DESKTOP ASSESSMENT OF FLORA AND VEGETATION VALUES

EMA

SURVEY AREAS

Prepared for

South32 Worsley Alumina

Prepared by

Mattiske Consulting Pty Ltd

May 2025

Mattiske Consulting Pty Ltd

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ABBREVIATIONS

The following abbreviations are used throughout this document:

BAM Act	*Biosecurity and Agriculture Management Act 2007*
BC Act	*Biodiversity and Conservation Act 2016*
BOM	Commonwealth Bureau of Meteorology
Buffer	Nearby Buffer areas near the EMA areas
DAFWA	Department of Agriculture and Food, Western Australia
DAFF	Department of Agriculture, Fisheries and Forestry
DBCA	Department of Biodiversity, Conservation and Attractions
DMIRS	Department of Mines, Industry Regulation and Safety
DotE	Department of the Environment
DPaW	Department of Parks and Wildlife, Western Australia
DPIRD	Department of Primary Industries and Regional Development
EMA	Expansion Mine Areas
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Area
ESCAVI	Executive Steering Committee for Australian Vegetation Information
IBRA	Interim Biogeographical Regionalisation for Australia
Mattiske	Mattiske Consulting Pty Ltd
NVIS	National Vegetation Information System
PAA	Current Mining Approval Areas
PEC	Priority Ecological Community
RFA	Regional Forest Agreement Area
South32	South32 Worsley Alumina Pty Ltd
SVT	Site-Vegetation Type
TEC	Threatened Ecological Community
TSSC	Threatened Species Scientific Committee
WAH	Western Australian Herbarium
WAOL	Western Australian Organism List

1. SUMMARY

Mattiske Consulting Pty Ltd was commissioned by South32 Worsley Alumina to undertake a desktop flora survey in accordance with EPA guidelines for the Extended Mining Areas (EMAs) as described within Ministerial Statement 1237. A study boundary including surrounding regional areas was provided for this work (the EMA Study Area) which includes areas of forest and woodland within State forest and also private properties covering approximately 428,101.7 hectares, Figure 1. The EMA study area was subdivided into three key groupings, the EMA survey areas, the Buffer survey area and the PAA survey area. This was undertaken to assist in delineating potential values in the EMA survey areas.

The survey areas lie primarily within the Jarrah Forest IBRA region and the Dale Botanical Sub-districts and on the eastern side overlap with the Western Australian Avon Wheatbelt IBRA region. The Dale Botanical Sub-district which includes most of the EMA areas is characterised by Jarrah (*Eucalyptus marginata*) forest on ironstone gravels and Marri-Wandoo (*Corymbia calophylla-Eucalyptus wandoo*) woodlands on loamy soils, with sclerophyll understoreys.

Flora

Desktop searches of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters database, the Department of Biodiversity, Conservation and Attractions (DBCA) NatureMap and Dandjoo databases (DBCA 2007-, DBCA 2022-), and where available the Western Australian Herbarium (WAH) and Threatened and Priority Flora (TPFL) databases, have identified a range of vascular taxa and also conservation significant flora species which have the potential to occur within the EMA survey areas. This information, together with a literature review of all available datasets from previous flora and vegetation surveys by Bennett Environmental Consulting Pty Ltd (Bennett 2004) and Mattiske Consulting efforts over some 40 years (Mattiske Consulting 2013, 2020, 2024a. 2024b) has formed the basis of a likelihood assessment for conservation significant flora within the EMA survey areas.

Key Findings to date include:

- No Threatened flora species were recorded by Bennett (2004); although it was recognized by Bennett (2004) that 3 threatened species (*Caladenia dorrienii*, *Pultenaea pauciflora* and *Verticordia fimbrilepis* subsp*. fimbrilepis*) are listed under the *Biodiversity and Conservation Act* (BC Act 2016) and the *Environment Protection and Biodiversity Conservation Act* (EPBC Act 1999) as occurring in the survey areas. Of the latter three species *Caladenia dorrienii* is listed as Endangered under the *EPBC Act 1999* and *Loricobbia pauciflora* (formerly *Pultenaea pauciflora*) and *Verticordia fimbrilepis* subsp*. fimbrilepis* are listed as Vulnerable under the *EPBC Act 1999*.
- The following is based on the updated database searches for the potential and recorded threatened flora within the EMA survey areas;
  - a total of 29 potential Threatened flora species were reviewed as part of the updated assessment of the survey areas. This total was reduced to 11 potential or known on the EMA areas after consideration of the distribution datasets on Florabase and their site preferences. Of these 11 species, three have been recorded in the EMA areas and eight have a potential to occur in the EMA areas.
  - The three known threatened species in the EMA areas are *Anthocercis gracilis* (T/E), *Caladenia hopperiana* (T/E) and *Verticordia fimbrilepis* subsp*. fimbrilepis* (WAH 1998-).
  - The eight potential threatened species recorded near the EMA areas; include *Acacia brachypoda* (T/E), *Andersonia* sp. Saxatilis (F. & J. Hort 3324) (T), *Caladenia dorrienii* (T/E), *Grevillea thelemanniana* (T/CE), *Lechenaultia laricina* (T/E), *Loricobbia pauciflora* (T/V), *Morelotia australiensis* (T/V) and *Thelymitra stellata* (T/E).
  - Of the previous Threatened flora species*, Calectasia cyanea* now only occurs well south near Albany and is very unlikely to occur in the survey areas. The latter reflects the re-allocation of many of the specimens to *Calectasia narragara* which is not a threatened species.

- Bennett (2004) recorded 11 Priority flora species and noted a potential for an additional 14 other Priority flora species. The initial database search of 20km radius identified 82 potential Priority species which may occur within the survey areas. This includes 8 potential Priority 1 (P1) flora species, 14 potential Priority 2 (P2) flora species, 32 potential Priority 3 (P3) flora species and 28 potential Priority 4 (P4) flora species may occur in the survey areas (WAH 1998-).
- The following is based on the updated database searches for the potential and recorded priority flora within the Buffer area, the PAA area and the proposed EMA survey areas;
  - A total of 133 potential Priority flora species were reviewed as part of the updated assessment of the survey areas. This total was reduced to 82 after consideration of the distribution datasets on Florabase and their site preferences. Of the remaining 82 species, 25 have been recorded in the survey area and 57 have a potential to occur in the survey area. The remaining 51 Priority flora are considered unlikely or highly unlikely to occur in the survey areas.
  - The 25 known priority species in the survey area consist of 3 priority 1 species, 1 priority 2 species, 8 priority 3 species and 13 priority 4 species (WAH 1998-). The latter number in part reflects the previous studies in the area, but also the interface with the western section of the Western Australian Wheatbelt with the eastern Jarrah forest and also the increased variety of sandier soils in the Goonaping vegetation complex, the clays to clay-loams of the Yalanbee 5 and Yalanbee 6 vegetation complexes and the granite areas of the Cooke vegetation complex. In applying the "known" criteria it is evident that several species have been highlighted that may not be expected in this area and as such may reflect misidentifications or historical seedlings in rehabilitation areas (e.g. *Calothamnus quadrifidus* subsp. *teretifolius* and *Styphelia filifolia*). Several other potential species also are restricted to more westerly occurrences and will require additional investigation in future studies.
  - Several of the priority species recorded in the early 2000's have been delisted as priority species since the earlier work was undertaken (e.g. *Acacia gemina, Templetonia drummondii*). Others have been added as more field studies have been undertaken and more taxonomic studies have been undertaken (e.g. splitting of *Hibbertia commutata* group by Thiele 2019). Other species have changed in likelihood, for example *Hemigenia rigida* was applied to *Hemigenia* plants in the Jarrah forest area but is now restricted to the Wheatbelt.
- Based on database searches of State and Federal listings (DBCA 2025-, DCCEEW 2025c), a total of 1789 vascular plant taxa from 105 families and 412 genera have the potential to occur in the EMA survey areas. This includes 142 introduced species. Bennett Environmental Consulting Pty Ltd (2004) recorded 436 taxa from 53 families and 167 genera in the botanical studies undertaken on the Brookton and Mid-Central survey areas. On reviewing the species recorded a range of species were either misidentified based on current comparisons with WAH (1998-) and Florabase records or are now excluded taxa in the Western Australian Florabase records and therefore the resulting coverage of flora by Bennett (2004) is closer to some 415 taxa. These latter differences may require further investigation and targeted collecting to check these flora taxa.
- Flora and vegetation surveys undertaken to date indicate introduced species presence is variable with greater presence in forest areas adjacent to cleared agricultural areas and within agricultural areas. This includes several Weeds of National Significance (WONS) (DCCEEW 2025d) and/or Declared plants as defined by the Department of Primary Industries and Resource Development (DPIRD 2025).

Vegetation

Key Findings to date include:

- There is some overlap on the eastern fringes of the Buffer survey area with the Priority Ecological Community (P3) at the State level and the Threatened Ecological Community (TEC, Critically Endangered) at the Federal level under the *BC Act 2016* and *EPBC Act 1999* respectively for the "Eucalypt Woodlands of the Western Australian Wheatbelt" (Department of the Environment, DotE 2015). The initial designation of areas will need checking against the criteria following detailed field studies as the potential areas were based on aerial photographic and remnant vegetation datasets. The latter TEC was not recognised at the time of the work undertaken by Bennett as this threatened ecological community was not finalised and approved in 2004. The potential occurrence on the eastern fringes of the survey area will require additional effort to determine extent, condition and values of the Eucalypt communities in relation to the criteria as used by (DotE 2015).

- The Threatened Ecological Community ("Clay Pans of the Swan Coastal Plain") highlighted in the database search for the Brookton area (DCCEEW 2025b) does not occur in this area and is restricted to the Swan Coastal Plain located west of the survey areas.

- The Threatened Ecological Community ("*Empodisma* peatlands of southwestern Australia") highlighted in the database search for the Brookton area (DCCEEW 2025b) does not occur in this area. This community is characterised by the presence of the *Empodisma gracillimum* species and also peat soils in swamp areas. The recently defined TEC associated with the *Empodisma* peatland is suspected to occur in larger swamp areas to the west and southwest of the survey area; noting that this species was recorded in the 1980's by Mattiske and fellow botanists during Phase II for South32 botanical studies near Boddington. Unlike the recent studies further west, this species was recorded in Wandoo gullies on clays and on granites. This again reflects the lack of knowledge on the distribution patterns of many species.

- The potential for alignment of some of the granite areas, which are mainly aligned with the Cooke vegetation complex, is likely to be further clarified through integration of data sets to the west and south on these landforms and soils. This would enable clarification of any alignment with the "Granite of the northern Jarrah forest" (P3) in areas to the west of the survey area and the Mt Saddleback Heath Communities (P1) in areas to the south of the survey area.

- Twenty vegetation complexes as defined by Heddle et al. (1980) and Mattiske and Havel (1998) have been defined and mapped within the majority of the survey areas that cover the Buffer, EMA survey areas and the PAA area. The vegetation complexes were defined as part of the System 6 and Regional Forest Agreement (RFA) projects respectively. The approach developed by Heddle *et al.* (1980) and Mattiske and Havel (1998) enabled relationships to be defined between the resulting regional patterns of vegetation and the underlying landforms, soils and climatic trends in the southwest forests. The vegetation mapping undertaken by Heddle *et al.* (1980) and the updated vegetation complex mapping by Mattiske and Havel (1998) aligns with the RFA areas in the Buffer, EMA and PAA survey areas with only a small area on the eastern side of the buffer that was not part of the earlier vegetation complex mapping. The vegetation complex mapping of the RFA by Mattiske and Havel (1998) assisted in assessing the vegetation at a regional level when complexes within the survey areas were compared with extent within the southwest forest area of the RFA. Ten of the twenty vegetation complexes defined in the survey areas are poorly represented in lands for Conservation (<10% of areas). Several of the complexes on the eastern fringes of the south-west forests have also been markedly impacted by historical agricultural activities.

- Less than 30% of the pre-European extent of the Beard vegetation associations 946 (18% remaining) and 4 (24% remaining) remain (Bennett 2004).

- Threats to the plant communities and vegetation include disease from fungal diseases such as *Phytophthora cinnamomi* and *Armillaria luteobubalina* (Williams and Mitchell 2002; Glevan Consultants 2004), salinity waterlogging, infestations of *Cerambycid* beetles, *Armillaria*

luteobubalina and mistletoe (Mercer 1991), as well as introduced species from recreational activities and nearby agricultural activities. Other threats relate to an increase in off-road recreational activities in the area, as well as the occurrence of intense and frequent fires.

. Bennett (2004) also defined and mapped 24 vegetation mapping units for the forest areas within the Brookton and Mid-Central survey areas. Some of these mapping units differed slightly from those developed by Havel (1975a and 1975b) and as further developed by Mattiske for the South32 Boddington areas (Mattiske Consulting Pty Ltd 2013, 2020, 2024a, 2024b).

The EMA survey areas overlap the State Forest, the Regional Forest Agreement area (RFA) (DAFF 2019) and abuts and overlaps a small section of the Wandoo National Park.

The EMA survey areas occur 50-100km east and upstream from Ramsar Site (the Peel – Yalgorup system) and as such this Ramsar area is not located near the survey area.

The survey areas overlap the State Forest, the Wandoo National Park, two Timber Reserves, two Conservation Parks (including the larger area in the Lupton Conservation Park), a section of the Wandering Aboriginal Reserve and a group of Nature Reserves and relatively large areas of private agricultural holdings.

In view of the extensive range of threatened and priority flora and site-vegetation types potentially present within the survey area there is a need to undertake further botanical studies in the areas prior to the commencement of any activities which will disturb the native vegetation. Surveys should be undertaken during spring from September to November to align with current EPA (2016a and 2016b) standards.

2. INTRODUCTION

Mattiske Consulting Pty Ltd was commissioned to undertake a desktop flora survey in accordance with EPA guidelines for the Extended Mining Areas (EMAs) as described within Ministerial Statement 1237. A study boundary including surrounding regional areas was provided for this work which includes areas of forest and woodland within State forest and also private properties covering approximately 428,101.7 hectares, Figure 1. The area bounded by the Primary Assessment Area (PAA) as approved under Ministerial Statement 1237 for South Worsley Alumina Pty Ltd's (Worsley's) current mining operations is not specifically included within the EMA survey areas; however, relevant information has been incorporated to ensure a complete data set to support the design of future flora and vegetation surveys.

The survey areas occur within a series of tenements (Figure 2). The Department of Biodiversity Conservation and Attractions (DBCA) estate occurring within the survey areas is summarized in Figure 3. The survey areas mainly occur within the Northern Jarrah Forest (JF1) IBRA region with some overlap in the eastern areas with the western fringes of the Avon Wheatbelt (AW2) IBRA region (Thackway and Cresswell 1995).

2.1 Western Australia's Flora – A Legislative Perspective

Western Australia has a unique and diverse flora, and is recognised as one of the world's 25 biodiversity hotspots (Myers et al. 2000). In this context, Western Australia possesses a high degree of species richness and endemism. This is particularly pronounced in the south-west region of the state. There are currently over 12,000 vascular plant species known to occur within Western Australia (DBCA 2019b), and scientific knowledge of many of these species is limited.

The legislative protection of flora within Western Australia is principally governed by three Acts, namely:

- The Biodiversity Conservation Act 2016 (superseding The Wildlife Conservation Act 1950);
- The Environmental Protection Act 1986; and
- Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

The unique flora of Western Australia is potentially under threat due to historical clearing practices associated with agricultural, mining and human habitation activities. As a consequence of these historical clearing practices a number of flora species have become threatened or have the potential to become

threatened as their habitat is impacted by human activity. In addition, some areas of the State have been affected by past clearing practices such that entire ecological communities are under threat. The following sections describe these threatened and priority flora and ecological communities, and outline the legislative protection afforded to them.

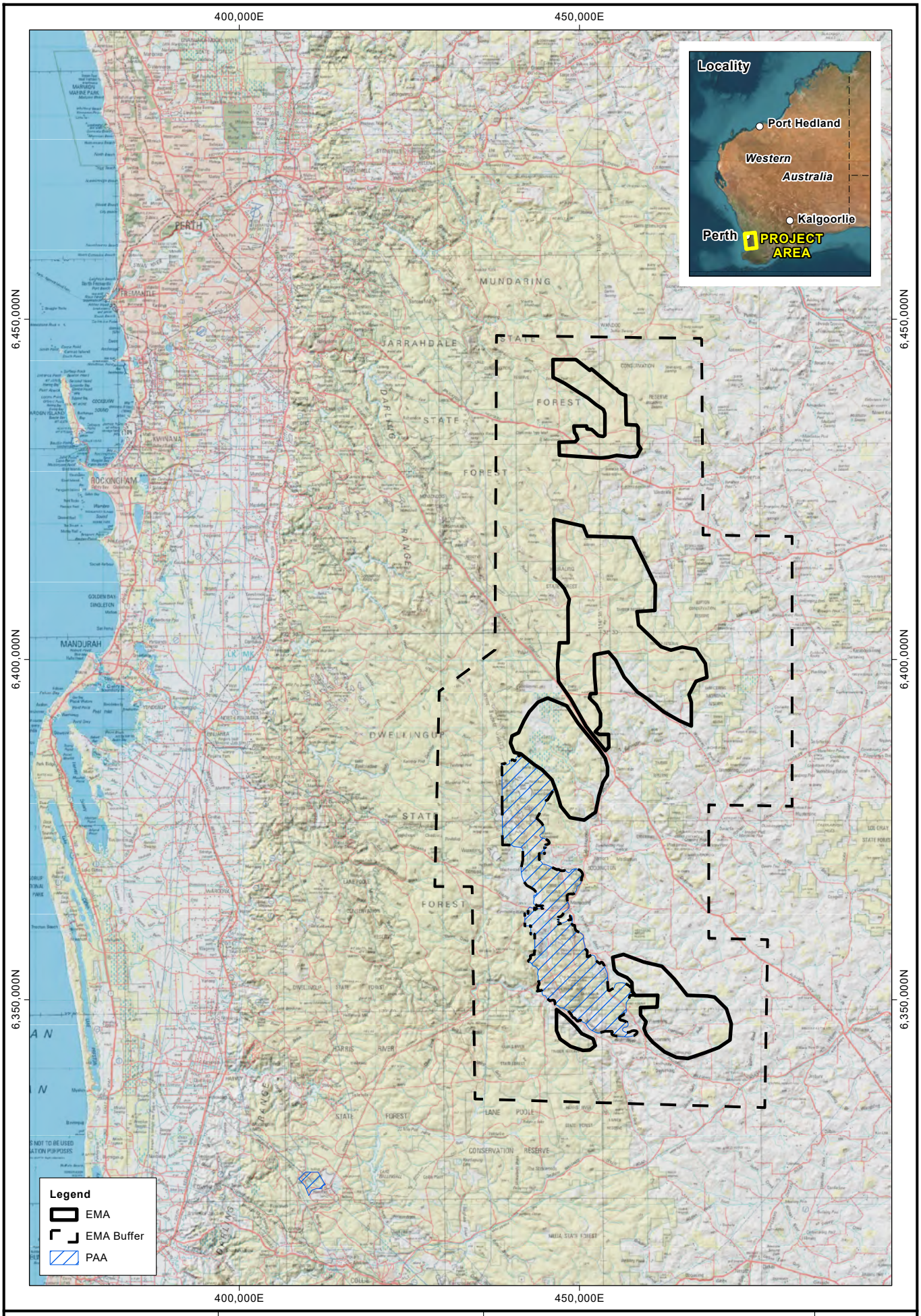
At the State level, the Biodiversity Conservation Act 2016 provides for taxa of native flora (and fauna) to be specially protected because they are subject to identifiable threats. Protection of these taxa has been identified as being warranted because they may become extinct, are threatened, or are otherwise in need of special protection. Ecological communities that are deemed to be threatened are afforded protection under the *Environmental Protection Act 1986.*

Listings of threatened species and communities are reviewed annually by the Western Australian Threatened Species Scientific Committee (TSSC), which is a body appointed by the Minister for the Environment and supported by the Department of Biodiversity, Conservation and Attractions. The TSSC reviews threatened and specially protected flora (and fauna) listings on an annual basis. Recommendation for additions or deletions to the listings of specially protected flora (and fauna) is made to the Minister for the Environment by the TSSC, via the Director General of the Department of Biodiversity Conservation and Attractions, and the WA Conservation Commission. Under Section 19(1) of the *BC Act 2016*, the Minister for the Environment may declare a class or description of flora to be threatened flora throughout the State, by notice published in the *Government Gazette* (DBCA 2018a). At the Commonwealth level, under the *Environment Protection and Biodiversity Conservation Act 1999*, a nomination process exists, to list a threatened species or ecological community. Additions or deletions to the lists of Threatened species and communities are made by the Minister for the Environment, on advice from the Federal Threatened Species Scientific Committee. *Environment Protection and Biodiversity Conservation Act 1999* lists of Threatened flora and ecological communities are published by the Department of Climate Change, Energy, the Environment and Water (2025a, 2025b).

2.2 Threatened and Priority Flora

Flora within Western Australia that is considered to be under threat may be classed as either Threatened flora or Priority flora. Where flora has been gazetted as Threatened flora under the *Biodiversity Conservation Act 2016*, it is an offence “to take” such flora without the written consent of the Minister. The *BC Act 2016* states that “to take” flora includes 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 by any means. Priority flora constitute species which are considered to be under threat, but for which there is insufficient information available concerning their distribution and/or populations to make a proper evaluation of their conservation status. Such species are considered to potentially be under threat, but do not have legislative protection afforded under the *BC Act 2016*. The Department Biodiversity, Conservation and Attractions categorises Priority flora according to their conservation priority, using four categories, P1 to P4, to denote the conservation priority status of such species. Priority flora species are regularly reviewed and may have their priority status changed when more information on the species becomes available. Appendix A1 sets out definitions of both threatened and priority flora (DBCA 2025a).

At the Commonwealth level, under the *Environment Protection and Biodiversity Conservation Act 1999*, threatened species can be listed as extinct, extinct in the wild, critically endangered, endangered, vulnerable, or conservation dependent, by the Commonwealth Minister for the Environment. Refer to Appendix A1 for a description of each of these categories of threatened species. Under the *Environment Protection and Biodiversity Conservation Act 1999*, a person must not take an action that has or will have a significant impact on a listed threatened species without approval from the Commonwealth Minister for the Environment, unless those actions are not prohibited under the Act.



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Scale: 1:750,000
GDA 1994 MGA Zone 50

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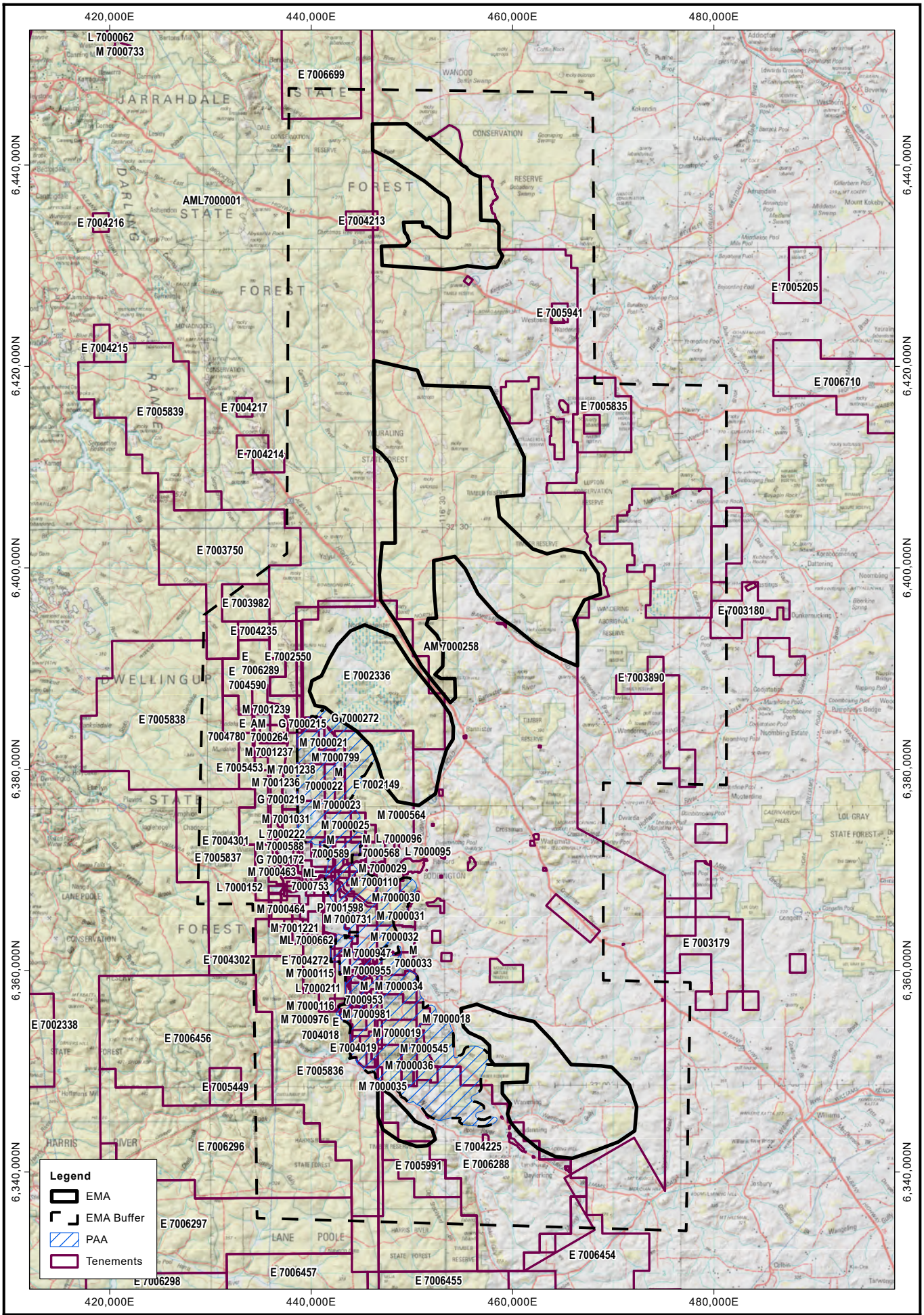
EMA
Locality

Figure: **1**

CAD Ref: g1881_F070_01		Author: L. Mattiske	Ref:
Date: May 2025	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

Imagery:



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GDA 1994 MGA Zone 50

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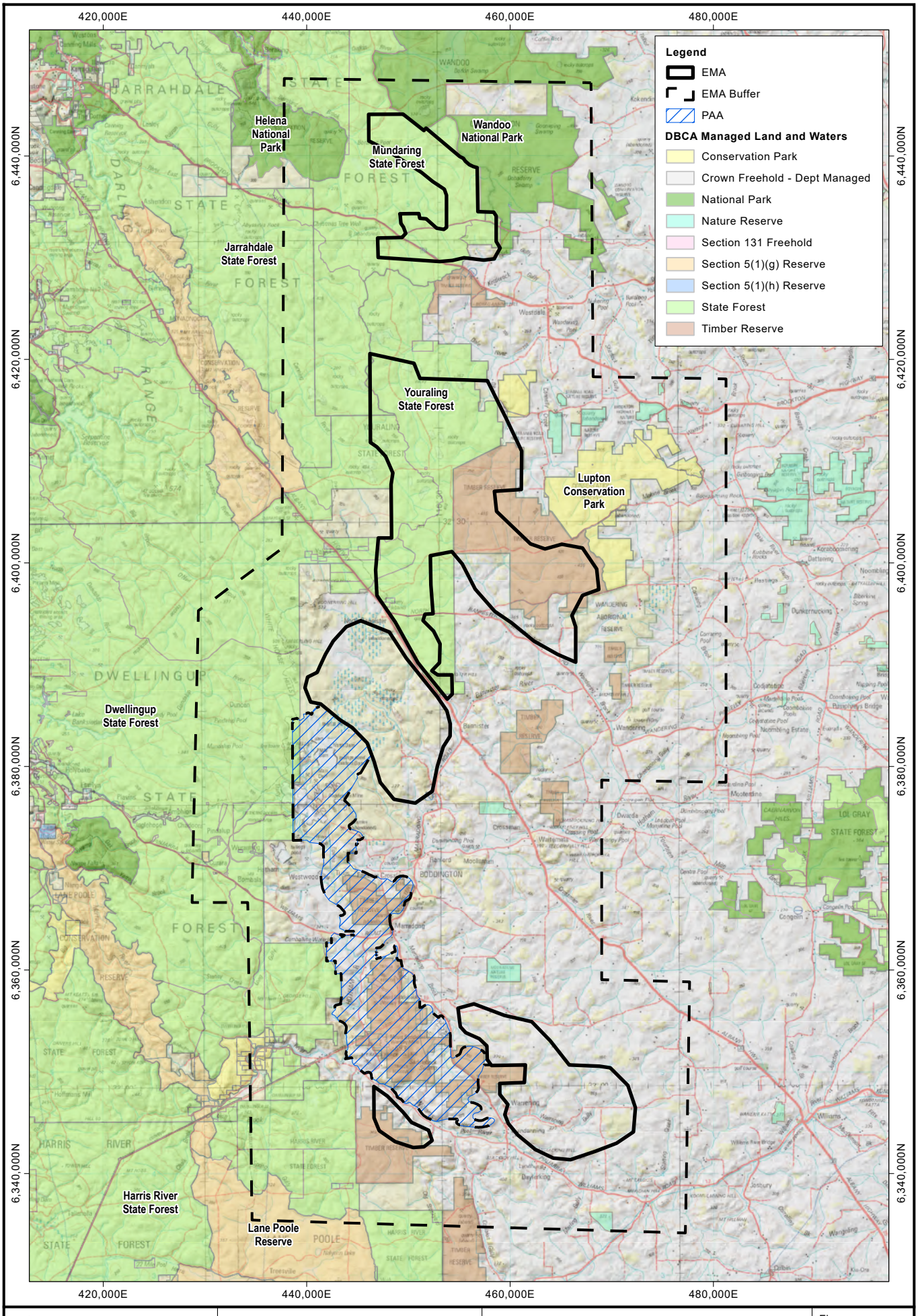
EMA
Tenements

Figure: **2**

CAD Ref: g1881_F070_02		Author: L. Mattiske	Ref:
Date: May 2025	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

Imagery:



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GDA 1994 MGA Zone 50

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EMA
DBCA Managed Lands

Figure: **3**

CAD Ref: g1881_F070_03		Author: L. Mattiske	Ref:
Date: May 2025	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

Imagery:

2.3 Threatened and Priority Ecological Communities

An ecological community is defined as a naturally occurring biological assemblage that occurs in a particular type of habitat composed of specific abiotic and biotic factors. At the State level, ecological communities may be considered as threatened once they have been identified as such by the Western Australian Threatened Ecological Communities Scientific Advisory Committee. A Threatened Ecological Community (TEC) is defined, under the *Environmental Protection Act 1986*, as an ecological community listed, designated or declared under a written law or a law of the Commonwealth as threatened, endangered or vulnerable. There are four State categories of TECs: presumed totally destroyed (PD); critically endangered (CR); endangered (EN); and vulnerable (VU) (DEC 2013). A description of each of these categories of TECs is presented in Appendix A2. Threatened Ecological Communities are gazetted as such (DBCA 2025c). Additional Western Australian TECs may be listed as threatened under the *Biodiversity Conservation Act 2016*.

At the Commonwealth level, some Western Australian TECs are listed as threatened, under the *Environment Protection and Biodiversity Conservation Act 1999*. Under the *Environment Protection and Biodiversity Conservation Act 1999*, a person must not take an action that has or will have a significant impact on a listed TEC without approval from the Commonwealth Minister for Climate Change, Energy, the Environment and Water, unless those actions are not prohibited under the Act. A description of each of these categories of TECs is presented in Appendix A2. The current *Environment Protection and Biodiversity Conservation Act 1999* list of threatened ecological communities can be located on the Department of Climate Change, Energy, the Environment and Water (2025b) website.

Ecological communities identified as threatened, but not listed as TECs, can be classified as Priority Ecological Communities (PECs). These communities are under threat, but there is insufficient information available concerning their distribution to make a proper evaluation of their conservation status. The Department of Biodiversity, Conservation and Attractions categorises PECs according to their conservation priority, using five categories, P1 to P5, to denote the conservation priority status of such ecological communities, with P1 communities being the most threatened and P5 the least. Appendix A2 sets out definitions of PECs (DEC 2013). A list of current PECs can be viewed at the Department of Biodiversity, Conservations and Attractions (2025d) website.

2.4 Declared (Plant) Pest Organisms

The *Biosecurity and Agriculture Management Act 2007* (BAM Act), Section 22, 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 section 26 (1) of the *Biosecurity and Agriculture Management Act 2007*, a person who finds a declared plant pest must report, in accordance with subsection (2), the presence or suspected presence of the declared pest to the Director General or an inspector of the Department of Primary Industries and Regional Development, Western Australia.

Under the *Biosecurity and Agriculture Management Regulations 2013*, declared plant pests 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 (Appendix A3). According to section 30 (3) of the BAM Act, the owner or occupier of land, or a person who is conducting an activity on the land, must take the prescribed control measures to control the declared pest if it is present on the land.

The current listing of declared pest organisms and their control category is available on the Western Australian Organism List (WAOL), at the Agriculture and Food website (Department of Primary Industries and Regional Development 2025).

The Department of Parks and Wildlife (DPAW) now the Department of Biodiversity, Conservation and Attractions (DBCA) delineated a series of introduced species into different categories based on ecological risk and the degree of invasiveness (DPAW 2014).

2.5 Local and Regional Significance

Flora and vegetation may be considered significant in addition to statutory listings by the State or Federal Government. This may be for a range of reasons, including, but not limited to the following:

Flora

- being locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- being a new species or having anomalous features that indicate a potential new species;
- being representative of the range of a species (particularly, at the extremes of range recently discovered range extensions, or isolated outliers of the main range);
- being an unusual species, including restricted subspecies, varieties or naturally occurring hybrids; or
- having relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape (Environmental Protection Authority 2016b).

Vegetation

- having a restricted distribution or size;
- holding unusual species or novel combinations of species;
- being representative of the range of a unit (particularly, a good local and/or regional example of a unit in “prime” habitat, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- having a degree of historical impact from threatening processes;
- having a role as a refuge; or
- providing an important function required to maintain ecological integrity of a significant ecosystem (Environmental Protection Authority 2016b).

Vegetation communities are locally significant if they contain Priority Flora species or contain a range extension of a particular taxon outside of the normal distribution. They may also be locally significant if they are very restricted to one or two locations or occur as small, isolated communities. In addition, vegetation communities that exhibit unusually high structural and species diversity are also locally significant.

Vegetation communities are regionally significant where they are limited to specific landform types, are uncommon or restricted plant community types within the regional context, or support populations of threatened Flora.

Determining the significance of flora and vegetation may be applied at various scales, for example, a vegetation community may be nationally significant and governed by statutory protection as well as being locally and regionally significant.

3. OBJECTIVES

The aim of the current study was to conduct a comprehensive desktop review to evaluate the flora and vegetation values of the EMA survey areas. Specifically:

- Undertake updated database searches to identify potential vascular plant species present in the survey areas;
- highlight threatened and priority species potentially present in the survey areas and evaluate the likelihood of their occurrence within the survey areas;
- highlight introduced weed species potentially present in the survey areas;
- review the conservation status of vascular plant species returned in desktop search by reference to current literature and current listings by the Department of Biodiversity, Conservation and Attractions (2025a; 2025b) and plant collections held at the Western Australian State Herbarium (WAH 1998-), and as listed by the Department of Climate Change, Energy, the Environment and Water (2025a) under the *Environment Protection and Biodiversity Conservation Act 1999*;
- identify potential significant vegetation communities including TECs and PECs present in the survey areas;
- undertake a review of relevant historical and contemporary documentation and reports related to the project area; and
- prepare a report summarising the findings.

4. METHODS

An updated desktop search for threatened and priority flora; threatened and priority ecological communities; and introduced species that have the potential to occur within the survey area was undertaken using the NatureMap and Dandjoo datasets (DBCA 2007-, DBCA 2022-) and the *EPBC Act* Protected Matters Search Tool (DBCA 2025a, 2025b; DCCEEW 2025a, 2025c).

The database search was conducted for the EMA survey areas and as such included references to both the PAA (Primary Assessment Area) and nearby and abutting Buffer areas. Search parameters used were a polygon for each search area including a 20 km buffer using a centralised point for each area and also the Buffer areas.

In addition, historical documentation and vegetation mapping of the region were reviewed, principally that of Pre-European Vegetation (Beard 1990) and RFA Vegetation Complex Mapping (Mattiske and Havel 1998) which provide extensive resource material for the floristics and vegetation of the EMA, Buffer and PAA survey areas. Previous flora and vegetation assessments from the Boddington area for South32 by Bennett Environmental Consulting (2004) and Mattiske team for South 32 Worsley Alumina Pty Ltd and Newmont Boddington Gold Mine as summarized in Mattiske Consulting Pty Ltd (2013, 2020, 2024a, 2024b) were also utilised to assist in the assessment of flora and vegetation values to be found within the EMA survey areas.

The Threatened and Priority Flora and WAH Flora databases (DBCA 2025b) were searched by CAD Resources for records of threatened and priority flora in the survey areas. The likelihood of occurrence of any threatened and priority flora within Project study areas was assessed on the basis of proximity of previous records to the current survey areas, age of the record, and size of the recorded population.

5. RESULTS

5.1 Climate

Beard (1990) described the climate of the Dale Botanical District as warm Mediterranean, with mainly winter precipitation and an average of 5-6 dry months per year (Beard 1990). The Marradong recording station provide the most complete dataset near the survey area (Bureau of Meteorology 2025), (Figure 4a). The trend of rainfall near Boddington is extracted from the Marradong Bureau of Meteorology dataset reflects decreasing annual rainfalls from 1898 and in the last 10 years only 2 years have reached or exceeded the 717.2 long term annual rainfall, Figure 4b. These latter results reflect recent trends in rainfall recordings in the eastern Jarrah forest which may influence the flora values in the survey areas.

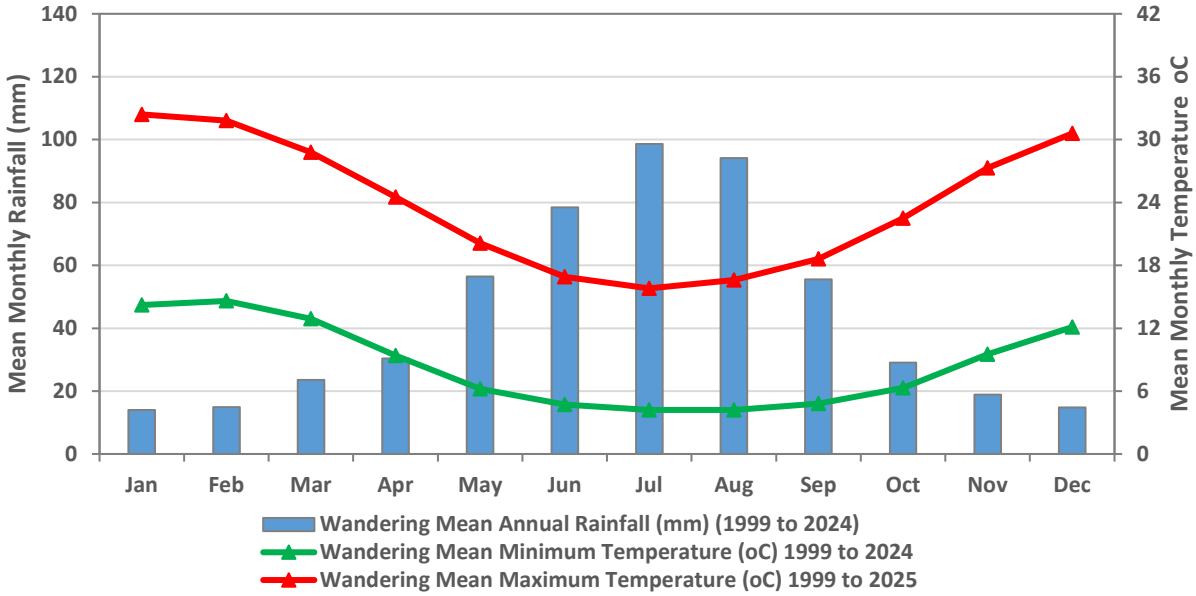


Figure 4a: Rainfall and temperature data from the Wandering recording station
Long term average rainfall (1999-2024), together with monthly rainfall and monthly maximum and minimum temperature data (BOM 2025).

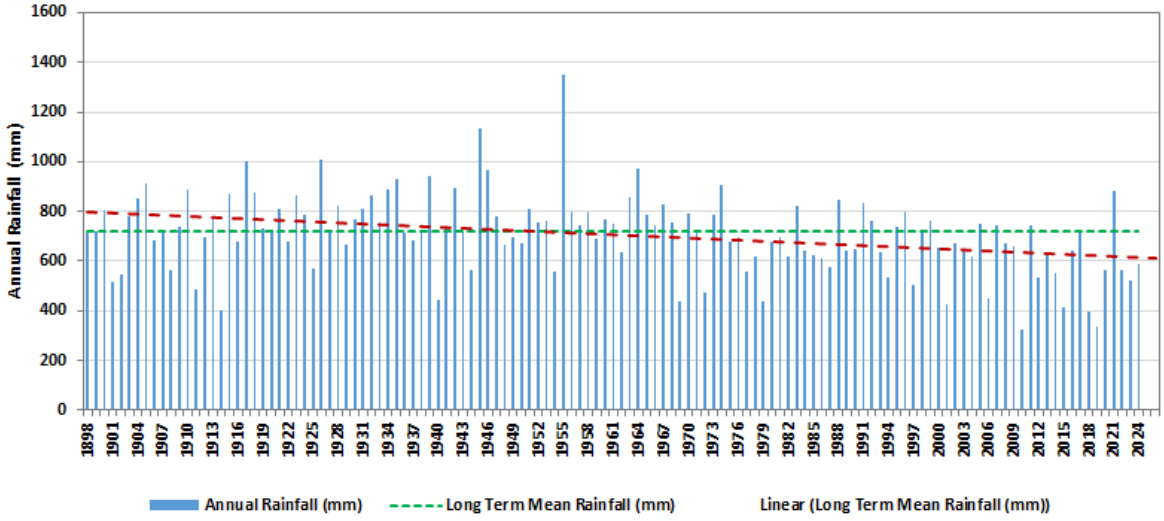


Figure 4b: Long Term Rainfall data from the Marradong recording station
Long term average rainfall (1898-2024) from Marradong station (BOM 2025)

5.2 Geology, Soils and Topography

According to the Interim Biogeographic Regionalisation for Australia, the EMA survey areas are situated within both the Northern Jarrah Forest (JF1) subregion of the Jarrah Forest bioregion and the eastern fringes of the Avon Wheatbelt bioregion (DCCEEW 2025e; Thackway and Cresswell 1995) as well as the Dale and Avon botanical subdistricts (Beard 1990).

The Northern Jarrah Forest bioregion encompasses the area to the east of the Darling Scarp, overlying Archaean granite and metamorphic rocks at an average elevation of 300 m (Beard 1990; Williams and Mitchell 2001). The area is capped by extensive lateritic duricrust, dissected by later drainage and broken by occasional granite hills. In the eastern section the laterite becomes deeply dissected until it compresses isolated remnants (Williams and Mitchell 2001). The eastern fringes overlaps with the Avon Wheatbelt 2 subregion and consists of an area of active drainage dissecting a Tertiary plateau in the Yilgarn Craton (Beecham 2001). These eastern areas have been subjected to more land clearing for agricultural activities. These eastern areas support undulating landscapes with low relief and support mixed Eucalypt and Sheoak woodlands.

The duricrusted plateau of the Yilgarn Craton is characterised by lateritic gravels, consisting of 5 m or more of ironstone gravels in a yellow sandy matrix, and related lateritic podzolic soils with ironstone gravels in a sandy surface horizon. These overlay mottled yellow-brown clay subsoils and hard setting loamy soils which become evident in the east (Beard 1990).

5.3 Land Systems

Land system mapping of the survey areas, has been prepared by the Department of Primary Industries and Regional Development. Land systems are grouped into land types according to a combination of landforms, soils, vegetation and drainage patterns.

A total of ten land systems are intersected by the survey areas (Figure 5). The coverage of each land system for the PAA area, EMA survey areas and the Buffer areas is summarized in Table 1. Three of these only occur in the Buffer area and of those land systems that occur in the EMA areas all but three of the land systems include less than 1% of the total regional area in the EMA areas.

Boyagin System
Large duricrust remnants surrounded by stripped terrain of rock outcrops and fresh soils in Eastern Darling Range Zone. Gravels have Jarrah-Marri-Parrot bush forest. Loams and duplexes with York and Wandoo. Mallet and Powderbark on scarps.

Clackline System
Moderately dissected areas with gravelly slopes and ridges and minor rock outcrop on the eastern side of the Darling Plateau over weathered granite and granitic gneiss. Loamy gravels, shallow duplexes and pale deep sands common. Wandoo woodlands.

Dale System
Sediments of the ancestral Avon River from Beverley through West Dale to the Helena valley, that now occupies both valley and low rolling uplands.

Darling Plateau System
Lateritic plateau. Duplex sandy gravels, loamy gravels and wet soils. Jarrah-marri-wandoo forest and woodland.

Dryandra System
Gently undulating granitic terrain, in the central Zone of Rejuvenated Drainage, with deep sandy duplex, loamy duplex and brown loamy earth.

Marradong Upland System
Plateau remnants, in the central Eastern Darling Range, with sandy gravel, loamy gravel, grey deep sandy duplex and loamy duplex. Jarrah-marri-wandoo forest and woodland.

Murray Valley System
Western Darling Range from the Avon Valley to Harvey. Deeply incised valleys with Red loamy earths, shallow duplexes and rock outcrop and Jarrah-marri-wandoo forest and woodland with mixed shrubland

Pumphreys Bridge System
Valley floors, in the central Zone of Rejuvenated Drainage, with deep sandy duplex, pale deep sand and wet soil (often saline).

Quindanning System
Deep granitic valleys, in the northern and central Eastern Darling Range, with deep sandy duplex soils, shallow sand, loamy duplex and bare rock. Marri-wandoo-york gum-jam woodland.

Wundowie System
Intact undulating lateritic terrain with minor rock outcrops in the north eastern Darling Range. "Buckshot" gravels, duricrust and some deep sands vegetated by Jarrah forest.

5.4 Landforms and Soils

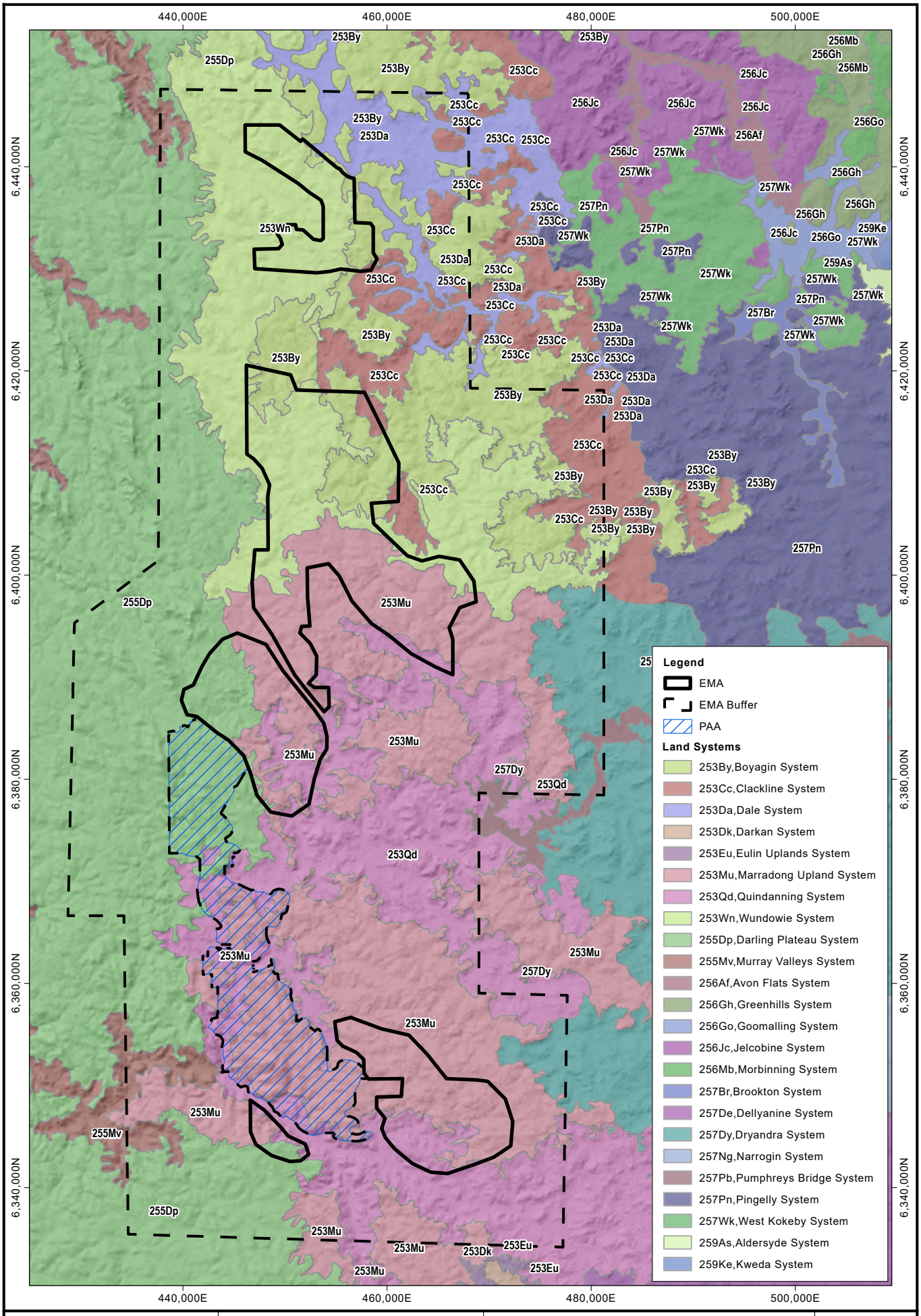
The soils of the Dale Botanical Subdistrict can be broadly defined as lateritic gravels consisting of up to 5 m or more of ironstone gravels in a yellow, sandy matrix. Related to these are the lateritic podzolic soils with ironstone gravels in a sandy surface horizon, overlying a mottled yellow-brown clay subsoil (Beard 1990). The region overlies an ancient plateau landform and has an average elevation of 300 m which is broken sporadically by nonconforming monadnocks such as Mt Cooke, Mt Dale and Mt Saddleback which reach up to 582 m (Havel 1975a; Beard 1990).

The more undulating areas to the east in the Avon Botanical subdistrict reflect active drainage patterns and colluvial processes and as such the soils are dominated by colluvium or in-situ weathered rock (Beecham 2001).

Churchward and McArthur (1980) initially defined a series of landform and soil mapping units for the Darling System which included the northern and central Jarrah forest. Subsequently, the following soil landscape units were defined and occurred in the PAA area, the EMA survey areas and the Buffer areas (DPIRD 2020), Table 2, Figure 6, Appendix D.

Table 1: Summary of Representation of Land Systems in the EMA, PAA and BUFFER survey areas (Ha and % of Total Mapped in Region)
Note: Areas listed in hectares (ha)

LAND SYSTEM	MAPPING UNIT	PAA	BUFFER AREA	EMA BROOKTON	EMA CENTRAL	EMA QUINDANNING	EMA HOTHAM NORTH EXTENSION	EMA MORGANS	TOTAL MAPPED IN REGION (HA)	ALL EMA AS A % OF TOTAL AREA IN REGION
Boyagin System	253By	-	35414.06	1476.58 (0.99%)	6825.21 (4.59%)	-	-	-	148794.97	5.58%
Clackline System	253Cc	-	18875.38	65.87 (0.08%)	690.68 (0.80%)	-	-	-	85944.37	0.88%
Dale System	253Da	-	13146.06	17.76 (0.06%)	-	-	-	-	29568.22	0.06%
Darling Plateau System	255Dp	8242.03	84984.21	-	16.34 (0.002%)	-	5059.38 (0.62%)	540.62 (0.07%)	820265.77	0.69%
Dryandra System	257Dy	-	12071.65	-	-	-	-	-	172996.67	0.00%
Murray Valley System	255Mv	-	5209.97	-	-	-	-	-	132255.57	0.00%
Marradong Upland System	253Mu	13394.32	69800.50	-	15256.19 (10.90%)	9862.72 (7.05%)	6011.57 (4.30%)	609.92 (0.44%)	139924.01	28.27%
Pumphreys Bridge System	257Pb	-	1060.65	-	-	-	-	-	-	0.00%
Quindanning System	253Qd	6804.35	66160.74	-	759.88 (0.66%)	3444.76 (3.00%)	2971.87 (2.59%)	498.58 (0.43%)	114871.61	6.68%
Wundowie System	253Wn	-	46465.32	7679.56 (4.31%)	13125.74 (7.37%)	-	-	-	178014.23	11.68%
Total (ha)		28,440.70	353,188.54	9,239.77	36,674.04	13,307.48	14,042.82	1,649.11	7,251,583.79	



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CAD Ref: g1881_F070_04 | Author: L. Mattiske | Ref:

Date: May 2025 | Rev: A | A4 | Drawn: CAD Resources ~ www.cadresources.com.au

Imagery:

EMA
Land Systems

Figure:

5

Table 2: Summary of Soil Landscapes in the EMA, PAA and BUFFER survey areas (DPIRD 2020)

Note: Total Mapped in Survey Area excludes PAA area.

SOIL LANDSCAPES	ID CODE	PAA	BUFFER AREA	EMA BROOKTON	EMA CENTRAL	EMA QUINDANNING	EMA HOTHAM NORTH EXTENSION	EMA MORGANS	TOTAL MAPPED IN SURVEY AREA (HA)
Biberkine Subsystem (Dryandra)	257DyBK	-	1834.92	-	-	-	-	-	1834.92
Biberkine Subsystem (Quindanning)	253QdBK	-	1429.75	--	-	-	-	-	1429.75
Boyagin 1 Subsystem	253By_1	-	3891.95	-	-	-	-	-	3891.95
Boyagin 1 valley Phase	253By_1v	-	26.12	-	-	-	-	-	26.12
Boyagin 2 Subsystem	253By_2	-	9130.32	-	-	-	-	-	9130.32
Boyagin 3 dolerite Phase	253By_3d	-	61.52	-	-	-	-	-	61.52
Boyagin 3 rock Phase	253By_3r	-	269.15	-	-	-	-	-	269.15
Boyagin 3 undifferentiated Phase	253By_3u	-	3158.49	-	-	-	-	-	3158.49
Boyagin 4 pn Phase	253By_4pn	-	89.70	-	-	-	-	-	89.70
Boyagin 4 wet Phase	253By_4w	-	1227.08	-	-	-	-	-	1227.08
Boyagin, Steep Rocky Hills 1 subsystem	253ByR1	-	12.18	-	-	-	-	-	12.18
Clackline 1 Subsystem	253Cc_1	-	547.97	-	-	-	-	-	547.97
Clackline 2 Subsystem	253Cc_2	-	777.01	-	-	-	-	-	777.01
Clackline 3 dolerite Phase	253Cc_3d	-	38.87	-	-	-	-	-	38.87
Clackline 3 granite Phase	253Cc_3g	-	8.24	-	-	-	-	-	8.24
Clackline 3 rock Phase	253Cc_3r	-	1107.75	-	-	-	-	-	1107.75
Clackline 3 undifferentiated Phase	253Cc_3u	-	5985.46	-	-	-	-	-	5985.46
Clackline 4 wet Phase	253Cc_4w	-	1589.19	-	119.65	-	-	-	1708.84
Clackline Leaver subsystem	253CcLV	-	62.03	-	-	-	-	-	62.03
Clackline sandy phase	253Cc_1s	-	3.94	-	-	-	-	-	3.94
Clackline, Steep Rocky Hills 1 subsystem	253CcR1	-	97.61	-	-	-	-	-	97.61
Cooke Subsystem	255DpCO	-	3958.21	-	-	-	-	-	3958.21
Cooke Subsystem (Boyagin)	253ByCO	-	54.74	-	141.14	-	-	-	195.88
Coolakin (Marradong), rocky phase	253MuCKr	41.38	2502.28	-	437.24	210.39	239.94	-	3389.85
Coolakin (Marradong), very rocky phase	253MuCKrx	-	509.26	-	164.34	-	82.19	-	755.79

Table 2: Summary of Soil Landscapes in the EMA, PAA and BUFFER survey areas (DPIRD 2020) (continued)

Note: Total Mapped in Survey Area excludes PAA area.

SOIL LANDSCAPES	ID CODE	PAA	BUFFER AREA	EMA BROOKTON	EMA CENTRAL	EMA QUINDANNING	EMA HOTHAM NORTH EXTENSION	EMA MORGANS	TOTAL MAPPED IN SURVEY AREA (HA)
Coolakin subsystem (Boyagin)	253ByCK	-	5370.10	393.67	4906.28	-	-	-	10670.05
Coolakin subsystem (Marradong)	253MuCK	3604.80	31897.82	-	7253.03	4648.81	1939.41	191.18	45930.22
Dale 4 w phase	253Da_4w	-	1335.73	-	-	-	-	-	1335.73
Dale Maitland subsystem	253DaMA	-	96.87	-	-	-	-	-	96.87
Dale subsystem	253DaDA	-	4069.07	17.76	-	-	-	-	4086.83
Dwellingup (Marradong), rock outcrop phase	253MuDWr	9.30	56.67	-	66.97	-	58.76	-	182.40
Dwellingup (Marradong), very rocky phase	253MuDWrx	-	44.16	-	1.42	-	-	-	45.58
Dwellingup rock outcrops phase	255DpDWr	163.81	167.32	-	-	-	-	-	167.32
Dwellingup sandy divides phase	255DpDWs	-	32.59	-	-	-	-	-	32.59
Dwellingup subsystem	255DpDW	3887.38	37849.74	-	-	-	1591.88	379.67	39821.20
Dwellingup subsystem (Marradong)	253MuDW	9733.48	23875.90	-	7333.20	3510.25	3691.26	418.74	38829.35
Dwellingup subsystem (Quindanning)	253QdDW	315.17	1986.36	-	44.06	4.01	8.31	1.07	2043.80
Goonaping subsystem (Wundowie)	253WnGO	-	824.71	99.21	-	-	-	-	923.92
Hester subsystem (Murray)	255MvHR	-	163.32	-	-	-	-	-	163.32
Kokeby laterite phase	253DaKOlat	-	323.03	-	-	-	-	-	323.03
Kokeby subsystem	253DaKO	-	7083.38	-	-	-	-	-	7083.38
Leaver subsystem	253ByLV	-	4403.94	657.64	-	-	-	-	5061.59
Michabin subsystem (Boyagin)	253ByMN	-	102.88	-	-	-	-	-	102.88
Michibin (Quindanning), rocky phase	253QdMNr	292.18	7107.18	-	-	754.97	420.11	79.49	8361.76
Michibin (Quindanning), very rocky phase	253QdMNrx	342.21	4709.18	-	42.18	-	616.19	-	5367.55
Michibin subsystem	253CcMN	-	7838.85	65.87	571.03	-	-	-	8475.75
Michibin subsystem (Quindanning)	253QdMN	4222.48	39038.83	-	616.98	2246.15	1844.88	418.02	44164.86
Mornington Hill subsystem	255DpMH	-	440.20	-	-	-	-	-	440.20

Table 2: Summary of Soil Landscapes in the EMA, PAA and BUFFER survey areas (DPIRD 2020) (continued)

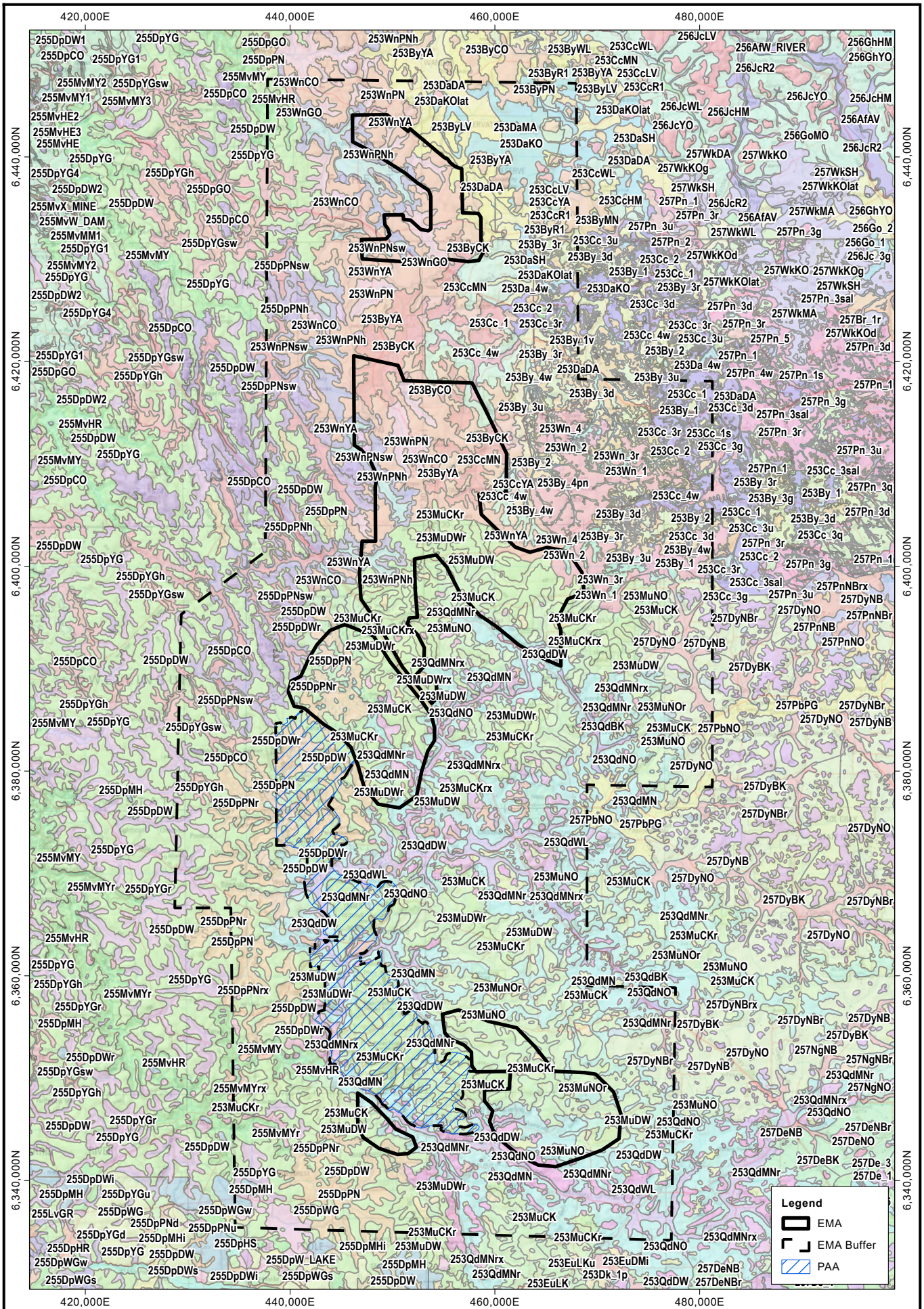
Note: Total Mapped in Survey Area excludes PAA area.

SOIL LANDSCAPES	ID CODE	PAA	BUFFER AREA	EMA BROOKTON	EMA CENTRAL	EMA QUINDANNING	EMA HOTHAM NORTH EXTENSION	EMA MORGANS	TOTAL MAPPED IN SURVEY AREA (HA)
Murray rock outcrop phase	255MvMYr	-	823.69	-	-	-	-	-	823.69
Murray subsystem	255MvMY	-	3907.67	-	-	-	-	-	3907.67
Murray, very rocky phase	255MvMYrx	-	315.29	-	-	-	-	-	315.29
Noombling (Dryandra), rocky phase	257DyNBr	-	928.44	-	-	-	-	-	928.44
Noombling subsystem (Dryandra)	257DyNB	-	8428.45	-	-	-	-	-	8428.45
Norrine (Marradong), rocky phase	253MuNOr	-	80.64	-	-	5.64	-	-	86.28
Norrine subsystem (Dryandra)	257DyNO		879.84	-	-	-	-	-	879.84
Norrine subsystem (Marradong)	253MuNO	5.37	10833.76	-	-	1487.63	-	-	12321.39
Norrine subsystem (Pumphreys)	257PbNO	-	13.82	-	-	-	-	-	13.82
Norrine subsystem (Quindanning)	253QdNO	41.12	2703.60	-	-	311.87	-	-	3015.47
Pindalup hillslope phase	253WnPNh	-	6906.83	975.30	2162.04	-	-	-	10044.17
Pindalup hillslope phase	255DpPNh	-	11518.95	-	16.34	-	104.13	-	11639.42
Pindalup rock outcrop phase	255DpPNr	94.32	525.74	-	-	-	290.58	-	816.31
Pindalup subsystem	253WnPN	-	3325.15	1541.14	1805.84	-	-	-	6672.13
Pindalup subsystem	255DpPN	4096.53	16509.90	-	-	-	3072.80	160.95	19743.65
Pindalup subsystem (Boyagin)	253ByPN	-	62.05	-	-	-	-	-	62.05
Pindalup swampy valley floor phase	253WnPNsw	-	3495.39	274.84	1111.33	-	-	-	4881.56
Pindalup swampy valley floor phase	255DpPNsw	-	5755.18	-	-	-	-	-	5755.18
Pindalup upstream valleys phase	255DpPNu	-	5.42	-	-	-	-	-	5.42
Pindalup very rocky phase	255DpPNrx	-	93.89	-	-	-	-	-	93.89
Popanyinning subsystem (Pumphreys)	257PbPG	-	1046.83	-	-	-	-	-	1046.83
Sheahan subsystem	253DaSH	-	237.98	-	-	-	-	-	237.98
Wilga subsystem	255DpWG	-	1107.49	-	-	-	-	-	1107.49
Wilga wet flats phase	255DpWGw	-	127.92	-	-	-	-	-	127.92
Williams subsystem	253CcWL	-	95.04	-	-	-	-	-	95.04

Table 2: Summary of Soil Landscapes in the EMA, PAA and BUFFER survey areas (DPIRD 2020) (continued)

Note: Total Mapped in Survey Area excludes PAA area.

SOIL LANDSCAPES	ID CODE	PAA	BUFFER AREA	EMA BROOKTON	EMA CENTRAL	EMA QUINDANNING	EMA HOTHAM NORTH EXTENSION	EMA MORGANS	TOTAL MAPPED IN SURVEY AREA (HA)
Williams subsystem (Boyagin)	253ByWL	-	76.73	-	-	-	-	-	76.73
Williams subsystem (Quindanning)	253QdWL	-	9185.84	-	56.67	127.76	82.38	1592.84	9452.65
Wundowie 1 subsystem	253Wn_1	-	11161.82	-	571.50	-	-	-	11733.33
Wundowie 2 subsystem	253Wn_2	-	2102.48	-	111.43	-	-	-	2213.91
Wundowie 3 rock phase	253Wn_3r	-	115.56	-	8.20	-	-	-	123.76
Wundowie 4 subsystem	253Wn_4	-	850.92	-	-	-	-	-	850.92
Wundowie, Cook subsystem	253WnCO	-	1168.60	-	275.59	-	-	-	1444.19
Yalanbee subsystem	253ByYA	-	7477.11	425.26	1777.79	-	-	-	9680.16
Yalanbee subsystem	253CcYA	-	723.41	-	-	-	-	-	723.41
Yalanbee subsystem	253WnYA	-	16513.85	4789.07	7079.82	-	-	-	28382.74
Yarragil DpYGh phase	255DpYGh	-	2040.92	-	-	-	-	-	2040.92
Yarragil subsystem	255DpYG	-	4287.98	-	-	-	-	-	4287.98
Yarragil Swamp phase	255DpYGsw	-	562.86	-	-	-	-	-	562.86



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Scale: 1:500,000
GDA 1994 MGA Zone 50

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EMA
Soil Landscape Mapping

Figure: **6**

CAD Ref: g1881_F070_09 | Author: L. Mattiske | Ref:

Date: May 2025 | Rev: A | A4 | Drawn: CAD Resources ~ www.cadresources.com.au

Imagery:

5.5 Pre-European Vegetation

Pre-European vegetation (Beard *et al*. 2013; as supplied by Department of Primary Industries and Regional Development DPIRD 2020b) within the EMA survey areas (Figure 7) is described in Table 3. The areas are covered under the Pre-European vegetation delineated mainly by *Eucalyptus marginata, Corymbia calophylla and Eucalyptus wandoo* woodlands. As indicated below the descriptions of the respective Pre-European vegetation units are broad in view of the coverage of the whole of Western Australia.

A total of twenty-nine pre-European vegetation units occur in the survey areas including the Buffer and EMA areas (Figure 7). The coverage of each Pre-European vegetation unit for the PAA area, EMA survey areas and the Buffer area is summarized in Table 3. Eighteen of these only occur in the Buffer area within the survey area (excludes PAA areas). Of those vegetation units that occur in the EMA areas six of the units have more than 10% of their mapped regional extent occurring within the EMA areas. Note these figures do not reflect the degree of land clearing in the study area which is summarized in Table 4 with the majority of remnant vegetation currently remaining within the Buffer areas (see Figure 8).

3.1 Bannister - Mainly jarrah and marri *Eucalyptus marginata, Corymbia calophylla*
3.3 East Darling - Mainly jarrah and marri *Eucalyptus marginata, Corymbia calophylla*
3.3 West Darling – Mainly jarrah and marri *Eucalyptus marginata, Corymbia calophylla*
3.3 Dryandra - Mainly jarrah and marri *Eucalyptus marginata, Corymbia calophylla*
3.3 Williams - Mainly jarrah and marri *Eucalyptus marginata, Corymbia calophylla*
4.4 Dryandra - Jarrah, marri and wandoo *Eucalyptus marginata, Corymbia calophylla, E. wandoo.*
4.4 Williams - Jarrah, marri and wandoo *Eucalyptus marginata, Corymbia calophylla, E. wandoo.*
4.7 Bannister - Jarrah, marri and wandoo *Eucalyptus marginata, Corymbia calophylla, E. wandoo*.
5.0 Dryandra - Wheatbelt; York gum, salmon gum etc. *Eucalyptus loxophleba, E. salmonophloia*. Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa.* Riverine; rivergum *E. camaldulensis.*
25.0 Pingelly - Other acacia, banksia, peppermint, cypress pine, casuarina, York gum Acacia spp., Banksia spp., Agonis flexuosa, Callitris spp., Allocasuarina spp., Eucalyptus loxophleba.
49.0 Bannister - Low shrubs of mixed composition.
51.0 Bannister – Cyperaceae, Restionaceae, Juncaceae (mainly in the South-West)
128.0 Bannister – Bare Areas, Rock Outcrops
128.0 East Darling - Bare Areas, Rock Outcrops
128.0 Pingelly - Bare Areas, Rock Outcrops
352.0 Bannister - Wheatbelt; York gum, salmon gum etc. *Eucalyptus loxophleba, E. salmonophloia.* Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa.* Riverine; rivergum *E. camaldulensis.*
352.0 Dryandra - - Wheatbelt; York gum, salmon gum etc. *Eucalyptus loxophleba, E. salmonophloia.* Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa.* Riverine; rivergum *E. camaldulensis.*
352.3 Pingelly - Wheatbelt; York gum, salmon gum etc. *Eucalyptus loxophleba, E. salmonophloia*. Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa.* Riverine; rivergum *E. camaldulensis.*
946.0 Bannister - Wheatbelt; York gum, salmon gum etc. *Eucalyptus loxophleba, E. salmonophloia*. Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa*. Riverine; rivergum *E. camaldulensis.*
968.0 Bannister - Jarrah, marri and wandoo *Eucalyptus marginata, Corymbia calophylla, E. wandoo*.
1002.0 East Darling - Wheatbelt; York gum, salmon gum etc. *Eucalyptus loxophleba, E. salmonophloia*. Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa.* Riverine; rivergum *E. camaldulensis.*
1003.0 Bannister - Mainly jarrah and marri *Eucalyptus marginata, Corymbia calophylla*
1003.0 Dryandra - Mainly jarrah and marri *Eucalyptus marginata, Corymbia calophylla*
1003.0 Williams - Mainly jarrah and marri *Eucalyptus marginata, Corymbia calophylla*
1005.0 Bannister - Other acacia, banksia, peppermint, cypress pine, casuarina, York gum Acacia spp., Banksia spp., Agonis flexuosa, Callitris spp., Allocasuarina spp., Eucalyptus loxophleba.
1006.0 Dryandra - Jarrah, marri and wandoo Eucalyptus marginata, Corymbia calophylla, E. wandoo.
1114.0 East Darling - Mixed heath with low trees *Banksia ashbyi.*
1114.0 West Darling - Mixed heath with low trees *Banksia ashbyi*

Table 3: Pre-European vegetation (PEV) in the EMA, PAA and BUFFER survey areas (Ha and % of Total Mapped in Region)

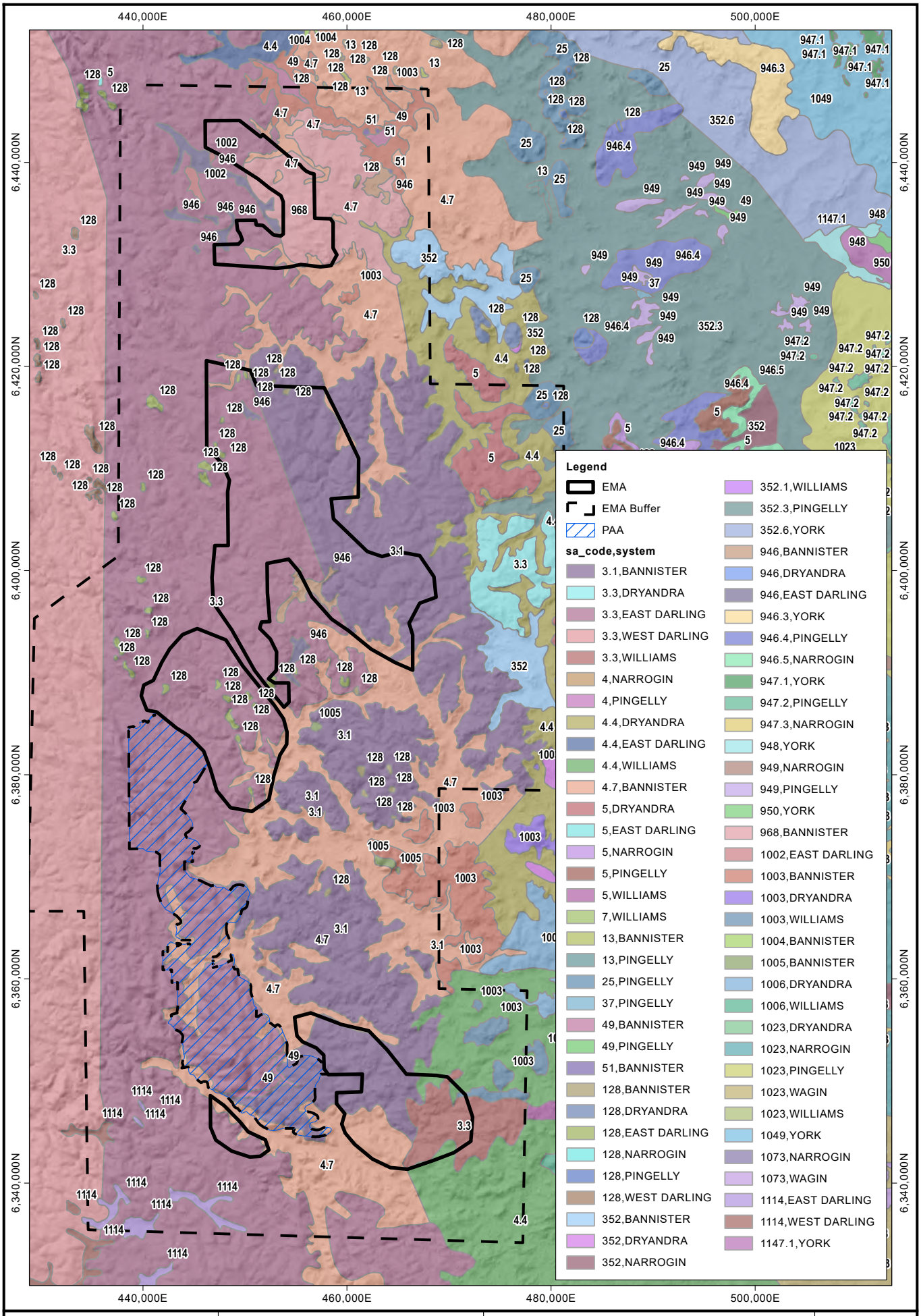
PEV CODE	SYSTEM	PAA	BUFFER AREA	EMA BROOKTON	EMA CENTRAL	EMA QUINDANNING	EMA HOTHAM NORTH EXTENSION	EMA MORGANS	Total Mapped (ha)	ALL EMA AS A % OF TOTAL AREA IN REGION
3.1	Bannister	3424.74 (3.75%)	64821.17 (71.03%)	-	16783.26 (18.39%)	6061.92 (6.64%)	-	-	91252.90	25.04
3.3	East Darling	21031.90 (6.93%)	118885.85 (39.19%)	3827.86 (1.26%)	17433.92 (5.75%)	-	12328.25 (4.06%)	1260.37 (0.42%)	303349.65	11.49
3.3	West Darling	-	26390.75 (5.44%)	-	-	-	-	-	485225.88	-
3.3	Dryandra	-	6307.88 (89.61%)	-	-	-	-	-	7039.48	-
3.3	Williams	-	2842.91 (44.76%)	-	-	3469.89 (54.62%)	-	-	6351.09	54.62
4.4	Dryandra	-	15497.33 (38.24%)	-	-	-	-	-	40552.913	-
4.4	Williams	-	15497.33 (9.29%)	-	-	751.98 (0.44%)	-	-	170767.28	0.44
4.7	Bannister	3479.00 (1.64%)	61402.70 (29.02%)	845.42 (0.40%)	1659.45 (0.78%)	2990.70 (1.41%)	1326.79 (0.63%)	388.74 (0.18%)	211568.161	3.41
5.0	Dryandra	-	5332.91 (16.77%)	-	-	-	-	-	31795.699	-
25.0	Pingelly	-	1408.68 (16.87%)	-	-	-	-	-	8351.90	-
49.0	Bannister	506.73 (30.10%)	479.96 (28.51%)	-	-	-	-	-	1683.27	-
51.0	Bannister	-	63.00 (100.00%)	-	-	-	-	-	63.00	-
128.0	Bannister	-	399.10 (50.71%)	-	54.65 (6.94%)	-	-	-	787.054	6.94
128.0	East Darling	-	816.49 (46.44%)	-	195.37 (11.11%)	-	387.78 (22.06%)	-	1758.140	33.17
128.0	Pingelly	-	32.30 (2.70%)	-	-	-	-	-	1196.30	-
352.0	Bannister	-	5569.43 (59.20%)	-	-	-	-	-	9407.029	-
352.0	Dryandra	-	563.40 (7.32%)	-	-	-	-	-	7699.029	-
352.3	Pingelly	-	2059.92 (2.36%)	-	-	-	-	-	87165.954	-

Table 3: Pre-European vegetation (PEV) in the EMA, PAA and BUFFER survey areas (Ha and % of Total Mapped in Region) (continued)

PEV CODE	SYSTEM	PAA	BUFFER AREA	EMA BROOKTON	EMA CENTRAL	EMA QUINDANNING	EMA HOTHAM NORTH EXTENSION	EMA MORGANS	Total Mapped (ha)	ALL EMA AS A % OF TOTAL AREA IN REGION
946.0	Bannister	-	1004.80 (70.27%)	-	425.13 (29.73%)	-	-	-	1429.925	29.73
946.0	East Darling	-	2442.65 (93.36%)	51.55 (1.97%)	122.25 (4.67%)	-	-	-	2616.453	6.64
968.0	Bannister	-	9305.63 (67.33%)	4514.94 (32.67%)	-	-	-	-	13820.574	32.67
1002.0	East Darling	-	360.84 (100.00%)	-	-	-	-	-	360.84	-
1003.0	Bannister	-	7,151.85 (51.85%)	-	-	-	-	-	13792.83	-
1003.0	Dryandra	-	21.63 (1.08%)	-	-	-	-	-	2003.28	-
1003.0	Williams	-	1735.11 (77.36%)	-	-	33.99 (1.52%)	-	-	2242.90	1.52
1005.0	Bannister	-	256.03 (100.00%)	-	-	-	-	-	256.03	-
1006.00	Dryandra	-	136.53 (1.65%)	-	-	-	-	-	8261.73	-
1114.00	East Darling	-	1783.71 (31.27%)	-	-	-	-	-	5703.96	-
1114.00	West Darling	-	250.55 (8.37%)	-	-	-	-	-	2993.79	-
	Total Area:			9,239.77	36,674.04	13,307.48	14,042.82	1,649.11	4,785,033.13	

Table 4: Summary of Remnant Native Vegetation Extent in EMA, BUFFER and PAA survey areas (Ha and % of Total Mapped in Region)

PEV CODE	PAA	BUFFER AREA	EMA BROOKTON	EMA CENTRAL	EMA QUINDANNING	EMA HOTHAM NORTH EXTENSION	EMA MORGANS	Total Area of Remnant Vegetation in Survey Areas (ha)	ALL EMA AS A % OF REMNANT VEGETATION IN SURVEY AREAS (PAA, BUFFER AND EMA)
Native Vegetation Remaining	14,539.69	266,530.01	8,826.86	33,147.35	3,597.08	8,000.88	1,017.17	335,659.04	16.26
% of Total Areas of Remnant Native Vegetation	4.33%	79.40%	2.63%	9.88%	1.07%	2.38%	0.30%		



0 5 10km

Scale: 1:500,000
GDA 1994 MGA Zone 50

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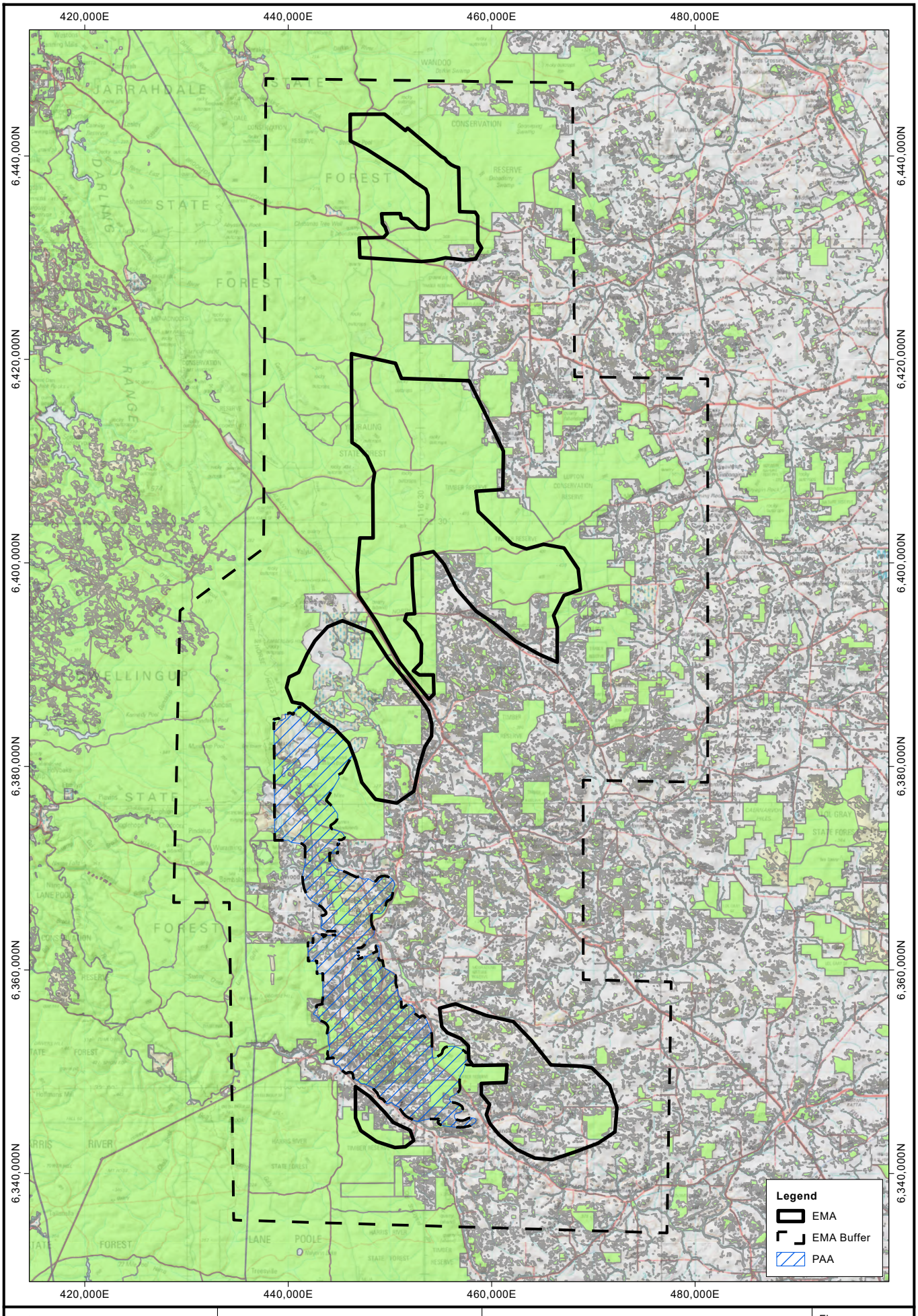
CAD Ref: g1881_F070_06 | Author: L. Mattiske | Ref:

Date: May 2025 | Rev: A | A4 | Drawn: CAD Resources ~ www.cadresources.com.au

Imagery:

EMA
Pre-European Vegetation

Figure: **7**



0 5 10km

Scale: 1:500,000
GDA 1994 MGA Zone 50

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EMA
Native Vegetation Extents

Figure: **8**

CAD Ref: g1881_F070_10 | Author: L. Mattiske | Ref:

Date: May 2025 | Rev: A | A4 | Drawn: CAD Resources ~ www.cadresources.com.au

Imagery:

5.6 Regional Vegetation

Dell and Havel (1989) broadly classified the Jarrah Forest as an open forest in its northern extent and as a tall forest in its southern extent. In lower rainfall areas towards the east, trees decrease in size, forming woodlands or low forests. This dry sclerophyllous forest typically comprises a dominant *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri) overstorey, a mid-storey of *Allocasuarina fraseriana* (Sheoak), *Banksia grandis* (Bull Banksia), *Persoonia longifolia* (Snottygobble), *Persoonia elliptica* (Spreading Snottygobble) and a groundcover of woody shrubs with grass trees *Xanthorrhoea preissii*, *Kingia australis* and the cycad *Macrozamia riedlei* (Dell and Havel 1989).

The Interim Biogeographic Regionalisation for Australia (IBRA) delineated 85 bioregions across Australia, based on a range of biotic and abiotic factors, including climate, vegetation, fauna, geology and landform (DCCEEW 2025e; Thackway and Cresswell 1995). IBRA Version 6.1 refined the original 85 bioregions (and 354 sub-regions) by expanding the number of sub-regions to 403. The sub-regions represent more localised and homogenous geomorphological units in each bioregion. The survey areas are located in the eastern section of the JF1 – Northern Jarrah Forest subregion (Williams and Mitchell 2001, Hearn *et al.* 2002).

The Northern Jarrah Forest, specifically the Dale Botanical Subdistrict has been extensively described over the past 100 years by several authors (Diels 1906; Speck 1958; Havel 1975a; Beard 1979; Beard 1990, Smith 1974). Beard defined and mapped the vegetation on the Pinjarra sheet at a scale of 1:250,000.

Havel (1975a, 1975b) summarised a number of the major ecological projects undertaken within the area, from Diels's (1906) original plant geography work in 1906 through to Kimber's study of the relationship between the root systems of the Jarrah plant and non-seasonal water loss in 1974. Beard (1990) again built on this framework and further defined the vegetation of this region in his botanical survey of Western Australia.

Diels (1906) and Speck (1958) both recognised that the Eastern range of the Jarrah forest contains a comparatively poorer range of species when compared to the Western reaches of the forest. This poorer range of species across the Eastern range can be related to a decrease in rainfall from West to East. Speck (1958) split the Jarrah forest into two broad vegetation systems; The Darling System and the Bannister System. The Darling System was described as "prime" Jarrah forest which covers the Darling Scarp and contains youthful streams with an average annual rainfall of over 890 mm. The Bannister System which covers the Eastern Jarrah forest, in comparison was associated with a mean annual rainfall of 520 – 1000 mm and no youthful streams.

Comparisons between climatic and edaphic factors and their relationships with trees within the region have been made since Lange (1960) attempted to relate these factors to the distribution of tree species within the Narrogin district. Additional work by Churchill (1961; 1968) addressed the influence of climatic conditions on the distribution of species, also undertaken more recently as part of the regional vegetation mapping program for the Regional Forest Agreement by Mattiske and Havel (1998). The latter studies relied on the conceptual climatic zoning developed by Gentilli (1989) for the Jarrah forest areas and were further summarised in Havel (2000).

Beard (1990) described the Jarrah forest as one of only two forest formations in Western Australia. As would be expected, Jarrah (*Eucalyptus marginata*) is the dominant tree species within this area and is commonly found in association with Marri (*Corymbia calophylla*) in varying proportions. Maximum forest heights range from less than 25 m in the Eastern range of the Jarrah forest to heights of greater than 30m in the Western range (Havel 1975a; Abbott & Loneragan 1986). Beard, as well as other researchers noticed that with the exception of creeklines and areas with significantly higher/lower than average rainfall amounts, no other tree species enters the canopy of the forest. Several smaller tree species (10 – 15 m tall) occur in the forest including, Bull Banksia (*Banksia grandis*), Sheoak (*Allocasuarina fraseriana*) and Snottygobble (*Persoonia longifolia*).

The forest understorey is comprised of a variety of shrub species which range from 1 – 2 m in height and have an average density of 185 plants/ha. Commonly occurring species include; *Adenanthos barbiger*, *Grevillea wilsonii*, *Trymalium ledifolium*, *Xanthorrhoea preissii*, *Macrozamia riedlei* and *Hypocalymma angustifolium*. Beard (1990) described the Eastern range of the Jarrah forest as being typically lower and more open woodland, with *Allocasuarina huegeliana* and *Acacia acuminata* occurring amongst the tree species. An association between tree species and the 500 mm isohyet line was also made obvious in this study with Beard noting the absence of Jarrah and the presence of Powderbark Wandoo (*Eucalyptus accedens*) east of this line. Understorey species also vary in these areas with *Gastrolobium spinosum*, *Calothamnus quadrifidus* and *Leptospermopsis erubescens* becoming more common.

Species which occur within the northern Jarrah forest were analysed by Havel (1975a and 1975b) and as a result a range of indicator species were delineated in relationship with particular site parameters that subsequently led to a classification of 21 site-vegetation types which are relevant for the northern Jarrah forest area.

Heddle *et al.* (1980a) and Mattiske and Havel (1998) described the dominant pre-European vegetation of the Darling System in a series of vegetation complexes and determined how they relate to the landforms, soils and climatic conditions. Twelve of the twenty vegetation complexes as occur in the EMA survey areas (Mattiske and Havel 1998; Figure 9). The extent of the vegetation complexes varies between the EMA, Buffer and PAA survey area, Table 5.

Cooke Ce

Mosaic of open forest of *Eucalyptus marginata* subsp. *marginata* – *Corymbia calophylla* (subhumid zone) and open forest of *Eucalyptus marginata* subsp. *thalassica* – *Corymbia calophylla* (semiarid and arid zones) and on deeper soils adjacent to outcrops, closed heath of Myrtaceae – Proteaceae species and lithic complex on granite rocks and associated soils in all climate zones, with some *Eucalyptus laeliae* (semiarid), and *Allocasuarina huegeliana* and *Eucalyptus wandoo* (mainly semiarid to perarid zones).

Darkan Dk1

Woodland of *Eucalyptus marginata* subsp. *marginata* – *Corymbia calophylla* over *Banksia sessilis* on uplands in the arid zones.

Dwellingup 1 D1

Open forest of *Eucalyptus marginata* subsp. *marginata* – *Corymbia calophylla* on lateritic uplands in mainly humid and sub-humid zones.

Dwellingup 2 D2

Open forest of *Eucalyptus marginata* subsp. *marginata* – *Corymbia calophylla* on lateritic uplands in mainly sub-humid and semi-arid zones.

Dwellingup 4 D4

Open forest of *Eucalyptus marginata* subsp. *marginata* – *Corymbia calophylla* on lateritic uplands in semiarid and arid zones.

Dalmore 2 DM2

Woodland of *Eucalyptus wandoo* – *Eucalyptus marginata* subsp. *marginata* – *Corymbia calophylla* on uplands in semiarid and arid zones.

Dalmore DMg

Mosaic of woodland of *Eucalyptus wandoo* with some *Corymbia calophylla* on deeper soils and open heath of Myrtaceae – Proteaceae spp. And lithic complex on shallow soils near granite outcrops in sub-humid to arid zones.

Yalanbee 5 Y5

Mixture of open forest of *Eucalyptus marginata* subsp. *thalassica– Corymbia calophylla* and woodland of *Eucalyptus wandoo* on lateritic uplands in semiarid and perarid zones.

Yalanbee 6 Y6

Woodland of *Eucalyptus wandoo-Eucalyptus accedens*, less consistently open forest of Eucalyp*tus marginata* subsp. *thalassica– Corymbia calophylla* and woodland of *Eucalyptus wandoo* on lateritic uplands and breakaways in arid and perarid zones.

Murray 1 My1

Open forest of *Eucalyptus marginata* subsp. *marginata - Corymbia calophylla - Eucalyptus patens* on valley slopes to woodland of *Eucalyptus rudis – Melaleuca rhaphiophylla* on the valley floors in humid and subhumid zones.

Murray 2 My2

Open forest of *Eucalyptus marginata* subsp. *thalassica - Corymbia calophylla - Eucalyptus patens* and woodland of *Eucalyptus wandoo* with some *Eucalyptus accedens o*n valley slopes to woodland of *Eucalyptus rudis – Melaleuca rhaphiophylla* on the valley floors in semi-arid to arid zones.

Yarragil 1 Yg1

Open forest of *Eucalyptus marginata* subsp. *marginata - Corymbia calophylla* on slopes with mixtures of *Eucalyptus patens* and *Eucalyptus megacarpa* on the valley floors in humid and subhumid zones.

Yarragil 2 Yg2

Open Forest of *Eucalyptus marginata* subsp. *thalassica - Corymbia calophylla* on slopes, woodland of *Eucalyptus patens-Eucalyptus rudis* with *Hakea prostrata* and *Melaleuca viminea* on valley floors in subhumid and semiarid zones.

Pindalup Pn

Open forest of *Eucalyptus marginata* subsp. *thalassica – Corymbia calophylla* on slopes and open woodland of *Eucalyptus wandoo* with some *Eucalyptus patens* on the lower slopes in semiarid and arid zones.

Coolakin Ck

Woodland of *Eucalyptus wandoo* with mixtures of *Eucalyptus patens, Eucalyptus marginata* subsp*. thalassica* and *Corymbia calophylla* on the valley slopes in arid and perarid zones.

Goonaping G

Mosaic of open forest of *Eucalyptus marginata* subsp. *marginata* (humid zones) and *Eucalyptus marginata* subsp. *thalassica* (semiarid to perarid zones) on the sandy-gravels, low woodland of *Banksia attenuata* on the drier sandier sites (humid to perarid zones) with some *Banksia menziesii* (northern arid and perarid zones) and low open woodland of *Melaleuca preissiana-Banksia littoralis* on the moister sandy soils (humid to perarid zones).

Swamp S

Mosaic of low open woodland of *Melaleuca preissiana – Banksia littoralis*, closed scrub of Myrtaceae spp., closed heath of Myrtaceae spp. and sedgelands of *Baumea* and *Leptocarpus* spp. seasonally wet or moist sand, peat and clay soils on valley floors in all climatic zones.

Lukin 2 LK2

Woodland of *Eucalyptus wandoo* with some mixtures of *Eucalyptus marginata* subsp. *thalassica – Corymbia calophylla* on the valley slopes with occasional *Eucalyptus rudis* on valley floors in semi-arid and arid zones.

Michibin Mi

Open woodland of *Eucalyptus wandoo* over *Acacia acuminata* with some *Eucalyptus loxophleba* on valley slopes, with low woodland of *Allocasuarina huegeliana* on or near shallow granite outcrops in arid and perarid zones.

Williams Wi

Mixture of woodland of *Eucalyptus rudis – Melaleuca rhaphiophylla,* low forest of *Casuarina obesa* and tall shrubland of *Melaleuca* spp. on major valley systems in arid and perarid zones.

Of the vegetation complexes defined ten of the vegetation complexes are poorly represented in the conservation estate (<10%), largely due to historical clearing activities for agriculture and other clearing activities in the area (Government of Western Australia 2019).

Several other vegetation complexes have only slightly more than 10% in the conservation estate (Table 5). If one considers a higher cut off, then all of the vegetation complexes fall below the 30% in conservation reserves except the Goonaping vegetation complex.

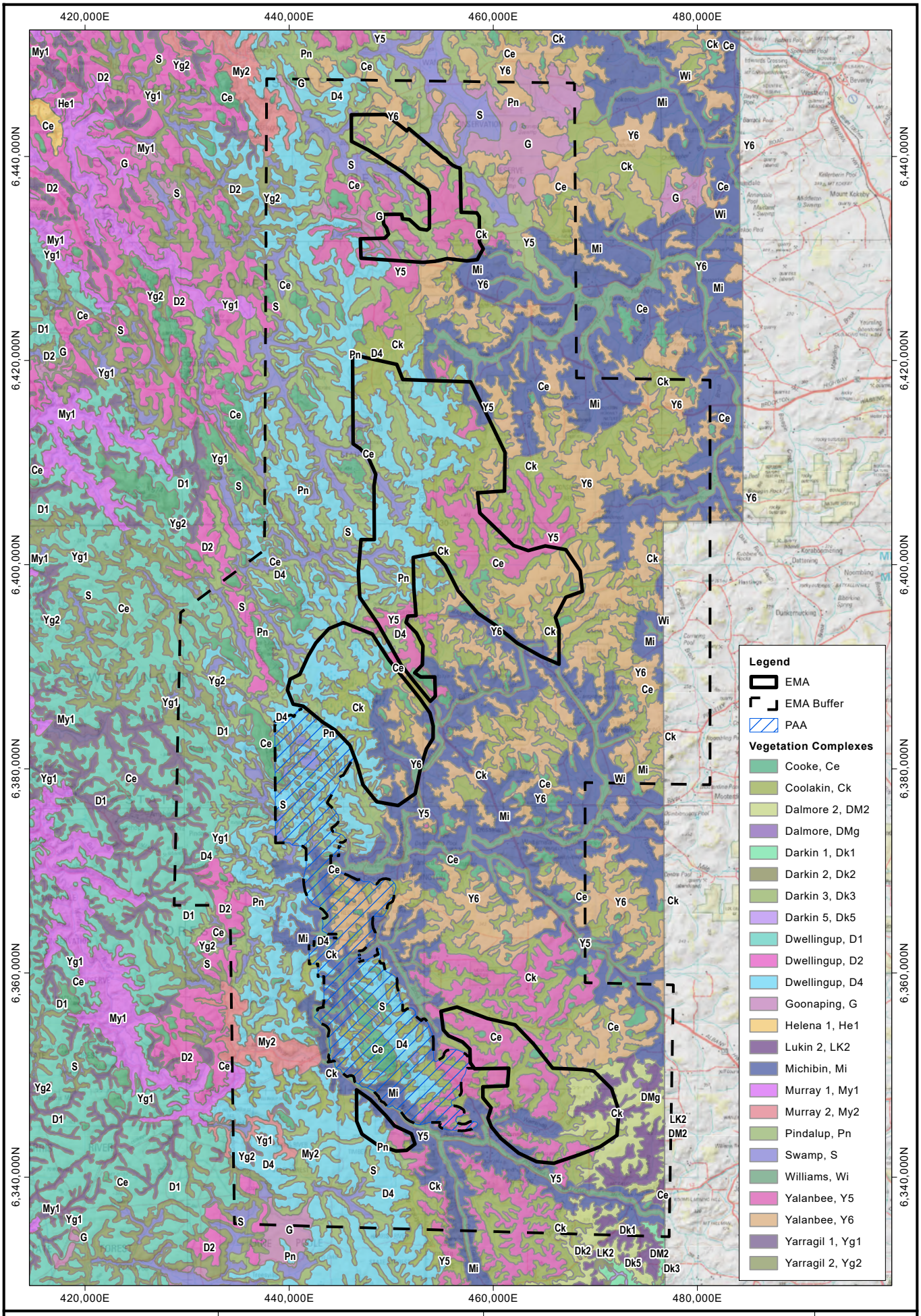
A small section of the survey areas was not covered by vegetation mapping during the System 6 (Heddle et al. 1980) and Regional Forest Agreement (RFA) mapping by Mattiske and Havel (1998).

Table 5: Extent of Vegetation Complexes (VC) within the EMA, PAA and BUFFER survey areas (Ha and % of Total Mapped in Region)
Note: ^^representation in conservation estate extracted from Government of Western Australia (2019) statistics for SW forests in CAR report.

Vegetation Complex	VC Code	PAA	BUFFER AREA	EMA BROOKTON	EMA CENTRAL	EMA QUINDANNING	EMA HOTHAM NORTH EXTENSION	EMA MORGANS	Total Mapped (ha)	ALL EMA AS A % OF TOTAL AREA IN REGION	% IN PROTECTED LANDS FOR CONSERVATION (DBCA 2017)
Cooke	Ce	2605.09 (5.02%)	14585.24 (28.12%)	-	1246.09 (2.40%	164.84 (0.32%)	728.83 (1.41%)	-	51,872.10	4.13%	18.65%
Darkan 1	Dk1	-	152.04 (0.51%)	-	-	-	-	-	29,829.69	-	1.03%
Dwellingup 1	D1	-	9120.55 (3.06%)	-	-	-	-	-	297,624.85	-	8.33%
Dwellingup 2	D2	-	3626.79 (3.00%)	-	-	-	-	-	120,755.00	-	19.31%
Dwellingup 4	D4	9260.88 (4.94%)	58271.84 (31.06%)	145.17 (0.08%)	8683.39 (4.63%)	-	4288.73 (2.29%)	786.03 (0.42%)	187,589.00	7.41%	12.03%
Dalmore 2	DM2	-	6796.51 (10.90%)	-	-	1590.56 (2.55%)	-	-	62,350.42	2.55%	3.55%
Dalmore	DMg	-	80.70 (3.86%)	-	-	-	-	-	2,091.41	-	0.00%
Yalanbee 5	Y5	1498.05 (0.84%)	34005.80 (19.03%)	3052.45 (1.71%)	4644.31 (2.60%)	4771.06 (2.67%)	61.65 (0.03%)	309.94 (0.17%)	178,711.46	7.18%	6.08%
Yalanbee 6	Y6	2329.36 (0.85%)	53885.18 (19.55%)	2016.74 (0.73%)	3587.87 (1.30%)	55.29 (0.02%)	1388.81 (0.50%)	-	275,629.98	2.56%	11.49%
Murray 1	My1	-	267.88 (0.27%)	-	-	-	-	-	97,562.81	-	25.66%
Murray 2	My2	-	4362.33 (5.28%)	-	-	-	-	-	82,649.94	-	15.89%
Yarragil 1	Yg1	-	1759.86 (1.55%)	-	-	-	-	-	113,828.12	-	9.86%
Yarragil 2	Yg2	-	3421.98 (4.80%)	-	-	-	-	-	71,234.37	-	10.58%
Pindalup	Pn		49024.35 (20.73)	3174.07 (1.34%)	5019.62 (2.12%)	-	-	-	236,540.60	3.46%	14.32%

Table 5: Extent of vegetation complexes (VC) within the EMA, PAA and BUFFER survey areas (Ha and % of Total Mapped in Region) (continued)
Note: ^^representation in conservation estate extracted from Government of Western Australia (2019) statistics for SW forests in CAR report.

Vegetation Complex	VC Code	PAA	BUFFER AREA	EMA BROOKTON	EMA CENTRAL	EMA QUINDANNING	EMA HOTHAM NORTH EXTENSION	EMA MORGANS	Total Mapped (ha)	ALL EMA AS A % OF TOTAL AREA IN REGION	% IN PROTECTED LANDS FOR CONSERVATION (DBCA 2017)
Coolakin	Ck	3618.43 (1.58%)	64998.06 (28.31%)	393.68 (0.17%)	11310.86 (4.93%)	4608.43 (2.01%)	2640.09 (1.15%)	199.55 (0.09%)	229,556.30	8.34%	3.89%
Goonaping	G	-	8528.71 (21.94%)	99.22 (0.26%	-	-	-	-	38,871.59	0.26%	50.63%
Swamp	S	866.50 (1.14%)	16901.63 (22.17%)	292.55 (0.38%)	1116.85 (1.46%)	-	-	-	76,245.98	1.84%	21.78%
Lukin 2	Lk2	-	4589.38 (12.41%)	-	-	656.58 (1.78%)	-	-	36,969.62	1.78%	0.97%
Michibin	Mi	4771.51 (2.02%)	67129.07 (28.48%)	65.89 (0.03%)	899.36 (0.38%)	1400.88 (0.59%)	2672.69 (1.13%)	308.08 (0.13%)	235,692.37	2.27%	1.59%
Williams	Wi	1240.77 (3.04%)	13238.12 (32.48%)	-	165.68 (0.41%)	59.84 (0.15%)	260.92 (0.64%)	-	40,761.97	1.19%	0.01%



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GDA 1994 MGA Zone 50

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EMA
Vegetation Complexes

Figure: **9**

CAD Ref: g1881_F070_07 | Author: L. Mattiske | Ref:

Date: May 2025 | Rev: A | A4 | Drawn: CAD Resources ~ www.cadresources.com.au

Imagery:

5.7 Vegetation Mapping (Bennett 2004)

Bennett (2004) also defined and mapped 24 vegetation mapping units for the forest areas within the Brookton and Mid-Central survey areas. These mapping units differed slightly from those developed by Havel (1975a and 1975b) and as further developed by Mattiske for the South32 Boddington areas (Mattiske Consulting Pty Ltd 2020). A summary of the descriptions of the vegetation mapping units is provided in Appendix E.

5.8 Potential Flora

Based on database searches of State and Federal listings (DBCA 2025-, DCCEEW 2025c), a total of 1789 vascular plant taxa from 105 families and 412 genera have the potential to occur on the EMA survey areas, Appendix B. This total does not include all of the older species in the South32 Phase II studies near Mt Saddleback but does include recent analogue sites and the recent work associated with the South32 and Newmont Boddington Gold expansion studies (Mattiske Consulting (2013, 2020, 2024a, 2024b) which extends further north and is more relevant to several of the proposed survey areas. This includes 142 introduced species. Bennett Environmental Consulting Pty Ltd (2004) recorded 436 taxa from 53 families and 167 genera in the botanical studies undertaken on the Brookton and Mid-Central survey areas. On reviewing the species recorded a range of species were either misidentified based on current comparisons with WAH (1998-) and Florabase records or are now excluded taxa in the Western Australian Florabase records and therefore the resulting coverage of flora by Bennett (2004) is closer to some 415 taxa. These latter differences may require further investigation and targeted collecting to check these flora taxa.

Flora and vegetation surveys undertaken to date indicate introduced species presence is variable with greater presence in forest areas adjacent to cleared agricultural areas and within agricultural areas. This includes several Weeds of National Significance (WONS) (DCCEEW 2025d) and/or Declared plants as defined by the Department of Primary Industries and Resource Development (DPIRD 2025).

5.9 Potential Threatened and Priority Flora

Desktop searches of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters database, the Department of Biodiversity, Conservation and Attractions (DBCA) NatureMap and Dandjoo databases (DBCA 2007-, DBCA 2022-), and where available the Western Australian Herbarium (WAH) and Threatened and Priority Flora (TPFL) databases, have identified a range of vascular taxa and also conservation significant flora species which have the potential to occur within the EMA survey areas. This information, together with a literature review of all available datasets from previous flora and vegetation surveys by Bennett Environmental Consulting Pty Ltd (Bennett 2004) and Mattiske over some 40 years (as summarized in Mattiske Consulting (2013, 2020, 2024a, 2024b) has formed the basis of a likelihood assessment for conservation significant flora within the EMA survey areas.

Key Findings are summarized in Table 6, Figure 10, Appendix C and include:

- No Threatened flora species were recorded by Bennett (2004); although it was recognized that 3 threatened species (*Caladenia dorrienii*, *Pultenaea pauciflora* and *Verticordia fimbrilepis* subsp. *fimbrilepis*) were listed under the *Biodiversity and Conservation Act* (BC Act 2016) and the *Environment Protection and Biodiversity Conservation Act* (EPBC Act 1999) as occurring in the survey areas. Of the latter three species *Caladenia dorrienii* is listed as Endangered under the *EPBC Act 1999* and *Loricobbia pauciflora* (formerly *Pultenaea pauciflora*) and *Verticordia fimbrilepis* subsp. *fimbrilepis* are listed as Vulnerable under the *EPBC Act 1999*.
- The following is based on the updated database searches for the potential and recorded threatened flora within the EMA survey areas;
    - a total of 29 potential Threatened flora species were reviewed as part of the updated assessment of the survey areas. This total was reduced to 11 potential or known on the EMA areas after consideration of the distribution datasets on Florabase and their site

preferences. Of the remaining 11 species, three have been recorded in the EMA areas and eight have a potential to occur in the EMA areas.

- The three known threatened species in the EMA areas are *Anthocercis gracilis* (T/E), *Caladenia hopperiana* (T/E) and *Verticordia fimbrilepis* subsp*. fimbrilepis* (WAH 1998-).
- The eight potential threatened species which have been recorded near the EMA areas; includes *Acacia brachypoda* (T/E), *Andersonia* sp. Saxatilis (F. & J. Hort 3324) (T), *Caladenia dorrienii* (T/E), *Grevillea thelemanniana* (T/CE), *Lechenaultia laricina* (T/E), *Loricobbia pauciflora* (T/V), *Morelotia australiensis* (T/V) and *Thelymitra stellata* (T/E).
- Of the previous Threatened flora species*, Calectasia cyanea* now only occurs well south near Albany and is very unlikely to occur in the survey areas. The latter reflects the re-allocation of many of the specimens to *Calectasia narragara* which is not a threatened species. A similar occurrence relates to the reallocation of *Hemigenia pritzelii* to the formerly recorded *Hemigenia rigida* (P1). *Hemigenia rigida* (P1) occurs well east of the survey areas.

- Bennett (2004) recorded 11 Priority flora species and noted a potential for an additional 14 Priority flora species to occur. The initial database search of 20km radius identified 82 potential Priority species which may occur within the survey areas. This includes 8 potential Priority 1 (P1) flora species, 14 potential Priority 2 (P2) flora species, 32 potential Priority 3 (P3) flora species and 28 potential Priority 4 (P4) flora species may occur in the survey areas (WAH 1998-).
- The following is based on the updated database searches for the potential and recorded priority flora within the Buffer area, the PAA area and the proposed EMA survey areas;
  - A total of 133 potential Priority flora species were reviewed as part of the updated assessment of the survey areas. This total was reduced to 82 after consideration of the distribution datasets on Florabase and their site preferences. Of the remaining 82 species, 25 have been recorded in the survey area and 57 have a potential to occur in the survey area. The remaining 51 Priority flora are considered unlikely or highly unlikely to occur in the survey areas.
  - The 25 known priority species in the survey area consist of 3 priority 1 species, 1 priority 2 species, 8 priority 3 species and 13 priority 4 species (WAH 1998-). The latter number in part reflects the previous studies in the area, but also the interface with the western section of the Western Australian Wheatbelt with the eastern Jarrah forest and also the increased variety of sandier soils in the Goonaping vegetation complex, the clays to clay-loams of the Yalanbee 5 and Yalanbee 6 vegetation complexes and the granite areas of the Cooke vegetation complex. In applying the "known" criteria it is evident that several species have been highlighted that may not be expected in this area and as such may reflect misidentifications or historical seedlings in rehabilitation areas (e.g. *Calothamnus quadrifidus* subsp. *teretifolius* and *Styphelia filifolia*). Several other potential species also are restricted to more westerly occurrences and will require additional investigation in future studies.
  - . Several of the priority species recorded in the early 2000's have been delisted as priority species since the earlier work was undertaken (e.g. *Acacia gemina, Templetonia drummondii*). Others have been added as more field studies have been undertaken and more taxonomic studies have been undertaken (e.g. splitting of *Hibbertia commutata* group by Thiele 2019). Other species have changed in likelihood, for example *Hemigenia rigida* was applied to *Hemigenia* plants in the Jarrah forest area but is now restricted to the Wheatbelt.

The currently known (within survey area) and potential (in nearby and surrounding areas) threatened and priority species are summarised in Appendices B and C and Figure 10. The results in Appendices B and C and Figure 10 reflect the variety of landforms and soils supporting a wide range of flora and also the interface with the largely cleared vegetation in the Wheatbelt.

Table 6: Summary of Known and Potential Threatened and Priority Species in EMA, Buffer and PAA survey areas

Note: Known species rely on current recordings in EMA areas and Potential Rely on Buffer and PAA recordings which abut or are near the EMA areas

Taxon	Buffer	EMA Brookton	EMA Central	EMA East Quindanning	EMA Hotham North Ext'n	PAA
Threatened Taxa						
Acacia brachypoda	X					
Andersonia sp. Saxatilis (F. & J. Hort 3324)	X					
Anthocercis gracilis	X		X			
Caladenia dorrienii	X					
Caladenia hopperiana	X			X		X
Grevillea thelemanniana	X					
Lechenaultia laricina	X					
Loricobbia pauciflora	X					
Morelotia australiensis (formerly *Tetraria australiensis*)	X					
Thelymitra stellata	X					
Verticordia fimbrilepis subsp. *fimbrilepis*	X		X			
Priority 1 Taxa						
Baeckea sp. Youndegin Hill (A.S. George 15772)	X					
Calytrix simplex subsp. simplex						x
Darwinia hortiorum	X					
Gastrolobium sp. Prostrate Boddington (M. Hislop 2130)	X				X	X
Hibbertia ambita	X					X
Hibbertia hortiorum	X				X	X
Hibbertia polyancistra	X	X				
Papistylus intropubens						X
Paracaleana gracilicordata	X					
Synaphea panhesya						X
Thysanotus formosus	X					

Table 6: Summary of Known and Potential Threatened and Priority Species in EMA, Buffer and PAA survey areas (continued)
Note: Known species rely on current recordings in EMA areas and Potential Rely on Buffer and PAA recordings which abut or are near the EMA areas

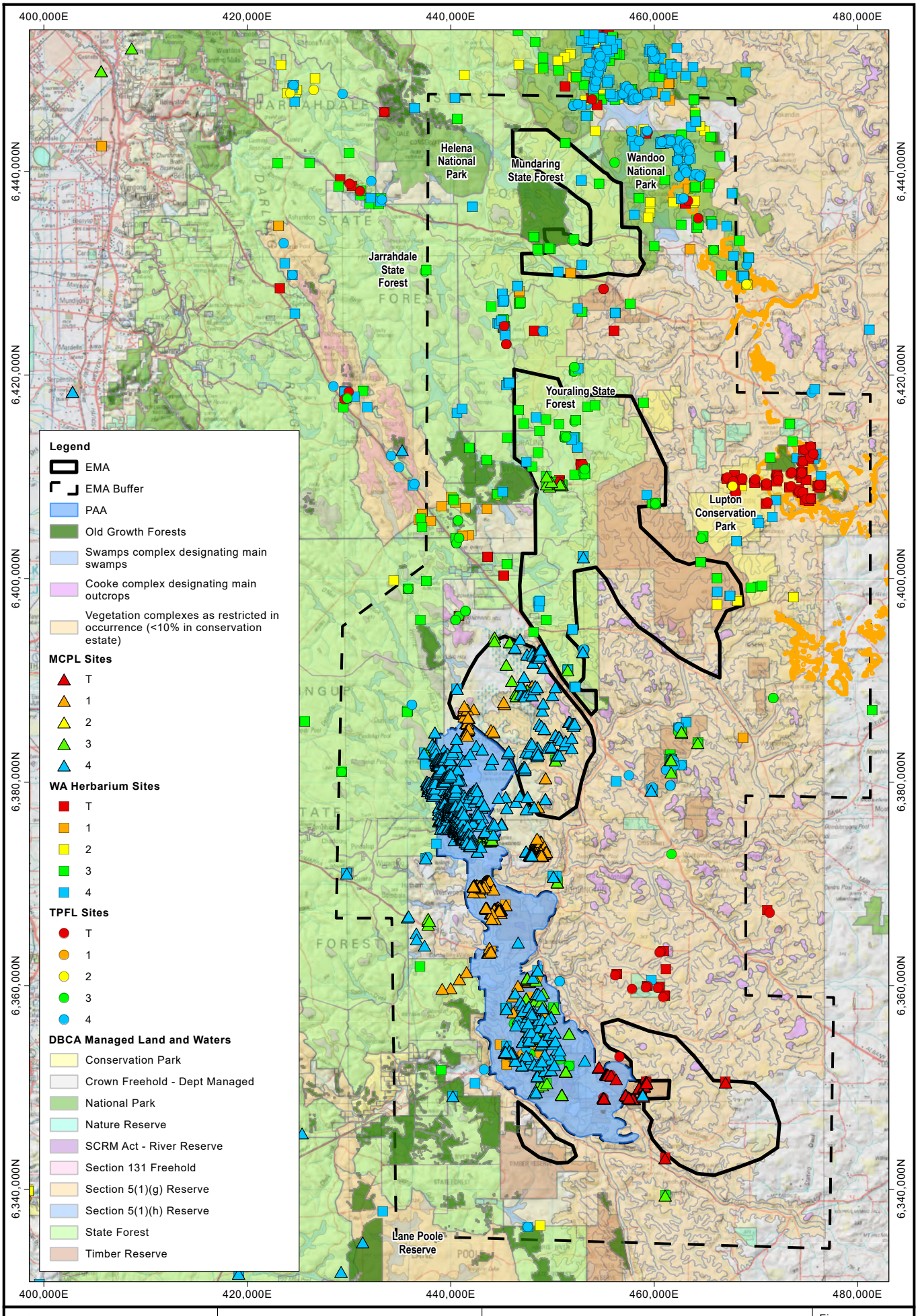
Taxon	Buffer	EMA Brookton	EMA Central	EMA East Quindanning	EMA Hotham North Ext'n	PAA
Priority 2 Taxa						
Banksia recurvistylis	X					
Banksia subpinnatifida var. *subpinnatifida*						x
Eremaea violacea subsp. Dobaderry Swamp (M.E. Trudgen 3909)	X					
Grevillea crowleyae	X		X			
Haloragis aculeolata	X					
Lechenaultia hortii	X					
Lilaeopsis polyantha	X					
Logania sylvicola	X					
Styphelia angustiflora	X					
Styphelia sp. Wandoo (F. & J. Hort 2441)	X					
Priority 3 Taxa						
Acacia adjutrices	X					
Acacia horridula	X					X
Andersonia sp. Audax (F. Hort, B. Hort & J. Hort 3179)	X					
Anigozanthos bicolor subsp. *exstans*	X					
Asteridea gracilis						X
Banksia meganotia	X					
Banksia subpinnatifida var. *imberbis*	X					X
Byblis gigantea	X					
Chordifex gracilior	X					
Conospermum scaposum	X					
Dicrastylis reticulata	X					
Goodenia katabudjar	X					X
Grevillea dissectifolia	X		X		X	
Hakea oldfieldii	X					
Halgania corymbosa	X				X	X
Hemigenia microphylla	X					

Table 6: Summary of Known and Potential Threatened and Priority Species in EMA, Buffer and PAA survey areas (continued)
Note: Known species rely on current recordings in EMA areas and Potential Rely on Buffer and PAA recordings which abut or are near the EMA areas

Taxon	Buffer	EMA Brookton	EMA Central	EMA East Quindanning	EMA Hotham North Ext'n	PAA
Priority 3 Taxa						
Hibbertia wandoo (formerly *Hibbertia glomerata* subsp. *wandoo*)	X					
Lasiopetalum caroliae	X		X			
Leucopogon florulentus	X		X			
Meionectes tenuifolia	X					
Petrophile filifolia subsp. *laxa*	X					
Stylidium asteroideum	X					
Stylidium exappendiculatum	X					
Stylidium marradongense	X		X			X
Stylidium rubricalyx	X	X				
Styphelia filifolia						X
Synaphea pandurata	X		X			
Synaphea sp. Darkin (F. Hort et al. 586)	X					
Tetratheca pilifera						X
Tetratheca similis	X	X	X			
Thelymitra yorkensis	X					
Thysanotus cymosus	X					
Priority 4 Taxa						
Acacia alata var. *platyptera*	X					
Acacia cuneifolia	X				X	
Acacia oncinophylla subsp. *patulifolia*	X		X			
Banksia insulanemorecincta	X		X			
Caladenia integra	X					
Calothamnus quadrifidus subsp. *teretifolius*						X
Cyanothamnus tenuis (formerly *Boronia tenuis*)	X	X	X			
Darwinia pimelioides	X					
Darwinia sp. *Dryandra* (G.J. Keighery 9295)	X		X			
Darwinia thymoides subsp. St Ronans (J.J. Alford & G.J. Keighery 64)	X				X	

Table 6: Summary of Known and Potential Threatened and Priority Species in Buffer areas, EMA areas and PAA area (continued)
Note: Known species rely on current recordings in EMA areas and Potential Rely on Buffer and PAA recordings which abut or are near the EMA areas

Taxon	Buffer	EMA Brookton	EMA Central	EMA East Quindanning	EMA Hotham North Ext'n	PAA
Priority 4 Taxa						
Drosera occidentalis	X					
Eucalyptus exilis	X		X			
Gastrolobium ovalifolium	X	X	X			
Goodenia verreauxii (formerly *Verreauxia verreauxii*)	X					
Grevillea pimeleoides	X					
Grevillea saccata	X					
Hemigenia platyphylla	X					
Hydrocotyle lemnoides	X	X				
Lasiopetalum bracteatum	X		X			
Lasiopetalum cardiophyllum	X		X		X	X
Lechenaultia pulvinaris	X					
Microtis quadrata	X					
Ornduffia submersa	X					
Parsonsia diaphanophleba	X					
Schoenus natans	X					
Senecio leucoglossus	X		X			X
Stylidium leptocalyx	X					
Stylidium scabridum	X					
Stylidium striatum	X					



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GDA 1994 MGA Zone 50

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EMA's Potential Constraints

Figure: **10**

CAD Ref: g1881_F069_01		Author: L. Mattiske	Ref:
Date: May 2025	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

Imagery:

5.10 Other Flora Values

A range of previously recorded flora in the EMA survey areas require some review as in some cases their distribution does not align with current patterns as indicated on databases such as Florabase (WAH 1998-). These issues relate to the inconsistencies between DBCA databases, changes in taxonomic nomenclature and also to potential misidentifications of some species.

Some of the following genera have been reviewed since earlier studies including some species of *Hibbertia, Leucopogon, Boronia, Dryandra* and *Lepidosperma*.

Other queries relate to species or taxa that have been highlighted in the database search for taxon that have now been linked with more southerly, coastal and Wheatbelt distributions (e.g. *Calectasia cyanea, Hibbertia gracilipes, Andersonia sprengelioides, Leucopogon florulentus* (P3), *Daviesia divaricata* subsp. *divaricata, Daviesia uniflora, Gastrolobium velutinum, Hemigenia rigida* (P1), *Melaleuca lecanantha* and *Verticordia habrantha*). Any future studies may warrant checking all recorded taxa against updated taxonomic changes and also distribution patterns. Where a taxon is a conservation species (threatened or priority flora) or a significant range extension any previously recorded taxa should be reconfirmed through relocating efforts in the field from previous locational datasets.

5.11 Potential Introduced and Invasive (weed) Flora

Flora and vegetation surveys undertaken to date indicate introduced species presence is variable with greater presence in forest areas adjacent to cleared agricultural areas and within agricultural areas. Whilst some weeds occur in the rehabilitation areas, these species tend to be less aggressive ecologically and tend to persist only for a short period until the native species start to dominate the rehabilitated areas. Weed control is mostly achieved through hygiene procedures.

Of the potential 142 introduced flora species, the following are Declared pests under the *Biodiversity and Agricultural Management Act 2007* (BAM Act) (Department of Primary Industries and Regional Development (DPIRD) 2025) and/or Weeds of National Significance (WONS) under the EPBC Act 1999 (DCCEEW 2025d) for the southwest region, namely:

- **Asparagus asparagoides*
- **Chrysanthemoides monilifera* (declared) and **Chrysanthemoides monilifera* subsp. *monilifera*
- **Moraea flaccida* and **Moraea miniata*
- **Rubus fruticosus aggregate*
- **Salvinia molesta*
- **Tamarix aphylla*

A range of the introduced and invasive species also have high ecological impacts and rapid invasiveness (DPAW 2013). Further field studies are required to delineate weed or introduced species distributions.

5.12 Potential Threatened and Priority Ecological Communities

There is some overlap on the eastern fringes of the Buffer survey area with the Priority Ecological Community (P3) at the State level and the Threatened Ecological Community (TEC, Critically Endangered) at the Federal level under the *BC Act 2016* and *EPBC Act 1999* respectively for the "Eucalypt Woodlands of the Western Australian Wheatbelt" (Department of the Environment, DotE 2015), Figure 10. The initial designation of areas will need checking against the criteria following detailed field studies as the potential areas were based on aerial photographic and remnant vegetation datasets. The latter TEC was not recognized at the time of the work undertaken by Bennett as this threatened ecological community was not finalised and approved in 2004. The potential occurrence on the eastern fringes of the survey area will require additional effort to determine extent, condition and values of the Eucalypt communities in relation to the criteria as used by (DotE 2015).

The Threatened Ecological Community ("Clay Pans of the Swan Coastal Plain") highlighted in the database search for the EMA survey areas (DCCEEW 2025b) does not occur in this area and is restricted to the Swan Coastal Plain located west of the survey areas.

The Threatened Ecological Community ("*Empodisma* peatlands of southwestern Australia") highlighted in the database search for the Brookton area (DCCEEW 2025b) does not occur in this area. This community is characterised by the presence of the *Empodisma gracillimum* species and also peat soils in swamp areas. The recently defined TEC associated with the *Empodisma* peatland is suspected to occur in larger swamp areas to the west and southwest of the survey area; noting that this species was recorded in the 1980's by Mattiske and fellow botanists during Phase II for South32 botanical studies near Boddington. Unlike the recent studies further west, this species was recorded in Wandoo gullies on clays and on granites. This again reflects the lack of knowledge on the distribution patterns of many species.

The potential for alignment of some of the granite areas, which are mainly aligned with the Cooke vegetation complex, is likely to be further clarified through integration of data sets to the west and south on these landforms and soils. This would enable clarification of any alignment with the "Granite of the northern Jarrah forest" (P3) in areas to the west of the survey area and the Mt Saddleback Heath Communities (P1) in areas to the south of the survey area. These are not illustrated on Figure 10 as the areas are restricted in size and in many cases overlap with the threatened and priority flora values.

5.13 Potential Groundwater Dependent Ecosystems (GDEs)

The potential groundwater dependent ecosystems have been previously based on the vegetation complexes as defined by Mattiske and Havel (1998). The vegetation complexes that may support groundwater dependent ecosystems include Swamp (S), Yarragil 1 (Yg1), Yarragil 2 (Yg2), Murray 1 (My1), Murray 2 (My2), Coolakin (Ck), Williams (Wi) and Pindalup (Pn), Figure 11. Whilst this is a broad categorisation, the values within these areas are likely to in part have the potential for groundwater dependent ecosystems.

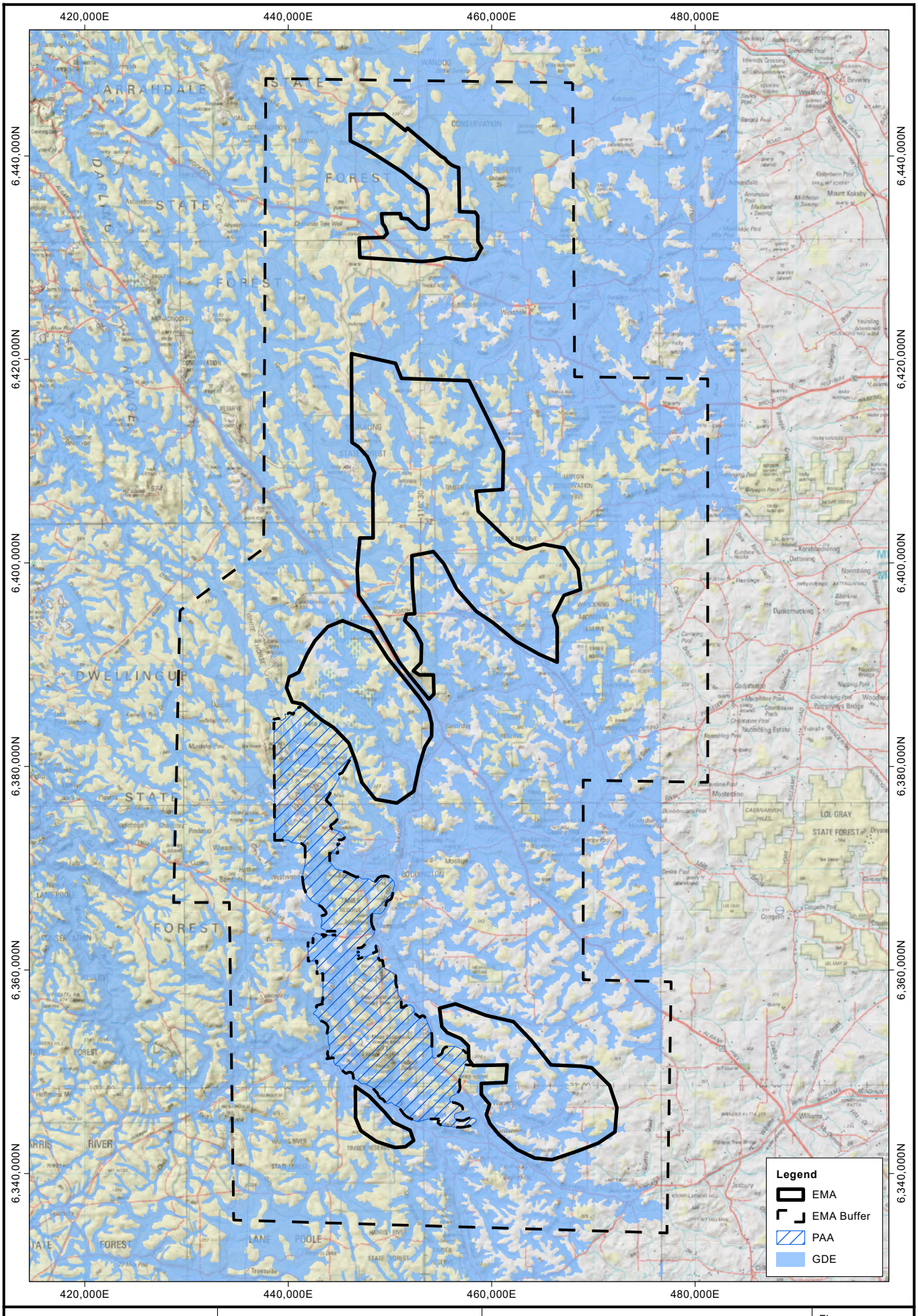
In view of the extensive flora and vegetation studies in the northern Jarrah Forest and in the vicinity of Boddington, these vegetation complexes support species and site-vegetation types that prefer and occur on seasonally moister and wetter soils. This approach was considered to represent a precautionary approach in the absence of detailed groundwater level data at the time of selecting the potential groundwater dependent ecosystems at this juncture. It is expected that the extent of these potential GDEs will be substantially lower if more detailed and local mapping is undertaken in the future.

Key indicator plant species that are generally accepted as indicators of moister soils and, hence, potential groundwater dependent ecosystems include – *Banksia littoralis, Hakea varia, Eucalyptus rudis, Melaleuca preissiana, Melaleuca rhaphiophylla, Melaleuca viminea* and *Taxandria linearifolia.*

5.14 Old Growth Forests

Based on data from Department of Biodiversity, Conservation and Attractions (2020), there are only a few areas of old growth forests occurring near or within the EMA survey areas (Figure 12). The respective area of each old growth forest area that overlaps the study area is summarized on Figure 12.

The pattern of old growth forest largely relates to the historical activities of forestry, mining and agriculture in the eastern Jarrah forest areas. In view of these historical activities, it is unlikely that extensive additional areas are present in these areas.



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Scale: 1:500,000
GDA 1994 MGA Zone 50

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EMA
Potential GDE

Figure: **11**

CAD Ref: g1881_F070_11		Author: L. Mattiske	Ref:
Date: May 2025	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

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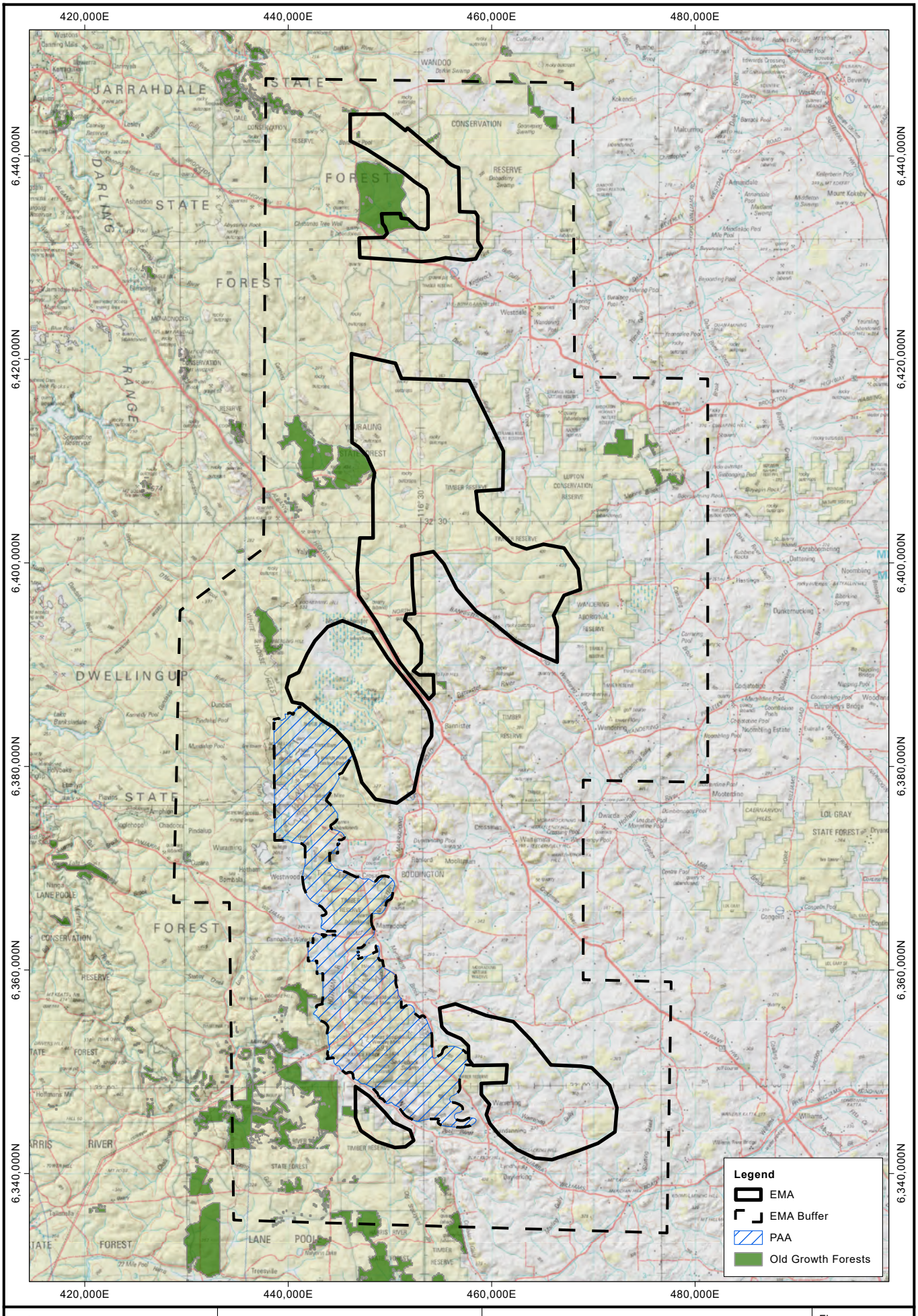

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Scale: 1:500,000
GDA 1994 MGA Zone 50

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EMA
Old Growth Forests

Figure: **12**

CAD Ref: g1881_F070_08		Author: L. Mattiske	Ref:
Date: May 2025	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

Imagery:

5.15 Other Conservation Values

The EMA survey areas overlap the State Forest, the Regional Forest Agreement area (RFA) (DAFF 2019).

The EMA survey areas occur 50-100km east and upstream from Ramsar Site (the Peel – Yalgorup system) and as such this Ramsar area is not located near the survey area.

The EMA survey areas overlap the State Forest, the Wandoo National Park, two Timber Reserves, two Conservation Parks (including the larger area in the Lupton Conservation Park), a section of the Wandering Aboriginal Reserve and a group of Nature Reserves and relatively large areas of private agricultural holdings.

6. DISCUSSION AND CONCLUSIONS

Mattiske Consulting Pty Ltd was commissioned by South32 Worsley Alumina to undertake a desktop survey of the EMA Study Area to support the completion of Biodiversity related Investigations required under MS1237. The EMA Study Area includes forest ad woodland areas of the State forest and also private properties covering approximately 428,101.7 hectares.

6.1 Flora

Desktop searches of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters database, the Department of Biodiversity, Conservation and Attractions (DBCA) NatureMap and Dandjoo databases (DBCA 2007-, DBCA 2022-), and where available the Western Australian Herbarium (WAH) and Threatened and Priority Flora (TPFL) databases, have identified a range of vascular taxa and also conservation significant flora species which have the potential to occur within the EMA survey areas. This information, together with a literature review of all available datasets from previous flora and vegetation surveys by Bennett Environmental Consulting Pty Ltd (Bennett 2004) and a compilation of surveys complete by Mattiske and her team over some 40 years near Boddington (Mattiske Consulting 2013, 2020, 2024a, 2024b) has formed the basis of a likelihood assessment for conservation significant flora within the EMA survey areas.

The results reflected the diversity of soils landscapes and also the interface with the Western Australian Wheatbelt. Several issues arose during the preparation of the data on the flora values which raised some difficulties in assessing the potential values. Some of these issues relate to the inconsistencies between DBCA databases and also to potential misidentifications of some species. In addition, some taxa have changed nomenclature since the earlier studies by various authors and in particular Bennett (2004). To overcome these issues detailed targeted studies for the flora of interest will need to be completed prior to any future works taking place. Targeted work will also be needed on threatened and priority flora and a range of taxa recorded by Bennett that have had nomenclature changes or have been noted as unlikely to be in the survey area.

Key Findings to date include:

- No Threatened flora species were recorded by Bennett (2004); although it was recognized by Bennett (2004) that 3 threatened species (*Caladenia dorrienii*, *Pultenaea pauciflora* and *Verticordia fimbrilepis* subsp. *fimbrilepis*) are listed under the *Biodiversity and Conservation Act* (BC Act 2016) and the *Environment Protection and Biodiversity Conservation Act* (EPBC Act 1999) as occurring in the survey areas. Of the latter three species *Caladenia dorrienii* is listed as Endangered under the *EPBC Act 1999* and *Loricobbia pauciflora* (formerly *Pultenaea pauciflora*) and *Verticordia fimbrilepis* subsp. *fimbrilepis* are listed as Vulnerable under the *EPBC Act 1999*.
- The following is based on the updated database searches for the potential and recorded threatened flora within the EMA survey areas;
  - a total of 29 potential Threatened flora species were reviewed as part of the updated assessment of the survey areas. This total was reduced to 11 potential or known on the

EMA areas after consideration of the distribution datasets on Florabase and their site preferences. Of the remaining 11 species, three have been recorded in the EMA areas and eight have a potential to occur in the EMA areas.

- The three known threatened species in the EMA areas are *Anthocercis gracilis* (T/E), *Caladenia hopperiana* (T/E) and *Verticordia fimbrilepis* subsp*. fimbrilepis* (WAH 1998-). The latter number in part reflects the interface with the western section of the Western Australian Wheatbelt with the eastern Jarrah forest and also the increased variety of sandier soils in the Goonaping vegetation complex, the clays to clay-loams of the Yalanbee 5 and Yalanbee 6 vegetation complexes and the granite areas of the Cooke vegetation complex.
- The eight potential threatened species have been recorded near the EMA areas; including *Acacia brachypoda* (T/E), *Andersonia* sp. Saxatilis (F. & J. Hort 3324) (T), *Caladenia dorrienii* (T/E), *Grevillea thelemanniana* (T/CE), *Lechenaultia laricina* (T/E), *Loricobbia pauciflora* (T/V), *Morelotia australiensis* (T/V) and *Thelymitra stellata* (T/E).
- Of the previous Threatened flora species*, Calectasia cyanea* now only occurs well south near Albany and is very unlikely to occur in the survey areas. The latter reflects the re-allocation of many of the specimens to *Calectasia narragara* which is not a threatened species.

- Bennett (2004) recorded 11 Priority flora species and noted a potential for an additional 14 other Priority flora species. The initial database search of 20km radius identified 82 potential Priority species which may occur within the survey areas. This includes 8 potential Priority 1 (P1) flora species, 14 potential Priority 2 (P2) flora species, 32 potential Priority 3 (P3) flora species and 28 potential Priority 4 (P4) flora species may occur in the survey areas (WAH 1998-).
- The following is based on the updated database searches for the potential and recorded priority flora within the Buffer area, the PAA area and the proposed EMA survey areas;
  - A total of 133 potential Priority flora species were reviewed as part of the updated assessment of the survey areas. This total was reduced to 82 after consideration of the distribution datasets on Florabase and their site preferences. Of the remaining 82 species, 25 have been recorded in the survey area and 57 have a potential to occur in the survey area. The remaining 51 Priority flora are considered unlikely or highly unlikely to occur in the survey areas.
  - The 25 known priority species in the survey area consist of 3 priority 1 species, 1 priority 2 species, 8 priority 3 species and 13 priority 4 species (WAH 1998-). The latter number in part reflects the previous studies in the area, but also the interface with the western section of the Western Australian Wheatbelt with the eastern Jarrah forest and also the increased variety of sandier soils in the Goonaping vegetation complex, the clays to clay-loams of the Yalanbee 5 and Yalanbee 6 vegetation complexes and the granite areas of the Cooke vegetation complex. In applying the "known" criteria it is evident that several species have been highlighted that may not be expected in this area and as such may reflect misidentifications or historical seedlings in rehabilitation areas (e.g. *Calothamnus quadrifidus* subsp. *teretifolius* and *Styphelia filifolia*). Several other potential species also are restricted to more westerly occurrences and will require additional investigation in future studies.
  - Several of the priority species recorded in the early 2000's have been delisted as priority species since the earlier work was undertaken (e.g. *Acacia gemina, Templetonia drummondii*). Others have been added as more field studies have been undertaken and more taxonomic studies have been undertaken (e.g. splitting of *Hibbertia commutata* group by Thiele 2019). Other species have changed in likelihood, for example *Hemigenia rigida* was applied to *Hemigenia* plants in the Jarrah forest area but is now restricted to the Wheatbelt.

- Based on database searches of State and Federal listings (DBCA 2025-, DCCEEW 2025c), a total of 1789 vascular plant taxa from 105 families and 412 genera have the potential to occur on the EMA survey areas. This includes 142 introduced species. Bennett Environmental Consulting Pty Ltd (2004) recorded 436 taxa from 53 families and 167 genera in the botanical studies undertaken on the Brookton and Mid-Central survey areas. On reviewing the species recorded a range of species were either misidentified based on current comparisons with WAH (1998-) and Florabase records or are now excluded taxa in the Western Australian Florabase records and therefore the resulting coverage of flora by Bennett (2004) is closer to some 415 taxa. These latter differences may require further investigation and targeted collecting to check these flora taxa.
- Flora and vegetation surveys undertaken to date indicate introduced species presence is variable with greater presence in forest areas adjacent to cleared agricultural areas and within agricultural areas. This includes several Weeds of National Significance (WONS) (DCCEEW 2025d) and/or Declared plants as defined by the Department of Primary Industries and Resource Development (DPIRD 2025).

6.2 Vegetation

Key Findings to date include:

- There is some overlap on the eastern fringes of the Buffer survey area with the Priority Ecological Community (P3) at the State level and the Threatened Ecological Community (TEC, Critically Endangered) at the Federal level under the *BC Act 2016* and *EPBC Act 1999* respectively for the "Eucalypt Woodlands of the Western Australian Wheatbelt" (Department of the Environment, DotE 2015), Figure 10. The initial designation of areas will need checking against the criteria following detailed field studies as the potential areas were based on aerial photographic and remnant vegetation datasets. The latter TEC was not recognized at the time of the work undertaken by Bennett as this threatened ecological community was not finalised and approved in 2004. The potential occurrence on the eastern fringes of the survey area will require additional effort to determine extent, condition and values of the Eucalypt communities in relation to the criteria as used by (DotE 2015).
- The Threatened Ecological Community ("Clay Pans of the Swan Coastal Plain") highlighted in the database search for the EMA survey areas (DCCEEW 2025b) does not occur in this area and is restricted to the Swan Coastal Plain located west of the survey areas.
- The Threatened Ecological Community ("*Empodisma* peatlands of southwestern Australia") highlighted in the database search for the Brookton area (DCCEEW 2025b) does not occur in this area. This community is characterised by the presence of the *Empodisma gracillimum* species and also peat soils in swamp areas. The recently defined TEC associated with the *Empodisma* peatland is suspected to occur in larger swamp areas to the west and southwest of the survey area; noting that this species was recorded in the 1980's by Mattiske and fellow botanists during Phase II for South32 botanical studies near Boddington. Unlike the recent studies further west, this species was recorded in Wandoo gullies on clays and on granites. This again reflects the lack of knowledge on the distribution patterns of many species.
- The potential for alignment of some of the granite areas, which are mainly aligned with the Cooke vegetation complex, is likely to be further clarified through integration of data sets to the west and south on these landforms and soils. This would enable clarification of any alignment with the "Granite of the northern Jarrah forest" (P3) in areas to the west of the survey area and the Mt Saddleback Heath Communities (P1) in areas to the south of the survey area. These are not illustrated on Figure 10 as the areas are restricted in size and in many cases overlap with the threatened and priority flora values.
- Heddle *et al.* (1980a) and Mattiske and Havel (1998) described the dominant pre-European vegetation of the Darling System in a series of vegetation complexes and determined how they relate to the landforms, soils and climatic conditions. Twelve of the twenty vegetation complexes in the wider EMA study area occur in the EMA survey areas (Mattiske and Havel 1998). Several

vegetation complexes within the EMA survey areas have very low representation in the conservation estate (Government of Western Australia 2019) with only 3.55% of Dalmore 2, 6.08% of Yalanbee 5, 3.89% of Coolakin, 0.97% of Lukin 2, 1.59% of Michibin and 0,01% of Williams remaining extent in lands protected for conservation.

. Less than 30% of the pre-European extent of the Beard vegetation associations 946 (18% remaining) and 4 (24% remaining) remain (Bennett 2004).

. Threats to the plant communities and vegetation include disease from fungal diseases such as *Phytophthora cinnamomi* and *Armillaria luteobubalina* (Williams and Mitchell 2002; Glevan Consultants 2004), salinity waterlogging and infestations of *Cerambycid* beetles, *Armillaria luteobubalina* and mistletoe (Mercer 1991) as well as introduced species from recreational activities and nearby agricultural activities. Other threats relate to an increase in off-road recreational activities in the area, as well as the occurrence of intense and frequent fires.

. Bennett (2004) also defined and mapped 24 vegetation mapping units for the forest areas within the Brookton and Mid-Central survey areas. These mapping units differed slightly from those developed by Havel (1975a and 1975b) and as further developed by Mattiske for the South32 Boddington areas (Mattiske Consulting Pty Ltd 2020).

There is a need to undertake further botanical and ecological studies in the areas prior to the commencement of any activities which will disturb the native vegetation. Surveys should be undertaken during spring from September to November to align with current EPA (2016a and 2016b) standards.

6.3 Key Findings

The EMA survey areas overlap the State Forest, the Regional Forest Agreement area (RFA) (DAFF 2019).

The EMA survey areas occur 50-100km east and upstream from Ramsar Site (the Peel – Yalgorup system) and as such this Ramsar area is not located near the survey area.

The EMA survey areas overlap the State Forest, the Wandoo National Park, two Timber Reserves, two Conservation Parks (including the larger area in the Lupton Conservation Park), a section of the Wandering Aboriginal Reserve and a group of Nature Reserves and relatively large areas of private agricultural holdings.

The main risks associated with the flora and vegetation values are discussed in Sections 5.1 to 5.14 above and on Figure 13 and are summarised below:

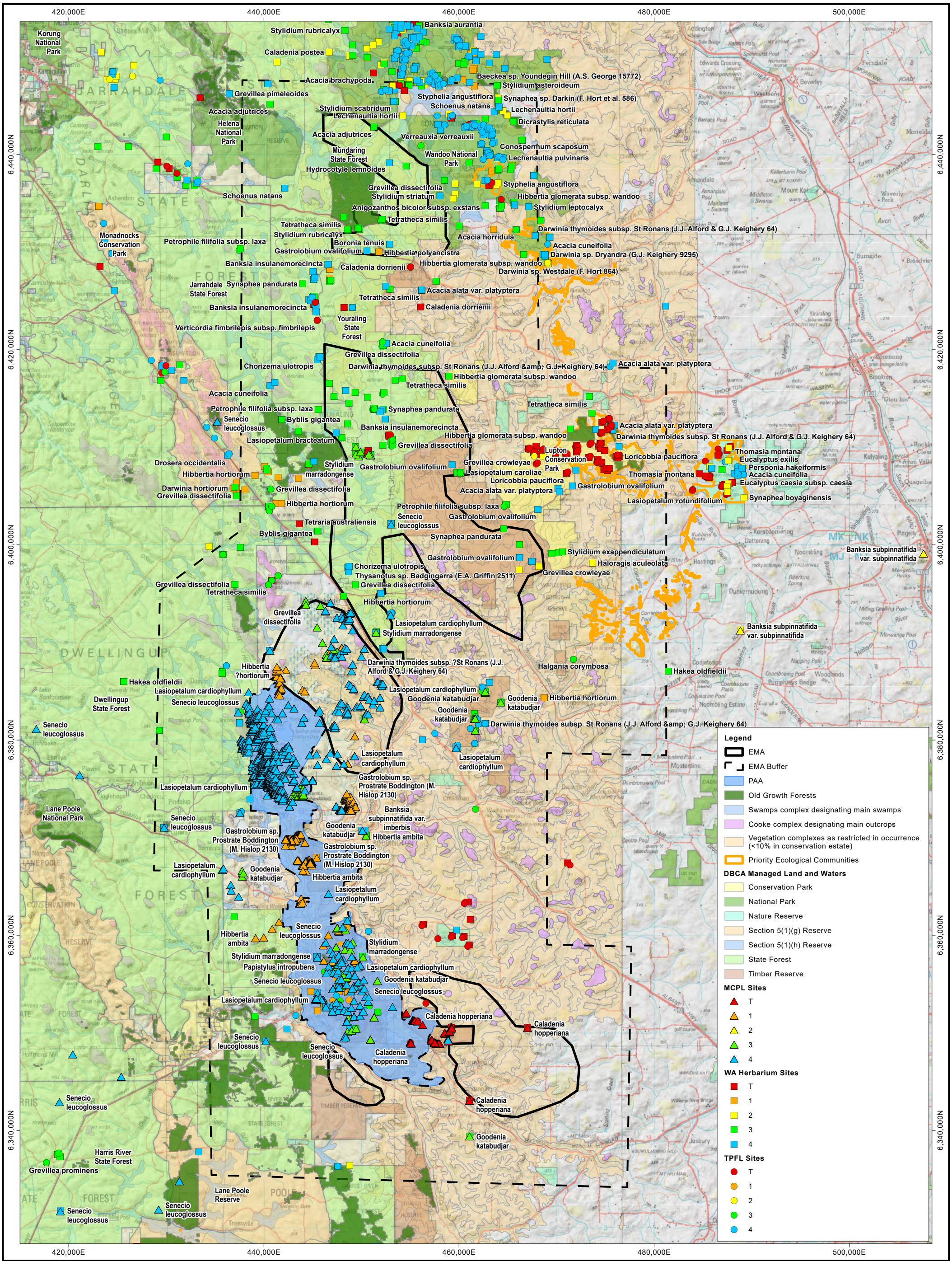
- The known and potential occurrence of threatened and priority flora.
- The proximity of the Wheatbelt with its associated flora and vegetation which has largely been cleared for agricultural activities.
- The overlap on the eastern fringes in the Buffer areas with the Priority Ecological Community (P3) at the State level and the Threatened Ecological Community (TEC, Critically Endangered) at the Federal level under the *BC Act 2016* and *EPBC Act 1999* respectively for the “Eucalypt Woodlands of the Western Australian Wheatbelt”.
- The potential overlap of some values associated with the two priority ecological communities associated with granite outcrop areas need to be defined more clearly in a regional context, Some
- There is a potential for the recently defined Threatened Ecological Community associated with the *Empodisma* and peatlands which has been recorded in larger swamp areas to the west of the EMA survey areas. *Empodisma gracillimum* was recorded in the 1980’s by Mattiske and fellow botanists during the Phase II studies for South32 (Worsley Alumina Pty Ltd 1985). Unlike more recent studies further west, this species in the Boddington areas was recorded in Wandoo gullies on clays and on granites rather than in peat swamp areas. This reflects the lack of knowledge on the distribution patterns of many species and also the importance of clarifying the detail on TEC communities.

- The presence of DBCA defined old growth areas.
- The proximity to the Wandoo National Park and various reserves.
- The poor representation of selected vegetation complexes.
- The presence of swamps and granite outcrops that have tended to support restricted communities with a higher probability of threatened and priority species.

Whilst different priorities are placed on the values above by regulators and the wider community these values appear to highlight the current priorities from a conservation perspective. If one then adds other cumulative impacts to the considerations of these values then other vegetation complexes and flora values may be added to the current list. In addition, in recent years there has been additional Priority flora species added to local values (e.g. *Hibbertia* species have changed their conservation status after the taxonomic revision of the *Hibbertia commutata* group by Thiele 2019).

In view of the extensive range of threatened and priority flora with potential to occur within the area there is a need to undertake further botanical and ecological studies in the areas prior to the commencement of any activities which will disturb the native vegetation. Surveys should be undertaken during spring from September to November to align with current EPA (2016a and 2016b) standards.

Imagery:



0 3.5 7km

Scale: 1:350,000
GDA 1994 MGA Zone 50

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CAD Ref: g1881_F069_02		Author: L. Mattiske	Ref:
Date: May 2025	Rev: A	A3	Drawn: CAD Resources ~ www.cadresources.com.au

EMA's
Potential Constraints

Figure:
13

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8. LIST OF PERSONNEL:

The following Mattiske Consulting Pty Ltd personnel were involved in this project:

Name	Position	Project Involvement	Flora Collection Permit
Dr E.M. Mattiske	Managing Director & Principal Ecologist	Planning, management, data interpretation, and report review	N/A
Ms K Smith	Experienced Botanist	Report preparation and editing	N/A

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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 *Biodiversity Conservation Act 2016* (*BC Act*) provides for (amongst other things) the protection of flora likely to become extinct or are otherwise in need of special protection in Western Australia under Part 10 (Division 2).

Threatened flora are listed in the *Wildlife Conservation (Rare Flora) Notice 2018* (under Part 2 of the BC Act; Department of Biodiversity, Conservation and Attractions (DBCA 2019b) and are categorised under Schedules 1-3**.** A flora species is defined as **threatened** if it is facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future, pursuant to sections 20, 21 and 22 of the *BC Act* (Department of Biodiversity, Conservation and Attractions 2019b). Threatened species are categorised as critically endangered, endangered, and vulnerable (Table A1.2).

Table A1.2 State definition of threatened flora species

Note: Adapted from Department of Biodiversity, Conservation and Attractions (2019b).

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 2018*).
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 2018*).
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 2018*).

Priority flora species are defined as "possibly threatened species that do not meet the survey criteria, or are otherwise data deficient" or species that 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 2019b). **Priority species are** considered significant under the Environmental Protection Authority's *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a). 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 (2019b).

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.

The *Biodiversity Conservation Act 2016* (BC Act) provides for (amongst other things) some protection of ecological communities at risk of collapse in Western Australia under Part 3 (Division 2).

Threatened ecological communities (TECs) are listed in the *List of Threatened Ecological Communities endorsed by the Western Australian Minister for Environment* (under Part 2 of the *BC Act*; Department of Biodiversity, Conservation and Attractions 2025c). An ecological community is defined as **threatened** if it is facing an extremely high risk of collapse in the immediate, near or medium-term future, pursuant to sections 28, 29 and 30 of the BC Act. Threatened ecological communities are categorised as critically endangered, endangered, and vulnerable (Table A2.2). Some of these TECs are also endorsed by the Federal Minister as threatened, and some of these are 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
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 Biodiversity, Conservation and Attractions (2025d) in the *Priority Ecological Communities for Western Australia* – Priority ecological communities are considered significant under the Environmental Protection Authority's (2016a) *Environmental Factor Guideline: Flora and Vegetation*. The Department of Biodiversity, Conservation and Attractions 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 A3.1). The current listing of declared pest organisms and their control category is through the Western Australian Organism List (Department of Primary Industries and Regional Development 2025).

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 A4: OTHER DEFINITIONS

Environmentally sensitive areas

Environmentally sensitive areas are declared by the State Minister under section 51B of the *Environmental Protection Act 1986* (EP Act) and are listed in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, gazetted 8 April 2005. Specific environmentally sensitive areas relevant to this report include: a defined wetland and the area within 50 metres of the wetland; the area covered by vegetation within 50 metres of rare flora; the area covered by a threatened ecological community; a Bush Forever site – further areas and information are described in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*.

Conservation significant flora

Under the *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a), flora may be considered significant for a range of reasons, including, but not limited to the following:

- being identified as threatened or priority species;
- locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- new species or anomalous features that indicate a potential new species;
- representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids; or
- relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Conservation significant vegetation

Under the *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a), vegetation may be considered significant for a range of reasons, including, but not limited to the following:

- being identified as threatened or priority ecological communities;
- restricted distribution;
- degree of historical impact from threatening processes;
- a role as a refuge; or
- providing an important function required to maintain ecological integrity of a significant ecosystem.

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES WITHIN THE EMA SURVEY AREAS

Note: * denotes introduced species, T denotes threatened species, P1 to P4 denote Prioirty species (WAH 1998-)

Family	*	Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Amaranthaceae		*Ptilotus declinatus*			x		x	x	x	x
		Ptilotus drummondii			x		x			x
		Ptilotus drummondii var. *drummondii*								x
		Ptilotus esquamatus			x					
		Ptilotus manglesii			x		x	x	x	x
		Ptilotus sp.								x
Anarthriaceae		*Anarthria gracilis*			x					
		Anarthria humilis			x					
		Anarthria laevis					x			
		Lyginia barbata			x		x	x		x
		Lyginia imberbis			x		x	x		
Apiaceae		*Actinotus glomeratus*			x		x			
		Actinotus leucocephalus			x		x			
	*	*Ammi majus*			x		x			
		Apium prostratum subsp. *prostratum*			x					
		Centella asiatica					x			
		Daucus glochidiatus			x		x	x	x	x
		Eryngium pinnatifidum			x		x	x	x	x
		Eryngium pinnatifidum subsp. pinnatifidum							x	x
		Eryngium pinnatifidum subsp. *Inland Swamp (G.J. Keighery 6686)*			x					
		Homalosciadium homalocarpum			x		x		x	
		Lilaeopsis polyantha	P2				x			
		Pentapeltis peltigera			x		x	x	x	x
		Platysace cirrosa			x		x			
		Platysace filiformis			x		x			
		Platysace juncea			x		x			
		Platysace ramosissima	P3				x			
		Platysace tenuissima						x		
		Platysace teres			x		x			
		Schoenolaena juncea			x		x			
		Xanthosia atkinsoniana			x		x	x	x	x
		Xanthosia candida			x		x	x	x	x
		Xanthosia ciliata			x		x		x	
		Xanthosia huegelii			x		x	x	x	x
		Xanthosia singuliflora			x		x		x	x
		Xanthosia tomentosa	P4				X			
		Xanthosia sp.								x
		Apiaceae sp.								x

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Family	*	Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Apocynaceae		*Parsonsia diaphanophleba*	P4		x				x	
Apodanthaceae		*Pilostyles hamiltoniorum*			x		x			
Araceae		*Lemna disperma*					x			
Araliaceae		*Hydrocotyle alata*			x		x			
		Hydrocotyle callicarpa			x		x	x		x
		Hydrocotyle diantha					x			
		Hydrocotyle hispidula						x		
		Hydrocotyle lemnoides	P4				x			
		Hydrocotyle sp.								x
		Trachymene pilosa			x		x	x	x	x
Asparagaceae	*	*Asparagus asparagoides*			x					
		Chamaescilla gibsonii	P3				x			
		Chamaexeros serra			x		x			
		Dichopogon capillipes			x		x	x	x	x
		Dichopogon preissii					x			
		Laxmannia grandiflora			x		x			
		Laxmannia grandiflora subsp. *grandiflora*			x		x	x		
		Laxmannia omnifertilis			x					
		Laxmannia ramosa			x		x			
		Laxmannia ramosa subsp. *ramosa*					x	x		
		Laxmannia sessiliflora								x
		Laxmannia sessiliflora subsp. *australis*			x		x			
		Laxmannia sessiliflora subsp. *sessiliflora*						x		
		Laxmannia squarrosa			x		x	x	x	x
		Laxmannia sp.							x	
		Lomandra brittanii			x		x		x	x
		Lomandra caespitosa			x		x	x	x	x
		Lomandra drummondii			x		x		x	x
		Lomandra effusa			x		x	x		
		Lomandra hermaphrodita			x		x	x	x	x
		Lomandra integra			x		x			x
		Lomandra micrantha							x	
		Lomandra micrantha subsp. *micrantha*			x		x	x		x
		Lomandra nigricans			x			x		x
		Lomandra nutans			x		x			
		Lomandra odora								x
		Lomandra preissii			x		x		x	x
		Lomandra purpurea			x		x	x		x

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Family	*	Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Asparagaceae		*Lomandra sericea*			x		x	x		x
(continued)		*Lomandra sonderi*			x		x	x	x	x
		Lomandra spartea			x		x	x	x	x
		Lomandra suaveolens			x		x			
		Lomandra whicherensis	P3						x	
		Lomandra sp.							x	x
		Sowerbaea laxiflora			x		x	x	x	x
		Thysanotus anceps	P3		x					
		Thysanotus arbuscula			x		x			
		Thysanotus asper			x					
		Thysanotus cymosus	P3		x					
		Thysanotus dichotomus			x			x	x	x
		Thysanotus fastigiatus								x
		Thysanotus formosus	P1		x					
		Thysanotus manglesianus			x		x		x	x
		Thysanotus manglesianus/patersonii complex					x			
		Thysanotus multiflorus			x				x	x
		Thysanotus patersonii			x		x	x		x
		Thysanotus sparteus			x		x			
		Thysanotus tenellus			x		x	x	x	x
		Thysanotus tenuis	P3		x					
		Thysanotus teretifolius			x					
		Thysanotus thyrsoideus			x		x		x	x
		Thysanotus triandrus			x		x			
		Thysanotus unicupensis	P3						x	
		Thysanotus sp. Badgingarra (E.A. Griffin 2511)			x					
		Thysanotus sp.							x	x
		Trachymene cyanopetala			x		x			
Asteraceae		*Angianthus drummondii*	P3						x	
		Anigozanthos bicolor subsp. *exstans*	P3				x			
		Angianthus preissianus					x			
	*	*Arctotheca calendula*								x
		Asteridea gracilis	P3						x	
		Asteridea nivea			x		x			
		Asteridea pulverulenta			x		x			
		Blennospora drummondii			x		x			
		Brachyscome glandulosa					x			
		Brachyscome iberidifolia			x		x		x	x

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Family	*	Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Asteraceae		*Brachyscome pusilla*			x		x			
(continued)	*	*Carthamus tinctorius*			x					
	*	*Chrysanthemoides monilifera*			x					
	*	*Chrysanthemoides monilifera* subsp. *monilifera*								
	*	*Cotula coronopifolia*			x		x			x
		Cotula cotuloides					x			
		Craspedia variabilis			x		x	x	x	x
		Gnaphalium sp.								
		Gnephosis drummondii			x		x		x	x
		Gnephosis tenuissima			x		x			
		Gnephosis tenuissima - drummondii complex					x			
		Helichrysum leucopsideum			x		x		x	x
		Helichrysum luteoalbum							x	
		Hyalosperma cotula			x		x	x	x	x
		Hyalosperma demissum			x		x			
		Hyalosperma glutinosum subsp. *glutinosum*			x		x			
		Hyalosperma simplex			x					
	*	*Hypochaeris glabra*			x		x	x	x	x
	*	*Hypochaeris radicata*							x	x
		Lagenophora huegelii			x		x	x	x	x
		Millotia tenuifolia			x		x	x		
		Millotia tenuifolia var. *tenuifolia*			x		x		x	x
		Olearia cassiniae			x					
		Olearia muricata			x		x			
		Olearia paucidentata			x		x		x	x
		Olearia rudis			x		x	x		
		Panaetia lessonii			x		x	x	x	x
		Pithocarpa pulchella var. *melanostigma*			x		x			
		Pithocarpa pulchella var. *pulchella*			x					
		Podolepis aristata subsp. *aristata*					x			
		Podolepis canescens			x					
		Podolepis gracilis			x		x		x	x
		Podotheca angustifolia			x		x		x	x
		Podotheca chrysantha								x
		Podotheca gnaphaloides								x
		Podotheca sp.							x	
		Pogonolepis stricta					x			
	*	*Pseudognaphalium luteoalbum*								x
		Pterochaeta paniculata			x		x	x	x	x
		Quinetia urvillei			x		x	x		
		Rhodanthe citrina			x		x		x	x

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Family	*	Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Asteraceae		*Rhodanthe corymbosa*								x
(continued)		*Rhodanthe laevis*			x		x			
		Rhodanthe manglesii							x	x
		Rhodanthe pyrethrum			x		x			
		Rhodanthe sp.							x	x
		Senecio diaschides								x
		Senecio hispidulus			x		x		x	x
		Senecio multicaulis subsp. *multicaulis*			x		x			
		Senecio pinnatifolius								x
		Senecio pinnatifolius var. *pinnatifolius*			x					
		Senecio quadridentatus						x		x
		Senecio leucoglossus	P4							x
	*	*Senecio vulgaris*							x	
		Senecio sp.								x
		Siemssenia capillaris					x			x
		Siloxerus filifolius			x		x		x	x
		Siloxerus humifusus					x		x	
		Siloxerus multiflorus			x		x			x
	*	*Sonchus asper*								x
	*	*Sonchus oleraceus*			x		x			x
	*	*Sonchus* sp.								x
	*	*Symphyotrichum squamatum*			x		x			
		Trichocline spathulata			x		x	x	x	x
	*	*Ursinia anthemoides*			x		x	x	x	x
	*	*Ursinia anthemoides subsp. anthemoides*			x		x			
	*	*Vellereophyton dealbatum*					x		x	x
		Vittadinia australasica var. *australasica*			x		x			
		Waitzia acuminata			x			x		x
		Waitzia nitida			x		x			
		Waitzia suaveolens			x		x			x
		Waitzia suaveolens var. *suaveolens*					x		x	
		Waitzia sp.								x
		Xerochrysum macranthum					x			x
		Asteraceae sp.							x	x
Aytoniaceae		*Asterella drummondii*			x					
Boraginaceae		*Halgania anagalloides* var. Southern (A.E. Orchard 1609)			x		x			
		Halgania corymbosa	P3					x	x	
		Halgania cyanea					x			
		Heliotropium curassavicum			x		x			

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Family	*	Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Boryaceae		*Borya laciniata*			x		x			
		Borya scirpoidea			x		x			
		Borya sphaerocephala			x		x	x	x	x
Brassicaceae	*	*Brassica barrelieri* subsp. *oxyrrhina*								
	*	*Brassica tournefortii*								
	*	*Cardamine occulta*								
	*	*Cardamine* sp.								
	*	*Raphanus raphanistrum*			x		x			
		Stenopetalum gracile			x		x			
		Stenopetalum robustum					x			
		Brassicaceae sp.								
Bryaceae		*Gemmabryum pachytheca*			x					
		Ptychostomum angustifolium			x					
		Rosulabryum albolimbatum			x					
		Rosulabryum billarderii			x					
		Rosulabryum campylothecium			x					
Byblidaceae		*Byblis gigantea*	P3						x	
Campanulaceae		*Isotoma hypocrateriformis*			x		x		x	x
		Isotoma pusilla			x		x			
		Lobelia anceps			x					x
		Lobelia gibbosa			x		x		x	
		Lobelia heterophylla								x
		Lobelia rarifolia							x	
		Lobelia rhombifolia			x					x
	*	*Monopsis debilis*								
	*	*Monopsis debilis* var. *depressa*			x		x			
	*	*Wahlenbergia capensis*								
		Wahlenbergia gracilenta			x		x			
		Wahlenbergia preissii			x		x		x	x
Caryophyylaceae	*	*Cerastium glomeratum*								x
	*	*Moenchia erecta*								
	*	*Petrorhagia dubia*			x					x
	*	*Polycarpon tetraphyllum*								
	*	*Sagina apetala*								
	*	*Silene gallica*								
		Spergularia marina					x			

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Casuarinaceae		*Allocasuarina acuaria*			x		x			
		Allocasuarina fraseriana			x		x	x	x	x
		Allocasuarina grevilleoides	P3				x			
		Allocasuarina huegeliana			x		x	x	x	x
		Allocasuarina humilis			x		x	x	x	x
		Allocasuarina microstachya			x		x	x	x	
		Allocasuarina thuyoides					x			
		Allocasuarina sp.							x	x
		Casuarina obesa			x		x			
Celastraceae		*Stackhousia pubescens*			x		x		x	x
		Stackhousia scoparia			x					
		Tripterococcus brunonis			x		x	x	x	x
Centrolepidaceae		*Aphelia brizula*			x		x			
		Aphelia cyperoides			x		x		x	
		Aphelia drummondii			x					
		Aphelia nutans			x		x			
		Aphelia sp. Albany (B.G. Briggs 596)			x					
		Centrolepis alepyroides			x		x			
		Centrolepis aristata			x		x		x	
		Centrolepis drummondiana			x		x		x	
		Centrolepis glabra			x		x			
		Centrolepis mutica			x		x			
		Centrolepis pilosa			x		x			
		Centrolepis polygyna			x		x			
Chenopodiaceae	*	*Atriplex prostrata*			x		x			
		Dysphania pumilio			x					
		Suaeda australis			x		x			
		Chenopodiaceae sp.								x
Colchicaceae		*Burchardia congesta*					x	x	x	x
		Burchardia monantha			x		x			
		Burchardia multiflora			x		x			x
		Burchardia sp.								x
		Wurmbea dioica			x		x			
		Wurmbea sinora			x		x			
		Wurmbea tenella			x		x	x		
		Wurmbea sp.							x	x
Convolvulaceae		Convolvulaceae sp.								x

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES WITHIN THE EMA SURVEY AREAS

Note: * denotes introduced species, T denotes threatened species, P1 to P4 denote Prioirty species (WAH 1998-)

Family	*	Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Crassulaceae	*	*Crassula alata* var. *alata*			x		x			
		Crassula closiana			x		x			
		Crassula colorata			x		x	x		
		Crassula colorata var. *colorata*			x					
		Crassula decumbens					x			
	*	*Crassula natans* var. *minor*			x		x			
		Crassula peduncularis								x
		Crassula sp.								x
Cucurbitaceae	*	*Cucumis myriocarpus* subsp. *myriocarpus*			x					
Cupressaceae		*Callitris acuminata*			x					
		Callitris pyramidalis			x		x			
Cyperaceae		*Carex tereticaulis*	P3		x					
		Caustis dioica			x		x	x		
		Chaetospora curvifolia			x			x		
		Chorizandra enodis			x		x			x
		Chorizandra multiarticulata			x		x			
		Cyathochaeta avenacea			x		x	x		x
	*	*Cyperus congestus*					x			
	*	*Cyperus tenellus*					x			
	*	*Cyperus tenuiflorus*			x		x			
		Cyperus vaginatus			x		x			
		Eleocharis keigheryi	T	V		x				
	*	*Ficinia marginata*			x		x			x
		Ficinia nodosa					x			
		Fimbristylis sp.								x
		Gahnia ancistrophylla						x		
		Gahnia aristata			x		x	x	x	x
		Gahnia australis			x		x			
		Gahnia divaricatum					x			
		Gahnia murale					x			
		Gahnia trifida			x					
		Isolepis cernua			x		x			
		Isolepis cernua var. *setiformis*			x		x			
		Isolepis cyperoides			x		x			
	*	*Isolepis prolifera*					x		x	
		Isolepis stellata					x			
		Lepidosperma affin. squamatum						x		
		Lepidosperma apricola			x		x			
		Lepidosperma asperatum			x		x		x	

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Family	* Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Cyperaceae (continued)	*Lepidosperma brunonianum*			x					
	Lepidosperma calcicola			x					
	Lepidosperma costale			x		x			
	Lepidosperma diurnum			x		x			
	Lepidosperma drummondii						x		x
	Lepidosperma gracile			x		x	x		
	Lepidosperma leptostachyum			x		x	x	x	x
	Lepidosperma longitudinale			x		x			x
	Lepidosperma obtusum			x		x			
	Lepidosperma pruinosum			x		x			
	Lepidosperma pubisquameum			x		x	x	x	x
	Lepidosperma resinosum					x	x		
	Lepidosperma sp. P1 small head (M.D. Tindale 166A)			x		x			
	Lepidosperma squamatum			x		x	x	x	x
	Lepidosperma squamatum (narrow form)								x
	Lepidosperma tenue			x		x	x	x	x
	Lepidosperma tetraquetrum			x		x			
	Lepidosperma tuberculatum			x		x			
	Lepidosperma viscidum							x	
	Lepidosperma sp.							x	x
	Machaerina acuta								x
	Machaerina articulata					x			
	Machaerina juncea			x		x			
	Machaerina laxa					x			
	Machaerina rubiginosa			x		x			
	Machaerina sp.								x
	Mesomelaena graciliceps			x		x	x		
	Mesomelaena preissii					x			
	Mesomelaena pseudostygia			x		x	x		
	Mesomelaena tetragona			x		x	x		x
	Morelotia australiensis	T	V		x				
	Morelotia octandra			x		x	x	x	x
	Netrostylis sp. Jarrah Forest (R. Davis 7391)			x		x	x	x	x
	Schoenus armeria						x		
	Schoenus bifidus			x		x			x
	Schoenus brevisetis			x		x	x		
	Schoenus clandestinus			x		x	x	x	
	Schoenus curvifolius					x			
	Schoenus discifer					x			
	Schoenus globifer							x	
	Schoenus laevigatus			x		x			

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Family	*	Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Cyperaceae		*Schoenus minutulus*			x		x			
(continued)		*Schoenus nanus*			x		x		x	x
		Schoenus natans	P4				x		x	
		Schoenus odontocarpus			x		x		x	
		Schoenus pleiostemoneus			x					
		Schoenus plumosus			x		x			
		Schoenus rigens			x		x			
		Schoenus subfascicularis			x		x			
		Schoenus ?subflavus							x	
		Schoenus sublateralis			x					
		Schoenus tenellus			x		x			
		Schoenus unispiculatus			x		x		x	x
		Schoenus variicellae					x			
		Schoenus sp.								x
		Tricostularia exsul			x		x			
		Tricostularia neesii			x		x	x		
		Cyperaceae sp.							x	x
Dasypogonaceae		*Calectasia cyanea*	T	CE			x			
		Calectasia narragara			x		x			
		Calectasia valida			x					
		Dasypogon bromeliifolius			x					
		Kingia australis						x		
Dicranaceae		*Campylopus bicolor* var. *bicolor*			x					
		Campylopus clavatus			x					
	*	*Campylopus introflexus*			x					
Dilleniaceae		*Hibbertia acerosa*			x		x			x
		Hibbertia ambita	P1							x
		Hibbertia amplexicaulis			x			x	x	x
		Hibbertia aurea			x		x		x	
		Hibbertia avonensis			x			x		
		Hibbertia commutata			x		x	x	x	x
		Hibbertia commutata (hairy form)								x
		Hibbertia crassifolia			x		x			
		Hibbertia cunninghamii			x					
		Hibbertia diamesogenos			x		x		x	x
		Hibbertia exasperata			x					
		Hibbertia glaucophylla			x					
		Hibbertia glomerata								x
		Hibbertia glomerata subsp. *glomerata*								x

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Dilleniaceae	*Hibbertia hemignosta*			x					
(continued)	*Hibbertia hibbertioides*			x		x			
	Hibbertia hibbertioides var. *hibbertioides*					x			
	Hibbertia hibbertioides var. *pedunculata*					x			
	Hibbertia hortiorum	P1						x	
	Hibbertia huegelii			x		x	x		
	Hibbertia hypericoides			x		x	x	x	x
	Hibbertia hypericoides subsp. *hypericoides*			x		x			
	Hibbertia improna			x					
	Hibbertia inclusa					x			
	Hibbertia lasiopus			x			x	x	x
	Hibbertia micrantha	P1				x			
	Hibbertia microphylla			x					x
	Hibbertia montana			x		x			
	Hibbertia nymphaea			x		x			
	Hibbertia ovata			x			x		x
	Hibbertia aff. *ovata*								x
	Hibbertia perfoliata			x			x		x
	Hiobbertia pilosa								x
	Hibbertia polyancistra	P1				x			
	Hibbertia polystachya			x		x		x	x
	Hibbertia prolata			x					x
	Hibbertia quadricolor			x					
	Hibbertia racemosa					x			
	Hibbertia rupicola						x		
	Hibbertia semipilosa			x					
	Hibbertia serrata							x	x
	Hibbertia silvestris						x		
	Hibbertia spicata					x	x		x
	Hibbertia spicata subsp. *spicata*							x	
	Hibbertia stellaris			x		x			
	Hibbertia striata			x					
	Hibbertia subvaginata			x		x	x		x
	Hibbertia vaginata			x		x	x		
	Hibbertia verrucosa					x	x		
	Hibbertia wandoo	P3				x			
	Hibbertia sp.							x	x
Ditrichaceae	*Ceratodon purpureus*			x					
Droseraceae	*Drosera bulbosa*			x		x	x		x
	Drosera bulbosa subsp. *bulbosa*			x		x			

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Family	* Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Droseraceae	*Drosera callistos*			x		x			
(continued)	*Drosera collina*			x		x			
	Drosera erythrorhiza			x		x	x	x	x
	Drosera gigantea			x		x		x	
	Drosera gigantea subsp. *gigantea*							x	
	Drosera glanduligera			x		x		x	
	Drosera heterophylla			x		x	x		
	Drosera hyperostigma			x		x			
	Drosera intricata			x		x			
	Drosera leucoblasta			x		x	x	x	
	Drosera macrantha			x		x	x		x
	Drosera macrantha subsp. *macrantha*							x	
	Drosera macrophylla			x					
	Drosera menziesii			x		x	x		x
	Drosera menziesii subsp. *menziesii*							x	
	Drosera micrantha					x	x		
	Drosera microphylla						x		
	Drosera minutiflora			x		x			
	Drosera nitidula			x		x			
	Drosera occidentalis	P4						x	
	Drosera pallida			x		x	x		x
	Drosera platystigma			x		x		x	x
	Drosera porrecta			x					
	Drosera pulchella			x		x	x		
	Drosera ramellosa					x			
	Drosera rosulata			x		x			
	Drosera scorpioides			x		x		x	
	Drosera silvicola						x	x	
	Drosera spilos			x		x			x
	Drosera squamosa			x		x			
	Drosera stolonifera			x		x	x	x	x
	Drosera stricticaulis			x		x			
	Drosera subhirtella			x					
	Drosera tubaestylis			x					
	Drosera zonaria			x		x	x		
	Drosera sp. Branched styles (S.C. Coffey 193)			x		x			
	Drosera sp.							x	x
	Drosera sp. (climbing)								x
Elaeocarpaceae	*Tetratheca confertifolia*			x		x			
	Tetratheca hirsuta			x		x	x	x	x
	Tetratheca hirsuta subsp. *hirsuta*			x		x			

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Elaeocarpaceae	*Tetratheca hirsuta* subsp. *viminea*			x					x
(continued)	*Tetratheca hispidissima*			x					x
	Tetratheca parvifolia	P3		x					
	Tetratheca pilifera	P3					x		
	Tetratheca nuda			x					x
	Tetratheca setigera			x			x		
	Tetratheca similis	P3				x			
	Tetratheca virgata			x		x	x	x	x
	Tetratheca sp.							x	x
Ericaceae	*Andersonia aristata*			x		x	x		
	Andersonia brevifolia			x		x			
	Andersonia caerulea			x					
	Andersonia caerulea subsp. Concinna (F. Hort 2144)			x					
	Andersonia gracilis	T	E		x				
	Andersonia involucrata			x					
	Andersonia latiflora			x					x
	Andersonia lehmanniana			x		x		x	x
	Andersonia lehmanniana subsp. *lehmanniana*			x			x		
	Andersonia simplex			x					
	Andersonia sprengelioides						x		
	Andersonia sp. Audax (F. Hort, B. Hort & J. Hort 3179)	P3							
	Andersonia sp. Saxatilis (F. & J. Hort 3324)	T							
	Andersonia sp.							x	x
	Astroloma ciliatum							x	
	Astroloma drummondii							x	
	Astroloma sp.								x
	Astroloma pallidum							x	
	Brachyloma preissii			x		x			
	Conostephium hortiorum			x		x			
	Conostephium pendulum					x			
	Conostephium preissii						x		
	Conostephium sp.								
	Leucopogon australis			x		x			x
	Leucopogon capitellatus			x			x	x	x
	Leucopogon cordatus								x
	Leucopogon darlingensis			x		x	x		
	Leucopogon darlingensis subsp. *darlingensis*			x		x			
	Leucopogon fimbriatus			x					

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Ericaceae	*Leucopogon florulentus*	P3				x	x		
(continued)	*Leucopogon glabellus*			x		x		x	x
	Leucopogon glabellus (glabrous form)								x
	Leucopogon gracillimus			x		x			
	Leucopogon obtusatus			x		x	x		
	Leucopogon parviflorus								x
	Leucopogon pulchellus								x
	Leucopogon sprengelioides			x		x	x		
	Leucopogon striatus			x					
	Leucopogon tenuis					x	x		
	Leucopogon verticillatus			x		x			x
	Leucopogon sp. Boddington (D. Halford 80746)			x		x		x	
	Leucopogon sp. Boyagin (M. Hislop 2825)							x	
	Leucopogon sp. Coujinup (M.A. Burgman 1085)			x		x			
	Leucopogon sp. Great Southern (R.S. Cowan A 586)					x			
	Leucopogon sp. Parkerville (A. Meebold 11654)					x			
	Leucopogon sp. Wandering (F. Hort 419)					x			
	Leucopogon sp. (undescribed)							x	
	Leucopogon sp.							x	x
	Leucopogon sp. (JK10)								x
	Lysinema ciliatum			x		x	x		
	Lysinema elegans			x		x			
	Lysinema pentapetalum			x		x			
	Styphelia acervata			x		x			
	Styphelia angustiflora	P2				x			
	Styphelia compacta			x		x	x		x
	Styphelia concinna			x		x			
	Styphelia conostephioides			x		x	x		
	Styphelia dielsiana			x		x	x		
	Styphelia discolor			x		x	x		x
	Styphelia epacridis			x		x	x		x
	Styphelia erectifolia			x			x		x
	Styphelia erubescens			x		x	x		
	Styphelia filifolia	P3							x
	Styphelia macrocalyx					x			
	Styphelia nitens			x		x	x	x	x
	Styphelia pallida			x		x	x		x
	Styphelia propinqua			x		x	x	x	x
	Styphelia prostrata								

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Ericaceae	*Styphelia pubescens*			x		x			
(continued)	*Styphelia recurva*			x					
	Styphelia serratifolia			x					
	Styphelia stricta			x		x	x	x	
	Styphelia tenuiflora			x		x	x	x	x
	Styphelia tortifolia						x		
	Styphelia sp. Wandoo (F. & J. Hort 2441)	P2				x			
Euphorbiaceae	*Monotaxis grandiflora*			x		x		x	
	Monotaxis grandiflora var. *grandiflora*			x		x			x
	Monotaxis occidentalis						x		x
	Rincinocarpos graniticus					x			
	Rincinocarpos undulatus					x			
	Stachystemon exilis	P1					x		
	Stachystemon vermicularis			x		x			
	Stachystemon virgatus			x		x			
Fabaceae	*Acacia acuminata*			x		x			
	Acacia adjutrices	P3				x			
	Acacia alata			x		x	x		
	Acacia alata var. *alata*			x					x
	Acacia alata var. *platyptera*	P4		x		x			
	Acacia applanata			x		x	x	x	x
	Acacia barbinervis subsp. *barbinervis*			x		x		x	x
	Acacia bidentata					x			
	Acacia brachypoda	T	E		x	x			
	Acacia browniana							x	x
	Acacia browniana var. *browniana*			x					
	Acacia browniana var. *endlicheri*						x		x
	Acacia browniana var. *intermedia*			x		x			
	Acacia celastrifolia			x		x	x	x	x
	Acacia chrysocephala			x		x			
	Acacia cuneifolia	P4				x			
	Acacia cyclops			x					
	Acacia dentifera			x					
	Acacia dilatata			x		x			
	Acacia divergens						x		
	Acacia drummondii			x		x		x	x
	Acacia drummondii subsp. *candolleana*					x		x	x
	Acacia drummondii subsp. *drummondii*			x		x	x	x	x
	Acacia drummondii subsp. *elegans*			x					
	Acacia ephedroides					x			

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Fabaceae	*Acacia extensa*			x			x		
(continued)	*Acacia gemina*			x					
	Acacia gilbertii								x
	Acacia horridula	P3				x			
	Acacia huegelii			x		x			
	Acacia incurva			x		x	x		x
	Acacia insolita					x			
	Acacia iteaphylla					x			
	Acacia lasiocalyx			x		x			
	Acacia lasiocarpa							x	
	Acacia lasiocarpa var. *lasiocarpa*						x		
	Acacia lasiocarpa var. *sedifolia*			x		x			
	Acacia lateriticola						x	x	x
	Acacia lullfitziorum			x					
	Acacia microbotrya			x		x			
	Acacia neorigida			x		x			
	Acacia nervosa			x		x	x	x	x
	Acacia obovata								x
	Acacia oncinophylla subsp. *patulifolia*	P4							
	Acacia preissiana			x		x	x	x	x
	Acacia pulchella			x		x		x	x
	Acacia pulchella var. *glaberrima*			x		x			x
	Acacia pulchella var. *goadbyi*			x					
	Acacia pulchella var. *pulchella*			x		x	x		
	Acacia pycnocephala			x		x			
	Acacia saligna			x		x			x
	Acacia saligna subsp. *lindleyi*					x			
	Acacia saligna subsp. Wheatbelt (B.R. Maslin 8602)			x					
	Acacia semitrullata	P4							
	Acacia sessilispica					x			
	Acacia sphacelata subsp. *sphacelata*					x			
	Acacia squamata			x		x			
	Acacia stenoptera			x		x	x	x	x
	Acacia subflexuosa subsp. *subflexuosa*			x		x			
	Acacia teretifolia			x					
	Acacia trigonophylla			x					
	Acacia ulicina					x			
	Acacia urophylla			x		x	x	x	
	Acacia varia			x		x	x		
	Acacia willdenowiana			x		x	x	x	x
	Acacia sp.							x	x

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Fabaceae	*Aotus gracillima*			x		x			
(continued)	*Aotus intermedia*					x			
	Aotus procumbens			x		x			
	Aotus sp.								
	Bossiaea aquifolium subsp. *aquifolium*			x			x		
	Bossiaea disticha	P4							
	Bossiaea eriocarpa			x		x	x		x
	Bossiaea modesta	P2							
	Bossiaea ornata			x		x	x	x	x
	Bossiaea preissii						x		
	Bossiaea pulchella			x		x	x	x	
	Bossiaea spinescens			x		x			
	Bossiaea sp.								x
	Chorizema aciculare			x		x			
	Chorizema aciculare subsp. *aciculare*			x		x	x		
	Chorizema aciculare subsp. *laxum*			x		x			
	Chorizema cordatum			x					x
	Chorizema dicksonii			x		x	x		
	Chorizema ilicifolium								x
	Chorizema rhombeum								x
	Chorizema ulotropis	P4				x	x		
	Daviesia brachyphylla			x		x			
	Daviesia cardiophylla			x		x			
	Daviesia cordata			x		x			
	Daviesia costata			x		x	x		
	Daviesia decurrens			x		x	x	x	x
	Daviesia decurrens subsp. *decurrens*			x		x			
	Daviesia divaricata subsp. *divaricata*						x		
	Daviesia hakeoides					x			
	Daviesia hakeoides subsp. *subnuda*			x		x	x		
	Daviesia horrida			x		x		x	
	Daviesia incrassata			x		x	x	x	x
	Daviesia incrassata subsp. *incrassata*			x		x			x
	Daviesia longifolia			x		x	x		x
	Daviesia microphylla			x		x			
	Daviesia nudiflora								x
	Daviesia pedunculata					x			
	Daviesia physodes			x		x	x		
	Daviesia polyphylla						x		
	Daviesia preissii			x		x	x	x	x
	Daviesia rhombifolia			x		x	x	x	x
	Daviesia sp.								x

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES WITHIN THE EMA SURVEY AREAS

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Family	*	Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Fabaceae (continued)		*Dillwynia cinerascens*			x					
		Dillwynia dillwynioides	P3							
		Dillwynia laxiflora			x		x	x		x
		Euchilopsis linearis			x		x	x		
		Eutaxia microphylla			x					
		Eutaxia virgata			x					
		Gastrolobium alternifolium			x		x			
		Gastrolobium asperum					x			
		Gastrolobium bilobum			x					x
		Gastrolobium calycinum			x		x	x	x	x
		Gastrolobium capitatum			x		x	x		
		Gastrolobium cyanophyllum					x			
		Gastrolobium dilatatum					x			
		Gastrolobium ebracteolatum					x			
		Gastrolobium glabratum			x		x			
		Gastrolobium hookeri			x		x	x		
		Gastrolobium ilicifolium					x			
		Gastrolobium obovatum					x			
		Gastrolobium ovalifolium	P4				x	x		
		Gastrolobium oxylobioides			x					
		Gastrolobium parviflorum			x		x			
		Gastrolobium parvifolium			x					
		Gastrolobium praemorsum			x		x	x		
		Gastrolobium pusillum					x			
		Gastrolobium reticulatum			x					
		Gastrolobium retusum			x		x	x		
		Gastrolobium rhombifolium					x			
		Gastrolobium spinosum			x		x	x	x	x
		Gastrolobium trilobum			x		x			
		Gastrolobium sp.								
		Gastrolobium villosum			x		x	x		
		Gastrolobium sp. Prostrate Boddington (M. Hislop 2130)	P1							x
	*	*Genista monspessulana*			x					
	*	*Genista* sp. X *Genista monspessulana*								
		Gompholobium burtonioides			x					
		Gompholobium capitatum			x		x	x	x	x
		Gompholobium confertum			x		x	x		
		Gompholobium cyaninum			x		x			
		Gompholobium knightianum			x		x	x	x	x
		Gompholobium marginatum			x		x	x	x	x
		Gompholobium polymorphum			x		x	x	x	x

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Fabaceae		*Gompholobium preissii*			x		x		x	x
(continued)		*Gompholobium scabrum*			x		x			
		Gompholobium shuttleworthii			x		x			
		Gompholobium tomentosum			x		x	x		x
		Gompholobium venustum						x		x
		Gompholobium sp.								x
		Hardenbergia comptoniana			x		x			x
		Hovea chorizemifolia			x		x	x	x	x
		Hovea elliptica			x		x			
		Hovea pungens			x		x			x
		Hovea trisperma			x		x	x	x	x
		Hiovea sp.								
		Isotropis cuneifolia			x		x			x
		Isotropis cuneifolia subsp. *cuneifolia*			x					
		Isotropis drummondii			x		x			
		Jacksonia alata			x				x	
		Jacksonia angulata					x			
		Jacksonia condensata			x		x	x		
		Jacksonia epiphyllum			x		x			
		Jacksonia floribunda			x		x	x		
		Jacksonia furcellata			x		x	x		
		Jacksonia hakeoides					x			
		Jacksonia racemosa			x		x			
		Jacksonia restioides			x		x			
		Jacksonia sternbergiana			x		x			
		Jennata ericifolia			x					
		Kennedia coccinea			x		x	x	x	x
		Kennedia coccinea subsp. *esotera*			x		x			
		Kennedia prostrata			x		x	x	x	x
		Kennedia sp.								x
		Labichea lanceolata								
		Labichea lanceolata subsp. *lanceolata*			x					
		Labichea punctata			x		x	x		x
		Loricobbia pauciflora	T	V		x				
		Loricobbia skinneri	P4							
	*	*Lupinus luteus*			x		x			
	*	*Medicago polymorpha*								
	*	*Medicago* sp.								x
		Mirbelia dilatata			x			x		
		Mirbelia floribunda			x		x	x		
		Mirbelia ramulosa					x			
		Mirbelia spinosa			x				x	

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Fabaceae		*Paraserianthes lophantha* subsp. *lophantha*			x					
(continued)		*Phyllota gracilis*			x		x			
		Pultenaea ericifolia						x		
		Sphaerolobium linophyllum			x					
		Sphaerolobium medium			x		x	x	x	x
		Sphaerolobium vimineum								x
		Templetonia drummondii			x		x	x	x	x
	*	*Trifolium arvense*					x			
	*	*Trifolium campestre*			x		x			x
	*	*Trifolium dubium*			x		x			x
	*	*Trifolium glomeratum*								
	*	*Trifolium resupinatum*			x					
	*	*Trifolium subterraneum*			x		x			
	*	*Trifolium* sp.							x	x
	*	*Vicia sativa* subsp. *sativa*			x		x			
		Viminaria juncea			x		x			x
		Fabaceae sp.							x	x
Funariaceae		*Entosthodon subnudus* var. *gracilis*			x					
		Funaria hygrometrica			x					
Gentianaceae	*	*Centaurium erythraea*							x	x
	*	*Cicendia filiformis*			x		x			
		Schenkia australis								x
Geraniaceae	*	*Erodium cicutarium*			x					
		Erodium cygnorum			x		x			
	*	*Geranium molle*								x
		Geranium retrorsum			x					
		Pelargonium littorale					x	x		
Goodeniaceae		*Dampiera alata*			x		x	x	x	x
		Dampiera eriocephala			x		x			
		Dampiera lavandulacea			x		x	x		
		Dampiera lindleyi								x
		Dampiera linearis			x		x	x	x	x
		Dampiera obliqua			x		x			
		Dampiera spicigera								x
		Goodenia berardiana					x			
		Goodenia caerulea			x		x		x	x
		Goodenia claytoniacea			x		x			

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Family	* Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Goodeniaceae (continued)	*Goodenia discophora*			x					
	Goodenia drummondii			x					
	Goodenia drummondii subsp. *megaphylla*			x		x			
	Goodenia fasciculata			x		x			
	Goodenia filiformis								x
	Goodenia glareicola					x			
	Goodenia helmsii			x		x			
	Goodenia incana			x		x			
	Goodenia katabudjar	P3							x
	Goodenia micrantha			x		x		x	
	Goodenia pinifolia					x			
	Goodenia pulchella			x		x		x	
	Goodenia pulchella subsp. Coastal Plain A (M.Hislop 634)					x			
	Goodenia pulchella subsp. Wheatbelt (L.W. Sage & F. Hort 795)			x					
	Goodenia reinwardtii					x			
	Goodenia scapigera subsp. *scapigera*			x					
	Goodenia trinervis			x		x		x	x
	Goodenia verreauxii	P4				x			
	Goodenia watsonii subsp. *glandulosa*			x					
	Goodeniaceae sp.								x
	Goodenia sp.							x	x
	Lechenaultia biloba			x		x	x	x	x
	Lechenaultia expansa			x					
	Lechenaultia floribund			x					
	Lechenaultia formosa			x		x			
	Lechenaultia formosa subsp. Wheatbelt (R.J. Cranfield 4718)			x		x			
	Lechenaultia hortii	P2				x			
	Lechenaultia laricina	T	E		x	x			
	Lechenaultia linarioides					x			
	Lechenaultia pulvinaris	P4				x			
	Lechenaultia tubiflora					x			
	Scaevola anchusifolia								x
	Scaevola calliptera			x		x	x	x	x
	Scaevola glandulifera			x		x			x
	Scaevola lanceolata					x			
	Scaevola pilosa			x					x
	Scaevola platyphylla					x			x
	Scaevola repens			x		x			
	Scaevola repens subsp. West Talbot (R.Davis 2755)					x			

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Goodeniaceae	*Scaevola repens* var. *repens*			x		x	x		
(continued)	*Scaevola* sp.								x
Gyrostemoaceae	*Gyrostemon subnudus*					x			
Haemodoraceae	*Anigozanthos bicolor*			x		x			
	Anigozanthos bicolor subsp. *bicolor*			x		x			
	Anigozanthos bicolor subsp. *decrescens*			x		x			
	Anigozanthos humilis			x		x	x		
	Anigozanthos humilis subsp. *humilis*			x		x			
	Anigozanthos manglesii			x		x	x	x	x
	Anigozanthos sp.							x	
	Conostylis aculeata			x		x			
	Conostylis aculeata subsp. *aculeata*			x		x			
	Conostylis caricina subsp. *caricina*			x		x	x		
	Conostylis festucacea					x			
	Conostylis laxiflora			x		x			
	Conostylis petrophiloides			x					
	Conostylis prolifera			x		x			
	Conostylis pusilla			x		x			x
	Conostylis serrulata			x		x	x	x	x
	Conostylis setigera			x		x			x
	Conostylis setigera subsp. *setigera*			x		x	x	x	x
	Conostylis setosa			x		x	x	x	x
	Conostylis sp.							x	x
	Haemodorum discolor			x		x		x	x
	Haemodorum laxum			x		x	x	x	x
	Haemodorum paniculatum					x	x		
	Haemodorum simplex			x		x		x	
	Haemodorum sparsiflorum					x			
	Haemodorum spicatum			x		x			x
	Haemodorum sp.							x	x
	Phlebocarya ciliata			x		x			
	Tribonanthes australis			x					
	Tribonanthes keigheryi			x					
	Tribonanthes longipetala			x		x	x		x
	Tribonanthes porphyrea			x					
	Tribonanthes purpurea	T	V		x				
	Tribonanthes uniflora			x		x			
	Tribonanthes violacea			x		x			

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Family	*	Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Haloragaceae		*Glischrocaryon ? flavescens*						x		
		Glischrocaryon angustifolium			x		x			
		Glischrocaryon aureum			x		x		x	x
		Gonocarpus benthamii			x					
		Gonocarpus cordiger			x		x	x	x	x
		Gonocarpus nodulosus			x		x			
		Gonocarpus pithyoides Nees			x					
		Haloragis aculeolata	P2							
		Haloragis sp.								x
		Meionectes tenuifolia	P3							
		Myriophyllum aff. *tillaeoides*					x			
		Myriophyllum drummondii					x			
		Myriophyllum limnophilum			x		x			
Hemerocallidaceae		*Agrostocrinum hirsutum*			x					x
		Agrostocrinum scabrum			x			x		x
		Agrostocrinum scabrum subsp. *scabrum*			x		x			
		Caesia micrantha			x		x		x	x
		Caesia occidentalis			x					x
		Caesia sp. Wongan (K.F. Kenneally 8820)			x		x			
		Chamaescilla corymbosa			x		x	x		x
		Chamaescilla corymbosa var. *corymbosa*			x		x			x
		Chamaescilla spiralis			x		x			
		Chamaescilla versicolor			x		x			
		Corynotheca micrantha					x			x
		Dianella revoluta			x		x		x	x
		Dianella revoluta var. *divaricata*			x		x	x		x
		Johnsonia lupulina						x		
		Johnsonia pubescens subsp. *pubescens*			x					
		Stypandra glauca			x		x	x	x	x
		Tricoryne elatior			x		x	x	x	x
		Tricoryne humilis			x		x		x	x
		Tricoryne soullierae	P3				x			
		Tricoryne sp.								x
Hydatellaceae		*Trithuria australis*	P4				x			
		Trithuria bibracteata			x		x			
		Trithuria submersa			x		x			
Hypericaceae	*	*Hypericum perforatum*			x					

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Hypoxidaceae		*Pauridia gardneri*			x		x			
		Pauridia glabella			x		x			
		Pauridia occidentalis			x		x	x		
		Pauridia occidentalis var. *occidentalis*					x			
		Pauridia occidentalis var. *quadriloba*			x		x			
Iridaceae	*	*Freesia leichtlinii* subsp. *alba* x *leichtlinii* subsp. *leichtlinii*			x					
	*	*Gladiolus caryophyllaceus*			x		x			
	*	*Ixia fuscocitrina*			x					
	*	*Ixia maculata*					x			
	*	*Moraea flaccida*			x		x			
	*	*Moraea miniata*					x			
		Orthrosanthus laxus			x		x			
		Orthrosanthus laxus var. *gramineus*			x		x			
		Patersonia babianoides			x			x	x	
		Patersonia juncea			x		x	x	x	
		Patersonia limbata			x					
		Patersonia maxwellii			x					
		Patersonia occidentalis			x		x	x	x	x
		Patersonia occidentalis var. *latifolia*			x		x			
		Patersonia occidentalis var. *occidentalis*					x			
		Patersonia pygmaea			x		x		x	x
		Patersonia rudis			x		x	x	x	x
		Patersonia rudis subsp. *rudis*			x		x			
		Patersonia sp.							x	x
	*	*Romulea rosea*			x		x		x	x
	*	*Romulea rosea* var. *australis*					x			
	*	*Sparaxis pillansii*			x		x			
	*	*Watsonia versfeldii*			x		x			
	*	Iridaceae sp.							x	
Isoetaceae		*Isoetes drummondii*			x		x			
Juncaceae	*	*Juncus acutus*								
	*	*Juncus acutus subsp. acutus*					x			
	*	*Juncus bufonius*			x		x			
	*	*Juncus capitatus*			x		x			
		Juncus pallidus					x			
Juncaginaceae		*Cycnogeton lineare*			x		x			
		Triglochin minutissima			x		x			

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Juncaginaceae		*Triglochin nana*			x		x			
(continued)		*Triglochin* sp. A Flora of Australia (G.J. Keighery 2477)			x					
		Triglochin striata			x					
Lamiaceae		*Dicrastylis corymbosa*					x			
		Dicrastylis reticulata	P3				x			
		Hemiandra glabra					x			
		Hemiandra incana			x		x	x		
		Hemiandra linearis			x		x			
		Hemiandra pungens			x		x	x	x	x
		Hemiandra sp. Watheroo (S. Hancocks 4)	P4				x			
		Hemigenia argentea			x		x			
		Hemigenia humilis			x		x			
		Hemigenia incana			x		x			
		Hemigenia microphylla	P3							
		Hemigenia platyphylla	P4				x			
		Hemigenia pritzelii								x
		Hemigenia rigida	P1							
		Hemigenia sericea						x	x	
		Hemigenia viscida			x		x	x		
		Hemigenia wandooana			x		x			
		Lachnostachys ferruginea			x		x			
		Lachnostachys verbascifolia var. verbascifolia					x	x		
		Microcorys capitata			x		x			
	*	*Stachys arvensis*			x		x			
Lauraceae		*Cassytha glabella*			x		x			
		Cassytha glabella forma *dispar*					x			
		Cassytha glabella forma *glabella*			x		x			
		Cassytha racemosa			x		x		x	x
		Cassytha racemosa forma racemosa						x		
		Cassytha sp.							x	x
Lentibulariaceae		*Utricularia benthamii*			x		x			
		Utricularia inaequalis			x		x			
		Utricularia menziesii			x					
		Utricularia multifida			x		x			
		Utricularia petertaylorii			x		x			
		Utricularia tenella			x		x			
		Utricularia violacea			x		x			

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Liliaceae		Lilaceae sp.								
Linaceae		*Linum marginale*			x		x			x
	*	*Linum usitatissimum*			x		x			
Loganiaceae		*Logania micrantha*			x		x	x		
		Logania sylvicola	P2							
		Mitrasacme sp.								
		Orianthera campanulata			x					
		Orianthera serpyllifolia			x			x	x	x
		Phyllangium divergens			x		x			
		Phyllangium palustre	P2				x			
		Phyllangium paradoxum							x	x
Loranthaceae		*Amyema miquelii*			x		x			
		Amyema preissii					x			
		Nuytsia floribunda						x		
Lycopodiaceae		*Phylloglossum drummondii*			x		x			
Lythraceae	*	*Lythrum hyssopifolia*			x		x			
Macarthuriaceae		*Macarthuria australis*			x					
Malvaceae		*Lasiopetalum bracteatum*	P4		x					
		Lasiopetalum cardiophyllum	P4		x			x		x
		Lasiopetalum caroliae	P3		x					
		Lasiopetalum floribundum						x		x
		Lasiopetalum glabratum			x		x	x		
		Lasiopetalum rotundifolium	T	E	x		x			
		Lasiopetalum sp.								x
		Thomasia foliosa			x		x	x		x
		Thomasia grandiflora			x		x			
		Thomasia macrocalyx			x		x			
		Thomasia macrocarpa					x			
		Thomasia montana	T	V		x				
Menyanthaceae		*Liparophyllum capitatum*			x		x			
		Ornduffia submersa	P4				x			
Mniaceae		*Schizymenium bryoides*			x					

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Myrtaceae	*Apectospermum spinescens*			x		x			
	Astartea affinis			x		x			
	Babingtonia camphorosmae			x		x	x	x	x
	Baeckea sp. Youndegin Hill (A.S. George 15772)	P1				x			
	Beaufortia bracteosa					x			
	Beaufortia incana					x			
	Beaufortia macrostemon						x		
	Beaufortia puberula					x			
	Beaufortia purpurea	P3					x		
	Beaufortia squarrosa			x					
	Callistemon phoeniceus			x		x			
	Calothamnus planifolius								x
	Calothamnus planifolius var. *planifolius*					x			x
	Calothamnus preissii			x		x	x		
	Calothamnus quadrifidus					x	x		x
	Calothamnus quadrifidus subsp. *quadrifidus*			x		x			x
	Calothamnus quadrifidus subsp. *teretifolius*	P4		x					
	Calothamnus graniticus subsp. *leptophyllus*	P4							
	Calothamnus rupestris			x		x			
	Calothamnus sanguineus			x		x	x	x	
	Calothamnus sp.								x
	Calytrix acutifolia			x		x			
	Calytrix angulata					x			
	Calytrix aurea			x					
	Calytrix cravenii			x		x			
	Calytrix flavescens					x	x		x
	Calytrix fraseri			x					
	Calytrix leschenaultii			x		x			
	Calytrix sapphirina					x			
	Calytrix simplex subsp. *simplex*	P1							
	Calytrix simplex subsp. *suboppositifolia*			x		x			
	Calytrix variabilis						x		
	Calytrix violacea			x		x			
	Chamelaucium sp. Dryandra (D.Rose 446)	P2		x		x			
	Corymbia aspera			x					
	Corymbia calophylla			x		x	x	x	x
	Darwinia citriodora			x					
	Darwinia hortiorum	P1				x			
	Darwinia pimelioides	P4							
	Darwinia thymoides			x		x			

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES WITHIN THE EMA SURVEY AREAS

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Family	*	Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Myrtaceae		*Darwinia vestita*			x					
(continued)		*Darwinia* sp. Dryandra (G.J. Keighery 9295)	P4				x			
		Darwinia sp. Westdale (F. Hort 864)	P2				x			
		Darwinia thymoides subsp. St Ronans (J.J. Alford & G.J. Keighery 64)	P4				x			
		Eremaea pauciflora			x		x	x		
		Eremaea pauciflora var. pauciflora					x			
		Eremaea purpurea			x		x			
		Eremaea violacea			x					
		Eremaea violacea subsp. Dobaderry Swamp (M.E. Trudgen 3909)	P2				x			
		Ericomyrtus drummondii					x			
		Ericomyrtus parviflora			x		x			
		Ericomyrtus serpyllifolia					x			
		Eucalyptus accedens			x		x	x	x	
		Eucalyptus aspersa			x		x	x		
		Eucalyptus caesia subsp. *caessa*	P4		x		x			
		Eucalyptus decurva			x		x	x		
		Eucalyptus dorrienii			x		x			
		Eucalyptus drummondii			x		x	x		
		Eucalyptus exilis	P4				x			
		Eucalyptus falcata			x					
		Eucalyptus horistes					x			
		Eucalyptus latens			x		x	x		
		Eucalyptus loxophleba subsp. *loxophleba*			x		x			
		Eucalyptus marginata			x		x	x	x	x
		Eucalyptus marginata subsp. *marginata*			x		x			
		Eucalyptus marginata subsp. *thalassica*			x		x	x		
		Eucalyptus patens			x		x			x
		Eucalyptus redunca subsp. *pluricaulis*			x		x			
		Eucalyptus rudis			x		x			x
		Eucalyptus rudis subsp. *cratyantha*	P4		x					
		Eucalyptus rudis subsp. *rudis*			x		x			
		Eucalyptus wandoo			x		x	x	x	x
		Eucalyptus wandoo subsp. *wandoo*			x		x			
		Eucalyptus sp.							x	x
	*	*Gaudium laevigatum*								
		Hypocalymma angustifolium			x		x	x	x	x
		Hypocalymma angustifolium subsp. Dandaragan plateau (S. Patrick 702A)					x			
		Hypocalymma robustum						x		
		Kunzea baxteri								

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Myrtaceae		*Kunzea ericifolia*					x			
(continued)		*Kunzea glabrescens*					x			
		Kunzea preissiana			x		x			
		Kunzxea sp.								
		Leptospermopsis erubescens			x		x	x	x	
		Melaleuca acutifolia					x			
		Melaleuca aspalathoides			x		x			
		Melaleuca cuticularis			x		x	x		
		Melaleuca fulgens			x					
		Melaleuca holosericea			x		x	x		
		Melaleuca incana			x		x			
		Melaleuca incana subsp*. incana*			x		x			
		Melaleuca lateritia			x		x			
		Melaleuca parviceps			x			x		x
		Melaleuca platycalyx			x		x			
		Melaleuca preissiana			x		x	x		x
		Melaleuca pungens			x		x	x		
		Melaleuca rhaphiophylla			x		x			x
		Melaleuca subtrigona			x		x			
		Melaleuca trichophylla						x	x	
		Melaleuca tuberculata			x					
	*	*Melaleuca viminalis*			x		x			
		Melaleuca viminea			x		x	x		x
		Melaleuca viminea subsp. *viminea*			x		x			x
		Pericalymma ellipticum							x	
		Pericalymma ellipticum var. *ellipticum*			x					
		Regelia ciliata			x		x			
		Regelia inops			x					
		Rinzia crassifolia			x		x	x		
		Rinzia fumana			x		x			
		Scholtzia involucrata			x		x			
		Taxandria linearifolia					x			
		Tetrapora preissiana			x		x			
		Thryptomene australis					x	x		
		Thryptomene australis subsp. *australis*					x			
		Verticordia acerosa var. *preissii*			x		x	x		
		Verticordia bifimbriata			x		x			
		Verticordia densiflora			x		x		x	
		Verticordia densiflora var. *cespitosa*			x		x			
		Verticordia densiflora var. *densiflora*			x		x			
		Verticordia fimbrilepis subsp. *fimbrilepis*	T	E		x				
		Verticordia grandiflora			x		x			

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Family	*	Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Myrtaceae		*Verticordia huegelii* var. *decumbens*			x		x		x	
(continued)		*Verticordia huegelii* var. *huegelii*			x		x	x		
		Verticordia huegelii var. stylosa					x			
		Verticordia insignis subsp. *insignis*			x		x		x	
		Verticordia lindleyi subsp. *lindleyi*	P4							
		Verticordia lindleyi subsp. *purpurea*			x		x			
		Verticordia multiflora subsp. *multiflora*			x		x			
		Verticordia ovalifolia					x			
		Verticordia pennigera			x		x		x	x
		Verticordia plumosa			x		x			
		Verticordia plumosa var. *brachyphylla*					x			
		Verticordia plumosa var. *plumosa*					x			
		Verticordia serrata var. *ciliata*			x		x			
		Verticordia serrata var. *serrata*						x		
Olacaceae		*Olax benthamiana*			x		x		x	
		Olax phyllanthi						x		
Oleaceae	*	*Olea europaea* subsp. *europaea*					x			
Onagraceae		*Epilobium billardiereanum*								
Ophioglossaceae		*Ophioglossum lusitanicum*			x					
Orchidaceae		*Caladenia barbarossa*			x		x			
		Caladenia bryceana subsp. *bryceana*	T	E						
		Caladenia chapmanii					x			
		Caladenia denticulata			x		x			
		Caladenia denticulata subsp. *rubella*					x			
		Caladenia discoidea			x		x			
		Caladenia dorrienii	T	E		x	x			
		Caladenia falcata			x		x			
		Caladenia filamentosa			x					
		Caladenia filifera			x		x			
		Caladenia flava			x		x	x		x
		Caladenia flava subsp. *flava*			x		x		x	x
		Caladenia flava subsp. late red (G. Brockman GBB 2381)			x					
		Caladenia flava subsp. sylvestris					x			
		Caladenia fluvialis			x		x			
		Caladenia footeana			x		x			
		Caladenia hiemalis			x		x			
		Caladenia hirta subsp. *hirta*			x		x			

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Orchidaceae		*Caladenia hirta* subsp. *rosea*			x		x			
(continued)		*Caladenia hopperiana*	T	E						x
		Caladenia integra	P4							
		Caladenia latifolia			x					
		Caladenia longicauda			x		x			
		Caladenia longicauda subsp. *eminens*			x		x			
		Caladenia longicauda subsp. *longicauda*			x		x			
		Caladenia longicauda subsp. *redacta*			x		x			
		Caladenia longiclavata			x		x			
		Caladenia macrostylis			x		x			
		Caladenia marginata			x		x			
		Caladenia pectinata			x		x			
		Caladenia pendens					x			
		Caladenia pendens subsp. *talbotii*			x		x			
		Caladenia postea	P2				x			
		Caladenia radiata			x					
		Caladenia reptans			x					x
		Caladenia reptans subsp. *reptans*			x		x	x		x
		Caladenia serotina			x		x			
		Caladenia sp. Wandoo (G. Brockman GBB 671)			x		x			
		Caladenia speciosa	P4							
		Caladenia splendens			x		x			
		Caladenia uliginosa subsp. *candicans*			x		x			
		Caladenia uliginosa subsp. *patulens*	P1							
		Caladenia uliginosa subsp. *uliginosa*			x		x			
		Caladenia validinervia	P1							
		Caladenia x cala					x			
		Caladenia xantha			x		x	x		
		Caladenia sp.							x	x
		Calochilus robertsonii			x					
		Calochilus stramenicola			x		x			
		Cryptostylis ovata								x
		Cyanicula ashbyae					x			
		Cyanicula gemmata			x		x			
		Cyanicula sericea			x		x			x
		Cyanicula sp. Dale (G. Brockman 713)			x		x			
		Cyrtostylis huegelii					x	x		x
		Cyrtostylis sp.								x
	*	*Disa bracteata*			x		x			
		Diuris brachyscapa			x		x			
		Diuris brumalis			x			x		
		Diuris carinata			x					

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Orchidaceae	*Diuris corymbosa*			x		x	x		x
(continued)	*Diuris decrementum*			x					
	Diuris laxiflora			x		x			
	Diuris longifolia			x					
	Diuris micrantha	T	V		x				
	Diuris porrifolia			x		x			
	Diuris purdiei	T	E		x				
	Diuris septentrionalis			x					
	Diuris setacea			x		x			
	Diuris sp.								x
	Drakaea glyptodon			x		x			
	Drakaea gracilis			x		x			
	Drakaea livida			x		x			
	Drakaea sp.								x
	Elythranthera brunonis			x		x			x
	Elythranthera emarginata			x		x			
	Ericksonella saccharata			x					
	Eriochilus dilatatus			x		x			
	Eriochilus dilatatus subsp. *brevifolius*			x					
	Eriochilus dilatatus subsp. *undulatus*					x			
	Eriochilus helonomos			x		x			
	Eriochilus scaber subsp. *scaber*			x		x			
	Eriochilus sp.								x
	Leporella fimbriata			x		x			x
	Leptoceras menziesii			x		x			
	Microtis atrata			x		x			
	Microtis media			x		x			
	Microtis media subsp. *media*			x		x			x
	Microtis orbicularis			x		x			
	Microtis quadrata	P4							
	Paracaleana gracilicordata	P1				x			
	Paracaleana hortiorum					x			
	Paracaleana nigrita			x		x			
	Paracaleana triens			x		x			
	Pheladenia deformis			x		x	x		
	Prasophyllum cyphochilum			x		x			
	Prasophyllum drummondii					x			
	Prasophyllum elatum			x		x			
	Prasophyllum fimbria			x					
	Prasophyllum gracile			x		x			
	Prasophyllum hians			x		x			
	Prasophyllum macrostachyum			x		x			

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Orchidaceae	*Prasophyllum ovale*			x		x			
(continued)	*Prasophyllum* sp. Brookton Highway (G. Brockman 734)			x		x			
	Prasophyllum sp.								x
	Pterostylis angulata			x		x			
	Pterostylis barbata			x		x	x		
	Pterostylis ciliata			x		x			
	Pterostylis concava			x		x			
	Pterostylis crispula			x					
	Pterostylis ectypha			x		x			
	Pterostylis erubescens			x		x			
	Pterostylis hamiltonii			x		x			
	Pterostylis occulta			x					
	Pterostylis orbiculata			x					
	Pterostylis platypetala					x			
	Pterostylis pyramidalis			x					
	Pterostylis recurva			x		x	x		x
	Pterostylis sanguinea			x		x			
	Pterostylis sargentii			x		x			
	Pterostylis scabra					x			
	Pterostylis setulosa			x					
	Pterostylis sp. Crinkled leaf (G.J. Keighery 13426)					x			
	Pterostylis vittata			x			x		x
	Pterostylis sp.								x
	Pyrorchis nigricans			x		x	x	x	x
	Spiculaea ciliata			x		x			
	Thelymitra antennifera			x		x			
	Thelymitra benthamiana			x		x			
	Thelymitra canaliculata								x
	Thelymitra crinita			x		x			x
	Thelymitra dedmaniarum	T	E						
	Thelymitra flexuosa			x		x			
	Thelymitra graminea			x		x			
	Thelymitra latiloba			x		x			
	Thelymitra macrophylla			x		x			
	Thelymitra maculata					x			
	Thelymitra mucida			x		x			
	Thelymitra pauciflora			x					
	Thelymitra stellata	T	E						
	Thelymitra villosa			x		x			
	Thelymitra vulgaris			x		x			
	Thelymitra xanthotricha			x		x			

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Orchidaceae		*Thelymitra yorkensis*	P3				x			
(continued)		*Thelymitra* sp.							x	x
		Orchidaceae sp.							x	x
Orobanchaceae	*	*Bellardia trixago*			x				x	x
	*	*Orobanche minor*								x
	*	*Parentucellia latifolia*			x		x		x	
Oxalidaceae	*	*Oxalis bowiei*			x		x			
	*	*Oxalis compressa*								x
	*	*Oxalis corniculata*							x	x
		Oxalis exilis			x		x			
		Oxalis perennans			x		x	x		
		Oxalis sp.							x	x
Papaveraceae	*	*Fumaria muralis*								
Philydraceae		*Philydrella drummondii*			x		x			
		Philydrella pygmaea			x		x			
		Philydrella pygmaea subsp. *pygmaea*			x		x			x
		Philydrella sp.							x	
Phrymaceae		*Glossostigma diandrum*					x			
		Glossostigma drummondii			x		x			
Phyllanthaceae		*Lysiandra calycina*			x		x	x		x
		Poranthera ericoides			x		x			
		Poranthera florosa					x			
		Poranthera huegelii								x
		Poranthera microphylla			x		x		x	x
Pinaceae	*	*Pinus radiata*								
Pittosporaceae		*Billardiera fraseri*			x		x	x		x
		Billardiera fusiformis			x			x		x
		Billardiera variifolia			x		x	x	x	x
		Billardiera venusta			x		x			
		Billardiera sp.							x	x
		Cheiranthera preissiana					x			
		Marianthus bicolor			x		x	x		
		Marianthus drummondianus						x	x	x
		Marianthus tenuis			x		x			

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Plantaginaceae	*	*Plantago* sp.			x					
	*	*Veronica* sp.			x					
Poaceae	*	*Aira caryophyllea*			x		x		x	x
	*	*Aira cupaniana*			x		x			x
		Amphibromus nervosus			x		x			
		Amphipogon amphipogonoides			x		x		x	x
		Amphipogon caricinus								x
		Amphipogon debilis			x		x			
		Amphipogon laguroides			x		x		x	
		Amphipogon laguroides subsp. *havelii*			x		x			
		Amphipogon strictus			x		x		x	
		Amphipogon turbinatus			x		x	x	x	x
		Amphipogon sp.								x
		Aristida contorta					x			
	*	*Aristida ramosa*					x			
		Aristida sp.								
		Austrostipa campylachne			x		x		x	x
		Austrostipa compressa			x		x		x	
		Austrostipa elegantissima			x		x	x	x	x
		Austrostipa flavescens							x	x
		Austrostipa hemipogon			x		x			
		Austrostipa pycnostachya			x		x			
		Austrostipa semibarbata								x
		Austrostipa trichophylla			x		x	x		
		Austrostipa variabilis			x		x			
		Austrostipa sp.							x	x
	*	*Avellinia festucoides*								
	*	*Avellinia michelii*					x			
	*	*Avena barbata*			x		x			x
	*	*Avena* sp.								x
	*	*Briza maxima*			x		x	x	x	x
	*	*Briza minor*			x		x		x	x
	*	*Bromus hordeaceus*								
	*	*Bromus rubens*								x
	*	*Bromus* sp.								x
	*	*Catapodium rigidum*								
	*	*Cortaderia selloana*			x					
	*	*Cynodon dactylon*			x		x			
		Deyeuxia quadriseta					x			
		Dichelachne crinita					x		x	x
	*	*Ehrharta calycina*			x					x

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Poaceae	*	*Ehrharta longiflora*			x		x		x	
(continued)		*Eriachne flaccida*					x			
		Eriachne ovata					x			
		Hemarthria uncinata					x			
	*	*Holcus lanatus*								
	*	*Holcus setigera*								x
	*	*Hordeum glaucum*			x		x			
		Lachnagrostis aemula					x			
		Lachnagrostis filiformis			x		x			
		Lachnagrostis plebeia					x			
	*	*Lagurus ovatus*								
	*	*Lolium multiflorum*								
	*	*Lolium temulentum*								
	*	*Lolium* sp.					x			
		Microlaena stipoides			x		x		x	x
		Neurachne alopecuroidea			x		x	x	x	x
	*	*Paspalum dilatatum*			x		x			
		Paspalum vaginatum			x		x			
	*	*Pentameris airoides*								x
	*	*Phalaris aquatica*			x		x			
	*	*Phalaris sp.*								
	*	*Poa annua*								x
		Poa drummondiana			x		x		x	x
		Poa porphyrocladus								
	*	*Polypogon monspeliensis*			x		x			x
		Polypogon tenellus					x			
	*	*Rostraria pumila*								
		Rytidosperma acerosum					x			x
		Rytidosperma caespitosum					x	x	x	x
		Rytidosperma occidentale					x			x
		Rytidosperma setaceum			x		x		x	x
		Rytidosperma sp.							x	x
		Tetrarrhena laevis			x			x	x	x
		Themeda triandra			x					
	*	*Triticum aestivum*								x
	*	*Vulpia bromoides*			x		x	x		x
	*	*Vulpia fasciculata*								
	*	*Vulpia myuros*								x
	*	*Vulpia myuros forma megalura*					x			
	*	*Vulpia myuros* forma *myuros*			x		x			
	*	*Vulpia* sp.					x			x
		Poaceae sp.							x	x

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES WITHIN THE EMA SURVEY AREAS

Note: * denotes introduced species, T denotes threatened species, P1 to P4 denote Prioirty species (WAH 1998-)

Family	*	Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Podocarpaceae		*Podocarpus drouynianus*			x					
Polygalaceae		*Comesperma calymega*			x		x	x	x	x
		Comesperma ciliatum					x	x		x
		Comesperma drummondii			x		x			
		Comesperma flavum								
		Comesperma integerrimum							x	
		Comesperma polygaloides								x
		Comesperma scoparium					x			
		Comesperma virgatum			x		x			x
		Comesperma volubile			x					
		Comesperma sp.								x
Polygonaceae	*	*Polygonum aviculare*			x		x			
	*	*Rumex obtusifolius*			x					
	*	*Rumex pulcher*			x		x			
Portulacaceae		*Calandrinia calyptrata*					x			
		Calandrinia corrigioloides					x			
		Calandrinia granulifera			x		x			
		Calandrinia sp.								x
Potamogetonaceae		*Stuckenia pectinata*			x					
Pottiaceae		*Barbula calycina*			x					
		Barbula subcalycina			x					
		Pseudocrossidium hornschuchianum			x					
		Triquetrella papillata			x					
Primulaceae	*	*Lysimachia arvensis*			x		x		x	x
		Samolus junceus			x		x			
Proteaceae		*Adenanthos barbiger*			x			x		
		Adenanthos cygnorum			x		x			
		Adenanthos cygnorum subsp. *chamaephyton*	P3							
		Adenanthos cygnorum subsp. *cygnorum*			x		x	x		
		Adenanthos obovatus			x		x	x		
		Banksia armata			x		x	x		
		Banksia armata var. *armata*			x		x			
		Banksia armata var. *ignicida*			x		x			
		Banksia attenuata			x		x	x		

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Family	* Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Proteaceae	*Banksia aurantia*	T	CE		x	x			
(continued)	*Banksia bipinnatifida*			x		x	x		x
	Banksia bipinnatifida subsp. *bipinnatifida*			x		x		x	
	Banksia columnaris					x			
	Banksia dallanneyi			x		x		x	x
	Banksia dallanneyi subsp. *dallanneyi*					x	x		x
	Banksia dallanneyi subsp. *dallanneyi* var. *dallanneyi*					x			x
	Banksia dallanneyi subsp. *dallanneyi* var. *mellicula*					x			
	Banksia dallanneyi subsp. *sylvestris*			x		x			x
	Banksia dallanneyi var. *mellicula*			x					
	Banksia drummondii subsp. *hiemalis*			x		x			
	Banksia fraseri			x		x	x		
	Banksia fraseri var. *fraseri*			x		x		x	
	Banksia grandis			x		x	x	x	x
	Banksia insulanemorecincta	P4				x			
	Banksia littoralis			x		x			x
	Banksia meganotia	P3							
	Banksia menziesii			x		x			
	Banksia oligantha	T	E						
	Banksia nivea			x		x			
	Banksia nivea subsp. *nivea*			x		x			
	Banksia nobilis subsp. *nobilis*					x			
	Banksia prionotes			x					
	Banksia proteoides			x					
	Banksia recurvistylis	P2							
	Banksia sessilis			x					x
	Banksia sessilis var. *sessilis*			x		x	x	x	x
	Banksia sphaerocarpa					x	x	x	x
	Banksia sphaerocarpa var. *caesia*			x					
	Banksia sphaerocarpa var. *sphaerocarpa*			x		x			x
	Banksia squarrosa			x		x			x
	Banksia squarrosa subsp. *squarrosa*			x		x	x		x
	Banksia stuposa			x		x			
	Banksia subpinnatifida var. *imberbis*	P3							
	Banksia subpinnatifida var. *subpinnatifida*	P2							
	Banksia telmatiaea			x					
	Banksia undata			x				x	
	Banksia undata var. *splendens*			x					
	Banksia undata var. *undata*			x		x	x		
	Banksia vestita			x					
	Conospermum amoenum subsp. *cuneatum*					x			

APPENDIX B: POTENTIAL VASCULAR PLANT SPECIES WITHIN THE EMA SURVEY AREAS

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Family	* Species	SCC	FCC	Dandjoo	PMST	NatureMap South	Bennett 2004	Newmont Sotico 2011 to 2013	South32 Analogue Forest Areas
Proteaceae	*Conospermum capitatum* subsp. *glabratum*			x					
(continued)	*Conospermum densiflorum* subsp. *densiflorum*					x			
	Conospermum galeatum	T	CE			x			
	Conospermum huegelii			x					
	Conospermum scaposum	P3				x			
	Conospermum stoechadis			x		x		x	
	Conospermum stoechadis subsp. *sclerophyllum*			x		x			
	Conospermum stoechadis subsp. *stoechadis*					x	x		
	Conospermum stoechadis subsp. *stoechadis*			x					
	Conospermum sp.								x
	Grevillea bipinnatifida			x		x	x	x	x
	Grevillea bipinnatifida subsp. *bipinnatifida*			x		x			
	Grevillea cirsiifolia			x		x	x		
	Grevillea corrugata	T	E						
	Grevillea crowleyae	P2							
	Grevillea dissectifolia	P3				x	x		
	Grevillea diversifolia						x		
	Grevillea diversifolia subsp. *diversifolia*			x					
	Grevillea drummondii	P4							
	Grevillea flexuosa	T	V						
	Grevillea hookeriana			x					
	Grevillea hookeriana subsp. *hookeriana*			x			x		
	Grevillea leptobotrys			x		x			
	Grevillea manglesii			x		x			
	Grevillea monticola			x		x	x		
	Grevillea paniculata						x		
	Grevillea pilulifera			x		x	x		
	Grevillea pimeleoides	P4							
	Grevillea prominens	P3							
	Grevillea pulchella						x		
	Grevillea pulchella subsp. *ascendens*			x					
	Grevillea quercifolia					x	x		x
	Grevillea quercifolia			x					
	Grevillea rara	T	E						
	Grevillea ripicola	P4							
	Grevillea saccata	P4							
	Grevillea scabra					x			
	Grevillea spinosissima			x		x			
	Grevillea synapheae			x		x			x
	Grevillea synapheae subsp. *synapheae*			x		x	x		

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Proteaceae	*Grevillea tenuiflora*			x		x			
(continued)	*Grevillea thelemanniana*	T	CE						
	Grevillea umbellulata			x		x			
	Grevillea vestita subsp. *vestita*			x		x			
	Grevillea wilsonii			x			x		
	Grevillea sp. Gunapin (F. Hort 308)					x			
	Grevillea sp.								x
	Hakea amplexicaulis			x		x	x		x
	Hakea anadenia			x					
	Hakea ceratophylla						x		
	Hakea cyclocarpa			x		x	x	x	
	Hakea erinacea			x		x	x		
	Hakea gilbertii			x		x			
	Hakea incrassata			x		x	x	x	x
	Hakea lissocarpha			x		x	x	x	x
	Hakea loranthifolia					x			
	Hakea marginata			x		x			
	Hakea neospathulata					x			
	Hakea oldfieldii	P3							
	Hakea petiolaris						x	x	
	Hakea prostrata			x		x	x	x	
	Hakea ruscifolia			x		x	x	x	x
	Hakea stenocarpa			x		x	x		
	Hakea sulcata			x		x			
	Hakea trifurcata			x		x	x		
	Hakea undulata			x		x	x	x	x
	Hakea varia			x		x	x	x	
	Hakea sp.								x
	Isopogon crithmifolius			x		x			
	Isopogon dubius			x		x	x	x	x
	Isopogon pallidus			x					
	Isopogon teretifolius			x		x	x		
	Isopogon sp.								x
	Lambertia multiflora var. *darlingensis*			x					
	Persoonia angustiflora			x		x	x		x
	Persoonia elliptica			x		x	x		x
	Persoonia longifolia			x		x	x		x
	Persoonia quinquenervis			x		x	x	x	
	Persoonia saccata						x		
	Persoonia trinervis			x				x	
	Petrophile antecedens			x		x			
	Petrophile biloba						x		

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Proteaceae	*Petrophile brevifolia*			x		x			
(continued)	*Petrophile circinata*			x					
	Petrophile divaricata			x		x			
	Petrophile drummondii			x		x			
	Petrophile ericifolia subsp. *subpubescens*					x			
	Petrophile filifolia subsp. *laxa*	P3							
	Petrophile heterophylla			x		x	x		x
	Petrophile juncifolia					x			
	Petrophile linearis								x
	Petrophile macrostachya								x
	Petrophile media						x		
	Petrophile rigida			x		x			
	Petrophile seminuda			x		x	x		
	Petrophile serruriae			x		x	x	x	x
	Petrophile squamata			x					
	Petrophile squamata subsp. northern (J. Monks 40)			x		x			
	Petrophile squamata subsp. *squamata*						x		
	Petrophile striata			x		x	x	x	x
	Stirlingia latifolia			x		x	x		
	Stirlingia simplex			x		x	x	x	x
	Synaphea aephynsa					x			
	Synaphea boyaginensis	P2				x			
	Synaphea cuneata			x		x	x	x	x
	Synaphea damopsis			x		x	x		x
	Synaphea decorticans			x		x	x		
	Synaphea diabolica	P3				x			
	Synaphea floribunda					x	x		
	Synaphea gracillima			x		x			x
	Synaphea hians	P3							
	Synaphea interioris			x		x			
	Synaphea obtusata			x					
	Synaphea pandurata	P3							
	Synaphea panhesya	P1							
	Synaphea petiolaris						x		x
	Synaphea sp. Darkin (F. Hort et al. 586)	P3				x			
	Synaphea sp. Udumung (A.S. George 17058)			x		x			
	Synaphea sp.							x	
	Proteaceae sp.							x	
Ranunculaceae	*Clematis pubescens*						x		x
	Ranunculus colonorum					x			

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Restionaceae	*Alexgeorgea nitens*						x		
	Chaetanthus aristatus					x			
	Chordifex gracilior	P3							
	Chordifex isomorphus			x					
	Chordifex stenandrus			x		x			
	Desmocladus asper			x		x	x	x	
	Desmocladus fasciculatus			x		x	x	x	x
	Desmocladus flexuosus			x		x		x	x
	Desmocladus lateriflorus			x		x			
	Desmocladus parthenicus					x			
	Desmocladus sp.							x	
	Hypolaena exsulca			x		x	x		
	Hypolaena pubescens			x		x			
	Hypolaena robusta	P4							
	Lepidobolus chaetocephalus			x		x			
	Lepidobolus preissianus			x		x	x		
	Lepidobolus prissianus subsp. *priessianus*							x	x
	Lepidobolus sp.							x	x
	Leptocarpus coangustatus			x		x			x
	Leptocarpus kraussii			x		x			
	Lepyrodia curvescens	P2							
	Lepyrodia glauca			x		x			
	Lepyrodia hermaphrodita						x		
	Lepyrodia macra			x		x			
	Loxocarya cinerea			x		x	x	x	
	Loxocarya striata			x		x	x		
	Loxocarya sp.								x
	Tremulina tremula					x			
	Restionaceae sp.								x
Rhamnaceae	*Cryptandra arbutiflora*			x		x	x		x
	Cryptandra arbutiflora var. *arbutiflora*			x		x			
	Cryptandra myriantha			x			x		
	Cryptandra nutans			x		x	x	x	
	Cryptandra pungens						x		
	Papistylus intropubens	P1							
	Stenanthemum coronatum			x		x		x	x
	Stenanthemum nanum			x		x	x		
	Stenanthemum pumilum			x		x	x		
	Stenanthemum pumilum subsp. *majus*			x		x			
	Stenanthemum tridentatum			x		x			
	Trymalium angustifolium			x		x	x		

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Rhamnaceae		*Trymalium ledifolium*			x		x		x	x
(continued)		*Trymalium ledifolium* var. *lineare*			x		x			
		Trymalium ledifolium var. *rosmarinifolium*			x			x		
		Trymalium odoratissimum							x	
		Trymalium odoratissimum subsp. *odoratissimum*						x		
Rosaceae	*	*Rubus fruticosus* aggregate								
	*	*Galium divaricatum*							x	x
	*	*Galium murale*			x		x			x
		Opercularia apiciflora			x			x		x
		Opercularia echinocephala			x		x	x	x	x
		Opercularia hispidula			x			x	x	x
		Opercularia vaginata			x		x	x	x	x
Rutaceae		*Asterolasia grandiflora*	P4				x			
		Asterolasia pallida			x					x
		Asterolasia squamuligera			x		x			
		Boronia capitata subsp. *capitata*	T	E		x				
		Boronia capitata subsp. *clavata*					x			
		Boronia crassifolia			x		x			
		Boronia crenulata								x
		Boronia crenulata var. *crenulata*							x	x
		Boronia crenulata subsp. *viminea*			x			x		
		Boronia fastigiata						x	x	x
		Boronia scabra			x		x			
		Boronia scabra subsp. *scabra*			x		x			
		Boronia spathulata			x		x	x		
		Boronia sp.								x
		Cyanothamnus ramosus			x		x			
		Cyanothamnus ramosus subsp. *anethifolius*			x		x			
		Cyanothamnus ramosus subsp. *ramosus*			x			x		
		Cyanothamnus tenuis	P4				x	x		
		Diplolaena drummondii			x			x		
		Diplolaena graniticola			x		x		x	
		Diplolaena microcephala			x		x			
		Philotheca nodiflora subsp. *lasiocalyx*					x			
		Philotheca nodiflora subsp. *latericola*			x		x			
		Philotheca spicata			x		x	x		x
Salicaceae	*	*Salix* spp. except *S.babylonica, S.* x *calodendron* & *S.* x *reichardtii*								

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Salviniaceae	*	*Salvinia molesta*					x			
		Exocarpos sparteus			x		x	x		x
		Leptomeria cunninghamii			x		x		x	x
		Leptomeria ellytes			x					
		Santalum acuminatum			x		x	x		x
Sapindaceae		*Diplopeltis huegelii* subsp. *lehmannii*			x					
		Dodonaea adenophora			x		x			
		Dodonaea ceratocarpa			x			x		
		Dodonaea inaequifolia					x			
		Dodonaea pinifolia			x		x		x	
		Dodonaea viscosa subsp. *angustissima*			x		x			
Solanaceae		*Anthocercis gracilis*	T	V		x				
	*	*Lycium ferocissimum*								
Stylidiaceae		*Levenhookia pauciflora*			x		x			
		Levenhookia preissii	P1				x			
		Levenhookia pusilla			x		x	x	x	x
		Levenhookia stipitata			x		x		x	x
		Stylidium acuminatum subsp. *acuminatum*	P2							
		Stylidium aff. *androsaceum*					x			
		Stylidium affine			x		x	x	x	x
		Stylidium amoenum			x		x	x	x	x
		Stylidium androsaceum			x		x		x	x
		Stylidium araeophyllum			x		x			
		Stylidium asteroideum	P3				x			
		Stylidium asymmetricum	T	E			x			
		Stylidium beaugleholei			x		x			
		Stylidium brunonianum			x		x	x	x	x
		Stylidium calcaratum			x		x		x	x
		Stylidium caricifolium			x		x			
		Stylidium carnosum			x		x			
		Stylidium ciliatum			x		x		x	x
		Stylidium crassifolium			x					x
		Stylidium cygnorum					x			
		Stylidium despectum			x		x			
		Stylidium dichotomum			x		x	x	x	x
		Stylidium diplectroglossum	P1				x			
		Stylidium diuroides			x		x			
		Stylidium diuroides subsp. diuroides					x			

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Stylidiaceae	*Stylidium ecorne*			x		x			
(continued)	*Stylidium egralliforme*			x		x			
	Stylidium emarginatum			x		x		x	
	Stylidium eriopodum					x			
	Stylidium exappendiculatum	P3				x			
	Stylidium guttatum			x			x		
	Stylidium hirsutum			x		x			
	Stylidium hispidum			x		x		x	
	Stylidium hortiorum			x		x			
	Stylidium inundatum			x		x			
	Stylidium junceum			x			x	x	x
	Stylidium korijekup	P2							
	Stylidium lateriticola			x		x			
	Stylidium leptocalyx	P4		x		x			
	Stylidium leptophyllum			x		x			
	Stylidium lineatum			x					
	Stylidium longitubum	P4				x		x	
	Stylidium marradongense	P3							x
	Stylidium obtusatum			x		x			
	Stylidium paulineae			x		x			
	Stylidium perpusillum			x		x			
	Stylidium perula					x			
	Stylidium petiolare			x		x			
	Stylidium piliferum			x		x	x	x	x
	Stylidium preissii			x					
	Stylidium pubigerum			x		x			
	Stylidium pulchellum			x		x			
	Stylidium pycnostachyum			x		x			
	Stylidium recurvum			x		x			
	Stylidium repens			x		x	x	x	x
	Stylidium rhynchocarpum			x		x	x		
	Stylidium roseoalatum			x		x			
	Stylidium rubricalyx	P3				x			
	Stylidium salmoneum					x			
	Stylidium scabridum	P4				x			
	Stylidium scariosum			x					
	Stylidium schoenoides			x		x			x
	Stylidium sp. Boulder Rock (A.H. Burbidge 2536)			x		x			
	Stylidium spathulatum						x		
	Stylidium striatum	P4				x			
	Stylidium tenue							x	
	Stylidium tenue subsp. *majusculum*			x		x			

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Stylidiaceae		*Stylidium tenue* subsp. *tenue*			x		x			
(continued)		*Stylidium thesioides*			x		x			
		Stylidium uniflorum			x		x		x	x
		Stylidium uniflorum subsp. *uniflorum*			x		x			
		Stylidium utricularioides			x		x			
		Stylidium sp.							x	x
Tamaricaceae	*	*Tamarix aphylla*								
Thymelaeaceae		*Pimelea angustifolia*			x		x			
		Pimelea ciliata			x		x			x
		Pimelea ciliata subsp. *ciliata*			x		x	x	x	
		Pimelea imbricata			x		x	x		
		Pimelea imbricata var. *piligera*			x		x		x	x
		Pimelea lehmanniana						x		
		Pimelea preissii			x		x	x		
		Pimelea rara	P4							
		Pimelea rosea			x					
		Pimelea suaveolens							x	x
		Pimelea suaveolens subsp. *suaveolens*			x		x			
		Pimelea sulphurea			x		x			
		Pimelea villifera			x		x			
		Pimelea sp.							x	x
Typhaceae		*Typha domingensis*								x
Violaceae		*Pigea floribunda*			x		x	x		x
Xanthorrhoeaceae		*Xanthorrhoea drummondii*			x					
		Xanthorrhoea drummondii x *preissii*			x					
		Xanthorrhoea gracilis			x		x	x	x	x
		Xanthorrhoea preissii			x		x	x	x	x
Zamiaceae		*Macrozamia fraseri*			x					
		Macrozamia riedlei			x		x	x	x	x

APPENDIX C: LIKELIHOOD OF THREATENED AND PRIORITY SPECIES WITH THE POTENTIAL TO OCCUR ON THE BUFFER, EMA AND PAA SURVEY AREAS

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Acacia brachypoda	Fabaceae	T	Endangered	Habit: Dense, rounded, slightly aromatic shrub, 1-3 m high, 1-4 m wide. Flower colour: Yellow. Flowering period: May to Jul. Soils: Sandy clay or loam. Low-lying seasonal swampy areas. IBRA Distribution: AVW, JAF Florabase records: 30	Potential Occurs mainly in Wheatbelt with outliers north of survey area in Buffer area
Andersonia gracilis	Ericaceae	T	Endangered	Habit: Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Flower colour: White-pink-purple. Flowering period: Sep to Nov. Soils: White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps. IBRA Distribution: GES, SWA Florabase records: 36	Highly Unlikely Near Perth and northern sandplains, not suitable site conditions
Andersonia sp. Saxatilis (F. & J. Hort 3324)	Ericaceae	T		Habit: Single stemmed shrub, to 0.6 m high. Flower colour: White-pink. Flowering period: Sep to Jan. Soils: Brown loam, clay, over granite, laterite slopes. IBRA Distribution: JAF Florabase records: 6	Potential Occurs in Buffer area near Monadnocks to northwest and restricted in occurrence
Anthocercis gracilis	Solanaceae	T	Vulnerable	Habit: Erect, spindly shrub, to 0.6(-1) m high. Flower colour: Yellow-green. Flowering period: Sep to Oct. Soils: Sandy or loamy soils. Granite outcrops. IBRA Distribution: JAF Florabase records: 31	Known Near Perth and Darling Scarp, recorded in survey area in EMA Central and in Buffer area
Banksia aurantia	Proteaceae	T	Critically Endangered	Habit: Prostrate lignotuberous shrub, 0.10-0.35 m high. Flower colour: Red-orange-brown-cream. Flowering period: Apr Soils: White/grey sand. Seasonally waterlogged plains. IBRA Distribution: JAF Florabase records: 18	Unlikely Occurs mainly north of survey area

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Banksia oligantha	Proteaceae	T	Endangered	Habit: Non-lignotuberous shrub, to 3 m high. Flower colour: Red and cream/orange-brown. Flowering period: Oct to Nov. Soils: Yellow or yellow-brown sand. IBRA Distribution: AVW, JAF, SWA Florabase records: 16	Highly Unlikely Occurs mainly in Wheatbelt and outlier in Perth
Boronia capitata subsp. *capitata*	Rutaceae	T	Endangered	Habit: Slender shrub, 0.3-1.3 m high. Flower colour: Pink. Flowering period: Aug to Dec or Feb. Soils: Sand, often over laterite. Sandplains. IBRA Distribution: AVW, MAL Florabase records: 26	Highly Unlikely Occurs in Wheatbelt
Caladenia bryceana subsp. *bryceana*	Orchidaceae	T		Habit: Tuberous, perennial, herb, 0.05-0.1 m high. Flower colour: Green Yellow Flowering period: Aug to Oct. Soils: Adjacent to watercourses, winter wet sites IBRA Distribution: ESP, JAF, MAL Florabase records: 16	Highly Unlikely Recorded well south of survey area; mainly in southern Wheatbelt
Caladenia dorrienii	Orchidaceae	T	Endangered	Habit: Tuberous, perennial, herb, 0.1-0.2 m high. Flower colour: White-cream-yellow. Flowering period: Sep to Nov. Soils: Clayey loam. Moist sites adjacent to rivers and seasonal creeks. IBRA Distribution: AVW, JAF Florabase records: 15	Potential Recorded in survey area; although mainly in Wheatbelt with outlier near Brookton Highway and eastern fringe of survey area. Occurs in Buffer area and on fringes of PAA in southeast.
Caladenia hopperiana	Orchidaceae	T	Endangered	Habit: Erect herb, to 0.2 m high. Flower colour: Cream. Flowering period: Sep to Oct. Soils: Low lying, winter wet swampland, wandoo woodland. IBRA Distribution: JAF Florabase records: 4	Known Recorded south-east of Boddington and in Wheatbelt. Occurs in PAA, EMA East Quindanning and Buffer area

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Calectasia cyanea	Dasypogonaceae	T	Critically Endangered	Habit: Rhizomatous, clump forming, woody perennial, herb, 0.1-0.6m high, to 0.3 m wide. Flower colour: Blue/purple. Flowering period: Jun to Oct. Soils: White, grey or yellow sand, gravel. IBRA Distribution: AVW, JAF, WAR Florabase records: 15	Highly Unlikely Recorded in southern Wheatbelt; change in taxonomy and northern plants *Calectasia narragara*
Conospermum galeatum	Proteaceae	T	Critically Endangered	Habit: Open shrub, ca 0.9 m high. Flower colour: White. Flowering period: Aug to Sep. Soils: Yellow sand. IBRA Distribution: AVW Florabase records: 20	Highly Unlikely Recorded in Wheatbelt
Diuris micrantha	Orchidaceae	T	Vulnerable	Habit: Tuberous, perennial herb, 0.3-0.6 m high. Flower colour: Yellow and brown. Flowering period: Sep-Oct. Soils: Brown loamy clay. Winter-wet swamps, in shallow water. IBRA Distribution: JAF, SWA Florabase records: 10	Highly Unlikely Recorded on Swan Coastal Plain and southeast of survey areas in Wheatbelt
Diuris purdiei	Orchidaceae	T	Endangered	Habit: Tuberous, perennial herb, 0.15-0.35 m high. Flower colour: Yellow. Flowering period: Sep-Oct. Soils: Grey-black sand, moist. Winter-wet swamps. IBRA Distribution: JAF, SWA Florabase records: 26	Highly Unlikely Mainly on Swan Coastal Plain with outlier to northwest of survey area near Brookton Highway
Eleocharis keigheryi	Cyperaceae	T	Vulnerable	Habit: Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.4 meters high. Flower colour: Green. Flowering period: Aug to Nov. Soils: Clay, sandy loam. Emergent in freshwater: creeks, claypans. IBRA Distribution: AVW, ESP, GES, JAF, SWA Florabase records: 59	Unlikely Mainly on Swan Coastal Plain, northern sandplains ad Wheatbelt. Not near survey areas. Site conditions not likely

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Grevillea corrugata	Proteaceae	T	Endangered	Habit: Shrub, 1.5-2.5 m high. Flower colour: White. Flowering period: Aug to Sep. Soils: Gravelly loam. Roadsides. IBRA Distribution: JAF Florabase records: 21	Highly Unlikely In northern fringes of State Forest north near Julimar forest
Grevillea flexuosa	Proteaceae	T	Vulnerable	Habit: Irregular, few-branched, non-lignotuberous shrub, to 2 m high. Flower colour: Cream/yellow. Flowering period: Jul to Oct. Soils: Red-brown sand with laterite & gravel, sand over granite. Ridgetop plateau & associated breakaways. IBRA Distribution: JAF Florabase records: 43	Highly Unlikely In northern fringes of State Forest north near Julimar forest
Grevillea rara	Proteaceae	T		Habit: Dense,,prickly shrub to 2m high. Flower colour: White-pink/white Flowering period: Oct. Soils: Lateritic loam, creeklnes IBRA Distribution: JAF Florabase records: 13	Highly Unlikely In central forests north east of Bunbury
Grevillea thelemanniana	Proteaceae	T	Critically Endangered	Habit: Spreading, lignotuberous shrub, 0.3-1.5 meters high. Flower colour: Pink/red. Flowering period: May to Nov. Soils: Sand, sandy clay. Winter-wet low-lying flats IBRA Distribution: JAF, SWA Florabase records: 47	Potential In areas on Swan Coastal Plain near Perth. Occurs in Buffer area.
Lasiopetalum rotundifolium	Malvaceae	T	Endangered	Habit: Erect shrub, to 0,4m high. Flower colour: Pink. Flowering period: - Soils: Gravelly clayey sand, hills. IBRA Distribution: JAF, AVW Florabase records: 39	Unlikely Recorded east of survey area and extends to north and southeast into Wheatbelt

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Lechenaultia laricina	Goodeniaceae	T	Endangered	Habit: Diffuse, ascending shrub, 0.15-0.7 m high. Flower colour: Red/red-orange. Flowering period: Sep to Dec or Jan. Soils: Sand, gravelly loam. IBRA Distribution: AVW, JAF, MAL Florabase records: 20	Potential Mainly north and northeast of survey area into Wheatbelt. Occurs in Buffer area
Loricobbia pauciflora (formerly Pultenaea pauciflora)	Fabaceae	T	Vulnerable	Habit: Dense, much-branched shrub, to 0.8 m high. Flower colour: Yellow. Flowering period: Oct to Nov. Soils: Sandy and clay lateritic soils. Undulating country. IBRA Distribution: AVW, JAF Florabase records: 41	Potential Recorded in survey; although mainly east and southeast of survey area into Wheatbelt. Occurs in Buffer area
Morelotia australiensis	Cyperaceae	T	Vulnerable	Habit: Rhizomatous, tufted perennial, grass-like or herb (sedge), to 1 m high. Flower colour: Brown. Flowering period: Nov to Dec. Soils: Sandy clay or loam. Low-lying seasonal swampy areas. IBRA Distribution: JAF, SWA Florabase records: 50	Potential Mainly on eastern fringes of the Swan Coastal Plain and on southern Swan Coastal Plain and some near Albany Highway and survey area. Occurs in Buffer area
Stylidium asymmetricum	Stylidiaceae	T	Endangered	Habit: Erect herb, 0.04 cm high. Flower colour: Pink. Flowering period: Oct-Jan. Soils: Fringes of swamp, wet, yellow-brown clay. IBRA Distribution: JAF Florabase records: 16	Unlikely Mainly north of survey area and Brookton Highway
Thelymitra dedmaniarum	Orchidaceae	T	Endangered	Habit: Tuberous, perennial, herb, to 0.8 m high. Flower colour: Yellow. Flowering period: Nov to Dec or Jan. Soils: Granite. IBRA Distribution: JAF Florabase records: 4	Highly Unlikely North of Mundaring and Great Eastern Highway

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Thelymitra stellata	Orchidaceae	T		Habit: Tuberous, perennial, herb, 0.15 to 0.25 m high. Flower colour: Yellow brown Flowering period: Oct to Nov. Soils: Sand, gravel & lateritic loam IBRA Distribution: GES, JAF,SWA Florabase records: 20	Potential Mainly on northern sandplains and near western edge of Darling Ranges near Perth. Occurs in Buffer area.
Thomasia montana	Malvaceae	T	Vulnerable	Habit: Upright shrub, 0.5-1 m high. Flower colour: Blue-purple-red. Flowering period: Sep to Oct. Soils: Loamy soils. Rocky granite knolls, lateritic hills. IBRA Distribution: AVW, JAF Florabase records: 35	Unlikely Near survey areas, east and northeast of survey area in Wheatbelt
Tribonanthes purpurea	Haemodoraceae	T	Vulnerable	Habit: Tuberous, perennial, herb, 0.03-0.04 m high. Flower colour: Pink-purple. Flowering period: Aug. Soils: Seasonally wet soils in moss swards and herb fields among granite rocks. IBRA Distribution: AVW, ESP, JAF, MAL Florabase records: 21	Highly Unlikely Outlier northwest near Brookton Highway; but mainly easy in Wheatbelt
Verticordia fimbrilepis subsp. *fimbrilepis*	Myrtaceae	T	Endangered	Habit: Shrub, 0.3-0.7 m high. Flower colour: Pink-white. Flowering period: Oct to Dec or Jan. Soils: Gravelly, sandy, or clayey soils. Flats, road verges. IBRA Distribution: AVW, JAF Florabase records: 39	Known Recorded in survey area and then to northwest of survey area and eastwards into Wheatbelt Occurs in Buffer area and EMA Central
Baeckea sp. Youndegin Hill (A.S. George 15772)	Myrtaceae	P1		Habit: Erect shrub, to 1.45 m high. Flower colour: White. Flowering period: Sep to Oct. Soils: Yellow sand, red sandy clay, laterite. Along road verges. IBRA Distribution: AVW, JAF, MAL Florabase records: 17	Potential Just northeast of survey area in Buffer area and then eastwards into Wheatbelt

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Caladenia uliginosa subsp. *patulens*	Orchidaceae	P1		Habit: Tuberous, perennial, herb, 0.2-0.35 m high. Flower colour: Green-cream. Flowering period: Sep to Oct. Soils: Clay loam and gravel. Well drained soils amongst dense shrubs. IBRA Distribution: JAF, SWA Florabase records: 6	Highly Unlikely Occurs on southern Swan Coastal Plain and in southern forests
Caladenia validinervia	Orchidaceae	P1		Habit: Upright single stem herb, to 0.3 m high. Flower colour: Cream/purple. Flowering period: - Soils: Brown lateritic sandy loam. IBRA Distribution: JAF Florabase records: 9	Highly Unlikely Occurs in southern forests
Calytrix simplex subsp. *simplex*	Myrtaceae	P1		Habit: Shrub, to 0.2 m high. Flower colour: Purple. Flowering period: Oct to Nov. Soils: Shallow soils, laterite, over granite outcrops on slopes. IBRA Distribution: JAF, SWA Florabase records: 7	Potential Occurs near Boddington to south of Albany Highway and some to northwest near Armadale and western areas of Darling Ranges. Occurs in PAA.
Darwinia hortiorum	Myrtaceae	P1		Habit: Low spreading shrub, to 0.8 m high. Flower colour: Brown, to reddish brown bracts Flowering period: Oct to Dec. Soils: Shallow soils, laterite, over granite outcrops on slopes. IBRA Distribution: JAF Florabase records: 9	Potential Occurs west near Albany Highway and in Buffer area
Gastrolobium sp. Prostrate Boddington (M. Hislop 2130)	Fabaceae	P1		Habit: Prostrate, mat-like shrub, to 0.05 m high. Flower colour: Yellow/red. Flowering period: Oct. Soils: Littered brown loam, clay, laterite. Lower slopes and rises, valley bottoms. IBRA Distribution: JAF Florabase records: 6	Known Occurs near Boddington and may extend northwards. Occurs in PAA, Buffer area and EMA Hotham North Extension

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Hemigenia rigida	Lamiaceae	P1		Habit: Upright or spreading shrub, 0.1 to 1 m high. Flower colour: Blue-purple/violet. Flowering period: Aug to Dec or Jan. Soils: Sandy soils, lateritic gravelly soils. Hillslopes, granite outcrops, flats, ironstone ridges. IBRA Distribution: AVW Florabase records: 4	Highly Unlikely Formerly applied to taxon in Jarrah forest that now recognised a s *Hemigenia pritzelii*. *H. rigida* occurs in Central Wheatbelt.
Hibbertia ambita	Dilleniaceae	P1		Habit: Low, perennial shrub, to 1 m high. Flower colour: Yellow. Flowering period: Aug to Sep. Soils: Red-brown loam gravel, over lateritic slopes. IBRA Distribution: JAF Florabase records: 17	Potential Occurs near Boddington and may extend northwards. Occurs in Buffer area and PAA
Hibbertia hortiorum	Dilleniaceae	P1		Habit: Shrub 0.4 m high. Flower colour: Yellow. Flowering period: Sep to Oct. Soils: Lateritic slopes. IBRA Distribution: JAF Florabase records: 14	Known Occurs in northern Jarrah and in survey area. Also extends slightly into Wheatbelt. Occurs in PAA, Buffer Area and EMA Hotham North Extension
Hibbertia micrantha	Dilleniaceae	P1		Habit: Shrub 0.3 m high. Flower colour: Yellow. Flowering period: Sep to Oct. Soils: Sandy loam or gravels over granite IBRA Distribution: JAF Florabase records: 3	Unlikely Occurs in northern Jarrah to the west of survey area.
Hibbertia polyancistra	Dilleniaceae	P1		Habit: Shrub, to 0.6 m high. Flower colour: Yellow. Flowering period: - Soils: Yellow-brown sand, laterite. Flats. IBRA Distribution: JAF Florabase records: 13	Known Occurs in northern Jarrah and in survey area and to northwest near Brookton Highway. Occurs in Buffer area, EMA Brookton. Also outlier in southern forests

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Levenhookia preissii	Stylidiaceae	P1		Habit: Annual (ephemeral), herb, 0.03-0.17 m high. Flower colour: Pink-red. Flowering period: Sep to Dec or Jan. Soils: Grey or black, peaty sand. Swamps. IBRA Distribution: SWA Florabase records: 17	Highly Unlikely On northern Sandplains and on Swan Coastal Plain
Papistylus intropubens	Rhamnaceae	P1		Habit: Erect, slender shrub, to 0.5 m high. Flower colour: - Flowering period: - Soils: - IBRA Distribution: JAF Florabase records: 1	Potential Only recorded in Tunnel Road Heath south of Boddington in heath communities in PAA. Despite searching very restricted in occurrence
Paracaleana gracilicordata	Orchidaceae	P1		Habit: Perennial herb, to 0.07m high. Flower colour: Green-yellow-purple Flowering period: Oct to Nov Soils: Growing on moss mats, granite and outcrops IBRA Distribution: JAF Florabase records: 8	Potential Recorded west of survey area in Buffer area
Stachystemon exilis	Euphorbiaceae	P1		Habit: Shrub, to 0.3 m high. Flower colour: Green-yellow. Flowering period: Oct-Nov. Soils: White -grey sands, seasonally damp. IBRA Distribution: JAF, SCP Florabase records: 8	Highly Unlikely On Swan Coastal Plain
Stylidium diplectroglossum	Stylidiaceae	P1		Habit: Creeping perennial, herb, to 0.1 m, elevated up to 0.02 m on stilt roots and forming a tangled, matted network to 1 m wide. Flower colour: Pink. Flowering period: Oct-Dec. Soils: Loamy sands, Low bushland, plains. IBRA Distribution: ESP, JAF Florabase records: 30	Highly Unlikely In southern Wheatbelt

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Synaphea panhesya	Proteaceae	P1		Habit: Erect shrub, 0.3-0.6 m high. Flower colour: Yellow. Flowering period: Aug to Sep. Soils: Gravelly loam and sandy gravel. IBRA Distribution: JAF, SWA Florabase records: 16	Potential Has been recorded as an outlier near Boddington, within the PAA and mainly occurs north of Great Eastern Highway
Thysanotus formosus	Asparagaceae	P1		Habit: Caespitose perennial, herb, to 0.3 m high. Flower colour: Purple. Flowering period: Nov to Dec or Jan. Soils: Clayey sand, sandy loam. In situations often inundated in winter. IBRA Distribution: JAF Florabase records: 9	Potential Recorded near survey area in Buffer area, but mainly south of Bunbury
Banksia recurvistylis	Proteaceae	P2		Habit: Shrub. Flower colour: Yellow. Flowering period: Jan, Nov or Dec. Soils: Soils associated with granites and gravelly laterite IBRA Distribution: JAF Florabase records: 7	Potential Occurs nearby survey area; recorded mainly within Monadnocks reserve with outlier near Wandering. Occurs in Buffer area.
Banksia subpinnatifida var. *subpinnatifida*	Proteaceae	P2		Habit: Erect or straggling, non-lignotuberous shrub, 0.3-1.5 m high. Flower colour: Yellow. Flowering period: Sep to Oct. Soils: Gravelly loam. IBRA Distribution: AVW, JAF Florabase records: 22	Potential Recorded near survey area, within PAA and east of survey area in Wheatbelt
Bossiaea modesta	Fabaceae	P2		Habit: Slender, trailing and twining shrub. Flower colour: Yellow and red. Flowering period: Oct to Dec. Soils: Soils derived from granite. Damp areas close to stream. IBRA Distribution: JAF Florabase records: 22	Unlikely Recorded west of survey area in central forests

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Caladenia postea	Orchidaceae	P2		Habit: Tuberous, perennial, herb, 0.16m – 0.2 m high. Flower colour: Cream-yellow. Flowering period: Oct-Nov. Soils: Damp flats and drainage areas. IBRA Distribution: JAF Florabase records: 9	Unlikely Recorded north of survey area
Chamelaucium sp. Dryandra (D. Rose 446)	Myrtaceae	P2		Habit: Erect shrub, to 2m high. Flower colour: White cream turning pink Flowering period: Sept-Nov. Soils: Sand over laterite, granites and clays IBRA Distribution: JAF Florabase records: 3	Unlikely Recorded east of survey area
Darwinia sp. Westdale (F. Hort 864)	Myrtaceae	P2		Habit: Decumbent to prostrate shrub, 0.5-1.2 m high. Flower colour: Red. Flowering period: Dec. Soils: Dry lateritic soils. High on steep slopes. IBRA Distribution: JAF Florabase records: 3	Unlikely Recorded east of northern part of survey area
Eremaea violacea subsp. Dobaderry Swamp (M.E. Trudgen 3909)	Myrtaceae	P2		Habit: Dense shrub, 0.2 m high. Flower colour: - Flowering period: - Soils: Grey sand. IBRA Distribution: JAF Florabase records: 9	Potential Occurs north of the survey area on the eastern section of the northern Jarrah forest in Buffer area
Grevillea crowleyae	Proteaceae	P2		Habit: Dense and spreading shrub, 0.5-1.5 m high. Flower colour: - Flowering period: Aug to Nov. Soils: Gravel. In gravel pit. IBRA Distribution: JAF Florabase records: 10	Known Occurs in Buffer area and within and east of the survey area on the eastern section of the northern Jarrah forest and outliers to southeast Wheatbelt Occurs in EMA Central

APPENDIX C: LIKELIHOOD OF THREATENED AND PRIORITY SPECIES WITH THE POTENTIAL TO OCCUR ON THE BUFFER, EMA AND PAA SURVEY AREAS

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Haloragis aculeolata	Haloragaceae	P2		Habit: Slender, erect perennial, herb, to 0.4 m high. Flower colour: Green. Flowering period: Sep or Dec. Soils: Black sand or clay over limestone. Winter-wet areas. IBRA Distribution: JAF, SWA Florabase records: 7	Potential Recorded in Buffer of survey area and east of survey area. Mainly occurs on Coastal Plains
Lechenaultia hortii	Goodeniaceae	P2		Habit: Erect to spreading perennial, herb or shrub (subshrub), to 0.4 m high. Flower colour: Blue Flowering period: Jan, Nov and Dec. Soils: White-cream sandy soils. Low slopes and flats, road verges. IBRA Distribution: JAF Florabase records: 17	Potential Occurs north of the survey area on the eastern section of the northern Jarrah forest in Buffer area
Lepyrodia curvescens	Restionaceae	P2		Habit: Dioecious, shortly creeping, tufted rhizomatous, herb, 0.24-0.4 m high, rhizomes on surface or to 1 cm deep. Flower colour: - Flowering period: Sep to Nov. Soils: Sand, laterite. Seasonally inundated swampland. IBRA Distribution: GES, JAF, SWA Florabase records: 21	Unlikely Occurs mainly on northern sandplains and Swan Coastal Plain, outlier to southwest of survey area
Lilaeopsis polyantha	Apiaceae	P2		Habit: Rhizomatous, perennial, herb, 0.02-0.25(-0.4) m high. Flower colour: Purple/red-brown. Flowering period: Nov. Soils: Sandy mud. Lake margins. IBRA Distribution: AVW, JAF Florabase records: 6	Potential On eastern fringes of forest areas and into Wheatbelt and in Buffer area
Logania sylvicola	Loganiaceae	P2		Habit: Erect or spreading perennial shrub to 0.4 m high. Flower colour: White. Flowering period: Aug to Sep. Soils: Dry, brown, gravelly, sandy loam over laterite. Mid slope. IBRA Distribution: JAF Florabase records: 9	Highly Unlikely On eastern fringes south of survey area and extends into Wheatbelt

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Phyllangium palustre	Loganiaceae	P2		Habit: Erect, succulent annual, herb, 0.02 m high. Flower colour: White. Flowering period: Oct-Nov. Soils: Clay. Winter wet claypans, low lying seasonal wetlands. IBRA Distribution: AVW, JAF, SCP Florabase records: 7	Highly Unlikely Mainly on Swan Coastal Plain, extends into Wheatbelt. Site conditions unlikely
Stylidium acuminatum subsp. *acuminatum*	Stylidiaceae	P2		Habit: Perennial herb 0.1-0.4 m high. Flower colour: White-yellow. Flowering period: Nov to Jan. Soils: Red-brown loam over laterite. IBRA Distribution: JAF Florabase records: 11	Highly Unlikely Occurs south of survey area
Stylidium korijekup	Stylidiaceae	P2		Habit: Perennial, herb, 0.18-0.34 m high. Flower colour: Cream-yellow and maroon. Flowering period: - Soils: Well-drained grey-brown sandy loam with laterite. Upland ridges. IBRA Distribution: JAF, SWA Florabase records: 4	Highly Unlikely Occurs south of survey area near Bunbury on Coastal Plain and in southern forests
Styphelia angustiflora (formerly *Astroloma* sp. Sessile leaf (J.L. Robson 657))	Ericaceae	P2		Habit: Erect shrub, to 0.8 m. Flower colour: White. Flowering period: - Soils: Grey or white sand. IBRA Distribution: JAF Florabase records: 12	Potential Occurs on north of survey area on eastern fringes of forests in Buffer area
Styphelia sp. Wandoo (F. & J. Hort 2441)	Ericaceae	P2		Habit: Erect spreading shrub, to 0.3 m high. Flower colour: White. Flowering period: May-Jun. Soils: Grey sand, sandy-loam clays. IBRA Distribution: JAF Florabase records: 11	Potential Occurs on north of survey area on eastern fringes of forests and extends into Wheatbelt southeast of survey area and in Buffer area

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Synaphea boyaginensis	Proteaceae	P2		Habit: Shrub, to 0.25 m high. Flower colour: Yellow. Flowering period: Sep to Oct. Soils: Gravelly clay-loam. IBRA Distribution: AVW, JAF, MAL Florabase records: 22	Unlikely Occurs on north of survey area on eastern fringes of forests and extends into areas in Wheatbelt east of survey area
Acacia adjutrices	Fabaceae	P3		Habit: Sub-shrub 0.3-0.7 m high. Flower colour: Yellow/golden. Flowering period: Jul to Aug. Soils: Loam, clay on laterite hills, sandplains. IBRA Distribution: AVW, JAF Florabase records: 24	Potential Occurs on north and northwest of survey area and extends into areas in Wheatbelt east of survey area. Occurs in Buffer area
Acacia horridula	Fabaceae	P3		Habit: Harsh, slender, single-stemmed shrub, 0.3-0.6(-1) m high. Flower colour: Yellow. Flowering period: May to Aug. Soils: Gravelly soils over granite, sand. Rocky hillsides. IBRA Distribution: JAF, SWA Florabase records: 33	Potential Recorded near survey area; recorded mainly from Swan Coastal Plain and Darling Scarp, outlier east of survey area. Occurs in Buffer area, and PAA
Adenanthos cygnorum subsp. *chamaephyton*	Proteaceae	P3		Habit: Prostrate, mat-forming, non-lignotuberous shrub, to 0.3 m high. Flower colour: White-cream-pink-green/green. Flowering period: Jul or Sep to Dec or Jan. Soils: Grey sand, lateritic gravel. IBRA Distribution: AVW, JAF, SWA Florabase records: 23	Highly Unlikely Occurs mainly near and north of Great Eastern Highway, north of survey areas and outliers east of Bunbury
Allocasuarina grevilleoides	Casuarinaceae	P3		Habit: Dioecious, lignotuberous shrub, 0.15 to 0.4 m high. Flower colour: - Flowering period: - Soils: Sand over laterite, gravel. IBRA Distribution: AVW, GES, JAF, SCP Florabase records: 39	Highly Unlikely Occurs mainly near and north of Great Eastern Highway, north of survey areas and mainly on northern sandplains

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Andersonia sp. Audax (F. Hort, B. Hort & J. Hort 3179)	Ericaceae	P3		Habit: Erect, spreading shrub to 1.3 m high. Flower colour: White-pink. Flowering period: - Soils: Loam-clay over granite. Granite outcropping. IBRA Distribution: JAF Florabase records: 23	Potential Recorded mainly near Monadnocks and occurs west of survey area. Occurs in Buffer area
Angianthus drummondii	Asteraceae	P3		Habit: Erect annual, herb, to 0.1 m high. Flower colour: Yellow. Flowering period: Oct to Dec. Soils: Grey or brown clay soils, ironstone. Seasonally wet flats. IBRA Distribution: JAF, SWA Florabase records: 20	Highly Unlikely Occurs on Swan Coastal Plain, northern sandplains and south of survey area on eastern fringes of Jarrah forest and extends into Wheatbelt
Anigozanthos bicolor subsp. *exstans*	Haemodoraceae	P3		Habit: Rhizomatous, perennial, herb, 0.1-0.25 m high. Flower colour: Green and red. Flowering period: Aug to Oct. Soils: White sand, sandy clay loam. IBRA Distribution: AVW, JAF Florabase records: 34	Potential Occurs on the eastern fringes of the northern Jarrah forest and into Wheatbelt. Just east of northern section of survey area in Buffer area
Asteridea gracilis	Asteraceae	P3		Habit: Annual, herb, 0.15-0.35 m high. Flower colour: White-pink. Flowering period: Sep to Dec. Soils: Sand, clay, gravelly soils. IBRA Distribution: ESP, JAF, SWA Florabase records: 11	Potential Occurs in southern wheatbelt and north of Brookton Highway with one record from near Boddington. Recorded in PAA
Banksia meganotia	Proteaceae	P3		Habit: Straggly or erect, prickly, lignotuberous shrub, 0.3-1 m high. Flower colour: Yellow. Flowering period: Oct. Soils: Sand, sandy loam or clay loam over laterite. IBRA Distribution: AVW, JAF, MAL Florabase records: 38	Potential Occurs in Wheatbelt with occurrence in Buffer area

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Banksia subpinnatifida var. *imberbis*	Proteaceae	P3		Habit: Erect or straggling, non-lignotuberous shrub, 0.3-1.5 m high. Flower colour: Yellow. Flowering period: Sep to Oct. Soils: Laterite. IBRA Distribution: AVW, JAF Florabase records: 17	Potential Occurs in Buffer area and in PAA. Occurs south Albany Highway and extends southwards into Wheatbelt
Beaufortia purpurea	Myrtaceae	P3		Habit: Erect or spreading shrub, 0.3-1.5 m high. Flower colour: Red-purple. Flowering period: Oct to Dec or Jan to Feb. Soils: Lateritic or granitic soils. Rocky slopes. IBRA Distribution: JAF, SWA Florabase records: 43	Highly Unlikely Occurs on western fringes of Darling Ranges and north of Great Eastern Highway
Byblis gigantea	Byblidaceae	P3		Habit: Small, branched perennial, herb (or sub-shrub), to 0.45 m high. Flower colour: Pink-purple/white. Flowering period: Sep to Dec or Jan. Soils: Sandy-peat swamps. Seasonally wet areas. IBRA Distribution: GES, JAF, SWA Florabase records: 49	Potential Recorded near survey area in Buffer area. Site conditions may not be present. Extends from Perth to central forest areas
Carex tereticaulis	Cyperaceae	P3		Habit: Monoecious, rhizomatous, tufted perennial, grass-like or herb (sedge), 0.7 m high. Flower colour: Brown. Flowering period: Sep to Oct. Soils: Black peaty sand. IBRA Distribution: JAF, SWA, WAR Florabase records: 18	Highly Unlikely Occurs on the Swan Coastal Plain and in southern forests with outlier in southern Wheatbelt
Chamaescilla gibsonii	Xanthorrhoeaceae	P3		Habit: Clumped tuberous, herb. Flower colour: Blue. Flowering period: Sep. Soils: Clay to sandy clay. Winter-wet flats, shallow water-filled claypans. IBRA Distribution: JAF, SWA, WAR Florabase records: 29	Highly Unlikely Occurs on the Swan Coastal Plain and in southern forests

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Chordifex gracilior	Restionaceae	P3		Habit: Rhizomatous, erect perennial, herb, 0.3-0.5 m high. Flower colour: Brown. Flowering period: Sep to Dec. Soils: Peaty sand. Swamps. IBRA Distribution: JAF, SWA, WAR Florabase records: 33	Potential Recorded near survey area; mainly in southern forest areas. Occurs in Buffer area
Conospermum scaposum	Proteaceae	P3		Habit: Erect shrub, 0.2-0.45(-0.75) m high. Flower colour: Blue. Flowering period: Oct to Dec or Jan to Feb. Soils: White-grey sand, sandy clay. Low swampy areas, road verges. IBRA Distribution: AVW, GES, JAF, SWA Florabase records: 47	Potential Extends from northern sandplains to Wheatbelt, few occurrences north near survey area in Buffer area
Dicrastylis reticulata	Lamiaceae	P3		Habit: Woolly shrub, (0.15-)0.6-1.2(-1.5) m high. Flower colour: White. Flowering period: Sep to Dec. Soils: Sandy soils, often over granite. Amongst granite rock. IBRA Distribution: AVW, JAF, MAL Florabase records: 30	Potential Mainly in Wheatbelt to east and northeast. A few near the survey area in Buffer area
Dillwynia dillwynioides	Fabaceae	P3		Habit: Decumbent or erect, slender shrub, 0.3-1.2 m high. Flower colour: Red and yellow/orange. Flowering period: Aug to Dec. Soils: Sandy soils. Winter-wet depressions. IBRA Distribution: SWA Florabase records: 41	Highly Unlikely On Swan Coastal Plain and northern sandplains
Goodenia katabudjar	Goodeniaceae	P3		Habit: Shrub (subshrub), 0.1-0.2 m high. Flower colour: Blue-pink/white. Flowering period: Dec. Soils: Sandy gravel. Upland areas of open wandoo woodland. IBRA Distribution: JAF Florabase records: 12	Potential Recorded south and east of survey area in Buffer area and in PAA

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Grevillea dissectifolia	Proteaceae	P3		Habit: Shrub, 1-2.5 m high. Flower colour: White or pink. Flowering period: Jun to Oct. Soils: - IBRA Distribution: JAF Florabase records: 24	Known Recorded near and within the survey area, extends from near Mundaring to Dwellingup. Occurs in Buffer area, EMA Central and EMA Hotham North Extension.
Grevillea prominens	Proteaceae	P3		Habit: Spreading shrub, 0.5-1.7 m high, 0.3-1 m wide. Flower colour: Cream-white. Flowering period: Sep to Oct. Soils: Gravelly loam. Along creeklines. IBRA Distribution: JAF Florabase records: 11	Highly Unlikely Recorded south of Boddington and Dwellingup
Hakea oldfieldii	Proteaceae	P3		Habit: Open, straggling shrub, up to 2.5 m high. Flower colour: White-cream/yellow. Flowering period: Aug to Oct. Soils: Red clay or sand over laterite. Seasonally wet flats. IBRA Distribution: AVW, ESP, JAF, MAL, SWA Florabase records: 66	Potential Recorded to south of Albany Highway, south of Bunbury and in southern Wheatbelt. Occurs in Buffer area.
Halgania corymbosa	Boraginaceae	P3		Habit: Erect shrub, 0.35-1 m high. Flower colour: Blue-purple. Flowering period: Aug to Nov. Soils: Gravelly soils, soils over granite. IBRA Distribution: JAF, SWA Florabase records: 18	Known Recorded mainly west of Perth near Darling Scarp, with several outliers to south of survey area. Occurs in Buffer area, PAA and EMA Hotham North Extension.
Hemigenia microphylla	Lamiaceae	P3		Habit: Slender shrub, 0.4-1.8 m high. Flower colour: Blue-purple. Flowering period: Sep to Dec. Soils: Sandy clay, peaty clay, granite. Winter-wet depressions. IBRA Distribution: JAF, SWA, WAR Florabase records: 26	Potential Occurs south of Albany Highway but mainly on Swan Coastal Plain and in southern forest areas. Occurs in Buffer area.

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Hibbertia wandoo	Dilleniaceae	P3		Habit: Erect, much-branched shrub, to 0.6 m high. Flower colour: Yellow. Flowering period: Feb or Apr or Aug or Oct. Soils: Lateritic soils. IBRA Distribution: AVW, JAF Florabase records: 19	Potential Occurs in survey area and extends eastwards into Wheatbelt. Occurs in Buffer area.
Lasiopetalum caroliae	Malvaceae	P3		Habit: Shrub, with hairy stems. 0.08–0.4 m high, 0.15–0.2 m wide Flower colour: Pale to bright mauve-pink and dark red. Flowering period: Sep or Oct. Soils: Yellow-brown, sandy loam and lateritic gravel soils, mid-slope. IBRA Distribution: JAF, SWA Florabase records: 19	Known Occurs in survey area; although mainly north of Great Eastern Highway. Occurs in Buffer area and EMA Central.
Leucopogon florulentus	Ericaceae	P3		Habit: Erect, slender shrub, 0.3-0.8 m high. Flower colour: White. Flowering period: Jun to Nov. Soils: White/ grey or yellow sand, sandy clay, gravelly lateritic soils. Sandplains, gentle slopes. IBRA Distribution: AVW, ESP, MAL Florabase records: 34	Known Recorded in EMA Central, near survey area, occurs in Buffer area and occurs in Wheatbelt and mainly South-eastern Wheatbelt
Lomandra whicherensis	Asparagaceae	P3		Habit: Erect herb, to 0.4 m high. Flower colour: - Flowering period: - Soils: Gravelly brown, sandy loam, laterite. IBRA Distribution: JAF Florabase records: 17	Highly Unlikely Occurs east of Bunbury in central forests near Darling Scarp
Meionectes tenuifolia	Haloragaceae	P3		Habit: Prostrate aquatic/semi-aquatic herb. Erect stems. Flower colour: - Flowering period: - Soils: Grey sand, seasonally wet, poorly drained flats. IBRA Distribution: JAF, SWA, WAR Florabase records: 28	Potential Occurs in Buffer area, Occurs mainly in western areas of Darling Ranges and on Swan Coastal Plain

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Petrophile filifolia subsp. *laxa*	Proteaceae	P3		Habit: Erect, spreading shrub, to 0.75 m high. Flower colour: Cream. Flowering period: Nov to Dec. Soils: White gritty sand, brown, red, yellow, white or grey sand, brown-yellow sandy clay. Winter-wet sites, flats, slopes, swamps, drainage lines. IBRA Distribution: JAF Florabase records: 19	Potential Occurs within survey area and to east and west of the survey area within Buffer area, with main occurrences in central part of forest near Brookton Highway
Platysace ramosissima	Apiaceae	P3		Habit: Perennial, herb, to 0.3m high. Flower colour: White-cream. Flowering period: Oct to Nov. Soils: Sandy soils. IBRA Distribution: GES, JAF, SCP Florabase records: 17	Unlikely Occurs mainly on Swan Coastal plain, northern sandplains and north of survey area
Stylidium asteroideum	Stylidiaceae	P3		Habit: Erect plant, to 0.07 m high. Flower colour: White, pink, red. Flowering period: Aug to Oct. Soils: Clayey loams sand in shallow drainage lines. IBRA Distribution: AVW, GES, JAF Florabase records: 20	Potential Occurs in Buffer area, mainly north of survey area and extends to northern sandplains
Stylidium exappendiculatum	Stylidiaceae	P3		Habit: Erect trigger plant, to 0.07 m high Flower colour: White and red. Flowering period: - Soils: Clayey sand. IBRA Distribution: AVW, ESP, JAF Florabase records: 23	Potential Occurs in Buffer area survey area and on fringes of survey area and then northwards and south eastwards into Wheatbelt
Stylidium marradongense	Stylidiaceae	P3		Habit: Erect perennial, herb, 0.15-0.5 m high. Flower colour: White/pink. Flowering period: Sep to Nov. Soils: Sand over laterite. Jarrah-Marri forest. IBRA Distribution: AVW, JAF Florabase records: 15	Known Occurs in Buffer area, EMA Central, and PAA and on eastern fringes of forests with outliers in Wheatbelt

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Stylidium rubricalyx	Stylidiaceae	P3		Habit: Erect herb, to 0.08 m high. Flower colour: White and red. Flowering period: - Soils: Sand, loam and clay. Drainage lines and seasonal wetlands. IBRA Distribution: AVW, JAF Florabase records: 24	Known Occurs in Buffer area, EMA Brookton, survey area on eastern fringes of forests with outliers in Wheatbelt
Styphelia filifolia	Ericaceae	P3		Habit: Shrub to 0.3 m high. Flower colour: - Flowering period: - Soils: Brown and yellow sand, sandplains. IBRA Distribution: GES, SWA Florabase records: 37	Potential Previous collection may be seeded rather than native? Occurs on Swan Coastal Plain and northern sandplains
Synaphea diabolica	Proteaceae	P3		Habit: Clumped, sprawling shrub (subshrub), 0.2-0.6 m high. Flower colour: Yellow Flowering period: Aug to Nov Soils: Dry, yellow-brown laterite soil with laterite gravel. In undulating areas. IBRA Distribution: JAF Florabase records: 9	Unlikely Occurs mainly north of survey area with outlier south of Bunbury
Synaphea hians	Proteaceae	P3		Habit: Prostrate or decumbent shrub, 0.15-0.6 m high, to 1 m wide. Flower colour: Yellow. Flowering period: Jul or Sep to Nov. Soils: Sandy soils. Rises. IBRA Distribution: JAF, SWA Florabase records: 52	Highly Unlikely Occurs well south of survey area in forests with some occurrences on southern Swan Coastal Plain and into Wheatbelt
Synaphea pandurata	Proteaceae	P3		Habit: Clumped shrub (subshrub), 0.2-0.55 m high. Flower colour: Yellow. Flowering period: Sep and Oct. Soils: Yellow-grey, yellow-brown, yellow-red sands and sandy loams, dark brown loam, laterite gravel, granite. In undulating areas. IBRA Distribution: JAF Florabase records: 24	Known Occurs in Buffer area and EMA Central. North of Albany Highway and in survey area

APPENDIX C: LIKELIHOOD OF THREATENED AND PRIORITY SPECIES WITH THE POTENTIAL TO OCCUR ON THE BUFFER, EMA AND PAA SURVEY AREAS

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2018a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; COO – Coolgardie; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren; YAL – Yalgoo. Likelihood of occurrence in survey area is based on a Highly Unlikely, Unlikely, Potential, Likely and Known

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Synaphea sp. Darkin (F. Hort et al. 586)	Proteaceae	P3		Habit: Shrub, to 0.3 m high. Flower colour: Yellow. Flowering period: Sep or Oct. Soils: Sand. IBRA Distribution: JAF Florabase records: 21	Potential Occurs north of survey area on eastern areas of forests in Buffer area
Tetratheca parvifolia	Elaeocarpaceae	P3		Habit: Small shrub, 0.2-0.3 m high. Flower colour: Pink. Flowering period: Oct. Soils: Pale brown sandy-loam, gravel, over granite. IBRA Distribution: JAF, SWA Florabase records: 15	Highly Unlikely Occurs south of Dwellingup and extends onto Swan Coastal Plain
Tetratheca pilifera	Elaeocarpaceae	P3		Habit: Spreading shrub, 0.1-0.3 m high. Flower colour: Purple. Flowering period: Aug to Oct. Soils: Gravelly soils. IBRA Distribution: JAF, SWA Florabase records: 36	Potential Occurs north of Great eastern Highway in forest area and extends westwards to sandplains. Recorded in PAA
Tetratheca similis	Elaeocarpaceae	P3		Habit: Spreading shrub, to 0.3 m high. Flower colour: Pink. Flowering period: Aug to Sep. Soils: Sandy clay with lateritic boulders. IBRA Distribution: AVW, JAF Florabase records: 22	Known Recorded in Buffer area, EMA Brookton, EMA Central, survey areas and mainly on eastern side of northern forests to north of Albany Highway
Thelymitra yorkensis	Orchidaceae	P3		Habit: Erect, glabrous tuberous, perennial, herb (with cinnamon-scented flowers), to 0.45 m high. Flower colour: Yellow-orange. Flowering period: Nov. Soils: Sandy loams, brown-grey loam, gravel, clay, laterite, granite. Mid-slopes or hilltops. IBRA Distribution: JAF Florabase records: 24	Potential Occurs north of survey area on eastern fringes of the forests in Buffer area

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Thysanotus anceps	Asparagaceae	P3		Habit: Rhizomatous, leafless perennial, herb, to 0.4 m high. Flower colour: Purple. Flowering period: Oct to Dec. Soils: White or grey sand, lateritic gravel, laterite. IBRA Distribution: GES, JAF, SWA Florabase records: 18	Highly Unlikely Occurs on the western fringes of the Darling Ranges and on the northern sandplains
Thysanotus cymosus	Asparagaceae	P3		Habit: Caespitose perennial, herb (with fibrous roots with ellipsoidal tubers), to 0.3 m high. Flower colour: Purple. Flowering period: Sep to Oct. Soils: Clay, granitic or lateritic sand. IBRA Distribution: AVW, ESP, JAF, MAL, WAR Florabase records: 32	Potential Recorded on the eastern fringes of the forest in survey area and in Buffer area; although mainly north of Great Eastern Highway and in Wheatbelt
Thysanotus tenuis	Asparagaceae	P3		Habit: Perennial, herb (with tuberous roots), to 0.2 m high. Flower colour: Purple. Flowering period: Sep to Oct. Soils: Clay, sandy clay, sand. IBRA Distribution: AVW, MAL Florabase records: 34	Unlikely Occurs in Wheatbelt to east of survey area
Thysanotus unicupensis	Asparagaceae	P3		Habit: Erect herb, to 0.3 m high. Flower colour: Purple. Flowering period: - Soils: Grey, brown sandy loam over laterite. IBRA Distribution: JAF Florabase records: 13	Highly Unlikely Occurs in central and southern forests
Tricoryne soullierae	Hemerocallidaceae	P3		Habit: Multi-stemmed, open, caespitose rhizomatous, perennial herb to 0.2 m high. Flower colour: Yellow. Flowering period: Sep to Nov. Soils: Yellow to grey sand, gravelly clay quartz, laterite, limestone. IBRA Distribution: AVW, GES, JAF Florabase records: 10	Highly Unlikely Occurs north of survey area and extends northwards into Wheatbelt and northern sadnplains

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Acacia alata var. *platyptera*	Fabaceae	P4		Habit: Dense shrub, 0.5-1 m high. Flower colour: Yellow. Flowering period: Jun to Aug. Soils: Clay, gravelly sandy clay. Lateritic ridges, clay flats. IBRA Distribution: AVW, JAF Florabase records: 33	Potential Recorded in survey area and extends eastwards and northwards. Occurs in Buffer area.
Acacia cuneifolia	Fabaceae	P4		Habit: Erect or straggly shrub, 1-3 m high. Flower colour: Yellow. Flowering period: Jul to nOct. Soils: Sand, clay or loam over granite. Granite outcrops and hills, rocky watercourses. IBRA Distribution: AVW, JAF Florabase records: 43	Known Recorded in Buffer area, EMA Hotham North Extension and survey area and extends eastwards and northwards with outlier near Collie
Acacia oncinophylla subsp. *patulifolia*	Fabaceae	P4		Habit: Shrub, 0.5-2.5(-3) m high, 'minni-ritchi' bark, phyllodes 4-9 cm long, 3-6 mm wide. Flower colour: Yellow. Flowering period: Aug to Nov or Nov to Dec. Soils: Granitic soils, occasionally on laterite. IBRA Distribution: JAF, SWA Florabase records: 31	Known Occurs in survey area; Buffer area and EMA Central; although mainly in western fringes of Darling Ranges
Acacia semitrullata	Fabaceae	P4		Habit: Slender, erect, pungent shrub, (0.1-)0.2-0.7(-1.5) m high. Flower colour: Cream-white. Flowering period: May to Oct. Soils: White/grey sand, sometimes over laterite, clay. Sandplains, swampy areas. IBRA Distribution: JAF, SWA, WAR Florabase records: 90	Highly Unlikely Occurs south of Dwellingup in the forest and extends onto Swan Coastal Plain south of Mandurah
Asterolasia grandiflora	Rutaceae	P4		Habit: Slender open shrub, 0.2-0.6(-0.8) m high. Flower colour: Pink/white. Flowering period: Jul to Oct. Soils: Lateritic soils, clay over granite. Breakaways, hills. IBRA Distribution: AVW, JAF Florabase records: 68	Unlikely Occurs north of survey area and extends northwards into Wheatbelt

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Banksia insulanemorecincta	Proteaceae	P4		Habit: Non-lignotuberous shrub, to 1 m high. Flower colour: Cream. Flowering period: Jun to Sep. Soils: Yellow sand, clay, gravel, laterite, granite. Open scrubby flat, slopes, low heath. IBRA Distribution: JAF Florabase records: 20	Known Recorded in Buffer area and EMA Central on eastern fringes of forest with outlier near Mt Barker in southern Wheatbelt
Bossiaea disticha	Fabaceae	P4		Habit: Erect or straggly to spreading shrub, 0.1-1.5 m high. Flower colour: Yellow and brown/red. Flowering period: Sep to Nov. Soils: Sandy soils over limestone. IBRA Distribution: JAF, WAR Florabase records: 43	Unlikely Occurs mainly south of Busselton with outlier near Boddington
Caladenia integra	Orchidaceae	P4		Habit: Tuberous, perennial, herb, 0.2-0.5 m high. Flower colour: Green and red. Flowering period: Sep to Oct. Soils: Clayey loam. Granite outcrops, rocky slopes. IBRA Distribution: AVW, ESP, GES, JAF, MAL Florabase records: 54	Potential Recorded near Albany Highway in Buffer area; mainly occurs in Wheatbelt and to north of Great Eastern Highway
Caladenia speciosa	Orchidaceae	P4		Habit: Tuberous, perennial, herb, 0.35-0.6 m high. Flower colour: White-pink. Flowering period: Sep to Oct. Soils: White, grey or black sand. IBRA Distribution: JAF, SWA, WAR Florabase records: 66 (incl. hybrid spp.)	Highly Unlikely Occurs mainly on Swan Coastal Plain and northern sandplains with outliers near Albany Highway to west of survey area and in southern forest
Calothamnus graniticus subsp. *leptophyllus*	Myrtaceae	P4		Habit: Erect, multi-stemmed shrub, 1-2 m high. Flower colour: Red. Flowering period: Jun to Aug. Soils: Clay over granite, lateritic soils. Hillsides. IBRA Distribution: JAF, SWA Florabase records: 32	Highly Unlikely Occurs mainly on western fringes of the Darling Ranges, on the Swan Coastal Plain and in southern Wheatbelt and central forests

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Calothamnus quadrifidus subsp. *teretifolius*	Myrtaceae	P4		Habit: Tall, woody, erect shrub to 3 m high. Flower colour: Red. Flowering period: - Soils: White sand, brown loam over laterite. IBRA Distribution: JAF, SWA Florabase records: 48	Potential Previous collection may be seeded rather than native? Occurs mainly south of Bunbury; with outlier near Boddington
Chorizema ulotropis	Fabaceae	P4		Habit: Sprawling, open, semi-prostrate shrub, to 0.45 m high. Flower colour: Orange-yellow. Flowering period: Jul to Sep. Soils: Moist to dry soils, white sand with gravel, laterite, granite. Outcrops, winter damp to dry areas, flats. IBRA Distribution: ESP, JAF, MAL Florabase records: 24	Known Recorded in Buffer area, EMA Central, survey area and extends to populations in southeastern section of the Wheatbelt
Cyanothamnus tenuis	Rutaceae	P4		Habit: Procumbent or erect and slender shrub, 0.1-0.5 m high. Flower colour: Blue/pink-white. Flowering period: Aug to Nov. Soils: Laterite, stony soils, granite. IBRA Distribution: JAF, SWA Florabase records: 45	Known Mainly occurs on western and northern areas of the Darling Ranges with some occurrences further south in the forests and south of Bunbury. Occurs in Buffer area and EMA Brookton.
Darwinia pimelioides	Myrtaceae	P4		Habit: Erect shrub, 0.25-0.5(-1) m high. Flower colour: Red/pink and green. Flowering period: Sep to Oct. Soils: Loam, sandy loam. Granite outcrops. IBRA Distribution: JAF Florabase records: 28	Potential Occurs in Buffer area, occurs north of Great Eastern Highway with outlier south of Boddington
Darwinia sp. Dryandra (G.J. Keighery 9295)	Myrtaceae	P4		Habit: Dense shrub, 0.1-0.45 m high. Flower colour: White. Flowering period: May or Jul or Nov. Soils: Gravelly clay. Lateritic ridges. IBRA Distribution: AVW, JAF Florabase records: 18	Known Occurs in the Buffer area and the EMA Central, in the eastern fringes of the Jarrah forest and extends into Wheatbelt

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Darwinia thymoides subsp. St Ronans (J.J. Alford & G.J. Keighery 64)	Myrtaceae	P4		Habit: Low shrub, 0.3-0.6 m high, 0.2-1 m wide. Flower colour: Orange-red, red. Flowering period: Oct to Dec or Jan. Soils: Sandy or gravelly clay-loam soils. Slopes and flats. Granite outcrops. IBRA Distribution: AVW, JAF Florabase records: 25	Known Occurs in the Buffer area, the EMA Hotham North Extension and in eastern fringes of northern forest areas
Drosera occidentalis	Droseraceae	P4		Habit: Fibrous-rooted, rosetted perennial, herb, to 0.025 m high. Flower colour: Pink/white. Flowering period: Oct to Dec or Jan. Soils: - IBRA Distribution: JAF, SWA Florabase records: 23	Potential Occurs in Buffer area, mainly on western fringes of forest. Some outliers south of Boddington and Bunbury
Eucalyptus caesia subsp. *caesia*	Myrtaceae	P4		Habit: Mallee to 10 m high, bark minni ritchi Flower colour: Pink/Red Flowering period: May-Sept. Soils: Base of granites and loams IBRA Distribution: AVW, SWA, MAL Florabase records: 43	Unlikely Recorded near survey area; mainly in Wheatbelt and occasional in Perth
Eucalyptus exilis	Myrtaceae	P4		Habit: (Whipstick mallee), 2-6 m high, bark smooth. Flower colour: White. Flowering period: Aug to Oct. Soils: Grey sand, gravelly loam. Lateritic ridges. IBRA Distribution: AVW, GES, JAF Florabase records: 48	Known Occurs in Buffer area, EMA Central, and near survey aera and in eastern fringes of northern forest areas and extends into Wheatbelt
Eucalyptus rudis subsp. cratyantha	Myrtaceae	P4		Habit: Tree, 5-20 m high, bark rough, box-type. Flower colour: White. Flowering period: Jul to Sep. Soils: Loam. Flats, hillsides. IBRA Distribution: JAF, SWA, WAR Florabase records: 18	Highly Unlikely Occurs mainly on Swan Coastal Plain with outlier east of Bunbury
Gastrolobium ovalifolium	Fabaceae	P4		Habit: Prostrate, spreading shrub, to 0.1 m high. Flower colour: Orange and purple and yellow and red. Flowering period: Aug to Sep Soils: Sandy clay. Gravelly hills. IBRA Distribution: AVW, JAF Florabase records: 25	Known Occurs in Buffer area, EMA Brookton, EMA Central, survey area and extends into Wheatbelt

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Goodenia verreauxii	Goodeniaceae	P4		Habit: Perennial herb to 0.7 m high. Flower colour: Yellow. Flowering period: Dec to Jan. Soils: Yellow, white grey sandy clay over laterite and granite. IBRA Distribution: AVW, JAF Florabase records: 44	Potential Occurs in the Buffer area, mainly north of survey area with an outlier west near Albany Highway
Grevillea drummondii	Proteaceae	P4		Habit: Spreading to erect shrub, 0.2-2(-2.5) m high. Flower colour: Cream and yellow and red. Flowering period: Jun to Sep. Soils: Lateritic soils (sandy clay, gravel, loam, sand), sand over granite. Rocky hillsides, boulders, granite outcrops. IBRA Distribution: AVW, GES, JAF, SWA Florabase records: 27	Highly Unlikely Occurs north in Wheatbelt and extends onto northern sandplains
Grevillea pimeleoides	Proteaceae	P4		Habit: Non-lignotuberous shrub, 0.4-2.4 m high. Flower colour: Yellow-orange. Flowering period: May to Nov. Soils: Gravelly soils over granite. Rocky hillsides. IBRA Distribution: JAF, SWA Florabase records: 36	Potential Occurs in Buffer area, in the northern forests to west of survey areas with outlier near Albany and Perth
Grevillea ripicola	Proteaceae	P4		Habit: Spreading, much-branched, non-lignotuberous shrub, 0.6-2(-3) m high, to 4 m wide. Flower colour: Red/red-orange. Flowering period: Jan or Mar to Apr or Nov to Dec. Soils: Sandy clay, clay or gravelly loam. Swampy flats, granite outcrops, along watercourses. IBRA Distribution: JAF Florabase records: 23	Highly Unlikely Occurs in southern forests southeast and east of Bunbury
Grevillea saccata	Proteaceae	P4		Habit: Diffuse scrambling or trailing shrub, 0.25-0.5 m high, 1-2 m wide. Flower colour: Red. Flowering period: Apr or Jun to Nov. Soils: Yellow or brown sand, often with lateritic gravel. IBRA Distribution: GES, SWA Florabase records: 64	Potential Recorded in Buffer area, survey area, occurs north of forests and onto northern sandplains

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Hemiandra sp. Watheroo (S. Hancocks 4)	Lamiaceae	P4		Habit: Low sprawling shrub, 0.6 m high. Flower colour: Red. Flowering period: Oct to Jan. Soils: Sandplain, grey sands. IBRA Distribution: AVE, GES, JAF, SWA Florabase records: 50	Highly Unlikely Occurs north of survey areas and on northern sandplains
Hemigenia platyphylla	Lamiaceae	P4		Habit: Spreading shrub, 0.2-1.5 m high. Flower colour: Blue-purple. Flowering period: Sep to Nov. Soils: Sandy and loamy soils. Granite rocks, slopes. IBRA Distribution: AVW, ESP, JAF, MAL Florabase records: 22	Potential Occurs in Buffer area, north of survey area with outliers near Albany Highway and in southern Wheatbelt
Hydrocotyle lemnoides	Araliaceae	P4		Habit: Aquatic, floating annual, herb. Flower colour: Purple. Flowering period: Aug to Oct. Soils: Swamps. IBRA Distribution: AVW, GES, JAF, SWA Florabase records: 26	Known Occurs in Buffer area, the EMA Brookton and near survey area with main populations to northwest and north of forests with outlier on northern sandplains
Hypolaena robusta	Restionaceae	P4		Habit: Dioecious rhizomatous, perennial, herb, ca 0.5 m high. Flower colour: - Flowering period: Sep to Oct. Soils: White sand. Sandplains. IBRA Distribution: GES, JAF, SWA Florabase records: 49	Highly Unlikely Recorded mainly north of Perth on Northern sandplains with some outliers in southern forests
Lasiopetalum bracteatum	Malvaceae	P4		Habit: Erect, open shrub, 0.4-1.5 m high. Flower colour: Pink-purple. Flowering period: Aug to Nov. Soils: Sandy clay, clay, lateritic gravel. Along drainage lines, creeks, gullies, granite outcrops. IBRA Distribution: JAF, SWA Florabase records: 45	Known Recorded in Buffer area, EMA Central; although main occurrences on western fringes of the northern forest. Outliers n Wheatbelt within Dryandra forests

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Lasiopetalum cardiophyllum	Malv aceae	P4		Habit: Erect, multi-stemmed shrub, 0.2-0.5 m high. Flower colour: Pink. Flowering period: Aug to Dec or Jan. Soils: Lateritic gravelly soils, sandy clay. Flats, hillslopes. IBRA Distribution: AVW, JAF Florabase records: 34	Known Recorded in Buffer area, EMA Central, EMA Hotham North Extension, the PAA and known mainly from eastern fringes of forest near Boddington with a few outliers in Wheatbelt
Lechenaultia pulvinaris	Goodeniaceae	P4		Habit: Hemispherical, procumbent shrub, 0.03-0.2 m high. Flower colour: Blue. Flowering period: Oct to Dec. Soils: White/grey sand. IBRA Distribution: AVW, JAF Florabase records: 36	Potential In Buffer area, on northern fringes of survey area with main populations in Wheatbelt
Loricobbia skinneri	Fabaceae	P4		Habit: Perennial, erect shrub to 1.8 m high. Flower colour: Yellow-orange-red-brown. Flowering period: - Soils: Sandy loam, wetlands. IBRA Distribution: JAF, SWA Florabase records: 37	Highly Unlikely Occurs south of Dwellingup and on southern Swan Coastal Plain
Microtis quadrata	Orchidaceae	P4		Habit: Erect herb with tuber, 40 cm high. Flower colour: Green/white. Flowering period: - Soils: Winter wet brown loam/clay over laterite. IBRA Distribution: COO, ESP, JAF, SWA, WAR Florabase records: 19	Potential Occurs in Buffer area, on western fringes of forests, on Swan Coastal Plain and in southern forests and southern Wheatbelt
Ornduffia submersa	Menyanthaceae	P4		Habit: Aquatic herb. Flower colour: White. Flowering period: Aug to Oct. Soils: Claypan, wet sandy clay, seasonally inundated wetlands. IBRA Distribution: AVW, ESP, JAF, SWA, WAR Florabase records: 61	Potential Most populations area on the Swan Coastal Plain or in the southern forests and southern Wheatbelt, a few outliers near northern boundary of survey area in Buffer area

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Parsonsia diaphanophleba	Apocynaceae	P4		Habit: Woody climber, to 10 m high. Flower colour: White/cream and pink. Flowering period: Jan to Feb or Apr to Jun or Sep. Soils: Alluvial soils. Along rivers. IBRA Distribution: JAF, SWA Florabase records: 28	Potential Occurs mainly on Swan Coastal Plain with a few occurrences south of survey area. Occurs in Buffer area
Pimelea rara	Thymelaeaceae	P4		Habit: Shrub, 0.2-0.35 m high. Flower colour: White. Flowering period: Dec or Jan. Soils: Lateritic soils. IBRA Distribution: JAF Florabase records: 52	Highly Unlikely Mostly west of survey areas
Schoenus natans	Cyperaceae	P4		Habit: Aquatic annual, grass-like or herb (sedge), 0.3 m high. Flower colour: Brown. Flowering period: Oct. Soils: Winter-wet depressions. IBRA Distribution: AVW, GES, JAF, SWA, WAR Florabase records: 66	Potential Occurs in Buffer area, on fringes of survey area north of Brookton Highway and extends to Swan Coastal Plain, southern forests and Wheatbelt
Senecio leucoglossus	Asteraceae	P4		Habit: Erect annual, herb, to 1.3 meters high. Flower colour: White. Flowering period: August to December. Soils: Gravelly lateritic or granitic soils. Granite outcrops, slopes. IBRA Distribution: JAF, SWA, WAR Florabase records: 47	Known Occurs in Buffer area, EMA Central and PAA, and extends southwards in the Jarrah forests with other occurrences north-east of Perth on the Darling Ranges
Stylidium leptocalyx	Stylidiaceae	P4		Habit: Rosetted perennial, herb, 0.08-0.4 m high. Flower colour: Pink. Flowering period: Oct to Nov. Soils: Laterite soils. Upland, breakaways. Eucalypt woodland or shrubland. IBRA Distribution: JAF, SWA Florabase records: 15	Potential Occurs in Buffer area, north and east of survey area with outlier on northern sandplains

APPENDIX C: LIKELIHOOD OF THREATENED AND PRIORITY SPECIES WITH THE POTENTIAL TO OCCUR ON THE BUFFER, EMA AND PAA SURVEY AREAS

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2018a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; COO – Coolgardie; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren; YAL – Yalgoo. Likelihood of occurrence in survey area is based on a Highly Unlikely, Unlikely, Potential, Likely and Known

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Stylidium longitubum	Stylidiaceae	P4		Habit: Erect annual (ephemeral), herb, 0.05-0.12 m high. Flower colour: Pink. Flowering period: Oct to Dec. Soils: Sandy clay, clay. Seasonal wetlands. IBRA Distribution: GES, JAF, SWA Florabase records: 52	Highly Unlikely Occurs primarily on Swan Coastal Plain with extensions to northern sandplains and Wheatbelt
Stylidium scabridum	Stylidiaceae	P4		Habit: Rosetted perennial, herb, 0.05-0.24 m high. Flower colour: Pink. Flowering period: Sep-Nov. Soils: Sand. Open woodland or heath. IBRA Distribution: AVW, JAF Florabase records: 53	Potential Occurs in Buffer area, north of survey area and extends north and north-east into the Wheatbelt
Stylidium striatum	Stylidiaceae	P4		Habit: Rosetted perennial, herb, 0.15-0.55 m high. Flower colour: Yellow. Flowering period: Oct to Nov. Soils: Brown clay loam over laterite. Hillslopes. Jarrah/Marri forest, Wandoo woodland. IBRA Distribution: GES, JAF, SWA Florabase records: 51	Potential Occurs in Buffer area, recorded in survey area and extends northwards into northern forests and northern sandplains.
Trithuria australis	Hydatellaceae	P4		Habit: Rosetted perennial, herb, 0.15-0.55 m high. Small aquatic herb. Flower colour: - Flowering period: Oct to Dec. Soils: Grey clays, swamps. IBRA Distribution: ESP, GES, JAF, SWA, WAR Florabase records: 19	Unlikely Occurs on northern fringes of survey area, with extensions southwards into forests and into Wheatbelt and northern sandplains
Verticordia lindleyi subsp. *lindleyi*	Myrtaceae	P4		Habit: Erect shrub, 0.2-0.75 m high. Flower colour: Pink. Flowering period: May or Nov to Dec or Jan. Soils: Sand, sandy clay. Winter-wet depressions. IBRA Distribution: GES, JAF, SWA Florabase records: 83	Highly Unlikely Recorded main on Swan Coastal Plain and northern sandplains

APPENDIX C: LIKELIHOOD OF THREATENED AND PRIORITY SPECIES WITH THE POTENTIAL TO OCCUR ON THE BUFFER, EMA AND PAA SURVEY AREAS

Note: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2018a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; COO – Coolgardie; ESP – Esperance Plains; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; SWA – Swan Coastal Plain; WAR – Warren; YAL – Yalgoo. Likelihood of occurrence in survey area is based on a Highly Unlikely, Unlikely, Potential, Likely and Known

Species	Family	SCC	FCC	Description and Habitat		Likelihood of Occurrence
Xanthosia tomentosa	Apiaceae	P4		Habit: Flower colour: Flowering period: Soils: IBRA Distribution: Florabase records:	Prostrate to ascending perennial, herb, 0.2-0.5(-0.9) m high, to 2 m wide. White-cream-pink. Sep to Dec. Lateritic gravelly soils. GES, SWA 52	Highly Unlikely Mainly on northern sandplains

APPENDIX D: SOIL LANDSCAPES (DPIRD, 2020) FOR THE EMA, PAA and BUFFER SURVEY AREAS

Data extracted from Soil Landscapes (DPIRD 2020)

Map Code	Name	Description
257DyBK	Biberkine subsystem (Dryandra)	Valley floors & footslopes with gently undulating rises & low hills. Alluvium and colluvium over granite etc. Yellow brown sandy duplexes, wet and semi-wet soils & brown deep loamy duplexes. Wandoo-Flooded Gum with Jam-Sheoak-Teatree
253QdBK	Biberkine subsystem (Quindanning)	Valley floor subtended by the gentle slopes of Noombling unit; yellow sandy duplex soils and a narrow , lower, sandy terrace
253By_1	Boyagin 1 subsystem	Remnants of the lateritic plateau, often bounded by steep breakaways, in the Eastern Darling Range Zone. Dominated by gravels and colluvial sands derived from gravels with Jarrah/Marri forest and a proteaceae understorey
253By_1v	Boyagin 1 valley phase	Very smoothly undulating depressions in lateritic terrain with pale deep sand, gravelly pale deep sand and minor shallow and deep sandy duplexes (often sodic) with Wandoo vegetation
253By_2	Boyagin 2 subsystem	Uniform to concave colluvial slopes below breakaways and prominent laterite ridges. Mallet, Marri and Wandoo woodland on gravelly duplexes and gravelly yellow earths
253By_3d	Boyagin 3 dolerite phase	Irregularly undulating upper and mid slopes, crests and ridges with dolerite and diorite outcropping. Shallow rocky soils, red/brown loams, loamy duplexes and clays with York Gum woodland
253By_3r	Boyagin 3 rock phase	Irregularly undulating upper and mid slopes, crests and ridges with rock outcrops and minor shallow rocky soils and gritty pale deep sands with Jam and rock Sheoak woodland
253By_3u	Boyagin 3 undifferentiated phase	Mid to lower smoothly undulating colluvial slopes with Wandoo, Jam and York Gum woodland on loams and duplexes. Minor Flooded Gum in wet depressions
253By_4pn	Boyagin 4 pn phase	Depressions and lower slopes within smoothly undulating lateritic terrain with pale deep sand (often gravelly), some yellow deep sand, yellow sandy earth and minor grey shallow sandy duplex (often sodic) with Marri and Wandoo woodland
253By_4w	Boyagin 4 wet phase	Alluvial flats with duplex soils, alluvial loams and clays vegetated by York/Jam and Flooded Gum woodlands
253ByR1	Boyagin, Steep Rocky Hills 1 subsystem	Areas of rock outcrop and steep rocky hills
253Cc_1	Clackline 1 subsystem	Largely intact lateritic surface, often bounded by breakaways. Pisolitic gravelly, yellowish brown soils that vary in texture from loamy sands to clays, with pockets of pale sands and areas of outcropping laterite
253Cc_2	Clackline 2 subsystem	Gravelly slopes and ridges. Yellow gravelly sand and loams with pockets of pisolitic gravel and sandy loam over pink clay below upper slopes. E. wandoo on clay, E. marginata and E. calophylla and Dryandra on gravel

APPENDIX D: SOIL LANDSCAPES (DPIRD, 2020) FOR THE EMA, PAA and BUFFER SURVEY AREAS

Data extracted from Soil Landscapes (DPIRD 2020)

Map Code	Name	Description
253Cc_3d	Clackline 3 dolerite phase	Dolerite dykes on uplands with associated red to brown loamy and clayey soils
253Cc_3g	Clackline 3 granite phase	Granitic soils with numerous small granite outcrops on uplands with associated brown loams
253Cc_3r	Clackline 3 rock phase	Rock outcrops, predominantly granite, with minor skeletal soils
253Cc_3u	Clackline 3 undifferentiated phase	Duplex soils and brown loams formed on uplands and lower slopes from granitic colluvium, vegetated by York Gum and Wandoo
253Cc_4w	Clackline 4 wet phase	Flat valleys infilled by loamy and clayey alluvium, often waterlogged, mafic provenance
253CcLV	Clackline Leaver subsystem	Gravelly slopes and ridges of the dissected western Darling Plateau.Yellow gravelly sand & loams with pockets of pisolitic gravel and sandy loam over pink clay below upper slopes. E.wandoo on clay, E. marginata and calophylla and Dryandra
253Cc_1s	Clackline sandy phase	Pale deep sandy pockets within lateritic uplands
253CcR1	Clackline, Steep Rocky Hills 1 subsystem	Areas of rock outcrop and steep rocky hills
255DpCO	Cooke subsystem	Crests and upper slopes dominated by granite outcrop and very shallow yellow duplex soils, and yellow and brown massive earths
253ByCO	Cooke subsystem (Boyagin)	Residual granite, laterite and duricrust crests above the Yalanbee, Pindalup and Michibin units.Shallow to very shallow sandy to clayey sands derived from granite and gneiss
253MuCKr	Coolakin (Marradong), rocky phase	Minor Valleys bounded by Dwellingup or Norrine units; moderate slopes with gravelly and sandy yellow duplex soils; a minor valley floor with sandy alluvium; occasional rock outcrops and laterite spur
253MuCKrx	Coolakin (Marradong), very rocky phase	Minor Valleys bounded by Dwellingup or Norrine units; moderate slopes with gravelly and sandy yellow duplex soils; a minor valley floor with sandy alluvium; occasional rock outcrops and laterite spur
253ByCK	Coolakin subsystem (Boyagin)	Minor Valleys bounded by Dwellingup or Norrinee units; moderate slopes with gravelly and sandy yellow duplex soils; a minor valley floor with sandy alluvium; occasional rock outcrops and laterite spur

APPENDIX D: SOIL LANDSCAPES (DPIRD, 2020) FOR THE EMA, PAA and BUFFER SURVEY AREAS

Data extracted from Soil Landscapes (DPIRD 2020)

Map Code	Name	Description
253MuCK	Coolakin subsystem (Marradong)	Minor Valleys bounded by Dwellingup or Norrine units; moderate slopes with gravelly and sandy yellow duplex soils; a minor valley floor with sandy alluvium; occasional rock outcrops and laterite spur
253Da_4w	Dale 4 w phase	Narrow valley floors in the West Kokeby and Dale River areas containing loams and sand over clay soils and pale sands
253DaMA	Dale Maitland subsystem	Swamps found on the broad valley floors in the West Kokeby - Dale area
253DaDA	Dale subsystem	Broad valley floors in the West Kokeby and Dale River areas containing sand over clay soils and pale sands
253MuDWr	Dwellingup (Marradong), rock outcrop phase	Granite rock outcrop with stony soils and shallow gravels
253MuDWrx	Dwellingup (Marradong), very rocky phase	Granite rock outcrop with stony soils and shallow gravels
255DpDWr	Dwellingup rock outcrops phase	Granite rock outcrop with stony soils and shallow gravels
255DpDWs	Dwellingup sandy divides phase	Soils formed on Kirup conglomerate and other sandy sediments. Soils are sandy gravels, deep sands and sandy earths
255DpDW	Dwellingup subsystem	Divides, lower to upper slopes and hillcrests. Duplex sandy gravels and loamy gravels with minor areas of shallow gravels, deep sandy gravels, yellow deep sands and yellow and pale deep sands, often gravelly
253MuDW	Dwellingup subsystem (Marradong)	Divides, lower to upper slopes and hillcrests. Duplex sandy gravels and loamy gravels with minor areas of shallow gravels, deep sandy gravels, yellow deep sands and yellow and pale deep sands, often gravelly
253QdDW	Dwellingup subsystem (Quindanning)	Divides, lower to upper slopes and hillcrests. Duplex sandy gravels and loamy gravels with minor areas of shallow gravels, deep sandy gravels, yellow deep sands and yellow and pale deep sands, often gravelly
253WnGO	Goonaping subsystem (Wundowie)	Level to gently sloping imperfectly drained swampy margins with deep grey, yellowish brown or brown siliceous or bleached sands
255MvHR	Hester subsystem (Murray)	Ridges and hill crests on laterite and gneiss, relief 5-40 m, slopes 5-15%. Soils are sandy gravels, loamy gravels and loamy earths

APPENDIX D: SOIL LANDSCAPES (DPIRD, 2020) FOR THE EMA, PAA and BUFFER SURVEY AREAS

Data extracted from Soil Landscapes (DPIRD 2020)

Map Code	Name	Description
253DaKOlat	Kokeby laterite phase	Lateritised ridges and crests with shallow gravels and sandy gravels under proteaceous heath
253DaKO	Kokeby subsystem	Very gently sloping areas located in small pockets on summits and at breaks of slope. White and deeply bleached sand over laterite at greater than one metre depth
253ByLV	Leaver subsystem	Gravelly slopes and ridges of the western Darling Plateau. Gravelly yellow and red duplexes, gravelly deep clayey sands and sandy loams over laterite and clay. E.calophylla, Dryandra spp., Adenanthos with E. wandoo and E. marginata on clay
253ByMN	Michabin subsystem (Boyagin)	Hillslopes formed from weathering fresh rock and rock outcrop. Red and yellow loams and clays, often with gravelly and saline areas . E loxophleba, wandoo are common with casuarinas on rocky and E.marginata and accedens on gravelly clays
253QdMNr	Michibin (Quindanning), rocky phase	Hillslopes containing soils formed by the weathering of fresh rock. Rock outcrop is common
253QdMNrx	Michibin (Quindanning), very rocky phase	Hillslopes containing soils formed by the weathering of fresh rock. Rock outcrop is common
253CcMN	Michibin subsystem	Gentle to moderate hill slopes of freshly weathered soils. Red and yellowish brown loams and clays, often gravelly with rocky areas and lateritic crests. E. loxophleba and wandoo. Casuarina on rock and E.marginata and accedens on gravel
253QdMN	Michibin subsystem (Quindanning)	Hillslopes containing soils formed by the weathering of fresh rock. Rock outcrop is common
255DpMH	Mornington Hill subsystem	Low hills on laterite overlying granite, relief 40-80 m, slope5-20%. Soils are sandy and loamy gravels with some deep sands and loamy earths
255MvMYr	Murray rock outcrop phase	Deeply incised valley of the Murray River; areas of shallow soils and scattered rock outcrops
255MvMY	Murray subsystem	Deeply incised valley of the Murray River; red and yellow earths and minor duplex soils; occasional rock outcrops; narrow sandy terrace
255MvMYrx	Murray, very rocky phase	Deeply incised valley of the Murray River; areas dominated by rock outcrop
257DyNBr	Noombling (Dryandra), rocky phase	Long gentle and undulating hillslopes and divides with common (15-20%) rock outcrops. Bare rock, stony soils and yellow/brown and grey deep sandy duplexes

APPENDIX D: SOIL LANDSCAPES (DPIRD, 2020) FOR THE EMA, PAA and BUFFER SURVEY AREAS

Data extracted from Soil Landscapes (DPIRD 2020)

Map Code	Name	Description
257DyNB	Noombling subsystem (Dryandra)	Long gentle and undulating hillslopes and divides. Colluvium / weathered granite, gneiss and some dolerite. Yellow/brown and grey deep sandy duplexes, brown deep loamy duplexes, sandy gravels and shallow duplexes. Marri-Wandoo / Jam-Sheoak
253MuNOr	Norrine (Marradong), rocky phase	Small (20-1000 ha) lateritic residuals (mesas) and associated pediments on Deeply weathered profile over granite, gneiss and occasionally dolerite; Duricrust
257DyNO	Norrine subsystem (Dryandra)	A complex of lateritic residuals and associated pediment; gravely sand, sand, duplex yellow soils and duricrust
253MuNO	Norrine subsystem (Marradong)	A complex of lateritic residuals and associated pediment; gravely sand, sand, duplex yellow soils and duricrust
257PbNO	Norrine subsystem (Pumphreys)	A complex of lateritic residuals and associated pediment; gravely sand, sand, duplex yellow soils and duricrust
253QdNO	Norrine subsystem (Quindanning)	A complex of lateritic residuals and associated pediment; gravely sand, sand, duplex yellow soils and duricrust
253WnPNh	Pindalup hillslope phase	Very gently to gently inclined sideslopes (<10%) with well drained gravelly brownish sands, pale brown sands and earthy sands
255DpPNh	Pindalup hillslope phase	Sideslopes of minor valleys
255DpPNr	Pindalup rock outcrop phase	Rocky slopes
253WnPN	Pindalup subsystem	Shallow upper gently to sloping valleys. Alluvial red and yellow duplex and uniform fine soils which are often gravelly. Salinity prone especially in upper reaches. E. wandoo woodland with some E. rudis & camaldulensis, Acacia and Titree
255DpPN	Pindalup subsystem	Shallow minor valleys (5-20 m) with gentle sideslopes (3-10%). and broad swampy floors. Soils are loamy gravels, and deep sands, and non-saline wet soils on the valley floors
253ByPN	Pindalup subsystem (Boyagin)	Shallow upper gently to sloping valleys. Alluvial red and yellow duplex and uniform fine soils which are often gravelly. E. wandoo but with some and E. marginata and small areas of E. accedens, E.loxophleba, acacias and Casuarinas on salt
253WnPNsw	Pindalup swampy valley floor phase	Swampy floors of minor valleys

APPENDIX D: SOIL LANDSCAPES (DPIRD, 2020) FOR THE EMA, PAA and BUFFER SURVEY AREAS

Data extracted from Soil Landscapes (DPIRD 2020)

Map Code	Name	Description
255DpPNsw	Pindalup swampy valley floor phase	Swampy floors of minor valleys
255DpPNu	Pindalup upstream valleys phase	Shallow minor valleys (10-20 m) with gentle sideslopes (3-10%). and swampy floors (50-75 m wide). Soils are loamy gravels, and deep sands, and non-saline wet soils on the valley floors
255DpPNrx	Pindalup very rocky phase	Very rocky slopes
257PbPG	Popanyinning subsystem (Pumphreys)	Broad valley floor; yellow duplex soils and a narrow lower sandy terrace, spoadic sand dunes
253DaSH	Sheahan subsystem	Pockets of deep, pale sand common on hillslopes
255DpWG	Wilga subsystem	Broad gently undulating (1-5%) plains and low rises (2-15 m) with swampy depressions. Lateritic terrain over Eocene sediments. Soils are sandy and loamy gravels, with some deep sands, semi-wet soils and wet soils
255DpWGw	Wilga wet flats phase	Poorly drained flats and depressions with some sandy and gravelly rises. Soils are non-saline wet soils and sands with some gravels
253CcWL	Williams subsystem	Valley floors of the major tributary streams in the western part of the survey area
253ByWL	Williams subsystem (Boyagin)	Valley floors of the major tributary streams in the western part of the survey area
253QdWL	Williams subsystem (Quindanning)	Valley floor subtended by the steep slopes of the Michibin unit; yellow duplex soils and a lower sandy terrace
253Wn_1	Wundowie 1 subsystem	Residual plateau dissected by Pindalup valleys. Pisolitic gravelly, yellowish brown soils that vary in texture from loamy sands to clays, with pockets of pale sands and areas of outcropping laterite.
253Wn_2	Wundowie 2 subsystem	Steep colluvial deposits derived from lateritic plateau and small areas stripped of laterites, with loamy gravels, sandy gravels, acid shallow duplex and loamy duplex soils and Wandoo, Powderbark Wandoo and Mallet woodland with Dryandra
253Wn_3r	Wundowie 3 rock phase	Crystalline rock outcrops within lateritic terrain

APPENDIX D: SOIL LANDSCAPES (DPIRD, 2020) FOR THE EMA, PAA and BUFFER SURVEY AREAS

Data extracted from Soil Landscapes (DPIRD 2020)

Map Code	Name	Description
253Wn_4	Wundowie 4 subsystem	Narrow valleys within lateritic terrain with deep pale sands and sandy duplex soils, vegetated by Jarrah, Marri and Wandoo
253WnCO	Wundowie, Cook subsystem	Residual granite, laterite and duricrust crests above Yalanbee, Pindalup and Michibin. Shallow clayey sands and loams derived from granite and gneiss. Low shrublands, heath, sedges and some low E. wandoo and. Marginata and Acacia spp.
253ByYA	Yalanbee subsystem	Undulating, Darling Range upland. Pisolitic gravelly, yellowish brown soils that vary from loamy sands to clays, with pockets of pale sands and rock. E. marginata & calophylla and Dryandra on sand, E. wandoo clays and E.accedens on crests
253CcYA	Yalanbee subsystem	Undulating, Darling Range upland which contains predominantly "buckshot gravel"' soils
253WnYA	Yalanbee subsystem	Residual plateau at the top of the landscape shallowly dissected by Pindalup valleys.Pisolitic gravelly, yellowish brown soils that vary in texture from loamy sands to clays, with pockets of pale sands and areas of outcropping laterite.
255DpYGh	Yarragil DpYGh phase	Very gentle to moderately inclined (<20%) concave valley sideslopes.Moderately well drained yellow duplex soils and yellow and brown massive earths
255DpYG	Yarragil subsystem	Shallow, narrow, upper valleys of the deeply dissected Murray, Bindoon and Helena units. Alluvial, clay and loam soils, moderately well drained, often gravelly, with some sands and loams. Salt prone. Woodland of E. wandoo, E. accedens
255DpYGsw	Yarragil Swamp phase	Level to very gently inclined valley floors. Swampy river flats and terraces in granitic rocks; loamy and sandy duplex, wet soils, non-cracking clays and loams

APPENDIX E: VEGETATION MAPPING UNITS AS DEFINED BY BENNETT (2004) FOR BROOKTON MID-CENTRAL SURVEY AREAS

SITE VEGETATION TYPE	DESCRIPTION OF VEGETATION
D	Open Woodland to Woodland of *Eucalyptus marginata* subsp. *thalassica* and *Corymbia calophylla* on the lower slopes with mixed understorey species characterized by *Babingtonia camphorosmae* and *Mesomelaena tetragona* or occasionally *Mesomelaena graciliceps*. This site vegetation type was not common in the surveyed bauxite resource.
HS	Open forest to Woodland of *Eucalyptus marginata subsp. thalassica* and *Corymbia calophylla* over shrubland of *Banksia sessilis* and/ or *Banksia squarrosa* subsp. *squarrosa* over low shrubland of mixed species. Often there was another stratum of Low Open Woodland of *Banksia grandis*. This site vegetation type occurred on the sandier soils often with gravel. It occurred on the middle to upper.
HS (2)-	This site vegetation type was the same as HS but varied in the dominance of *Bossiaea pulchella* in the lower stratum. This site vegetation type occurred on the sandier soils often with gravel. It occurred on the middle to upper
HG	Woodland to Open woodland of *Eucalyptus marginata* subsp. *thalassica* and occasionally *Corymbia calophylla* , over an Open Low Heath with a mixture of species including *Banksia armata*, *Hakea stenocarpa*, *Hakea incrassata*, *Pericalymma ellipticum*, *Grevillea bipinnatifida*, *Styphelia tenuiflora*, *Lepidosperma squamatum* and *Xanthorrhoea preissii*. This site vegetation type was recorded from sandy gravel soils on the lower to middle slopes.
HP	Open Forest to Woodland of *Eucalyptus marginata* subsp. *thalassica* with scattered *Corymbia calophylla* over a varied understorey. The dominant species varied between *Calothamnus sanguineus* , *Allocasuarina humilis*, *Hibbertia hypericoides* and *Banksia sphaerocarpa* often with *Hakea ruscifolia* and *Hakea cyclocarpa*. This site type occurred on the sandier soils with gravel on the slower slopes or flat ground. It was the dominant site type and varied between areas of dominant species to a general species mix.
HP2	This site type was the same as HP but included *Bossiaea pulchella* and often the sedge *Loxocarya striata* as dominate species in the understorey. This unit was located in the Brookton mining envelope.
PS	Open Forest to Woodland *Allocasuarina fraseriana*, *Eucalyptus marginata* subsp.*thalassica* and occasionally *Corymbia calophylla* over a Shrubland of *Banksia sessilis* often with a Low Open Shrubland of various species. This site vegetation type occurred on the lower slopes or flat areas in sandy to sandy gravel soils. There were only a few areas of this site vegetation type recorded in the survey.
M	Woodland of *Eucalyptus wandoo* over Shrubland dominated by *Macrozamia riedlei*, *Xanthorrhoea preissii*, *Hakea lissocarpha* and *Trymalium ledifolium* var. *rosmarinifolium*. The site type occurred in the middle to upper valley ranges on sandy loam gravelly soils. Generally the vegetation was sparse.

APPENDIX E: VEGETATION MAPPING UNITS AS DEFINED BY BENNETT (2004) FOR BROOKTON MID-CENTRAL SURVEY AREAS

SITE VEGETATION TYPE	DESCRIPTION OF VEGETATION
Y	Woodland of *Eucalyptus wandoo* with an open understory that included *Gastrolobium calycinum* . This taxon was not common in the survey area. This site type occurred in the lower areas in clay-loam soils that were seasonally moist. Very few locations of this site type were recorded during the survey.
YG	Woodland of *Eucalyptus wandoo* with occasional scattered *Eucalyptus marginata* subsp. *thalassica* over Shrubland of *Banksia squarrosa* subsp. *squarrosa* over Low Shrubland that included *Allocasuarina humilis*, *Hakea lissocarpha* and *Banksia lindleyana*. The site type occurred in most soils but higher landscape than site type Y.
YP	Woodland of *Eucalyptus wandoo* over Low Shrubland that was dominated by *Hakea lissocarpha* and *Hibbertia commutata*. The site type occurred in most soils but higher landscape than site type Y.
P	Open Forest to Woodland of *Eucalyptus marginata* subsp. *thalassica* over an Open Low Heath that was dominated by *Lasiopetalum cardiophyllum* and *Banksia sphaerocarpa*. This site type occurred in the sandy gravelly soils on the mid slopes , but was only located in the southern extent of the survey area.
SP	Open Forest to Woodland of *Eucalyptus marginata* subsp. *thalassica* over a Low Woodland of *Banksia grandis* over an Open Low Heath dominated by *Lasiopetalum cardiophyllum* and *Lechenaultia biloba*. This site type occurred in the sandy gravelly soils on the mid slopes , higher than site type P. This was only located in the Southern extent of the survey area.
S	Open Forest to Woodland of *Eucalyptus marginata* subsp. *thalassica* over a Low Woodland of *Banksia grandis* over a Tall Shrubland dominated by *Acacia celastrifolia* and *Hakea cyclocarpa*. This site type occurred in laterite sandy loam on the middle to upper slopes . Only a few areas of this site type were recorded during this survey.
R	Open Forest to Woodland of *Eucalyptus marginata* subsp. *thalassica* over a Shrubland to Open Shrubland dominated by *Xanthorrhoea preissii*, *Hibbertia hypericoides*, *Hakea ruscifolia* and *Petrophile serruriae*. This site type occurred in the sandy loam gravels on the lower and middle slopes. Occasional trees of *Eucalyptus wandoo* or *Eucalyptus accedens* were recorded.
R2	Woodland of *Eucalyptus marginata* subsp. *thalassica* over and Open Low Heath dominated by *Conospermum stoechadis* subsp. *stoechadis* , *Styphelia tenuiflora* , *Grevillea monticola* , *Hakea ruscifolia* and *Patersonia rudis* in sand with scattered laterite pebbles. This site type occurred in the sandy loam gravels on the flats and lower slopes.

APPENDIX E: VEGETATION MAPPING UNITS AS DEFINED BY BENNETT (2004) FOR BROOKTON MID-CENTRAL SURVEY AREAS

SITE VEGETATION TYPE	DESCRIPTION OF VEGETATION
J	Woodland of *Eucalyptus marginata* subsp. *thalassica* over and Open Low Heath dominated by *Conospermum stoechadis* subsp. *stoechadis* , *Styphelia tenuiflora*, *Grevillea monticola*, *Hakea ruscifolia* and *Patersonia rudis* in sand with scattered laterite pebbles. This site type occurred in the lower often flat areas.
DG	Granite outcrop. Open woodland of *Corymbia calophylla* and *Eucalyptus marginata* subsp. *thalassica* over a mixed shrubland that includes *Hypocalymma angustifolium* over Herb land of mixed annuals. The trees surround the granite outcrop and the shrubs and herbs occur in the shallower soils of the outcrop
G2	Open Tree Mallee of *Eucalyptus aspersa* over a Low Heath of mixed species dominated by *Hibbertia hypericoides* and *Hibbertia huegelii*. This site type occurred in lower areas in a sandy gravel soil
G4	Open Tree Mallee of *Eucalyptus decurva* over a Low Heath of mixed species dominated by *Hakea ruscifolia*, *Banksia armata* and *Gahnia ancistrophylla*. This site type occurred on the flats and lowers lopes on a sandy gravel soil
G5	Open Tree Mallee of *Eucalyptus drummondii* over a Low Heath of mixed species dominated by *Banksia sphaerocarpa*, *Banksia armata*, *Hakea incrassata.* This site type occurred on the flats and lower slopes in a sandy gravel soil. Some of the sites included the priority flora *Eucalyptus latens* and *Gastrolobium ovalifolium*
G6	Open to Closed Low Heath of mixed species dominated by *Leptospermum erubescens, Banksia sphaerocarpa* and *Banksia armata* in sandy gravel soils. These heaths occurred as scattered , often small areas throughout the survey area.
G7	Open to Closed Low heath of mixed species dominated by *Banksia armata, Hakea cyclocarpa, Hakea lissocarpha, Hypocalymma angustifolium, Allocasuarina humilis* and *Leptosspermum erubescens*. These heaths occurred as scattered , often mall areas usually adjacent to site vegetation types HG and EaDa.
Michibin Complex	Low open Forest of *Allocasuarina huegeliana* over Shrubland to Low Shrubland dominated by *Hakea undulata* and *Grevillea bipinnatifida*. Occurs in sandy clay , often shallow soils.

APPENDIX E: VEGETATION MAPPING UNITS AS DEFINED BY BENNETT (2004) FOR BROOKTON MID-CENTRAL SURVEY AREAS

SITE VEGETATION TYPE	DESCRIPTION OF VEGETATION
EaBp	Woodland to Open Forest of *Eucalyptus accedens* with scattered *Eucalyptus wandoo* over a Tall Open Shrubland of *Banksia sessilis* over an Open Low Heath to Shrubland of *Bossiaea pulchella* and *Netrostylis capillaris*. This Unit occurs on the upper slopes to ridges in sandy loam gravel soils with outcropping laterite.
EaDa	Woodland to Open Forest of *Eucalyptus accedens* with scattered *Eucalyptus wandoo* over an Open Low Heath dominated by *Hakea stenocarpa*, *Banksia armata*, *Petrophile serruriae* and *Patersonia rudis*. This unit occurs on the upper slopes to ridge in sandy loam gravel soils with outcropping laterite
EaDs	Woodland to Open Forest of f *Eucalyptus accedens* with scattered *Eucalyptus wandoo* and/ or *Eucalyptus marginata* subsp. *thalassica* over a Tall Open to Closed Scrub of *Banksia sessilis* over a Low Open Shrubland dominated by *Gastrolobium villosum* and *Patersonia rudis*. This unit occurs on the upper slopes to ridges in sandy loam gravel soils with outcropping laterite.
EaHh	Woodland to Open Forest of *Eucalyptus accedens* with scattered *Eucalyptus wandoo* and/ or *Eucalyptus marginata* subsp. *thalassica* over a an Heath of *Banksia squarrosa* subsp. *squarrosa* and a Low Open Shrubland dominated by *Hibbertia hypericoides*, *Hakea lissocarpha* and *Allocasuarina humilis*. This unit occurs on the upper slopes to ridges in sandy loam gravel soils with outcropping laterite.