
FLORA, VEGETATION AND FAUNA ASSESSMENT

15 GUNBAR WAY (LOT 4), KALAMUNDA

Prepared By



Mattiske Consulting Pty Ltd

Date

July 2018



DOCUMENT STATUS				
DOCUMENT REFERENCE: ALL1801				
VERSION	TYPE	AUTHOR/S	REVIEWER/S	DATE DISTRIBUTED
V1	Report	E. Mattiske, E.Chetwin	E.M. Mattiske	8/7/2018



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TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	1
1. INTRODUCTION	2
1.1. Location and Scope of Project	2
1.2. Environmental Legislation and Guidelines	2
2. OBJECTIVES	2
3. METHODS	4
3.1. Desktop Assessment	4
3.2. Field Survey	4
4. DESKTOP ASSESSMENT RESULTS	4
4.1. Potential Flora	4
4.2. Potential Threatened and Priority Flora	4
4.3. Potential Threatened and Priority Ecological Communities	4
4.4. Potential Threatened and Priority Fauna	5
5. FIELD SURVEY RESULTS	5
5.1. Flora	5
5.2. Threatened and Priority Flora	5
5.3. Introduced (Weed) Species and Declared Pest (Plant) Organisms	5
5.4. Vegetation	5
5.5. Vegetation Condition	5
5.6. Threatened and Priority Ecological Communities	7
5.7. Threatened and Priority Fauna Species	7
7. PERSONNEL	10
8. REFERENCES	10

TABLE

- 1: Potential limitations affecting the conclusions made in this report

FIGURE

- 1: Locality – Aerial Photograph of 15 Gunbar Way Kalamunda

PLATES

- 1: Photograph of vegetation condition
2: Photograph of vegetation condition
3: Photograph of vegetation condition

APPENDICES

- A: Vascular Plant Species with the potential to occur on 15 Gunbar Way
B: Assessment of Threatened and Priority Flora potentially present at 15 Gunbar Way
C: Assessment of Threatened and Priority Fauna potentially present at 15 Gunbar Way
D: Summary of Vascular Plant Species recorded at 15 Gunbar Way Kalamunda, July 2018

LIST OF ABBREVIATIONS

- BAM Act:** *Biosecurity and Agriculture Management Act 2007* (WA)
BC Act: *Biodiversity Conservation Act 2016* (WA)
BOM: Bureau of Meteorology
DotEE: Department of the Environment and Energy
DPIRD: Department of Primary Industries and Regional Development
EP Act: *Environmental Protection Act 1986* (WA)
EPA: Environmental Protection Authority
EPBC Act: *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
MCPL: Matiske Consulting Pty Ltd
PEC: Priority ecological community
TEC: Threatened ecological community
WAH: Western Australian Herbarium (PERTH)
WAOL: Western Australian Organism List
WC Act: *Wildlife Conservation Act 1950* (WA)

EXECUTIVE SUMMARY

Mattiske Consulting Pty Ltd was commissioned in June 2018 to undertake a desktop assessment of flora, vegetation and fauna values that have the potential to occur on 15 Gunbar Way (Lot 4), Kalamunda. This assessment is required by the City of Kalamunda as part of the proposed housing development on 15 Gunbar Way (Lot 4) covering 4553m². A field assessment was undertaken by experienced biologists in July 2018, in accordance with methods outlined in Technical Guidance Statements for Flora, Vegetation and Fauna (EPA 2004a, 2004b, 2016a and 2016b).

Flora

A total of 39 vascular plant taxa, representative of 32 genera and 19 families, were recorded on Gunbar Way, Kalamunda. The majority of taxa recorded were representative of the Proteaceae (5 taxa) and Fabaceae (5 taxa) families. 13 of the 39 species recorded were introduced species.

No threatened flora species pursuant to subsection (2) of section 23F of the *WC Act* and as listed by the Department of Biodiversity, Conservation and Attractions (DBCA, 2018), or pursuant to section 179 of the *EPBC Act* or listed by the Department of the Environment and Energy (DotEE, 2018b), were recorded on 15 Gunbar Way, Kalamunda. There were also no priority flora species, as listed by the Western Australian Herbarium (WAH, 1998-), recorded on 15 Gunbar Way, Kalamunda. Although the field studies were undertaken in July 2018 and not during the spring, the timing is not likely to have influenced the outcome of findings as the understorey was degraded and very disturbed. The latter disturbance was evident from the lack of native understorey species and the presence of 13 introduced plant species which tended to dominate the understorey. Of the 13 introduced species one of these, **Asparagus asparagoides* (Bridal Creeper) is a declared pest organisms (Department of Primary Industries and Regional Development DPIRD, 2018). **Asparagus asparagoides* is also listed as a Weed of National Significance.

Vegetation

The vegetation is dominated by a forest of *Corymbia calophylla* – *Eucalyptus marginata* – *Allocasuarina fraseriana* (Marri-Jarrah-Sheoak). This community is well represented in the conservation areas in the northern Jarrah forest. The latter tree species are typical of the forest and woodlands on the lateritic uplands of the Darling Ranges and is not restricted in extent. As mentioned above the understorey was degraded and few native species persisted in the understorey. The condition of all vegetation on 15 Gunbar Way, Kalamunda is considered "Degraded". The main value on 15 Gunbar Way related to the density of the overstorey trees. There were 47 mature aged trees recorded by Bowden Tree Consultancy (2018). Further details on the size of the trees and condition of the trees is summarized in the Bowden Tree Consultancy report (2018)

No Threatened Ecological Communities or Priority Ecological Communities were recorded on 15 Gunbar Way, Kalamunda (Department of Biodiversity, Conservation and Attractions 2016, 2017b, Department of the Environment and Energy 2018c).

Fauna

On the basis of the desktop assessment of potential fauna species and field observations it appears that the main fauna values relate to the occasional foraging of the Marri (*Corymbia calophylla*) fruit by the Black Cockatoos and some diggings from Bandicoots. The foraging activities were evident from the chewed fruit on the ground. There was no evidence of nesting or roosting activities by the Cockatoos. Further the latter is unlikely in this largely urban environment near the property. The Bandicoots appear to have been increasing in residential areas in Kalamunda in recent years.

Of the latter findings, the foraging activities of the Black Cockatoos remains the main value of the flora, vegetation and fauna species on 15 Gunbar Way, Kalamunda. As the latter Black Cockatoos species are listed at the State and Federal levels there is a need to negotiate the potential impacts of the proposed activities with Local, State and Federal government agencies.

1. INTRODUCTION

1.1. Location and Scope of Project

Mattiske Consulting Pty Ltd was commissioned in June 2018 to undertake a desktop assessment of flora, vegetation and fauna values that have the potential to occur on 15 Gunbar Way, Kalamunda to support a clearing permit application (see Figure 1). A field assessment was undertaken by experienced botanists and biologists in July 2018, in accordance with methods outlined in Technical Guidance – Flora and vegetation surveys for environmental impact assessment.

1.2. Environmental Legislation and Guidelines

The following key Commonwealth (federal) legislation relevant to this survey is the:

- *Environment Protection and Biodiversity Conservation Act 1999.*

The following key Western Australian (state) legislation relevant to this survey include the:

- *Biodiversity Conservation Act 2016* (BC Act);
- *Biosecurity and Agriculture Management Act 2007* (BAM Act);
- *Environmental Protection Act 1986* (EP Act); and
- *Wildlife Conservation Act 1950* (WC Act).

Furthermore, key Western Australian guidelines relevant to this survey are the:

- Environmental Protection Authority 2004a, *Guidance for the assessment of environmental factors – terrestrial flora and vegetation surveys for environmental impact assessment in Western Australia*, No. 51, Environmental Protection Authority, Western Australia.
- Environmental Protection Authority 2004b, *Guidance for the assessment of environmental factors – terrestrial fauna surveys for environmental impact assessment in Western Australia*, No. 51, Environmental Protection Authority, Western Australia.
- Environmental Protection Authority 2016a, *Environmental Factor Guideline: Flora and Vegetation*, Environmental Protection Authority, Western Australia.
- *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b), Environmental Protection Authority, Western Australia.

2. OBJECTIVES

The objective of this survey was to undertake a flora, vegetation and fauna assessment of 15 Gunbar Way Kalamunda, including:

- Undertake a desktop study of the potential flora, vegetation and fauna values;
- Undertake a Reconnaissance level survey of 15 Gunbar Way, Kalamunda;
- Review the conservation status of the vascular plant species, fauna species and vegetation by reference to current literature and listings by the Department Biodiversity, Conservation and Attractions (DBCA), plant collections held at the Western Australian State Herbarium (WAH), and listings by the Department of the Environment and Energy (DotEE) under the EPBC Act;
- Prepare a report summarising the findings.



3. METHODS

3.1. Desktop Assessment

A desktop assessment was conducted using FloraBase (WAH 1998-), NatureMap (DPaW 2007-) and the EPBC Act Protected Matters Search Tool (DotEE 2018a) databases, to identify the possible occurrence of threatened and priority flora and fauna species and threatened and priority ecological communities in the vicinity of 15 Gunbar Way (Lot 4), Kalamunda.

3.2. Field Survey

A reconnaissance level field assessment of the flora and vegetation of 15 Gunbar Way, Kalamunda was undertaken by two experienced biologists from Mattiske Consulting in July 2018 in accordance with methods outlined in Technical Guidance Statements for Flora, Vegetation and Fauna (EPA 2004a, 2004b, 2016a and 2016b). All botanists held valid collection licences to collect flora for scientific purposes, issued under the WC Act. Observations were also undertaken on any evidence of fauna activity on 15 Gunbar Way, Kalamunda.

The search for threatened and priority flora and the search for evidence of fauna activity was undertaken by means of a comprehensive foot-traverses. Flora that was unknown to the botanists was collected to enable confirmation through identification with databases and taxonomic keys.

All plant specimens collected during the field surveys were dried and processed in accordance with the requirements of the WAH. The plant species were identified based on taxonomic literature and through comparison with pressed specimens housed at the WAH. Where appropriate, plant taxonomists with specialist skills were consulted. Nomenclature of the species recorded is in accordance with the WAH (1998-).

4. DESKTOP ASSESSMENT RESULTS

4.1. Potential Flora

A total of 239 vascular plant taxa, representative of 128 genera and 50 families, have the potential to occur in the vicinity of 15 Gunbar Way, Kalamunda (based on NatureMap search results, included in Appendix A).

4.2. Potential Threatened and Priority Flora

Nine threatened flora species, pursuant to subsection (2) of section 23F of the WC Act and as listed by the WAH (1998-) have the potential to occur on 15 Gunbar Way (Appendix B). All of these species, are also pursuant to section 179 of the EPBC Act listed by the DotEE (2018b). Five species are listed as Endangered and four as Vulnerable (Appendix B). A total of five priority flora species as listed by WAH (1998-) have the potential to occur on 15 Gunbar Way (Appendix B).

4.3. Potential Threatened and Priority Ecological Communities

No Threatened Ecological Communities or Priority Ecological Communities are likely to occur on the lateritic uplands associated with 15 Gunbar Way, Kalamunda based on current listings (DPaW 2007- and DotEE 2018a).

4.4. Potential Threatened and Priority Fauna

Nine threatened fauna species, pursuant to subsection (2) of section 23F of the WC Act and as listed by the WAH (1998-) and DBCA (2017a) have the potential to occur on 15 Gunbar Way (Appendix C). All of these species, are also pursuant to section 179 of the EPBC Act listed by the DotEE (2018b). Two species are listed as Critically Endangered, three as Endangered and four as Vulnerable (Appendix C). A total of two priority fauna species as listed by DBCA (2017a) have the potential to occur on 15 Gunbar Way (Appendix C).

5. FIELD SURVEY RESULTS

5.1. Flora

A total of 39 vascular plant taxa, representative of 32 genera and 19 families, were recorded on Gunbar Way, Kalamunda, and Appendix D. The majority of taxa recorded were representative of the Proteaceae (5 taxa) and Fabaceae (5 taxa) families.

5.2. Threatened and Priority Flora

No threatened flora species pursuant to subsection (2) of section 23F of the WC Act and as listed by the DBCA (2018), or pursuant to section 179 of the EPBC Act or listed by the DotEE (2018b), were recorded on 15 Gunbar Way, Kalamunda, Appendix D. There were also no priority flora species, as listed by the WAH (1998-), recorded on 15 Gunbar Way, Kalamunda. Although the field studies were undertaken in July 2018 and not during the spring the timing is not likely to influence the outcome of findings as the understorey was degraded and disturbed.

5.3. Introduced (Weed) Species and Declared Pest (Plant) Organisms

A total of 13 introduced (weed) species were recorded on 15 Gunbar Way, Kalamunda (Appendix D). Of the 13 introduced species one of these, **Asparagus asparagoides* (Bridal Creeper) is a declared pest organisms. **Asparagus asparagoides* is also listed as a Weed of National Significance (DotEE 2018d). The other declared pest organisms pursuant to section 22 of the BAM Act (the remaining 22 are permitted under section 11 of the BAM Act).

5.4. Vegetation

The vegetation is dominated by a forest of *Corymbia calophylla* – *Eucalyptus marginata* – *Allocasuarina fraseriana* (Marri-Jarrah-Sheoak). These communities are well represented in the conservation areas in the northern Jarrah forest. The latter tree species are typical of the forest and woodlands on the lateritic uplands of the Darling Ranges and is not restricted in extent.

5.5. Vegetation Condition

The condition of all vegetation on 15 Gunbar Way, Kalamunda is considered "Degraded" (based on Keighery 1994 scale). The main value on 15 Gunbar Way related to the density of the overstorey trees. The overstorey is relatively intact, although the understorey is very disturbed and degraded with few native species.



Plate 1: **Photograph of vegetation condition**



Plate 2: **Photograph of vegetation condition**



Plate 3: Photograph of vegetation condition

5.6. Threatened and Priority Ecological Communities

No Threatened Ecological Communities as listed by the DBCA (2016) or by DotEE (2018c) were recorded on 15 Gunbar Way, Kalamunda. No Priority Ecological Communities as listed by DBCA (2017b) were recorded on 15 Gunbar Way, Kalamunda.

5.7. Threatened and Priority Fauna Species

On the basis of the desktop assessment of potential fauna species and field observations it appears that the main fauna values relate to the listed Black Cockatoos and the Bandicoots. There was occasional foraging of the Marri (*Corymbia calophylla*) fruit by the Black Cockatoos and some diggings from Bandicoots. The foraging activities were evident from the chewed fruit on the ground. There was no evidence of nesting or roosting activities by the Cockatoos. Further nesting or roosting activities are unlikely in this largely urban environment near the property. The Bandicoots appear to have been increasing in residential areas in Kalamunda in recent years and are locally common in urban areas.

6. DISCUSSION

The aim of the survey was to undertake a flora, vegetation and fauna assessment to support a clearing permit application. 15 Gunbar Way is proposed for a set of housing units.

A general assessment was made of the current survey against a range of factors that may have limited the outcomes and conclusions of this report (Table 1) for the flora and vegetation values.

Table 1: Potential limitations affecting the conclusions made in this report

Note: Adapted from section 3.3.1 of *Guidance for the assessment of environmental factors – terrestrial flora and vegetation surveys for environmental impact assessment in Western Australia, No. 51* (Environmental Protection Authority 2004).

Potential Survey Limitation	Impact on Survey
Sources of information and availability of contextual information (<i>i.e.</i> pre-existing background versus new material)	Not a constraint: Adequate background information was sourced to provide detailed contextual information for the current project.
Scope (<i>i.e.</i> what life forms, <i>etc.</i> , were sampled)	Not a constraint: Vascular flora species were the focus of the survey. Any unknown species or species that resembled threatened or priority flora were thoroughly sampled.
Proportion of flora collected and identified (based on sampling, timing and intensity)	Not a constraint: The proportion of flora collected and identified was adequate for a reconnaissance level flora and vegetation survey. Only one species was not able to be identified to species level.
Completeness and further work which might be needed (was the relevant survey area fully surveyed?)	Not a constraint: Sites were pre-selected using aerial photography to ensure all vegetation communities subjectively identified were sampled.
Mapping reliability	Not a constraint: Adequate coverage of the area was made during the present survey.
Timing, weather, season, cycle	Not a constraint: Surveys were conducted following adequate rainfall in the months preceding the surveys. There were no interruptions to field work due to weather or timing issues.
Disturbances (fire flood, accidental human intervention, <i>etc.</i>)	Not a constraint: No disturbances were encountered within the survey areas that had the potential to adversely affect the survey completion.
Resources (were there adequate resources to complete the survey to the required standard?)	Not a constraint: Resources, in terms of time, equipment, support and personnel were adequate to undertake and complete the survey.
Access problems (<i>i.e.</i> ability to access survey area)	Not a constraint: All sections of the survey area were accessible by foot under escort.
Experience levels (<i>e.g.</i> degree of expertise in plant identification to taxon level)	Not a constraint: Biologists and ecologists have undertaken previous surveys in the local and wider area and were familiar with the flora and vegetation.

A total of 39 vascular plant taxa, representative of 32 genera and 19 families, were recorded on Gunbar Way, Kalamunda. The majority of taxa recorded were representative of the Proteaceae (5 taxa) and Fabaceae (5 taxa) families.

No threatened flora species pursuant to subsection (2) of section 23F of the WC Act and as listed by the DBCA (2018), or pursuant to section 179 of the EPBC Act or listed by the DotEE (2018b), were recorded on 15 Gunbar Way, Kalamunda. There were also no priority flora species, as listed by the WAH (1998-), recorded on 15 Gunbar Way, Kalamunda. Although the field studies were undertaken in July 2018 and

not during the spring the timing is not likely to influence the outcome of findings as the understorey was degraded and disturbed. The latter disturbance was evident from the presence of 13 introduced plant species which tended to dominate the understorey. Of the 13 introduced species one of these, **Asparagus asparagoides* (Bridal Creeper) is a declared pest organisms. **Asparagus asparagoides* is also listed as a Weed of National Significance.

The vegetation is dominated by a forest of *Corymbia calophylla* – *Eucalyptus marginata* – *Allocasuarina fraseriana* (Marri-Jarrah-Sheoak). These communities are well represented in the conservation areas in the northern Jarrah forest. The latter tree species are typical of the forest and woodlands on the lateritic uplands of the Darling Ranges and is not restricted in extent. As mentioned above the understorey was degraded and few native species persisted in the understorey. No Threatened Ecological Communities or Priority Ecological Communities were recorded on 15 Gunbar Way, Kalamunda.

On the basis of the desktop assessment of potential fauna species and field observations it appears that the main fauna values relate to the occasional foraging of the Marri fruit by the Black Cockatoos and some diggings from Bandicoots that appear to have been increasing in populated areas in Kalamunda in recent years.

A brief discussion of relevant clearing principles in relation to the impacts on flora, vegetation and fauna listed under Schedule 5 of the *Environmental Protection Act 1986* is given below:

- a) *Native vegetation should not be cleared if it comprises a high level of biological diversity* – 15 Gunbar Way is dominated by the overstorey species; however the range of native species is low due to the degraded nature of the understorey.
- b) *Native vegetation should not be cleared if it comprises the whole, or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia* – 15 Gunbar Way supports a relatively dense overstorey of Marri trees that are used for foraging occasionally by the listed Black Cockatoos. The size of the property (4553 m²) restricts the value of the trees in the overstorey for foraging activities of the Black Cockatoos. Further, as this area occurs in an urban environment the impact on the Cockatoo species is minimal in both a local and regional context as Kalamunda abuts a large range of conservation areas and forest areas.
- c) *Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora* – No threatened flora species pursuant to subsection (2) of section 23F of the WC Act and as listed by the DBCA (2018), or pursuant to section 179 of the EPBC Act or listed by the DotEE (2018b), were recorded on 15 Gunbar Way, Kalamunda.
- d) *Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of a threatened ecological community* - No TECs, pursuant to Schedule 1 of the WC Act and as listed by the DBCA (2016) or DotEE (2018c) were recorded on 15 Gunbar Way, Kalamunda.
- e) *Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared* – 15 Gunbar Way, Kalamunda is a small remnant of trees in the Kalamunda suburb. The property was considered to be in a degraded condition (Keighery 1994).
- f) Not applicable as 15 Gunbar Way on upper slopes and not near a watercourse or wetland.
- g) Not applicable as 15 Gunbar Way occurs in an urban environment and any clearing is unlikely to lead to land degradation.
- h) Not applicable as 15 Gunbar Way occurs in an urban environment and does impact on any adjacent or nearby conservation areas.
- i) Not applicable as 15 Gunbar Way occurs on upper slopes, any clearing is unlikely to lead to a deterioration in the quality of surface or underground water.
- j) Not applicable as 15 Gunbar Way occurs on upper slopes and the clearing is unlikely to cause or exacerbate, the incidence or intensity of flooding.

Of the latter findings, the foraging activities of the Black Cockatoos remains the main value of the flora, vegetation and fauna species on 15 Gunbar Way, Kalamunda. As the latter Black Cockatoos species are listed at the State and Federal levels there is a need to negotiate the potential impacts of the proposed

activities with Local, State and Federal government agencies. The size of the property (4553 m²) restricts the value of the trees in the overstorey for foraging activities of the Black Cockatoos.

The declared pest organism **Asparagus asparagoides* should be controlled to limit its spread during further proposed development.

7. PERSONNEL

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

NAME	POSITION	PROJECT INVOLVEMENT	FLORA COLLECTION PERMITS
Dr EM Matiske	Managing Director & Principal Ecologist	Planning, site inspection, managing, editing, reporting	SL012274
Mr L Rowles	Experienced Biologist	Fieldwork, data collation	SL012277
Ms E Chetwin	Biologist	Data Collation and Desktop collation	SLL12294
Mr B. Ellery	Senior Botanist	Fieldwork, data collation, plant identifications	SL012282

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APPENDIX A: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR ON 15 GUNBAR WAY

Note: * denotes introduced species, T denotes threatened flora and P1-P4 denote priority flora species (WAH 1998-).

SCC = State conservation category, FCC = Federal conservation category: V = Vulnerable,

E = Endangered and CE = Critically Endangered. 1 DPaW (2007-); 2 DotEE (2018b).

Family	Species	SCC	FCC	Nature Map ¹	EPBC ²
AMARANTHACEAE	<i>Ptilotus drummondii</i> var. <i>drummondii</i>			X	
APIACEAE	<i>Xanthosia candida</i>			X	
ARACEAE	<i>Colocasia esculenta</i>			X	
ASPARAGACEAE	<i>Laxmannia squarrosa</i>			X	
	<i>Lomandra sparteae</i>			X	
	* <i>Ornithogalum thyrsoides</i>			X	
	<i>Sowerbaea laxiflora</i>			X	
	<i>Thysanotus multiflorus</i>			X	
	<i>Thysanotus sparteus</i>			X	
ASTERACEAE	<i>Brachyscome iberidifolia</i>			X	
	* <i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i>			X	
	<i>Lagenophora huegelii</i>			X	
	<i>Lawrencella rosea</i>			X	
	<i>Podolepis gracilis</i>			X	
	<i>Podolepis lessonii</i>			X	
	<i>Xerochrysum macranthum</i>			X	
BORAGINACEAE	<i>Halgania corymbosa</i>	P3		X	
BORYACEAE	<i>Borya sphaerocephala</i>			X	
BRASSICACEAE	* <i>Brassica fruticulosa</i>			X	
BRYACEAE	<i>Rosulabryum campylothecium</i>			X	
CAMPANULACEAE	<i>Isotoma hypocrateriformis</i>			X	
	<i>Lobelia rhombifolia</i>			X	
CARYOPHYLLACEAE	* <i>Silene nocturna</i>			X	
	* <i>Spergula arvensis</i>			X	
CHENOPODIACEAE	<i>Dysphania pumilio</i>			X	
CLADOPHORACEAE	* <i>Linum trigynum</i>			X	
CYPERACEAE	* <i>Cyperus vorsteri</i>			X	
DILLENIACEAE	<i>Hibbertia acerosa</i>			X	
	<i>Hibbertia aurea</i>			X	
	<i>Hibbertia commutata</i>			X	
	<i>Hibbertia glomerata</i> subsp. <i>darlingensis</i>			X	
	<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>			X	
	<i>Hibbertia lasiopus</i>			X	
	<i>Hibbertia ovata</i>			X	
	<i>Hibbertia subvaginata</i>			X	
DITRICHACEAE	<i>Eccremidium pulchellum</i>			X	

E = Endangered and CE = Critically Endangered. 1 DPaW (2007-); 2 DotEE (2018b).

[illegible]

APPENDIX A: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR ON 15 GUNBAR WAY

Note: * denotes introduced species, T denotes threatened flora and P1-P4 denote priority flora species (WAH 1998-).

SCC = State conservation category, FCC = Federal conservation category: V = Vulnerable,

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Family	Species	SCC	FCC	Nature Map ¹	EPBC ²
FABACEAE (continued)	<i>Kennedia coccinea</i>			X	
	<i>Kennedia prostrata</i>			X	
	<i>Kennedia stirlingii</i>			X	
	<i>Labichea lanceolata</i> subsp. <i>lanceolata</i>			X	
	<i>Labichea punctata</i>			X	
	<i>Pultenaea ericifolia</i>			X	
	* <i>Trifolium campestre</i> var. <i>campestre</i>			X	
GERANIACEAE	<i>Erodium cygnorum</i>			X	
GOODENIACEAE	<i>Dampiera alata</i>			X	
	<i>Dampiera coronata</i>			X	
	<i>Dampiera linearis</i>			X	
	<i>Goodenia fasciculata</i>			X	
	<i>Lechenaultia biloba</i>			X	
	<i>Scaevola calliptera</i>			X	
	<i>Scaevola glandulifera</i>			X	
	<i>Scaevola platyphylla</i>			X	
HAEMODORACEAE	<i>Anigozanthos bicolor</i> subsp. <i>bicolor</i>			X	
	<i>Anigozanthos humilis</i> subsp. <i>humilis</i>			X	
	<i>Conostylis androstemma</i>			X	
	<i>Conostylis caricina</i> subsp. <i>caricina</i>			X	
	<i>Conostylis juncea</i>			X	
	<i>Conostylis setosa</i>			X	
	<i>Haemodorum laxum</i>			X	
HEMEROCALLIDACEAE	<i>Hensmania turbinata</i>			X	
	<i>Johnsonia pubescens</i> subsp. <i>pubescens</i>			X	
	<i>Stypandra glauca</i>			X	
HYPOXIDACEAE	<i>Pauridia occidentalis</i> var. <i>quadriloba</i>			X	
IRIDACEAE	<i>Patersonia rudis</i> subsp. <i>rudis</i>			X	
JUNCACEAE	* <i>Juncus microcephalus</i>			X	
LAMIACEAE	<i>Hemiandra pungens</i>			X	
	<i>Hemigenia incana</i>			X	
	* <i>Lavandula stoechas</i> subsp. <i>stoechas</i>			X	
	* <i>Stachys arvensis</i>			X	
	<i>Cassytha glabella</i> forma <i>dispar</i>			X	
MALVACEAE	<i>Commersonia corniculata</i>	P4		X	
	<i>Lasiopetalum bracteatum</i>			X	
	<i>Thomasia grandiflora</i>			X	
	<i>Thomasia macrocarpa</i>			X	
	<i>Thomasia triphylla</i>			X	
MORACEAE	* <i>Ficus carica</i>			X	

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Family	Species	SCC	FCC	Nature Map ¹	EPBC ²
MYRTACEAE	<i>Babingtonia camphorosmae</i>			X	
	<i>Babingtonia pelloeae</i>			X	
	<i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i>			X	
	<i>Calytrix glutinosa</i>			X	
	<i>Corymbia calophylla</i>			X	
	<i>Darwinia apiculata</i>	T	E	X	X
	<i>Darwinia citriodora</i>			X	
	<i>Eucalyptus laeliae</i>			X	
	<i>Eucalyptus marginata</i>			X	
	<i>Eucalyptus todtiana</i>			X	
	<i>Hypocalymma angustifolium</i>			X	
	<i>Hypocalymma robustum</i>			X	
	<i>Leptospermum erubescens</i>			X	
	<i>Rinzia crassifolia</i>			X	
	<i>Taxandria linearifolia</i>			X	
	<i>Verticordia acerosa</i> var. <i>acerosa</i>			X	
	<i>Verticordia densiflora</i> var. <i>densiflora</i>			X	
	<i>Verticordia huegelii</i> var. <i>huegelii</i>			X	
	<i>Verticordia pennigera</i>			X	
	<i>Verticordia plumosa</i> var. <i>plumosa</i>			X	
ORCHIDACEAE	<i>Caladenia hiemalis</i>			X	
	<i>Caladenia longicauda</i> subsp. <i>eminens</i>			X	
	<i>Caladenia longicauda</i> subsp. <i>longicauda</i>			X	
	<i>Caladenia reptans</i> subsp. <i>reptans</i>			X	
	<i>Cyanicula gemmata</i>			X	
	<i>Cyanicula sericea</i>			X	
	<i>Diuris brumalis</i>			X	
	<i>Diuris micrantha</i>		V		X
	<i>Diuris purdiei</i>		E		X
	<i>Drakaea livida</i>			X	
	<i>Eriochilus dilatatus</i> subsp. <i>multiflorus</i>			X	
	<i>Leporella fimbriata</i>			X	
	<i>Microtis atrata</i>			X	
	<i>Prasophyllum elatum</i>			X	
	<i>Prasophyllum hians</i>			X	
	<i>Prasophyllum parvifolium</i>			X	
	<i>Prasophyllum plumiforme</i>			X	
	<i>Pterostylis barbata</i>			X	
	<i>Pterostylis recurva</i>			X	
	<i>Pyrorchis nigricans</i>			X	
	<i>Thelymitra antennifera</i>			X	
	<i>Thelymitra benthamiana</i>			X	
	<i>Thelymitra crinita</i>			X	
	<i>Thelymitra dedmaniarum</i>		E		X
	<i>Thelymitra macrophylla</i>			X	
	<i>Thelymitra magnifica</i>	P1		X	
	<i>Thelymitra stellata</i>		E		X
OXALIDACEAE	<i>Oxalis exilis</i>			X	
	* <i>Oxalis glabra</i>			X	
PHYLLANTHACEAE	<i>Phyllanthus calycinus</i>			X	

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Family	Species	SCC	FCC	Nature Map ¹	EPBC ²
PITTOSPORACEAE	<i>Billardiera fusiformis</i>			X	
	<i>Marianthus candidus</i>			X	
	<i>Marianthus coeruleopunctatus</i>			X	
	<i>Marianthus drummondianus</i>			X	
PLANTAGINACEAE	* <i>Misopates orontium</i>			X	
POACEAE	* <i>Aira cupaniana</i>			X	
	* <i>Cenchrus macrourus</i>			X	
	<i>Neurachne alopecuroidea</i>			X	
POTTIACEAE	<i>Barbula calycina</i>			X	
PROTEACEAE	<i>Adenanthos barbiger</i>			X	
	<i>Banksia dallanneyi</i> var. <i>mellicula</i>			X	
	<i>Banksia menziesii</i>			X	
	<i>Banksia sessilis</i> var. <i>sessilis</i>			X	
	<i>Conospermum huegelii</i>			X	
	<i>Conospermum undulatum</i>		V		X
	<i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>			X	
	<i>Grevillea pilulifera</i>			X	
	<i>Grevillea synapheae</i> subsp. <i>synapheae</i>			X	
	<i>Hakea cyclocarpa</i>			X	
	<i>Hakea incrassata</i>			X	
	<i>Hakea lissocarpa</i>			X	
	<i>Hakea stenocarpa</i>			X	
	<i>Hakea sulcata</i>			X	
	<i>Hakea trifurcata</i>			X	
	<i>Isopogon asper</i>			X	
	<i>Isopogon dubius</i>			X	
	<i>Isopogon sphaerocephalus</i>			X	
	<i>Lambertia multiflora</i> var. <i>darlingensis</i>			X	
	<i>Persoonia elliptica</i>			X	
	<i>Petrophile seminuda</i>			X	
	<i>Petrophile striata</i>			X	
PTERIDACEAE	<i>Cheilanthes austrotenuifolia</i>			X	
	<i>Cheilanthes distans</i>			X	
RANUNCULACEAE	<i>Clematis pubescens</i>			X	
RHAMNACEAE	<i>Cryptandra nutans</i>			X	
	<i>Trymalium ledifolium</i> var. <i>rosmarinifolium</i>			X	
ROSACEAE	* <i>Rubus laudatus</i>			X	
RUBIACEAE	<i>Oepcularia vaginata</i>			X	
RUTACEAE	<i>Asterolasia pallida</i>			X	
	<i>Boronia crenulata</i> var. <i>crenulata</i>			X	
	<i>Boronia cymosa</i>			X	
	<i>Boronia ovata</i>			X	
	<i>Boronia ramosa</i> subsp. <i>ramosa</i>			X	

APPENDIX A: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR ON 15 GUNBAR WAY

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Family	Species	SCC	FCC	Nature Map ¹	EPBC ²
RUTACEAE (continued)	<i>Boronia tenuis</i> <i>Diplolaena andrewsii</i> <i>Philotheca spicata</i>	P4	E	x x	x
SANTALACEAE	<i>Leptomeria cunninghamii</i>			x	
SAPINDACEAE	<i>Diplopeltis huegelii</i> subsp. <i>lehmannii</i>			x	
SOLANACEAE	<i>Anthocercis gracilis</i>		V		x
STYLIDIACEAE	<i>Levenhookia stipitata</i> <i>Stylidium affine</i> <i>Stylidium amoenum</i> <i>Stylidium androsaceum</i> <i>Stylidium ciliatum</i> <i>Stylidium eriopodum</i> <i>Stylidium hispidum</i> <i>Stylidium piliferum</i> <i>Stylidium rhynchocarpum</i> <i>Stylidium scariosum</i> <i>Stylidium tenue</i> subsp. <i>tenue</i>			x x x x x x x x x x x	
THYMELAEACEAE	<i>Pimelea ciliata</i> subsp. <i>ciliata</i> <i>Pimelea imbricata</i> var. <i>piligera</i> <i>Pimelea lehmanniana</i> subsp. <i>nervosa</i>			x x x	

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT AT 15 GUNBAR WAY

SCC = State Conservation Category: T = Threatened P1-P4 denote priority flora species (DPaW 2017); FCC = Federal Conservation Category: V = Vulnerable, E = Endangered and CE = Critically Endangered (EPBC Act). IBRA Distribution: AVW – Avon Wheatbelt; COO – Coolgardie; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; MUR – Murchison; SWA – Swan Coastal Plain; WAR – Warren; YAL – Yalgoo.

¹ Western Australian Herbarium (1998–). ² Likelihood of occurrence is on a Low-Medium-High ranking.

Family	Species	SCC	FCC	Description and Habitat ¹	Likelihood of Occurrence ²
BORAGINACEAE	<i>Halgania corymbosa</i>	P3		Habit Erect shrub, 0.35-1 m high. Flowers Blue-purple Flowering Period Aug-Nov Soils Gravelly soils, soils over granite. IBRA Distribution JAF, SWA. Florabase Records 18	Low
FABACEAE	<i>Acacia anomala</i>	T	V	Habit Slender, rush-like shrub, 0.2-0.5 m high. Flowers Yellow Flowering Period Aug-Sep Soils Lateritic soils on slopes. IBRA Distribution JAF, SWA. Florabase Records 25	Medium
FABACEAE	<i>Acacia oncinophylla</i> subsp. <i>patulifolia</i>	P4		Habit Shrub, 0.5-2.5(-3) m high. Flowers Yellow Flowering Period Aug-Nov or Nov-Dec Soils Granitic soils, occasionally on laterite. IBRA Distribution JAF, SWA. Florabase Records 31	Low
MALVACEAE	<i>Lasiopetalum bracteatum</i>	P4		Habit Erect, open shrub, 0.4-1.5 m high. Flowers Pink-purple Flowering Period Aug-Nov Soils Sandy clay, clay, lateritic gravel. Along drainage lines, creeks, gullies, granite outcrops. IBRA Distribution AVW, JAF, SWA. Florabase Records 45	Low
MYRTACEAE	<i>Darwinia apiculata</i>	T	E	Habit Densely branched shrub, 0.4-0.5 m high. Flowers Green and yellow-red. Flowering Period Oct Soils Lateritic soils. IBRA Distribution JAF, SWA. Florabase Records 10	Medium

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT AT 15 GUNBAR WAY

SCC = State Conservation Category: T = Threatened P1-P4 denote priority flora species (DPaW 2017); FCC = Federal Conservation Category: V = Vulnerable, E = Endangered and CE = Critically Endangered (EPBC Act). IBRA Distribution: AVW – Avon Wheatbelt; COO – Coolgardie; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; MUR – Murchison; SWA – Swan Coastal Plain; WAR – Warren; YAL - Yalgoo.

¹ Western Australian Herbarium (1998–). ² Likelihood of occurrence is on a Low-Medium-High ranking.

Family	Species	SCC	FCC	Description and Habitat ¹	Likelihood of Occurrence ²
ORCHIDACEAE	<i>Diuris micrantha</i>	T	V	Habit Flowers Flowering Period Soils IBRA Distribution Florabase Records Tuberous, perennial, herb, 0.3-0.6 m high. Yellow and brown. Sep-Oct Brown loamy clay JAF, SWA. 6	Low
ORCHIDACEAE	<i>Diuris purdiei</i>	T	E	Habit Flowers Flowering Period Soils IBRA Distribution Florabase Records Tuberous, perennial, herb, 0.15-0.35 m high. Yellow Sep-Oct Grey-black sand, moist. Winter-wet swamps. JAF, SWA. 11	Low
ORCHIDACEAE	<i>Thelymitra dedmaniarum</i>	T	E	Habit Flowers Flowering Period Soils IBRA Distribution Florabase Records Tuberous, perennial, herb, to 0.8 m high. Yellow Nov-Dec or Jan. Granite JAF, SWA. 5	Low
ORCHIDACEAE	<i>Thelymitra magnifica</i>	P1		Habit Flowers Flowering Period Soils IBRA Distribution Florabase Records Perennial, herb. Sep-Oct Stony ridges. JAF, SWA. 12	Low
ORCHIDACEAE	<i>Thelymitra stellata</i>	T	E	Habit Flowers Flowering Period Soils IBRA Distribution Florabase Records Tuberous, perennial, herb, 0.15-0.25 m high. Yellow and brown. Oct-Nov. Sand, gravel, lateritic loam. AVW, GES, JAF, MAL, SWA. 23	Medium

APPENDIX B: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT AT 15 GUNBAR WAY

SCC = State Conservation Category: T = Threatened P1-P4 denote priority flora species (DPaW 2017); FCC = Federal Conservation Category: V = Vulnerable, E = Endangered and CE = Critically Endangered (EPBC Act). IBRA Distribution: AVW – Avon Wheatbelt; COO – Coolgardie; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; MUR – Murchison; SWA – Swan Coastal Plain; WAR – Warren; YAL – Yalgoo.

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Family	Species	SCC	FCC	Description and Habitat ¹	Likelihood of Occurrence ²
PROTEACEAE	<i>Conospermum undulatum</i>	T	V	Habit Flowers Flowering Period Soils IBRA Distribution Florabase Records Erect, compact shrub, 0.6-2 m high. White-other. May-Oct Grey or yellow-orange clayey sand. JAF, SWA. 87	Low
RUTACEAE	<i>Boronia tenuis</i>	P4		Habit Flowers Flowering Period Soils IBRA Distribution Florabase Records Procumbent or erect & slender shrub, 0.1-0.5 m high. Blue/pink-white Aug-Nov Laterite, stony soils, granite. JAF, SWA. 43	Low
RUTACEAE	<i>Diplolaena andrewsii</i>	T	E	Habit Flowers Flowering Period Soils IBRA Distribution Florabase Records Erect shrub, 0.5-1 m high. Red Jul-Oct Loam, clay. JAF, SWA. 19	Low
SOLANACEAE	<i>Anthocercis gracilis</i>	T	V	Habit Flowers Flowering Period Soils IBRA Distribution Florabase Records Erect, spindly shrub, to 0.6(-1) m high. Yellow-green Sep-Oct Sandy or loamy soils, granite outcrops. AVW, JAF. 29	Low

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FAUNA POTENTIALLY PRESENT AT 15 GUNBAR WAY

Note: * denotes introduced species, T denotes threatened fauna and P1-P4 denote priority fauna species (DPaW 2017). SCC = State conservation category, FCC = Federal conservation category: V = Vulnerable, E = Endangered and CE = Critically Endangered (EPBC Act).

¹ Description and Habitat from Atlas of Living Australia, Australian Government Department of the Environment and Energy, West Australian DBCA.

² Likelihood of occurrence is on a Low-Medium-High ranking.

Family	Species	Common Name	SCC	FCC	Description and Habitat ¹	Likelihood of Occurrence ²
CACATUIDAE	<i>Calyptorhynchus banksii</i> subsp. <i>naso</i>	Forest red-tailed cockatoo	V	V	<p>General Distribution: Black cockatoo with red, orange or yellow in tail. Endemic to southwestern WA. Most common in jarrah forest of northern Darling Range.</p> <p>Habitat: Dense jarrah, karri and marri forests receiving more than 600 mm average rainfall annually, mainly in the hilly interior. mainly nests in old veteran and stag marri, often nesting in clusters in the landscape, in deep hollows with a broad floor space. Diet primarily consists of marri and jarrah seeds.</p>	High
CACATUIDAE	<i>Calyptorhynchus baudinii</i>	Baudin's cockatoo	E	E	<p>General Distribution: Black cockatoo with white panels in the tail. Southwest WA. Breed in far southwest but range north to Perth Hills in non-breeding season (Feb-Oct).</p> <p>Habitat: Mainly eucalypt forests, especially jarrah, marri and karri forest. Preferred roosts are emergent eucalypts in areas with a dense canopy close to permanent sources of water. Primary food is marri seeds, flower, nectar, buds.</p>	High
CACATUIDAE	<i>Calyptorhynchus latirostris</i>	Carnaby's cockatoo	E	E	<p>General Distribution: Brownish- or greyish-black cockatoo with white tail panels. Endemic to and widespread throughout southwest WA, as far north as Kalbarri. Breeds mostly in the wheatbelt.</p> <p>Habitat: Uncleared or remnant native eucalypt woodlands, especially those that contain salmon gum and wandoo, and in shrubland or kwongan heathland. Requires large hollows in tall, living or dead eucalypts, preferably smooth-barked wandoo and salmon gum for breeding. Feeds in banksia woodlands on the Swan Coastal Plain during the non-breeding season and on vegetation surrounding breeding sites during breeding season.</p>	Medium
DASYURIDAE	<i>Dasyurus geoffroii</i>	Chuditch, Western quoll	V	V	<p>General Distribution: Carnivorous small marsupial. Southwest WA.</p> <p>Habitat: Forest, mallee shrublands, woodland and desert. Most dense populations are in riparian jarrah forest. Require hollow logs or earth burrows for dens and refuge, and sufficient prey. Require large home ranges.</p>	Medium

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FAUNA POTENTIALLY PRESENT AT 15 GUNBAR WAY

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¹ Description and Habitat from Atlas of Living Australia, Australian Government Department of the Environment and Energy, West Australian DBCA.

² Likelihood of occurrence is on a Low-Medium-High ranking.

Family	Species	Common Name	SCC	FCC	Description and Habitat ¹	Likelihood of Occurrence ²
MACROPODIDAE	<i>Setonix brachyurus</i>	Quokka	V	V	General Distribution Habitat Small marsupial. Southwest WA, in 10 confirmed populations. Dense understorey, less than 10 years since fire, adjacent vegetation age that is greater than 25 years and the absence of feral predators. Requires close proximity to fresh water year-round. In the northern jarrah forest Agonis swamp shrublands in the upper, open reaches of creek systems.	Low
MEGAPODIDAE	<i>Leipoa ocellata</i>	Malleefowl	T	V	General Distribution Habitat Ground-dwelling bird. Southern half of Australia. Semi-arid shrubland and low woodland dominated by mallee and wattle species. In WA occasionally in E. wandoo, C. calophylla and E. astringens woodlands. Require sandy substrate and abundant leaf litter for breeding.	Low
MURIDAE	<i>Hydromys chrysogaster</i>	Water rat, Rakali	P4		General Distribution Habitat Semi-aquatic carnivorous mammal. Wetlands throughout Australia. Permanent, large or connected water bodies with some vegetation. Requires steep banks or logs for dens and burrows.	Low
PERAMELIDAE	<i>Isoodon obesulus fusciventer</i>	Quenda, Southwestern brown bandicoot	P4		General Distribution Habitat Omnivorous small marsupial. Southwest WA, north to Guilderton. Jarrah and karri forest, Swan Coastal Plain. Dense, often swampy vegetation, including wetland fringes and heathland. Require low, dense vegetation or existing burrows for nesting. Feed on small invertebrates, fungi and plant material buried in leaf litter or shallow soil in open areas adjacent to dense vegetation. Home range up to 7 ha.	Medium

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FAUNA POTENTIALLY PRESENT AT 15 GUNBAR WAY

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¹ Description and Habitat from Atlas of Living Australia, Australian Government Department of the Environment and Energy, West Australian DBCA.

² Likelihood of occurrence is on a Low-Medium-High ranking.

Family	Species	Common Name	SCC	FCC	Description and Habitat ¹	Likelihood of Occurrence ²
ROSTRATULIDAE	<i>Rostratula australis</i>	Australian painted snipe	E	E	General Distribution Wading bird. Wetlands throughout Australia. Habitat Shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. Also inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Require shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby for breeding.	Low
SCOLOPACIDAE	<i>Calidris ferruginea</i>	Curlew sandpiper	V	CE	General Distribution Migratory shore bird. Around coasts and quite widespread inland. Habitat Occur mainly on intertidal mudflats in sheltered coastal areas. Inland occurrences around still water bodies with bare edges of mud or sand.	Low
SCOLOPACIDAE	<i>Numenius madagascariensis</i>	Eastern curlew	V	CE	General Distribution Migratory shore bird. Primarily coastal. Habitat Sheltered coasts with large intertidal mudflats or sandflats.	Low

APPENDIX D: SUMMARY OF VASCULAR PLANT SPECIES RECORDED AT 15 GUNBAR WAY KALAMUNDA, JULY 2018

Note: * denotes introduced species; T=Tree, S=Shrub, PG=Perennial grass, PH=Perennial herb, CL=Climber (WAH 1998-).

FAMILY	SPECIES	LIFEFORM
AMARANTHACEAE	<i>Ptilotus manglesii</i>	PH
ASPARAGACEAE	* <i>Asparagus asparagoides</i>	CL
	<i>Lomandra nigricans</i>	PH
	<i>Lomandra</i> sp. (sterile)	PH
CACTACEAE	Cactaceae sp.	S
CASUARINACEAE	<i>Allocasuarina fraseriana</i>	T
CONVOLVULACEAE	* <i>Ipomoea indica</i>	CL
CYPERACEAE	<i>Lepidosperma apricola sens lat.</i>	PH
	<i>Lepidosperma</i> sp.	PH
DILLENIACEAE	<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>	S
FABACEAE	* <i>Acacia decurrens</i>	T
	* <i>Acacia podalyriifolia</i>	T
	* <i>Chamaecytisus palmensis</i>	S
	<i>Hovea chorizemifolia</i>	S
	<i>Hovea trisperma</i>	S
GOODENIACEAE	<i>Dampiera linearis</i>	PH
	<i>Lechenaultia biloba</i>	S
	<i>Scaevola platyphylla</i>	S
IRIDACEAE	* <i>Chasmanthe floribunda</i>	PH
	* <i>Freesia</i> sp. (sterile)	PH
	* <i>Gladiolus caryophyllaceus</i>	PH
LAMIACEAE	Lamiaceae sp.	H
MYRTACEAE	<i>Corymbia calophylla</i>	T
	<i>Eucalyptus marginata</i>	T
	<i>Hypocalymma robustum</i>	S
OXALIDACEAE	* <i>Oxalis glabra</i>	PH
	* <i>Oxalis pes-caprae</i>	PH
PHYLLANTHACEAE	<i>Phyllanthus calycinus</i>	S
PITTOSPORACEAE	<i>Billardiera heterophylla</i>	
POACEAE	* <i>Cenchrus clandestinus</i>	PG
	* <i>Eragrostis curvula</i>	PH
POLYGALACEAE	* <i>Polygala myrtifolia</i>	S
PROTEACEAE	<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>	S
	<i>Banksia sessilis</i> var. <i>sessilis</i>	S
	<i>Grevillea wilsonii</i>	S
	<i>Hakea lissocarpa</i>	S
	<i>Petrophile striata</i>	S
XANTHORRHOACEAE	<i>Xanthorrhoea gracilis</i>	S
	<i>Xanthorrhoea preissii</i>	T