

# **Flora and Vegetation Assessment**

Augusta Boat Harbour to Dead Finish Foreshore,  
Cape Leeuwin



**Litoria Ecoservices**  
Environmental Assessment, Planning & Management

Prepared November 2017  
for the Shire of Augusta Margaret River

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## **1.0 INTRODUCTION**

### **1.1 Background**

Litoria Ecoservices (LE) was commissioned by the Shire of Augusta Margaret River to prepare this report to guide the development of a walking trail between the Augusta Boat Harbour and Dead Finish.

### **1.2 Description of the proposal**

The Augusta Margaret River Shire Council resolved on 09 March 2016 to progressively construct a concrete dual use path from the Augusta Boat Harbour (ABH) to the Cape Leeuwin Lighthouse and to form a group to determine the most suitable alignment.

The group has developed a potential alignment for the first section of this 2m wide concrete dual use path between ABH and Dead Finish Rd, a distance of approximately 800m.

### **1.3 Site Description**

The site represents a narrow band of coastal foreshore between Leeuwin Road and the coast ranging from primary dunes through degraded open areas to open heath, tall closed scrub and low closed peppermint forest. It is bounded to the north by the Augusta Boat Harbour and to the south by Dead Finish Rd. It is gently undulating and includes a number of beach tracks, lookouts and coastal carparks.

### **1.4 Assessment Objectives and Scope**

The assessment was undertaken in October and November 2017, with the following objectives:

1. To assess the condition, nature and conservation significance of native vegetation onsite particularly targeted at rare, threatened species previously recorded from the surrounding area; and
2. To identify management issues and recommendations to ensure conservation values are protected and enhanced during any trail construction.

This assessment of the site's flora and vegetation represents a targeted survey as described by the EPA's Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016).

This level of survey is considered appropriate at this stage of the proposal.

### **1.5 Limitations of the Botanical Survey**

The potential limitations of the botanical survey are detailed within Table 1 below:

**Table1. Statement of survey constraints**

Variable	Constraints	Details
Experience levels and resources	No constraints	The scientist that undertook the assessment was regarded as suitably qualified for the level of assessment undertaken.
Proportion of flora identified	No constraints	Native and weed species observed during the reconnaissance survey were identified
Sources of Information	No constraints	The Capes region has been covered by a number of targeted biological surveys. Documented information regarding the site was limited however the assessment was able to utilise a number of relevant databases and local records.
Proportion of the task achieved and further work to be undertaken	No Constraints	There is no requirement for further work.
Timing, weather, season, cycle	Minor Constraints	The survey was undertaken during late Spring 2016. While this period will pick up most annual species It is noted that some target species if present may have finished flowering before the survey commenced.
Intensity of Survey	No constraints	The areas mapped and searched at a high intensity for a this level of survey
Completeness	No constraints	The areas mapped and searched at a high intensity for a this level of survey
Resources	No constraints	Extensive local knowledge and relevant keys and guides utilised
Remoteness or access	Minor constraints	The extreme density of vegetation within 2m of ground height through parts of the survey area provided challenges with regard to access with some small areas (5-10m) considered impenetrable and requiring diversion around and observation from the edge.
Availability of contextual information for the survey area	No constraints	Several relevant references and reports available and utilised.

## 1.6 Personnel

The assessment was undertaken by Drew M<sup>c</sup>Kenzie BAppSc (Env) Hons. of Litoria Ecoservices, Margaret River. Drew has over 17 years professional experience in environmental and natural resource management including over 12 years experience in native vegetation survey, assessment and management within south west WA.

## 1.7 Landform

The site is a gently undulating mix coastal foreshore less than 10m AHD.

The site lies within the Wilyabrup land system and the Busselton Margaret River Augusta Land Capability Survey describes the site as falling within land unit GrWLe3 – Wilyabrup exposed slopes phase. This unit is described as “Low Slopes (gradients generally 5-10%) exposed to strong winds off the ocean”

Soils are a mix of coastal sands over granite with occasional granite gneiss outcropping and expression.

### **1.8 Hydrology**

No water courses or springs were encountered during the survey

### **1.9 Climate**

Located in Western Australia’s south-west, the area experiences a Mediterranean climate with hot dry summers and cool wet winters. Cape Leeuwin experiences an average annual rainfall of 961mm with the majority of this rain falling between May and October.

### **1.10 Vegetation**

The site vegetation is dominated by coastal native vegetation with the majority of the site forming open heath, closed scrub and low closed Peppermint forest.

Augusta Margaret River Shire is situated within the South West Botanical Province of WA which is internationally recognised as a biodiversity hotspot. Within this, the site lies in the Boranup System of the Western Botanical subdistrict within the Darling Botanical District. The Western Botanical subdistrict spans from Cape Naturalist to Albany with Augusta/ Cape Leeuwin falling within the Boranup System. This broader system is described as Tall Forest of Karri (*Eucalyptus diversicolor*) on red earths and Forest of Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) on the red and yellow podzolic soils. Extensive paperbark (*Melaleuca* spp.) and sedge swamps occur in the valleys and flood plains. (Beard 1990)

## 2. BACKGROUND AND CONTEXT

### 2.1 Previous work

Prior to undertaking this assessment the following previous studies were reviewed which represented similar assessments of nearby or adjoining areas:

- ‘2014 Spring Flora and Vegetation Surveys, Flinders Bay and Margaret River Foreshore Areas’ by Eco Logic Environmental Services Pty Ltd;
- ‘2013 Cape Leeuwin Tourism Precinct: Level 2 Flora and Vegetation Survey’ by Onshore Environmental.

### 2.2 Vegetation Representation

The broadscale vegetation mapping of Mattiske and Havel (1998) identifies a single vegetation complex across the site:

- Wilyabrup Wr: Woodland of *Corymbia calophylla*-*Eucalyptus marginata* subsp. *marginata* with closed heath of Myrtaceae-Proteaceae-Papilionaceae spp. on steep rocky slopes in the hyperhumid zone.

The extent remaining of this complex was assessed using the data available from the Department of Agriculture and Food (2014).

The State Government’s commitment to the National Objectives Targets for Biodiversity Conservation includes a target to prevent the clearance of ecological communities with extents below 30% of their pre European coverage or less than 1500ha total extent remaining.

With 71.7% of the original pre European extent remaining, the Wilyabrup Wr vegetation complex does not trigger the criteria of less than 30% remaining.

This vegetation complex would benefit from additional protection and reservation.

### 2.3 Ecological Connectivity

Based on the South West Regional Ecological Linkages mapping the property is identified as having a 1a proximity value – ie with an edge touching or <100m from an edge.

### 2.4 Rare and Priority Flora

A search was undertaken of the relevant DPAW database to identify significant plant species known as occurring within the nearby locality. The result of this search is provided below as Table 2.

**Table 2: State listed plant species known from surrounding areas**

Taxon	Status	Rank	EPBC
<i>Agrostocrinum scabrum subsp. littorale</i>	2		
<i>Astartea onycis</i>	4		
<i>Banksia sessilis var. cordata</i>	4		
<i>Caladenia abbreviata</i>	3		
<i>Caladenia caesarea subsp. transiens</i>	1		
<i>Caladenia lodgeana</i>	T	CR	CR
<i>Caladenia pholcoidea subsp. augustensis</i>	1		

Taxon	Status	Rank	EPBC
<i>Drakaea micrantha</i>	T	EN	VU
<i>Drosera fimbriata</i>	4		
<i>Galium leptogonium</i>	3		
<i>Gonocarpus pusillus</i>	4		
<i>Hemigenia obovata</i>	1		
<i>Kennedia lateritia</i>	T	EN	EN
<i>Lepyrodia extensa</i>	2		
<i>Leucopogon wheelerae</i>	3		
<i>Orobanche cernua</i> var. <i>australiana</i>	3		
<i>Philydrella pygmaea</i> subsp. <i>minima</i>	1		
<i>Stylidium ireneae</i>	4		

### Conservation Codes

#### **Declared Rare Flora - Extant Taxa**

Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.

#### **X: Declared Rare Flora - Presumed Extinct Taxa**

Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.

#### **Priority One - Poorly known Taxa**

Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

#### **Priority Two - Poorly Known Taxa**

Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

#### **Priority Three - Poorly Known Taxa**

Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.

#### **Priority Four - Rare Taxa**

Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

An additional search was also undertaken of the Department of Environment and Energy's Protected Matters Search Tool to identify Matters of National Environmental Significance that may be relevant to the subject site. The report generated out of this search identified the Nationally listed plant species that may be likely to occur within 10km of the subject site. The results of this search are summarised below as Table 3.

**Table 3: Nationally significant plant species known from surrounding areas**

Taxon	EPBC Status
<i>Banksia nivea</i> subsp. <i>uliginosa</i>	Endangered
<i>Banksia squarrosa</i> subsp. <i>argillaceae</i>	Vulnerable
<i>Boronia exilis</i>	Endangered
<i>Caladenia hoffmanii</i>	Endangered
<i>Caladenia huegelii</i>	Endangered
<i>Caladenia winfieldii</i>	Endangered
<i>Calectasia cyanea</i>	Critically Endangered



Taxon	EPBC Status
<i>Drakea micrantha</i>	Vulnerable
<i>Gastrolobium papilio</i>	Endangered
<i>Grevillea brachystylis subsp. australis</i>	Vulnerable
<i>Kennedia lateritia</i>	Endangered
<i>Lambertia echinate subsp. occidentalis</i>	Endangered
<i>Lambertia orbifolia</i>	Endangered
<i>Leptomeria dielsiana</i>	Vulnerable
<i>Sphenotoma drummondii</i>	Endangered
<i>Verticordia plumosa var. ananeotes</i>	Endangered
<i>Verticordia plumosa var. vassensis</i>	Endangered

## 2.5 Threatened and Priority Ecological Communities

An ‘ecological community’ is a naturally occurring grouping of plants and/or animals that together with their habitat form ecosystems. A threatened ecological community (TEC) is one which is deemed to be subject to processes which threaten to destroy or significantly modify it across much of its range and which are found to fit into one of the following categories: ‘presumed totally destroyed’, ‘critically endangered’, ‘endangered’ or ‘vulnerable’ (DEC, 2007).

Possible TECs which are not yet adequately defined or do not meet the criteria for the above categories are identified under the DBCA’s Priority Ecological Community (PEC) List under Priorities 1, 2 and 3 in order of priority for definition, evaluation and survey. Other ecological communities that are rare but adequately known, not threatened, are listed as Priority 4 and require regular monitoring.

A search of the DBCA Threatened and Priority Ecological Communities Database for known records of TEC and/or PEC within a 10km radius of the site and an EPBC Act online Protected Matters Report within a 10km radius were undertaken. These identified the following communities:

- Endangered Threatened Ecological Community (TEC): ‘Rimstone Pools and Cave structures formed by microbial activity on the marine shoreline: Augusta Microbial – (Aquatic rootmat community Number 1 in caves of the Leeuwin – Naturalist Ridge.)’
- Priority 1 Ecological Community (PEC): ‘Sedgelands of Cape Leeuwin Spring - Tall closed sedgelands on shallow soils derived from granite gneiss on the Leeuwin Naturaliste Ridge’
- Vulnerable (EPBC) Threatened ecological community (TEC) : ‘Coastal saltmarsh – Subtropical and Temperate Coastal Saltmarsh.’

### 3. METHODOLOGY

#### 3.1 Pre Survey

Prior to commencing field work, a review of previous studies and relevant databases was undertaken in order to understand the likely target species and vegetation to be encountered.

#### 3.2 Field Assessment

The Field Assessment was undertaken over two days on the 29th October 2017 and the 19th November 2017. The assessment involved walking four transects along and adjacent to the proposed path alignment covering a 20m wide corridor. A more general assessment was made of the broader reserve adjoining the corridor.

The assessment included the following elements:

- Ground truthing of the corridor and broader reserve;
- Development of preliminary species list for the site;
- Mapping and recording of vegetation condition, structure and floristics;
- Collection of specimens for identification off site (where required); and
- All relevant elements and items were mapped using a Bad Elf Bluetooth GPS and a remote GIS mapping system

#### 3.3 Post Field work

Following the field work, a number of specimens were confirmed using a number of references, raw mapping data was analysed and processed into the final figures using QGIS GIS mapping system. Species lists were compiled and an overview of the site considered prior to making final conclusions and recommendations.

## 4. RESULTS

### 4.1 Flora and Species Diversity

Appendix 1 shows all flora species, native and introduced, that were identified during the course of this survey.

A total of 64 species were recorded during the survey. Of these, 36 native species from 28 genera were recorded.

### 4.2 Rare and Priority Flora

Following extensive searching along the four transects along the target corridor, no Declared Rare Flora or Priority species were recorded within the corridor targeted by this survey. Although not recorded within the proposed path alignment or the 20m target corridor for this survey, the State and Federally listed Endangered species *Kennedia laterita* was recorded within a revegetation area within the north western corner of the site. The location of this area is identified within Figure 4.

### 4.3 Introduced Flora

A total of 28 introduced species (or 44% of the total flora species recorded) were recorded during the course of the survey. These species are denoted by an asterisk in Appendix 1.

Of these, two species (Arum lily (*Zantedeschia aethiopica*) and Apple of Sodom (*Solanum linnaeanum*)) are declared under Section 22 of the *Biosecurity and Agriculture Management Act 2007* were identified on site. Within the Shire of Augusta Margaret River both of these species are categorised as C3 (Management) declared pests.

A number of other environmental weed species considered as high priorities for control were identified and mapped as part of the assessment. These were prioritised either due to the level of invasiveness and impact of the species under local conditions and due to relatively restricted nature of the current infestation. These include:

- Wavy Gladioli (*Gladiolus undulatus*);
- Black flag (*Ferraria crispa*);
- Dolichos pea (*Dipogon lignosus*) and
- Bridal creeper (*Asparagus asparagoides*).

Key locations of priority environmental weeds are identified in Figure 2. It is noted that some species eg) Bridal creeper are quite widespread and not reflected on this Figure because of this. Interestingly the Bridal creeper present on site lacked signs of the biocontrol rust and these specimens were particularly healthy and producing significant seed.

### 4.4 Threatened and Priority Ecological Communities

None of the PECs or other TEC/PECs identified from the background research (Section 2.5) were identified on the site.

### 4.5 Vegetation Condition

The vegetation of the site has been assessed using a condition assessment based on the Vegetation Condition Scale of Keighery (1994), which is attached as Appendix 2.

Based on this system, condition ratings across the site are shown on Figure 3 and summarised as follows:

- The southern half of the site was assessed to be in very good condition;
- The northernmost quarter of the corridor was assessed as very good to good condition; and
- The remaining portions of the site were highly variable ranging from completely degraded sections through to good condition.;

#### 4.6 Vegetation Units

Vegetation units were described and mapped based on structural and floristic characteristics using the system detailed in Appendix 3. In total, six units were identified across the site as shown in Figure 4, with representative photographs provided in Appendix 4.

The vegetation units are described as follows:

**AfVG** - Very Good Condition Low Closed Forest of *Agonis flexuosa* over open grassland/sedgeland/herbland of *Lepidosperma gladiatum*, *Rhagodia baccata*, *Dichondra repens*, *Microlaena stipoides*, *Pteridium esculentum*, *Muehlenbeckia adpressa* and *Acanthocarpus preissii*.

**SgOaLpAfVG** – Very Good condition Tall closed scrub *Spyridium globulosum*, *Olearia axillaris*, and *Leucopogon parviflorus* with scattered *Agonis flexuosa*, over a open grassland/sedgeland of *Lepidosperma gladiatum*, *Hibbertia grossularifolia*, *Dichondra repens*, *Clematis pubescen*, *Dianella revoluta* and *Hardenbergia comptoniana*

**SgOaScVGG** - Very Good to Good Condition Open Heath of *Spyridium globulosum*, *Olearia axillaris*, *Scaevola crassifolia*, *Agonis flexuosa* and *Leucopogon parviflorus* over a predominantly sedgeland/herbland of *Lepidosperma gladiatum*, *Rhagodia baccata*, *Muehlenbeckia adpressa*, *Acanthocarpus preissii*, *Senecio elegans*, *Phyllanthus calycinus*, *Ficinia nodosa*, *Ozothamnus cordatus*, *Lagurus ovatus* and *Carpobrotus viresecens*.

**OaScAfGVG** - Good to Very Good Condition Closed Heath of *Olearia axillaris*, *Scaevola crassifolia*, *Agonis flexuosa*, *Leucopogon parviflorus* and *Spyridium globulosum* over a predominantly sedgeland/herbland/grassland of *Lepidosperma gladiatum*, *Rhagodia baccata*, *Muehlenbeckia adpressa*, *Acanthocarpus preissii*, *Ficinia nodosa*, *Lagurus ovatus* , *Trachyandra divaricata* and *Cenchrus clandestinus*.

**SgOaScGD** - Good to Degraded Condition Low Open Heath of *Spyridium globulosum*, *Olearia axillaris*, *Scaevola crassifolia*, and *Leucopogon parviflorus* over a predominantly grassland/herbland of *Lepidosperma gladiatum*, *Rhagodia baccata*, *Muehlenbeckia adpressa*, *Senecio elegans*, *Phyllanthus calycinus*, *Ficinia nodosa*, *Cenchrus clandestinus*, *Stenotaphrum secundatum*, *Arctotheca calendula* *Lagurus ovatus* and *Carpobrotus viresecens*.

**OaLpD** – Degraded Condition Low Shrubland of *Olearia axillaris*, *Leucopogon parviflorus*, *Spyridium globulosum*, over a predominantly grassland/ herbland of introduced annual grasses, *Rhagodia baccata*, *Cenchrus clandestinus*, *Muehlenbeckia adpressa*, *Stenotaphrum secundatum*, *Arctotheca calendula* *Lagurus ovatus*, *Carpobrotus viresecens*, *Lepidosperma gladiatum*, *Tetragonia decumben*, *Trachyandra divaricate* and *Dipogon lignosus*



## 5. CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions

It is concluded that although no Declared Rare Flora or Priority species or Threatened or Priority Ecological Communities were recorded from the target corridor, the site contains a number of conservation values worthy of protection and where possible enhancement including:

- Areas of good and very good condition remnant vegetation;
- Diverse range of vegetation mapping units across the site;
- A diverse array of flora species were recorded, with significantly more expected if a more intensive assessment was undertaken across the year;
- Parts of the site represent important buffer areas for coastal erosion and protection of the reserve and carpark and the adjoining road;
- A high level of existing ecological connectivity and linkage with surrounding tracts of native vegetation to the North, West and South;
- Although not recorded within the proposed path alignment or the 20m target corridor for this survey, State and Federally listed Endangered species *Kennedia laterita* was recorded within a revegetation area within the north western corner of the site.
- Two areas of Low Closed Peppermint Forest utilised by Western Ringtail Possums.

### 5.2 Recommendations

Management recommendations to protect and enhance the identified vegetation values of the site include:

1. Wherever possible, minimise clearing and disturbance of native vegetation (especially the areas identified as Very Good or Good Condition);
2. Wherever possible, limit any clearing to the pathway corridor, use this corridor for the movement of all material in and out of the site.
3. The potential exists to recover some plant material from within the pathway alignment prior to clearing eg) *Lepidosperma gladiatum*. This could be valuable for use in local revegetation projects including revegetation of the disturbed edges of the pathway.
4. Rapidly revegetate any additional areas disturbed as part of the project
5. Ensure that the priority environmental weed species are not spread as part of the proposal
6. Undertake bush regeneration works to improve the condition of the degraded and good condition portions of the reserve;
7. Actively control the priority environmental weed species recorded within the Reserve;
8. Undertake follow up weed control work and revegetation along the corridor following any construction work to ensure opportunistic weeds do not spread and dominate.
9. Ensure the population of *Kennedia laterita* in the north western corner of the property is protected and buffered during any work.
10. Where possible during any pathway clearing within the Low Closed Forest of *Agonis flexuosa* maintain branch and canopy connectivity alongside and over the pathway to minimise impacts on Western Ringtail Possum habitat.
11. Conduct additional flora surveys at alternative times of the year and following any fire events in order to expand the species list for the site.
12. Ensure hygiene management protocols are followed to address the potential spread and introduction of diseases such dieback and environmental weeds into the site.

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**APPENDIX 1: FLORA SPECIES RECORDED ON-SITE**

Family	Species	Weed
<i>Aizoaceae</i>	<i>Carpobrotus virescens</i>	
<i>Aizoaceae</i>	<i>Tetragonia decumbens</i>	*
<i>Araceae</i>	<i>Zantedeschia aethiopica</i>	*
<i>Asparagaceae</i>	<i>Asparagus asparagoides</i>	*
<i>Asparagaceae</i>	<i>Sowerbaea laxiflora</i>	
<i>Asphodelaceae</i>	<i>Trachyandra divaricata</i>	*
<i>Asteraceae</i>	<i>Arctotheca calendula</i>	*
<i>Asteraceae</i>	<i>Arctotheca populifolia</i>	*
<i>Asteraceae</i>	<i>Conyza sumatrensis</i>	*
<i>Asteraceae</i>	<i>Hypochaeris radicata</i>	*
<i>Asteraceae</i>	<i>Leucophyta brownii</i>	
<i>Asteraceae</i>	<i>Olearia axillaris</i>	
<i>Asteraceae</i>	<i>Ozothamnus cordatus</i>	
<i>Asteraceae</i>	<i>Senecio elegans</i>	*
<i>Chenopodiaceae</i>	<i>Rhagodia baccata</i> subsp. <i>baccata</i>	
<i>Convolvulaceae</i>	<i>Dichondra repens</i>	
<i>Cyperaceae</i>	<i>Ficinia nodosa</i>	
<i>Cyperaceae</i>	<i>Lepidosperma gladiatum</i>	
<i>Dasypogonaceae</i>	<i>Acanthocarpus preisii</i>	
<i>Dennstaedtiaceae</i>	<i>Pteridium esculentum</i>	
<i>Dilleniaceae</i>	<i>Hibbertia cuneiformis</i>	
<i>Dilleniaceae</i>	<i>Hibbertia grossulariifolia</i>	
<i>Euphorbiaceae</i>	<i>Euphorbia paralias</i>	*
<i>Euphorbiaceae</i>	<i>Euphorbia peplus</i>	*
<i>Ericaceae</i>	<i>Leucopogon parviflorus</i>	
<i>Fabaceae</i>	<i>Dipogon lignosus</i>	*
<i>Fabaceae</i>	<i>Hardenbergia comptoniana</i>	
<i>Fabaceae</i>	<i>Medicago polymorpha</i>	*
<i>Fumariaceae</i>	<i>Fumaria capreolata</i>	*
<i>Goodeniaceae</i>	<i>Scaevola crassifolia</i>	
<i>Hemerocallidaceae</i>	<i>Dianella revoluta</i>	
<i>Hemerocallidaceae</i>	<i>Stypantra glauca</i>	
<i>Iridaceae</i>	<i>Ferraria crispa</i>	*
<i>Iridaceae</i>	<i>Gladiolis undulatus</i>	*
<i>Iridaceae</i>	<i>Romulea rosea</i>	*
<i>Lauraceae</i>	<i>Cassytha racemosa</i>	
<i>Mimosaceae</i>	<i>Acacia cyclops</i>	
<i>Mimosaceae</i>	<i>Acacia littorea</i>	
<i>Myrtaceae</i>	<i>Agonis flexuosa</i>	
<i>Oxalidaceae</i>	<i>Oxalis incarnata</i>	*
<i>Phyllanthaceae</i>	<i>Phyllanthus calycinus</i>	
<i>Pittosporaceae</i>	<i>Marianthus tenuis</i>	
<i>Plantaginaceae</i>	<i>Plantago lanceolata</i>	*
<i>Poaceae</i>	<i>Avena barbata</i>	*
<i>Poaceae</i>	<i>Briza maxima</i>	*
<i>Poaceae</i>	<i>Briza minor</i>	*

Family	Species	Weed
<i>Poaceae</i>	<i>Cynodon dactylon</i>	*
<i>Poaceae</i>	<i>Lagurus ovatus</i>	*
<i>Poaceae</i>	<i>Cenchrus clandestinus</i>	*
<i>Poaceae</i>	<i>Microlaena stipoides</i>	
<i>Poaceae</i>	<i>Spinifex hirsutus</i>	
<i>Poaceae</i>	<i>Stenotaphrum secundatum</i>	*
<i>Polygonaceae</i>	<i>Muehlenbeckia adpressa</i>	
<i>Ranunculaceae</i>	<i>Clematis pubescens</i>	
<i>Rhamnaceae</i>	<i>Spyridium globulosum</i>	
<i>Rutaceae</i>	<i>Boronia alata</i>	
<i>Santalaceae</i>	<i>Exocarpus sparteus</i>	
<i>Scrophulariaceae</i>	<i>Myoporum oppositifolium</i>	
<i>Scrophulariaceae</i>	<i>Verbascum virgatum</i>	*
<i>Solanaceae</i>	<i>Solanum linnaeanum</i>	
<i>Thymelaeaceae</i>	<i>Pimelea ferrugineae</i>	
<i>Xanthorrhoeaceae</i>	<i>Xanthorrhoea preissii</i>	
<i>Zamiaceae</i>	<i>Macrozamia riedlei</i>	

**APPENDIX 2: VEGETATION CONDITION SCALE (ADAPTED FROM KEIGHERY 1994)**

CONDITION	DESCRIPTION
<b>Pristine</b>	Pristine or nearly so, no obvious signs of disturbance.
<b>Excellent</b>	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive.
<b>Very Good</b>	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
<b>Good</b>	Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
<b>Degraded</b>	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
<b>Completely Degraded</b>	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora composing weed or crop species with isolated native trees or shrubs.

**APPENDIX 3: VEGETATION STRUCTURAL CLASSIFICATION (ADAPTED FROM MUIR 1977 AND APLIN 1979)**

Strata	Canopy Cover				
	<2%	2-10%	10 – 30%	30 -70%	70 -100%
Trees over 30m	Scattered Tall Trees	Tall Open Woodland	Tall Woodland	Tall Open Forest	Tall Closed Forest
Trees 10 – 30m	Scattered Trees	Open Woodland	Woodland	Open Forest	Closed Forest
Trees under 10m	Scattered Low Trees	Open Woodland	Woodland	Low Open Forest	Low Closed Forest
Shrubs over 2m	Scattered Tall Shrubs	Tall Open Shrubland	Tall Shrubland	Tall Open Scrub	Tall Closed Scrub
Shrubs 1-2m	Scattered Low Shrubs	Open Shrubland	Shrubland	Open Heath	Closed Heath
Shrub under 1m	Scattered Low Shrubs	Low Open Shrubland	Low Shrubland	Low Open Heath	Low Closed Heath
Grasses	Scattered Grasses	Very Open Grassland	Open Grassland	Grassland	Closed Grassland
Herbs and Sedges	Scattered Sedges/ Herbs	Very Open Sedgeland/ Herbland	Open Sedgeland/ Herbland	Sedgeland/ Herbland	Closed Sedgeland/ Herbland



**APPENDIX 4: PHOTOS OF THE VARIOUS VEGETATION MAPPING UNITS IDENTIFIED ON SITE**



**OaLpAfVG**



**OaLpD**



**SgOaScGD**



**OaScAfGVG**



**AfVG**



**SgOaScVGG**

**FIGURES**













