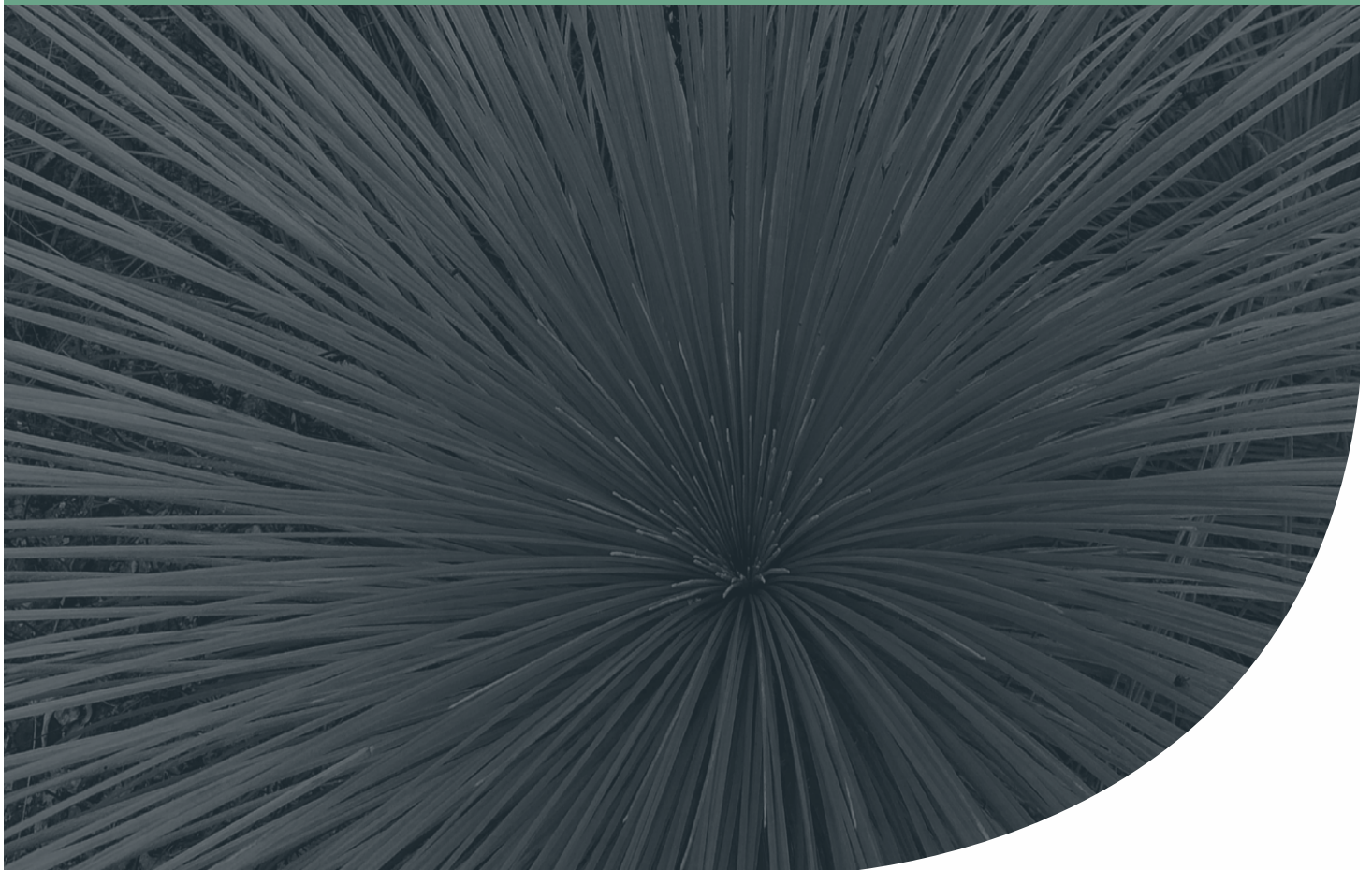


# Detailed Flora and Vegetation Assessment

Lot 100 and 256 Clarke Road, Margaret River

Project No: EP22-096(01)

**Prepared for Colchester Pty Ltd  
September 2023**



# Detailed Flora and Vegetation Assessment

Lot 100 and 256 Clarke Road, Margaret River



## Document Control

<b>Doc name:</b>	Detailed Flora and Vegetation Assessment Lot 100 and 256 Clarke Road, Margaret River				
<b>Doc no.:</b>	EP22-096(01)--002A MS				
Version	Date	Author		Reviewer	
1	May 2023	Melanie Schubert	MS	Tom Atkinson	TAA
	Submitted for client review				
A	September 2023	Rachel Weber	RAW	Kirsten Knox	KK
	Updated to include road reserve				

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# Detailed Flora and Vegetation Assessment

Lot 100 and 256 Clarke Road, Margaret River



## Executive Summary

Colchester Pty Ltd engaged Emerge Associates to conduct a detailed flora and vegetation assessment to provide information on the flora and vegetation values within Lots 100 and 256 Clarke Road and adjacent road reserve in Margaret River (referred to herein as the 'site').

As part of the assessment a desktop review of relevant background information was completed and a field survey was undertaken on 29 September 2022. During the field survey an assessment was made on the type, condition and values of vegetation across the site.

Outcomes of the survey include the following:

- Remnant native vegetation is present across 1.84 ha of the site and occurs in varying condition.
- Non-native vegetation is present across 1.12 ha of the site.
- A total of 41 native and 47 non-native (weed) species were recorded in the site.
- No threatened or priority flora species were recorded within the site and none are considered to occur due to the absence of suitable habitat and/or because they were not recorded during the field survey.
- The vegetation within the site was classified into the following four plant communities that are present in 'very good', 'degraded' and 'completely degraded' condition.
  - Plant community **CcHh** includes the most intact native vegetation in the site with vegetation condition ranging from 'very good' to 'good - degraded' condition.
  - Plant community **Cc** occurs in 'degraded' condition and comprises an intact native tree canopy over scattered native species and pasture weeds.
  - Plant community **Af** occurs in 'degraded - completely degraded' condition and consists of a relatively intact native tree canopy over effectively parkland cleared vegetation of woody and pasture weeds.
  - **Non-native** vegetation which is in 'completely degraded' condition and primarily comprises non-native pasture weeds and planted \**Eucalyptus* sp. with occasional native species.
- No threatened ecological communities (TECs) or priority ecological communities (PECs) occur within the site.

# Detailed Flora and Vegetation Assessment

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# Detailed Flora and Vegetation Assessment

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## Abbreviation Tables

Table A1: Abbreviations – Organisations

Organisations	
EPA	Environmental Protection Authority
DBCA	Department of Biodiversity, Conservation and Attractions
DoW	Department of Water (now DWER)
DWER	Department of Water and Environmental Regulation
WALGA	Western Australia Local Government Association

Table A2: Abbreviations – General terms

General terms	
IBRA	Interim Biogeographic Regionalisation of Australia
NVIS	National Vegetation Inventory System (ESCAVI 2003)
P1	Priority 1
P2	Priority 2
P3	Priority 3
P4	Priority 4
P5	Priority 5
PEC	Priority ecological community
TEC	Threatened ecological communities

Table A3: Abbreviations – Legislation

Legislation	
BAM Act	Biosecurity and Agriculture Management Act 2007
EP Act	Environmental Protection Act 1986
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
BC Act	Biodiversity Conservation Act 2016
BC Regs	Biodiversity Conservation Regulations 2018

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*Table A5: Abbreviations – Units of measurement*

Units of measurement	
ha	Hectare
km	Kilometre
m AHD	m in relation to the Australian height datum
mm	Millimetre



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## 1 Introduction

### 1.1 Project background

Emerge Associates (Emerge) were engaged by Colchester Pty Ltd to characterise the flora and vegetation values within Lots 100 and 256 Clarke Road and the adjacent Clarke Road reserve in Margaret River (referred to herein as the 'site'). The site is located approximately one kilometre (km) south-west of the Margaret River Central Business District within the Shire of Augusta Margaret River.

The site is approximately 2.96 hectares (ha) in size and is bounded by Clarke Road to the west, Commercial lots to the north and south and rural lots to the east. The location and extent of the site is shown in **Figure 1**.

### 1.2 Purpose and scope of work

The scope of work was specifically to undertake a flora and vegetation assessment within the site to the standard required of a detailed survey with reference to the Environmental Protection Authority's (EPA's) technical guidance (EPA 2016).

As part of this scope of work, the following tasks were undertaken:

- Desktop review of relevant background information pertaining to the site and surrounds, including database searches for threatened flora species and ecological communities.
- A field survey to record a comprehensive list of flora species and assess vegetation type and condition.
- Mapping of plant communities, vegetation condition and conservation significant flora and vegetation.
- Identification of potential habitat for conservation significant flora and vegetation and an assessment of likelihood of occurrence.
- Documentation of the desktop assessment, methodology, field survey and results into a report.

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## 2 Environmental Context

### 2.1 Climate

Climate influences the types of vegetation that grow in a region and the life cycles of the flora present. Therefore, it is critical for a flora and vegetation survey to respond appropriately to climatic conditions to ensure that surveys are conducted during times when flora species are easiest to detect and identify.

The south-west of Western Australia experiences a Mediterranean climate of hot dry summers and cool wet winters. In Mediterranean type climates some flora species will typically spend part of their lifecycle as either underground storage organs or as seed. This is an adaptation to unfavourable environmental conditions such as excessive heat and drought that occur over the summer period. These species, known as 'geophytes' or 'annuals', tend to re-emerge during winter when favourable conditions return and are most visible during spring, which is the flowering period for a majority of plant species. Therefore, spring is the optimal time to complete flora and vegetation surveys in the south-west of WA.

An average of 1111.6 millimetres (mm) of rainfall is recorded annually from the Margaret River weather station (no. 109521), which is the closest weather station, located approximately 850 m from the site. The majority of this rainfall is received between the months of May and September. Mean maximum temperatures at the Busselton Aero weather station, which is the nearest long-term temperature recording station located approximately 44 km north-east of the site, range from 16.9°C in July to 30.3°C in January, while mean minimum temperatures range from 6.9°C in July to 14.7°C in February (BoM 2023).

A total of 733.7 mm of rain was recorded from May to September 2022 prior to the survey, which is approximately 85.77% of the mean of 855.4 mm for this period (BoM 2023). Although lower than the mean this amount of rainfall was considered to have been sufficient to promote the flowering and emergence of native flora.

### 2.2 Geomorphology and soils

Landform and soils influence vegetation types at regional and local scales. The site lies within the Leeuwin Zone which is described as a 'moderately dissected lateritic plateau on granite (with) colluvial soils in the valleys. On the western margin the granite is overlain by Tamala Limestone and there are some coastal dunes' (Purdie *et al.* 2004).

More detailed soil-landscape mapping indicates that the site supports two soil-landscape units, as listed in **Table 1** and shown in **Figure 2**.

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Table 1: Soil landscape mapping units within the site (DPIRD 2018)

Soil landscape unit	Location within site	Description
Cowaramup, undifferentiated upland Phase	Majority of the site	Flats and gentles slopes (0-5% gradient) with gravelly duplex (Forest Grove) and pale grey mottled (Mungite) soils.
Cowaramup wet vales Phase	North-eastern corner of the site	Small, broad U-shaped drainage depressions with swampy floors. Gravelly duplex (Forest Grove) soils on sideslopes and poorly drained alluvial soils on valley floor.

The site is not known to contain any restricted landforms or unique geological features.

## 2.3 Topography

The elevation of the site ranges from 92 m in relation to the Australian height datum (mAHD) on the eastern side of the site to 94 mAHD on the western side of the site (DoW 2008) (**Figure 2**).

## 2.4 Hydrology and wetlands

Wetlands are areas of seasonally, intermittently or permanently waterlogged land such as poorly drained soils, ponds, billabongs, lakes, swamps, tidal flats, estuaries, rivers and their tributaries (Wetlands Advisory Committee 1977). Wetlands can be recognised by the presence of vegetation associated with waterlogging or the presence of hydric soils such as peat, peaty sand or carbonate mud (Hill *et al.* 1996).

Wetlands of national or international significance may be afforded special protection under Commonwealth or international agreements. The following lists of important wetlands were checked as part of this assessment:

- *Ramsar List of Wetlands of International Importance* (DBCA 2017)
- *A Directory of Important Wetlands in Australia* (DBCA 2018a)

No Ramsar or listed 'important wetlands' are located within or near the site.

Examination of the Department of Water and Environmental Regulation (DWER) hydrography dataset (DWER 2018) shows no wetland or water related features occur within the site.

A review of the *Geomorphic Wetlands, Leeuwin Naturaliste Ridge and Donnybrook to Nannup - Unreviewed* dataset indicated that no wetland features occur within the site (DBCA 2018b). One 'floodplain' wetland feature occurs approximately 270 metres east of the site. The locations of the geomorphic wetland mapped near the site is shown in **Figure 2**.

## 2.5 Regional vegetation

Native vegetation is described and mapped at different scales in order to illustrate patterns in its distribution. At a continental scale Australia is classified into *Interim Biogeographic Regionalisation of Australia* (IBRA) regions, of which the site lies within the Warren subregion (Environment Australia 2000). The Warren subregion lies along the coastline between Cape Naturaliste and Albany and

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comprises a variety of landforms including Holocene marine dunes, jarrah-marri forest on laterite, karri forest on loamy soils (Beard 1990). The south-west of Western Australia is recognised as a biodiversity hotspot and contains a wide variety of endemic flora and vegetation types.

Variations in native vegetation can be further classified based on regional vegetation mapping. Beard *et al.* (2013) mapping shows the site as comprises vegetation association 'Boranup 3' which is described as 'mainly jarrah and marri'.

The Boranup 3 association was determined to have 22% of its pre-European extent on the SCP remaining with 13% protected for conservation purposes (Government of Western Australia 2018).

In addition, DBCA have published vegetation complex mapping of the south west forest region which indicates the site lies predominantly within the 'Cowaramup C1' complex (DBCA 2019). The Cowaramup C1 complex is described as 'open to tall open forest of *Eucalyptus marginata* subsp. *marginata*, *Corymbia calophylla*, *Banksia grandis* on lateritic uplands in the hyperhumid zone.' (DBCA 2019). The north-eastern corner of the site is mapped as comprising the 'Cowaramup Cw1' complex which is described as a 'mixture of open forest to woodland of *Eucalyptus diversicolor*, *Corymbia calophylla* and woodland of *Eucalyptus marginata* subsp. *marginata*, *Corymbia calophylla* on slopes and low woodland of *Melaleuca preissiana*, *Banksia littoralis* on depressions in the hyperhumid and humid zones' (DBCA 2019).

## 2.6 Historical land use

Review of historical images available from 1954 and 2003 onwards shows that the south-western portion of the site was cleared of native vegetation prior to 1954 for rural residential/farming purposes (WALIA 2023). No historical images are available from between 1954 and 2003. Historical images available from 2003 onwards shows that much of the site was cleared of native vegetation prior to 2003.

## 2.7 Conservation significant values

### 2.7.1 Threatened and priority flora

Certain flora taxa that are considered to be rare or under threat warrant special protection under Commonwealth and/or State legislation. At a Commonwealth level, flora taxa may be listed as 'threatened' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Threatened flora species listed under the EPBC Act are assigned a conservation status according to attributes such as population size and geographic distribution. Any action likely to have a significant impact on a taxon listed under the EPBC Act requires Ministerial approval.

In Western Australia flora species may also be classed as 'threatened' under the *Biodiversity Conservation Act 2016* (BC Act). Similarly, it is an offence to 'take' or 'disturb' threatened flora listed under the BC Act without Ministerial approval.

Flora species that do not currently meet the criteria for listing as threatened but are potentially rare or threatened may be added to the DBCA's *Priority Flora List*. These species are classified into

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‘priority’ levels based on threat. Whilst priority species are not under direct statutory protection, they are considered during State approval processes.

Further information on threatened and priority species and their categories is provided in **Appendix A**. An assessment of the likelihood of occurrence of threatened and priority flora within the site was undertaken (refer to **Sections 3.1** and **4.2.1**).

### 2.7.2 Threatened and priority ecological communities

An ecological community is a naturally occurring group of native plants, animals and other organisms that are interacting in a unique habitat. An ecological community’s structure, composition and distribution are influenced by environmental factors such as soil type, position in the landscape, altitude, climate and water availability (DAWE 2021a). ‘Threatened ecological communities’ (TECs) are ecological communities that are recognised as rare or under threat and therefore warrant special protection.

Selected TECs are afforded statutory protection at a Commonwealth level under the EPBC Act. Similar to flora species, TECs listed under the EPBC Act are assigned a conservation status. Any action likely to have a significant impact on a community listed under the EPBC Act requires Ministerial approval.

TECs are also listed within Western Australia under the BC Act and the BC Regulations. Their significance is also acknowledged through other state environmental approval processes such as ‘environmental impact assessment’ pursuant to Part IV of *the Environmental Protection Act 1986* (EP Act) and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

An ecological community that is under consideration for listing as a TEC in Western Australia but does not yet meet survey criteria or has not been adequately defined may be listed as a ‘priority ecological community’ (PEC). Listing as a PEC is similarly considered during State approval processes.

Further information on categories of TECs and PECs is provided in **Appendix A**. An assessment of the likelihood of occurrence of threatened and priority flora within the site was undertaken (refer to **Sections 3.1** and **4.3.1**).

### 2.8 Weeds and pests

The term ‘weed’ can refer to any plant that requires some form of action to reduce its effect on the economy, the environment, human health and amenity. Many non-native flora species and some native species are considered to be weeds. The likelihood of weeds occurring is higher in areas disturbed areas, especially areas that have been agricultural or urban landuse.

A particularly invasive or detrimental weed species may be listed as a ‘declared pest’ pursuant to *Western Australia’s Biosecurity and Agriculture Management Act 2007* (BAM Act), indicating that it warrants special management to limit its spread.

The Commonwealth government has further compiled a list of 32 *Weeds of National Significance* (WoNS) (DAWE 2021b). Whilst the WoNS list is non-statutory, many WoNS are also listed under the BAM Act. Further information on weeds and declared pests is provided in **Appendix A**.

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### 2.9 Ecological linkages

Ecological linkages are linear landscape elements that allow the movement of fauna, flora and genetic material between areas of remnant habitat. This exchange of genetic material between vegetation remnants improves the viability of those remnants by allowing greater access to breeding partners and food sources, refuge from disturbances such as fire and maintenance of genetic diversity of plant communities and populations. Ecological linkages are ideally continuous or near-continuous as the more fractured a linkage is, the less ease flora and fauna have in moving within the corridor (Alan Tingay and Associates 1998).

The Perth Biodiversity Project, supported by the Western Australia Local Government Association (WALGA), have identified and mapped regional ecological linkages within the Perth Metropolitan Region (WALGA and PBP 2004). This study was extended beyond the Perth Metropolitan Region through the South West Biodiversity Project, resulting in the identification and mapping of the South West regional ecological linkages (Molloy *et al.* 2009).

There are no mapped ecological linkages within or in close proximity to the site. However, extensive areas of native vegetation exist to the south and west of the site and provide connectivity.

### 2.10 Previous surveys

No previous surveys are known to have been undertaken over the site.

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## 3 Methods

### 3.1 Database searches

A search was conducted for threatened and priority flora that may occur or have been recorded within a 10 km radius of the site using the *Protected Matters Search Tool* (DAWE 2022), *NatureMap* (DBCA 2022) and DBCA's threatened and priority flora database (reference no. 79-0922FL).

A search was also conducted for TECs and PECs that may occur or have been recorded within a 10 km radius of the site using the *Protected Matters Search Tool* (DAWE 2022) and DBCA's threatened and priority ecological communities' database (reference no. 48-0922EC).

Prior to undertaking the field survey, information on the habitat preferences of threatened and priority flora species and communities identified from database searches was reviewed. This was compared to existing environmental information available for the site, such as geomorphology, soils, regional vegetation and historic land use, to identify species and communities for which habitat may occur in the site.

### 3.2 Field survey

An ecologist from Emerge visited the site on 29 September 2022 and 27 February 2023 to conduct the flora and vegetation field survey.

The site was traversed on foot and the composition and condition of vegetation was recorded. Photographs were taken throughout the field visit to show particular site conditions. Flora species not native to Western Australia are denoted by an asterisk (\*) in text and raw data.

Plant specimens collected during the field survey were dried, pressed and named in accordance with requirements of the Western Australian Herbarium (2022). Identification of specimens occurred through comparison with named material and through the use of taxonomic keys.

#### 3.2.1 Sampling

Detailed sampling of the vegetation was undertaken using non-permanent 10 x 10 m quadrats. The quadrats were established using fence droppers bound by measuring tape. The position of each sample was recorded with a hand-held GPS unit.

The data recorded within each sample included:

- site details (site name, site number, observers, date, location)
- environmental information (slope, aspect, bare-ground, rock outcropping soil type and colour class, litter layer, topographical position, time since last fire event)
- biological information (vegetation structure and condition, 'foliage projective cover' (FPC), degree of disturbance and species present).

Additional plant taxa not observed within samples were recorded opportunistically as the botanist traversed the site.

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### 3.2.2 Targeted searches

The suitability of habitat within the site for conservation significant flora and communities identified in the desktop assessment was assessed (refer **Section 3.1**). Areas of suitable habitat were traversed along transects and searched for conservation significant species, as required.

### 3.2.3 Vegetation condition

Vegetation condition was assigned at each sample and changes in vegetation condition were also noted and mapped across the site. The condition of the vegetation was assessed using the Keighery (1994) scale (**Table 2**).

Table 2: Vegetation condition scale applied during the field assessment

Condition category	Definition (Keighery 1994)
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very good	Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
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.

## 3.3 Mapping and analysis

### 3.3.1 Conservation significant flora and communities

Based on the database searches and information recorded during the field survey, an assessment of the likelihood of occurrence of threatened and priority flora species and communities within the site was undertaken using the categories outlined in **Table 3**.



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Table 3: Likelihood of occurrence assessment categories and definitions

Likelihood	Definition
Recorded	The species was recorded during the current field survey.
Likely	The site contains suitable habitat for the species and it is likely the species may occur based on presence of a recent historical record within or close to the site.
Possible	The site contains suitable habitat for the species but there is no other information to suggest that the species may occur within or close to the site.
Unlikely	The site does not contain suitable habitat for the species or the site contains suitable habitat for the species within which thorough targeted searches were completed and conclusion has been made that the species is unlikely to be present.

### 3.3.2 Plant community identification and description

The plant communities within the site were identified from the sample data collected during the field survey. The vegetation was described according to the dominant species present using the structural formation descriptions of the *National Vegetation Inventory System (NVIS)* (NVIS Technical Working Group 2017). The identified plant communities were mapped on aerial photography from the sample locations and boundaries were interpreted from aerial photography and notes taken in the field. Vegetation condition was mapped on aerial photography based on the samples and notes recorded during the field survey to define areas with differing condition.

### 3.3.3 Threatened and priority ecological communities

Areas of native vegetation potentially representing a TEC or PEC were assessed against key diagnostic characteristics and, if available, size and/or vegetation condition thresholds.

### 3.4 Survey limitations

It is important to note the specific constraints imposed on surveys and the degree to which these may have limited survey outcomes. An evaluation of the survey methodology against standard constraints outlined in the EPA document *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016) is provided in **Table 4**.

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Table 4: Evaluation of survey methodology against standard constraints outlined in EPA (2016)

Constraint	Degree of limitation	Details
Availability of contextual information	No limitation	The broad scale contextual information described in <b>Section 2</b> is adequate to place the site and vegetation in context.
		No relevant previous survey information available.
Experience level of personnel	No limitation	This flora and vegetation assessment was undertaken by a qualified ecologist with over 3.5 years of botanical experience in Western Australia. Technical review was undertaken by a senior environmental consultant with 20 years' experience in environmental science in Western Australia.
Suitability of timing	No limitation	The survey was conducted in September and thus within the main flowering season. High rainfall was recorded from May to September 2022 in the months preceding the site visit. Therefore, it is likely that many plant species would have been in flower and/or visible at the time of survey. The degraded nature of the majority of the site limits the potential habitat for native geophytic plants such as orchids and the majority of threatened and priority flora species with potential to occur are perennial species. The survey timing was considered adequate to allow the detection of species for which seasonal timing is critical. The site visit in February offered an insight into the vegetation assembly and condition outside of the main flowering season.
Temporal coverage	Minor limitation	Detailed flora and vegetation assessments can require multiple visits, at different times of year, and over a period of a number of years, to enable observation of all species present. The site was visited twice, once in September 2022 and once in February 2023. The September site visit coincided with the main flowering season, while the February site visit provided an insight into the vegetation condition and composition outside of the main flowering period. Although the vegetation was only formally sampled once using quadrats, the site data was considered conclusive as it was collected in the spring main flowering period and much of the vegetation present within the site is degraded and so it is only considered a minor limitation.
Spatial coverage and access	No limitation	Site coverage was comprehensive (track logged).
	No limitation	All parts of the site could be accessed as required.
Sampling intensity	No limitation	A total of 41 native and 47 non-native species were recorded, of which 18 were recorded from a sample location and 70 were recorded opportunistically. Given the degraded nature of the majority of the site, the survey effort was considered adequate to prepare a near-comprehensive species inventory for the site.
Influence of disturbance	Minor limitation	Time since fire is greater than 20 years as interpreted from aerial imagery and therefore short-lived species more common after fire may not have been visible.
Adequacy of resources	No limitation	All resources required to perform the survey were available.

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## 4 Results

### 4.1 General site conditions

The site is located on an east facing slope which comprises brown sandy loam soils. Native vegetation occurs predominantly in the northern portion of the site and smaller patches of native trees occur scattered throughout the site.

### 4.2 Flora

#### 4.2.1 Desktop assessment

The database search results identified a total of 15 threatened and 70 priority flora species occurring or potentially occurring within a 10 km radius of the site. Information on these species including their habitat preferences and flowering period is provided in **Appendix B**.

Based on background information available for the site, suitable habitat was considered to potentially occur within the site for two threatened flora species and 11 priority flora species as shown in **Table 5**.

Table 5: Conservation significant flora species considered to have potential to occur in the site based on known habitat preferences

Species	Level of significance		Life strategy	Habitat	Flowering period
	State	EPBC Act			
<i>Caladenia huegelii</i>	CR	EN	PG	Well-drained, deep sandy soils in lush undergrowth in a variety of moisture levels.	Sep-early Nov
<i>Verticordia plumosa</i> var. <i>ananeotes</i>	CR	EN	P	Sand in open jarrah woodland or sandy/clay soils with marri.	Nov-Dec
<i>Deyeuxia inaequalis</i>	P1	-	A/P	Loam soils.	Nov-Dec
<i>Netrostylis</i> sp. Nannup (P.A. Jurjevich 1133)	P1	-	P	Sand and clay loam in valley flats and creeks.	Undocumented (likely Mar-Nov)
<i>Amperea micrantha</i>	P2	-	P	Sandy soils.	Oct-Nov
<i>Andersonia</i> sp. Echidna (A.R. Annels ARA 5500)	P2	-	P	Brown laterite and sandy loam on slopes and flats.	Nov-Dec
<i>Xyris maxima</i>	P2	-	P	Black peaty sand on drainage flats.	Nov-Dec/Jan
<i>Actinotus repens</i>	P3	-	P	Sand, clay or loam in wetlands or low-lying areas in scrub, woodland or forest.	Dec-Mar
<i>Lepyrodia heleocharoides</i>	P3	-	P	Moist peaty sand. Dry or seasonally inundated heath or woodland, swamps.	Dec

## Detailed Flora and Vegetation Assessment

Lot 100 and 256 Clarke Road, Margaret River



Table 5: Conservation significant flora species considered to have potential to occur in the site based on known habitat preferences (continued)

Species	Level of significance		Life strategy	Habitat	Flowering period
	State	EPBC Act			
<i>Stylidium lowrieanum</i>	P3	-	P	Sand or sandy loam over limestone. Eucalypt or Agonis woodland, forest.	Oct-Nov
<i>Tricostularia davisii</i>	P3	-	P	Variety of soils in mallee woodland and heath on flats, hillsides and valleys.	Oct-Nov
<i>Eucalyptus rudis</i> subsp. <i>cratyantha</i>	P4	-	P	Loam on flats and hillsides.	Jul-Sep
<i>Gahnia sclerioides</i>	P4	-	P	Loam, sandy soils. Moist shaded situations.	Feb, Apr, Jun, Aug or Nov

CR=critically endangered, EN=endangered, P1-P4=Priority 1-Priority 4, P=perennial, PG=perennial geophyte.

#### 4.2.2 Species inventory

A total of 41 native and 47 non-native (weed) species were recorded within the site during the field survey, representing 35 families and 73 genera. The dominant families containing native taxa were Fabaceae (eight native taxa and six weed taxa) and Proteaceae (four native taxa). The most common genus was *Eucalyptus* with four taxa and *Acacia* with three taxa. Of the species recorded 18 were recorded in sample locations and 62 were recorded opportunistically. A complete species list is provided in **Appendix C**.

#### 4.2.3 Threatened and priority flora

No threatened or priority flora species were recorded within the site.

The threatened and priority flora species identified in the desktop assessment are not considered to occur in the site due to lack of suitable habitat and/or because they were not recorded during the field survey.

#### 4.2.4 Declared pests

One species listed as a declared pest (C3) pursuant to the BAM Act, *\*Zantedeschia aethiopica* (arum lily), was recorded within the site. A number of individuals were recorded scattered throughout the site.

Two weeds of national significance (WoNS) were recorded: *\*Genista linifolia* and *\*Genista monspessulana*.

# Detailed Flora and Vegetation Assessment

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## 4.3 Vegetation

### 4.3.1 Desktop assessment

The database search results identified two TECs and one PECs occurring or potentially occurring within a 10 km radius of the site. Information on these communities is provided in **Appendix D**.

Based geomorphology, soils and regional vegetation patterns, none of these TECs or PECs were considered to have potential to occur in the site.

### 4.3.2 Plant communities

Four plant communities were identified within the site. Plant community **CcHh** exists across the western portion of the site and extends over 0.87 ha. Plant community **Cc** occurs in the northern portion of the site and extends over 0.6 ha. Plant community **Af** occurs as a patch along the Clarke Road reserve and also multiple smaller patches across the site and extends over 0.38 ha. Non-native vegetation occurs over the remainder of the site (1.12 ha).

A description and the area of each plant community is provided in **Table 6** and representative photographs of each are provided in **Plate 1** to **Plate 3**. The location of each plant community is shown in **Figure 3** and raw sample data is provided in **Appendix E**.

Table 6: Description and extent of plant communities identified within the site

Plant community	Description	Area (ha)
<b>Af</b>	Low open forest <i>Agonis flexuosa</i> over occasional native shrubs and/or forbs over closed non-native grass/forbland of pasture weeds ( <b>Plate 1</b> ).	0.38
<b>Cc</b>	Closed forest <i>Corymbia calophylla</i> over occasional native shrubs and/or forbs over closed non-native grass/forbland of pasture weeds ( <b>Plate 2</b> ).	0.60
<b>CcHh</b>	Closed forest <i>Corymbia calophylla</i> and occasional <i>Eucalyptus diversicolor</i> and <i>Agonis flexuosa</i> over open shrubland <i>Hibbertia hypericoides</i> , <i>Xanthorrhoea preissii</i> , <i>Hakea lissocarpha</i> and <i>Acacia pulchella</i> over open forbland <i>Burchardia congesta</i> , <i>B. multiflorus</i> , <i>Patersonia occidentalis</i> and <i>P. umbrosa</i> over open to sparse grass/forbland of pasture weeds ( <b>Plate 3</b> ).	0.87
<b>Non-native</b>	Heavily disturbed areas comprising predominantly closed grass/forbland of pasture weeds with occasional native and non-native trees, shrubs or forbs ( <b>Plate 4</b> ). Bare ground and tracks were also included in this community.	1.12

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*Plate 1: Plant community Af in 'degraded to completely degraded' condition*



*Plate 2: Plant community Cc in 'degraded' condition*

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Plate 3: Plant community **CcHh** in 'very good' condition



Plate 4: **Non-native** vegetation in 'completely degraded' condition

### 4.3.3 Vegetation condition

The most intact native vegetation was located in the north-eastern portion of the site (approximately 0.50 ha of the **CcHh** plant community). This vegetation was mapped as being in 'very good' condition as it retains the structure expected of a forest community and has moderate native species diversity.

## Detailed Flora and Vegetation Assessment

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Past disturbance of this area is evident from historical aerial photography and through the presence of weed species. The **CcHh** vegetation in the south-eastern portion of the site were mapped as being in 'good - degraded' condition due to higher weed cover with lower native species cover.

The **Cc** vegetation comprises a relatively intact native tree cover but the understorey is void of most native vegetation, with only a few scattered native species present at very low cover and diversity. Therefore, this vegetation was mapped as being in 'degraded' condition.

The **Af** vegetation contains small patches of native trees over a dense cover woody and pasture weeds. This vegetation was mapped as being in 'degraded to completely degraded' condition as it lacks understory structure and has very low species diversity in combination with very high weed loads.

Remaining areas in the site are in 'completely degraded' condition and consist of non-native species such as pasture grasses and planted trees and shrubs. Sandy tracks and bare ground within the site were also mapped as being in 'completely degraded' condition.

The extent of vegetation by condition category is detailed in **Table 7** and shown in **Figure 4**.

*Table 7: Extent of vegetation condition categories within the site*

Condition category (Keighery 1994)	Size (ha)
Pristine	0
Excellent	0
Very good	0.50
Good	0
Good - degraded	0.37
Degraded	0.58
Degraded - completely degraded	0.39
Completely degraded	1.12

#### 4.3.4 Threatened and priority ecological communities

The plant communities within the site do not represent a TEC or PEC.



# Detailed Flora and Vegetation Assessment

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## 5 Discussion

### 5.1 Threatened and priority flora

No threatened or priority flora species were recorded within the site. The absence of the larger perennial species such as *Eucalyptus rudis* subsp. *cratyantha*, *Verticordia plumosa* var. *ananeotes* and *Andersonia* sp. Echidna (A.R. Annel's ARA 5500) was relatively easy to confirm. However, due to their size and seasonal lifeform, smaller annual or geophytic species such as *Caladenia huegelii*, *Caladenia ambusta* and *Deyouxia inaequalis* can be more difficult to detect.

Prior to the survey, based on background information, two threatened flora species and 11 priority flora species were considered to potentially occur within the site. The two field surveys in late September and February are considered sufficient to determine that most of these species are absent or are unlikely to occur. The timing of the first survey coincided with the main flowering period of the majority of the flora and therefore they should have been visible, if present. Those species with flowering periods outside of September are mostly perennials and would be visible throughout the year.

Note the information available on *Deuyixia inaequalis* is limited. Based on confirmed records it may be annual or perennial and likely flowers between November and December.

Searches were completed across potentially suitable habitat within the site and no unidentified specimens were collected that had potential to represent a conservation significant species. Survey effort was therefore considered sufficient to confirm the absence of these species.

### 5.2 Vegetation condition

Assigning vegetation condition was straight forward where vegetation clearly met description for very good, degraded and completely degraded condition. While further survey during the flowering season would likely detect additional native and non-native species, it is not considered to be required to confirm the condition of vegetation within the site.

Two compound condition categories were used where vegetation met parts of the criteria for multiple categories and thus was in between condition categories. Part of plant community **CcHh** was mapped as being in good - degraded condition as it comprised an intact native tree layer with mixed native and non-native understorey with low native species diversity but higher weed loads (more than 50%). Plant community **Af** was mapped as being in degraded - completely degraded condition as it comprised a relatively intact native understorey layer over effectively parkland cleared vegetation of pasture weeds, as well as, some woody weeds.

### 5.3 Threatened and priority ecological communities

The two TECs identified as potentially occurring within 10 km of the site are 'aquatic root mat' communities that occur in caves of the Leeuwin Naturaliste Ridge (refer **Appendix D**). The site does not support this landform and so this TEC is not considered to occur. The one PEC identified as potentially occurring within 10 km of the site comprises *Melaleuca lanceolata* forests which is also

## Detailed Flora and Vegetation Assessment

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not present in the site (refer **Appendix D**). The vegetation in the site was compared to available information for other listed TECs and PECs and was not considered to align with any. Therefore, no TECs or PECs occur within the site.

### 5.4 Locally and regionally significant flora and vegetation

Flora and vegetation may be significant irrespective of protection under policy or legislation. The site supports native vegetation that may provide habitat for native fauna, including western ringtail possum and species of black cockatoo listed as threatened under the EPBC Act and BC Act.

## Detailed Flora and Vegetation Assessment

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## 6 Conclusions

The majority of the site has been subject to long-term historical disturbance and is dominated by non-native vegetation. The best condition vegetation occurs within the northern portion of the site.

No threatened or priority flora species were recorded and none are considered to occur due to the absence of suitable habitat and/or because none were recorded during the field survey.

Three native plant communities were identified within the site, which extend over 1.84 ha and occur in very good, good - degraded, degraded and degraded - completely degraded condition. The remainder of the site contains non-native vegetation in completely degraded condition (1.12 ha).

No TECs or PECs occur within the site.

The vegetation in the site provides habitat for conservation significant fauna species, including western ringtail possum and species of black cockatoo.

# Detailed Flora and Vegetation Assessment

Lot 100 and 256 Clarke Road, Margaret River



## 7 References

### 7.1 General references

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# Detailed Flora and Vegetation Assessment

Lot 100 and 256 Clarke Road, Margaret River



## 7.2 Online references

The online resources that have been utilised in the preparation of this report are referenced in **Section 7.1**, with access date information provided in **Table R 1**.

*Table R 1 Access dates for online references*

Reference	Date accessed	Website or dataset name
BoM (2022)	20 February 2023	Climate Data Online
DAWE (2021a)	16 September 2022	Threatened Ecological Communities
DAWE (2021b)	23 February 2023	Weeds of National Significance (WoNS)
DAWE (2022)	16 September 2022	Protected Matters Search Tool
DBCA (2022)	16 September 2022	NatureMap
WALIA (2022)	23 February 2023	Landgate Map Viewer
Western Australian Herbarium (2022)	23 February 2023	Florabase

# Figures



*Figure 1: Site Location*

*Figure 2: Hydrography, Soils and Topography*

*Figure 3: Plant Communities*

*Figure 4: Vegetation Condition*



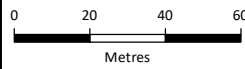




**Figure 1: Site Location**

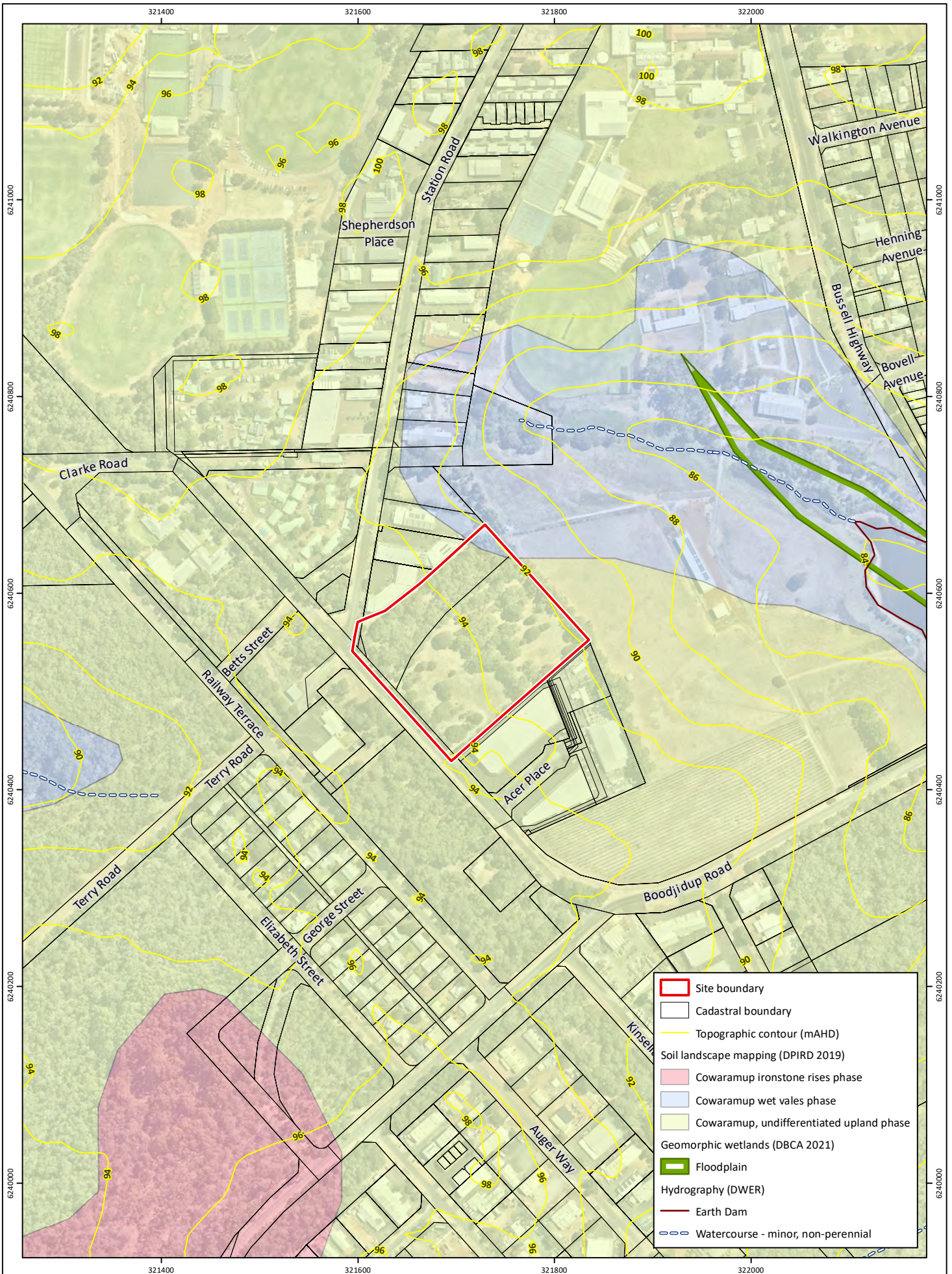
**Project:** Detailed Flora and Vegetation Assessment  
 Lots 100 and 256 Clarke Road, Margaret River  
**Client:** Colchester Pty Ltd

**Plan Number:** EP22-096(01)--F01a  
**Drawn:** GAR  
**Date:** 30/08/2023  
**Checked:** MS  
**Approved:** TAA  
**Date:** 30/08/2023



**Scale: 1:2,000@A4**  
 GDA 1994 MGA Zone 50



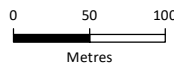


**Figure 2: Hydrography, Soils and Topography**

**Project:** Detailed Flora and Vegetation Assessment  
 Lots 100 and 256 Clarke Road, Margaret River

**Client:** Colchester Pty Ltd

**Plan Number:** EP22-096(01)--F02a  
**Drawn:** GAR  
**Date:** 30/08/2023  
**Checked:** MS  
**Approved:** TAA  
**Date:** 30/08/2023



**Scale:** 1:5,000@A4  
 GDA 1994 MGA Zone 50



While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used.  
 © Landgate (2022). Nearmap Imagery date: 28/02/2022



**Figure 3: Plant Communities**

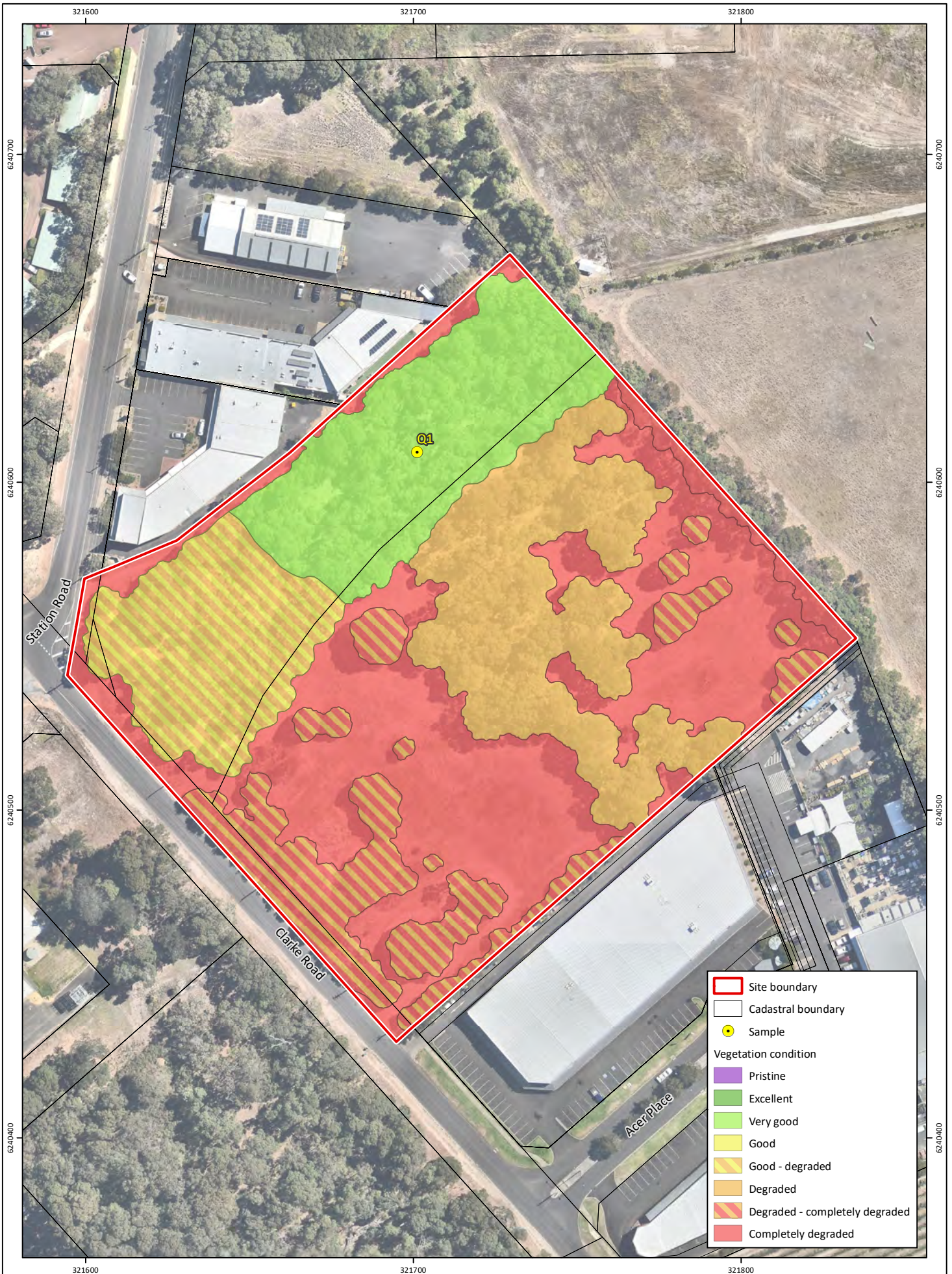
**Project:** Detailed Flora and Vegetation Assessment  
 Lots 100 and 256 Clarke Road, Margaret River  
**Client:** Colchester Pty Ltd

**Plan Number:** EP22-096(01)--F03a  
**Drawn:** GAR  
**Date:** 30/08/2023  
**Checked:** MS  
**Approved:** TAA  
**Date:** 30/08/2023



0 20 40  
 Metres  
 Scale: 1:1,500@A4  
 GDA 1994 MGA Zone 50





**Figure 4: Vegetation Condition**

**Project:** Detailed Flora and Vegetation Assessment  
 Lots 100 and 256 Clarke Road, Margaret River  
**Client:** Colchester Pty Ltd

**Plan Number:** EP22-096(01)--F04a  
**Drawn:** GAR  
**Date:** 30/08/2023  
**Checked:** MS  
**Approved:** TAA  
**Date:** 30/08/2023



0 20 40  
 Metres  
 Scale: 1:1,500@A4  
 GDA 1994 MGA Zone 50



# Appendix A

Additional Information





## Conservation Significant Flora and Vegetation

### Threatened and priority flora

Flora species considered rare or under threat warrant special protection under Commonwealth and/or State legislation. At the Commonwealth level, flora species can be listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Flora species considered 'threatened' pursuant to Schedule 1 of the EPBC Act are assigned categories according to their conservation status, as outlined in **Table 1**.

In Western Australia, plant taxa may be classed as 'threatened' under the *Biodiversity Conservation Act 2016* (BC Act) which is enforced by Department of Biodiversity Conservation and Attractions (DBCA). Threatened flora species are listed under sections 19(1) and 26(2) of the BC Act. It is an offence to 'take' or disturb threatened flora without Ministerial approval. Section 5(1)1 of the Act defines to take as including "... to gather, pluck, cut, pull up, destroy, dig up, remove, harvest or damage flora by any means" or to cause or permit the same to be done. The definition of threatened flora under the BC Act is provided in **Table 1**.

Section 43 of the BC Act requires that an occurrence of a threatened species or threatened ecological community is reported to DBCA where the occurrence has been identified as part of field work completed:

- as part of an assessment under Part IV of the *Environmental Protection Act 1986*; or
- in relation to an application for a clearing permit under the *Environmental Protection Act 1986* section 51E(1)(d).

Penalties apply to individuals and organisations that fail to provide accurate reports of threatened species or communities.

The *Biodiversity Conservation Regulations 2018* (BC Regulations 2018) came into effect on January 1 2019. The BC Regulations include provisions for licencing, charges, penalties and other provisions associated with the BC Act.

Flora species that may be threatened or near threatened but lack sufficient information to be listed under the BC Act may be added to the DBCA's *Priority Flora List* (DBCA 2018c). Priority flora species are considered during State approval processes. Priority flora categories and definitions are listed in **Table 1**.

## Additional Background Information

Table 1: Definitions of conservation significant flora species pursuant to the EPBC Act and BC Act and on DBCA's Priority Flora List (DBCA 2018c)

Conservation code	Description
EX <sup>†</sup>	Threatened Flora – Presumed Extinct Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.
T <sup>†</sup>	Threatened Flora – Extant Taxa which are declared to be likely to become extinct or is rare, or otherwise in need of special protection.
CR <sup>^</sup>	Threatened Flora – Critically Endangered Taxa which are considered to be facing an extremely high risk of extinction in the wild.
EN <sup>^</sup>	Threatened Flora – Endangered Taxa which are considered to be facing a very high risk of extinction in the wild.
VU <sup>^</sup>	Threatened Flora – Vulnerable Taxa which are considered to be facing a high risk of extinction in the wild.
P1 <sup>□</sup>	Priority One – Poorly Known Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat e.g. road verges, urban areas, farmland, active mineral leases etc., or the plants are under threat, e.g. from disease, grazing by feral animals etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
P2 <sup>□</sup>	Priority Two – Poorly Known Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but urgently need further survey.
P3 <sup>□</sup>	Priority Three – Poorly Known Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but needs further survey.
P4 <sup>□</sup>	Priority Four – Rare Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

<sup>^</sup>pursuant to the EPBC Act, <sup>†</sup>pursuant to the BC Act, <sup>□</sup>on DBCA's Priority Flora List

## Threatened and priority ecological communities

'Threatened ecological communities' (TECs) are recognised as ecological communities that are rare or under threat and therefore warrant special protection. Selected TECs are afforded statutory protection at a Commonwealth level under section 181 of the EPBC Act. TECs nominated for listing under the EPBC Act are considered by the Threatened Species Scientific Committee and a final decision is made by the Commonwealth Minister for the Environment. Once listed under the EPBC Act, communities are categorised as either 'critically endangered', 'endangered' or 'vulnerable' as defined in **Table 2**. Any action likely to have a significant impact on a community listed under the EPBC Act requires approval from the Minister for the Environment.



## Additional Background Information

Within Western Australia TECs are determined by the Western Australian Threatened Ecological Communities Scientific Advisory Committee (WATECSAC) and endorsed by the State Minister for the Environment. The WATECSAC is an independent group comprised of representatives from organisations including tertiary institutions, the Western Australian Museum and DBCA. The TECs endorsed by the State Minister are published by DBCA (DBCA 2018b).

TECs are assigned to one of the categories outlined in **Table 2** according to their status (in relation to the level of threat). TECs are afforded direct statutory protection at a State level under the BC Act and BC Regulations. Ecological communities are listed under Section 27(1) and 33 of the BC Act. Their significance is also acknowledged through other state environmental approval processes such as 'environmental impact assessment' pursuant to Part IV of the *Environmental Protection Act 1986* (EP Act) and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

Table 2: Categories of threatened ecological communities (English and Blyth 1997; DEC 2009)

Conservation code	Description
PD	Presumably Totally Destroyed An ecological community that has been adequately searched for but for which no representative occurrences have been located.
CE	Critically Endangered An ecological community that has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future.
E	Endangered An ecological community that has been adequately surveyed and is not critically endangered but is facing a very high risk of total destruction in the near future.
V	Vulnerable An ecological community that has been adequately surveyed and is not critically endangered or endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future.

An ecological community that is under consideration for listing as a TEC, but does not yet meet survey criteria or has not been adequately defined may be listed as a 'priority ecological community' (PEC). PECs are categorised as priority category 1, 2 or 3 as described in **Table 3**. Ecological communities that are adequately known and are rare but not threatened, or meet criteria for 'near threatened', or that have been recently removed from the threatened list, are placed in 'priority 4'. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in 'priority 5' (DEC 2013). Listed PECs are published by DBCA (DBCA 2017b).

## Additional Background Information

Table 3: Categories of priority ecological communities (DEC 2013)

Priority code	Description
P1	<p>Priority One: Poorly known ecological communities</p> <p>Ecological communities that are known from very few occurrences with a very restricted distribution (generally <math>\leq 5</math> occurrences or a total area of <math>\leq 100</math>ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.</p>
P2	<p>Priority Two: Poorly known ecological communities</p> <p>Communities that are known from few occurrences with a restricted distribution (generally <math>\leq 10</math> occurrences or a total area of <math>\leq 200</math>ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.</p>
P3	<p>Priority Three: Poorly known ecological communities</p> <p>(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;</p> <p>(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.</p> <p>Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.</p>
P4	<p>Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p> <p>(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.</p> <p>(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category.</p> <p>(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.</p>
P5	<p>Priority Five: Conservation Dependent ecological communities</p> <p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>

## Weeds

A number of legislative and policy documents exist in relation to weed management at state and national levels. The *Biosecurity and Agriculture Management Act 2007* (BAM Act) is the principle legislation guiding weed management in Western Australia and lists declared pest species. At a national level, the Australian government has compiled a list of 32 Weeds of National Significance (WoNS) (DoEE 2018), of which many are also listed under the BAM Act.

### Declared Pests

Part 2.3.23 of the BAM Act requires a person must not; “a) keep, breed or cultivate the declared pest; b) keep, breed or cultivate an animal, plant or other thing that is infected or infested with the declared pest; c) release into the environment the declared pest, or an animal, plant or other thing that is infected or infested with the declared pest; or d) intentionally infect or infest, or expose to infection or infestation, a plant, animal or other thing with a declared pest”.

Under the BAM Act, all declared pests are assigned a legal status, as described in **Table 7**. Species assigned to the ‘declared pest, prohibited - s12’ category are placed in one of three control categories, as described in **Table 8**.

The *Biosecurity and Agriculture Management Regulations 2013* specify keeping categories for species assigned to the ‘declared pest - s22(2)’ category, which relate to the purposes of which species can be kept, as well as the entities that can keep them. The categories are described in **Table 9**.

The Western Australian Organism List (WAOL) provides the status of organisms which have been categorised under the BAM Act (DPIRD 2020).

Table 4: Legal status of declared pest species listed under the BAM Act (DPIRD 2020)

Category	Description
Declared Pest Prohibited - s12	May only be imported and kept subject to permits. Permit conditions applicable to some species may only be appropriate or available to research organisations or similarly secure institutions.
Declared Pest s22(2)	Must satisfy any applicable import requirements when imported, and may be subject to an import permit if they are potential carriers of high-risk organisms. They may also be subject to control and keeping requirements once within Western Australia

Table 5: Control categories of declared pest species listed under the BAM Act (DPIRD 2020)

Category	Description
C1	Exclusion Not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2	Eradication Present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.

## Additional Background Information

*Table 8: Control categories of declared pest species listed under the BAM Act (DPIRD 2020) (continued)*

Category	Description
C3	Management Established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

*Table 6: Keeping categories of declared pest species listed under the BAM Act (DPIRD 2020)*

Category	Description
Prohibited	Can only be kept under a permit for public display and education purposes, and/or genuine scientific research, by entities approved by the state authority.
Exempt	No permit or conditions are required for keeping.
Restricted	Organisms which, relative to other species, have a low risk of becoming a problem for the environment, primary industry or public safety and can be kept under a permit by private individuals.

## Wetland Habitat

### Geomorphic wetland types

On the Swan Coastal Plain DBCA (2017a) have used the geomorphic wetland classification system developed by Semeniuk (1987) and Semeniuk and Semeniuk (1995) to classify wetlands based on the landform shape and water permanence (hydro-period) as outlined in **Table 10**.

Table 7: Geomorphic Wetlands of the Swan Coastal Plain classification categories (DBCA 2017a)

Level of inundation	Geomorphology			
	Basin	Flat	Channel	Slope
Permanently inundated	Lake	-	River	-
Seasonally inundated	Sumpland	Floodplain	Creek	-
Seasonally waterlogged	Dampland	Palusplain	-	Paluslope

### Wetland management categories

DBCA maintains the *Geomorphic Wetland of the Swan Coastal Plain* dataset (DBCA 2018a), which also categorises individual wetlands into specific management categories as described in **Table 11**.

Table 8: Geomorphic Wetlands of the Swan Coastal Plain classification categories (DBCA 2017a)

Management category	Description of wetland	Management objectives
Conservation (CCW)	Support high levels of attributes	Preserve wetland attributes and functions through reservation in national parks, crown reserves and state owned land. Protection provided under environmental protection policies.
Resource enhancement (REW)	Partly modified but still supporting substantial functions and attributes	Restore wetland through maintenance and enhancement of wetland functions and attributes. Protection via crown reserves, state or local government owned land, environmental protection policies and sustainable management on private properties.
Multiple use (MUW)	Few wetland attributes but still provide important hydrological functions	Use, development and management considered in the context of water, town and environmental planning through land care.

The management categories of wetland features are determined based on hydrological, biological and human use features. The DBCA document *A methodology for the evaluation of specific wetland types on the Swan Coastal Plain, Western Australia* (DBCA 2017a) details the methodology by which wetlands on the Swan Coastal Plain are assigned management categories based on a two tiered evaluation system, with preliminary and secondary evaluation stages. The preliminary evaluation aims to identify any features of conservation significance that would immediately place the wetland within the CCW management category. Examples of these significant features include presence on significant wetland lists, presence of TECs or PECs (Priority 1 and 2), presence of threatened flora and

## Additional Background Information



over 90% of vegetation in good or better condition based on the Keighery (1994) scale. If such environmental values are identified the wetland would be categorised as CCW without further evaluation.

Should the preliminary evaluation indicate that no such features occur, the secondary evaluation and site assessment are then applied. In the secondary evaluation, an appropriate management category is determined through the assessment of a range of environmental attributes, functions and values.

### Wetland reclassification

DBCA have a protocol for proposing changes to the wetland boundaries and management categories of the existing geomorphic wetland dataset (DEC 2007). The procedure involves a wetland desktop evaluation and site assessment which culminates in a recommended management category.

Relevant information should be obtained in the optimal season for vegetation condition and water levels, which is usually spring (DEC 2007). In the case of larger wetlands that have undergone a degree of disturbance, a separate management category may be assigned to parts of the wetland in order to reflect the current values.

## References

### General references

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### Online references

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## Additional Background Information



Department of Primary Industries and Regional Development (DPIRD) 2020, The Western Australian Organism List (WAOL), < <https://www.agric.wa.gov.au/bam/western-australian-organism-list-waol>>.



# Appendix B

Conservation Significant Flora Species and likelihood of  
Occurrence Assessment





Species name	Level of		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
<i>Caladenia huegelii</i>	CR	EN	PG	Well-drained, deep sandy soils in lush undergrowth in a variety of moisture levels.	Sep-early Nov	Unlikely
<i>Caladenia lodgeana</i>	CR	CR	PG	Seasonally moist to wet clay/sand soils on the margins of either low granite outcrops or ephemeral wetlands	Oct	Unlikely
<i>Calectasia cyanea</i>	CR	CR	P	Heathland on white sand or laterite gravel over laterite. Known only from one population near Albany.	Jun-Oct	Unlikely
<i>Gastrolobium papilio</i>	CR	EN	P	Sandy clay over ironstone and laterite. Flat plains.	Oct-Dec	Unlikely
<i>Grevillea brachystylis</i> subsp. <i>grandis</i>	CR	CR	P	Sand and loam with lateritic gravel.	Sep-Dec	Unlikely
<i>Lambertia echinata</i> subsp. <i>occidentalis</i>	CR	EN	P	White sandy soils over laterite, orange/brown-red clay over ironstone. Flats to foothills, winter-wet sites.	Feb, Apr or Dec	Unlikely
<i>Verticordia plumosa</i> var. <i>ananeotes</i>	CR	EN	P	Sand in open jarrah woodland or sandy/clay soils with marri.	Nov-Dec	Unlikely
<i>Banksia nivea</i> subsp. <i>uliginosa</i>	EN	EN	P	Clay over laterite in thick scrub, in winter wet ironstones.	Aug-Sep	Unlikely
<i>Caladenia excelsa</i>	EN	EN	PG	Hilltops, slopes, swales and low plains in deep pale yellow, white or grey sandy soils among dense low shrubs in banksia, jarrah and marri woodlands	Sep-Oct	Unlikely
<i>Caladenia hoffmanii</i>	EN	EN	PG	Clay, loam, laterite, granite. Rocky outcrops and hillsides, ridges, swamps and gullies.	Aug-Oct	Unlikely
<i>Drakaea micrantha</i>	EN	VU	PG	Open sandy patches often adjacent to winter-wet swamps.	Sept- early Oct	Unlikely
<i>Reedia spathacea</i>	EN	CR	P	Low nutrient, anoxic and highly acidic wetlands usually over peat.	Nov (flowering is rare)	Unlikely
<i>Banksia mimica</i>	VU	EN	P	Flat to gentle slopes in grey and white sand in open woodlands.	Dec-Jan	Unlikely
<i>Banksia squarrosa</i> subsp. <i>argillacea</i>	VU	VU	P	White/grey sand, gravelly clay or loam predominantly in winter-wet areas over ironstone in open to tall shrubland.	Jun-Nov	Unlikely
<i>Daviesia elongata</i>	VU	listed at subsp. level	P	Sand, laterite.	Sep/Dec-Jan/Feb	Unlikely
<i>Andersonia ferricola</i>	P1	-	P	White sand or red-brown loam over ironstone on seasonally wet flats.	Oct	Unlikely
<i>Deyeuxia inaequalis</i>	P1	-	A	Loam soils	Nov-Dec	Unlikely
<i>Netrostylis</i> sp. Nannup (P.A. Jurjevich 1133)	P1	-	P	Sand and clay loam in valley flats and creeks	Undocumented (likely Mar-Nov)	Unlikely

Species name	Level of		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
<i>Platychorda rivalis</i>	P1	-	P	Peat, laterite. Edges of swamps, valleys	Unknown	Unlikely
<i>Stylidium hygrophilum</i>	P1	-	P	White-grey peaty sand. Winter-wet flats	Nov	Unlikely
<i>Synaphea macrophylla</i>	P1	-	P	Gravelly loam with jarrah or marri woodland or forest	Oct	Unlikely
<i>Synaphea</i> sp. Redgate Road (J. Scott 16)	P1	-	P	Grey clay, litter. Winter-wet areas, wet areas along road verges and ditches.	Oct-Nov	Unlikely
<i>Actinotus whicheranus</i>	P2	-	P	White sand pockets over laterite.	Dec or Jan-Mar	Unlikely
<i>Amperea micrantha</i>	P2	-	P	Sandy soils.	Oct-Nov	Unlikely
<i>Andersonia</i> sp. Echidna (A.R. Annel's ARA 5500)	P2	-	P	Brown laterite and sandy loam on slopes and flats.	Nov-Dec	Unlikely
<i>Boronia</i> sp. Leeuwin (J. Scott 235)	P2	-	P	Sand and peat with gravelly laterite in winter-wet depressions, swamps and watercourses.	Aug-Dec	Unlikely
<i>Caladenia ambusta</i>	P2	-	PG	Flat to gentle slopes in brown soil or dunes (limited information)	Nov	Unlikely
<i>Caladenia nivalis</i>	P2	-	PG	Sand, loam, granite on coastal granite outcrops.	Sep-Oct	Unlikely
<i>Gastrolobium whicherense</i>	P2	-	P	Red-grey sandy clay over quartzite on steep westerly slopes.	Oct	Unlikely
<i>Grevillea brachystylis</i> subsp. Yelverton (A. Webb AW09122)	P2	-	P	Grey or black sand, sandy clay. Swampy situations, stream banks	Jan, Apr, Aug-Dec	Unlikely
<i>Hybanthus volubilis</i>	P2	-	P	Clay or sandy clay on river banks.	Sep-Dec	Unlikely
<i>Leptomeria furtiva</i>	P2	-	P	Grey or black peaty sand in winter-wet flats.	Aug-Oct	Unlikely
<i>Melaleuca incana</i> subsp. Gingilup (N. Gibson & M. Lyons 593)	P2	-	P	Red-grey sand, sandy clay over ironstone. Seasonally wet flats.	May - Jun	Unlikely
<i>Thysanotus</i> sp. Badgingarra (E.A. Griffin 2511)	P2	-	P	Grey sand with lateritic gravel.	Dec	Unlikely
<i>Xyris maxima</i>	P2	-	P	Black peaty sand on drainage flats.	Nov-Dec/Jan	Unlikely
<i>Acacia inops</i>	P3	-	P	Black peaty sand, clay. Swamps, creeks.	Sep-early Nov	Unlikely
<i>Acacia lateritica</i> var. glabrous variant (B.R. Maslin 6765)	P3	-	P	Lateritic soils.	Aug or Oct	Unlikely
<i>Actinotus repens</i>	P3	-	P	Sand, clay or loam in wetlands or low lying areas in scrub, woodland or forest.	Dec-Mar	Unlikely
<i>Austrostipa mundula</i>	P3	-	P	Grey sand over limestone.	Sept-Nov	Unlikely
<i>Boronia anceps</i>	P3	-	P	White sand, gravelly laterite in seasonally swampy heaths.	Sep-Dec/Jan	Unlikely
<i>Boronia capitata</i> subsp. <i>gracilis</i>	P3	-	P	White/grey or black sand in winter-wet swamps, hillslopes.	Jun-Nov	Unlikely
<i>Caladenia abbreviata</i>	P3	-	PG	Sand dunes.	Nov-Dec	Unlikely

Species name	Level of		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
<i>Calothamnus lateralis</i> var. <i>crassus</i>	P3	-	P	Sand, clay or peat in swamps and winter-wet depressions.	Aug-Dec	Unlikely
<i>Chamaescilla gibsonii</i>	P3	-	P	Clay to sandy clay in winter-wet flats, shallow water-filled claypans.	Sep	Unlikely
<i>Cyathochaeta teretifolia</i>	P3	-	P	Grey sand, sandy clay in swamps and creek edges.	Oct-Jan	Unlikely
<i>Dampiera heteroptera</i>	P3	-	P	Sandy soils, swampy areas.	Sep-Oct	Unlikely
<i>Gastrolobium formosum</i>	P3	-	P	Clay loam. Along river banks or in swamps.	Nov	Unlikely
<i>Grevillea brachystylis</i> subsp. <i>brachystylis</i>	P3	-	P	Black sand, sandy clay in swampy situations.	Aug-Nov	Unlikely
<i>Grevillea bronweniae</i>	P3	-	P	Grey sand over laterite, lateritic loam on hillslopes.	Jun-Dec	Unlikely
<i>Grevillea manglesioides</i> subsp. <i>ferricola</i>	P3	-	P	Red sandy clay over ironstone on winter wet flats.	Oct	Unlikely
<i>Hakea oldfieldii</i>	P3	-	P	Red clay or sand over laterite on seasonally wet flats.	Aug-Oct	Unlikely
<i>Isopogon formosus</i> subsp. <i>dasylepis</i>	P3	-	P	Sand, sandy clay, gravelly sandy soils over laterite, often in swampy areas.	Jun-Dec	Unlikely
<i>Johnsonia inconspicua</i>	P3	-	P	White-grey or black sand. Low dunes, winter-wet flats.	Oct-Nov	Unlikely
<i>Juncus meianthus</i>	P3	-	P	Black sand, sandy clay. Creeks, seepage areas.	Nov-Dec/Jan	Unlikely
<i>Lasiopetalum laxiflorum</i>	P3	-	P	Sand and/or clay with laterite.	Sep-Dec	Unlikely
<i>Leptinella drummondii</i>	P3	-	A	Clay loam, mud along rivers.	Nov-Dec or Jan-Feb	Unlikely
<i>Lepyrodia heleocharoides</i>	P3	-	P	Moist peaty sand. Dry or seasonally inundated heath or woodland, swamps.	Dec	Unlikely
<i>Loxocarya magna</i>	P3	-	P	Sand, loam, clay, ironstone in seasonally inundated or damp habitats.	Sep or Nov	Unlikely
<i>Netrostylis</i> sp. Blackwood River (A.R. Annel 3043)	P3	-	P	Creebeds, edges of lakes and swamps. Clay, peat or loam soils.	?Nov (limited information)	Unlikely
<i>Pimelea ciliata</i> subsp. <i>longituba</i>	P3	-	P	Grey sand over clay, loam.	Oct-Dec	Unlikely
<i>Pultenaea pinifolia</i>	P3	-	P	Loam or clay. Floodplains, swampy areas.	Oct-Nov	Unlikely
<i>Stylidium lowrieianum</i>	P3	-	P	Sand or sandy loam over limestone. Eucalypt or Agonis woodland, forest.	Oct-Nov	Unlikely
<i>Synaphea decumbens</i>	P3	-	P	Sand over laterite.	Sep-Oct	Unlikely
<i>Synaphea hians</i>	P3	-	P	Sandy soils on rises.	Jul/Sep-Nov	Unlikely
<i>Synaphea petiolaris</i> subsp. <i>simplex</i>	P3	-	P	Sandy soils on flats and in winter-wet areas.	Sep-Oct	Unlikely
<i>Thysanotus cymosus</i>	P3	-	P	Shrubland or woodland on clay, granitic or lateritic sand.	Sep-Oct	Unlikely
<i>Tricostularia davisii</i>	P3	-	P	Variety of soils in mallee woodland and heath on flats, hillsides and valleys.	Oct-Nov	Unlikely
<i>Acacia flagelliformis</i>	P4	-	P	Sandy soils in winter-wet areas.	May-Sep	Unlikely

Species name	Level of		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
<i>Acacia semitrullata</i>	P4	-	P	White/grey sand, sometimes over laterite, clay sometimes in sandplains, swampy areas.	May-Oct	Unlikely
<i>Acacia tayloriana</i>	P4	-	P	Grey or yellow/orange sandy soils, lateritic gravel, clay loam. Winter-wet areas.	Jan	Unlikely
<i>Astartea onycis</i>	P4	-	P	Seasonally inundated swamps and low-lying areas on sandy clay, loam or peat	Nov-Mar	Unlikely
<i>Banksia sessilis</i> var. <i>cordata</i>	P4	-	P	White/grey sand. Coastal limestone.	Jul-Oct	Unlikely
<i>Chamelaucium erythrochlorum</i>	P4	-	P	Sandy clay or sandy loam, sometimes with laterite. Creekbeds, slopes and ridges	Nov-Feb	Unlikely
<i>Drosera fimbriata</i>	P4	-	P	White sand, granite.	Sep-Oct	Unlikely
<i>Eucalyptus calcicola</i> subsp. <i>calcicola</i>	P4	-	P	Red-brown sand over limestone on coastal dunes, calcareous ridges, rocky outcrops.	May-Jun	Unlikely
<i>Eucalyptus marginata</i> x <i>megacarpa</i>	P4	-	P	Sandy loam. Interdunal areas.	Unknown	Unlikely
<i>Eucalyptus rudis</i> subsp. <i>cratyantha</i>	P4	-	P	Loam on flats and hillsides.	Jul-Sep	Unlikely
<i>Franklandia triaristata</i>	P4	-	P	White or grey sand.	Aug-Oct	Unlikely
<i>Gahnia sclerioides</i>	P4	-	P	Loam, sandy soils. Moist shaded situations.	Feb, Apr, Jun, Aug or Nov	Unlikely
<i>Gonocarpus pusillus</i>	P4	-	A	Grey sandy clay in winter-wet swamps.	Nov-Dec	Unlikely
<i>Lambertia rariflora</i> subsp. <i>rariflora</i>	P4	-	P	Red-brown clay soils, black organic loam, laterite near intermittent streams.	Feb-Mar or May	Unlikely
<i>Melaleuca basicephala</i>	P4	-	P	Black peaty sand, clay. Winter-wet flats, swamps.	Dec or Jan	Unlikely
<i>Stylidium gloeophyllum</i>	P4	-	P	Sandy clay loam, granite in winter wet depressions or fringing outcrops. Grows with peppermint trees, mallees or in hakea shrubland with sedges.	Oct-Dec	Unlikely
<i>Thysanotus glaucus</i>	P4	-	P	White, grey or yellow sand, sandy gravel.	Oct-Mar	Unlikely
<i>Thysanotus isantherus</i>	P4	-	P	Hillsides, sand over granite.	Nov-Dec	Unlikely

Note: CR=critically endangered, EN=endangered, VU=vulnerable, P1-P4=priority 1 to priority 4, P=perennial, PG=perennial geophyte, A=annual.

# Appendix C

Species List







Family	Status	Species
Alliaceae	*	<i>Allium triquetrum</i>
Araceae	*DP	<i>Zantedeschia aethiopica</i>
Asparagaceae		<i>Lomandra</i> sp.
Asphodelaceae	*	<i>Aloe</i> sp.
Asteraceae	*	<i>Cotula turbinata</i>
	*	<i>Hypochaeris glabra</i>
	*	<i>Hypochaeris radicata</i>
		<i>Lagenophora huegelii</i>
	*	<i>Osteospermum ecklonis</i>
	*	<i>Senecio angulatus</i>
Caprifoliaceae	*	<i>Centranthus ruber</i>
	*	<i>Lonicera japonica</i>
Caryophyllaceae	*	<i>Petrorhagia dubia</i>
Colchicaceae		<i>Burchardia congesta</i>
		<i>Burchardia multiflorus</i>
Cyperaceae		<i>Cyathochaeta</i> ? <i>avenacea</i>
		<i>Morelotia octandra</i>
		<i>Lepidosperma apricola</i>
Dennstaedtiaceae		<i>Pteridium esculentum</i>
Dilleniaceae		<i>Hibbertia amplexicaulis</i>
		<i>Hibbertia hypericoides</i>
Droseraceae		<i>Drosera</i> sp.
Elaeocarpaceae		<i>Tremandra diffusa</i>
Ericaceae		<i>Leucopogon verticillatus</i>
		<i>Styphelia</i> ? <i>propinqua</i>
Fabaceae	*	<i>Acacia podalyriifolia</i>
		<i>Acacia pulchella</i>
		<i>Acacia saligna</i>
		<i>Bossiaea linophylla</i>
	*	<i>Fabaceae</i> sp.
	*WoNS	<i>Genista linifolia</i>
	*WoNS	<i>Genista monspessulana</i>
		<i>Hovea chorizemifolia</i>

		<i>Hovea trisperma</i>
		<i>Jacksonia sternbergiana</i>
		<i>Kennedia coccinea</i>
	*	<i>Lupinus cosentinii</i>
		<i>Mirbelia dilatata</i>
	*	<i>Trifolium</i> sp.
Geraniaceae		
	*	<i>Pelargonium</i> x <i>asperum</i>
Goodeniaceae		
		<i>Dampiera linearis</i>
Haemodoraceae		
		<i>Conostylis aculeata</i> subsp. <i>aculeata</i>
Iridaceae		
	*	<i>Chasmanthe floribunda</i>
	*	<i>Freesia alba</i> x <i>leichtlinii</i>
	*	<i>Gladiolus caryophyllaceus</i>
	*	<i>Iridaceae</i> sp.
	*	<i>Ixia maculata</i>
		<i>Patersonia occidentalis</i>
		<i>Patersonia umbrosa</i>
	*	<i>Romulea rosea</i>
	*	<i>Watsonia borbonica</i>
	*	<i>Watsonia meriana</i> var. <i>bulbillifera</i>
Juncaceae		
		<i>Juncus</i> sp.
Myrtaceae		
		<i>Agonis flexuosa</i>
	Pl	<i>Callistemon phoeniceus</i>
		<i>Corymbia calophylla</i>
	Pl	<i>Eucalyptus camaldulensis</i>
		<i>Eucalyptus diversicolor</i>
	*	<i>Eucalyptus sideroxylon</i>
	*	<i>Eucalyptus</i> sp.
	*	<i>Leptospermum laevigatum</i>
Orobanchaceae		
	*	<i>Orobanche minor</i>
Oxalidaceae		
	*	<i>Oxalis glabra</i>
	*	<i>Oxalis pes-caprae</i>
Phyllanthaceae		
		<i>Phyllanthus calycinus</i>
Plantaginaceae		
	*	<i>Plantago major</i>
Poaceae		
	*	<i>Cenchrus clandestinus</i>
	*	<i>Anthoxanthum odoratum</i>
	*	<i>Avena barbata</i>
	*	<i>Briza maxima</i>
	*	<i>Eragrostis curvula</i>

	*	<i>Hyparrhenia hirta</i>
		<i>Microlaena stipoides</i>
	*	<i>Phalaris ?aquatica</i>
Polygalaceae		
	*	<i>Polygala myrtifolia</i>
Proteaceae		
		<i>Hakea amplexicaulis</i>
		<i>Hakea lissocarpha</i>
		<i>Persoonia longifolia</i>
Restionaceae		
		<i>Desmocladius flexuosus</i>
Rosaceae		
	*	<i>Cotoneaster</i> sp.
	*	<i>Rosa</i> sp.
	*	<i>Rubus</i> sp.
Rubiaceae		
		<i>Opercularia hispidula</i>
Thymelaeaceae		
		<i>Pimelea hispida</i>
Xanthorrhoeaceae		
		<i>Xanthorrhoea preissii</i>
Zamiaceae		
		<i>Macrozamia riedlei</i>

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\*=non-native, DP=Declared Pest, PI=planted



# Appendix D

Conservation Significant Communities and Likelihood of  
Occurrence Assessment





Code	Community name	TEC/ PEC	Level of significance		Likelihood of occurrence
			State	EPBC Act	
Augusta-microbial	Rimstone Pools and Cave Structures Formed by Microbial Activity on Marine Shorelines (Augusta microbialites)	TEC	EN	-	Unlikely
Melaleuca lanceolata forests	Melaleuca lanceolata forests, Leeuwin Naturaliste Ridge	PEC	P2	-	Unlikely
CAVES LEEUWIN04	Aquatic Root Mat Community 4 in Caves of the Leeuwin Naturaliste Ridge	TEC	CR	EN	Unlikely
Note: TEC=threatened ecological community, PEC=priority ecological community, CR=critically endangered, EN=endangered, P2=priority 2.					





# Appendix E

Sample Data



**Sample Name: Q1**

**Project no.:** EP22-096

**Date:** 29/09/2022

**Author:** NAW

**Status:** Non-permanent

Q1: Page 1 of 2

**Quadrat and landform details**

Sample type: Quadrat	Size: 10x10 metre
NW corner easting: 321701	NW corner northing: 6240609
Altitude (m): 99	Geographic datum/zone: GDA94/Zone 50
Soil water content: Damp	Landform: flat
Time since fire: >5 years	Disturbance: track, tyre
Soil type/texture: sand / loam	Bare ground (%): 0
Rocks (%) and type: No rocks	Soil colour: brown
Litter: 30% (leaves, twigs, branches)	Vegetation condition: good



**Sample Name:**

**Q1**

**Project no.:** EP22-096

**Date:** 29/09/2022

**Author:** NAW

**Status** Non-permanent

Q1: Page 2 of 2

## Species Data

\* denotes non-native species

Status	Confirmed name	Cover (%)
	* <i>Anthoxanthum odoratum</i>	0.1
	<i>Burchardia multiflorus</i>	0.1
	<i>Conostylis aculeata</i> subsp. <i>aculeata</i>	0.5
	<i>Corymbia calophylla</i>	50
	<i>Cyathochaeta ?avenacea</i>	0.5
	* <i>Fabaceae</i> sp.	4
	* <i>Freesia alba</i> x <i>leichtlinii</i>	0.1
	<i>Hakea lissocarpha</i>	5
	<i>Hibbertia hypericoides</i>	10
	<i>Hovea chorizemifolia</i>	0.1
	* <i>Hypochaeris glabra</i>	0.5
	<i>Lagenophora huegelii</i>	0.5
	<i>Lomandra</i> sp.	4
	<i>Microlaena stipoides</i>	5
	<i>Morelotia octandra</i>	4
	<i>Patersonia umbrosa</i>	opp
	<i>Pimelea hispida</i>	opp
	<i>Xanthorrhoea preissii</i>	2