat. | Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat. | Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat. |
| Impact from significant plant disease | -1 | Subtract 1 if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50 % of the preferred food plants present. | Subtract 1 if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50 % of the preferred food plants present. | Subtract 1 if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50 % of the preferred food plants present. |
| Total score | | Enter Score | Enter Score | Enter Score |
| Appraisal | | To support your habitat score, you should provide an overall appraisal of the habitat on the impact site and within 20 km of the impact area to clearly explain and justify the score. It should include discussion on the foraging habitat's proximity to other resources (e.g. exact distance to proximate resources), frequency of use of proximate sites, the degree of evidence and description of vegetation type and condition. | | |

Source: DAWE, 2022

Bamford's *Scoring System for the Assessment of Foraging Values of Vegetation for Black-Cockatoos* (2020) was applied. This includes assessinges and scoring a site based on three components:

- site condition (score out of 6)
- site context (score out of 3)
- species density (score out of 1).

A site condition score between 0-6 is determined based on vegetation composition, condition and structure, with 0 representing no foraging value and the absence of potential food sources, while a score of 6 represents high foraging value and typically consists of *Banksia* and Eucalypt Forest with more than 60% projected foliage cover. Appendix 8 outlines the Bamford (2020) foraging scoring system for site condition.

## 3.4 Limitations

Limitations associated with the survey undertaken are detailed in Table 6.

**Table 6:** Survey limitations

| Potential Limitation | Degree of Limitation | Comments |
|---|---|---|
| Availability of contextual information and data | None | Government data on regional and local contextual information are readily available for the survey area. |
| Competency/ experience of team | None | Survey activities were undertaken by experienced environmental scientists who have extensive experience undertaking detailed flora surveys and black cockatoo habitat assessments within the Swan Coastal Plain, Jarrah Forrest and Avon Wheatbelt bioregions. |
| Proportion of flora recorded/collected, any identification issues<br><br>Adequacy of the survey intensity and proportion of survey achieved | Major | A total of 68 flora species (taxa) were recorded from 20 families across both field surveys (March and Spring 2023). The total comprised of 36 introduced (weed) species and 32 native species. Of these, two species (3.17%) were unable to be identified to species level due to a lack of diagnostic characteristics present at the time of surveys. This species was able to be identified to genus level, *Tecticornia* sp.<br><br>In March 2023, a *Conostylis* sp. was recorded and had the potential to be a conservation significant flora species, namely *Conostylis caricina* subsp. *elachys*, which was recorded in the desktop survey. However, there were limited diagnostic features present during the March 2023 survey to confirm identification and therefore further field surveys were required to confirm identification. During the spring 2023, the *Conostylis* sp. was no longer present on site and was likely cleared during road maintenance activities undertaken by the Shire. This is considered a major limitation.<br><br>No other unidentified species including the unidentified *Tecticornia* sp.1 and sp.2 are considered to be threatened or priority flora following comparison with desktop data. |
| Survey effort and extent | None/Minor | A detailed flora and vegetation survey was undertaken over a period of one day in March and then another day in September 2023. The entire survey area was traversed and all flora species and vegetation types/condition within the survey area were adequately surveyed. A total of six quadrats were established to adequately survey the two vegetation types present. |

| Potential Limitation | Degree of Limitation | Comments |
|---|---|---|
| | | A targeted black cockatoo habitat survey was undertaken involving the marking of trees with a DBH ≥ 300 mm and recording significant characteristics. As this was a targeted search for this species, other faunal groups which may have been present within the site have not been recorded. The black cockatoo hollow assessment was conducted from the ground and is therefore limited to those hollows visible from ground-level. As such, not all hollows may have been observed as new growth, dense foliage and position in the landscape can hide hollows from vision. Additionally, internal hollow inspections would be required to confirm hollow characteristics such as internal hollow depth and structure and therefore to confirm their suitability to support nesting by black cockatoos. |
| Access restrictions | None | Ecologist were able to traverse throughout the survey area with no restrictions. |
| Survey timing (weather/season) | Minor | The survey was originally undertaken in March, as requested by the Shire. This was outside of the optimal time to survey flora in the Avon Wheatbelt Region, which is spring. As a result, the Shire then requested a spring survey to occur in September 2023. Of the 29 conservation significant flora species identified in the desktop survey as being likely to occur within the survey area, 16 species have flowering periods outside of the survey period.<br><br>The majority of these species (16) are perennial shrub and herb species for which identification would have been possible outside of their flowering periods due to distinct morphological characteristics including growth habit and leaf structure.<br><br>*Austrostipa frankliniae* has limited information available within databases such as FloraBase and the Australian Virtual Herbarium. All native grass samples were submitted to the Western Australian herbarium for identification.<br><br>The remaining species, *Goodenia verreauxii,* has limited information available within databases such as FloraBase. As members of this genus can often be small in size and difficult to identify in the absence of flowers, this species has the potential to occur on site and not have been detected during the surveys. |
| Disturbances | Major | The survey area in spring 2023 showed recent signs of clearing. This disturbance on the site since March 2023 has the ability to have major impacts on survey results and therefore is considered a major limitation. |

| Potential Limitation | Degree of Limitation | Comments |
|---|---|---|
| | | A total of five flora species (two natives and three weeds) were not recorded in spring 2023 and had been removed. Two quadrats were partially cleared and results were significantly altered between March and September 2023. No other recent disturbances such as fire or floods were identified during the survey. |

# 4.0 Flora Survey Results

## 4.1 Desktop Survey

A desktop survey of online databases indicated the potential for a total of 59 conservation significant species to occur within 20 km of the survey area (Table 7). NatureMap indicated 44 conservation significant flora species listed under the *Biodiversity Conservation Act 2016* (WA), as potentially occurring within 20 km radius of the site (WA Herbarium, 1998-). A review of the Protected Matters Search Tool (PMST) (DCCEEW, 2023) indicated 26 significant flora species listed under the *EPBC Act 1999* (Cwlth) as potentially occurring within a 20 km radius of the site (Appendix 1).

A review of the DBCA (2023a) threatened and priority flora database indicated 41 threatened or priority species have been recorded within 20 km of the site. Of the conservation significant species potentially found in the area, it was determined that the site conditions (soil type, drainage, location) may be suitable for 29 (highlighted green) of these species (Table 7). Conservation code descriptions are provided in Appendix 2.

**Table 7:** Threatened and Priority flora species listed by NatureMap, PMST and DBCA

| Species Name | Cons. Code | NatureMap | PMST | DBCA |
|---|---|---|---|---|
| *Acacia ataxiphylla* subsp. *magna* | EN/T | X | X | X |
| *Acacia campylophylla* | P3 | X | | X |
| *Acacia cochlocarpa* subsp. *cochlocarpa* | EN/T | X | X | X |
| *Acacia cochlocarpa* subsp. *velutinosa* | CR | | X | |
| *Acacia lasiocarpa var. ** | P1 | X | | |
| *Acacia leptoneura* | CR/T | X | X | X |
| *Acacia lirellata* subsp. *compressa* | P2 | X | | X |
| *Acacia phaeocalyx* | P3 | X | | X |
| *Acacia volubilis* | EN | | X | |
| *Andersonia gracilis* | EN | | X | |
| *Austrostipa frankliniae* (syn. *Austrostipa* sp. Dowerin) | P2 | X | | X |
| *Banksia horrida* | P3 | X | | X |
| *Banksia nivea* subsp. Morangup | P2 | X | | |
| *Bossiaea atrata* | P3 | X | | X |
| *Caladenia drakeoides* | EN | | X | |
| *Calectasia pignattiana* | VU/T | X | X | X |
| *Calothamnus brevifolius* | P4 | X | | X |
| *Calytrix parvivallis* | P2 | X | | X |
| *Chorizema humile* | T | X | | X |

| Species Name | Cons. Code | NatureMap | PMST | DBCA |
|---|---|---|---|---|
| *Conospermum eatoniae* | P3 | X | | X |
| *Conostylis caricina* subsp. *elachys* | P1 | X | | X |
| *Conostylis wonganensis* | EN/T | X | X | X |
| *Cryptandra dielsii* | P3 | X | | X |
| *Dasymalla axillaris* | CR | | X | |
| *Daviesia euphorbioides* | EN/T | X | X | X |
| *Daviesia nudiflora* subsp. *amplectens* | P1 | X | | X |
| *Daviesia nudiflora* subsp. *drummondii* | P3 | X | | X |
| *Daviesia smithiorum* | P2 | X | | X |
| *Eremophila resinosa* | EN | | X | |
| *Eremophila viscida* | EN | | X | |
| *Eucalyptus erythronema* subsp. *inornata* | P3 | X | | X |
| *Eucalyptus recta* | EN | | X | |
| *Eutaxia rubricarina* | P3 | X | | X |
| *Frankenia conferta* | EN | | X | |
| *Gastrolobium appressum* | VU | | X | |
| *Gastrolobium hamulosum* | EN | | X | |
| *Goodenia verreauxii* | P4 | X | | X |
| *Grevillea dryandroides* subsp. *hirsuta* | EN/T | X | X | X |
| *Grevillea pythara* | EN | | X | |
| *Grevillea roycei* | P3 | X | | X |
| *Hemiandra rutilans* | EN/T | X | X | X |
| *Hibbertia leptopus* | P2 | X | | X |
| *Lysiosepalum abollatum* | CR | | X | |
| *Lysiosepalum aromaticum* | P2 | X | | X |
| *Melaleuca sciotostyla* | EN/T | X | X | X |
| *Microcorys eremophiloides* | VU/T | X | X | X |
| *Millotia tenuifolia* var. *laevis* | P2 | X | | X |
| *Persoonia pungens* | P3 | X | | X |
| *Phebalium drummondii* | P3 | X | | X |
| *Roycea pycnophylloides* | EN | | X | |
| *Stylidium scabridum* | P4 | X | | X |

| Species Name | Cons. Code | NatureMap | PMST | DBCA |
|---|---|---|---|---|
| *Styphelia caudata* (syn. *Leucopogon* sp. Bungulla) | P3 | X | | X |
| *Synaphea constricta* | P3 | X | | X |
| *Thomasia montana* | VU | X | | |
| *Thysanotus* sp. Badgingarra | P2 | X | | X |
| *Urodon capitatus* | P3 | X | | X |
| *Verticordia hughanii* | EN/T | X | X | X |
| *Verticordia staminosa* subsp. *staminosa* | EN | | X | |
| *Verticordia venusta* | P3 | X | | X |

### 4.1.1 Threatened and Priority Ecological Communities

A review of the PMST report and DBCA's Threatened Communities database identified three listed ecological communities that could potentially occur within 20 km of the site:

- *Eucalypt Woodlands of the Western Australian Wheatbelt* TEC (Critically Endangered under the *EPBC Act 1999*). Listed as 'Community likely to occur within area' (DCCEEW, 2023)
- *Perched wetlands of the Wheatbelt region with extensive stands of living Swamp Sheoak (Casuarina obesa) and Paperbark (Melaleuca strobophylla) across the lake floor* TEC (Critically Endangered under the *BC Act 2016* and Endangered under the *EPBC Act 1999*). Known to occur within the site (DBCA, 2023a; DCCEEW, 2023)
- *Canegrass perched clay wetlands of the wheatbelt dominated by Eragrostis australasica and Melaleuca strobophylla across the lake floor* PEC (Priority 1 under the *BC Act 2016*). Known to occur <1 km north-east of the site (DBCA, 2023a).

## 4.2 Flora Survey Results

### 4.2.1 Vegetation Types

Two vegetation types were recorded within the Dowerin-Meckering Rd survey area, these are described in Table 8 and shown in Figure 6. All these vegetation types are present within the construction development envelope.

**Table 8:** Vegetation type within Dowerin-Meckering Rd survey area

| Vegetation Type | Description | Photograph |
|---|---|---|
| *Eucalyptus loxophleba* subsp*. loxophleba* and *Eucalyptus longicornis* Open Woodland | An open woodland of *Eucalyptus loxophleba* subsp*. loxophleba* and *Eucalyptus longicornis* over an understorey of *Atriplex amnicola, Atriplex semibaccata* and *Maireana georgei.* |  |
| Tecticornia Dampland | A dampland of *Maireana georgei* and *Enchylaena tomentosa* over *Tecticornia pergranulata* subsp. *pergranulata* and weedy grasses. |  |

### 4.2.2 Vegetation Condition

Vegetation condition on site ranged from good to completely degraded, with the majority of the survey area recorded to be in a degraded condition (Table 9, Figure 7). However, the vegetation condition located within the development envelope ranges from degraded to completely degraded and has been designed to avoid the good vegetation.

**Table 9:** Vegetation condition within Dowerin-Meckering Rd survey area.

| Vegetation Condition | Pristine | Excellent | Very Good | Good | Degraded | Completely Degraded | Total |
|---|---|---|---|---|---|---|---|
| **Area (ha)** | 0 | 0 | 0 | 0.12 | 1.21 | 0.10 | 1.43 |
| **Area (%)** | 0 | 0 | 0 | 8.39 | 84.62 | 6.99 | 100 |


**Figure 6:**
Vegetation Type
Dowerin-Meckering Rd, Dowerin


**Figure 7:**
Vegetation Condition
Dowerin-Meckering Rd, Dowerin

### 4.2.3 Flora

A total of 68 flora species (taxa) were recorded from 20 families, comprising of 36 introduced (weed) species and 32 native species across both surveys. The spring survey alone recorded a total of 63 flora species from 17 families, comprising 34 weed species and 29 native species. In comparison to the March 2023 survey, there were 19 additional species recorded (three natives and 16 weed species). But three native species were also not recorded in the new spring survey results, this included *Acacia acuminata* (Jam)*, Acacia eremophila* subsp. *eremophila* and *Conostylis* sp. Examples of native flora species are shown in Figure 8 and weed species in Figure 9. A complete flora species list is provided in Appendix 6. No Declared Pests or Weeds of National Significance (WoNS) were identified within the survey boundary.

*Atriplex semibaccata* (Berry Saltbush)

*Santalum acuminatum* (Quandong)

*Solanum hoplopetalum* (Thorny Solanum)

*Salsola australis*

**Figure 8**: Examples of native flora species recorded

Stinkwort (*_Dittrichia graveolens_*)

Prickly Paddy Melon (*_Cucumis myriocarpus_*)

**Figure 9**: Examples of introduced flora species recorded

### 4.2.4 Threatened and Priority Communities

The desktop analysis indicated the potential for two TECs and one PEC to occur within the survey boundary: *Eucalyptus Woodlands of the Western Australian Wheatbelt* TEC*, Perched wetlands of the Wheatbelt region with extensive stands of living Swamp Sheoak (Casuarina obesa) and Paperbark (Melaleuca strobophylla) across the lake floor* TEC*,* and *Canegrass perched clay wetlands of the wheatbelt dominated by Eragrostis australasica and Melaleuca strobophylla across the lake floor* PEC*.*

*Perched wetlands of the Wheatbelt region with extensive stands of living Swamp Sheoak (Casuarina obesa) and Paperbark (Melaleuca strobophylla) across the lake floor* TEC is listed as Critically Endangered under the *BC Act 2016* (WA) and Endangered under the *EPBC Act 1999*. This TEC is listed as occurring within the survey boundary (DBCA, 2023a) however the key dominant species associated with this TEC were not encountered within the survey boundary. These are *Casuarina obesa* (Swamp Sheoak), *Melaleuca strobophylla* (Paperbark), *Eucalyptus rudis* (Flooded Gum), *Banksia prionotes* (Acorn Banksia) and *Allocasuarina huegeliana* (Rock Sheoak) (Department of the Environment, Water, Heritage and the Arts, 2008). However, it should be noted that this TEC has the potential to be present in the areas surrounding the wetland basins that are adjacent to the survey boundary.  This area was not included in this survey.

The *Canegrass perched clay wetlands of the wheatbelt dominated by Eragrostis australasica and Melaleuca strobophylla across the lake floor* PEC is known to occur in the basin wetlands <1 km north-east of the survey area. This PEC is considered unlikely to occur within the survey boundary as the key dominant species associated with this PEC (as listed in the title of the ecological community, being *Eragrostis australasica and Melaleuca strobophylla)* were not encountered within the survey boundary. However, it should be noted that this TEC has the potential to be present in the areas surrounding the wetland basins that are adjacent to the survey boundary.

The *Eucalyptus Woodlands of the Western Australian Wheatbelt* is listed as Critically Endangered under the *EPBC Act 1999*, and as a Priority 3 under the *BC Act 2016*. Two key species *Eucalyptus longicornis* (Red

Morrel) and *Eucalyptus loxophleba* subsp. *loxophleba* (York Gum) were recorded within the vegetation type, *Eucalyptus loxophleba s*ubsp*. loxophleba* and *Eucalyptus longicornis* Open Woodland. This vegetation type meets the description and key diagnostic characteristics of the *Eucalyptus Woodlands of the Western Australian Wheatbelt* TEC as described in the approved conservation advice (Department of Environment, 2015) (Table 10). Where these criteria are met, the minimum conditions for patches of this TEC apply. These condition thresholds for degraded vegetation patches are summarised in Table 11.

As this vegetation patch is along a roadside, the width of the patch is used to assess the condition thresholds, rather than the total size of the patch. The width of the native understorey within the road verge varies but ranges between 3.5 in some areas to 10 m in other areas and is therefore considered to meet the minimum patch width criteria of 5 m. These patches also meet the criteria for weed cover and number of mature trees. As a result, the patches of vegetation within the *Eucalyptus loxophleba s*ubsp*. loxophleba* and *Eucalyptus longicornis* Open Woodland are considered likely to be part of the *Eucalyptus Woodlands of the Western Australian Wheatbelt* TEC.

**Table 10:** Key Diagnostic Criteria for the *Eucalyptus Woodlands of the Western Australian Wheatbelt* TEC

| Key Diagnostic Characteristics | Meets/Doesn't Meet | Site Specifics |
|---|---|---|
| Occurs in the Avon Wheatbelt, Western Mallee (MAL02) and eastern Jarrah Forest Bioregions, Western Australia | Meets diagnostic characteristics | Site occurs in the Avon Wheatbelt Bioregion. |
| The structure of the ecological community is a woodland in which the minimum crown cover of the tree canopy in a mature woodland is 10% | Meets diagnostic characteristics | Site is an open woodland with an average tree canopy cover of 10%. |
| The key species of the tree canopy are species of Eucalyptus as identified in Table 2a, and are dominant or co-dominant | Meets diagnostic characteristics | The key species *Eucalyptus loxophleba* subsp. *loxophleba* and *Eucalyptus longicornis* were present within the site and are listed in Table 2a of the approved conservation advice. *Eucalyptus loxophleba* subsp. *loxophleba* was dominant in two of the three quadrats. |
| A native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs, as specified in section 2.3.2 and in Table A1 of Appendix A | Meets diagnostic characteristics | A native understorey was present in the patch. 11 out of the 20 native species recorded in this vegetation type are listed in table A1 of the conservation advice for this TEC. |

**Table 11:** Minimum condition thresholds for the *Eucalyptus Woodlands of the Western Australian Wheatbelt* TEC (Category D: Patches likely to correspond to a condition of degraded to good BUT retains important habitat features)

| Condition threshold | | Meets/Doesn't Meet | Site Specifics |
|---|---|---|---|
| **Criteria** | **Threshold** | | |
| Minimum Patch Width | 5 m | Meets condition threshold | The width of the native understorey within the road verge ranged between 3.5 – 10 m |
| Weed cover | Weeds account for >50-70% of total understorey vegetation cover | Meets condition threshold | Weed cover was >50% |
| Mature trees | 5 mature trees (DBH >300 mm) per 0.5 ha | Meets condition threshold | >5 mature trees were present / 0.5 ha |

# 5.0 Black Cockatoo Habitat Assessment Results

## 5.1 Desktop Survey

A desktop survey of online databases indicated the potential for the Carnaby's Cockatoo (*Zanda latirostris)* and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso)* to occur within 20 km of the survey area (Table 12). DBCA fauna database search identified one roosting site for black cockatoos and 40 breeding sites for white-tailed black cockatoos were within a 60 km search buffer of the survey boundary (DBCA, 2023a).

**Table 12:** Black cockatoo species listed by NatureMap, PMST and DBCA

| Species Name | Cons Code | NatureMap | PMST | DBCA |
|---|---|---|---|---|
| *Zanda latirostris* | EN | X | X | X |
| *Calyptorhynchus banksii naso* | VU | X | | |

## 5.2 Field Results

A total of 26 trees were recorded that satisfied the Commonwealth guidelines for potential black cockatoo habitat trees (trees with DBH greater than 300 mm) (DAWE, 2022) within the survey area at Dowerin-Meckering Road. The trees recorded included *Eucalyptus longicornis* (Red Morrel, 34.6 %), *Eucalyptus loxophleba* subsp. *loxophleba* (York Gum, 50%), *Eucalyptus salmonophloia* (Salmon Gum, 3.9%) and dead stags (11.5 %). All trees were observed to be in a mature and good condition, except for three dead stags and two *Eucalyptus longicornis* trees recorded to be in poor condition.

Three trees contained bird nests (Figure 11). During the spring survey, two Magpie-larks (*Grallina cyanoleuca)* were recorded occupying one of the bird nests.

### 5.2.1 Roosting Habitat

No evidence of roosting in the form of scats or feathers were observed within the survey area. Evening surveys were not conducted as part of this assessment, so the location of any potential roosting sites cannot be confirmed.

### 5.2.2 Foraging Habitat

The survey area contained areas of vegetation that provide primary feeding resources for Carnaby's Cockatoo, including **Erodium botrys, *Raphanus raphanistrum, Eucalyptus longicornis, Eucalyptus loxophleba* subsp. *loxophleba* and *Eucalyptus salmonophloia (*DEC, 2011). No evidence of foraging was recorded within the survey area. The foraging scoring tools described below were not applied to Baudin's Cockatoo and Forest Red-tailed Black Cockatoo as they did not meet the distribution and preferred vegetation respectively.

#### 5.2.2.1 Bamford Foraging Habitat Scoring System

Bamford's *Scoring System for the Assessment of Foraging Values of Vegetation for Black-Cockatoos* (2020) assesses and scores a site based on three components:

- site condition (score out of 6)

- site context (score out of 3)
- species density (score out of 1).

Site context takes into consideration the size of the site and availability of nearby habitat and breeding areas. The score is calculated based on the estimated percentage of the existing native vegetation within a 15 km radius (the 'local' area) that the study site represents and is weighted for where nearby breeding is known/likely. Species density accounts for black cockatoo stocking rates. A score of 1 is assigned when black cockatoos are regularly observed and/or there is abundant foraging evidence, and a score of 0 is assigned when there is a lack of foraging evidence with little or infrequent records of black cockatoos utilising the study site. The species density and site context can then be moderated when the site condition score is less than 2, utilising assessors judgment where required. All of these components are then combined to determine a total score (out of 10).

A total foraging value of three for Carnaby's Cockatoo was assigned for the sites' vegetated areas (*Eucalyptus loxophleba subsp. loxophleba and Eucalyptus longicornis Open Woodland*). The foraging value calculations are shown in Table 14.

**Table 14:** Bamford scoring system for Meckering- Dowerin Rd

| | **Carnaby's Cockatoo** |
|---|---|
| **Site Condition (0-6)** | Low Foraging Value<br>(Open Eucalypt Woodland/Mallee of Small-Fruited Species) |
| | **Score: 2** |
| **Site Context (0-3)** | 0.1-1% 'Local breeding known/likely (percentage of the existing native vegetation within the 'local' area, that the study site represents). Database searches likely do not encompass the Wheatbelt to this extent, therefore limiting the availability of information recorded. |
| | **1** |
| **Species Density (0-1)** | No foraging evidence or individuals were recorded within the survey during both the Autumn and Spring surveys. |
| | **Score: 0** |
| **Total Score** | **3** |

#### 5.2.2.2 Commonwealth Foraging Habitat Scoring Tool

The black cockatoo foraging quality scoring tool (DAWE, 2022) was applied across the survey area and a score of seven was assigned for Carnaby's Cockatoo (Table 15).

This scoring tool (Table 15) assigns a habitat score between one and ten, with a score of ten representing the maximum possible score and very high quality of foraging habitat. Contextual adjustors (attributes that improve or reduce functionality of foraging habitat) such as presence of foraging evidence and proximity to known breeding and roosting sites, were considered and used to evaluate habitat quality.

**Table 15**: Foraging quality score for some areas of the survey area

| | Carnaby's Cockatoo | Appraisal |
|---|---|---|
| **Starting score** | 10 | Vegetation within the survey has been recorded as native eucalypt woodland along a roadside and is >1 ha. |
| Foraging potential | 8 | No evidence of feeding debris by black cockatoos were recorded within the survey area. |
| Connectivity | 8 | Database searches have not recorded foraging habitat within 12 km of the survey area. However, foraging species are known to occur within 12km of the survey area. |
| Proximity to breeding | 8 | There is no evidence to conclude that the site is more than 12 km from breeding habitat. No known breeding sites have been recorded within 12 km of the survey area, however Dowerin is within the known breeding range for this species and there are suitable black cockatoo breeding tree species within and surrounding the survey area. |
| Proximity to roosting | 7 | The survey area is more than 20 km from a known night roosting site. However, database searches likely do not encompass the Wheatbelt to this extent, therefore limiting the availability of information recorded. |
| Impact from significant plant disease | 7 | No significant pest/disease were evident through the survey areas. |
| **Total Score** | **7** | |

### 5.2.3 Breeding Habitat

The survey area contained areas of vegetation that could provide suitable breeding habitat for black cockatoos. The survey area is also known within proximity to one roosting site for black cockatoos and 40 breeding sites for white-tailed black cockatoos (DBCA, 2023a). Of the 26 trees recorded within the survey boundary, a total of seven were identified to contain hollows. Of these, four (Tree 2, 9, 7 and 26) contained hollows potentially suitable for black cockatoos.

However, within the construction development envelope there is a total of nine black cockatoo habitat trees (Table 13) and of these, three trees (Tree No. 2, 7 and 9) contained hollows potentially suitable for black cockatoos (highlighted green). Black cockatoos are known to utilise hollows that have a vertical to near-vertical orientation and have an entrance diameter of at least 100 mm (Cherriman, 2022). The hollows in these three trees had entrance diameters of approximately 200 mm and were vertical to near-vertical in orientation. Although these hollows are considered potentially suitable for use by black cockatoos, there was no evidence of current or past use (i.e. no scats, chew marks, rubbing or feathers were present at these locations).

Examples of habitat trees and hollows observed are shown in Figure 10 and 11 and the locations of all recorded habitat trees are showing in Figure 12 and 13. Data is provided in Appendix 7.

**Table 13:** Black cockatoo habitat trees within the construction development envelope, green highlighted trees have hollows present

| Tree No | Scientific Name | DBH (mm) | Condition | Hollows Present | Location of hollow | Size of hollow | Type of entrance | Comment | Suitability |
|---|---|---|---|---|---|---|---|---|---|
| 2 | *Dead* sp. | 500 | Dead | 3x Hollows | Mid Tree | 200mm | Chimney | 2x Pink and Grey Galahs | Potentially |
| 3 | *Eucalyptus longicornis* | 650 | Good | No | | | | | No |
| 4 | *Eucalyptus loxophleba* subsp. *loxophleba* | 505 | Good | No | | | | Bird Nest Present | No |
| 5 | *Dead* sp. | 450 | Dead | No | | | | | No |
| 6 | *Dead* sp. | 530 | Dead | No | | | | | No |
| 7 | *Eucalyptus longicornis* | 885 | Poor | 2x Hollows | Top of Tree | 200mm | Chimney, Side | Bird Nest, Photo 5931 | Potentially |
| 9 | *Eucalyptus loxophleba* subsp. *loxophleba* | 805 | Good | 1x Chimney Hollow | Mid Tree | 200mm | Chimney | | Potentially |
| 10 | *Eucalyptus longicornis* | 715 | Good | No | | | | | No |
| 16 | *Eucalyptus loxophleba* subsp. *loxophleba* | 750 | Good | No | | | | | No |

**Figure 10:** Examples of habitat trees observed

Example of bird nests

Example of bird nests

Example of potential suitable sized hollow

Example of potential suitable sized hollow

**Figure 11:** Examples of bird nests and hollows observed

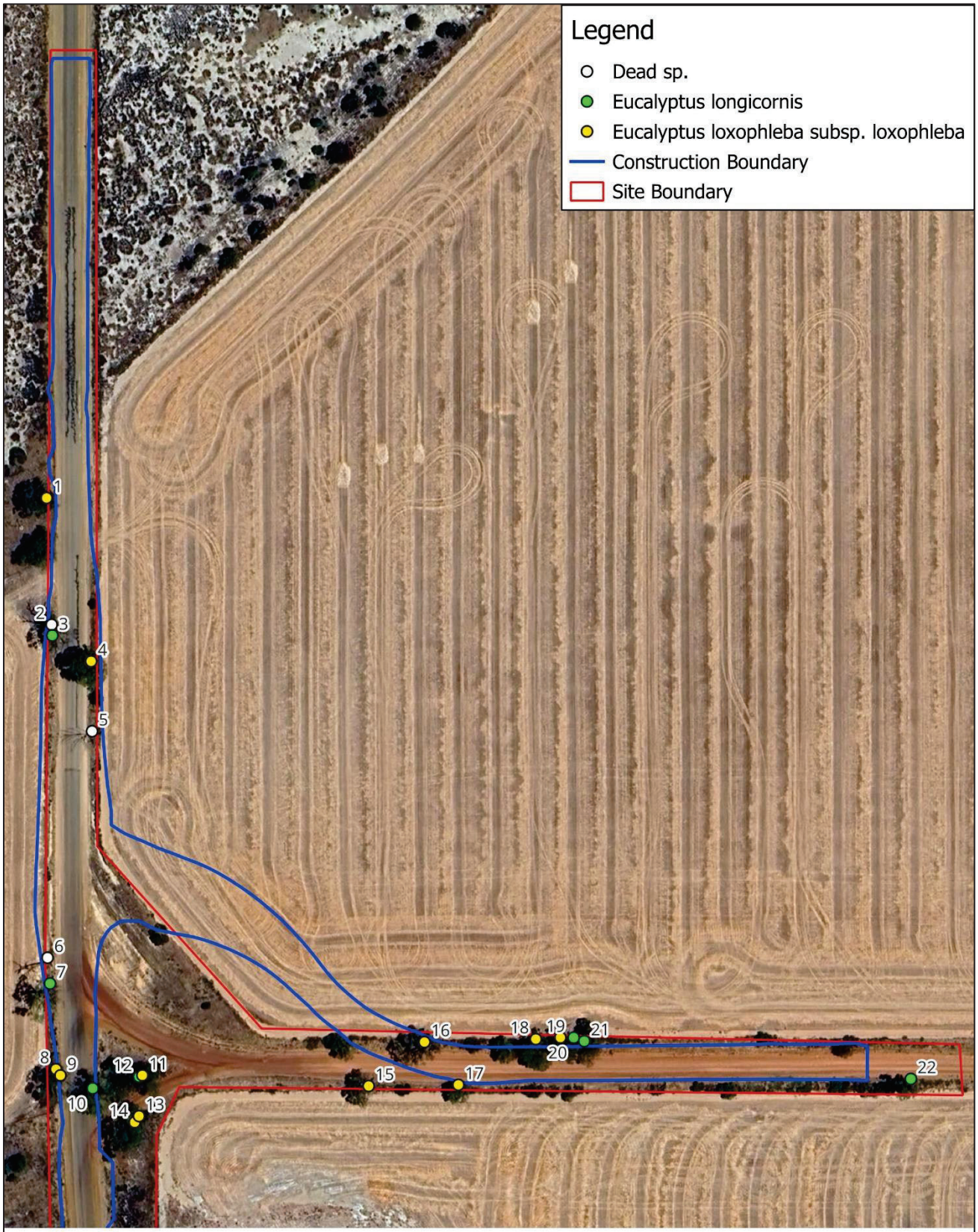


**Figure 12:**
Potential Black Cockatoo Trees
Dowerin-Meckering Rd, Dowerin

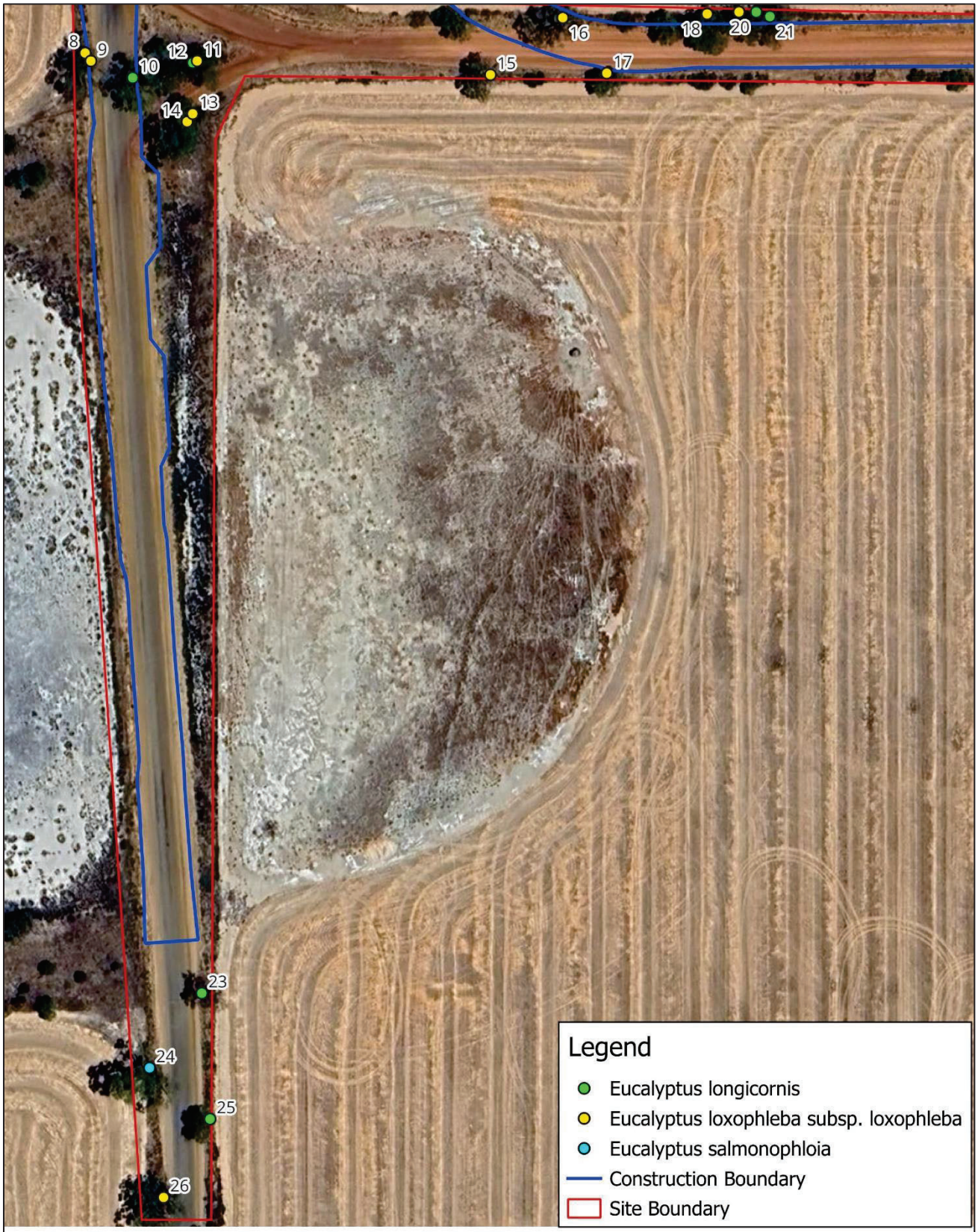


**Figure 13:**
Potential Black Cockatoo Trees
Dowerin-Meckering Rd, Dowerin

# 6.0 Implications of Results

## 6.1 Flora and Vegetation

Two vegetation types were recorded during the 2023 surveys, *Eucalyptus loxophleba s*ubsp. *loxophleba* and *Eucalyptus longicornis* Open Woodland and Tecticornia Dampland. Vegetation condition on site ranged from good to completely degraded, with the majority of the survey area in a degraded condition (84.62%). A total of 68 flora species (taxa) were recorded from 20 families across both field surveys, comprising of 36 introduced (52.94%) species and 32 (47.06%) native species.

A total of two species (3.17%) were unable to be identified to species level due to a lack of diagnostic characteristics present at the time of the survey, these were able to be identified to genus level. The unidentified *Tecticornia* sp.1 and sp.2 are not considered to be Threatened or Priority flora following comparison with desktop data.

The Poaceae sp. and *Acacia* sp. from the March survey were collected during the spring 2023 survey and were taken to the Western Australian herbarium for identification. These species were not identified as conservation significant flora species.

### 6.1.1 Vegetation Clearing

Clearing of roadside vegetation was undertaken by the Shire along Hindmarsh Back Road prior to the spring 2024 survey. This was conducted in accordance with native vegetation clearing exemptions, specifically Regulation 5, Item 22, of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Department of Environment Regulation, 2015) (Figure 14), for drainage maintenance within the maintenance zone (top of the back slope). Three native species were removed from the survey area during this clearing; *Acacia acuminata* (Jam)*, Acacia eremophila* subsp. *eremophila* and *Conostylis* sp. The *Acacia acuminata* (Jam) and *Acacia eremophila* subsp. *eremophila* are common within the area and within roadside verges within the Shire of Dowerin. No habitat trees were cleared. In Quadrat 1, two species were no longer present and in Quadrat 2, ten species were no longer present. The difference between quadrat data from March to spring 2023 is shown in Appendices 4 and 5. The extent of clearing has not been mapped.

**Figure 14:** Examples of areas that have been partially cleared within the survey area (Quadrat 1 and 2, respectively)

## 6.2 Significant Flora

No significant flora was recorded during the 2023 March and spring survey. However, during the March 2023 survey, a *Conostylis* sp. was recorded which had the potential to be a conservation significant flora species, *Conostylis caricina* subsp. *Elachys*; this species was identified in the desktop survey. However, there were limited diagnostic features present during the out of season March 2023 survey to confirm identification and therefore further field surveys were required to confirm identification. During the spring 2023 survey, the *Conostylis* sp. was no longer present on site. As a result, the identification of this species was unable to be confirmed.

Natural Area conducted two surveys (in March and September 2024) to increase the chances of encountering conservation significant flora species during their respective flowering periods. Of the 29 conservation significant flora species identified in the desktop survey as being likely to occur within the survey boundary, 16 species had flowering periods outside of the survey periods. All of these species (16) are perennial shrub and herb species for which identification would have been possible outside of their flowering periods due to distinct morphological characteristics including growth habit and leaf structure. The remaining species, *Goodenia verreauxii,* has limited information available within databases such as FloraBase. As members of this genus can often be small in size and difficult to identify in the absence of flowers, this species has the potential to occur on site and not have been detected during the surveys.

## 6.3 Threatened Ecological Communities

Of the three ecological communities identified during the desktop survey, one TEC was identified as occurring within the site (*Eucalyptus Woodlands of the Western Australian Wheatbelt*) and one PEC and one TEC were considered unlikely to be present (*Perched wetlands of the Wheatbelt region with extensive stands of living Swamp Sheoak (Casuarina obesa) and Paperbark (Melaleuca strobophylla) across the lake floor* TEC; and *Canegrass perched clay wetlands of the wheatbelt dominated by Eragrostis australasica and Melaleuca strobophylla across the lake floor* PEC).

As the *Eucalyptus loxophleba s*ubsp*. loxophleba* and *Eucalyptus longicornis* Open Woodland vegetation type met the key diagnostic criteria and condition thresholds it is considered to be part of the *Eucalyptus Woodlands of the Western Australian Wheatbelt* TEC.

The survey criteria and condition thresholds have not been defined for the *Perched wetlands of the Wheatbelt region with extensive stands of living Swamp Sheoak (Casuarina obesa) and Paperbark (Melaleuca strobophylla) across the lake floor* TEC or the *Canegrass perched clay wetlands of the wheatbelt dominated by Eragrostis australasica and Melaleuca strobophylla across the lake floor* PEC. However, based on the results of this survey it was considered unlikely that these ecological communities were present due to the key dominant species associated with this TEC and PEC not being recorded within the survey boundary. However, it should be noted that this PEC could potentially be present in the areas surrounding the wetland basins that are adjacent to the survey boundary. This area was not surveyed as it was not part of the survey area requested by the Shire.

A TEC/PEC assessment of these surrounding wetland basins would be required to ascertain whether the *Tetricornia* Damplands vegetation type is a degraded edge of the potentially adjacent *Perched wetlands of the Wheatbelt region with extensive stands of living Swamp Sheoak (Casuarina obesa) and Paperbark (Melaleuca strobophylla) across the lake floor* TEC and/or the *Canegrass perched clay wetlands of the wheatbelt dominated by Eragrostis australasica and Melaleuca strobophylla across the lake floor* PEC.

## 6.4 Black Cockatoo Habitat Assessment

A total of 26 trees were identified which satisfy the Commonwealth requirements for potential black cockatoo habitat trees (DBH > 300 mm). The trees recorded included *Eucalyptus longicornis (*Red Morrel, 34.6 %), *Eucalyptus loxophleba* subsp. *loxophleba* (York Gum, 50%), *Eucalyptus salmonophloia* (Salmon Gum, 3.9%) and dead stags (11.5 %). *Eucalyptus salmonophloia* is known to have high foraging and nesting value (DEC, 2011) for black cockatoo species, while *Eucalyptus loxophleba* subsp. *loxophleba* and *Eucalyptus longicornis* is considered to have low foraging and breeding value.

A total of nine trees that satisfied the Commonwealth guidelines for black cockatoo habitat trees are located within the construction development envelope. Of these, three trees (Tree ID 2, 7 and 9) contained potentially suitable hollows, based on their entrance diameter and orientation meeting the characteristics required for black cockatoo breeding. Internal hollow inspections would be required to confirm hollow characteristics such as internal hollow depth and structure and therefore to confirm their suitability for breeding by black cockatoos. No signs of hollow usage by black cockatoos were identified during the survey.

## 6.5 Assessment Against Clearing Principles

An assessment of information obtained during the 2023 survey has been made against the Western Australian 10 clearing principles. It is suggested that the clearing application may be at variance with six (A, B, C, D, E, and F) of the ten clearing principles (Table 16).

**Table 16:** Assessment against the clearing principles

| Clearing Principles | | Comment |
|---|---|---|
| **A** | Native vegetation should not be cleared if it comprises a high level of biological diversity | The proposed survey area to be cleared may be at variance with this principle:<br>▪ the survey area recorded a total of 68 flora species (taxa) from 20 families, including 36 introduced (weed) species and 32 native species, across two vegetation types<br>▪ vegetation condition was Good to Completely Degraded, with the majority being Degraded (84.62%)<br>▪ no conservation significant flora species were recorded in March and September 2023 |
| **B** | Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia | The proposed site to be cleared may be at variance with this principle:<br>▪ no Black Cockatoo individuals or evidence of feeding or roosting were observed during survey activities<br>▪ no signs of usage by black cockatoos were identified in any of the hollows<br>▪ a total of 26 potential habitat trees (DBH ≥ 300 mm) were recorded within the survey area and only nine potential habitat trees were recorded within the construction development envelope<br>▪ only three trees contained potentially suitable hollows for black cockatoos construction development envelope.<br>▪ trees recorded included *Eucalyptus longicornis (*Red Morrel, 34.6 %), *Eucalyptus loxophleba* subsp. *loxophleba* (York Gum, 50%), *Eucalyptus salmonophloia* (Salmon Gum, 3.9%) and Dead stags (11.5 %)<br>▪ *Eucalyptus salmonophloia* is known to have high foraging and nesting value (DEC, 2011), while *Eucalyptus loxophleba* subsp. *loxophleba* and *Eucalyptus longicornis* is considered to have low foraging and breeding value |
| **C** | Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora. | The proposed site to be cleared may be at variance with this principle:<br>▪ the desktop survey identified the possibility for the presence of 29 threatened flora species<br>▪ sixteen species have flowering periods outside of the survey period, majority of these species (16) are perennial shrub and herb species for which identification would have been possible outside of their flowering periods |

| Clearing Principles | | Comment |
|---|---|---|
| | | ▪ *Goodenia verreauxii,* has limited information available within databases such as FloraBase. This species was not encountered during the survey, however, as members of this genus can often be small in size and difficult to identify in the absence of flowers, this species has the potential to occur on site and not have been detected during the surveys. |
| **D** | Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community | The proposed site to be cleared may be at variance with this principle:<br>▪ of the three ecological communities identified during the desktop survey, one TEC was identified as occurring within the site: *Eucalyptus Woodlands of the Western Australian Wheatbelt*<br>▪ the other two ecological communities (*Perched wetlands of the Wheatbelt region with extensive stands of living Swamp Sheoak (Casuarina obesa) and Paperbark (Melaleuca strobophylla) across the lake floor* TEC; and *Canegrass perched clay wetlands of the wheatbelt dominated by Eragrostis australasica and Melaleuca strobophylla across the lake floor* PEC) were considered unlikely to be present, however further surveys and analysis of the wetland basins outside of the survey area would be required to confirm their presence/absence, and whether the *Tetricornia* Damplands vegetation type is a degraded edge of the ecological communities. |
| **E** | Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared. | The proposed site to be cleared may be at variance with this clearing principle:<br>▪ the proposed clearing occurs within the Wheatbelt which has been extensively cleared historically for farming practices<br>▪ the survey site resides within the Goomalling 694 vegetation association. The pre-European extent of these vegetation complexes remaining is:<br>o 5.72 within the Shire of Dowerin<br>o 6.26% within the Avon Wheatbelt (Government of Western Australia, 2019). |
| **F** | Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland. | The proposed site to be cleared may be at variance with this clearing principle:<br>▪ the survey site occurs between two different named wetlands, Mortlock Basin 56a and Mortlock Basin 56b which are both described as Peripheral (DBCA 2023b). |
| **G** | Native Vegetation should not be cleared if the clearing of the vegetation is likely to cause | The proposed site to be cleared is not likely to be at variance with this clearing principle: |

| Clearing Principles | | Comment |
|---|---|---|
| | appreciable land degradation. | ▪ the proposed clearing is not expected to cause further land degradation as the site occurs along an existing roadway and is surrounded by land which is used for farming practices. |
| **H** | Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area. | The proposed site to be cleared is not likely to be at variance with this clearing principle:<br>▪ the proposed clearing is not expected to impact adjacent or nearby conservation areas as the site is not located in close proximity to any conservation areas and is predominantly bordered by agricultural land-uses. |
| **I** | Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or groundwater. | The proposed site to be cleared is not likely to be at variance with this clearing principle:<br>▪ the proposed clearing is not expected to cause deterioration in the quality of surface or underground water as the site occurs along an existing road within the road reserve<br>▪ There is the potential for clearing of the site to impact water quality through road run-off and machinery spills/contamination, the development of a management plan and strategy is recommended to aid with the mitigation. |
| **J** | Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding. | The proposed site to be cleared is not likely to be at variance with this clearing principle:<br>▪ the proposed clearing is not expected to cause, or exacerbate, the incidence of flooding as the site is occurring along an existing road within the road reserve and the design of the proposed upgraded road should allow for water management/ development of a management plan<br>▪ there is a potential for water run-off to increase as a result of the loss of large, established trees during clearing, however this is not expected to have a significant impact or result in an increased risk of flooding. |

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# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 24-Feb-2023

# Summary

## Matters of National Environment Significance

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

| | |
|---|---|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance (Ramsar | None |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | 1 |
| Listed Threatened Species: | 36 |
| Listed Migratory Species: | 8 |

## Other Matters Protected by the EPBC Act

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

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

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

| | |
|---|---|
| Commonwealth Lands: | 7 |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 14 |
| Whales and Other Cetaceans: | None |
| Critical Habitats: | None |
| Commonwealth Reserves Terrestrial: | None |
| Australian Marine Parks: | None |
| Habitat Critical to the Survival of Marine Turtles: | None |

## Extra Information

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

| | |
|---|---|
| State and Territory Reserves: | 12 |
| Regional Forest Agreements: | None |
| Nationally Important Wetlands: | None |
| EPBC Act Referrals: | 1 |
| Key Ecological Features (Marine): | None |
| Biologically Important Areas: | None |
| Bioregional Assessments: | None |
| Geological and Bioregional Assessments: | None |

# Details

## Matters of National Environmental Significance

### Listed Threatened Ecological Communities [ Resource Information ]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

| Community Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Eucalypt Woodlands of the Western Australian Wheatbelt | Critically Endangered | Community likely to occur within area | In feature area |

### Listed Threatened Species [ Resource Information ]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| BIRD | | | |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area | In feature area |
| Falco hypoleucos<br>Grey Falcon [929] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Leipoa ocellata<br>Malleefowl [934] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Pezoporus occidentalis<br>Night Parrot [59350] | Endangered | Species or species habitat may occur within area | In buffer area only |
| Rostratula australis<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat may occur within area | In feature area |
| Zanda latirostris listed as Calyptorhynchus latirostris<br>Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737] | Endangered | Breeding likely to occur within area | In feature area |
| MAMMAL | | | |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Dasyurus geoffroii<br>Chuditch, Western Quoll [330] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Phascogale calura<br>Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor [316] | Vulnerable | Species or species habitat likely to occur within area | In buffer area only |
| PLANT | | | |
| Acacia ataxiphylla subsp. magna<br>Large-fruited Tammin Wattle [64823] | Endangered | Species or species habitat known to occur within area | In feature area |
| Acacia cochlocarpa subsp. cochlocarpa<br>Spiral-fruited Wattle [23877] | Endangered | Species or species habitat known to occur within area | In feature area |
| Acacia cochlocarpa subsp. velutinosa<br>Velvety Spiral Pod Wattle [65112] | Critically Endangered | Species or species habitat likely to occur within area | In feature area |
| Acacia leptoneura<br>[15610] | Critically Endangered | Species or species habitat known to occur within area | In buffer area only |
| Acacia volubilis<br>Tangled Wattle, Tangle Wattle [6476] | Endangered | Species or species habitat may occur within area | In feature area |
| Andersonia gracilis<br>Slender Andersonia [14470] | Endangered | Species or species habitat known to occur within area | In feature area |
| Caladenia drakeoides<br>Hinged Dragon Orchid [68687] | Endangered | Species or species habitat may occur within area | In buffer area only |
| Calectasia pignattiana<br>Stilted Tinsel Lily [82018] | Vulnerable | Species or species habitat known to occur within area | In buffer area only |
| Conostylis wonganensis<br>Wongan Conostylis [10906] | Endangered | Species or species habitat known to occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Dasymalla axillaris<br>Native Foxglove [38829] | Critically Endangered | Species or species habitat may occur within area | In feature area |
| Daviesia euphorbioides<br>Wongan Cactus [3477] | Endangered | Species or species habitat known to occur within area | In feature area |
| Eremophila resinosa<br>Resinous Eremophila [11735] | Endangered | Species or species habitat may occur within area | In feature area |
| Eremophila viscida<br>Varnish Bush [2394] | Endangered | Species or species habitat may occur within area | In buffer area only |
| Eucalyptus recta<br>Silver Mallet [56430] | Endangered | Species or species habitat may occur within area | In buffer area only |
| Frankenia conferta<br>Silky Frankenia [6074] | Endangered | Species or species habitat may occur within area | In buffer area only |
| Gastrolobium appressum<br>Scale-leaf Poison [7358] | Vulnerable | Species or species habitat may occur within area | In buffer area only |
| Gastrolobium hamulosum<br>Hook-point Poison [9212] | Endangered | Species or species habitat may occur within area | In buffer area only |
| Grevillea dryandroides subsp. hirsuta<br>Hairy Phalanx Grevillea [64577] | Endangered | Species or species habitat known to occur within area | In feature area |
| Grevillea pythara<br>Pythara Grevillea [64525] | Endangered | Species or species habitat may occur within area | In buffer area only |
| Hemiandra rutilans<br>Sargents Snakebush, Colourful Snakebush [17932] | Endangered | Species or species habitat may occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Lysiosepalum abollatum | | | |
| Woolly Lysiosepalum [83216] | Critically Endangered | Species or species habitat may occur within area | In buffer area only |
| Melaleuca sciotostyla | | | |
| Wongan Melaleuca [24324] | Endangered | Species or species habitat known to occur within area | In buffer area only |
| Microcorys eremophiloides | | | |
| Wongan Microcorys [3498] | Vulnerable | Species or species habitat may occur within area | In buffer area only |
| Roycea pycnophylloides | | | |
| Saltmat [21161] | Endangered | Species or species habitat likely to occur within area | In feature area |
| Verticordia hughanii | | | |
| Hughan's Featherflower [11434] | Endangered | Species or species habitat known to occur within area | In feature area |
| Verticordia staminosa subsp. staminosa | | | |
| Wongan Featherflower [55825] | Endangered | Species or species habitat likely to occur within area | In buffer area only |
| REPTILE | | | |
| Egernia stokesii badia | | | |
| Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483] | Endangered | Species or species habitat known to occur within area | In feature area |
| SPIDER | | | |
| Idiosoma nigrum | | | |
| Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798] | Vulnerable | Species or species habitat known to occur within area | In feature area |

## Listed Migratory Species [ Resource Information ]

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Migratory Marine Birds | | | |
| Apus pacificus | | | |
| Fork-tailed Swift [678] | | Species or species habitat likely to occur within area | In feature area |
| Migratory Terrestrial Species | | | |
| Motacilla cinerea | | | |
| Grey Wagtail [642] | | Species or species habitat may occur within area | In feature area |
| Migratory Wetlands Species | | | |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat may occur within area | In feature area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat known to occur within area | In feature area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area | In feature area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area | In feature area |
| Calidris ruficollis<br>Red-necked Stint [860] | | Species or species habitat known to occur within area | In buffer area only |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | | Species or species habitat may occur within area | In buffer area only |

## Other Matters Protected by the EPBC Act

### Commonwealth Lands [ Resource Information ]

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

| Commonwealth Land Name | State | Buffer Status |
|---|---|---|
| Unknown | | |
| Commonwealth Land - [52047] | WA | In buffer area only |
| Commonwealth Land - [52040] | WA | In buffer area only |
| Commonwealth Land - [52135] | WA | In buffer area only |
| Commonwealth Land - [52221] | WA | In buffer area only |
| Commonwealth Land - [50987] | WA | In buffer area only |
| Commonwealth Land - [52206] | WA | In buffer area only |
| Commonwealth Land - [51612] | WA | In buffer area only |

| Listed Marine Species | | | [ Resource Information ] |
|---|---|---|---|
| Scientific Name | Threatened Category | Presence Text | Buffer Status |
| Bird | | | |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat may occur within area | In feature area |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area overfly marine area | In feature area |
| Bubulcus ibis as Ardea ibis<br>Cattle Egret [66521] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat known to occur within area | In feature area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area overfly marine area | In feature area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Calidris ruficollis<br>Red-necked Stint [860] | | Species or species habitat known to occur within area overfly marine area | In buffer area only |
| Chalcites osculans as Chrysococcyx osculans<br>Black-eared Cuckoo [83425] | | Species or species habitat known to occur within area overfly marine area | In feature area |
| Charadrius ruficapillus<br>Red-capped Plover [881] | | Species or species habitat known to occur within area overfly marine area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Merops ornatus<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Motacilla cinerea<br>Grey Wagtail [642] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Rostratula australis as Rostratula benghalensis (sensu lato)<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat may occur within area overfly marine area | In feature area |
| Thinornis cucullatus as Thinornis rubricollis<br>Hooded Plover, Hooded Dotterel [87735] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | | Species or species habitat may occur within area overfly marine area | In buffer area only |

## Extra Information

### State and Territory Reserves [ Resource Information ]

| Protected Area Name | Reserve Type | State | Buffer Status |
|---|---|---|---|
| Amery | Nature Reserve | WA | In buffer area only |
| Eaton | Nature Reserve | WA | In buffer area only |
| Hindmarsh | Nature Reserve | WA | In buffer area only |
| Minnivale | Nature Reserve | WA | In buffer area only |
| Namelcatchem | Nature Reserve | WA | In buffer area only |
| NTWA Bushland covenant (0123) | Conservation Covenant | WA | In buffer area only |
| Unnamed WA04315 | 5(1)(h) Reserve | WA | In buffer area only |
| Unnamed WA06557 | Nature Reserve | WA | In buffer area only |
| Unnamed WA15461 | 5(1)(h) Reserve | WA | In buffer area only |
| Unnamed WA17710 | Nature Reserve | WA | In buffer area only |

| Protected Area Name | Reserve Type | State | Buffer Status |
|---|---|---|---|
| Unnamed WA21475 | Nature Reserve | WA | In buffer area only |
| Unnamed WA47960 | Nature Reserve | WA | In buffer area only |

## EPBC Act Referrals

[ Resource Information ]

| Title of referral | Reference | Referral Outcome | Assessment Status | Buffer Status |
|---|---|---|---|---|
| Not controlled action | | | | |
| Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia | 2015/7522 | Not Controlled Action | Completed | In feature area |

# Caveat

## 1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

## 2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

## 3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

## 4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

# Acknowledgements

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

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

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

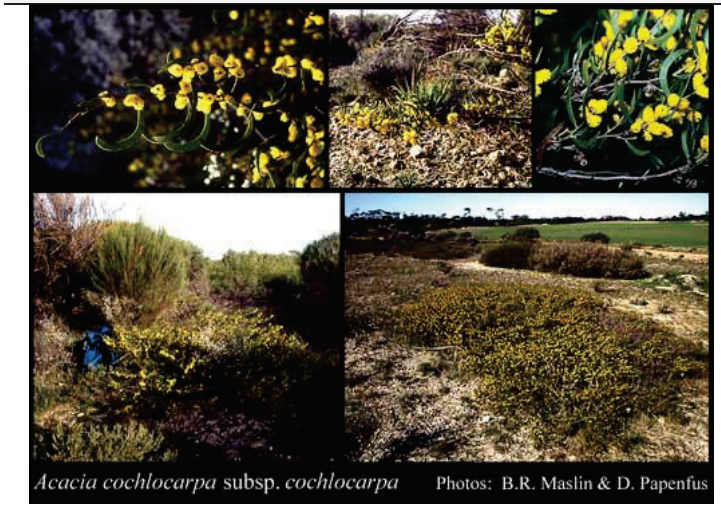
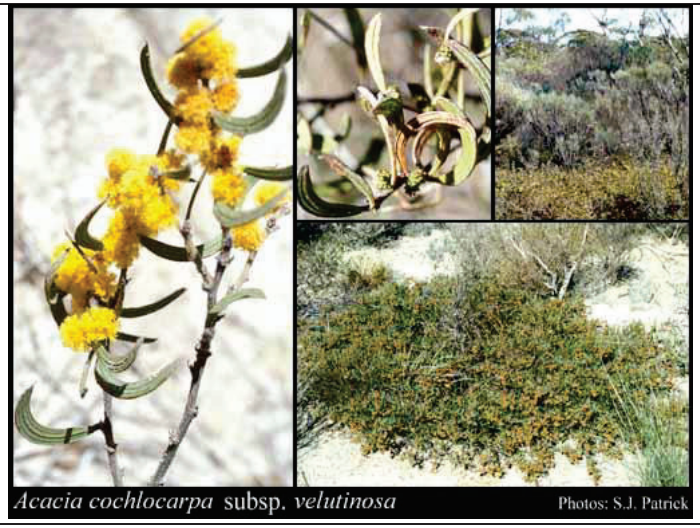
Please feel free to provide feedback via the Contact us page.


Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

## Appendix 2: Significant Species

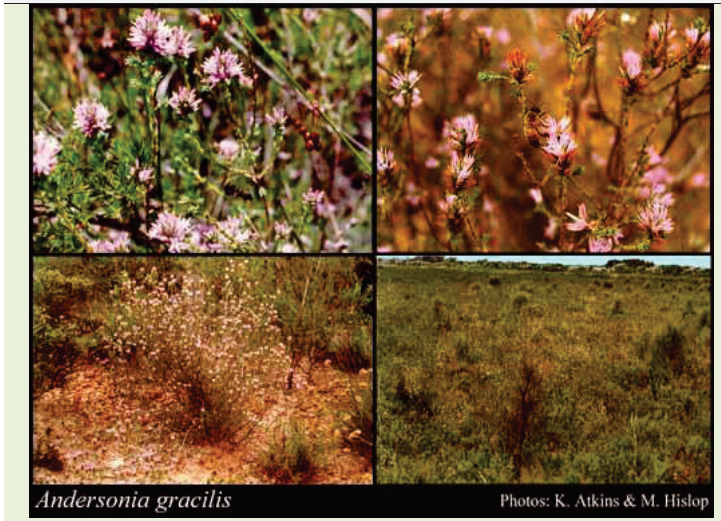
| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | | Spreading to ascending shrub, 0.3-0.6 m high. | Fl. yellow, Jun to Jul. | Sandy soils. Lateritic ironstone rises, flats. | T | Y | Geographic location |

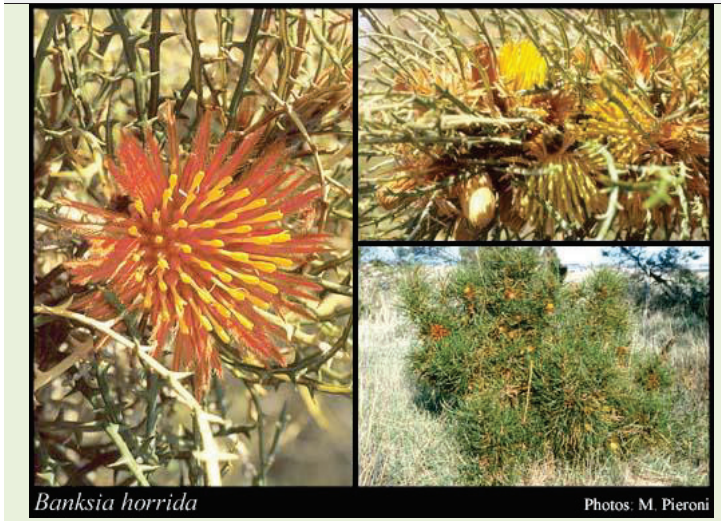
| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | | Dense, rigid, spreading shrub, 0.1-0.6 m high. | Fl. yellow, Jul to Aug. | Lateritic gravelly soils. | P3 | Y | Geographic location |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | | Glabrous, sprawling shrub, 0.3-0.7(-1.5) m high. | Fl. yellow. | Clayey, sandy, often gravelly soils. | T | N | |
|  | | Velutinous, sprawling shrub, 0.3-0.7(-1.5) m high. | Fl. yellow. | Sandy clay or laterite. | T | N | |

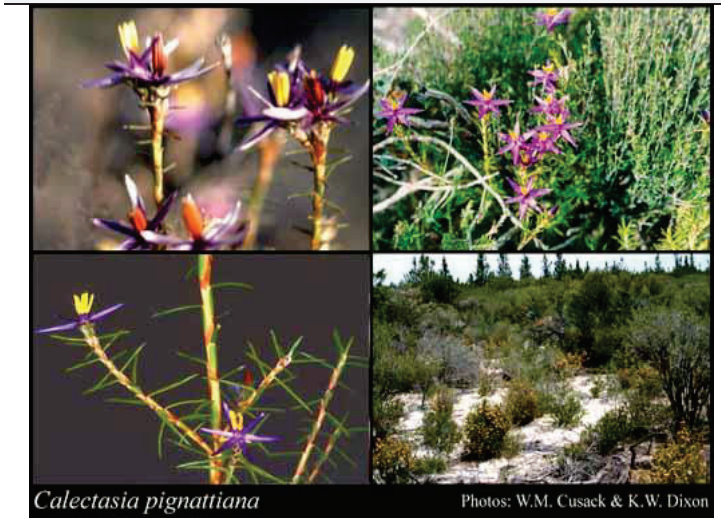
| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
| *Acacia leptoneura* | | Domed shrub with globular flowering heads which are simple and 1 or 2 per axil. | | | T | Y | Geographic location |
|  | | Bushy procumbent, spreading shrub, ca 0.5 m high, to 1.2 m wide. | Fl. yellow. | Yellow sand, clayey loam. Sandplains. | P2 | Y | Geographic location |

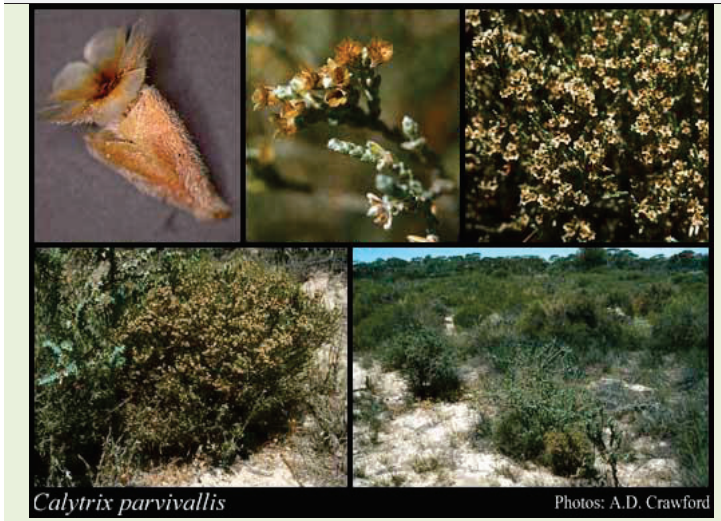
| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | | Intricately branched, sprawling or compact, pungent shrub, 0.3-0.6(-0.8) m high. | Fl. yellow, Apr to Jun. | Yellow or white sand, often over laterite. Flats, hillsides. | P3 | Y | Geographic location |
|  | | Dense, compact, domed, wiry, entangled shrub, 0.3-0.4 m high, to 1 m wide. | Fl. yellow, Jun. | Gravelly sand, sandy clay. | T | N | |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | | Slender erect or open straggly shrub, 0.1-0.5(-1) m high. | Fl. white-pink-purple, Sep to Nov. | White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps. | T | Y | Habitat may be suitable |
| *Austrostipa frankliniae* (syn. *Austrostipa* sp. Dowerin) | | Perennial tussock grass, 250–400 mm tall with a basal tuft of leaves. Seed: Falcate awns with brown lemma hairs (all other members of this subgenus have white lemma hairs). (Williams, 2022) | Spring, fruiting late spring to early summer. (Williams, 2022) | | P2 | Y | Geographic location |

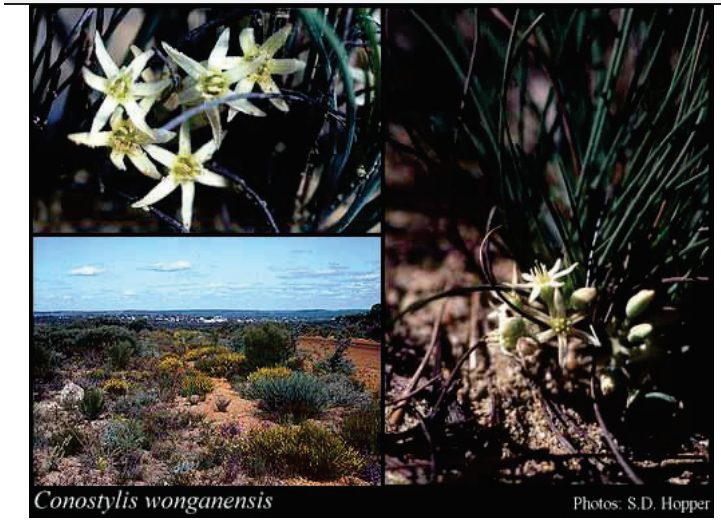
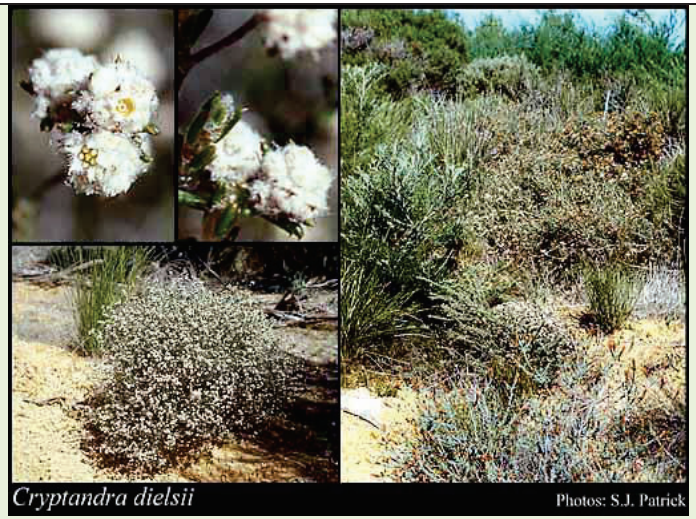
| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | | Upright, lignotuberous shrub, 0.6-1.6 m high. | Fl. yellow-orange, Apr to Jun or Aug. | Sand, sometimes with gravel. | P3 | Y | Geographic location |
| *Banksia nivea* subsp. Morangup | | Non-lignotuberous shrub, 0.15-1.5 m high. | Fl. cream-yellow-orange-pink/red-brown, Apr. | | P2 | N | |

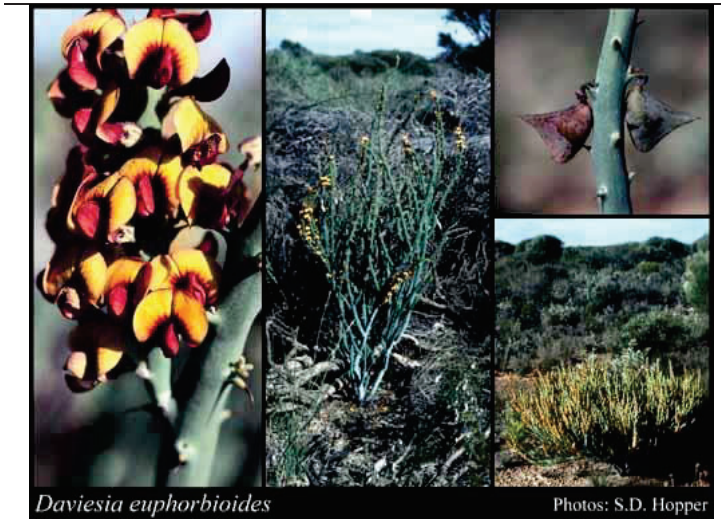
| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  *Bossiaea atrata* Photos: J.M. Collins | | Compact, dense, intricately-branched, rigid, spinescent herb, to 1.2 m high. | Fl. orange-yellow-red-brown, May to Aug | White sand or sandy loam over laterite or clay, quartzite sand, clay. | P3 | Y | Geographic location |
|  *Caladenia drakeoides* Photos: I & M Greeve, A.P. Brown & S.D. Hopper | Hinged Dragon Orchid | Tuberous, perennial, herb, 0.12-0.3 m high. | Fl. green, Sep to Oct. | Grey clayey sand, red sandy loam, in damp situations. Margins of salt lakes. | T | Y | Potentially suitable habitat |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | | Rhizomatous, prickly herb, to 0.5 m high. | Fl. blue-purple, Aug to Oct. | Sand to sandy clay over granite or laterite, gravel. Plains and gentle slopes. | T | N | |
|  | | Erect, spreading shrub, 0.3-0.6(-0.8) m high. | Fl. red, Jan to Feb or Apr. | White/grey or yellow sand. | P4 | N | |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | | Shrub, 0.25-0.5 m high. | Fl. purple, Oct. | Sand, loam. | P2 | Y | Potentially suitable habitat |
|  | | Sprawling, prostrate or decumbent shrub. | Fl. yellow & red/brown, Jul to Sep. | Sandy clay or loam. Plains. | T | Y | Potentially suitable habitat/ geographic location |

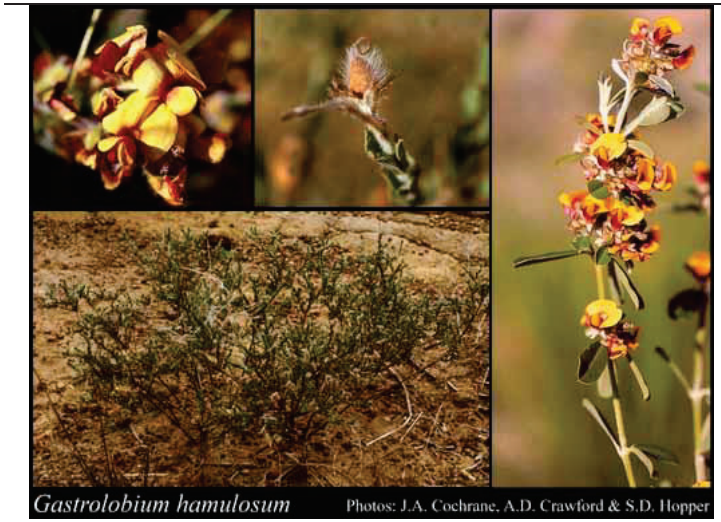
| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | | Spreading, intricately branched shrub, 0.3-1 m high. | Fl. blue, Aug to Oct. | Deep white sand, sandy clay loam. | P3 | Y | Potentially suitable habitat/ geographic location |
| *Conostylis caricina* subsp. *elachys* | | Rhizomatous, tufted perennial, grass-like or herb, 0.05-0.1 m high. | Fl. cream-yellow, Jul to Aug. | Gravel, clayey loam, sand. | P1 | | Potentially suitable habitat/ geographic location |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | Wongan Conostylis | Rhizomatous, tufted perennial, grass-like or herb, 0.08-0.17 m high. | Fl. cream-yellow, Jul to Sep. | Yellow sand, sandy clay. | T | N | Geographic range |
|  | | Intricately branched, spreading shrub, 0.2-0.6 m high. | Fl. white, Jul to Sep. | Sand, often over laterite. Sandplains. | P3 | Y | Potentially suitable habitat/ geographic location |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
| *Dasymalla axillaris* | Native Foxglove | | | | T | N | Geographic range |
|  | Wongan Cactus | Shrub, 0.4-0.8 m high. | Fl. yellow & red, Jul to Sep.. | Clayey sand, sandy gravel. Flats, sandplains | T | N | |
| *Daviesia nudiflora* subsp. *amplectens* | | Bushy shrub, 0.3-1.5 m high. | Fl. orange/yellow & red, Jul to Aug. | Clayey sand, laterite. Flats. | P1 | Y | Habitat may be suitable |
| *Daviesia nudiflora* subsp. *drummondii* | | Bushy shrub, 0.3-1.5 m high. | Fl. orange/yellow & red, Jul to Aug. | White or grey sand. Undulating low rises. | P3 | Y | Habitat may be suitable |
| *Daviesia smithiorum* | | Many-stemmed shrub, to 0.5 m high. | | | P2 | Y | Geographic range |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | Resinous Eremophila | Spreading shrub, 0.4-0.8 m high, to 1 m wide. | Fl. blue-purple-white, Apr or Oct to Nov. | Clay loam, gravelly sandy clay. Road verges. | T | N | Geographic range |
|  | Varnish Bush | Shrub, 1.2-4 m high. | Fl. green-white-yellow, Sep to Nov. | Granitic soils, sandy loam. Stony gullies, sandplains. | T | N | |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
| *Eucalyptus erythronema* subsp. *inornata* | Yellow-flowered Mallee | | | | P3 | Y | Geographic location |
| *Eucalyptus recta* | Mt Yule Silver Mallet | Tree, to 15 m high, bark smooth. | | Sandy laterite. | T | N | Geographic range |
| *Eutaxia rubricarina* | | Straggling shrub, to 0.5 m high. | Fl. Orange & yellow & brown, Aug or Oct. | Gravelly sand, grey to pinkish-white sandy clay, red loam. Flats, slopes, valley floors, road verges. | P3 | Y | Habitat may be suitable |
| *Frankenia conferta* | Silky Frankenia | Small shrub. Leaves and calyx covered with short, soft hairs. The stalkless, linear leaves are clustered at the nodes of the stem (DEC 2009). | October | Clayey soils on the edge of salt lakes (DEC 2009) | T | N | Geographic location |

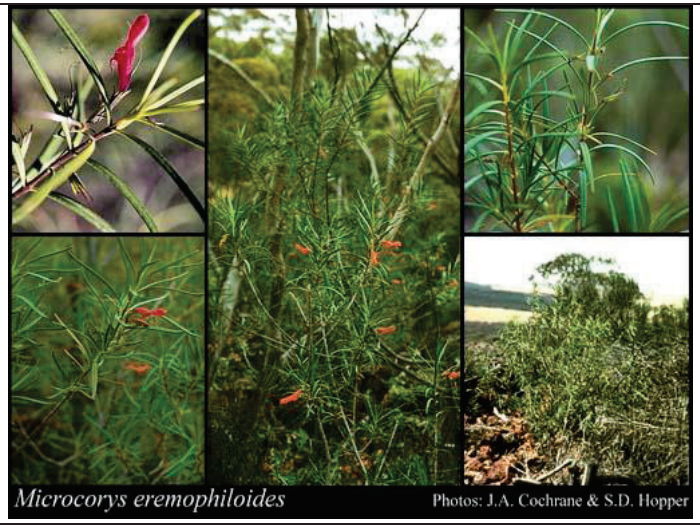
| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | Scaleleaf Poison | Erect shrub, to 0.3 m high. | Fl. Yellow & orange & red & purple, Aug to Dec. | White/yellow sand with quartz gravel. Sandplains, low rises. | T | N | Geographic range |
|  | Hookpoint Poison | Low shrub, 0.2-0.45 m high. | Fl. Yellow & orange & red & purple, Aug to Oct. | Sandy, often gravelly soils or clay. Flats, slopes, ridges. | T | N | Geographic range |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
| *Goodenia verreauxii* | Spindly Verreauxia | | | | P4 | Y | Geographic range may be suitable |
|  | | Prostrate, vigorously suckering shrub, 0.05-0.3 m high. | Fl. red/pink-red, May or Sep to Nov. | White or yellow sand, laterite. | T | Y | Habitat may be suitable |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | | Suckering shrub, 0.06-0.3 m high. | Fl. orange & red & blue, May to Oct (possibly all year). | Sand or sandy loam with gravel. | T | N | Geographic range |
| *Grevillea roycei* | | Erect to spreading shrub, 1.2-2.1 m high. | Fl. white, Aug to Oct. | White or yellow sand. | P3 | Y | Habitat may be suitable/geographic range |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | Colourful Snakebush | Prostrate to ascending shrub, 0.08-0.3 m high. | Fl. red-purple-pink, Oct to Nov. | Yellow/grey sand. | T | N | Geographic range |
| *Hibbertia leptopus* | | | | | P2 | N | Geographic range |

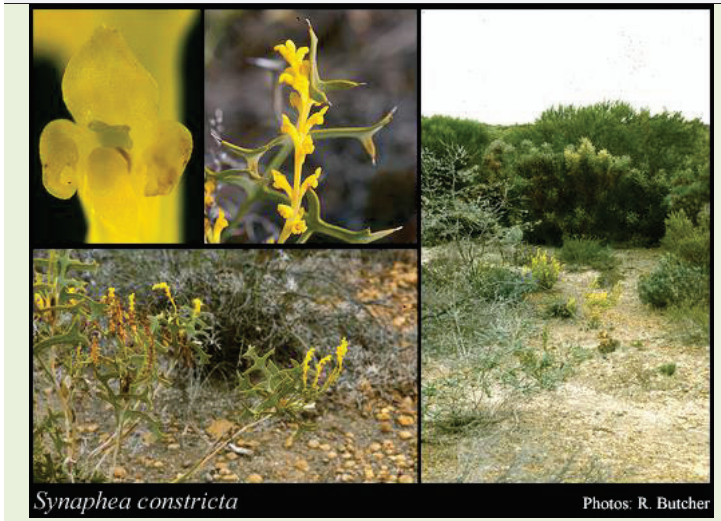
| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | | Dense, erect shrub, to 1.5 m high. | Fl. pink-blue-purple, Aug to Sep. | Red clay. | T | N | Geographic range |
| *Lysiosepalum aromaticum* | | Thick, bushy shrub, to 0.75 m high, with a peppery scent. | Fl. pink-purple, Nov. | Brown loam over granite. Slopes, moist area at foot of outcrops. | P2 | N | Habitat may not be suitable |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | Wongan Melaleuca | Spreading shrub, 0.6-1.5 m high. | Fl. Aug. | Orange clayey sand with lateritic pebbles. Scree slopes. | T | N | Habitat may not be suitable |
|  | | Erect shrub, to 2 m high. | Fl. pink-red, Jul or Sep to Nov. | Shallow soils over massive laterite, granite. | T | N | Habitat may not be suitable |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
| *Millotia tenuifolia* var. *laevis* | | Ascending to erect annual, herb, 0.02-0.1 m high. | Fl. yellow, Sep to Oct. | Granite or laterite soils. | P2 | N | Habitat may not be suitable |
|  | | Erect to decumbent or almost prostrate, lignotuberous shrub, 0.2-0.8 m high. | Fl. yellow, Sep to Dec. | White or yellow sand, often over laterite. | P3 | Y | Habitat may be suitable |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | | Upright shrub, 0.6-1.5 m high. | Fl. yellow, Jul to Sep. | Gravelly sandy or clayey soils. Flats, roadsides. | P3 | N | Habitat may not be suitable |
|  | Saltmat | Perennial, herb, forming densely branched, silvery mats to 1 m wide. | Fl. Sep. Sandy soils, clay. | Saline flats. | T | Y | Habitat may be suitable |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | Moth Triggerplant | Rosetted perennial, herb, 0.05-0.24 m high, Leaves tufted, linear, 2.5-9.5 cm long, 0.7-2 mm wide, apex acute to mucronate, margin involute, scabrous. Membranous scale leaves present at base of mature leaves. Scape glandular throughout, pilose at base. Inflorescence racemose. | Fl. pink, Sep to Nov. | Sand. Open woodland or heath. | P4 | N | Habitat may not be suitable |
| *Styphelia caudata* (syn. *Leucopogon* sp. Bungulla) | | | | | P3 | Y | Geographic location may be suitable |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | | Compact, tufted shrub, 0.2-0.5 m high. | Fl. yellow, Jun to Sep. | Sand or sandy clay-loam over laterite. | P3 | Y | Geographic location may be suitable |
|  | Hill Thomasia | Upright shrub, 0.5-1 m high. | Fl. blue-purple-red, Sep to Oct | Loamy soils. Rocky granite knolls, lateritic hills. | T | N | Habitat may not be suitable |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
| Thysanotus sp. Badgingarra | | Perennial, herb (with tuberous roots), ca 0.35 m high. | Fl. blue, Dec. | Grey sand with lateritic gravel. | P2 | N | Habitat may not be suitable |
| *Urodon capitatus* | | Low spreading or upright shrub, (0.12-)0.3-1.2 m high, to 1 m wide. | Fl. yellow-orange-red, Sep to Oct. | Sandy gravelly soils. Plains. | P3 | Y | Geographic location may be suitable |
|  | Hughan's Featherflower | Low shrub, to 0.3 m high. | Fl. red, Dec. | Yellow sand. Near salt lakes. | T | Y | Habitat suitable |

| Species Name | Common Name | Description | Flowering Period | Habitat Type | Cons. code | Likelihood (Y/N) | Comment |
|---|---|---|---|---|---|---|---|
|  | | Spreading shrub, 0.15-0.6 m high. | Fl. green-yellow/yellow-brown, Jul to Oct. | Soil pockets. Granite outcrops. | T | N | Habitat may not be suitable |
|  | | Erect, spreading shrub, 0.2-2 m high. | Fl. pink-purple/red-brown, Sep to Dec or Jan. | Yellow sand, sandy gravel. Sandplains. | P3 | Y | Habitat suitable |

# Appendix 3: Conservation Codes

**Western Australia**

| Conservation Code | Name | Description |
|---|---|---|
| T | Threatened | Flora or fauna that is rare or likely to become extinct, ranked according to their level of threat using IUCN Red List criteria (Schedules 1-3 of the Wildlife Conservation (Specially Protected Fauna) Notice or the Wildlife Conservation (Rare Flora) Notice) |
| CR | Critically endangered | Species considered to be facing an extremely high risk of extinction within the wild in the immediate future |
| EN | Endangered | Species considered to be facing a very high risk of extinction in the wild in the near future |
| VU | Vulnerable | Species considered to be facing a high risk of extinction in the wild in the medium-term future |
| EX | Extinct Species | Species where 'there is no reasonable doubt that the last member of the species has died (Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice or the Wildlife Conservation (Rare Flora) Notice) |
| EW | Extinct in the Wild | Species that are known to only survive in cultivation, in captivity, or as a naturalised population well outside its past range; and it has not been recorded in its known or expected habitat at appropriate seasons anywhere in its past range, despite surveys over a timeframe appropriate to its life cycle and form |
| MI | Migratory Species | Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth (Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice) |
| CD | Conservation Dependent | Species of special conservation interest (conservation dependent fauna), being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened (Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice) |
| OS | Specially Protected | Fauna otherwise in need of special protection to ensure their conservation (Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice) |
| P | Priority Species | Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or |

| Conservation Code | Name | Description |
|---|---|---|
| | | flora. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. |
| P1 | Priority One | Poorly known species – Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either very small or on lands not managed for conservation, such as road verges, urban areas, farmland, active mineral lease and under threat of habitat destruction or degradation. |
| 2 | Priority Two | Poorly known species – Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, such as national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves and similar. |
| 3 | Priority Three | Poorly known species – Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat |
| 4 | Priority Four | Rare or near threatened and other species in need of monitoring. |

(Source: DBCA, 2020)

**Commonwealth**

| Category | Description |
|---|---|
| **Critically Endangered** | Species facing an extremely high risk of extinction in the wild in the immediate future |
| **Endangered** | Species facing a very high risk of extinction in the wild in the near future |
| **Vulnerable** | Species facing a high risk of extinction in the wild in the medium term |

(Source: DBCA, 2019)

# Appendix 4: March 2023- Quadrat Data

| Quadrat No.: | Q1 |
|---|---|
| Survey Date: | 27/03/2023 |
| Personnel: | KG LC ST |
| Latitude: | -31.265128 |
| Longitude: | 117.061076 |
| Topography: | Plain |
| Aspect: | Flat |
| Slope: | 0% |
| Soil: | Orange Brown Loam |
| Gravel: | 0% |
| Rock: | 0% |
| Leaf Litter: | 3% |
| Bare Ground: | 3% |
| Drainage: | Well |
| Condition: | Degraded |

Notes: *Eucalyptus loxophleba* subsp. *loxophleba* and *Eucalyptus longicornis* Open Woodland

| Species | Cover (%) | Height (m) |
|---|---|---|
| **Ehrharta longiflora* | 10 | 0.2 |
| **Eragrostis curvula* | 2 | 0.2 |
| **Lolium rigidum* | 1 | 0.2 |
| **Raphanus raphanistrum* | 0.1 | 0.2 |
| *Acacia eremophila* subsp. *eremophila* | 2 | 1.5 |
| *Atriplex semibaccata* | 15 | 0.2 |
| *Enchylaena tomentosa* | 10 | 0.2 |
| *Eucalyptus loxophleba* subsp. *loxophleba* | 30 | 8 |
| *Maireana georgei* | 20 | 0.3 |
| *Rhagodia drummondii* | 1 | 0.3 |
| *Senna artemisioides* subsp. *filifolia* | 5 | 2 |

Note: *denotes introduced species.

| Quadrat No.: | Q2 |
|---|---|
| Survey Date: | 27/03/2023 |
| Personnel: | KG LC ST |
| Latitude: | -31.265270 |
| Longitude: | 117.062522 |
| Topography: | Flat |
| Aspect: | West |
| Slope: | 0% |
| Soil: | Orange Brown Loam |
| Gravel: | 0% |
| Rock: | 0% |
| Leaf Litter: | 5% |
| Bare Ground: | 1% |
| Drainage: | Well |
| Condition: | Degraded |

Notes: *Eucalyptus loxophleba* subsp. *loxophleba* and *Eucalyptus longicornis* Open Woodland

| Species | Cover (%) | Height (m) |
|---|---|---|
| **Ehrharta longiflora* | 5 | 0.2 |
| **Lolium rigidum* | 2 | 0.2 |
| **Raphanus raphanistrum* | 5 | 0.2 |
| *Acacia aestivalis* | 30 | 1 |
| *Acacia ligustrina* | 5 | 1.5 |
| *Acacia sp.* (no flowers or pods) | 5 | 1 |
| *Atriplex semibaccata* | 5 | 0.1 |
| *Enchylaena tomentosa* | 20 | 0.2 |
| *Eucalyptus longicornis* | 5 | 10 |
| *Exocarpos aphyllus* | 5 | 1.5 |
| *Maireana georgei* | 60 | 0.3 |
| *Salsola australis* | 1 | 0.1 |

Note: *denotes introduced species.

| Quadrat No.: | Q3 |
|---|---|
| Survey Date: | 27/03/2023 |
| Personnel: | KG LC ST |
| Latitude: | -31.265509 |
| Longitude: | 117.060124 |
| Topography: | Flat |
| Aspect: | West |
| Slope: | 1-3% |
| Soil: | Brown Loam Sand |
| Gravel: | 0% |
| Rock: | 0% |
| Leaf Litter: | 0% |
| Bare Ground: | 10% |
| Drainage: | Well |
| Condition: | Good |

Notes: Tecticornia Dampland

| Species | Cover (%) | Height (m) |
|---|---|---|
| **Avena barbata* | 1 | 0.2 |
| **Lolium rigidum* | 1 | 0.1 |
| **Raphanus raphanistrum* | 1 | 0.2 |
| *Enchylaena tomentosa* | 1 | 0.2 |
| *Maireana georgei* | 2 | 0.2 |
| *Tecticornia pergranulata* subsp. *Pergranulata* | 90 | 0.2 |

Note: *denotes introduced species.

| Quadrat No.: | Q4 |
|---|---|
| Survey Date: | 27/03/2023 |
| Personnel: | KG LC ST |
| Latitude: | -31.266975 |
| Longitude: | 117.060126 |
| Topography: | Flat |
| Aspect: | West |
| Slope: | 1-3% |
| Soil: | Brown Sandy Loam |
| Gravel: | 0% |
| Rock: | 0% |
| Leaf Litter: | 5% |
| Bare Ground: | 5% |
| Drainage: | Well |
| Condition: | Degraded |

Notes: Tecticornia Dampland

| Species | Cover (%) | Height (m) |
|---|---|---|
| **Avena barbata* | 2 | 0.2 |
| **Brassica ×napus* | 1 | 0.2 |
| **Cenchrus clandestinus* | 1 | 0.1 |
| **Dittrichia graveolens* | 1 | 0.2 |
| **Eragrostis curvula* | 1 | 0.2 |
| **Lactuca serriola* | 1 | 0.2 |
| *Chloris truncata* | 1 | 0.1 |
| *Maireana georgei* | 2 | 0.3 |
| *Poaceae* sp. | 1 | 0.3 |
| *Salsola australis* | 1 | 0.1 |
| *Tecticornia pergranulata* subsp. *Pergranulata* | 50 | 0.2 |
| *Tecticornia sp. 2* (sterile) | 5 | 0.2 |

Note: *denotes introduced species.

| Quadrat No.: | Q5 |
|---|---|
| Survey Date: | 27/03/2023 |
| Personnel: | KG LC ST |
| Latitude: | -31.263991 |
| Longitude: | 117.059931 |
| Topography: | Mid slope |
| Aspect: | Northwest |
| Slope: | 1-3% |
| Soil: | Brown Orange Loam |
| Gravel: | 0% |
| Rock: | 0% |
| Leaf Litter: | 1% |
| Bare Ground: | 5% |
| Drainage: | Well |
| Condition: | Degraded |

Notes: *Eucalyptus loxophleba* subsp. *loxophleba* and *Eucalyptus longicornis* Open Woodland

| Species | Cover (%) | Height (m) |
|---|---|---|
| **Avena barbata* | 1 | 0.2 |
| **Raphanus raphanistrum* | 1 | 0.1 |
| *Atriplex semibaccata* | 5 | 0.2 |
| *Atriplex amnicola* | 10 | 0.5 |
| *Eucalyptus loxophleba* subsp. *loxophleba* | 15 | 10 |
| *Maireana georgei* | 10 | 0.2 |
| *Templetonia sulcata* | 15 | 2 |

Note: *denotes introduced species.

| Quadrat No.: | Q6 |
|---|---|
| Survey Date: | 27/03/2023 |
| Personnel: | KG LC ST |
| Latitude: | -31.263104 |
| Longitude: | 117.059924 |
| Topography: | Mid slope |
| Aspect: | Northwest |
| Slope: | 1-3% |
| Soil: | Brown Orange Loam |
| Gravel: | 0% |
| Rock: | 0% |
| Leaf Litter: | 3% |
| Bare Ground: | 10% |
| Drainage: | Well |
| Condition: | Degraded |

Notes: Tecticornia Dampland

| Species | Cover (%) | Height (m) |
|---|---|---|
| **Avena barbata* | 2 | 0.2 |
| **Bromus diandrus* | 2 | 0.1 |
| **Cenchrus clandestinus* | 5 | 0.1 |
| **Eragrostis minor* | 2 | 0.4 |
| **Lactuca serriola* | 2 | 0.2 |
| *Enchylaena tomentosa* | 5 | 0.2 |
| *Maireana georgei* | 25 | 0.3 |
| *Tecticornia* sp. 1 (sterile) | 30 | 0.3 |

Note: *denotes introduced species.

# Appendix 5: Spring 2023- Quadrat Data

| Quadrat No.: | Q1 |
|---|---|
| Survey Date: | 26/09/2023 |
| Personnel: | KG LC |
| Latitude: | -31.265128 |
| Longitude: | 117.061076 |
| Topography: | Plain |
| Aspect: | Flat |
| Slope: | 0% |
| Soil: | Orange Brown Loam |
| Gravel: | 0% |
| Rock: | 0% |
| Leaf Litter: | 3% |
| Bare Ground: | 3% |
| Drainage: | Well |
| Condition: | Degraded |

Notes: *Eucalyptus loxophleba* subsp. *loxophleba* and *Eucalyptus longicornis* Open Woodland, has been partially cleared since March 2023

| Species | Cover (%) | Height (m) |
|---|---|---|
| **Ehrharta longiflora* | 10 | 0.2 |
| **Eragrostis curvula* | 2 | 0.2 |
| **Lolium rigidum* | 1 | 0.2 |
| **Raphanus raphanistrum* | 0.1 | 0.2 |
| *Atriplex semibaccata* | 15 | 0.2 |
| *Enchylaena tomentosa* | 10 | 0.2 |
| *Eucalyptus loxophleba* subsp. *loxophleba* | 30 | 8 |
| *Maireana georgei* | 20 | 0.3 |
| *Rhagodia drummondii* | 1 | 0.3 |

Note: *denotes introduced species.

| Quadrat No.: | Q2 |
|---|---|
| Survey Date: | 26/09/2023 |
| Personnel: | KG LC |
| Latitude: | -31.265270 |
| Longitude: | 117.062522 |
| Topography: | Flat |
| Aspect: | West |
| Slope: | 0% |
| Soil: | Orange Brown Loam |
| Gravel: | 0% |
| Rock: | 0% |
| Leaf Litter: | 5% |
| Bare Ground: | 1% |
| Drainage: | Well |
| Condition: | Completely Degraded |

Notes: *Eucalyptus loxophleba* subsp. *loxophleba* and *Eucalyptus longicornis* Open Woodland, has been partially cleared since March 2023

| Species | Cover (%) | Height (m) |
|---|---|---|
| **Arctotheca calendula* | 0.5 | 0.1 |
| **Avena barbata* | 0.5 | 0.2 |
| *Acacia aestivalis* | 30 | 1 |
| *Eucalyptus longicornis* | 5 | 10 |

Note: *denotes introduced species.

| Quadrat No.: | Q3 |
|---|---|
| Survey Date: | 26/09/2023 |
| Personnel: | KG LC |
| Latitude: | -31.265509 |
| Longitude: | 117.060124 |
| Topography: | Flat |
| Aspect: | West |
| Slope: | 1-3% |
| Soil: | Brown Loam Sand |
| Gravel: | 0% |
| Rock: | 0% |
| Leaf Litter: | 0% |
| Bare Ground: | 10% |
| Drainage: | Well |
| Condition: | Good |

Notes: Tecticornia Dampland

| Species | Cover (%) | Height (m) |
|---|---|---|
| **Avena barbata* | 1 | 0.2 |
| **Lolium rigidum* | 1 | 0.1 |
| **Raphanus raphanistrum* | 1 | 0.2 |
| *Enchylaena tomentosa* | 1 | 0.2 |
| *Maireana georgei* | 2 | 0.2 |
| *Tecticornia pergranulata* subsp. *Pergranulata* | 90 | 0.2 |

Note: *denotes introduced species.

| Quadrat No.: | Q4 |
|---|---|
| Survey Date: | 26/09/2023 |
| Personnel: | KG LC |
| Latitude: | -31.266975 |
| Longitude: | 117.060126 |
| Topography: | Flat |
| Aspect: | West |
| Slope: | 1-3% |
| Soil: | Brown Sandy Loam |
| Gravel: | 0% |
| Rock: | 0% |
| Leaf Litter: | 5% |
| Bare Ground: | 5% |
| Drainage: | Well |
| Condition: | Degraded |

Notes: Tecticornia Dampland

| Species | Cover (%) | Height (m) |
|---|---|---|
| **Avena barbata* | 2 | 0.2 |
| **Brassica ×napus* | 1 | 0.2 |
| **Cenchrus clandestinus* | 1 | 0.1 |
| **Dittrichia graveolens* | 1 | 0.2 |
| **Eragrostis curvula* | 1 | 0.2 |
| **Lactuca serriola* | 1 | 0.2 |
| *Chloris truncata* | 1 | 0.1 |
| *Maireana georgei* | 2 | 0.3 |
| *Poaceae* sp. | 1 | 0.3 |
| *Salsola australis* | 1 | 0.1 |
| *Tecticornia pergranulata* subsp. *Pergranulata* | 50 | 0.2 |
| *Tecticornia sp. 2* (sterile) | 5 | 0.2 |

Note: *denotes introduced species.

| Quadrat No.: | Q5 |
|---|---|
| Survey Date: | 26/09/2023 |
| Personnel: | KG LC |
| Latitude: | -31.263991 |
| Longitude: | 117.059931 |
| Topography: | Mid slope |
| Aspect: | Northwest |
| Slope: | 1-3% |
| Soil: | Brown Orange Loam |
| Gravel: | 0% |
| Rock: | 0% |
| Leaf Litter: | 1% |
| Bare Ground: | 5% |
| Drainage: | Well |
| Condition: | Degraded |

Notes: *Eucalyptus loxophleba* subsp. *loxophleba* and *Eucalyptus longicornis* Open Woodland

| Species | Cover (%) | Height (m) |
|---|---|---|
| **Avena barbata* | 1 | 0.2 |
| **Raphanus raphanistrum* | 1 | 0.1 |
| *Atriplex semibaccata* | 5 | 0.2 |
| *Atriplex amnicola* | 10 | 0.5 |
| *Eucalyptus loxophleba* subsp. *loxophleba* | 15 | 10 |
| *Maireana georgei* | 10 | 0.2 |
| *Templetonia sulcata* | 15 | 2 |

Note: *denotes introduced species.

| Quadrat No.: | Q6 |
|---|---|
| Survey Date: | 26/09/2023 |
| Personnel: | KG LC |
| Latitude: | -31.263104 |
| Longitude: | 117.059924 |
| Topography: | Mid slope |
| Aspect: | Northwest |
| Slope: | 1-3% |
| Soil: | Brown Orange Loam |
| Gravel: | 0% |
| Rock: | 0% |
| Leaf Litter: | 3% |
| Bare Ground: | 10% |
| Drainage: | Well |
| Condition: | Degraded |

Notes: Tecticornia Dampland

| Species | Cover (%) | Height (m) |
|---|---|---|
| **Avena barbata* | 2 | 0.2 |
| **Bromus diandrus* | 2 | 0.1 |
| **Cenchrus clandestinus* | 5 | 0.1 |
| **Eragrostis minor* | 2 | 0.4 |
| **Lactuca serriola* | 2 | 0.2 |
| *Enchylaena tomentosa* | 5 | 0.2 |
| *Maireana georgei* | 25 | 0.3 |
| *Tecticornia* sp. 1 (sterile) | 30 | 0.3 |

Note: *denotes introduced species.

## Appendix 6: Species List

The combined flora list for the site is provided in the table below with species that were only able to be identified to genus level highlighted in red. *Denotes introduced species and # denotes species that are native to Western Australia but not to this local region.

| Family | Scientific Name | Common Name | Status | March 2023 | Spring 2023 |
|---|---|---|---|---|---|
| Poaceae | **Aira cupaniana* | Silvery Hairgrass | | | X |
| Asteraceae | **Arctotheca calendula* | Cape Weed | | | X |
| Poaceae | **Avena barbata* | Bearded Oat | | X | X |
| Nyctaginaceae | **Boerhavia coccinea* | Tar Vine | | X | |
| Brassicaceae | **Brassica × napus* | | | X | X |
| Poaceae | **Bromus diandrus* | Great Brome | | X | X |
| Poaceae | **Bromus rubens* | Red Brome | | | X |
| Poaceae | **Cenchrus clandestinus* | Kikuyu Grass | | X | X |
| Cucurbitaceae | **Citrullus amarus* | | | X | X |
| Asteraceae | **Cotula bipinnata* | Ferny Cotula | | X | X |
| Cucurbitaceae | **Cucumis myriocarpus* | Prickly Paddy Melon | | X | X |
| Poaceae | **Cynodon dactylon* | Couch | | X | X |
| Asteraceae | **Dittrichia graveolens* | Stinkwort | | X | X |
| Poaceae | **Ehrharta calycina* | Perennial Veldt | | | X |
| Poaceae | **Ehrharta longiflora* | Annual Veldt Grass | | X | X |
| Poaceae | **Eragrostis curvula* | African Lovegrass | | X | X |
| Poaceae | **Eragrostis minor* | Smaller Stinkgrass | | X | X |
| Asteraceae | **Erigeron bonariensis* | | | X | |
| Geraniaceae | **Erodium botrys* | Long Storksbill | | | X |
| Euphorbiaceae | **Euphorbia drummondii* | Caustic Weed | | X | X |
| Poaceae | **Hordeum leporinum* | Barley Grass | | | X |
| Asteraceae | **Lactuca serriola* | Prickly Lettuce | | X | X |
| Poaceae | **Lolium rigidum* | Wimmera Ryegrass | | X | X |
| Fabaceae | **Lupinus angustifolius* | Narrowleaf Lupin | | | X |
| Malvaceae | **Malva parviflora* | Marshmallow | | | X |
| Fabaceae | **Medicago littoralis* | Strand Medic | | | X |
| Fabaceae | **Medicago polymorpha* | Burr Medic | | | X |

| Family | Scientific Name | Common Name | Status | March 2023 | Spring 2023 |
|---|---|---|---|---|---|
| Aizoaceae | **Mesembryanthemum nodiflorum* | Slender Iceplant | | | X |
| Aizoaceae | **Mesembryanthemum crystallinum* | Iceplant | | X | X |
| Asteraceae | **Monoculus monstrosus* | | | | X |
| Iridaceae | **Moraea setifolia* | | | | X |
| Brassicaceae | **Raphanus raphanistrum* | Wild Radish | | X | X |
| Asteraceae | **Sonchus asper* | Rough Sowthistle | | | X |
| Zygophyllaceae | **Tribulus terrestris* | Caltrop | | X | X |
| Fabaceae | **Trifolium tomentosum* | Woolly Clover | | | X |
| Fabaceae | **Vicia sativa* | Common Vetch | | | X |
| Fabaceae | *Acacia acuminata* | Jam | | X | |
| Fabaceae | *Acacia aestivalis* | | | X | X |
| Fabaceae | *Acacia dissona* var. *dissona* | | | | X |
| Fabaceae | *Acacia eremophila* subsp. *eremophila* | | | X | |
| Fabaceae | *Acacia ligustrina* | | | X | X |
| Poaceae | *Aristida contorta* | Bunched Kerosene Grass | | | X |
| Chenopodiaceae | *Atriplex semibaccata* | Berry Saltbush | | X | X |
| Chenopodiaceae | *Atriplex amnicola* | Swamp Saltbush | | X | X |
| Poaceae | *Austrostipa nitida* | | | | X |
| Poaceae | *Austrostipa variabilis* | | | X | X |
| Poaceae | *Chloris truncata* | Windmill Grass | | X | X |
| Haemodoraceae | *Conostylis* sp. | | | X | |
| Crassulaceae | *Crassula colorata* | Dense Stonecrop | | | X |
| Chenopodiaceae | *Enchylaena tomentosa* | Barrier Saltbush | | X | X |
| Myrtaceae | *Eucalyptus longicornis* | Red Morrel | | X | X |
| Myrtaceae | *Eucalyptus loxophleba* subsp. *loxophleba* | York Gum | | X | X |
| Myrtaceae | *Eucalyptus salmonophloia* | Salmon Gum | | X | X |
| Santalaceae | *Exocarpos aphyllus* | Leafless Ballart | | X | X |
| Chenopodiaceae | *Maireana brevifolia* | Small Leaf Bluebush | | X | X |
| Chenopodiaceae | *Maireana georgei* | Satiny Bluebush | | X | X |
| Chenopodiaceae | *Maireana trichoptera* | Downy Bluebush | | X | X |

| Family | Scientific Name | Common Name | Status | March 2023 | Spring 2023 |
|---|---|---|---|---|---|
| Amaranthaceae | *Ptilotus polystachyus* | Prince of Wales Feather | | X | X |
| Chenopodiaceae | *Rhagodia drummondii* | | | | X |
| Poaceae | *Rytidosperma acerosum* | | | | X |
| Chenopodiaceae | *Salsola australis* | | | X | X |
| Santalaceae | *Santalum acuminatum* | Quandong | | X | X |
| Fabaceae | *Senna artemisioides* subsp. *filifo lia* | | | X | X |
| Solanaceae | *Solanum hoplopetalum* | Thorny Solanum | | X | X |
| Chenopodiaceae | *Tecticornia pergranulata* subsp. *pergranulata* | Blackseed Samphire | | X | X |
| Chenopodiaceae | *Tecticornia* sp. 1 | | | X | X |
| Chenopodiaceae | *Tecticornia* sp. 2 | | | X | X |
| Fabaceae | *Templetonia sulcata* | Centipede Bush | | X | X |

# Appendix 7: Potential Habitat Trees within Survey Boundary

| Tree No | Scientific Name | DBH (mm) | Height | Condition | Hollows Present | Location of hollow | Size of hollow | Type of entrance | Height above ground | Comment | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | *Eucalyptus loxophleba* subsp. *loxophleba* | 650 | 10m | Good | No | | | | | Tree just outside boundary | -31.263343 | 117.059829 |
| 2 | *Dead* sp. | 500 | 10m | Dead | 3x Small Hollows | Mid Tree | 200mm | Chimney | 4m | 2x Pink and Grey Galahs | -31.263722 | 117.059775 |
| 3 | *Eucalyptus longicornis* | 650 | 12m | Good | No | | | | | | -31.263769 | 117.059832 |
| 4 | *Eucalyptus loxophleba* subsp. *loxophleba* | 505 | 10m | Good | No | | | | | Bird Nest present | -31.263863 | 117.059984 |
| 5 | *Dead* sp. | 450 | 8m | Dead | No | | | | | | -31.264095 | 117.059932 |
| 6 | *Dead* sp. | 530 | 8m | Dead | No | | | | | | -31.264852 | 117.059835 |
| 7 | *Eucalyptus longicornis* | 885 | 12m | Poor | 2x Small Hollows | Top of Tree | 200mm | Chimney, Side | 10m | Bird Nest, Photo 5931 | -31.264930 | 117.059837 |
| 8 | *Eucalyptus loxophleba* subsp. *loxophleba* | 450 | 7m | Fair | No | | | | | | -31.265171 | 117.059837 |
| 9 | *Eucalyptus loxophleba* subsp. *loxophleba* | 805 | 10m | Good | 1x Chimney Hollow | Mid Tree | 200mm | Chimney | 5m | | -31.265218 | 117.059829 |
| 10 | *Eucalyptus longicornis* | 715 | 10m | Good | No | | | | | | -31.265256 | 117.059974 |
| 11 | *Eucalyptus loxophleba* subsp. *loxophleba* | 527 | 10m | Good | No | | | | | | -31.265224 | 117.060141 |
| 12 | *Eucalyptus longicornis* | 560 | 10m | Good | No | | | | | Bird Nest, Photo 5868 | -31.265224 | 117.060141 |
| 13 | *Eucalyptus loxophleba* subsp. *loxophleba* | 365 | 7m | Good | No | | | | | | -31.265333 | 117.060139 |
| 14 | *Eucalyptus loxophleba* subsp. *loxophleba* | 443 | 7m | Good | No | | | | | | -31.265355 | 117.060101 |

| Tree No | Scientific Name | DBH (mm) | Height | Condition | Hollows Present | Location of hollow | Size of hollow | Type of entrance | Height above ground | Comment | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | *Eucalyptus loxophleba* subsp. *loxophleba* | 470 | 7m | Good | No | | | | | | -31.26524 | 117.060992 |
| 16 | *Eucalyptus loxophleba* subsp. *loxophleba* | 750 | 10m | Good | No | | | | | | -31.265116 | 117.061176 |
| 17 | *Eucalyptus loxophleba subsp. loxophleba* | 380 | 5m | Good | No | | | | | | -31.265251 | 117.061344 |
| 18 | *Eucalyptus loxophleba* subsp. *loxophleba* | 375 | 8m | Good | No | | | | | | -31.265110 | 117.061594 |
| 19 | *Eucalyptus loxophleba* subsp. *loxophleba* | 520 | 8m | Good | No | | | | | | -31.265105 | 117.061676 |
| 20 | *Eucalyptus longicornis* | 390 | 6m | Poor | 1x Small Hollow | Snapped Dead Branch | | Side | 5m | one small side hollow. 100mm diameter. photo 5797 | -31.265091 | 117.061735 |
| 21 | *Eucalyptus longicornis* | 735 | 10m | Good | 1x Small Hollow | Snapped Dead Branch | | Side | 3m | one small side hollow. 50mm diameter. | -31.265096 | 117.061779 |
| 22 | *Eucalyptus longicornis* | 600 | 10m | Good | No | | | | | | -31.265247 | 117.062991 |
| 23 | *Eucalyptus longicornis* | 530 | 7.5 m | Good | No | | | | | | -31.267529 | 117.060133 |
| 24 | *Eucalyptus salmonophloia* | 910 | 12m | Good | 1x Small Hollow | Mid Tree | 100mm | | 6m | | -31.267702 | 117.060010 |
| 25 | *Eucalyptus longicornis* | 505 | 6m | Good | No | | | | | | -31.267838 | 117.060154 |
| 26 | *Eucalyptus loxophleba* subsp. *loxophleba* | 760 | 10m | Good | 1x Chimney Hollow | Mid Tree | 200mm | Chimney | 4m | | -31.268027 | 117.060050 |

# Appendix 8: Bamford Foraging Habitat Scoring System – Site Condition

| Site Score | Description of Vegetation | | |
|---|---|---|---|
| | **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 would be salt lakes and bare ground. | No foraging value. No Eucalypts or other potential sources of food. | No foraging value. No Eucalypts (i.e. Marri, Jarrah, Wandoo, Blackbutt or Karri) or other potential sources of food. |
| **1** | Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these <2%. Could include urban areas with scattered foraging trees. Blue Gum plantations are considered to have a score of 1 as foraging by Black Cockatoos has been reported but appears to be unusual. | Negligible to low foraging value. Scattered specimens of known food plants (e.g. Marri and Jarrah) 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: Shrubland in which species of foraging value, such as shrubby *Banksias*, with <10% projected foliage cover. Open eucalypt woodland/mallee of small fruited species. Paddocks with melons or other weeds (a short-term, seasonal food source). | Low foraging value. Examples: Woodland with scattered specimens of known food plants (e.g. Marri and Jarrah) 1-5% projected foliage cover; Urban areas with scattered foraging trees. | Low foraging value. Examples: Woodland with scattered specimens of known food plants (e.g. Marri, Jarrah or Sheoak) 1-5% projected foliage cover; Urban areas with scattered food plants such as Cape Lilac, *Eucalyptus caesia* and *E*. *erythrocorys*. |
| **3** | Low to Moderate foraging value. Examples: Shrubland in which species of foraging value, such as shrubby *Banksias*, with 10-20% projected foliage cover. Woodland with tree *Banksias* 2-10% projected foliage cover. Eucalypt woodland/mallee of small-fruited species; Marri, if present, <10% project foliage cover. | Low to Moderate foraging value. Examples: Eucalypt woodland with known food plants (and in particular Marri) with a projected foliage cover of 5 - <10%. Parkland-cleared eucalypt woodland with projected foliage cover of known food plants of 10-<20% can be considered low-to-moderate because of poor long-term viability without management. | Low to Moderate foraging value. Examples: Eucalypt woodland (i.e. Marri, Jarrah, Wandoo, and Blackbutt), if present, <10% projected foliage cover. |

| Site Score | Description of Vegetation | | |
|---|---|---|---|
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| **4** | Moderate foraging value. Examples: Woodland with tree *Banksias* 20-40% projected foliage cover. Eucalypt woodland/forest with Marri 20-40% projected foliage cover. | Moderate foraging value. Examples: Eucalypt woodland with known food plants (and in particular Marri) with a projected foliage cover of 10-<20%. Parkland-cleared eucalypt woodland with projected foliage cover of known food plants of 20-<40% can be considered moderate because of poor long-term viability without management. Areas of orchards and especially those with apples can be considered of moderate value. | Moderate foraging value. Examples: Eucalypt woodland/forest (i.e. Marri, Jarrah, Wandoo, and Blackbutt) with 20-40% projected foliage cover. |
| **5** | Moderate to High foraging value. Examples: *Banksia* woodlands with tree *Banksias* >40%. Vegetation condition moderate due to weed invasion and some tree deaths. | Moderate to High foraging value. Examples: Eucalypt woodland with known food plants (and in particular Marri) with a projected foliage cover of 20-<40%. Parkland-cleared eucalypt woodland with projected foliage cover of known food plants of >40% can be considered moderate because of poor long-term viability without management. | Moderate to High foraging value. Examples: Eucalypt woodland/forest (i.e. Marri, Jarrah, Wandoo, and Blackbutt) with >40% projected foliage cover. Vegetation condition moderate due to weed invasion and some tree deaths. |
| **6** | High foraging value. Example: *Banksia* woodlands of key species (e.g. *B. attenuata*, *B. menziesii*) with projected foliage cover >60%. Vegetation condition good with low weed invasion and low tree death to indicate it is robust and unlikely to decline in the medium term. | High foraging value. Example: Eucalypt woodland/forest with a high proportion of Marri (>40% projected foliage cover). Vegetation condition good with low weed invasion and low tree death to indicate it is robust and unlikely to decline in the medium term. | High foraging value. Example: Eucalypt woodland/forest (i.e. Marri, Jarrah, Wandoo, and Blackbutt) with >60% projected foliage cover. Vegetation condition good with low weed invasion and low tree death to indicate it is robust and unlikely to decline in the medium term. |