FLORA AND VEGETATION

OF

BUSHLAND AREA AT ST BRIGID'S

Prepared for:
St Brigid's College

Prepared by:
Mattiske Consulting Pty Ltd

October 2017

Mattiske Consulting Pty Ltd

Disclaimer and Limitation

This report has been prepared on behalf of and for the exclusive use of St Brigid's College; and is subject to and issued in accordance with the agreement between St Brigid's College and Mattiske Consulting Pty Ltd. Mattiske Consulting Pty Ltd accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any third party.

TABLE OF CONTENTS

Page

1. SUMMARY 1
2. INTRODUCTION 3
2.1 Location 3
2.2 Climate 3
2.3 Landform and Soils 3
2.4 Flora and Vegetation 4
3. OBJECTIVES 4
4. METHODS 5
4.1 Flora 5
4.2 Vegetation 5
4.3 Fauna 6
5. RESULTS 7
5.1 Flora 7
5.2 Threatened and Priority Flora Species 7
5.3 Vegetation 7
5.4 Review of the Condition of Vegetation 7
6. DISCUSSION 10
7. LIST OF PARTICIPANTS 11
8. REFERENCES 11

FIGURES

1: St Brigid's College – proposed clearing area
2: Summary of Temperature and Rainfall 2014 to 2017 at Bickley (Bureau of Meteorology 2017)
3: St Brigid's College Proposed Clearing – location of larger Trees (>50cm in stem diameter at breast height).

APPENDICES

A1: Definition of Threatened and Priority Flora Species (Department of Biodiversity, Conservation and Attractions, 2017a)
A2: Definition of Threatened Ecological Communities (Department of Biodiversity, Conservation and Attractions 2017d)
Definition of Threatened Ecological Communities (Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*)
Definition of Priority Ecological Communities (Department of Biodiversity, Conservation and Attractions 2017d)
A3: Categories and Control of Declared (Plant) Pests in Western Australia (Department of Agriculture and Food 2016) (Biosecurity and Agriculture Management Regulations 2013)
B: Threatened and Priority Species potentially occurring at St Brigid's College Survey Area
C: Vascular Plant Species recorded on St Brigid's College Survey Area

1. SUMMARY

Mattiske Consulting Pty Ltd was commissioned to undertake ecological studies on a small bushland area (0.26ha) south of the main school at the St Brigid's College in Lesmurdie, Figure 1.

A total of 71 vascular plant taxa from 29 plant families and 54 genera were recorded on the survey area at St Brigid's College. Of these, sixteen taxa were introduced plant taxa and four were planted tree or shrub species. Dominant families included Fabaceae 141 taxa), Proteaceae (8 taxa) and Myrtaceae (6 taxa).

Based on database searches, a series of threatened and priority flora species had the potential to occur in the survey area. Despite extensive searching, no declared or listed threatened or priority flora species as defined by the Environment Protection Biodiversity Conservation Act 1999 or the Wildlife Conservation Act 1950 were recorded on survey area in September 2017.

One site-vegetation type (type S) was defined and mapped for the St Brigid's College survey area. The definition of the site-vegetation type was based on the Havel's site-vegetation types for the Northern Jarrah Forest Region (Havel 1975a, 1975b). This community is not listed as a threatened ecological community or a priority ecological community (Department of Biodiversity, Conservation and Attractions 2017e, 2017f; Department of the Environment and Energy 2017b). This community is also relatively widespread in the northern Jarrah forest within State Forest and different reserves. The northern section of the proposed clearing area was degraded and supported mostly introduced species in the understorey and a few planted shrubs and trees.

The actual area proposed to be disturbed that is in relatively good condition is less than 0.2ha. The other sections of the survey area are either degraded or completely degraded.

During the field studies in September field observations were undertaken on the potentially significant fauna species. No suitable hollows for the listed Black Cockatoos were recorded on the tree species (*Eucalyptus marginata, Corymbia calophylla*); although there was a range of larger Marri (*Corymbia calophylla*) trees on the proposed clearing area which may provide foraging resources for the Black Cockatoos.

There were some diggings in the survey area that reflected the presence of native Bandicoots. The native Bandicoots are relatively common in the Kalamunda district.

The key value that appears to be present in the survey area on the St Brigid's College is the potential for foraging activities by the listed Black Cockatoos.

The latter values need to be assessed in the context that the area is abuted by housing on the western side and the area has been highly modified in the northern half of the survey area by previous planting and disturbance activities. In view of the size of the remaining less disturbed area of "good" vegetation (of less than 0.2 hectare), it is recommended that the proposed clearing activities could not be considered significant in the local or regional context for the management or protection of these values for the foraging activities of the Black Cockatoos.

410300 410350 410400

6459500 6459450 6459400 6459350 6459300

Legend

Clearing Area

Aerial Photography: Landgate 2017

N

0 6 12 m

Scale: 1:600
MGA94 (Zone 50)

CAD Ref: a2563_Tr_F001

Date: Oct 2017 | Rev: A | A3

Mattiske Consulting Pty Ltd
28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640

Author: E M Mattiske | MCPL Ref:

Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

St Brigids College

Proposed Clearing

Figure: **1**

2. INTRODUCTION

2.1 Location

St Brigid's College is located on land in the northern Jarrah forest within the suburb of Lesmurdie within the Kalamunda Shire (Figure 1). The property has been modified and disturbed by previous residency and activities. The St Brigid's College are proposing to clear the survey area to the west of the existing building for car parks and access roadways associated with the proposed building additions.

2.2 Climate

The survey area occurs within the northern Jarrah Forest Region as described by Beard (1990). The climate is dry Mediterranean, with winter rainfall of 1000 - 1400 mm and 5-6 dry months per year (Beard 1990). The rainfall for Bickley (located east of Kalamunda and Lesmurdie) is summarized in Figure 2 below. The seasonal fluctuations in temperature and rainfall are illustrated (Bureau of Meteorology 2017). As indicated on the results the winter rains prior to the assessment in September 2017 were similar to the previous year.

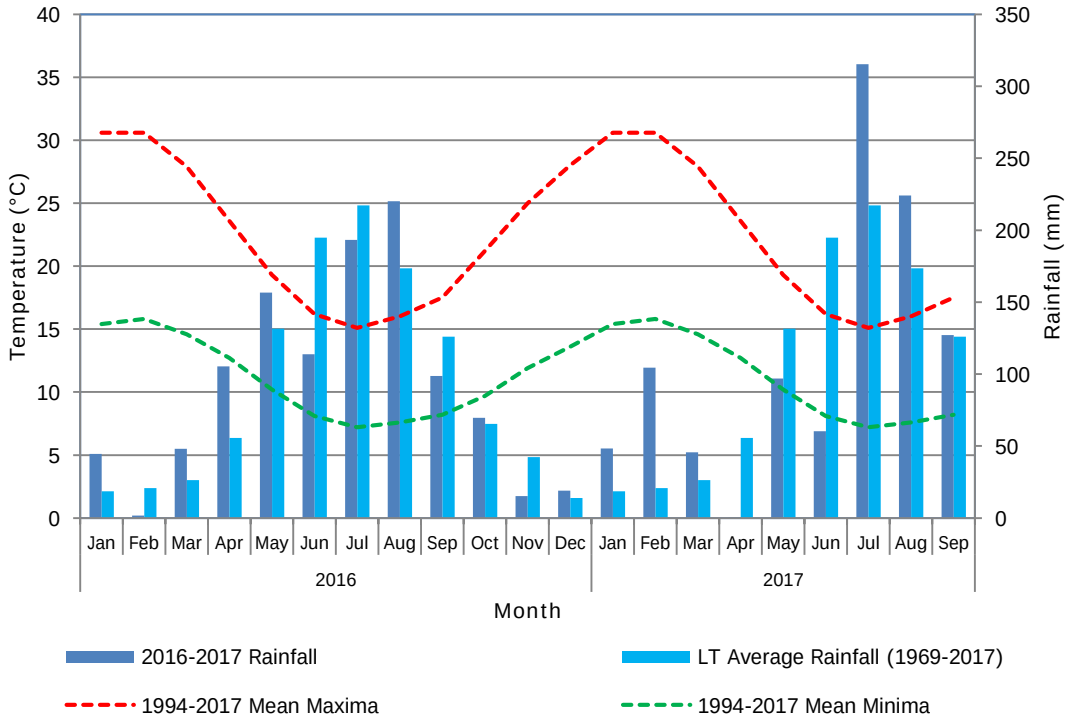

Figure 2: Summary of Temperature and Rainfall 2016 to 2017 at Bickley (Bureau of Meteorology 2017)

2.3 Landform and Soils

The survey area occurs on the lateritic capped Archaean granite and metamorphic rocks of the Darling Plateau.

Churchward and McArthur (1980) undertook a study of the landforms and geology of the Darling System. The following landform and soil unit is represented in the survey area:

Dwellingup - "Gently undulating landscape with duricrust on ridges; sands and gravels in shallow depressions."

2.4 Flora and Vegetation

St Brigid's College within the Darling Botanical District of the South-western Botanical Province as recognized by Diels (1906) and later developed by Gardner (1942) and Beard (1979, 1980).

Previous workers have stressed the significance of the climate, landforms and soils in determining the distribution of plant communities in this area (Diels 1906; Williams 1932, 1942; Speck 1952, 1958; Lange 1960; Churchill 1961, 1968; Smith 1974; Seddon 1972; Havel 1968, 1975a, 1975b; Heddle *et al*. 1980a; Beard 1981, Mattiske and Havel 1998).

In vegetation mapping it is necessary to define and map the plant communities into groups with common characteristics in structure and floristics. This grouping and classification has been achieved by:

. Havel on the Swan Coastal Plain (1968) and in the Northern Jarrah Forest (1975a, 1975b),
. Beard (1979) in the Pinjarra area (1:250,000),
. Heddle *et al*. (1980a) in the System 6 area; Perth, Pinjarra and Collie areas (1:250,000), and
. Mattiske and Havel (1998) in the vegetation mapping for the Regional Forest Agreement.

The classification system of Heddle *et al.* (1980a), which utilized the concept of vegetation complexes, emphasized the relationships between the underlying landforms, soils and the plant communities. This latter system incorporated linkages with the previous work by Havel (1975a and b).

One vegetation complex as defined and mapped by Heddle et al. (1980) and Mattiske and Havel (1998) occurs in the survey area, as follows:

Dwellingup 2 (D2) - Open forest of *Eucalyptus marginata* subsp. *marginata* - *Corymbia calophylla* on lateritic uplands in subhumid and semiarid zones.

The Dwellingup 2 (D2) vegetation complex is represented in the reserve system with 23.0% included in the formal and informal reserves (see Forest Management Plan, data supplied by Department of Conservation and Land Management – July 2003).

It is not possible to assess the representation of these site-vegetation types at a regional scale as only sections of the Jarrah forest have been mapped at this finer scale of definition. Therefore it is necessary to rely on previous mapping over four decades by Dr Libby Mattiske and earlier publications by Heddle *et al.* (1980b) reviewed some of the representation in broad terms for these site-vegetation types.

3. OBJECTIVES

The objectives of the survey were:

. to record the flora and fauna species present on the survey area and to search for threatened and priority flora and fauna species on the survey area.

. to review the local and regional significance of the flora and fauna recorded on the survey area.

. to define and map the site-vegetation types on the survey area.

. to review the local and regional significance of the site-vegetation types recorded on the survey area.

. to review the vegetation condition on the survey area.

. to prepare a report summarising the findings.

4. METHODS

The survey approach included:

1. An initial database search of potential values associated with the flora and fauna species on the survey area.
2. Detailed assessments of the tree and understorey species at various sites within the survey area.
3. Detailed foot traverses on two occasions searching for any threatened or priority flora species.
4. An assessment of each tree looking for potential suitable hollows for bird nesting sites.
5. Observations on native fauna utilisation of the area (through observations of sited fauna, ground disturbance or other signs of fauna usage).
6. Targeted searching for threatened and priority flora species through foot traverses within the survey area in September 2017.

4.1 Flora

The detailed recording of the vascular plant species was carried out in conjunction with the vegetation mapping program for the survey area. Detailed recordings were undertaken at 9 sites and in addition the area was traversed on several occasions by foot traverses in order to search for threatened and priority flora species.

All plant specimens which were collected during the field programme were dried and fumigated in accordance with the requirements of the West Australian Herbarium, and then sorted in readiness for identification.

Plant specimens were identified by the use of local and regional flora keys and by comparison with the named specimens held at the West Australian Herbarium. Plant taxonomists who are considered to be an authority on a particular plant group were consulted, when necessary.

The conservation status of all recorded flora was also checked against the current lists managed by the Department of Biodiversity, Conservation and Attractions (2017g), see Appendix A.

The status of all introduced species were checked against the current listings of Declared Plant Pests managed by the Department of Agriculture and Food (2017) under the *Biosecurity and Agriculture Management Act 2007.*

4.2 Vegetation

The survey area recordings were undertaken at 9 sites. At each recording site the following information was collected:

Soil types (gravels, sandy-gravels, sandy-loam gravels, sandy-loams, loams, clay-loams, clays and peat)

Topography (ridge, upper slope, mid-slope, lower slope, valley floor and swamp)

Outcropping (type - granite, laterite, dolerite; quantity - numerous, moderate, few)

Logging History (intensity - heavy, moderate, light; quantity - number of stumps within a 20 metre radius)

Species were ranked according to the scale developed by Havel (1975a):

Tree species
Assessments were undertaken within a 20 metre radius from the observation point.

0 - absent
1 - one or two trees
2 - three to five trees
3 - more than five trees, but contributing less than one third of total stand
4 - between one third and one half of total stand
5 - more than one half of total stand

Understorey species
Assessments were undertaken within a 5 metre radius from the observation point.

0 - absent
1 - very rarely seen; only after a careful search
2 - present, observable, but in small numbers only
3 - common locally, but not uniformly over the whole area
4 - common over the whole area
5 - completely dominating the undergrowth

The physiological stress was determined for each species within an area of 20 metres radius from the observation point and ranked according to the following scale. The above system was developed by E.M. Mattiske and Associates and has been used previously in the northern Jarrah forest:

0 - healthy, no evidence of stress
1 - odd plant showing signs of stress, not dead
2 - one or two stressed plants, near death
3 - scattered stressed, (2-4) dead plants around plot
4 - susceptible plants dying or dead (>4 plants)
5 - "graveyard" death

A further subdivision of the time period since death was undertaken for stress levels greater than 3:

R - Recent death (leaves recently desiccated or discoloured)
M - Medium death (Bark but no leaves left on trees)
O - Old death (no leaves or bark left on trees)

4.3 Fauna

An assessment of each tree looking for potential suitable hollows for bird nesting sites.

Observations on native fauna utilisation of the area (through observations of sited fauna, ground disturbance or other signs of fauna usage). Particular effort was directed at checking each tree for potential hollows suitable for the listed Black Cockatoo species and for checking any evidence of foraging activities by the Black Cockatoo species and other fauna species.

5. RESULTS

5.1 Flora

A total of 71 vascular plant taxa from 29 plant families and 54 genera were recorded on the survey area at St Brigid's College. Of these, sixteen taxa were introduced plant taxa and four were planted tree or shrub species. Dominant families included Fabaceae 141 taxa), Proteaceae (8 taxa) and Myrtaceae (6 taxa).

5.2 Threatened and Priority Flora Species

Based on database searches, a series of threatened and priority flora species had the potential to occur in the survey area. Despite extensive searching, no declared or listed threatened or priority flora species as defined by the *Environment Protection Biodiversity Conservation Act* 1999 or the *Wildlife Conservation Act* 1950 were recorded on the survey area in September 2017.

5.3 Vegetation

The St Brigid's survey area was dominated by one site-vegetation type (type S) based on Havel's site-vegetation types for the Northern Jarrah Forest Region (Havel 1975a, 1975b). At times the vegetation also indicated some localized surface water near the shallow lateritic cap-rock.

S - Open Forest of *Eucalyptus marginata - Corymbia calophylla* with scattered understorey, including *Leucopogon capitellatus, Xanthorrhoea preissii and Xanthorrhoea gracilis* and a range of low herbs and shrubs on sandy-loam gravels.

This site type is equivalent to the site-vegetation type S as defined by Havel (1975a). This type occurs within the Dwellingup and Dwellingup-Hester complexes as defined by sandy-loam gravelly soils on the undulating hills on the Darling Ranges. The S site-vegetation type is relatively widespread in distribution within the Northern Jarrah Forest and is well represented in the conservation estate (Heddle *et al.* 1980b; Department of Conservation and Environment 1980; Department of Conservation and Land Management 1987, Conservation Commission 2003).

This community (or site-vegetation type) is not listed as a threatened ecological community or priority ecological community (Department of Biodiversity, Conservation and Attractions 2017e, 2017f; Department of the Environment and Energy 2017b).

5.4 Review of the Condition of Vegetation

The condition of the vegetation within the St Brigid's survey area varies in condition depending on the extent of previous informal tracks, planted trees and shrubs and dominance of introduced species in the understorey. As the survey area abuts a long term residence that has been used for a variety of purposes (residency, hospital and education facilities) many of the values of the native vegetation have been modified due to the proximity of the building facility.

5.5 Fauna Activity

A range of other common native species were observed during the survey including Bandicoots and a range of native bird species.

During the botanical studies searches were made from potential habitat trees and although some trees were >50cm in diameter (see Figure 3), no hollows suitable for nesting by the listed cockatoo species were recorded. The forest areas do support tree species (such as the tree species - Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*) that are used for foraging by the listed Cockatoo species, namely Carnaby's Black Cockatoo (E) (*Calyptorhyncvhus latirotris*); Forest Red-tailed Black Cockatoo (V) (*Calyptorhyncvhus banksia naso*) and Baudin's Black Cockatoo (V) (*Calyptorhyncvhus baudinii*), Department of Environment and Conservation 2008 and Department of Sustainability, Environment, Water, Populations and Communities (2012). These cockatoo species are listed as Endangered (E) or Vulnerable (V) pursuant to the *Environment Protection and Biodiversity Conservation Act* (1999).

5.6 Review of Clearing Principles

The following is a review of the relevant clearing principles as it relates to native vegetation.

Principle (a): Native vegetation should not be cleared if it comprises a high level of biodiversity.

The property has sections that have been disturbed and as the bushland area that is relatively less disturbed is less than a hectare the range of flora and fauna species us relatively low in a local and regional context and therefore the survey area on St Brigid's College could not be considered representative of an area of high biodiversity in the local area, therefore, clearing of native vegetation on the survey area is unlikely to be at variance with this Principle.

Principle (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.

No suitable hollows were recorded on the trees within the survey area that might be suitable for the listed Black Cockatoos. Foraging activities by the listed Black Cockatoos were observed; however as the proposed clearing of the less disturbed area covers less than a 0.26 hectare it is unlikely that the vegetation on the survey area at St Brigid's College provides a significant habitat for the listed Black Cockatoo species.

Principle (c): Native Vegetation should not be cleared if it includes, or is necessary, for the continued existence of rare flora.

Despite searching over spring months, no Threatened flora species gazetted under the *Wildlife Conservation Act* (1950-1980) were located on the survey area on St Brigid's College. No Priority flora species were located on the survey area on St Brigid's College.

Despite searching over spring months, no Threatened flora species, pursuant to s179 of the *Environment Protection and Biodiversity Conservation Act* (1999) were located during the survey.

Principle (d): Native vegetation should not be cleared if it compromises the whole or part of, or is necessary for the maintenance of a threatened ecological community.

One site-vegetation type (type S) was defined mapped for the survey area on St Brigid's College. This site-vegetation type (community) is not listed as a threatened ecological community or a priority ecological community (Department of Biodiversity, Conservation and Attractions 2017e; Department of the Environment and Energy 2017b). Therefore this is not at variance with this Principle.

Principle (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.

As then less disturbed area of vegetation on the survey area at St Brigid's College is less than a hectare any proposed clearing could not be considered to be significant in this context. Therefore, clearing of native vegetation on the survey area is not at variance with this Principle.

410350 410400

6459450 6459450

6459400 6459400

6459350 6459350

410350 410400

Legend

Clearing Area

Trees

Corymbia calophylla, >50

Corymbia calophylla, >90

Eucalyptus maculata, >50

Aerial Photography: Landgate 2017

N

0 4 8m

Scale: 1:400
MGA94 (Zone 50)

CAD Ref: a2563_Tr_F002

Date: Oct 2017 | Rev: A | A3

Mattiske Consulting Pty Ltd
28 Central Road, Kalamunda WA 6076 ~ Tel: 9257 1625 ~ Fax: 9257 1640
Author: E M Mattiske | MCPL Ref:
Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

St Brigids College

Location of Large Trees

Figure: 3

Principle (f): Native vegetation should not be cleared if it is growing in, or in association with, and environment associated with a watercourse or wetland.

As the survey area occurs on upper lateritic slopes, the proposed clearing is not at variance with this Principle.

Principle (g): 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 survey area occurs adjacent to residential housing and school facilities and ovals. Therefore, clearing of the vegetation is unlikely to be at variance with this Principle.

Principle (h): Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

As the survey area occurs on upper slopes and abuts in the main an active school sports facility (to east) and associated infrastructure and residential housing, the proposed clearing is not at variance with this Principle.

Principle (i): Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water

As the survey area occurs on lateritic upper slopes, the proposed clearing is not at variance with this Principle.

Principle (j): Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

As the survey area occurs on lateritic upper slopes, the proposed clearing is not at variance with this Principle.

6. DISCUSSION

The survey effort builds extensive biological studies by the prime author in the region and therefore the information as provided reflects a substantial local knowledge of the northern Jarrah forest. Consequently the effort exceeds any needs that are required for government processing of the proposed clearing activities.

A total of 71 vascular plant taxa from 29 plant families and 54 genera were recorded on the survey area at St Brigid's College. Of these, sixteen taxa were introduced plant taxa and four were planted tree or shrub species. Dominant families included Fabaceae 141 taxa), Proteaceae (8 taxa) and Myrtaceae (6 taxa).

Based on database searches, a series of threatened and priority flora species had the potential to occur in the survey area. Despite extensive searching, no declared or listed threatened or priority flora species as defined by the *Environment Protection Biodiversity Conservation Act* 1999 or the *Wildlife Conservation Act* 1950 were recorded on the survey area in September 2017.

The St Brigid's survey area was dominated by one site-vegetation type (type S) based on Havel's site-vegetation types for the Northern Jarrah Forest Region (Havel 1975a, 1975b). This community (or site-vegetation type) is not listed as a threatened ecological community or priority ecological community (Department of Biodiversity, Conservation and Attractions 2017e, 2017f; Department of the Environment and Energy 2017b).

The condition of the vegetation within the St Brigid's survey area varies in condition from south to north, with the northern section influenced by tree and shrub planting and introduced species in the understorey. The actual area proposed to be disturbed that is in relatively good condition is less than 0.2ha. The other sections of the survey area are either degraded or completely degraded.

The key environmental value of the survey area on the St Brigid's College area relates to the potential foraging activities of the Black Cockatoos. As the vegetation on the survey area that is in good condition (less than 0.26hectare), the significance of such foraging activities is diminished significantly and therefore it is recommended that the value of the survey area is insignificant in the local and regional context to warrant consideration through the native vegetation state or federal processes.

7. LIST OF PARTICIPANTS

The following personnel were involved in various stages of the project:

Principal Plant Ecologist and Study Coordinator:
Dr E.M. Mattiske

Biologists:
Mrs F Martin
Mr B. Ellery

8. REFERENCES

Beard, J.S. (1979)
The vegetation of the Pinjarra Area, Western Australia. Map and Explanatory Memoir, 1:250,000 Series, Vegmap Publications, Perth.

Beard, J.S. (1980)
A New Phytogeographic Map of Western Australia. Western Australian Herbarium Notes Number 3: 37-58.

Beard, J.S. (1981)
Vegetation Survey of Western Australia. Swan. Map and Explanatory Notes, Sheet 7, 1:1,000,000 Series, University of Western Australia Press, Perth.

Beard, J.S. (1990)
Plant Life of Western Australia. Kangaroo Press Pty Ltd, N.S.W.

Biosecurity and Agriculture Management Act 2007

Biosecurity and Agriculture Management Regulations 2013

Bureau of Meteorology (2017)
Climate averages for specific sites.
http://www.bom.gov.au/climate/averages/tables/ca_wa_names.shtml

Churchill, D.M. (1961)
The Tertiary and Quaternary vegetation and climate in relation to the living flora in South Western Australia. Ph.D. thesis, University of Western Australia.

Churchill, D.M. (1968)
The distribution of and prehistory of Eucalyptus diversicolor F.Muell., E. marginata Donn ex Sm., and E. calophylla R.Br. in relation to rainfall. Aust. J. Bot. 16: 125-151.

Churchward, H.M and W.M. McArthur (1980)
Landforms and Soils of the Darling System, Western Australia. In: Department of Conservation and Environment (1980) *Atlas of Natural Resources Darling System, Western Australia*. Published by the Department of Conservation and Environment, Perth, 1980.

Conservation Commission of Western Australia (2003)
Forest Management Plan, data on representation of vegetation complexes. Supplied by the Department of Conservation and Land Management.

Conservation Commission (2013)
Forest Management Plan 2014-2023. Prepared by the Conservation Commission, Western Australia.

Department of Agriculture and Food (2017)
Western Australian Organism List.
<https://www.agric.wa.gov.au/organisms>

Department of Biodiversity, Conservation and Attractions (2017a)
Western Australian Flora Statistics. <http://florabase.dbca.wa.gov.au/statistics/>

Department of Biodiversity, Conservation and Attractions (2017b)
Wildlife Conservation (Rare Flora) Notice.
<http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/

Department of Biodiversity, Conservation and Attractions (2017c)
Conservation Codes for Western Australian Flora and Fauna.
<http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation_code_definitions>

Department of Biodiversity, Conservation and Attractions (2017d)
Definitions, Categories and Criteria for Threatened and Priority Ecological Communities.
<http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/tecs/tec-definitions.pdf>

Department of Biodiversity, Conservation and Attractions (2017e)
List of Threatened Ecological Communities endorsed by the Western Australian Minister for the Environment
http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/threatened-ecological-communities-endorsed-by-the-minister-for-the-environment.pdf

Department of Biodiversity, Conservation and Attractions (2017f)
Priority Ecological Communities for Western Australia. Species and Communities Branch, Department of Biodiversity, Conservation and Attractions.
<http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Priority_ecological_communities_list.pdf>

Department of Biodiversity, Conservation and Attractions (2017g)
Florabase, the Western Australian Flora. <http://florabase.dpaw.wa.gov.au/>

Department of Parks and Wildlife (2007-)
NatureMap, Mapping Western Australia's Biodiversity, viewed October 2017.
<http://naturemap.dpaw.wa.gov.au/>

Department of the Environment and Energy (2017a)
Environment Protection and Biodiversity Conservation Act 1999 List of Threatened Flora and Fauna.
https://www.environment.gov.au/biodiversity/threatened/species

Department of the Environment and Energy (2017b)
EPBC Act List of Threatened Ecological Communities.
http://www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl

Department of Environment and Conservation (2008)
Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*) Recovery Plan, 2008.

Department of Parks and Wildlife (2013)
Environmental Weed Strategy for Western Australia.
< https://www.dpaw.wa.gov.au/pdf/plants_animals/environmental_weed_strategy_wa.pdf >

Department of Sustainability, Environment, Water, Populations and Communities (2012)
Referral Guidelines for three Threatened Black Cockatoo Species. Carnaby's Black Cockatoo (*Calyptorhynchus latirotris*), Baundin's Black Cockatoo (*Calyptorhynchus baudinii*), Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*).

Diels, L. (1906)
Die Pflanzenwelt von Western-Australien sudlich des Wendekreises. Vegn. Erde 7, Leipzig.

Environmental Protection Authority (2004)
Guidance for the Assessment of Environmental Factors. Guidance Statement No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia. Environmental Protection Authority, Perth, 2004.

Environmental Protection Authority (2016a)
Environmental Factor Guideline: Flora and Vegetation. EPA, Western Australia.

Environmental Protection Authority (2016b)
Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment. EPA, Western Australia.

Environmental Protection Act 1986 (WA)

Environment Protection and Biodiversity Conservation Act 1999 (Cth)

Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (WA)

Gardner, C.A. (1942)
The vegetation of Western Australia with special reference to climate and soils. J. Proc. R. Soc. West. Aust. 28:11-87.

Havel, J.J. (1968)
The potential of the northern Swan Coastal Plain for Pinus pinaster Ait *plantations.* Bull. For. Dep. W. Aust. 76.

Havel, J.J. (1975a)
Site-vegetation mapping in the northern jarrah forest (Darling Range). II. Location and mapping of site-vegetation types. Bull. For. Dep. W. Aust. 87.

Heddle, E.M., J.J. Havel, and O.W. Loneragan (1980a)
Vegetation Complexes of the Darling System, Western Australia. In: Department of Conservation and Environment (1980) *Atlas of Natural Resources Darling System, Western Australia.* Department of Conservation and Environment, Perth, 1980.

Heddle, E.M., J.J. Havel, and O.W. Loneragan (1980b)
Focus on Northern Jarrah Forest Conservation and Recreation Areas. Forest Focus Number 22.

Hopper, S.D., van Leeuwen, S., Brown, A.P. and S.J. Patrick (1990).
Western Australia's Endangered Flora. Department of Conservation and Land Management, Wanneroo, Western Australia.

Hussey, B.M.J., Keighery, G.J., Dodd, J., Lloyd, S.G. and Cousens, R.D. (2007)
Western Weeds: A guide to the weeds of Western Australia. Second Edition. The Weeds Society of Western Australia (Inc.), Western Australia.

Keighery, B.J. (1994)
Bushland Plant Survey. A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc.), Western Australia.

Lange, R.T. (1960)
Rainfall and soil control of tree species distribution around Narrogin, Western Australia. J. Roy. Soc. W. Aust. 43:104-110.

Mattiske, E.M. and Havel, J.J. (1998)
Vegetation Complexes of the South-west Forest Region of Western Australia. Maps prepared as part of the Regional Forest Agreement, Western Australia for the Department of Conservation and Land Management and Environment Australia.

Speck, N.H. (1958)
The vegetation of the Darling-Irwin botanical districts and an investigation of the distribution of the family Proteaceae in south-western Western Australia. Ph.D. thesis, University of Western Australia.

Seddon, G. (1972)
Sense of Place. A Response to an Environment, the Swan Coastal Plain, Western Australia. University of Western Australia Press, Nedlands.

Smith, F.G. (1974)
Vegetation Survey of Western Australia. Vegetation Map of the Collie Sheet. 1:250 000. Department of Agriculture, Western Australia.

Wildlife Conservation Act (1950-1980)
Wildlife Conservation Act and Regulations. Western Australian Government Publication.

Williams, R.F. (1932)
An ecological analysis of the plant communities of the jarrah region on a small area near Darlington. J. Roy. Soc. W. Aust. 18: 105-124.

Williams, R.F. (1942)
An ecological study near Beraking forest station. J. Roy. Soc. W. Aust. 31: 19-31.

APPENDIX A1: THREATENED AND PRIORITY FLORA DEFINITIONS

Under section 179 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), threatened flora are categorised as extinct, extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent (Table A1.1).

Table A1.1 Federal definition of threatened flora species

Note: Adapted from section 179 of the EPBC Act.

CODE	CATEGORY	DEFINITION
Ex	Extinct	Species which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	Extinct in the Wild	Species which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	Critically Endangered	Species which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	Endangered	Species which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	Vulnerable	Species which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	Conservation Dependent	Species which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

The *Wildlife Conservation Act 1950* (WC Act) provides for (amongst other things) the protection of flora likely to become extinct or rare or otherwise in need of special protection in Western Australia under section 23F. Threatened (or rare) flora are listed in the *Wildlife Conservation (Rare Flora) Notice 2017* (under section 23F(2) of the WC Act; Department of Biodiversity, Conservation and Attractions 2017a) and are categorised under Schedules 1-4 as critically endangered, endangered, vulnerable or extinct, respectively. Threatened flora are defined as "likely to become extinct or is rare, or otherwise in need of special protection", pursuant to section 23F(2) of the WC Act. Threatened species are categorised as critically endangered, endangered, vulnerable and presumed extinct (Table A1.2).

Table A1.2 State definition of threatened flora species

Note: Adapted from Department of Biodiversity, Conservation and Attractions (2017c).

CODE	CATEGORY	DEFINITION
CR	Critically endangered	Species considered to be facing an extremely high risk of becoming extinct in the wild (listed under Schedule 1 of the *Wildlife Conservation (Rare Flora) Notice 2016*).
EN	Endangered	Species considered to be facing a very high risk of becoming extinct in the wild (listed under Schedule 2 of the *Wildlife Conservation (Rare Flora) Notice 2016*).
VU	Vulnerable	Species considered to be facing a high risk of becoming extinct in the wild (listed under Schedule 3 of the *Wildlife Conservation (Rare Flora) Notice 2016*).
EX	Presumed extinct species	Species that have been adequately searched for and there is no reasonable doubt that the last individual has died (listed under Schedule 4 of the *Wildlife Conservation (Rare Flora) Notice 2016*).

Priority flora species are defined as "possibly threatened species that do not meet the survey criteria, or are otherwise data deficient; or are adequately known, are rare but not threatened, meet criteria for near threatened or have recently been removed from the threatened species list for other than taxonomic reasons" (Department of Biodiversity, Conservation and Attractions 2017c). Priority species are not afforded any protection under state or federal legislation, however are considered significant under the Environmental Protection Authority's *Environmental Factor Guideline: Flora and Vegetation*. The Department of Biodiversity, Conservation and Attractions categorises priority flora into four categories: Priority 1; Priority 2, Priority 3 and Priority 4 (Table A1.3).

Table A1.3: State definition of priority flora species

Note: Adapted from Department of Biodiversity, Conservation and Attractions (2017c).

CODE	CATEGORY	DEFINITION
P1	Priority 1: Poorly-known species	Known from one or a few locations (< 5) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation; or are otherwise under threat of habitat destruction or degradation. In urgent need of further survey.
P2	Priority 2: Poorly-known species	Known from one or a few locations (< 5). Some occurrences are on lands managed primarily for nature conservation. In urgent need of further survey.
P3	Priority 3: Poorly-known species	Known from several locations and the species does not appear to be under imminent threat; or from few but widespread locations with either a large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. In need of further survey.
P4	Priority 4: Rare, Near Threatened, and other species in need of monitoring	a) Rare - Species 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 species are usually represented on conservation lands. b) Near Threatened - Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. c) Other - Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

APPENDIX A2: THREATENED AND PRIORITY ECOLOGICAL COMMUNITY DEFINITIONS

Under section 181 of the EPBC Act, threatened ecological communities are categorised as critically endangered, endangered and vulnerable (Table A2.1).

Table A2.1 Federal definition of threatened ecological communities

Note: Adapted from section 181 and section 182 of the EPBC Act.

CATEGORY	DEFINITION
Critically Endangered	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
Vulnerable	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

Currently there is no Western Australian legislation covering the conservation of state listed threatened ecological communities (TECs), however, a non-statutory process is in place, whereby the Department of Biodiversity, Conservation and Attractions have been identifying and informally listing TECs since 1994. Some of these TECs are endorsed by the Federal Minister as threatened, and some of these are also listed under the EPBC Act and therefore afforded legislative protection at the Commonwealth level.

Table A2.2 State definition of threatened ecological communities

Note: Adapted from Department of Environment and Conservation (2013).

CODE	CATEGORY	DEFINITION
PD	Presumed Totally Destroyed	An ecological community will be listed as PD if there are no recent records of the community being extant and either of the following applies: 1. Records within the last 50 years have not been confirmed despite thorough searches or known likely habitats; or 2. All occurrences recorded within the last 50 years have since been destroyed.
CR	Critically Endangered	An ecological community will be listed as CR when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one or more of the following criteria: 1. The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification; 2. The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or 3. The ecological community is highly modified with potential of being rehabilitated in the immediate future.
EN	Endangered	An ecological community will be listed as EN when it has been adequately surveyed and is not CR, but is facing a very high risk of total destruction in the near future. The ecological community must meet any one or more of the following criteria: 1. The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short term future, or is unlikely to be substantially rehabilitated in the short term future due to modification; 2. The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or 3. The ecological community is highly modified with potential of being rehabilitated in the short term future.
VU	Vulnerable	An ecological community will be listed as VU when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one or more of the following criteria: 1. The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated; 2. The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; or 3. The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.

Priority ecological communities (PECs) are defined as possible threatened ecological communities that do not meet the stringent survey criteria for the assessment of threatened ecological communities, and are listed by the Department of Parks and Wildlife. Similarly to priority flora, PECs are not afforded legislative protection, however are considered significant under the Environmental Protection Authority's (2016a) *Environmental Factor Guideline: Flora and Vegetation*. The Department of Parks and Wildlife categorises priority ecological communities into five categories: Priority 1; Priority 2, Priority 3, Priority 4 and Priority 5 (Table A2.3).

Table A2.3 State definition of priority ecological communities

Note: Adapted from Department of Environment and Conservation (2013).

CODE	CATEGORY	DEFINITION
P1	Priority 1 (Poorly known ecological communities)	Ecological communities that are known from very few, restricted occurrences (generally ≤ 5 occurrences or a total area of ≤ 100 ha). Most of these occurrences are not actively managed for conservation (e.g. located within agricultural or pastoral lands, urban areas, or active mineral leases) and for which immediate threats exist.
P2	Priority 2 (Poorly known ecological communities)	Communities that are known from few small occurrences (generally ≤ 10 occurrences or a total area of ≤ 200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation.
P3	Priority 3 (Poorly known ecological communities)	1. 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; 2. Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat; or 3. Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.
P4	Priority 4 (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)	1. Rare – Communities known from few occurrences that are considered to have been adequately surveyed, sufficient knowledge is available, and are considered not to be currently threatened. 2. Near Threatened – Communities considered to have been adequately surveyed and do not qualify for Conservation Dependent, but are close to qualifying for Vulnerable. 3. Communities that have been removed from the list of threatened communities during the past five years.
P5	Priority 5 (Conservation Dependent ecological communities)	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.

APPENDIX A3: CATEGORIES AND CONTROL MEASURES OF DECLARED PEST (PLANT) ORGANISMS IN WESTERN AUSTRALIA

Section 22 of Western Australia's *Biosecurity and Agriculture Management Act 2007* (BAM Act) makes provision for a plant taxon to be listed as a declared pest organism in respect to parts of, or the entire State. According to the BAM Act, a declared pest is defined as a prohibited organism (section 12), or an organism for which a declaration under section 22 (2) of the Act is in force.

Under the *Biosecurity and Agriculture Management Regulations 2013* (WA), declared pest plants are placed in one of three control categories, C1 (exclusion), C2 (eradication) or C3 (management), which determines the measures of control which apply to the declared pest (Table A4.1). The current listing of declared pest organisms and their control category is through the Western Australian Organism List (Department of Agriculture and Food Western Australia 2017).

Table A3.1 Categories and control measures of declared pest (plant) organisms

Note: Adapted from *Biosecurity and Agriculture Management Regulations 2013*.

CONTROL CATEGORY	CONTROL MEASURES
C1 (Exclusion) '(a) Category 1 (C1) — Exclusion: if in the opinion of the Minister introduction of the declared pest into an area or part of an area for which it is declared should be prevented.' Pests will be assigned to this category if they are 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.	In relation to a category 1 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C2 (Eradication) '(b) Category 2 (C2) — Eradication: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is feasible.' Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.	In relation to a category 2 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C3 (Management) '(c) Category 3 (C3) — Management: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is not feasible but that it is necessary to: (i) alleviate the harmful impact of the declared pest in the area; or (ii) reduce the number or distribution of the declared pest in the area; or (iii) prevent or contain the spread of the declared pest in the area.' Pests will be assigned to this category if they are 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.	In relation to a category 3 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to: (a) alleviate the harmful impact of the declared pest in the area for which it is declared; or (b) reduce the number or distribution of the declared pest in the area for which it is declared; or (c) prevent or contain the spread of the declared pest in the area for which it is declared.

APPENDIX B: THREATENED AND PRIORITY SPECIES POTENTIALLY OCCURRING AT ST BRIGIDS COLLEGE SURVEY AREA

SCC = State Conservation Code, FCC = Federal Conservation Code

X denotes Presumed Extinct Flora, T denotes Threatened Species (Extant), P1-P4 denotes priority flora (DBCA 2017, DotEE 2017)

Species	SCC	FCC	Annual/Perennial	Flowering Period	Species Description	Comments
Acacia anomala	T	Vulnerable	Perennial	Aug-Sep	Slender, rush-like shrub, 0.2-0.5 m high. Fl. yellow, Aug to Sep. Lateritic soils. Slopes.	Possible
Acacia aphylla	T	Vulnerable	Perennial	Aug-Oct	Divaricately branched, spinescent, glaucous shrub, 0.9-2.5 m high. Fl. yellow, Aug to Oct. Sand, loam, clay loam. Granite outcrops, hills.	Possible
Anthocercis gracilis	T	Vulnerable	Perennial	Sep-Oct	Erect, spindly shrub, to 0.6(-1) m high. Fl. yellow-green, Sep to Oct. Sandy or loamy soils. Granite outcrops.	Unlikely as dry lateritic soils
Austrostipa bronwenae	T	-	Perennial	Sep	Caespitose perennial grass-like or herb, 0.3 – 0.6 m high, 0.3 – 1 m wide. Fl. green, Sep. loam over clay, sandy loam, sandy clay, sand. Wetlands, seasonally waterlogged flats.	Unlikely as dry lateritic soils
Banksia mimica	T	Endangered	Perennial	Dec or Jan-Feb	Prostrate, lignotuberous shrub, 0.15-0.4 m high. Fl. yellow-brown, Dec or Jan to Feb. White or grey sand over laterite, sandy loam.	Unlikely as dry lateritic soils
Caladenia huegelii	T	Endangered	Tuberous, perennial herb	Sep-Oct	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green & cream & red, Sep to Oct. Grey or brown sand, clay loam.	Unlikely as dry lateritic soils
Calytrix breviseta subsp. *breviseta*	T	Endangered	Perennial	Oct-Nov	Shrub, 0.4-1 m high. Fl. purple-blue, Oct to Nov. Sandy clay. Swampy flats.	Unlikely as dry lateritic soils
Conospermum undulatum	T	Vulnerable	Perennial	May-Oct	Erect, compact shrub, 0.6-2 m high. Fl. white-other, May to Oct. Grey or yellow-orange clayey sand.	Unlikely as dry lateritic soils
Darwinia apiculata	T	Endangered	Perennial	Oct	Densely branched shrub, 0.4-0.5 m high. Fl. green & yellow/red, Oct. Lateritic soils.	Possible
Diuris drummondii	T	Vulnerable	Tuberous, perennial herb	Nov to Dec or Jan	Tuberous, perennial, herb, 0.5-1.05 m high. Fl. yellow, Nov to Dec or Jan. Low-lying depressions, swamps.	Unlikely as dry lateritic soils
Diuris micrantha	T	Vulnerable	Tuberous, perennial herb	Sep-Oct	Tuberous, perennial, herb, 0.3-0.6 m high. Fl. yellow & brown, Sep to Oct. Brown loamy clay. Winter-wet swamps, in shallow water.	Unlikely as dry lateritic soils

APPENDIX B: THREATENED AND PRIORITY SPECIES POTENTIALLY OCCURRING AT ST BRIGIDS COLLEGE SURVEY AREA

SCC = State Conservation Code, FCC = Federal Conservation Code

X denotes Presumed Extinct Flora, T denotes Threatened Species (Extant), P1-P4 denotes priority flora (DBCA 2017, DotEE 2017)

Species	SCC	FCC	Annual/Perennial	Flowering Period	Species Description	Comments
Diuris purdiei	T	Endangered	Tuberous, perennial herb	Sep-Oct	Tuberous, perennial, herb, 0.15-0.35 m high. Fl. yellow, Sep to Oct. Grey-black sand, moist. Winter-wet swamps.	Unlikely as dry lateritic soils
Eucalyptus x *balanites*	T	Endangered	Perennial	Oct-Dec or Jan-Feb	Mallee, to 5 m high, bark rough, flaky. Fl. white, Oct to Dec or Jan to Feb. Sandy soils with lateritic gravel.	Unlikely as dry lateritic soils
Grevillea thelemanniana subsp. *thelemanniana*	T	-	Perennial	May-Nov	Spreading shrub 0.4-1.5 m high x 0.5-1.5 m wide. Fl. Red, May-Nov. Sand, sandy clay, sandy loam, clay. Clay or sand flats, winter-wet areas.	Unlikely as dry lateritic soils
Lasiopetalum pterocarpum	T	Endangered	Perennial	Aug-Dec	Open, multi-stemmed shrub (with distinctly winged fruit), to 1.2 m high. Fl. pink, Aug to Dec. Dark red-brown loam or clayey sand over granite. On sloping banks near creeklines.	Unlikely as dry lateritic soils
Lepidosperma rostratum	T	Endangered	Perennial	Jun, Jul, Sep	Rhizomatous, tufted perennial, grass-like or herb (sedge), 0.5 m high. Fl. brown. Peaty sand, clay.	Unlikely as dry lateritic soils
Synaphea sp. Fairbridge Farm (D. Papenfus 696)	T	Critically Endangered	Perennial	Oct	Dense, clumped shrub, to 0.3 m high, to 0.4 m wide. Fl. yellow, Oct. Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	Unlikely as dry lateritic soils
Thelymitra dedmaniarum	T	Endangered	Tuberous, perennial herb	Nov-Dec or Jan	Tuberous, perennial, herb, to 0.8 m high. Fl. yellow, Nov to Dec or Jan. Granite.	Unlikely as dry lateritic soils
Thelymitra stellata	T	Endangered	Tuberous, perennial herb	Oct-Nov	Tuberous, perennial, herb, 0.15-0.25 m high. Fl. yellow & brown, Oct to Nov. Sand, gravel, lateritic loam.	Possible
Boronia humifusa	P1	-	Perennial	Jun or Sep	Low-growing, wiry perennial, herb, 0.1-0.2 m high. Fl. pink/red, Jun or Sep. Gravelly clay loam over laterite. Jarrah-marri open forest.	Possible
Grevillea bipinnatifida subsp. *pagna*	P1	-	Perennial	Aug or Oct-Nov	Prostrate, lignotuberous shrub, 0.2-0.7 m high. Fl. red & orange & yellow, Aug or Oct to Nov. Grey sandy clay and loam, ironstone. Seasonal wetlands, swamps, roadsides.	Unlikely as dry lateritic soils
Thelymitra magnifica	P1	-	Perennial herb	Oct, Nov	Perennial, herb. Stony ridges.	Possible
Banksia pteridifolia subsp. *vernalis*	P3	-	Perennial	Sep-Oct	Prostrate, lignotuberous shrub, to 0.4 m high. Fl. cream-white/yellow, Sep to Oct. White/grey sand over laterite.	Unlikely as dry lateritic soils

APPENDIX B: THREATENED AND PRIORITY SPECIES POTENTIALLY OCCURRING AT ST BRIGIDS COLLEGE SURVEY AREA

SCC = State Conservation Code, FCC = Federal Conservation Code

X denotes Presumed Extinct Flora, T denotes Threatened Species (Extant), P1-P4 denotes priority flora (DBCA 2017, DotEE 2017)

Species	SCC	FCC	Annual/Perennial	Flowering Period	Species Description	Comments
Byblis gigantea	P3	-	Perennial herb	Sep-Dec or Jan	Small, branched perennial, herb (or sub-shrub), to 0.45 m high. Fl. pink-purple/white, Sep to Dec or Jan. Sandy-peat swamps. Seasonally wet areas.	Unlikely as dry lateritic soils
Haemodorum loratum	P3	-	Bulbaceous, Perennial herb	Nov	Bulbaceous, perennial, herb, 0.45-1.2(-2) m high. Fl. black/brown-black/green, Nov. Grey or yellow sand, gravel.	Unlikely as dry lateritic soils
Halgania corymbosa	P3	-	Perennial	Aug-Nov	Erect shrub, 0.35-1 m high. Fl. blue-purple, Aug to Nov. Gravelly soils, soils over granite.	Unlikely as dry lateritic soils
Isopogon drummondii	P3	-	Perennial	Feb, Apr, Jun	Erect multistemmed shrub to 1 m high, to 1 m wide. Fl. pale yellow/creamy-yellow/cream, Feb, Apr, Jun. Sand, laterite gravel and boulders. Hilltops and slopes, gently sloping dunes and flats.	Possible
Lasiopetalum glutinosum subsp. *glutinosum*	P3	-	Perennial	Sep-Nov, or Mar	Erect shrub, 0.4-1 m high and 0.2-1 m wide. Fl. pink-purple /magenta/mauve, Sep-Nov or Mar. Granitic loam, gravel, silty clay, clayey sand. Sandplain, swampy area, hill slopes and summit.	Unlikely as dry lateritic soils
Pithocarpa corymbulosa	P3	-	Perennial herb	Jan-Apr	Erect to scrambling perennial, herb, 0.5-1 m high. Fl. white, Jan to Apr. Gravelly or sandy loam. Amongst granite outcrops.	Unlikely as dry lateritic soils
Tetratheca sp. Granite (S. Patrick SP1224)	P3	-	Perennial	Jul-Dec	Erect shrub, to 0.4 m high. Fl. Pink-dark pink/purple/magenta, Jul-Dec. Clay, moist loam, clayey sand. Granite boulders.	Unlikely as dry lateritic soils
Thysanotus anceps	P3	-	Perennial herb	Oct-Dec	Rhizomatous, leafless perennial, herb, to 0.4 m high. Fl. purple, Oct to Dec. White or grey sand, lateritic gravel, laterite.	Unlikely as dry lateritic soils
Acacia oncinophylla subsp. *patulifolia*	P4	-	Perennial	Aug-Nov or Nov-Dec	Shrub, 0.5-2.5(-3) m high, 'minni-ritchi' bark, phyllodes 4-9 cm long, 3-6 mm wide. Fl. yellow, Aug to Nov or Nov to Dec. Granitic soils, occasionally on laterite.	Unlikely as dry lateritic soils
Boronia tenuis	P4	-	Perennial	Aug-Nov	Procumbent or erect & slender shrub, 0.1-0.5 m high. Fl. blue/pink-white, Aug to Nov. Laterite, stony soils, granite.	Unlikely as dry lateritic soils
Centrolepis caespitosa	P4	-	Annual	Oct-Dec	Tufted annual, herb (forming a rounded cushion up to 25 mm across). Fl. Oct to Dec. White sand, clay. Salt flats, wet areas.	Unlikely as dry lateritic soils
Cyanicula ixioides subsp. *ixioides*	P4	-	Tuberous, perennial herb	Aug-Oct	Tuberous, perennial, herb, 0.05-0.15 m high. Fl. yellow, Aug to Oct. Laterite, gravel.	Possible

APPENDIX B: THREATENED AND PRIORITY SPECIES POTENTIALLY OCCURRING AT ST BRIGIDS COLLEGE SURVEY AREA

SCC = State Conservation Code, FCC = Federal Conservation Code

X denotes Presumed Extinct Flora, T denotes Threatened Species (Extant), P1-P4 denotes priority flora (DBCA 2017, DotEE 2017)

Species	SCC	FCC	Annual/Perennial	Flowering Period	Species Description	Comments
Drosera occidentalis subsp. *occidentalis*	P4	-	Perennial herb	Nov-Dec	Fibrous-rooted, rosetted perennial, herb, to 0.01 m high. Fl. pink/white, Nov to Dec. Sandy & clayey soils. Swamps & wet depressions.	Unlikely as dry lateritic soils
Hibbertia montana	P4	-	Perennial	Jul-Oct	Erect, straggling or sprawling shrub, 0.1-0.7 m high. Fl. yellow, Jul to Oct. Loam over granite, lateritic soils, gravel. Granite rocks, lateritic ridges & boulders, hills.	Possible
Jacksonia sericea	P4	-	Perennial	Dec or Jan to Feb.	Low spreading shrub, to 0.6 m high. Fl. orange, usually Dec or Jan to Feb. Calcareous & sandy soils.	Unlikely as dry lateritic soils
Lasiopetalum bracteatum	P4	-	Perennial	Aug-Nov	Erect, open shrub, 0.4-1.5 m high. Fl. pink-purple, Aug to Nov. Sandy clay, clay, lateritic gravel. Along drainage lines, creeks, gullies, granite outcrops.	Unlikely as dry lateritic soils
Pimelea rara	P4	-	Perennial	Dec or Jan	Shrub, 0.2-0.35 m high. Fl. white, Dec or Jan. Lateritic soils.	Possible
Senecio leucoglossus	P4	-	Annual	Aug-Dec	Erect annual, herb, to 1.3 m high. Fl. white, Aug to Dec. Gravelly lateritic or granitic soils. Granite outcrops, slopes.	Unlikely as dry lateritic soils
Stylidium striatum	P4	-	Perennial herb	Oct-Nov	Rosetted perennial, herb, 0.15-0.55 m high, Leaves erect, oblanceolate to spathulate, 1.5-4 cm long, 1.5-6 mm wide, apex acute to acuminate, margin entire, glabrous, striate. Scape sparingly glandular on inflorescence axis, glabrous below. Inflorescence racemose. Fl. yellow, Oct to Nov. Brown clay loam over laterite. Hillslopes. Jarrah/Marri forest, Wandoo woodland.	Possible
Verticordia lindleyi subsp. *lindleyi*	P4	-	Perennial	May, or Nov-Dec or Jan	Erect shrub, 0.2-0.75 m high. Fl. pink, May or Nov to Dec or Jan. Sand, sandy clay. Winter-wet depressions.	Unlikely as dry lateritic soils

APPENDIX C: VASCULAR PLANT SPECIES RECORDED ON THE ST BRIGIDS SURVEY AREA, 2017

Note: * denotes introduced species; ^ denotes planted species

Family	Species
Zamiaceae	*Macrozamia riedlei*
Pinaceae	* *Pinus pinaster*
Poaceae	* *Briza maxima*
	* *Ehrharta calycina*
	Neurachne alopecuroidea
Cyperaceae	*Cyathochaeta avenacea*
	Lepidosperma pubisquameum
	Tetraria sp. Jarrah Forest (R. Davis 7391)
Restionaceae	*Desmocladus fasciculatus*
Asparagaceae	*Lomandra sonderi*
Xanthorrhoeaceae	*Xanthorrhoea gracilis*
	Xanthorrhoea preissii
Colchicaceae	*Burchardia congesta*
Hemerocallidaceae	*Dianella revoluta*
Haemodoraceae	*Conostylis setosa*
	Consotylis setigera
	Haemodorum sp.
Iridaceae	* *Freesia alba × leichtlinii*
	* *Gladiolus cayophyllaceous*
	Orthrosanthus laxus
	Patersonia occidentalis
Casuarinaceae	*Allocasuarina fraseriana*
Proteaceae	*Banksia bipinnatifida*
	Banksia dallanneyi
	Grevillea synapheae
	Hakea lissocarpha
	Hakea prostrata
	Hakea stenocarpa
	Hakea undulata
	Synaphea petiolaris subsp. *petiolaris*
Droseraceae	*Drosera erythrorhiza*
	Drosera glanduligera
	Drosera pallida
	Drosera ?porrecta
	Drosera sp. Climbing
Fabaceae	* *Acacia longifolia*
	Acacia nervosa
	Acacia pulchella
	* *Acacia pycnantha*
	Bossiaea ornata
	* *Chamaecytisus palmensis*
	Chorizema cordatum
	* *Erythrina x sykesii*
	Gompholobium polymorphum
	Hardenbergia comptoniana
	Hovea trisperma

APPENDIX C: VASCULAR PLANT SPECIES RECORDED ON THE ST BRIGIDS SURVEY AREA, 2017

Note: * denotes introduced species; ^ denotes planted species

Family	Species
Fabaceae	*Kennedia coccinea*
(continued)	*Labichea punctata*
	* *Medicago* sp.
Geraniaceae	* *Pelargonium sp.*
Oxalidaceae	* *Oxalis pes-caprae*
Rutaceae	*Philotheca spicata*
Polygalaceae	* *Polygala myrtifolia*
Rhamnaceae	*Trymalium ledifolium*
Malvaceae	*Lasiopetalum floribundum*
Dilleniaceae	*Hibbertia hypericoides*
	Hibbertia ovata
Myrtaceae	^ *Callistemon* sp.
	Corymbia calophylla
	^ *Eucalyptus citriodora*
	^ *Eucalyptus maculata*
	Eucalyptus marginata
	Hypocalymma robustum
Apiaceae	*Xanthosia atkinsoniana*
Ericaceae	*Leucopogon capitellatus*
Convolvulaceae	* *Ipomoea indica*
Bignoniaceae	* *Jacaranda mimosifolia*
Goodeniaceae	*Lechenaultia biloba*
	Scaevola calliptera
Asteraceae	* *Hypochaeris glabra*
	* *Hypochaeris radicata*