Eco Logic ENVIRONMENTAL SERVICES Pty Ltd

LEVEL 2 FLORA AND VEGETATION ASSESSMENT,

PROPOSED MOUNTAIN BIKE TRACK EXTENSION, DUNSBOROUGH AND DISTRICTS COUNTRY CLUB

Prepared for Dunsborough and Districts

Country Club MTB Trail

Report Date: 7 December 2011

Project Reference: 2011/0145, V1

7 December 2011

Dunsborough and Districts

Country Club MTB Trail

Attention: Richard Renn

Dear Richard,

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

Please find enclosed the Level Flora and Vegetation Assessment for 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 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 - 2010/0145, V1.	Version 1	7 December 2011	Dunsborough and Districts Country Club MTB Trail	KL

LIST OF ATTACHMENTS

ABBREVIATIONS

1 INTRODUCTION 8

1.1 Background 8

1.2 Objectives 8

2. EXISTING INFORMATION 8

2.1 Location Description 8

2.2 Climate 8

2.3 Landform and Soil 8

2.4 Biological Context of the Study Area 9

2.4.1 Bioregional Data 9

3. FLORA AND VEGETATION SURVEY METHODOLOGY 10

3.1 Survey Methodology 10

3.1.1 Vegetation Description 11

3.1.2 Vegetation Condition 11

3.1.3 Database searches 12

3.1.4 Botanical Survey Limitations 15

4. FLORA AND VEGETATION RESULTS 17

4.1 Vegetation 17

4.1.1 Vegetation Types 17

4.1.2 Vegetation Condition 18

4.1.3 Vegetation Significance 19

4.2 Flora 19

4.2.1 General 19

4.2.2 Conservation Significance of Flora 19

5. CONCLUSIONS AND RECOMMENDATIONS 21

6. REFERENCES 23

7. DISCLAIMER 25

LIST OF ATTACHMENTS

Tables

Table 1: Vegetation Structural Classes

Table 2: Vegetation Condition Ratings

Table 3: DEC Listed Declared Rare and Priority Taxa Previously Recorded from the Vicinity of the Study Area

Table 4: Statement of Botanical Survey Limitations

Figures

Figure 1: Vegetation Types and Condition

Appendixes

Appendix 1: Online *EPBC Act 1999* Protected Matters Report

Appendix 2: Quadrat Data

Appendix 3: Flora Species List

ABBREVIATIONS

DEC	Department of Environment and Conservation
DRF	Declared Rare Flora
EES	Eco Logic Environmental Services Pty Ltd
EPA	Environmental Protection Authority
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
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 the proposed extension of the mountain bike track.

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 ranges from an average maximum of 25.8^{o} and an average minimum of 15.6^{o}. The average annual rainfall recorded at Cape Naturaliste is 809.9 mm (Bureau of Meteorology, 2011).

2.3 Landform and Soil

The study area is located on the eastern side of the Leeuwin-Naturaliste Ridge. The ridge consists of granite (gneiss) outcrops, which dominate the higher areas. The area is underlain by banded granite rocks composed mainly of quartz, feldspar and dark green pyroxene. Overlying soil are shallow lateritic with 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 was undertaken by Ms Kay Lehman an experienced botanist from Eco Logic Environmental Services of the project area, on 27 October 2011. A total of 8.5hrs 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 of 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 as well as the Regional Herbarium and DEC Florabase. 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

Prior to conducting the October 2011 flora and vegetation survey, a search of the DEC's Declared Rare and Priority database was undertaken 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;
- DEC's Threatened Ecological Communities database; and

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
Acacia lateriticola glabrous variant (BR Maslin 6765)	P3	
Acacia subracemosa	P3	
Banksia sessilis var. cordata	P4	
Boronia anceps	P3	
Boronia tenuis	P4	
Caladenia caesarea subsp. *maritima*	T	Endangered
Caladenia excelsa	T	Endangered
Caladenia huegelii	T	Endangered
Caladenia viridescens	T	Endangered
Calothamnus graniticus subsp. graniticus	P4	
Centrolepis caespitosa	P4	Endangered
Drosera fimbriata	P4	
Eucalyptus rudis subsp. *cratyantha*	P4	
Eucalyptus phylacis	T	Endangered
Eucalyptus virginea	P4	
Gastrolobium sp. Quindalup (H. Cole and D. Carter 577)	P1	
Hemigenia rigida	P1	
Hydrocotyle hamelinensis	P2	
Isopopgon uncinatus	T	Endangered
Johnsonia inconspicua	P3	
Millotia tenuifolia var. *laevis*	P2	
Thelymitra variegata	P3	
Wurmbea calcicola	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
TECs			
SCP3b	*Eucalyptus calophylla-Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain	Vulnerable	-
Meelup Granites	*Calothamnus graniticus* heaths on south west coastal granites	Vulnerable	-
PEC			
Whicher Scarp Paluslope Wetlands	*Swan Coastal Plain Paluslope Wetlands*	Priority 1	-

3.1.4 Botanical Survey Limitations

The potential limitations of the October 2011 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	8.5hrs spent on site.
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, Regional Herbarium and DEC Florabase.
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 10 discrete native vegetation types were recorded from the October 2011 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

OFCc -Open Forest of *Corymbia calophylla* over a Tall Shrubland of *Xanthorrhoea preissii* over an Open Heath of *Hakea lissocapha, Trymalium ledifolium* and *Pimelea rosea* over a Low Open Heath of *Hibbertia hypericoides* and *Acacia pulchella* over a Sedgeland of *Lepidosperma leptostachyum* and Herbland of *Lagenophora huegelii, Stackhousia monogyna* and *Xanthosia candida*.

Very Good to Excellent condition

OFCcEm - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Shrubland of *Xanthorrhoea preissii* and *Spyridium globulosum* over a Shrubland of *Acacia pulchella* over an Open Heath of *Calothamnus sanguineus, Hypocalymma robustrum, Hibbertia hypericoides, Acacia pulchella, Pimelea rosea* and *Trymalium ledifolium* over an Open Herbland of *Stackhousia mongyna* and *Haemodorum discolour* and Open Sedgeland of *Desmocladus fascicularis*.

Very Good to Excellent condition

OFCcTOSXp - Open Forest of *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii*, and *Spyridium globulosum* over a Shrubland of *Calothamnus sanguineus, Hibbertia hypericoides* and *Hakea lissocarpha* over a Low Open Shrubland of *Crypandra arbutiflora* over a Very Open Herbland of *Stylidium repens, *Lysimachia arvensis* and *Haemodorum discolour* and Grassland of **Briza maxima* and **Briza minor.*

Very Good condition

OFCcEmOSXp - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over an Open Shrubland/Shrubland of *Xanthorrhoea preissii* over a Low Open Shrubland of *Hypocalymma robustrum, Trymalium ledifolium* and *Hibbertia cunninghamii* over an Open Herbland of *Lagenophora huegelii* and **Arctotheca calendula*, **Hypochaeris* sp., **Lysimachia arvensis* and *Haemodorum discolour*.

Degraded to Good condition.

OFCcTOSXpDc - Open Forest of *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii* and *Dodonaea ceratocarpa* over a Low Shrubland of *Hibbertia hypericoides, Acacia pulchella* and *Hypocalymma robustrum* over a Herbland of *Stackhousia monogyna, *Euphorbia peplus, *Lysimachia arvensis* and **Cotula turbinata*.

Good to Very Good condition

.**OFCcWAf** - Open Forest of *Corymbia calophylla* over a Woodland of *Agonis flexuosa* over a Tall Shrubland of *Banksia grandis* and *Acacia cyclops, Acacia saligna* and *Hakea trifurcata* over a Shrubland of *Dodonaea ceratocarpa, Acacia divergens* and *Acacia pulchella* over a Low Shrubland of *Hypocalymma robustrum, Hibbertia cunninghamii, Pimelea hispida* over a Very Open Herbland of *Hyalosperma cotula*.

Good to Very Good condition.

OFcCcEmOHSg - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over an Open Heath of *Spyridium globulosum, Xanthorrhoea preissii, Hypocalymma angustissima, Kunzea glabrescens* and *Acacia pulchella* over an Open Heath of *Melaleuca systena, Pimelea rosea, Olearia axillaris, Hibbertia hypericoides* and *Patersonia umbrosa* var *xanthina* over an Open Sedgeland of *Lepidosperma leptostachyum* and Open Herbland of *Agrostocrinum hirsutum, Poranthera huegelii* and *Scaevola calliptera*.

Good to Very Good condition

OFCcOSHr -Open Forest of *Corymbia calophylla* over an Open Shrubland of H*ypocalymma robustrum, Acacia cyclops, Spyridium globulosum* and *Hibbertia cunninghamii* over a Very Open Herbland of **Lysimachia arvensis, Stylidium crassifolium, *Cotula turbinata* and Very Open Grassland of **Briza minor.*

Degraded condition.

<u>Woodland</u>

WCc - Woodland of *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii and Spyridium globulosum* over an Open Heath of *Acacia cyclops, Calothamnus sanguineus, Hibbertia hypericoides, Hypocalymma robustrum* over a Very Open Grassland of *Briza maxima and Neurachne alopecuroidea and Open Herbland of Stylidium fasciculatum and Stylidium repens.*

Very Good to Excellent condition.

WCcTOSKg - Woodland of *Corymbia calophylla* over a Tall Open Shrubland of *Kunzea glabrescens, Spyridium globulosum,* and Open Shrubland of *Hypocalymma robustrum, Hibbertia hypericoides* and *Xanthorrhoea preissii*.

Degraded to Good 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 ranged from Good, Very Good to Excellent condition. These areas had an intact vegetation structure with few weeds and minor

disturbance. Other sections of the proposed track have been disturbed by past clearing, gravel extraction and weed invasion and were recorded to be in a Degraded (or Degraded to Good) condition. The basic vegetation structure has been significantly impacted in these areas.

4.1.3 Vegetation Significance

Neither the Regional Forest Agreement (RFA) vegetation complex mapping (Mattiske and Havel 1998) or the Heddle 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 were located 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. This vegetation community was not recorded during the assessment.

A review of the list of TECs and PECs on DEC's Database (DEC, 2011) did not correspond with the vegetation types recorded from the October 2011 site assessment. 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, 2011b).

None of the listed TEC's or PECs recorded within the vicinity of the study area was recorded during the survey.

4.2 Flora

4.2.1 General

A total of 107 flora species from 34 families were recorded from the study area during the 27 October 2011 survey. This included 92 native species and 15 introduced species. The dominant families represented were the Paplionaceae (Pea family- nine native species), Proteaceae (10 native species), Stylidiaceae family (six native species), Myrtaceae family (seven native species) and the Asteraceae (Daisy family –three native and five introduced 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 1.

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 or Priority Flora 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 27 October 2011 site assessment.

Significant Rare or Priority Flora including the rare orchids, *Caladenia excelsa and C.huegelii and C. viridescens* would have been identifiable during the Spring survey if present.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the 27 October 2011 Level 2 Flora and Vegetation Assessment of Proposed Mountain Bike Track Extension at the Dunsborough and Districts Country Club, the following conclusion have been made:

- A total of 107 flora species from 34 families were recorded from the study area during the 27 October 2011 survey. This included 92 native species and 15 introduced species. The dominant families represented were the Paplionaceae (Pea family- nine native species), Proteaceae (10 native species), Stylidiaceae family (six native species), Myrtaceae family (seven native species) and the Asteraceae (Daisy family –three native and five introduced 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 or Priority Flora 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 27 October 2011 site assessment.

- A total of 10 discrete native vegetation types were recorded from the October 2011 site visit. The majority of the vegetation in the study area ranged from Good, Very Good to Excellent condition. These areas had an intact vegetation structure with few weeds and minor disturbance. Other sections of the proposed track have been disturbed by past clearing, gravel extraction and weed invasion and were recorded to be in a Degraded (or Degraded to Good) condition. The basic vegetation structure has been significantly impacted in these areas.

- A review of the list of TECs and PECs on DEC's Database (DEC, 2011) did not correspond with the vegetation types recorded from the October 2011 site assessment. 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.

- 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 and the Shire of Busselton.

- The planned use of hand tools for vegetation clearing 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 avoided.

6. REFERENCES

Aplin, T.E.H (1979) *The Flora*. In:O'Brien B.J. (ed) Environment and Science, University of Western Australia, Nedlands, Western Australia.

Bureau of Meteorology (2011) *Climates Averages for Australian Sites*, Publicly available data prepared by the Bureau of Meteorology. Commonwealth of Australia, http://www.bom.gov.au/climate/averages/tables.

Department of Environment and Conservation (2011) Threatened Ecological Communities for Western Australia, Species and Communities Branch, Department of Environment and Conservation. www.dec.wa.gov.au/content/view.

DoSEWPaC (2011a) Department of Sustainability, Environment, Water, Population and Communities.- *EPBC Act* Protected Matters Report. 5/12/11.

DoSEWPaC (2011b) Department of Sustainability, Environment, Water, Population and Communities. EPBC Act List of Threatened Ecological Communities, Species Profile and Threats Database, Australian Government.

Environmental Protection Authority (2002) *Terrestrial Biological Surveys as an Element of Biodiversity Protection: Position Statement No. 3. Environmental Protection Authority, Perth, Western Australia.*

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

Government of Western Australia (2000) *Bush Forever: Volume 2: A Directory of Bush Forever Sites*, Department of Environmental Protection, Perth.

Havel, J.J. and Mattiske, E.M. (2002) Review of Management Options for Poorly Represented Vegetation Complexes. December, 2002, Perth.

Heddle, E.M., Loneragan, O.W. and Havel. J.J. (1980) Vegetation of the Darling System IN Atlas of Natural Resources, Darling System, WA. Department of Conservation and Land Management, Perth.

Keating, C and Trudgen, M (1986). A Flora and Fauna Study of the Coastal Strip from Forrest Beach-Cape Naturaliste-Woodlands. Department of Conservation and Environment.

Mattiske, E.M. and Havel, J.J (1998) Vegetation Complexes 1:250,000 Vegetation Mapping in the South West of Western Australia for Environment Australia and the Department of Environment and Conservation, Perth.

McKenzie, N.L., May, J.E. and McKenna, S., (2003) Bioregional Summary of the 2002 Biodiversity Audit for Western Australia, Department of Conservation and Land Management, Perth.

Muir, B.G. (1977) Biological Survey of Western Australian Wheatbelt. Part II: Vegetation and habitat of Bendering Reserve. Records of the Western Australian Museum, Supplement No. 3.

Tille, P.J and Lantzke, N.C (1990) Busselton-Margaret River-Augusta Land Capability Study. Land Resources Series No. 5. Department of Agriculture and Food, WA

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 EESSW 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

OFCc -Open Forest of *Corymbia calophylla* over a Tall Shrubland of *Xanthorrhoea preissii* over an Open Heath of *Hakea lissocarpa, Trymalium ledifolium* and *Pimelea rosea* over a Low Open Heath of *Hibbertia hypericoides* and *Acacia pulchella* over a Sedgeland of *Lepidosperma leptostachyum* and Herbland of *Lagenophora huegelii, Stackhousia monogyna* and *Xanthosia candida*.
Very Good to Excellent condition

OFCcEm - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Shrubland of *Xanthorrhoea preissii* and *Spyridium globulosum* over a Shrubland of *Acacia pulchella* over an Open Heath of *Calothamnus sanguineus, Hypocalymma robustrum, Hibbertia hypericoides, Acacia pulchella, Pimelea rosea* and *Trymalium ledifolium* over an Open Herbland of *Stackhousia monogyna* and *Haemodorum discolour* and Open Sedgeland of *Desmocladus fascicularis*.
Very Good to Excellent condition

OFCcTOSXp - Open Forest of *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii*, and *Spyridium globulosum* over a Shrubland of *Calothamnus sanguineus, Hibbertia hypericoides* and *Hakea lissocarpa* over a Low Open Shrubland of *Crypandra arbutiflora* over a Very Open Herbland of *Stylidium repens, *Lysimachia arvensis* and *Haemodorum discolour* and Grassland of **Briza maxima* and **Briza minor*.
Very Good condition

OFCcEmOSXp - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over an Open Shrubland/Shrubland of *Xanthorrhoea preissii* over a Low Open Shrubland of *Hypocalymma robustrum, Trymalium ledifolium* and *Hibbertia cunninghamii* over an Open Herbland of *Lagenophora huegelii* and **Arctotheca calendula, *Hypochaeris* sp., **Lysimachia arvensis* and *Haemodorum discolour*.
Degraded to Good condition.

OFCcTOSXpDc - Open Forest of *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii* and *Dodonaea ceratocarpa* over a Low Shrubland of *Hibbertia hypericoides, Acacia pulchella* and *Hypocalymma robustrum* over a Herbland of *Stackhousia monogyna, *Euphorbia peplus, *Lysimachia arvensis* and **Cotula turbinata*.
Good to Very Good condition

.OFCcWAf - Open Forest of *Corymbia calophylla* over a Woodland of *Agonis flexuose* over a Tall Shrubland of *Banksia grandis* and *Acacia cyclops, Acacia saligna* and *Hakea trifurcata* over a Shrubland of *Dodonaea ceratocarpa, Acacia divergens* and *Acacia pulchella* over a Low Shrubland of *Hypocalymma robustrum, Hibbertia cunninghamii, Pimelea hispida* over a Very Open Herbland of *Hyalosperma cotula*.
Good to Very Good condition.

OFeCcEmOHSg - Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over an Open Heath of *Spyridium globulosum, Xanthorrhoea preissii, Hypocalymma angustissima, Kunzea glabrescens* and *Acacia pulchella* over an Open Heath of *Melaleuca systena, Pimelea rosea, Olearia axillaris, Hibbertia hypericoides* and *Patersonia umbrosa* var *xanthina* over an Open Sedgeland of *Lepidosperma leptostachyum* and Open Herbland of *Agrostocinum hirsutum, Poranthera huegelii* and *Scaevola calliptera*.
Good to Very Good condition

OFCcOSHr -Open Forest of *Corymbia calophylla* over an Open Shrubland of *Hypocalymma robustrum, Acacia cyclops, Spyridium globulosum* and *Hibbertia cunninghamii* over a Very Open Herbland of **Lysimachia arvensis, Stylidium crassifolium, *Cotula turbinata* and Very Open Grassland of **Briza minor*.
Degraded condition.

Woodland

WCc - Woodland of *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii and Spyridium globulosum* over an Open Heath of *Acacia cyclops, Calothamnus sanguineus, Hibbertia hypericoides, Hypocalymma robustrum* over a Very Open Grassland of *Briza maxima and Neurachne alopecuroidea and Open Herbland of Stylidium fasciculatum and Stylidium repens.*
Very Good to Excellent condition.

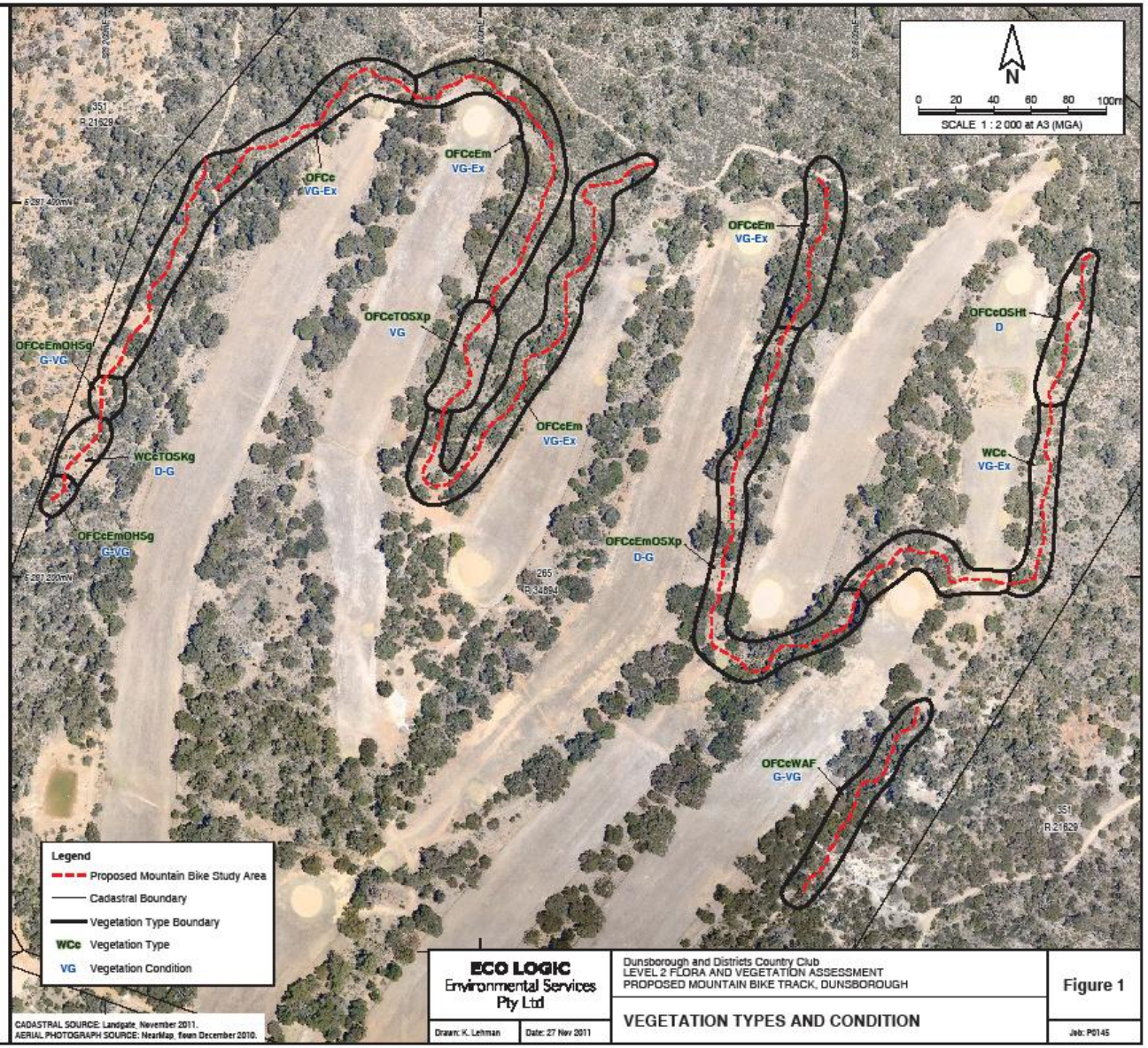
WCcTOSKg - Woodland of *Corymbia calophylla* over a Tall Open Shrubland of *Kunzea glabrescens, Spyridium globulosum,* and Open Shrubland of *Hypocalymma robustrum, Hibbertia hypericoides* and *Xanthorrhoea preissii.*
Degraded to Good condition.

* 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
CD	Completely Degraded (not applicable)

Note: Full description in text



ECO LOGIC Environmental Services Pty Ltd

Drawn: K. Lehman | Date: 27 Nov 2011

Dunsborough and Districts Country Club
LEVEL 2 FLORA AND VEGETATION ASSESSMENT
PROPOSED MOUNTAIN BIKE TRACK, DUNSBOROUGH

VEGETATION TYPES AND CONDITION

Figure 1

Job: P0145

P0145-01.dgn

PINPOINT CARTOGRAPHICS (08) 9562 7136

Appendix 1

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

Appendix 2

Quadrat Data

Quadrat 1

Date: 27/10/11 **GPS**: NW Corner Peg-50, 323234, 6281383 **Quadrat:** 10x10m

Habitat: Slight hillslope, lateritic gravel clay loam soil.

Vegetation: Open Forest of *Corymbia calophylla* over a Tall Shrubland of *Xanthorrhoea preissii* over an Open Heath of *Hakea lissocarpha, Trymalium ledifolium* and *Pimelea rosea* over a Low Open Heath of Hibbertia hypericoides and Acacia pulchella over a Sedgeland of *Lepidosperma leptostachyum* and Herbland of *Lagenophora huegelii, Stackhousia monogyna* and *Xanthosia candida.*

Vegetation Condition: Very Good to Excellent

Species List	**Height (m)**	**Cover (%)**
Corymbia calophylla	4-25	20
Xanthorrhoea preissii	2.2	10
Hakea lissocarpha	1.2	25
Acacia pulchella	1.1	10
Hakea amplexicaulis	1	2
Trymalium ledifolium	1.2	10-15
Pimelea rosea	1.1	2-5
Hibbertia hypericoides	1.0	30
Hibbertia cunninghamii	0.5	2
Leucopogon propinquus	1.4	2-5
Banksia dallanneyi	0.2	2
Stackhousia monogyna	1.0	1-2
Xanthosia candida	0.1	2

Chorizema illicifolium	0.8	<2
Comesperma confertum	1.2	<1
Lagenophora huegelii	0.1	<1
Tetrarrhena laevis	0.3	<1
**Cotula turbinata*	0.1	<1

Quadrat 2

Date: 27/10/11 **GPS**: NW Corner Peg-50, 323357, 6281481 **Quadrat:** 10x10

Habitat: Hillslope, granite outcrop, gravelly organic brown loam soil.

Vegetation: Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over a Tall Shrubland of *Xanthorrhoea preissii* and *Spyridium globulosum* over a Shrubland of *Acacia pulchella* over an Open Heath of *Calothamnus sanguineus, Hypocalymma robustrum, Hibbertia hypericoides, Acacia pulchella, Pimelea rosea* and *Trymalium ledifolium* over an Open Herbland of *Stackhousia monogyna* and *Haemodorum discolor* and Open Sedgeland of *Desmocaldus fasciculatus.*

Vegetation Condition: Excellent Condition

Species List	**Height (m)**	**Cover (%)**
Corymbia calophylla	8-20	25
Eucalyptus marginata	12-14	10-15
Xanthorrhoea preissii	0.5-3	25-30
Acacia pulchella	0.5-1.2	5-10
Spyridium globulosum	0.5-2.1	2-5
Pimelea rosea	0.45	2-5
Calothamnus sanguineus	0.5	5
Hypocalymma robustrum	1.2	1-2
Hibbertia hypericoides	0.4	10-15
Trymalium ledifolium	1.1	2-5

Stackhousia monogyna	0.45	<2
Synaphea gracillima	0.2	<1

Quadrat 3

Date: 27/10/11 **GPS**: NW Corner Peg- 50, 323399, 6281347**Quadrat:** 10x10m

Habitat: Hillslope- granite outcrop, shallow organic loam.

Vegetation: Open Forest of *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii*, and *Spyridium globulosum* over a Shrubland of *Calothamnus sanguineus, Hibbertia hypericoides* and *Hakea lissocarpha* over a Low Open Shrubland of *Cryptandra arbutiflora* over a Very Open Herbland of *Stylidium repens, *Lysimachia arvensis* and *Haemodorum discolor* and Grassland of **Briza maxima* and **Briza minor.*

Vegetation Condition: Very Good

Species List	**Height (m)**	**Cover (%)**
Corymbia calophylla	25	15
Xanthorrhoea preissii,	1.2-3	10
Spyridium globulosum	2.2	5
Calothamnus sanguineus	1.2	2-5
Cryptandra arbutiflora	0.15	1-2
Hibbertia hypericoides	0.3	5
Hakea lissocarpha	0.9	2-5
Hypocalymma robustrum	0.5	2
Stylidium repens	0.1	1-2
Levenhookia pusilla	0.01	<1
**Lysimachia arvensis*	0.1	<1

Lomandra sp.	0.4	1-2
Caesia micrantha	0.2	<1
Neurachne alopecuroidea	0.2	<1
Haemodorum discolor	0.4	<1
**Monodenia bracteata*	0.2	<1
**Briza maxima*	0.2	<1
**Briza minor*	0.2	<1

Quadrat 4

Date: 27/10/11 **GPS**: NW Corner Peg-50, 323552, 6281299 **Quadrat**: 10x10m

Habitat: Hillslope, small surface granite, brown loam.

Vegetation: Open Forest of *Corymbia calophylla* and *Eucalyptus marginata* over an Open Shrubland/Shrubland of *Xanthorrhoea preissii* over a Low Open Shrubland of *Hypocalymma robustrum, Trymalium ledifolium* and *Hibbertia cunninghamii* over an Open Herbland of *Lagenophora huegelii* and **Arctotheca calendula*, **Hypochaeris* sp., **Lysimachia arvensis* and *Haemodorum discolor*.

Vegetation Condition: Degraded to Good

Species List	**Height (m)**	**Cover (%)**
Corymbia calophylla	18-20	70
Eucalyptus marginata	20	5
Xanthorrhoea preissii	0.9	10
Hypocalymma robustrum	0.45	2-5
Trymalium ledifolium	0.4	2-5
Hibbertia cunninghamii	0.8	2-5
Lagenophora huegelii	0.2	2
**Arctotheca calendula*	0.2	1-2
**Hypochaeris* sp.	0.2	1-2
**Lysimachia arvensis*	0.1	1-2
Haemodorum discolor	0.3	1-2

**Cotula turbinata*	0.15	<1
Drosera erythrorhiza	0.01	<1
**Ursinia anthemoides*	0.3	<1
**Briza minor*	0.2	1

Quadrat 5

Date: 27/10/11 **GPS**: NW Corner Peg- 50, 323613, 6281225 **Quadrat**: 10x10m

Habitat: Slight hillslope, brown loam soil.

Vegetation: Open Forest of *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii* and *Dodonaea ceratocarpa* over a Low Shrubland of *Hibbertia hypericoides, Acacia pulchella* and *Hypocalymma robustrum* over a Herbland of *Stackhousia monogyna, *Euphorbia peplus, *Lysimachia arvensis* and **Cotula turbinata*.

Vegetation Condition: Good to Very Good

Species List	**Height (m)**	**Cover (%)**
Corymbia calophylla	28	70
Xanthorhoea preissii	3.8	30
Dodonaea ceratocarpa	2.2	25-30
Hibbertia hypericoides	0.4	5
Hibbertia cunninghamii	0.4	2
Calothamnus sanguineus	0.35-1	<1
Acacia pulchella	0.3-0.5	1
Hypocalymma robustrum	0.4	1-2
Daviesia inflata	1.5	<1
Pimelea sylvestris	0.3	<1
Banksia dallanneyi	0.3	1-2
Stackhousia monogyna,	0.3	1-5

**Euphorbia peplus*	0.1	1-2
Haemodorum discolor	0.3	<1
**Senecio vulgaris*	0.3	1-2
**Lysimachia arvensis*	0.1	1
**Cotula turbinata*	0.3	1-2
Caesia micrantha	0.25	<1
**Arctotheca calendula*	0.2	1
Neurachne alopecuroidea	0.4	<1

Quadrat 6

Date: 27/10/11 **GPS**: NW Corner Peg- 50, 323708, 6281266 **Quadrat**: 10x10m

Habitat: Hillslope, granite surface rock, brown clay loam soil.

Vegetation: Woodland of *Corymbia calophylla* over a Tall Open Shrubland of *Xanthorrhoea preissii and Spyridium globulosum* over an Open Heath of *Acacia cyclops, Calothamnus sanguineus, Hibbertia hypericoides, Hypocalymma robustrum* over a Very Open Grassland of **Briza maxima and Neurachne alopecuroidea and Open Herbland of Stylidium fasciculatum and Stylidium repens.*

Vegetation Condition: Very Good to Excellent

Species List	**Height (m)**	**Cover (%)**
Corymbia calophylla	14-20	15
Xanthorrhoea preissii	2.5	40
Spyridium globulosum	1.5	2
Hakea trifurcata	0.9	10
Acacia cyclops	0.8	2
Calothamnus sanguineus	0.3-0.4	2-5
Melaleuca systena	0.8	2-5
Trymalium ledifolium	1.2	2-5
Hibbertia hypericoides	0.4	15
Hypocalymma robustrum	0.8	2-5
Phyllanthus calycinus	0.4	<1

Banksia dallanneyi	0.25	2
**Briza maxima*	0.3	<1
Neurachne alopecuroidea	0.4	1
Mesolaena tetragona	0.5	<1
Gompholobium marginatum	0.2	<1
Desmocaldus fasciculatus	0.1	1-2
Stylidium fasciculatum	0.01	1
Stylidium repens	0.2	<1
Trachymene pilosa	0.01	<1
Tricoryne humilis	0.1	<1

Quadrat 7

Date: 27/10/11 **GPS**: NW Corner Peg- 50, 323631, 6281098 **Quadrat**: 10x10m

Habitat: Slight hillslope, organic sand with lateritic gravel.

Vegetation: Open Forest of *Corymbia calophylla* over a Woodland of *Agonis flexuosa* over a Tall Shrubland of *Banksia grandis* and *Acacia cyclops, Acacia saligna* and *Hakea trifurcata* over a Shrubland of *Dodonaea ceratocarpa, Acacia divergens* and *Acacia pulchella* over a Low Shrubland of *Hypocalymma robustrum, Hibbertia cunninghamii, Pimelea hispida* over a Very Open Herbland of *Hyalosperma cotula*

Vegetation Condition: Good to Very Good

Species List	**Height (m)**	**Cover (%)**
Corymbia calophylla	28	15
Agonis flexuosa	4-19	10
Banksia grandis	4.5	10
Acacia cyclops	3.5	2-5
Acacia saligna	3.5	2
Hakea trifurcata	2.5	2-5
Xanthorrhoea preissii	1.0	1-2
Dodonaea ceratocarpa	2.0	2
Acacia divergens	1.5	2
Acacia pulchella	0.8	1
Hypocalymma robustrum	0.5	2-5

Hibbertia cunninghamii	0.3	2
Pimelea hispida	0.2	<1
Hyalosperma cotula	0.05	<1

Appendix 3

Flora Species List

FLORA SPECIES LIST

FAMILY	SPECIES
ANTHERICACEAE	*Agrostocrinum hirsutum*
	Caesia micrantha
	Thysanotus manglesianus
APIACEAE	*Pentapeltis peltigera*
	Platysace tenuissima
	Trachymene pilosa
	Xanthosia candida
ARACEAE	**Zantedeschia aethiopica*
ASTERACEAE	**Arctotheca calendula*
	**Conyza albida*
	**Cotula turbinata*
	Hyalosperma cotula
	Lagenophora huegelii
	Rhodanthe citrina
	**Senecio vulgaris*
	**Ursinia anthemoides*
CYPERACEAE	*Lepidosperma leptostachyum*
	Lepidosperma squamatum
	Mesolaena tetragona
DASYPOGONACEAE	*Kingia australis*
	Lomandra sp.
DILLENIACEAE	*Hibbertia cunninghamii*
	Hibbertia furfuracea
	Hibbertia hypericoides
	Hibbertia racemosa
DROSERACEAE	*Drosera erythrorhiza*
EPACRIDACEAE	*Leucopogon propinquus*
EUPHORBIACEAE	**Euphorbia peplus*
	Phyllanthus calycinus
	Poranthera huegelii
GOODENIACEAE	*Dampiera linearis*
	Goodenia pusilla
	Scaevola calliptera
HAEMODORACEAE	*Conostylis setigera*
	Haemodorum discolor
IRIDACEAE	*Orthrosanthus laxus var. laxus*
	**Fressia alba x leichtlinii*
	Patersonia umbrosa var xanthina
	**Romulea rosea*
LAURACEAE	*Cassytha racemosa*
LOBELIACEAE	*Isotoma hypocrateriformis*
	Lobelia tenuior
LOGANIACEAE	*Logania serpyllifolia*
MIMOSAEAE	*Acacia browniana*
	Acacia cyclops
	Acacia divergens
	Acacia pulchella
	Acacia saligna
MYRTACEAE	*Agonis flexuosa*
	Calothanmus sanguineus

	Corymbia calophylla
	Eucalyptus marginata
	Hypocalymma angustifolium
	Hypocalymma robustum
	Melaleuca systena
ORCHIDACEAE	*Caladenia paludosa*
	Elythranthera emarginata
	**Monadenia bracteata*
PAPILIONACEAE	*Chorizema ilicifolium*
	Chorizema rhombeum
	Daviesia decurens
	Daviesia inflata
	Gompholobium knightianum
	Gompholobium marginatum
	Sphaerolobium medium
	**Trifolium sp.*
	Viminaria juncea
PITTOSPORACEAE	*Billardiera variifolia*
POACEAE	*Austrostipa campylachne*
	**Briza maxima*
	**Briza minor*
	**Cynodon dactylon*
	Neurachne alopecuroidea
	Tetrarrhena laevis
POLYGALACEAE	*Comesperma ciliatum*
	Comesperma confertum
PRIMULACEAE	**Lysimachia arvensis*
PROTEACEAE	*Banksia bipinnatifida*
	Banksia dallanneyi
	Banksia grandis
	Grevillea quercifolia
	Hakea amplexicaulis
	Hakea lissocarpha
	Hakea trifurcata
	Persoonia longifolia
	Petrophile striata
	Synaphea gracillima
RESTIONACEAE	*Desmocladus fasciculatus*
RHAMNACEAE	*Cryptandra arbutiflora*
	Spyridium globulosum
	Trymalium ledifolium
RUBIACEAE	*Opercularia echinocephala*
STACKHOUSIACEAE	*Stackhousia monogyna*
STERCULIACEAE	*Thomasia macrocarpa*
STYLIDIACEAE	*Levenhookia pusilla*
	Stylidium amoenum
	Stylidium calcaratum
	Stylidium crassifolium
	Stylidium fasciculatum
	Stylidium repens
THYMELAEACEAE	*Pimelea hispidula*
	Pimelea imbricata
	Pimelea rosea

	Pimelea sylvestris
XANTHORRHOEACEAE	*Xanthorrhoea gracilis*
	Xanthorrhoea preissii
ZAMIACEAE	*Macrozamia riedlei*
Native Species- 92	
Introduced Species- 15	
TOTAL NUMBER OF SPECIES- 107	