

**Eco Logic ENVIRONMENTAL SERVICES Pty Ltd**

**LEVEL 2 FLORA AND VEGETATION ASSESSMENT, STAGE 2 -  
PROPOSED MOUNTAIN BIKE TRACK EXTENSION,  
DUNSBOROUGH AND DISTRICTS COUNTRY CLUB**

Prepared for Dunsborough and Districts

Country Club MTB Trail

Report Date: 3 December 2012

Project Reference: 2012/0159, V1

3 December 2012

Dunsborough and Districts

Country Club MTB Trail

Attention: Richard Renn

Dear Richard,

**RE: Level 2 Flora and Vegetation Assessment Report, Stage 2- Proposed Mountain Bike Track Extension, Dunsborough and Districts Country Club**

Please find enclosed the Level 2 Flora and Vegetation Assessment for Stage 2 of the proposed extension of the mountain bike track. If you have any questions please do not hesitate to give me a call on 97573727 or 0437821426.

For Eco Logic Environmental Services Pty Ltd

Kay Lehman

Principal /Senior Environmental Scientist

## Distribution List

No. of copies	Report Name	Report Status	Date	Prepared for:	Initials
1	Level 2 Flora and Vegetation Assessment Report, Proposed Mountain Bike Track Extension, Dunsborough and Districts Country Club - 2012/0159, V1.	Version 1	3 December 2012	Dunsborough and Districts Country Club	KL

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## ABBREVIATIONS

DEC	Department of Environment and Conservation
DRF	Declared Rare Flora
EES	Eco Logic Environmental Services Pty Ltd
EPA	Environmental Protection Authority
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
GPS	Global Positioning System
TEC	Threatened Ecological Community

# **1 INTRODUCTION**

## **1.1 Background**

Eco Logic Environmental Services South West was commissioned by the Dunsborough and Districts Country Club to undertake a Level 2 Flora and Vegetation Assessment for Stage 2 of the proposed extension of the mountain bike track (Figure 1).

## **1.2 Objectives**

The main objective of the Flora and Vegetation Assessment was to provide the following information:

- Survey Methodology, including database searches and limitations;
- Mapping of vegetation types (and condition using the Bush Forever condition rating) within the study area using a combination of recent aerial photography and field surveys to ground truth;
- Providing a list of all native and non-native plant species recorded from non – permanent 10m x10m quadrats and releve sites located in representative vegetation types within the study area, as well as a thorough site walkover to record all additional species.
- A list of significant species recorded on DEC’s database occurring in the vicinity of the study area. The location of any Declared Rare Flora (DRF) and Priority species identified on site will be recorded using a handheld Global Positioning System (GPS);
- A description of the vegetation types, vegetation condition and presence of any Threatened Ecological Community’s (TECs) occurring on the site; and
- Discuss potential impacts the proposal will have on remnant vegetation within the property.

## **2. EXISTING INFORMATION**

### **2.1 Location Description**

The study area is located at the Dunsborough and District Country Club on Gifford Road directly adjacent to the golf course on the northern boundary of the Dunsborough townsite. This area is directly adjacent to the Meelup Regional Park.

### **2.2 Climate**

The study area experiences a Mediterranean climate with warm summers and cold winters. The temperature at the nearest recording station of Cape Naturaliste for 2011 annual data ranged from an average maximum of 25.8° and an average minimum of 15.6°. The average annual rainfall recorded at Cape Naturaliste is 809.9 mm (Bureau of Meteorology, 2012).

### **2.3 Landform and Soil**

The study area is located on the eastern side of the Leeuwin-Naturaliste Ridge. The ridge consists of aeolian limestone underlain by granitic basement rocks. The study area is underlain by banded granitic rocks composed mainly of quartz, feldspar and dark green pyroxene. Soils are shallow and lateritic with a mottled clay subsoil.



The study area is located within the Wilyabrup Exposed Rocky Slopes land unit of the Wilyabrup Valleys Land Systems. This land unit is described as low slopes (gradient mainly 5-10%) with shallow rocky soils and some granitic outcrop, exposed to strong winds of the ocean (Tille and Lantzke, 1990).

## **2.4 Biological Context of the Study Area**

### **2.4.1 Bioregional Data**

Western Australia supports 53 biogeographical subregions. These bioregions are defined on the basis of geology, landform, vegetation, fauna and climate. The study area is located in the Southern Jarrah Forest subregion of the Jarrah Forest bioregion (McKenzie *et al.*, 2003). The Southern Jarrah Forest subregion is composed of Jarrah-Marri forest in the west grading to Marri and Wandoo woodlands in the east. There are extensive areas of swamp vegetation in the south-east, dominated by Paperbarks and Swamp Yate (McKenzie *et al.*, 2003).

### **3. FLORA AND VEGETATION SURVEY METHODOLOGY**

#### **3.1 Survey Methodology**

The flora and vegetation survey on the project was undertaken by Ms Kay Lehman an experienced botanist from Eco Logic Environmental Services, on 28 September 2012. A total of 8 hours was spent undertaking the flora and vegetation survey which is considered an adequate time given the area of remnant vegetation within the study area.

The vegetation and flora survey involved compiling information from DEC databases, sampling of 10m x 10m quadrat located within representative vegetation types, as well as thoroughly traversing the site on foot to record all plant species present at the time of the survey. This method complies with Eco Logic Environmental Services' interpretation of the Environmental Protection Authority's (EPA) guidelines for flora surveys as outlined in Guidance Statement No.51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004) and Position Statement No.3, *Terrestrial Biological Surveys as an Element of Biodiversity Protection* (EPA, 2002).

Quadrat dimensions are dependant on the region in which the survey is being undertaken. For the Southern Jarrah Forest subregion it is appropriate to sample quadrats of 10m x 10m dimension.

The timing of the survey in spring was considered optimal for the identification of the majority of the Declared Rare Flora (DRF) and Priority listed flora potentially occurring in the area.

The major vegetation types were initially delineated using recent colour aerial photography supplemented by on-ground vegetation surveys to ground truth. The perimeter of the golf course area was accessible via vehicle and the survey was conducted by traversing areas of native remnant vegetation within the study area on foot. The proposed mountain bike track was flagged with tape in the vegetation as well as spray paint along the ground. The proposed track is planned to be approximately 1-2 metres in width. A 10 metre wide study area was assessed along the length of the proposed track.

Common species that were well known to the survey botanist were identified in the field, while specimens of all other species were collected, assigned a unique identification number to facilitate tracking and pressed that day. Some species such as *Caladenia* sp. (orchid) and other delicate plants were also photographed to assist in identification. Plant specimens collected were then identified using local and regional keys and DEC Florabase. A number of specimens were sent to the WA Herbarium for formal identification.

Species and site characteristics were recorded from each of the quadrats sampled. A handheld GPS was used to record the location of each quadrat and colour photographs were taken of each quadrat. The following information was collected at each quadrat:

#### **Percentage Foliage Cover and Height**

Cover was estimated visually for each species recorded within the quadrat. Estimates were made to the nearest percentage where possible. Height was visually estimated for all species recorded in the quadrat.

#### **Soil**

Colour, soil texture and soil moisture within each quadrat was recorded.

## Location

MGA coordinates (equivalent to WGS84) were taken from the corner of 10m x 10m quadrats using a hand held Global Positioning System (GPS) to an accuracy of 2m.

### 3.1.1 Vegetation Description

Vegetation types were described and mapped according to the structure and species composition of the dominant stratum using the system adapted from Muir (1977) and Aplin (1979) (Table 1).

**Table 1: Vegetation Structural Classes**

Stratum	Canopy Cover (adapted from Muir, 1977 and Aplin, 1979)				
	70-100%	30-70%	10-30%	2-10%	<2%
Trees over 30m	Tall Closed Forest	Tall Open Forest	Tall Woodland	Tall Open Woodland	Scattered Tall Trees
Trees 10-30m	Closed Forest	Open Forest	Woodland	Open Woodland	Scattered Trees
Trees under 10m	Low Closed Forest	Open Forest	Woodland	Open Woodland	Scattered Low Trees
Shrubs over 2m	Tall Closed Scrub	Tall Open Scrub	Tall Shrubland	Tall Open Shrubland	Scattered Tall Trees
Shrubs 1-2m	Closed Heath	Open Heath	Shrubland	Low Open Shrubland	Scattered Low Shrubs
Shrubs under 1m	Low Closed Heath	Low Open Heath	Low Shrubland	Low Open Shrubland	Scattered Low Shrubs
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland	Scattered Grasses
Herbs and Sedges	Closed Sedgeland/Herbland	Sedgeland/Herbland	Open Sedgeland/Herbland	Very Open Sedgeland/Herbland	Scattered Sedges/Herbs

### 3.1.2 Vegetation Condition

Vegetation condition was assessed using the condition rating scale adapted from Bush Forever (Government of Western Australia, 2000) as described on the following page.

**Table 2: Vegetation Condition Ratings**

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

### 3.1.3 Database Searches

A search of the DEC's Declared Rare and Priority database was previously undertaken for Stage 1 of the project in October 2011, to identify significant flora that potentially occur within the study area. This investigation encompasses a review of the following databases:

- DEC's 'Threatened (Declared Rare) Flora' database;
- DEC's 'Declared Rare and Priority List' which contains species that are Declared Rare (Conservation code T or X for those presumed extinct) poorly known (Conservation codes 2 or 3) or require monitoring (Conservation Code 4);
- The Western Australian Herbarium Specimen database; and
- DEC's Threatened Ecological Communities database.

In addition, an Online *EPBC Act 1999* Protected Matters Report was undertaken of the study area and vicinity (DoSEWPaC, 2011a) (Appendix 1).

The database search found that Seven Rare and 16 Priority species had been recorded in the vicinity of the study area. Refer to Table 3.

**Table 3: Species Listed on DEC's and WA Herbarium Database Recorded in the Vicinity of the Study Area**

Species	DEC Conservation and Priority Codes	EPBC Act
<i>Acacia lateritica</i> glabrous variant (BR Maslin 6765)	P3	
<i>Acacia subracemosa</i>	P3	
<i>Banksia sessilis</i> var. <i>cordata</i>	P4	
<i>Boronia anceps</i>	P3	
<i>Boronia tenuis</i>	P4	
<i>Caladenia caesarea</i> subsp. <i>maritima</i>	T	Endangered
<i>Caladenia excelsa</i>	T	Endangered
<i>Caladenia huegelii</i>	T	Endangered
<i>Caladenia viridescens</i>	T	Endangered
<i>Calothamnus graniticus</i> subsp. <i>graniticus</i>	P4	
<i>Centrolepis caespitosa</i>	P4	Endangered
<i>Drosera fimbriata</i>	P4	
<i>Eucalyptus rudis</i> subsp. <i>cratyantha</i>	P4	
<i>Eucalyptus phylacis</i>	T	Endangered
<i>Eucalyptus virginea</i>	P4	
<i>Gastrolobium</i> sp. Quindalup (H. Cole and D. Carter 577)	P1	
<i>Hemigenia rigida</i>	P1	
<i>Hydrocotyle hamelinensis</i>	P2	
<i>Isopogon uncinatus</i>	T	Endangered
<i>Johnsonia inconspicua</i>	P3	
<i>Millotia tenuifolia</i> var. <i>laevis</i>	P2	
<i>Thelymitra variegata</i>	P3	
<i>Wurmbea calcicola</i>	T	Endangered

### **DEC Conservation Codes**

T: 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.

1: 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.

2: 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.

3: 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.

4: 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.

**Categories of Threatened Species as defined in Section 179 of the EPBC Act 1999**

- (1) A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
- (2) A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time:
  - (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
  - (b) 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.
- (3) A native species is eligible to be included in the critically endangered category 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.
- (4) A native species is eligible to be included in the endangered category at a particular time if, at that time:
  - (a) it is not critically endangered; and
  - (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
- (5) A native species is eligible to be included in the vulnerable category at a particular time if, at that time:
  - (a) it is not critically endangered or endangered; and
  - (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.
- (6) A native species is eligible to be included in the conservation dependent category at a particular time if, at that time:

(a) 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; or (b) the following subparagraphs are satisfied:

(i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

While all native flora are protected under the Western Australia *Wildlife Conservation Act, 1950*, some Declared Rare Flora are afforded additional protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act).

A search of the DEC Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs) database was conducted by the proponent for the study area.

The DEC search recorded two TECs and one PEC within the vicinity of the study area. The results of the 2011 DEC TEC search are listed below on Table 4.

**Table 4: DEC Threatened Ecological Communities and Priority Ecological Communities database search in the vicinity of the study area**

Code	Description	WA Status	EPBC Act
<b>TECs</b>			
SCP3b	<i>Eucalyptus calophylla-Eucalyptus marginata</i> woodlands on sandy clay soils of the southern Swan Coastal Plain	Vulnerable	-
Meelup Granites	<i>Calothamnus graniticus</i> heaths on south west coastal granites	Vulnerable	-
<b>PEC</b>			
Whicher Scarp Paluslope Wetlands	<i>Swan Coastal Plain Paluslope Wetlands</i>	Priority 1	-

### 3.1.4 Botanical Survey Limitations

The potential limitations of the September 2012 flora and vegetation surveys of the study area are presented in Table 4 on the following page.

**Table 4: Statement of Botanical Survey Limitations**

Potential Limitations	Constraints (Yes/No); Significant, Moderate or Negligible	Comment
Competency/experience of the consultant conducting the survey	No constraints	Botanist with extensive survey experience and taxonomic skills in the South West Region.
Proportion of the flora identified	No constraints	8 hours spent on site. All recorded species were identified.
Sources of information (historic/recent or new data)	No constraints	Relatively well documented.
Proportion of the task achieved and further work that may need to be undertaken	No constraints	No requirement for further survey considered necessary.
Timing/weather/season/cycle	No constraints	Wet winter- should have resulted in ephemeral species developing in Spring.
Intensity of survey (e.g. In retrospect was to intensity adequate)	No constraints	All remnant vegetation area were mapped and searched comprehensively on foot.
Completeness (e.g. was relevant area fully surveyed)	No constraints	All remnant vegetation area were mapped and searched comprehensively on foot.
Resources (e.g. degree of expertise available for plant identification)	No constraints	Experienced botanist undertook plant identification using regional botanical keys, and DEC Florabase. Several specimens were sent to the WA Herbarium for formal identification.
Remoteness and/or access problems	No constraints	Vehicle access was available to the golf course. All areas of vegetation were traversed on foot.
Availability of contextual (e.g. bioregional) information for the survey area	No constraints	Beard (1990); McKenzie et al., (2002) Havel and Mattiske, (2002), Keating and Trudgen (1986).

Fungi and nonvascular flora (e.g. algae, mosses and liverworts) were not specifically surveyed during the survey. No numerical analysis of floristic data collected was conducted.



## 4. FLORA AND VEGETATION RESULTS

### 4.1 Vegetation

#### 4.1.1 Vegetation Types

A total of 15 discrete native vegetation types were recorded from the September 2012 site visit. The vegetation types are described below and mapped on Figure 1. Refer to Appendix 2 for quadrat data and Appendix 3 for a list of species recorded from the study area.

#### Forest

**OFCCem** - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Shrubland of *Xanthorrhoea preissii*, *Spyridium globulosum*, *Hakea amplexicaulis*, *Hibbertia hypericoides*, *Trymalium ledifolium*, *Calothamnus sanguineus* and *Hemigenia pritzelii* over an Open Sedgeland of *Lepidosperma leptostachyum* and *Desmocladius fascicularis* and Herbland of *Lomandra purpurea* and *Lagenophora huegelii*.

Excellent condition.

**OFCCemXp** - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Shrubland of *Xanthorrhoea preissii* over a Shrubland of *Hibbertia hypericoides*, *Pimelea rosea*, *Hibbertia cunninghamii* and *Hypocalymma angustifolium* over a Herbland of *Chamaescilla corymbosa* var *corymbosa* and *Lagenophora huegelii*.

Very Good to Excellent condition.

**OFCCemScAf** - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* with scattered *Agonis flexuosa* and *Persoonia longifolia* over a Tall Shrubland of *Xanthorrhoea preissii* and Open Shrubland of *Xanthorrhoea preissii*, *Macrozamia riedlei*, *Hakea lissocarpha*, *Hovea elliptica* and *Hibbertia cunninghamii* over a Very Open Herbland of *Chamaescilla corymbosa* var *corymbosa*, *Kennedia prostrata*, *Phyllanthus calycinus*, \**Euphorbia peplus*, \**Oxalis pes-caprea*, \**Zantedeschia aethiopica*, \**Anagallis arvensis* and \**Solanum nigrum* and Very Open Grassland of \**Briza minor*.

Degraded to Good condition.

**OFCCemXpXg** - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Shrubland of *Xanthorrhoea preissii*, *Xanthorrhoea gracilis*, *Acacia browniana*, *Calothamnus sanguineus*, *Hypocalymma robustum* over a Low Open Heath of *Hibbertia hypericoides*, *Trymalium ledifolium*, *Hakea lissocarpha*, *Banksia dallanneyi* and *Hibbertia cunninghamii* over an Open Herbland of *Chorizema rhombeum*, *Pentapeltis peligera*, *Lagenophora huegelii*, *Craspedia variabilis* and *Daucus glochidiatus*

Excellent condition.

**OFCCAf** - Open Forest of *Corymbia calophylla* and *Agonis flexuosa* over a Tall Shrubland of *Acacia saligna* and *Acacia cyclops* over an Open Heath of *Calothamnus graniticus* var *graniticus*, *Dodonaea ceratocarpa* and *Acacia divergens* over an Open Herbland of *Uticularia multifida*, \**Cotula turbinata* and Very Open Grassland of *Briza minor*.

Very Good condition.

**OFCCeMxpXgHr-** Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Open Shrubland of *Xanthorrhoea preissii*, *Xanthorrhoea gracilis* over an Open Heath of *Hypocalymma robustum*, *Hibbertia cunninghamii*, *Hibbertia hypericoides* and *Trymalium ledifolium* over a Very Open Herbland of *\*Coluta turbinata*, *\*Arctotheca calendula* and *Haemodorum discolor*.

Degraded to Good condition.

**OFCCeAfXp-** Open Forest of *Corymbia calophylla* and *Agonis flexuosa* over a Tall Open Shrubland of *Xanthorrhoea preissii* and *Spyridium globulosum* over an Open Shrubland of *Hypocalymma robustum*, *Calothamnus sanguineus*, *Trymalium ledifolium*, *Hibbertia cunninghamii* over an Open Herbland of *Chamaescilla corymbosa* var *corymbosa*, *\*Euphorbia peplus*, *\*Zantedeschia aethiopica*, *\*Anagallis arvensis* and *\*Cotula turbinata*.

Good to Very Good condition.

**OFEmCctOSXp-** Open Forest of *Eucalyptus marginata* and *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii* and Herbland of *\*Euphorbia peplus*, *\*Cotula turbinata*, *Haemodorum discolor*, *\*Oxalis pes-caprea* and Very Open Grassland of *\*Avena fatua*.

Degraded to Good condition.

**OFCCeEsp-** Open Forest of *Corymbia calophylla* and *Eucalyptus* sp. (planted) with scattered *Agonis flexuosa* (planted?) over a Tall open Shrubland of *Xanthorrhoea preissii* and Open Shrubland of *Hypocalymma angustifolium* and Herbland of *\*Cotula turbinata*, *\*Zantedeschia aethiopica*, *\*Petrohragia velutina* and *\*Arctotheca calendula*.

Degraded condition.

**OFCCeMAf-** Open Forest of *Corymbia calophylla*, *Eucalyptus marginata* and *Agonis flexuosa* over a Tall Open Shrubland of *Persoonia longifolia*, *Acacia saligna* and *Banksia grandis* over an Open Heath of *Acacia pulchella*, *Spyridium globulosum*, *Hypocalymma angustifolium*, *Leucopogon propinquus* and *Calothamnus sanguineus* over an Open Shrubland of *Hibbertia hypericoides* and *Phyllanthus calycinus* over an Open Herbland of *Chamaescilla corymbosa* var *corymbosa*, *Daucus glochidiatus* and *Lagenophora huegeli*.

Excellent condition.

**OFCCeMtsAp-** Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Shrubland of *Acacia pulchella* and *Acacia divergens* over an Open Heath of *Acacia pulchella*, *Hypocalymma robustum*, *Xanthorrhoea preissii*, *Calothamnus sanguineus*, *Hakea amplexicaulis*, *Pimelea rosea* over a Low Open Heath of *Hibbertia hypericoides*, *Trymalium ledifolium*, *Banksia dallanneyi* over an Open Heath of *Xanthosia candida*, *Chamaescilla corymbosa* var *corymbosa* and *Synathea gracillima*.

Excellent condition.

**OFCCeMTOSXpCs\_** Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Open Shrubland of *Xanthorrhoea preissii* over an Open Heath of *Calothamnus sanguineus*, *Acacia pulchella*, *Leucopogon propinquus*, *Hypocalymma angustifolium*,

*Dodonaea ceratocarpa*, *Babingtonia camphorosmae*, *Trymalium ledifolium*, *Hibbertia hypericoides* and *Hibbertia cunninghamii* over a Herbland of *Lomandra* sp., \**Cotula turbinata* and *Stylidium calcartum*.

Excellent condition.

### **Woodland**

**OWCc** - Open Woodland of *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii* over an Open Heath of *Melaleuca systema*, *Gastrolobium spinosum*, *Hakea amplexicaulis* and *Dodonaea ceratocarpa* over a Low Open Heath of *Hibbertia hypericoides*, *Darwinia citrodora*, *Hypocalymma angustifolium* and *Cryptandra arbutiflora* var *tubulosa* over an Open Herbland of *Conostylis setigera*, *Chamaescilla corymbosa* var *corymbosa*, \**Cotula turbinata* and Open Grassland of *Neurachne alopecuroidea*.

Excellent condition.

**W/OFCc**- Woodland/Open Forest of *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii* over an Open Heath of *Xanthorrhoea preissii*, *Calothamnus sanguineus*, *Hakea amplexicaulis* and *Hakea lissocarpha* over a Low Shrubland of *Banksia dallanneyi*, *Hibbertia hypericoides* and *Hypocalymma angustifolium* over an Open Sedgeland of *Mesolaena tetragona*, Open Grassland of *Neurachne alopecuroidea* and Open Herbland of *Lagenophora huegelii* and *Chamaescilla corymbosa* var *corymbosa*.

Excellent condition.

### **Shrubland**

**OHMs**- Open Heath of *Melaleuca systema*, *Dodonaea ceratocarpa*, *Darwinia citrodora*, *Petrophile striata*, *Daviesia inflata*, *Dillwynia laxiflora* and *Stachystemon virgatus* over an Open Herbland of *Conostylis setigera*, *Haemodorum discolor* and *Caladenia thinicola*.

Excellent condition.

\* denotes weed/introduced species

## **4.1.2 Vegetation Condition**

The condition of the vegetation was assessed using the vegetation condition rating scale of Keighery as published in Bush Forever (Government of Western Australia, 2000). Refer to Table 2 for the Vegetation Condition Ratings and Figure 1. The vegetation rating scale ranges from Pristine to Completely Degraded.

The majority of the vegetation in the study area was recorded to be in Very Good to Excellent condition. These remnant vegetation areas recorded a diverse understorey with an intact vegetation structure and very few weeds.

Other minor sections of the proposed track were recorded to be in Degraded to Good condition. The basic vegetation structure in these areas has been disturbed by past clearing, planting of trees and weed invasion.

### 4.1.3 Vegetation Significance

Neither the Regional Forest Agreement (RFA) vegetation complex mapping (Mattiske and Havel 1998) or the Heddlé et al (1980) vegetation complex mapping covers the study area.

A search of DEC's TEC and PEC database in the vicinity of the study area recorded two TEC's and one PEC (Table 4). The TEC 'SCP3b- (*Eucalyptus calophylla*-*Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain)' and PEC 'Whicher Scarp Paluslope Wetlands- (*Swan Coastal Plain Paluslope Wetlands*) are both associated with the Swan Coastal Plain and are recorded by DEC to the south of the study area.

The DEC records of the TEC, 'Meelup Granites- (*Calothamnus graniticus* heaths on south west coastal granites)' including the 500m buffer was located within the eastern section of the study area.

Several shrubs of *Calothamnus graniticus* subsp *graniticus* were recorded in a small area associated with Quadrat 4 (**OFCcAf**) in the eastern section of the proposed bike extension (Figure 1). The vegetation type was recorded to be an Open Forest of *Corymbia calophylla* and *Agonis flexuosa* over a Tall Shrubland of *Acacia saligna* and *Acacia cyclops* over an Open Heath of *Calothamnus graniticus* var *graniticus*, *Dodonaea ceratocarpa* and *Acacia divergens* over an Open Herbland of *Uticularia multifida*, *\*Cotula turbinata* and Very Open Grassland of *Briza minor* in Very Good condition.

The above vegetation type was located on sandy clay soil on the western side of a small wetland area. The TEC 'Meelup Granites' typically occurs on granite outcrops, which were not recorded at this site. The vegetation did comprise of several species which are associated with the TEC 'Meelup Granite' including *Agonis flexuosa*, *Dodonaea ceratocarpa* and *Drosera erythrorhiza*. The DEC may consider this vegetation type as being associated with the TEC 'Meelup Granites'.

The search results from the *EPBC Act* Protected Matters Report (Appendix 1) of the study area and vicinity recorded no TECs. No vegetation types recorded from the site assessment correspond to vegetation communities listed in the *EPBC Act* list of TECs (DoSEWPaC, 2012).

## 4.2 Flora

### 4.2.1 General

A total of 102 flora species from 39 families were recorded from the study area during the 28 September 2012 survey. This included 89 native species and 13 introduced species. The dominant families represented were the Papilionaceae (Pea family- eight native species, three introduced species), Proteaceae (10 native species), Myrtaceae family (10 native species) and the Mimoseae (*Acacia* family –five native species).

A complete list of the flora species recorded within the study area during the assessment is provided in Appendix 3. The floristic (quadrat) data collected from each site is provided in Appendix 2.

#### 4.2.2 Conservation Significance of Flora

A search of the DEC's Threatened Declared Rare and Priority Flora database, the Western Australian Herbarium Specimen database and the Online *EPBC Act 1999* Protected Matters Report was conducted in the vicinity of the study area. The search records identified seven Declared Rare Species and 16 Priority Species that have previously been recorded in the vicinity of the study area (Refer to Section 3.1.3).

No Declared Rare species, as listed under Section 23F of the Western Australian *Wildlife Conservation Act 1950* or under the Commonwealth *Environmental Protection and Biodiversity Act 1999* (EPBC) were recorded within the study area during the 28 September 2012 site assessment.

Significant rare flora including the rare orchids, *Caladenia excelsa*, *Caladenia caesarea* subsp. *maritima* and *C.huegelii* and *C. viridescens* would have been identifiable during the Spring survey if present.

A Priority 4 Flora species, *Calothamnus graniticus* subsp *graniticus* was recorded in the eastern section of the proposed mountain bike extension associated with Quadrat 4 (Figure 1). A specimen of the *Calothamnus* shrub was formally identified at the WA herbarium (pers. comm., 2012). Thirteen shrubs of *Calothamnus graniticus* subsp *graniticus* were recorded within and adjacent to Quadrat 4 at the locations outlined in Table 5 below.

**Table 5: Number and Locations of *Calothamnus graniticus* subsp *graniticus*- Priority 4 listed species**

Number of plants	GPS Location
3	50, 323598, 6281038
1	50, 323586, 6281041
9	50, 323603, 6281056

## 5. CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the 28 September 2012 Level 2 Flora and Vegetation Assessment of Stage 2 of the Proposed Mountain Bike Track Extension at the Dunsborough and Districts Country Club, the following conclusion and recommendations have been made:

- A total of 15 discrete native vegetation types were recorded from the September 2012 site visit. The majority of the vegetation in the study area was recorded to be in Very Good to Excellent condition. These remnant vegetation areas recorded a diverse understorey with an intact vegetation structure and very few weeds. Other minor sections of the proposed track were recorded to be in Degraded to Good condition. The basic vegetation structure in these areas has been disturbed by past clearing, planting of trees and weed invasion.
- A search of DEC's TEC and PEC database in the vicinity of the study area recorded two TEC's and one PEC including:
  - TEC 'SCP3b- (*Eucalyptus calophylla*-*Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain)',
  - TEC, 'Meelup Granites- (*Calothamnus graniticus* heaths on south west coastal granites ' ) and
  - PEC 'Whicher Scarp Paluslope Wetlands- (*Swan Coastal Plain Paluslope Wetlands*) are both associated with the Swan Coastal Plain and were located to the south of the study area.
- The vegetation type recorded at Quadrat 4 may be classified by the DEC as the TEC 'Meelup Granites' as it recorded an Open Heath of *Calothamnus graniticus* var *graniticus* and was associated with some species typical of the TEC including *Agonis flexuosa*, *Dodonaea ceratocarpa* and *Drosera erythrorhiza*.
- Liaison should be undertaken with the DEC to determine whether this vegetation type would be classified as the TEC 'Meelup Granites' and if so what management measures would be required. In addition to its potential TEC status, the shrub *Calothamnus graniticus* var *graniticus* is rated by the DEC as a Priority 4 species. It is recommended to divert the track around this vegetation type using an appropriate buffer as determined by the DEC. This area should be flagged prior to any track construction to protect the vegetation from any disturbance. Staff or contractors involved in the proposed construction of the track should be made aware of the location and protection required for the Priority listed flora and TEC community.
- An alternative bike track route, if required, should be surveyed in this area for flora and vegetation.
- A total of 102 flora species from 39 families were recorded from the study area during the 28 September 2012 survey. This included 89 native species and 13 introduced species. The dominant families represented were the Papilionaceae (Pea family-

eight native species, three introduced species), Proteaceae (10 native species), Myrtaceae family (10 native species) and the Mimoseae (Acacia family –five native species).

- A search of the DEC's Threatened Declared Rare and Priority Flora database, the Western Australian Herbarium Specimen database and the Online *EPBC Act 1999* Protected Matters Report was conducted in the vicinity of the study area. The search records identified seven Declared Rare Species and 16 Priority Species that have previously been recorded in the vicinity of the study area.
- No Declared Rare species as listed under Section 23F of the Western Australian *Wildlife Conservation Act 1950* or under the Commonwealth *Environmental Protection and Biodiversity Act 1999* (EPBC) were recorded within the study area during the site assessment.
- Thirteen shrubs of the Priority 4 Flora species, *Calothamnus graniticus* subsp *graniticus* were recorded in the eastern section of the proposed mountain bike extension associated with Quadrat 4 (Figure 1). It is recommended to liaise with the DEC on required buffers and to divert the track around the Priority 4 shrubs (and potential TEC vegetation type and required buffer). This area should be flagged prior to any track construction to protect the vegetation from any disturbance. Staff or contractors involved in the proposed construction of the track should be made aware of the location and protection required for the Priority 4 species.
- The proposed extension to the mountain bike track will have an impact on areas of vegetation in Good, Very Good and Excellent condition. Given the close proximity to the Meelup Regional Park, liaison should be undertaken with the Meelup Regional Park committee, DEC and the Shire of Busselton.
- The planned use of hand tools for vegetation clearing in some areas of the proposed 1-2 metre wide track will minimise the impact on the adjoining native vegetation. The use of machinery in these areas should be minimised and avoided where possible.

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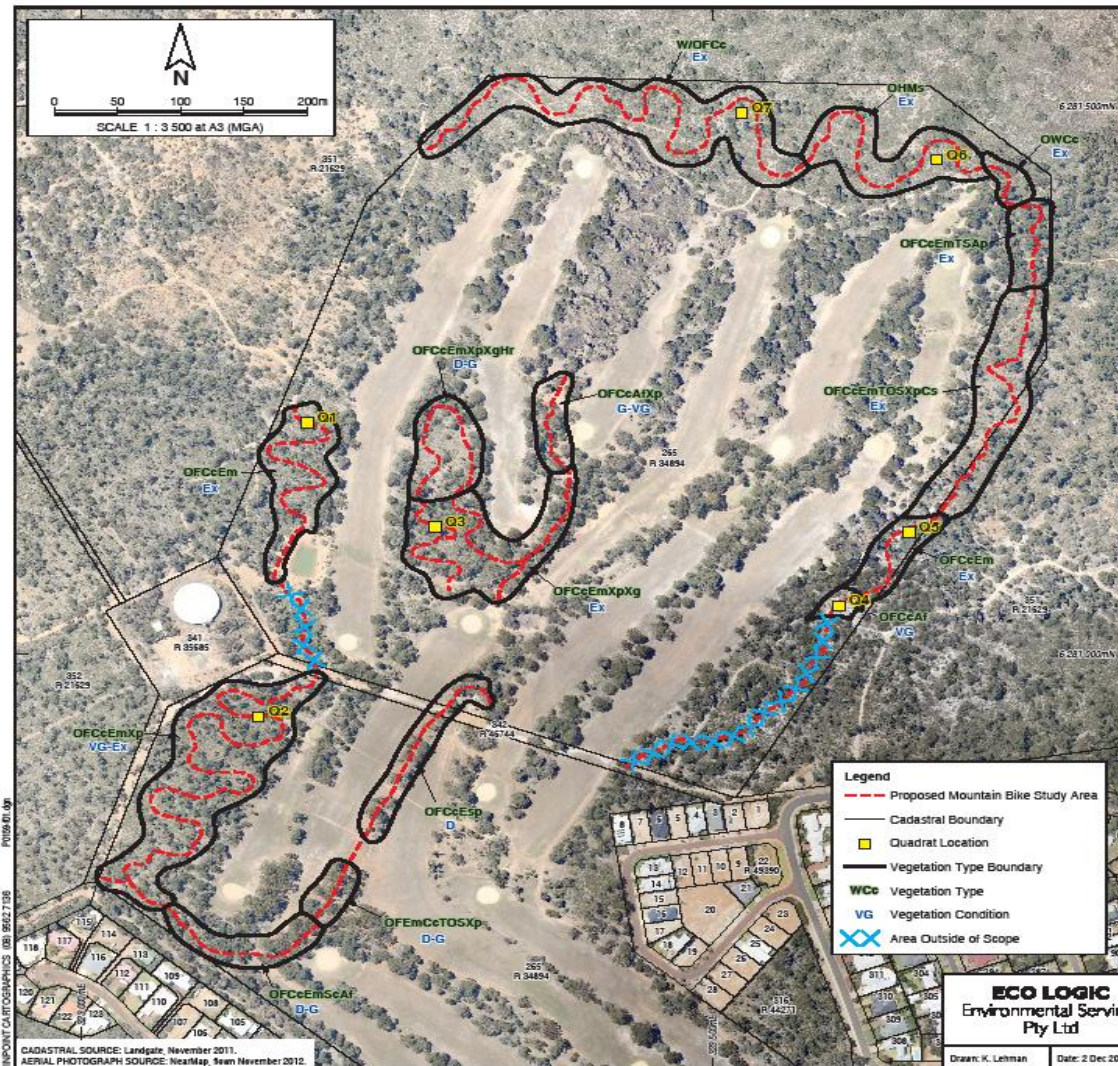
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## **7. DISCLAIMER**

This report is published in accordance with and subject to an agreement between Eco Logic Environmental Services Pty Ltd (EES) and the Client, Dunsborough and Districts Country Club. The report is restricted to the scope of the report and issues raised by the Client in engaging EES and has been prepared using the standard skill and care ordinarily exercised by an Environmental Scientist in preparing such reports.

Any person or organisation that relies on or uses the report for purposes or reasons other than those agreed by EES and the Client does so entirely at their own risk and EES denies all liability for any loss, damage or injury of any kind whatsoever that may be suffered as a consequence of relying on this report for any purpose other than that agreed with the Client.

Figure 1  
Vegetation Types and Condition



**Vegetation Type Descriptions**

**Forest**

**OFCCEm** - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Shrubland of *Xanthorrhoea preissii*, *Spyridium globulosum*, *Hahea amplexicaulis*, *Hibbertia hypericoides*, *Tymkium ledifolium*, *Calothamnus sanguineus* and *Hemiphysalis prostris* over an Open Sedgeland of *Lepidosperma leptosochyrum* and *Democarpus fasciculatus* and Herland of *Lomantha pumila* and *Lagenophora huegelii*. Excellent condition.

**OFCCEmXp** - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Shrubland of *Xanthorrhoea preissii* over a Shrubland of *Hibbertia hypericoides*, *Pimelea rosea*, *Hibbertia cuminghamii* and *Hypocalymma angustifolium* over an Herland of *Chamaescla corymbosa* var *corymbosa* and *Lagenophora huegelii*. Very Good to Excellent condition.

**OFCCEmXpXg** - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* with scattered *Agonis flexuosa* and *Pteronia longifolia* over a Tall Shrubland of *Xanthorrhoea preissii* and Open Shrubland of *Xanthorrhoea preissii*, *Macrocarpa nodosa*, *Hahea isocarpa*, *Hovea elliptica* and *Hibbertia cuminghamii* over a Very Open Herland of *Chamaescla corymbosa* var *corymbosa*, *Kemedia prostrata*, *Phyllanthus calycinus*, *Euphorbia peplus*, *Oriola pre-caprea*, *Zantedeschia aethiopica*, *Anagallis anensis* and *Solanum nigrum*. Degraded to Good condition.

**OFCCEmXpXgHr** - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Shrubland of *Xanthorrhoea preissii*, *Xanthorrhoea gracilis*, *Acacia bromiana*, *Calothamnus sanguineus*, *Hypocalymma robustum* over a Low Open Heath of *Hibbertia hypericoides*, *Tymkium ledifolium*, *Hahea isocarpa*, *Banksia dalrymplei* and *Hibbertia cuminghamii* over an Open Herland of *Chroisma nambour*, *Pentapetes setigera*, *Lagenophora huegelii*, *Cratogeomys variabilis* and *Daucus glomulosus*. Excellent condition.

**OFCCEmXpXgHr** - Open Forest of *Corymbia calophylla* and *Agonis flexuosa* over a Tall Shrubland of *Acacia saligna* and *Acacia cyclops* over an Open Heath of *Calothamnus granulosus* var *granulosus*, *Dodonaea cerasocarpa* and *Acacia diversipes* over an Open Herland of *Ulinclata nutiflora*, *Cotula latrinata* and Very Open Grassland of *Biza minor*. Very Good condition.

**OFCCEmXpXgHr** - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Open Shrubland of *Xanthorrhoea preissii*, *Xanthorrhoea gracilis* over an Open Heath of *Hypocalymma robustum*, *Hibbertia cuminghamii*, *Hibbertia hypericoides* and *Tymkium ledifolium* over a Very Open Herland of *Cotula latrinata*, *Arctostaphylos calandula* and *Haemodorum discolor*. Degraded to Good condition.

**OFCCEmXpXgHr** - Open Forest of *Corymbia calophylla* and *Agonis flexuosa* over a Tall Open Shrubland of *Xanthorrhoea preissii* and *Spyridium globulosum* over an Open Shrubland of *Hypocalymma robustum*, *Calothamnus sanguineus*, *Tymkium ledifolium*, *Hibbertia cuminghamii* over an Open Herland of *Chamaescla corymbosa* var *corymbosa*, *Euphorbia peplus*, *Zantedeschia aethiopica*, *Anagallis anensis* and *Cotula latrinata*. Good to Very Good condition.

**OFCCEmXpXgHr** - Open Forest of *Eucalyptus marginata* and *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii* and Herland of *Euphorbia peplus*, *Cotula latrinata*, *Haemodorum discolor*, *Oriola pre-caprea* and Very Open Grassland of *Avena fatua*. Degraded to Good condition.

**OFCCEmXpXgHr** - Open Forest of *Corymbia calophylla* and *Eucalyptus sp. (planted)* with scattered *Agonis flexuosa* (planted) over a Tall Open Shrubland of *Xanthorrhoea preissii* and Open Shrubland of *Hypocalymma angustifolium* and Herland of *Cotula latrinata*, *Zantedeschia aethiopica*, *Pteronia longifolia* and *Arctostaphylos calandula*. Degraded condition.

**OFCCEmXpXgHr** - Open Forest of *Corymbia calophylla*, *Eucalyptus marginata* and *Agonis flexuosa* over a Tall Open Shrubland of *Pteronia longifolia*, *Acacia saligna* and *Banksia granitica* over an Open Heath of *Acacia pulchella*, *Spyridium globulosum*, *Hypocalymma angustifolium*, *Leucopogon prostratus* and *Calothamnus sanguineus* over an Open Shrubland of *Hibbertia hypericoides* and *Phyllanthus calycinus* over an Open Herland of *Chamaescla corymbosa* var *corymbosa*, *Daucus glomulosus* and *Lagenophora huegelii*. Excellent condition.

**OFCCEmXpXgHr** - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Shrubland of *Acacia pulchella* and *Acacia diversipes* over an Open Heath of *Acacia pulchella*, *Hypocalymma robustum*, *Calothamnus sanguineus*, *Hahea amplexicaulis*, *Pimelea rosea* over a Low Open Heath of *Hibbertia hypericoides*, *Tymkium ledifolium*, *Banksia dalrymplei* over an Open Heath of *Xanthorrhoea canaliculata*, *Chamaescla corymbosa* var *corymbosa* and *Syntherisma gracilima*. Excellent condition.

**OFCCEmXpXgHr** - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Open Shrubland of *Xanthorrhoea preissii* over an Open Heath of *Calothamnus sanguineus*, *Acacia pulchella*, *Leucopogon prostratus*, *Hypocalymma angustifolium*, *Dodonaea cerasocarpa*, *Bathytrochis camphorata*, *Tymkium ledifolium*, *Hibbertia hypericoides* and *Hibbertia cuminghamii* over a Herland of *Lomantha sp.*, *Cotula latrinata* and *Styrium calcitrans*. Excellent condition.

**Woodland**

**OWCC** - Open Woodland of *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii* over an Open Heath of *Melicope systena*, *Gastrolobium sphaerum*, *Hahea amplexicaulis* and *Dodonaea cerasocarpa* over a Low Open Heath of *Hibbertia hypericoides*, *Darwinia cibrosa*, *Hypocalymma angustifolium* and *Cryptandra arbutiflora* var *subulosa* over an Open Herland of *Chamaescla corymbosa* var *corymbosa*, *Cotula latrinata* and Open Grassland of *Neurachne alopecuroides*. Excellent condition.

**WDFCC** - Woodland/Open Forest of *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii* over an Open Heath of *Xanthorrhoea preissii*, *Calothamnus sanguineus*, *Hahea amplexicaulis* and *Hahea isocarpa* over a Low Shrubland of *Banksia dalrymplei*, *Hibbertia hypericoides* and *Hypocalymma angustifolium* over an Open Sedgeland of *Mesobola tetragona*, Open Grassland of *Neurachne alopecuroides* and Open Herland of *Lagenophora huegelii* and *Chamaescla corymbosa* var *corymbosa*. Excellent condition.

**Shrubland**

**OHMS** - Open Heath of *Melicope systena*, *Dodonaea cerasocarpa*, *Darwinia cibrosa*, *Pteronia emata*, *Gallesia vitifolia*, *Dillwynia ladiifera* and *Stachytaraxa virgatus* over an Open Herland of *Conostylos setigera*, *Haemodorum discolor* and *Galathea thimicola*. Excellent condition.

\* denotes weed/introduced species

**Vegetation Condition**  
(Legend Source: Bush Forever (Govt of WA, 2000))

P - Pristine (not applicable)  
Ex - Excellent  
VG - Very Good  
G - Good  
D - Degraded  
DD - Completely Degraded (not applicable)

Note: Full description in text

CADASTRAL SOURCE: Landgate, November 2011.  
AERIAL PHOTOGRAPH SOURCE: Nearmap, Scan November 2012.

<p><b>ECO LOGIC</b> Environmental Services Pty Ltd</p> <p>Drawn: K. Lehman Date: 2 Dec 2012</p>	<p>Dunsborough and Districts Country Club FLORA AND VEGETATION ASSESSMENT - STAGE 2 PROPOSED MOUNTAIN BIKE EXTENSION, DUNSBOROUGH AND DISTRICTS COUNTRY CLUB</p>	<p><b>Figure 1</b></p> <p><b>VEGETATION TYPES AND CONDITION</b></p> <p>Job: P0159</p>
	<p>VEGETATION TYPES AND CONDITION</p>	

Appendix 1

Online *EPBC*  
*Act 1999* Protected  
Matters Report (see  
attached)

## Appendix 2

### Quadrat Data





**Quadrat 1**

**Date:** 28/9/12 **GPS:** NW Corner Peg-50, 323181, 6281222

**Quadrat:** 10x10m

**Habitat:** Hillslope, lateritic gravel clay loam soil.

**Vegetation:** Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Shrubland of *Xanthorrhoea preissii*, *Spyridium globulosum*, *Hakea amplexicaulis*, *Hibbertia hypericoides*, *Trymalium ledifolium* and *Calothamnus sanguineus* over an Open Sedgeland of *Lepidosperma leptostachyum* and *Desmocladius fascicularis* and Herbland of *Lomandra purpurea* and *Lagenophora huegelii*.

**Vegetation Condition:** Excellent

<b>Species List</b>	<b>Height (m)</b>	<b>Cover (%)</b>
<i>Corymbia calophylla</i>	10-28	35
<i>Eucalyptus marginata</i>	25	10
<i>Xanthorrhoea preissii</i>	1	15
<i>Hakea amplexicaulis</i>	1.2	2
<i>Hibbertia hypericoides</i>	0.4	5-10
<i>Trymalium ledifolium</i>	0.45	5
<i>Calothamnus sanguineus</i>	1	10
<i>Hypocalymma robustum</i>	1.2	5
<i>Acacia browniana</i>	1.1	1
<i>Comesperma confertum</i>	0.25	<1
<i>Lagenophora huegelii</i>	0.01	<1
<i>Lepidosperma leptostachyum</i>	1.2	2-5
<i>Desmocladius fascicularis</i>	0.2	1
<i>Lomandra purpurea</i>	0.45	5-10

<i>Tetrarrhena laevis</i>	0.2	<1
<i>Pentapeltis peltigera</i>	0.01	<1
<i>Chorizema rhombeum</i>	0.1	<1
<i>Caladenia ferruginea</i>	0.15	<1
<i>Daucus glochidiatus</i>	0.01	<1





**Quadrat 2**

**Date:** 28/9/12 **GPS:** NW Corner Peg-50, 323117, 6280953

**Quadrat:** 10x10

**Habitat:** Hillslope, granite outcrop, brown loam soil.

**Vegetation:** Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Shrubland of *Xanthorrhoea preissii* over a Shrubland of *Hibbertia hypericoides*, *Pimelea rosea*, *Hibbertia cunninghamii* and *Hypocalymma angustifolium* over a Herbland of *Chamaescilla corymbosa* var *corymbosa* and *Lagenophora huegelii*.

**Vegetation Condition:** Very Good to Excellent Condition

Species List	Height (m)	Cover (%)
<i>Corymbia calophylla</i>	25	10-20
<i>Eucalyptus marginata</i>	22	20-30
<i>Xanthorrhoea preissii</i>	0.5-2.5	60
<i>Hibbertia hypericoides</i>	0.5	10
<i>Pimelea rosea</i>	0.5	2-5
<i>Hibbertia cunninghamii</i>	0.5	5
<i>Calothamnus sanguineus</i>	0.6	2-5
<i>Hypocalymma angustifolium</i>	0.5	5
<i>Trymalium ledifolium</i>	0.5	2
<i>Chamaescilla corymbosa</i> var <i>corymbosa</i>	0.1	<1
<i>Lagenophora huegelii</i>	0.01	<1
* <i>Cotula turbainata</i>	0.01	<1
<i>Neurachne alopecuroidea</i>	0.1	<1
* <i>Arctotheca calendula</i>	0.1	<1
<i>Tetrarrhena laevis</i>	0.3	1





### Quadrat 3

**Date:** 28/9/12 **GPS:** NW Corner Peg- 50, 323275, 6281124

**Quadrat:** 10x10m

**Habitat:** Hillslope- granite outcrop, loam soil.

**Vegetation:** Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Shrubland of *Xanthorrhoea preissii*, *Xanthorrhoea gracilis*, *Acacia browniana*, *Calothamnus sanguineus*, *Hypocalymma robustum* over a Low Open Heath of *Hibbertia hypericoides*, *Trymalium ledifolium*, *Hakea lissocarpha*, *Banksia dallanneyi* and *Hibbertia cunninghamii* over an Open Herbland of *Chorizema rhombeum*, *Pentapeltis peligera*, *Lagenophora huegelii*, *Craspedia variabilis* and *Daucus glochidiatus*.

**Vegetation Condition:** Excellent

Species List	Height (m)	Cover (%)
<i>Corymbia calophylla</i>	28	15-20
<i>Eucalyptus marginata</i>	20-25	30
<i>Xanthorrhoea preissii</i>	0.5-1.5	10-15
<i>Xanthorrhoea gracilis</i>	1.2	1
<i>Acacia browniana</i>	0.5	2-5
<i>Calothamnus sanguineus</i>	0.5	10-15
<i>Hypocalymma robustum</i>	0.5	5-10
<i>Hibbertia hypericoides</i>	0.3	5-10
<i>Trymalium ledifolium</i>	0.5	2
<i>Hakea lissocarpha</i>	0.3	1
<i>Banksia dallanneyi</i>	0.05	1
<i>Hibbertia cunninghamii</i>	0.2	1
<i>Chorizema rhombeum</i>	0.01	<1

<i>Pentapeltis peligera</i>	0.01	<1
<i>Lagenophora huegelii</i>	0.01	1
<i>Caladenia attingens</i> subsp <i>atingens</i>	0.2	<1
<i>Craspedia variabilis</i>	0.6	<1
<i>Daucus glochidiatus</i>	0.01	<1
<i>Stylidium amoenum</i>	0.3	1





#### Quadrat 4

**Date:** 28/9/12 **GPS:** NW Corner Peg-50, 323603, 6281062

**Quadrat:** 10x10m

**Habitat:** Low lying area adjacent to a small wetland, sandy clay soil.

**Vegetation:** Open Forest of *Corymbia calophylla* and *Agonis flexuosa* over a Tall Shrubland of *Acacia saligna* and *Acacia cyclops* over an Open Heath of *Calothamnus graniticus* subsp *graniticus*, *Dodonaea ceratocarpa* and *Acacia divergens* over an Open Herbland of *Uticularia multifida*, *\*Cotula turbinata* and Very Open Grassland of *\*Briza minor*

**Vegetation Condition:** Very Good

Species List	Height (m)	Cover (%)
<i>Corymbia calophylla</i>	18	20
<i>Agonis flexuosa</i>	10	10-20
<i>Acacia saligna</i>	2.5	2
<i>Acacia cyclops</i>	2.2	2
<i>Calothamnus graniticus</i> subsp <i>graniticus</i>	1.0	10
<i>Dodonaea ceratocarpa</i>	1.0	2
<i>Acacia divergens</i>	1.2	2
<i>Uticularia multifida</i>	0.01	<1
<i>*Cotula turbinata</i>	0.01	<1
<i>*Briza minor</i>	0.3	1
<i>Drosera erythrorhiza</i>	0.01	<1





### Quadrat 5

**Date:** 28/9/12 **GPS:** NW Corner Peg- 50, 323669, 6281121

**Quadrat:** 10x10m

**Habitat:** Slight hillslope, sandy clay soil.

**Vegetation:** Open Forest of *Corymbia calophylla*, *Eucalyptus marginata* and *Agonis flexuosa* over a Tall Open Shrubland of *Persoonia longifolia*, *Acacia saligna* and *Banksia grandis* over an Open Heath of *Acacia pulchella*, *Spyridium globulosum*, *Hypocalymma angustifolium*, *Leucopogon propinquus* and *Calothamnus sanguineus* over an Open Shrubland of *Hibbertia hypericoides* and *Phyllanthus calycinus* over an Open Herbland of *Chamaescilla corymbosa* var *corymbosa*, *Daucus glochidiatus* and *Lagenophora huegeli*.

**Vegetation Condition:** Excellent

Species List	Height (m)	Cover (%)
<i>Corymbia calophylla</i>	25	20-30
<i>Eucalyptus marginata</i>	25	10
<i>Agonis flexuosa</i>	2-8	10-30
<i>Persoonia longifolia</i>	1.5	2
<i>Acacia saligna</i>	2.1	2
<i>Banksia grandis</i>	4	2
<i>Acacia pulchella</i>	0.5	2-5
<i>Spyridium globulosum</i>	2.5	2
<i>Hypocalymma angustifolium</i>	0.5	2
<i>Leucopogon propinquus</i>	0.6	2
<i>Calothamnus sanguineus</i>	0.5	5
<i>Hibbertia hypericoides</i>	0.25	2-5
<i>Phyllanthus calycinus</i>	0.3	1

<i>Chamaescilla corymbosa</i> var <i>corymbosa</i>	0.01	<1
<i>Daucus glochidiatus</i>	0.01	<1
<i>Lagenophora huegeli</i>	0.02	<1





### Quadrat 6

**Date:** 28/9/12 **GPS:** NW Corner Peg- 50, 323636, 6281516 **Quadrat:** 10x10m

**Habitat:** Hillslope, granite outcrop, clay soil.

**Vegetation:** Open Heath of *Melaleuca systema*, *Dodonaea ceratocarpa*, *Darwinia citrodora*, *Petrophile striata*, *Daviesia inflata* and *Dillwynia laxiflora* over an Open Herbland of *Conostylis setigera*, *Haemodorum discolour* and *Caladenia thinicola*

**Vegetation Condition:** Excellent

Species List	Height (m)	Cover (%)
<i>Melaleuca systema</i>	0.5-1.3	40
<i>Dodonaea ceratocarpa</i>	1.5	10-20
<i>Darwinia citrodora</i>	0.6	10
<i>Petrophile striata</i>	0.4	1
<i>Stachystemon virgatus</i>	0.1	<1
<i>Daviesia inflata</i>	1.1	2
<i>Dillwynia laxiflora</i>	0.5-1	1-2
<i>Conostylis setigera</i>	0.3	1
<i>Haemodorum discolour</i>	0.6	<1
<i>Caladenia thinicola</i>	0.2	<1





### Quadrat 7

**Date:** 28/9/12 **GPS:** NW Corner Peg- 50, 323488, 6281494 **Quadrat:** 10x10m

**Habitat:** Slight hillslope, granite outcrop, gravelly clay soil.

**Vegetation:** Woodland/Open Forest of *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii* over an Open Heath of *Xanthorrhoea preissii*, *Calothamnus sanguineus*, *Hakea amplexicaulis* and *Hakea lissocarpha* over a Low Shrubland of *Banksia dallanneyi*, *Hibbertia hypericoides* and *Hypocalymma angustifolium* over an Open Sedgeland of *Mesolaena tetragona*, Open Grassland of *Neurachne alopecuroidea* and Open Herbland of *Lagenophora huegelii* and *Chamaescilla corymbosa* var *corymbosa*.

**Vegetation Condition:** Excellent

Species List	Height (m)	Cover (%)
<i>Corymbia calophylla</i>	6-18	30-40
<i>Xanthorrhoea preissii</i>	1.2	10-15
<i>Calothamnus sanguineus</i>	0.5	20
<i>Hakea amplexicaulis</i>	1.2	2
<i>Hakea lissocarpha</i>	0.4	2
<i>Banksia dallanneyi</i>	0.2	2
<i>Hibbertia hypericoides</i>	0.6	5
<i>Hypocalymma angustifolium</i>	0.5	2
<i>Mesolaena tetragona</i>	0.4	2
<i>Neurachne alopecuroidea</i>	0.3	<1
<i>Haemodorum discolor</i>	0.2	<1



<i>Lagenophora huegelii</i>	0.05	2
<i>Chamaescilla corymbosa</i> var <i>corymbosa</i>	0.05	2

Appendix 3  
Flora Species List

## FLORA SPECIES LIST

FAMILY	SPECIES
ANTHERICACEAE	<i>Caesia micrantha</i>
	<i>Chamaescilla corymbosa</i> var <i>corymbosa</i>
	<i>Thysanotus manglesianus</i>
APIACEAE	<i>Daucus glochidiatus</i>
	<i>Pentapeltis peltigera</i>
	<i>Platysace tenuissima</i>
	<i>Xanthosia candida</i>
ARACEAE	* <i>Zantedeschia aethiopica</i>
ASTERACEAE	* <i>Arctotheca calendula</i>
	* <i>Cotula turbinata</i>
	<i>Craspedia variabilis</i>
	<i>Lagenophora huegelii</i>
	<i>Rhodanthe citrina</i>
CARYOPHYLLACEAE	* <i>Petrorhagia velutina</i>
CELASTRACEAE	<i>Tripterococcus brunonis</i>
COLCHICACEAE	<i>Burchardia congesta</i>
CYPERACEAE	<i>Lepidosperma leptostachyum</i>
	<i>Lepidosperma squamatum</i>
	<i>Mesolaena tetragona</i>
DASYPOGONACEAE	<i>Lomandra purpurea</i>
DILLENIACEAE	<i>Hibbertia cunninghamii</i>
	<i>Hibbertia hypericoides</i>
DROSERACEAE	<i>Drosera erythrorhiza</i>
EPACRIDACEAE	<i>Astroloma pallidum</i>
	<i>Leucopogon propinquus</i>
EUPHORBIACEAE	* <i>Euphorbia peplus</i>
	<i>Phyllanthus calycinus</i>
	<i>Stachystemon virgatus</i>
HAEMODORACEAE	<i>Conostylis setigera</i>
	<i>Haemodorum discolor</i>
IRIDACEAE	<i>Orthrosanthus laxus</i> var. <i>laxus</i>
	<i>Patersonia occidentalis</i>
	<i>Patersonia umbrosa</i> var <i>xanthina</i>
LAMIACEAE	<i>Hemigenia pritzelii</i>
LENTIBULARIACEAE	<i>Utricularia multifida</i>
LOBELIACEAE	<i>Isotoma hypocrateriformis</i>
LOGANIACEAE	<i>Logania serpyllifolia</i>
MALVACEAE	<i>Commersonia cygnorum</i>
MIMOSAEAE	<i>Acacia browniana</i>
	<i>Acacia cyclops</i>
	<i>Acacia divergens</i>
	<i>Acacia pulchella</i>
	<i>Acacia saligna</i>
MYRTACEAE	<i>Agonis flexuosa</i>
	<i>Babingtonia camphorosmae</i>
	<i>Calothanmus granitus</i> subsp <i>graniticus</i>
	<i>Calothanmus sanguineus</i>
	<i>Corymbia calophylla</i>

	<i>Eucalyptus marginata</i>
	<i>Eucalyptus sp. (planted)</i>
	<i>Hypocalymma angustifolium</i>
	<i>Hypocalymma robustum</i>
	<i>Kunzea glabrescens</i>
	<i>Melaleuca systema</i>
ORCHIDACEAE	<i>Caladenia attingens subsp attingens</i>
	<i>Caladenia ferruginea</i>
	<i>Caladenia rhomboidiformis</i>
	<i>Caladenia thinicola</i>
	<i>Cyanicula sericea</i>
OXALIDACEAE	* <i>Oxalis pes-caprae</i>
PAPILIONACEAE	<i>Chorizema rhombeum</i>
	<i>Daviesia inflata</i>
	<i>Daviesia horrida</i>
	<i>Daviesia preissii</i>
	<i>Dillwynia laxiflora</i>
	<i>Gastrolobium spinosum</i>
	<i>Hovea elliptica</i>
	<i>Kennedia prostrata</i>
	* <i>Lotus sp.</i>
	* <i>Medicago sp.</i>
	* <i>Trifolium sp.</i>
POACEAE	* <i>Avena fatua</i>
	* <i>Briza minor</i>
	<i>Neurachne alopecuroidea</i>
	<i>Tetrarrhena laevis</i>
POLYGALACEAE	<i>Comesperma confertum</i>
PRIMULACEAE	* <i>Lysimachia arvensis</i>
PROTEACEAE	<i>Banksia bipinnatifida</i>
	<i>Banksia dallanneyi</i>
	<i>Banksia grandis</i>
	<i>Grevillea quercifolia</i>
	<i>Hakea amplexicaulis</i>
	<i>Hakea lissocarpa</i>
	<i>Hakea trifurcata</i>
	<i>Persoonia longifolia</i>
	<i>Petrophile striata</i>
	<i>Synaphea gracillima</i>
RESTIONACEAE	<i>Desmocladius fasciculatus</i>
RHAMNACEAE	<i>Cryptandra arbutiflora</i>
	<i>Spyridium globulosum</i>
	<i>Trymalium ledifolium</i>
RUTACEAE	<i>Philothea spicata</i>
SAPINDACEAE	<i>Dodonaea ceratocarpa</i>
SOLANACEAE	* <i>Solanum nigrum</i>
STYLIDIACEAE	<i>Stylidium amoenum</i>
	<i>Stylidium calcaratum</i>
THYMELAEACEAE	<i>Pimelea rosea</i>
TREMANDRACEAE	<i>Tetratheca setigera</i>
XANTHORRHOEACEAE	<i>Xanthorrhoea gracilis</i>
	<i>Xanthorrhoea preissii</i>
ZAMIACEAE	<i>Macrozamia riedlei</i>

<b>Native Species- 89</b>
<b>Introduced Species- 13</b>
<b>TOTAL NUMBER OF SPECIES- 102</b>

\* denotes introduced species/weed