



# Lake King Townsite

## UCL Vegetation And Flora Survey

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## 1.0 Introduction

The study area subject to the vegetation and flora survey is Unallocated Crown Land (UCL) comprising a total area of just over 42 hectares. Prior to agreeing to release this land for residential purposes the Department for Planning and Infrastructure / Western Australian Planning Commission need a comprehensive structure plan prepared to illustrate how the land can be developed. One of the requirements with regard to preparing the structure plan is a vegetation and flora survey of the area. The requirement is for a Level 2 flora and vegetation survey in accordance with guideline No. 51 as outlined by the EPA 2004. This incorporates background research, reconnaissance and detailed survey resulting in the

- description and mapping of vegetation associations,
- assessment and mapping of the condition – or range of conditions – of the vegetation, and
- search for Declared Rare, Priority and other significant flora and for threatened ecological communities.

The UCL proposed to be classified 'Residential Development' zone in the Lake King townsite is shown in Figure 1.

## 2.0 Method

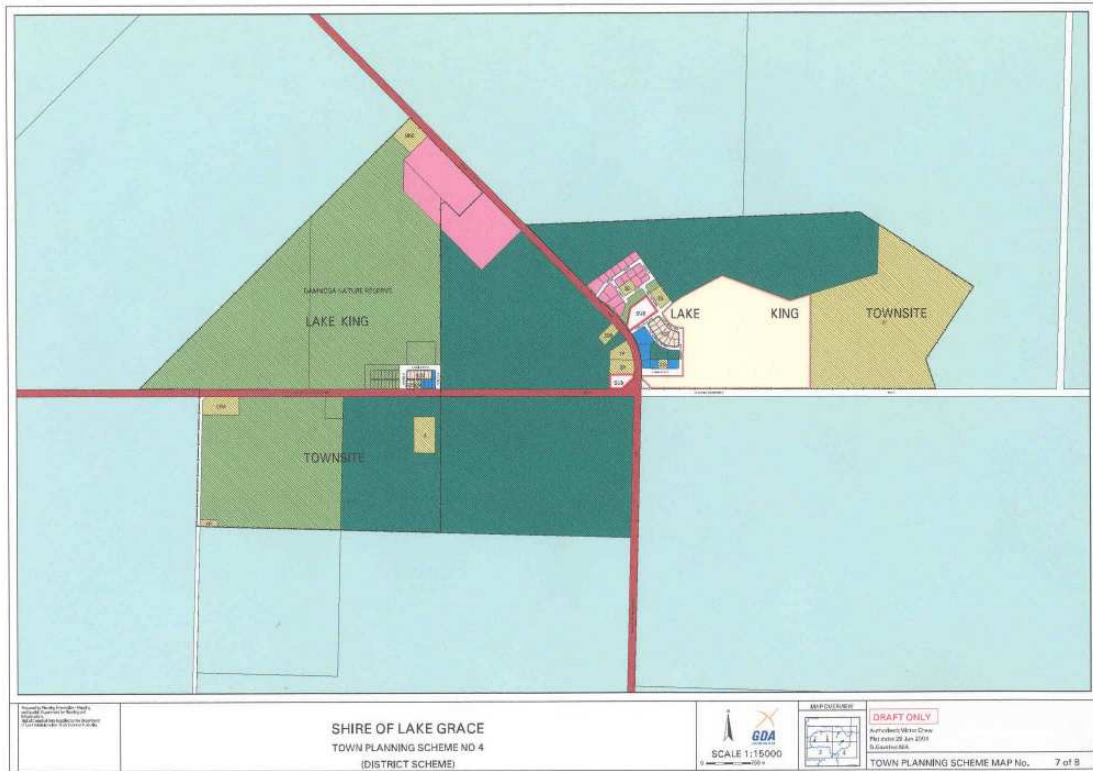
The ground survey of the vegetation and flora of the study area was carried out on the 17<sup>th</sup> November 2006. The work included site descriptions, collection of voucher specimens and vegetation mapping. The site was revisited on March 10<sup>th</sup> 2007 to survey the extent of the priority flora populations and to collect species that may have previously been overlooked.

General vegetation divisions were noted using coloured aerial photography at a scale of 1:25 000. Areas of interest thus delineated were examined in the field and the vegetation at selected sites described. Because of time limitations some areas were not covered in detail in the ground survey and mapping was carried out by extrapolation of known vegetation associations using the aerial photographs. Some vegetation boundaries were not always distinct on the photographs. The placement of these boundaries was aided by field observations and the use of a stereo viewer.

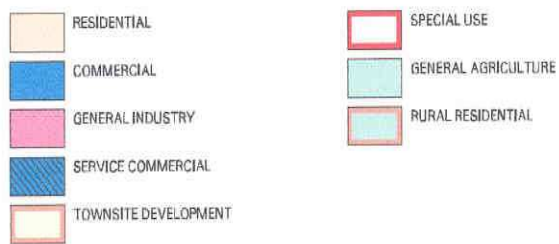
Vegetation association descriptions were based on the classification system devised by Muir (1977) which was specifically designed for describing Wheatbelt vegetation (see Table 1). The condition of the vegetation described follows the Vegetation Condition Scale modified from Trudgen 1991 by B.J. Keighery for the Swan Coastal Plain Survey 1994 (Table 2).

Searches for Declared Rare, Priority and other significant flora were made during the traverses walked through the survey area. Specimens of plant species encountered were collected and identified using keys and by comparison with specimens at the Western Australian Herbarium. Experts involved in revising particular genera were consulted wherever possible to ensure accuracy with identification.

Figure 1 Location of the study site. UCL proposed for rezoning as residential in the Lake King Townsite.



### ZONES



### LOCAL SCHEME RESERVES



**TABLE 1 - MUIR SYSTEM OF VEGETATION CLASSIFICATION**

LIFE FORM/ HEIGHT CLASS	CANOPY COVER				
	DENSE 70-100% d	MID-DENSE 30-70% c	SPARSE 10-30% i	VERY SPARSE 2-10% r	
<b>T</b> Trees > 30m	Dense Tall Forest	Tall Forest	Tall Woodland	Open Tall Woodland	
<b>M</b> Trees 15-30m	Dense Forest	Forest	Woodland	Open Woodland	
<b>LA</b> Trees 5-15m	Dense Low Forest A	Low Forest A	Low Woodland A	Open Low Woodland A	
<b>LB</b> Trees < 5m	Dense Low Forest B	Low Forest B	Low Woodland B	Open Low Woodland B	
<b>KT</b> Mallee tree form	Dense Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee	
<b>KS</b> Mallee shrub form	Dense Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee	
<b>S</b> Shrubs > 2m	Dense Thicket	Thicket	Scrub	Open Scrub	
<b>SA</b> Shrubs 1.5-2.0m	Dense Heath A	Heath A	Low Scrub A	Open Low Scrub A	
<b>SB</b> Shrubs 1.0-1.5m	Dense Heath B	Heath B	Low Scrub B	Open Low Scrub B	
<b>SC</b> Shrubs 0.5-1.0m	Dense Low Heath C	Low Heath C	Dwarf Scrub C	Open Dwarf Scrub C	
<b>SD</b> Shrubs 0.0-0.5m	Dense Low Heath D	Low Heath D	Dwarf Scrub D	Open Dwarf Scrub D	
<b>P</b> Mat plants	Dense Mat plants	Mat plants	Open Mat plants	Very Open Mat plants	
<b>H</b> Hummock Grass	Dense Hum. Grass	Mid-Dense Hum. Grass	Hummock Grass	Open Hummock Grass	
<b>GT</b> Bunch grass > 0.5m	Dense Tall Grass	Tall Grass	Open Tall Grass	Very Open Tall Grass	
<b>GL</b> Bunch grass < 0.5m	Dense Low Grass	Low Grass	Open Low Grass	Very Open Low Grass	
<b>J</b> Herbaceous spp.	Dense Herbs	Herbs	Open Herbs	Very Open Herbs	
<b>VT</b> Sedges > 0.5m	Dense Tall Sedges	Tall Sedges	Open Tall Sedges	Very Open Tall Sedges	
<b>VL</b> Sedges < 0.5m	Dense Low Sedges	Low Sedges	Open Low Sedges	Very Open Low Sedges	
<b>X</b> Ferns	Dense Ferns	Ferns	Open Ferns	Very Open Ferns	
Mosses, liverwort	Dense Mosses	Mosses	Open Mosses	Very Open Mosses	

**Table 2 Vegetation Condition Scale**

Table 2 : Vegetation Condition Scale Modified from Trudgen 1991 by B.J. Keighery for the Swan Coastal Plain Survey 1994
<b>1 = Pristine</b> Pristine or nearly so, no obvious signs of disturbance
<b>2 = Excellent</b> Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. For example damage to trees caused by fire, the presence of non - aggressive weeds and occasional vehicle tracks.
<b>3 = Very Good</b> Vegetation structure altered, obvious signs of disturbance. For example disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
<b>4 = Good</b> Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate to it. For example disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
<b>5 = Degraded</b> Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds, partial clearing, dieback and grazing.
<b>6 = Completely degraded</b> The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora composing weed or crop species with isolated native trees or shrubs.

## **3.0 Results**

### **3.1 Vegetation Survey**

#### **3.1.1 Previous surveys in the Lake King Townsite**

The study area is situated within the Hyden Vegetation System which is a subdivision of the Roe Botanical District (Beard 1976).

Beard (1976) describes the vegetation as scrub heath on the sandplain ridges, mallee on middle slopes covering the bulk of the area and woodlands (or mallee with patches of woodland) in the valleys.

Beard (1976) has mapped the Lake King area at a scale of 1:250 000. The map units covering the study area are eSi/eMi - Mallee with patches of woodland in lakes country and xSZc Scrub Heath - mixed Proteaceae – Myrtaceae. The woodlands in the lakes country are mixed woodland of *Eucalyptus salmonophloia*, *Eucalyptus longicornis*, *E. salubris* and *E. kondininensis*.

Recorded along the nature trails situated in the Lake King townsite are areas of *Eucalyptus salmonophloia*, *Eucalyptus longicornis*, *E. salubris*, *E. urna*, *E. extensa*, species rich Scrub Heath on lateritic soils and mallee areas with *Melaleuca* species prominent in the understorey.

In 2001 Anne (Coates) Rick with Arthur Weston for Bowman Bishaw Gorham conducted a vegetation and rare flora survey of four rezoning proposal areas in the Newdegate and Lake King townsites. The report was prepared for the Lake Grace Shire. Vegetation was described for the area on the NW corner of the Hyden – Ravensthorpe and the Lake King – Newdegate cross roads as *Eucalyptus salubris* (gimlet) Woodland, *Eucalyptus salmonophloia* (salmon gum) Woodland, *Eucalyptus cylindriflora* Mallee over Heath, *Melaleuca* Thicket, regenerating scrub and *Grevillea excelsior* Thicket.

#### **3.1.2 Current Survey**

The vegetation associations mapped and described in this study are outlined in Table 3. Descriptions of the vegetation and flora recorded at specific sites can be found in Appendix 1. The distribution of these vegetation associations within the survey area is shown on the vegetation map, Figure 2.

**Table 2. Vegetation Associations of the Study Area.**

<b>Vegetation Association</b>	<b>Map Unit</b>	<b>Soils</b>	<b>Topography</b>	<b>Sites</b>	<b>Comments</b>
Open Mallee over mixed <i>Melaleuca</i> Heath	Mm	Loamy soils over clay	Mostly on gentle slope. Site 12 flat terrain	Site 1, Site 12	Extensive in the northern section. <i>Melaleuca agathosmoides</i> Priority 1. <i>Eucalyptus depauperata</i> Priority 3 Mostly Pristine condition
Open Mallee over <i>Melaleuca</i> (broombush)	Mb	Stony soils. Sandy loams over clay	Ridge top and gentle slope	Site 3	Covers small areas only. Pristine condition.
Very Open Mallee over <i>Melaleuca</i> (broombush)	Mb	Sandy loam soils over clay	Gentle slope	Site 4	One small area. Pristine condition.
Open Mallee over Low Scrub	M	Shallow loamy soils over clay	Gentle slope and flat terrain	Site 5, Site 8, Site 9	Extensive in the northern section. Excellent to Pristine condition.
Scrub Heath	SH	Loamy soils with gravel over gravel sub soils. Sometimes stony	Flat to very gentle slope	Site 2, Site 6, Site 10, Site 11, Site 13	Extensive in the southern section. Excellent to pristine condition
<i>Allocasuarina</i> Thicket	T	Loamy soils +/- gravel over gravel sub soils	Flat to very gentle slope	Site 7, Site 14	Small areas forming a mosaic with the Scrub/Heath. Excellent to pristine condition.
Regenerating Vegetation	R			Site 15, Site 11 (part)	



## Mallee Formations

### Open Mallee over mixed *Melaleuca* Heath (map unit Mm)

Mallee formations cover the northern section of the UCL on gently sloping terrain with loamy soils over clay. The ground slopes downward from the Scrub Heath / Thicket areas in the southern section. Mallee species recorded in the Open Mallee over mixed *Melaleuca* Heath association include *Eucalyptus flocktoniae* 5780, *Eucalyptus pileata* 5775, *Eucalyptus depauperata* 5779 (Priority 3 flora), *Eucalyptus calycogona* 5781, *Eucalyptus eremophila* 5893-4 and *Eucalyptus cylindrifolia* 5782. Mm has a mid dense understorey with *Melaleuca* shrubs prominent. Fourteen species of *Melaleuca* were recorded at site 1 (see Appendix 1) including *Melaleuca agathosmoides* (Priority 1 flora) with *Melaleuca adnata* and *Melaleuca coronicarpa* frequent in stratum 3. The terrain becomes flat at site 12 and the mallee become sparse in this area. *Eucalyptus depauperata* (Priority 3 flora) was recorded at both sites 1 and 12. Mm is mostly in pristine condition except at the edges where some disturbance has occurred.

### Open Mallee over Low Scrub (map unit M)

This association occurs on the gently sloping terrain in the northern section of the study area on loamy soils over clay. The terrain is flatter in the western section. Mallee species recorded include *Eucalyptus eremophila*, *Eucalyptus olivina*, *Eucalyptus calycogona*, *Eucalyptus flocktoniae* and *Eucalyptus pileata*. The understorey is sparse with occasional *Melaleuca agathosmoides* (Priority 1 flora) at site 5. The association is in pristine condition in the eastern section and excellent in the western section where some disturbance has taken place in the past with old tracks evident. Vegetation is regenerating to the south of site 8. Weed species have only invaded edges near the road. Mm and M merge in places and boundaries are not always distinct.

### Open and Very Open Mallee over *Melaleuca* (broombush) (map unit Mb)

Mb (site 3) generally occurs between the Scrub Heath / Thicket area and the mallee associations to the north, mainly around the ridge area in the eastern section of the study area. The Mb associations occur on gently sloping terrain on sandy loam soils (some gravel) over clay. Mallee species recorded include *Eucalyptus eremophila*, *Eucalyptus flocktoniae*, *Eucalyptus olivina* and *Eucalyptus scyphocalyx* 5840. The broombush *Melaleuca scalena* is frequent in the understorey at site 3 and the broombush *Melaleuca hamata* is frequent at site 4. These associations only cover small areas and are in pristine condition.

## Shrubland Formations

### Scrub Heath (map unit SH)

Scrub Heath occurs on loamy soils with gravel over gravel subsoils, stony in places. The association is species rich and sedges (*Lepidosperma* species) become more prominent in the understorey in the southern section of the study area (sites 13 and 11). The ground slopes gently down ward in a southern and westerly direction. Shrubs to 4 meters form a very sparse to sparse overstorey with *Allocasuarina acutivalvis* prominent. Other characteristic species include *Santalum acuminatum*, *Allocasuarina corniculata*, *Callitris*

*preissii*, *Banksia elderiana* and *Grevillea excelsior*. Shrubs to 1.0 meter form a mid dense understorey which is the dominant stratum and species rich especially in plants belonging to the families Myrtaceae and Proteaceae (see Appendix 1). Species recorded include *Chamelaucium ciliatum* 5821, *Melaleuca villosisepala* 5816, *Melaleuca cordata* 5827, *Persoonia quinquinervis* 5824, *Grevillea beardiana* 5815, *Pimelea ?brevifolia* 5820 (no flowers), *Philotheca gardneri* 5828, *Philotheca rhombioidea* 5862, *Verticordia roei*, *Verticordia chrysantha* 5857, *Verticordia eriocephala* 5855, *Verticordia picta* 5858, *Verticordia densa var caspitosa* 5856, *Boronia inornata*, *Astroloma serratifolium*, *Hibbertia lepidocalyx*, *Psammomoya choretroides* 5863, *Thryptomene kochii*, *Hibbertia rostellata* 5864, *Melaleuca platycalyx*, *Melaleuca spicigera*, *Gastrolobium crassifolium* 5859, *Pityrodia terminalis* (disturbed areas), *Microcorys ericifolia* 5867, *Hemigenia? teretiuscula* 5868, *Eremophila drummondii*, *Persoonia helix* 5869, *Beaufortia schaueri* 5865, *Beaufortia micrantha var puberula* 5870 and *Baeckea* sp. Fine leaf 848.

*Acacia latens* (Priority 3 flora) occurs in this association. These areas are mostly in Pristine condition with some disturbed areas at site 11 and near edges, tracks and roads. Some of the shrubs appeared stressed or dying probably due to the dry season. It is expected that good rainfall in the area would improve the condition of these species.

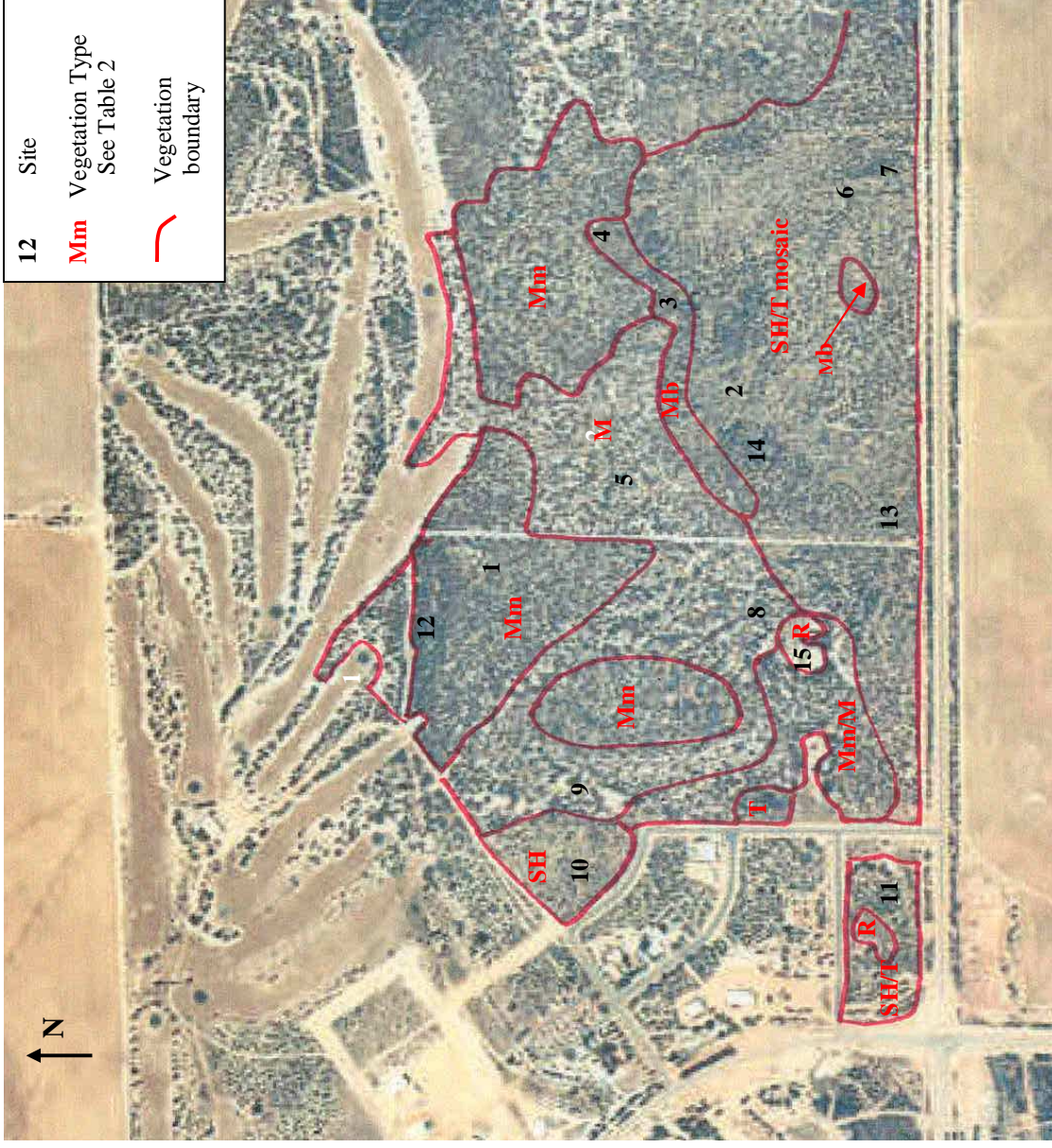
#### ***Allocasuarina* Thicket (T map unit)**

Covering only small areas and interspersed with the Scrub Heath vegetation are areas of *Allocasuarina* Thicket (T map unit) where shrubs to 4 meters form a mid dense overstorey with *Allocasuarina acutivalvis* prominent. Scrub Heath and *Allocasuarina* Thicket have been mapped as a mosaic as boundaries between these two associations were too complex to map separately and tend to merge. The Thicket areas were not as species rich as the Scrub Heath areas and the understorey stratum were sparse to very sparse. Overstorey species were however similar to those occurring in the Scrub Heath association including *Allocasuarina acutivalvis* (frequent), *Banksia elderiana*, *Hakea meisneriana*, *Hakea erecta* and *Allocasuarina corniculata*. Understorey species include *Grevillea didymobotrya*, *Hakea scoparia*, *Philotheca gardneri*, *Isopogon scabriusculus*, *Thryptomene kochii*, *Melaleuca cordata*, *Beaufortia micrantha*, *Lepidosperma* species (occasional), *Gastrolobium crassifolium*, *Beyeria brevifolia*, *Coleanthera myrtoides*, *Leucopogon cuneifolius*, *Acacia sulcata var. platyphylla*, *Acacia dielsii* and *Phebalium lepidotum*. These areas were mostly in Pristine condition with some disturbed areas near tracks.

#### **Regenerating vegetation**

At sites 15 and 11 (part) small areas of vegetation that have been previously cleared were regenerating. *Hakea preissii* (frequent) and *Wilsonia humilis* were only recorded at site 15. The regeneration was healthy and no weed species were recorded at these sites during the present survey.

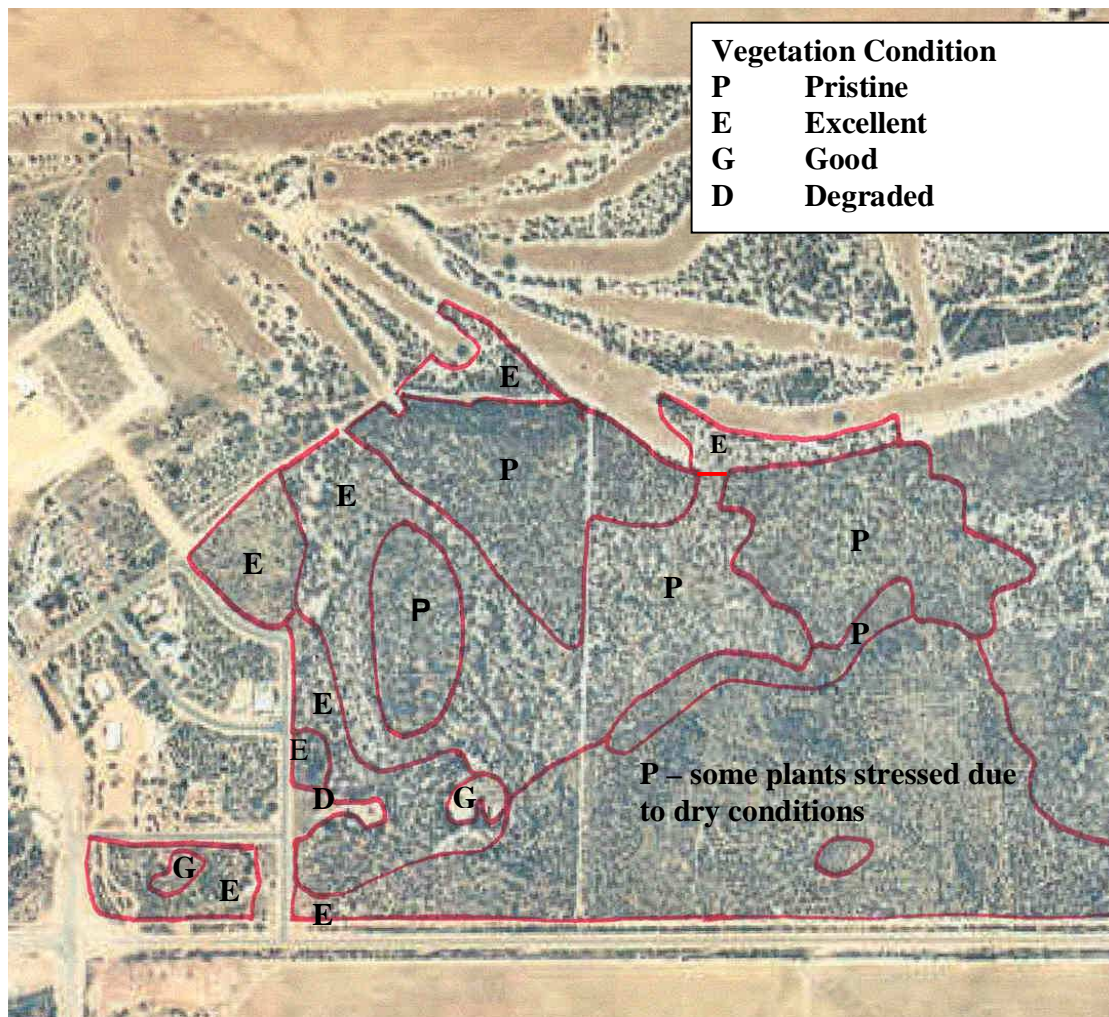
Figure 2. Vegetation Map. UCL Lake King Townsite.



### 3.1.3 Vegetation Condition

The vegetation condition scale is outlined in Table 2. The condition of the vegetation was pristine in areas east of the NS running track although some of the shrubs in the Scrub Heath association were stressed or had died due to the dry conditions. Good rainfall is expected to revive this vegetation. In the western section some past disturbance was noted, mainly in the Open Mallee over Low Scrub association but this was still in excellent condition. Two small areas that had previously been cleared were now regenerating (sites 15 and 11). Edges especially adjacent to roads showed some degree of degradation but only over small areas. It is possible that more weeds would have been recorded earlier in the season especially herbaceous species.

**Figure 3. Map of vegetation condition. UCL Lake King Townsite.**



## 3.2 Flora Survey

### 3.2.1 Flora of the Study Area.

A total of 131 plant species are recorded in Appendix 2 as occurring in the study area. Identifications with the name followed by "?" are uncertain due to a lack of flowering or fruiting material or to confusion in the current taxonomy of the group concerned. The nomenclature follows that of the Census of Western Australian Plants (The WA Herbarium data base).

Due to the time and seasonal constraints, Appendix 2 only represents part of the flora of the area, possibly 75%. Further survey work especially in August, September and October will provide a more comprehensive record of the flora of the area.

The families with the largest representatives of genera and species are listed in Table 3. The families Myrtaceae (bottlebrushes, *Eucalyptus* etc), Proteaceae (*Grevilleas*, *Hakeas* etc), Mimosaceae (wattles) and Papilionaceae (pea flowers) were the most strongly represented in the flora of the study area. The number of monocotyledons, including orchids, was low reflecting the dry season and the November survey date. Further survey work especially in August and September would increase the number recorded for this area. The number of Myrtaceae and Proteaceae are a reflection of the composition of plant species growing in the species rich Scrub Heath areas and the richness of the *Melaleuca* (Myrtaceae) understorey in the Open Mallee over mixed *Melaleuca* Heath association.

**Table 3. The number of species and genera represented within the major families in the study area.**

Family	No. species	No. Genera
Myrtaceae (bottlebrushes, <i>Eucalyptus</i> etc)	44	12
Proteaceae ( <i>Grevilleas</i> , <i>Hakeas</i> etc)	18	6
Mimosaceae (wattles)	10	1
Papilionaceae (pea flowers)	8	6
Rutaceae ( <i>Boronia</i> , <i>Phebalium</i> etc)	8	4
Epacridaceae (Heath plants)	5	4
Lamiaceae ( <i>Hemigenia</i> , <i>Pityrodia</i> etc)	5	5
Cyperaceae (sedges)	2	1

### **3.4.1 Species of Interest**

Plant species of interest recorded for the area surveyed are listed below.

These species have been classified by the Department of Environment and Conservation into categories which reflect their conservation status. These categories are listed below:

#### **R: 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 Flora**

Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which 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, eg. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, eg. 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 (ie. 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**

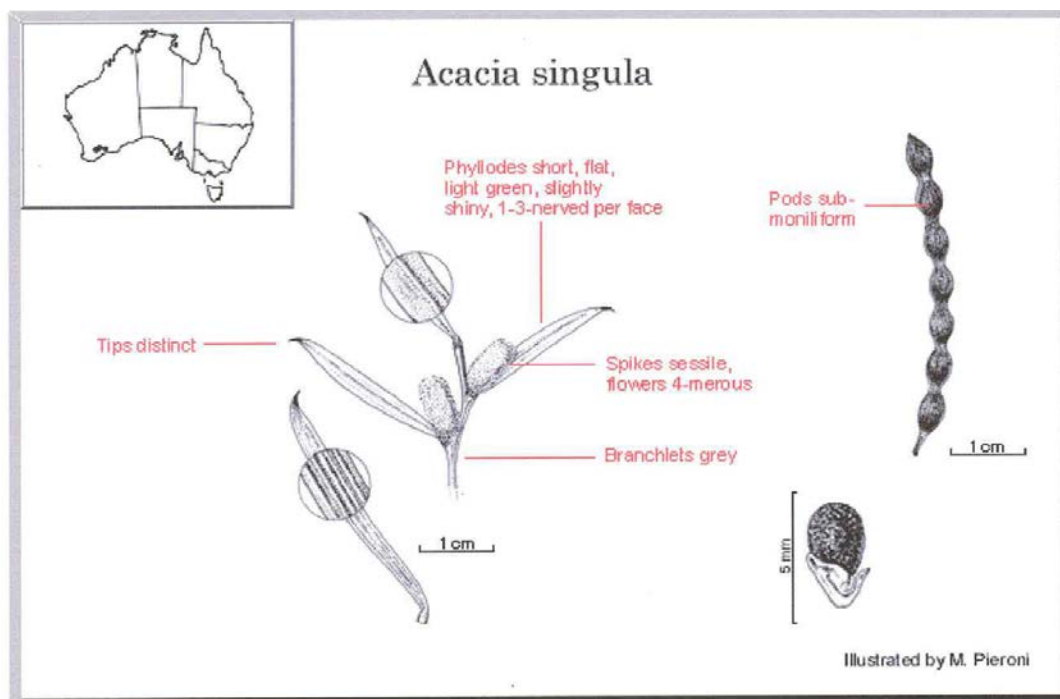
Taxa which are known from several populations, at least some of which are not believed to be under immediate threat (ie. not currently endangered). Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.

#### **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.

### ***Acacia singula* – Priority 3**

This species has been previously collected in the lake King townsite during a survey of vegetation on the north west corner of the Lake King – Newdegate and Lake King – Hyden cross roads (Coates and Weston 2001). During the present survey this species was recorded in the southern section of the Scrub Heath vegetation association. The voucher specimen was collected near site 6 and the species was occasional in the area. *Acacia singula* occurs from Lake Grace to near Hatter Hill with one collection from near Muckinwobert Rock which is ~ 100 km SE of Lake King. The plants grow mostly in gravelly sands over laterite, some times on rises and hilltops, in heath, scrub and mallee shrubland (Maslin 2001).



### ***Eucalyptus ?depauperata* – priority 3**

There is some confusion in the current taxonomy of the group of Eucalypts to which *Eucalyptus depauperata* belongs. The following quotes are taken from the latest Euclid CD Third edition 2006 and refer to “*Eucalyptus eremophila*” and related species.

“...the five species that now make up the *Eucalyptus eremophila* group are included in this edition of Euclid - it is not always possible to assign individual plants to one or other of the names with certainty.”

“...the broad concept of which has in recent times been revised extensively (although not all that conclusively) by various botanists.”

Dean Nicholl a taxonomist specializing in the genus *Eucalyptus* is at present considering including *Eucalyptus tenera* under the name *Eucalyptus depauperata* (Mike Hislop, WA Herbarium pers comm.). This would result in *Eucalyptus depauperata* losing its priority status. The voucher specimens for this species were collected from the Open Mallee over mixed *Melaleuca* Heath association. It is difficult to tell how widely this species occurs in the association because of the confusion in the current taxonomy. *Eucalyptus eremophila* was also collected in this area.



**Photograph 1.** *Eucalyptus ?depauperata* collected at site 12.

#### ***Melaleuca agathosmoides* Priority 1**

Thirteen collections of *Melaleuca agathosmoides* are present in the WA Herbarium. Most are collections from the Hatter Hill area with one specimen collected 5 kms NE of Lake King. This species was found in most of the northern section of the Open Mallee over mixed *Melaleuca* Heath association and was common in the area. Over a thousand plants are estimated as occurring in the area. This species was also recorded at site 5 as occasional in the Open Mallee over Low Scrub association.



**Photograph 2.** *Melaleuca agathosmoides* near site 1. adjacent to the golf course in the Lake King townsite. (The original photo has been replaced in this addition of the report)



### 3.3 Conservation Significance

Three priority species were found during the present survey. *Melaleuca agathosmoides* is Priority 1 flora and is mainly found in the Hatter Hill area. This species was common throughout the northern section of the Mallee over mixed *Melaleuca* Heath association and rare in the eastern section of the Mallee over Low Scrub association (site 5). Due to confusion in the current taxonomy of the “*Eucalyptus eremophila*” group it is likely that *Eucalyptus depauperata* Priority 3 is not as rare as first thought. *Acacia latens* Priority 3 flora was occasional in the Scrub Heath association mainly in the southern section.

Large areas of remnant vegetation still remain in the lake King area. Lake King and Dunn Rock Nature Reserves and adjacent UCL are situated ~5 kms west of the study area and Frank Hann National Park and extensive UCL are situated ~ 30 kms east across the rabbit proof fence. Smaller water, nature and other crown reserves are scattered throughout adjacent areas which have been extensively cleared for farming.

Mallee associations with *Melaleuca* species prominent in the understorey are common and extensive in areas of remnant vegetation in the area. However the *Melaleuca* understorey in the Mallee over mixed *Melaleuca* Heath vegetation association is particularly rich in species with 14 *Melaleuca* species including *Melaleuca agathosmoides* (Priority 1) recorded at site 1. Mallee with an understorey with broombush prominent is a common association in the area.

The Scrub Heath and *Allocasuarina* Thicket areas are also common in the general area but are not extensive and cover relatively small areas. Some of these areas in shire and water reserves have been partially cleared for gravel. Scrub Heath can also be found elsewhere within the Lake King townsite.

None of the plant communities in the survey areas are among the Threatened Ecological Communities listed by English and Blyth (1997).

### 3.4 Survey Limitations

The survey work was limited because of the following seasonal and time constraints.

- Because of the dry season in 2006 the spring has been a difficult time for conducting flora surveys in the Lake King area.
- Fieldwork which covers only a few days of the year can not be expected to exclude the possibility that there are still rare flora in the sites surveyed that have not as yet been located.
- Although the best time for survey is during the spring some plant species will flower at other times of the year, some species do not flower every year and some species are not identifiable or even visible except for short periods of time.

Searches carried out at other times of the year, especially early spring may find other populations of rare flora and increase the plant species list for the area.

## 4.0 Acknowledgements

The assistance of Western Australian Herbarium staff and other Botanists, particularly Bruce Maslin (*Acacia*), Malcolm Trudgen (*Baeckea*, *Rinzia*), Greg Keighery and Mike Hislop (*Melaleuca*, *Leucopogon*) in helping to identify specimens is gratefully appreciated. Access to the WA herbarium collections was essential for carrying out the project and is greatly appreciated.

Thank you also to Nancye Perkins (Lake King rare flora volunteer) who assisted with additional survey work in March 2007.

## 5.0 References

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# **Appendix 1**

## **Vegetation and Flora**

### **Site Descriptions**

## Lake King Townsite UCL

**Site 1**      **Mm**    **Open Mallee over Mixed *Melaleuca* Heath**

**Soils and Topography:**      Loam soils over clay. Gentle slope

**GPS (WGS 84)**      33° 04' 56.5"      119° 41' 36.4"

**Diagnosis:**      Open Shrub Mallee over Open Low Scrub B over Low Heath C over Open Dwarf Scrub D

### Vegetation Description

- Stratum 1**      Shrub Mallee 2-5ms (10-30% canopy cover) including *Eucalyptus flocktoniae* 5780, *Eucalyptus pileata* 5775, *Eucalyptus ?depauperata* 5779 (Priority 3), *Eucalyptus calycogona* 5781 and *Eucalyptus cylindrifolia* 5782.
- Stratum 2**      Shrubs 1.0-1.5ms (2-10% canopy cover) including *Melaleuca cucullata* 5801, *Melaleuca teuthidoides* 5803, *Melaleuca adnata* 5785, *Melaleuca lateriflora* 5778, *Melaleuca torquata* 5804, *Daviesia benthamii*, *Exocarpos aphyllus* 5805, *Melaleuca agathosmoides* 5806 (Priority 1), *Grevillea huegelii* and *Templetonia sulcata* 5786.
- Stratum 3**      Shrubs 0.5 – 1.0 ms (30-70% canopy cover) including *Melaleuca adnata* (frequent), *Melaleuca coroncarpa* 5813 (frequent), *Melaleuca sapientes* 5783, *Melaleuca glaberrima* 5794, *Melaleuca societatis* 5802, *Melaleuca cucullata*, *Melaleuca johnsonii* 5797, *Melaleuca spicigera* 5798, *Daviesia benthamii*, *Grevillea huegelii* 5810, *Grevillea pectinata* 5799, *Melaleuca scalena* 5795 and *Melaleuca pauperiflora* 5811.
- Stratum 4**      Shrubs to 0.5ms (2-10% canopy cover) in open spaces including *Comespermum spinosum* 5796, *Acacia deficiens* 5791, *Cassytha melantha* 5808, *Hakea commutata* 5807, *Acacia aff loxophylla* 5776, 5788, *Acacia mutabilis ssp mutabilis* 5777, *Grevillea oligantha* 5790, *Westringia cephalantha* 5773, *Acacia glaucoptera* 5787, *Acacia crassuloides* 5789, *Hibbertia ?gracilipes* 5792, *Spyridium mucronatum ssp mucronatum* 5793, *Acacia brachyclada* 5800, *Boronia inornata ssp leptophylla* 5809, *Eremophila densifolia ssp pubiflora* 5812 and *Thysanotus manglesianus* 5814 (herb).



**Photograph 1.** Open Shrub Mallee over mixed *Melaleuca* Heath at site 1.

**Site 2            SH            Scrub Heath**

**Soils and Topography:**        Sandy loam soils with gravel. Very gentle slope.

**GPS (WGS 84)**        33° 05' 05.6"            119° 41' 44.2"

**Diagnosis:**        Scrub over Low Heath C over Open Dwarf scrub D

**Vegetation Description**

**Stratum 1**        *Eucalyptus olivina* 5829 Shrub Mallee scattered. Shrubs 2-3 m (10-30% canopy cover) including *Allocasuarina acutivalvis*, *Santalum acuminatum*, *Allocasuarina corniculata* 5830, *Leptospermum nitens* 5817, *Grevillea didymobotrya*, *Callitris preissii*, *Melaleuca scalena* 5818, *Grevillea excelsior* and *Hakea erecta* 5826.

**Stratum 2**        Shrubs 1-1.5m (2-10% canopy cover) including, *Hakea scoparia*, *Grevillea shuttleworthiana* subsp. *obovata*, *Isopogon scabriusculus*, *Leptomeria preissiana* 5831, *Banksia elderiana*, *Acacia uncinella* and *Philothea gardneri* 5828.

**Stratum 3** Shrubs 0.5 – 1.0 ms (30-70% canopy cover) including *Thryptomene kochii* (frequent), *Melaleuca spicigera*, *Chamelaucium ciliatum* 5821, *Verticordia chrysantha*, *Melaleuca villosisepala* 5816, *Beaufortia micrantha*, *Persoonia quinquinervis* 5824, *Grevillea beardiana* 5815, *Pimelea ?brevifolia* 5820 (no flowers), *Melaleuca cordata* 5827, *Philotheca gardneri* 5828, *Conospermum brownii* 5802 and *Lepidosperma* sp (sedge).

**Stratum 4** Shrubs to 0.5 ms (2-10% canopy cover) including *Hibbertia lepidocalyx* subsp *lepidocalyx* 5823, *Hibbertia rostellata* 5822, *Leucopogon cuneifolius* 5819 and *Rinzia communis* 5825.



**Photograph 2.** Scrub Heath at site 2.

**Site 3** Mb **Open Mallee over *Melaleuca* (broombush)**

**Soils and Topography** Stony soils - sandy loam. Very gentle slope to flat terrain.

**GPS (WGS 84)** 33° 05' 04.2" 119° 41' 47.3"

**Diagnosis:** Open Shrub Mallee over Heath A over Open Dwarf Scrub D

### **Vegetation Description**

**Stratum 1** Shrub Mallee 4-5ms (10-30% canopy cover) including *Eucalyptus eremophila*, *Eucalyptus flocktoniae*, *Eucalyptus olivina* and *Eucalyptus scyphocalyx* 5840.

**Stratum 2** Shrubs 1.5-2 ms (30-70% canopy cover) including *Melaleuca scalena* 5834 (frequent), *Melaleuca coronicarpa*, *Daviesia benthamii* and *Melaleuca glaberrima* 5842.

**Stratum 3** Shrubs to 0.5m (2-10% canopy cover) in open spaces including *Dillwynia divaricata* 5836, *Gastrolobium tetragonophyllum* 5833, *Hibbertia ?gracilipes* 5837, *Cassytha melantha*, *Grevillea huegelii*, *Grevillea pectinata*, *Phebalium lepidotum* 5841, *Rinzia communis*, *Pultenaea purpurea* 5839, *Acacia mutibilis ssp mutibilis* 5835, *Coleanthera myrtooides* 5838, *Leucopogon* sp. Wheatbelt (S. Murray 257) 5843, *Logonia buxifolia* 5844 and *Microcybe multiflora* 5845. Sedges to 0.5m include *Lepidosperma* species.



**Photograph 3.** Open Mallee over *Melaleuca scalena* (broombush) at site 3.

**Site 4** Mb **Very Open Mallee over *Melaleuca* (broombush)**

**Soils and Topography:** Sandy loam soils with gravel over clay

**GPS (WGS 84)** 33° 05' 02.2" 119° 41' 50.9"

**Diagnosis:** Very Open Shrub Mallee over Heath A over Dwarf Scrub D

### **Vegetation Description**

**Stratum 1** Shrub Mallee 2-5 ms (2-10% canopy cover) including *Eucalyptus flocktoniae* and *Eucalyptus eremophila*. Scattered *Allocasuarina acutivalvis* shrubs to 2.5m.

**Stratum 2** Shrubs 1.5–2.0 ms (30-70% canopy cover) including *Melaleuca hamata* 5846 (frequent), *Melaleuca spicigera*, *Hakea scoparia* and *Hakea newbeyana*.

**Stratum 3** Shrubs to 0.5 ms (10-30% canopy cover) including *Phebalium tuberculosum*, *Gastrolobium tetragonophyllum* 5833, *Thryptomene kochii*, *Hibbertia ?gracilipes*, *Phebalium filifolium*, *Beaufortia schaueri*, *Hibbertia lepidocalyx* and *Cryptandra minutifolia* subsp. *brevistyla*.



**Photograph 4.** Very Open Mallee over *Melaleuca* (broombush).



**Site 5            M            Open Mallee over Low Scrub**

**Soils and Topography:**      Loam soils over clay. Gentle slope.

**GPS (WGS 84)**      33° 05' 00.7"            119° 41' 42.5"

**Diagnosis:**      Open Shrub Mallee over Open Low Scrub B over Dwarf Scrub D

**Vegetation Description**

**Stratum 1**      Shrub Mallee 2-5ms (10-30% canopy cover) including *Eucalyptus eremophila*, *Eucalyptus flocktoniae* and *Eucalyptus ? pileata*.

**Stratum 2**      Shrubs 1.0-1.5m (2-10% canopy cover) including *Melaleuca scalena*, *Melaleuca coronicarpa*, *Melaleuca pauperiflora* 5811, *Exocarpos aphyllus*, *Melaleuca agathosmoides* 5806 (Priority 1 flora), *Melaleuca lateriflora*, *Santalum acuminatum* and *Melaleuca teuthidoides*.

**Stratum 3**      Shrubs to 0.5m (10-30% canopy cover) including *Acacia crassuloides*, *Microcybe multiflora*, *Dodonaea stenozyga*, *Melaleuca johnsonii*, *Grevillea huegelii*, *Olearia muelleri*, *Acacia deficiens* and *Boronia inornata*.



**Photograph 5.** Open Mallee over Scrub at site 5.

**Site 6            SH            Scrub Heath**

**Soils and Topography:**      Yellow sandy loam soils with gravel. Very gentle slope.

**GPS (WGS 84)**      33° 05' 09.5"            119° 41' 54.6"

**Diagnosis:**      Scrub (patchy) over Low Scrub B over Low Heath D

**Vegetation Description**

- Stratum 1**      Shrubs to 3m (10 - 30% canopy cover - patchy) including *Allocasuarina acutivalvis* (frequent), *Banksia elderiana*, *Hakea scoparia*, *Grevillea excelsior* and *Callitris preissii* 5847.
- Stratum 2**      Shrubs 1.0-1.5m (10-30% canopy cover) including *Banksia elderiana*, *Isopogon scabriusculus*, *Acacia sulcata* var. *platyphylla* 5849, *Acacia dielsii* 5850, *Acacia singula* 5851 (Priority 3), *Acacia uncinella* 5852, *Philotheca gardneri*, *Grevillea didymobotrya* 5854, *Grevillea shuttleworthiana* subsp. *obovata* 5853, *Melaleuca cordata*, *Verticordia roei*, *Thryptomene kochii* 5861, *Allocasuarina corniculata*, *Persoonia helix*, *Hakea erecta*, *Beyeria brevifolia* 5860 and *Calothamnus quadrifidus* 5866. Sedges 0.5 – 1.0ms including *Lepidosperma* ?A2 Island flat 5896.
- Stratum 3**      Shrubs to 0.5m (30-70% canopy cover) including *Philotheca rhombioidea* 5862, *Melaleuca cordata*, *Verticordia roei*, *Verticordia chrysantha* 5857, *Verticordia eriocephala* 5855, *Verticordia picta* 5858, *Verticordia densa* var. *caspitosa* 5856, *Grevillea beardiana*, *Beaufortia micrantha*, *Boronia inornata*, *Astroloma serratifolium*, *Chamelaucium ciliatum*, *Hibbertia lepidocalyx*, *Calytrix leschenaultii*, *Psammomoya choretroides* 5863, *Thryptomene kochii*, *Hibbertia rostellata* 5864, *Melaleuca platycalyx*, *Gastrolobium crassifolium* 5859, *Pityrodia terminalis* (disturbed areas), *Microcorys ericifolia* 5867, *Hemigenia?* *teretiuscula* 5868, *Eremophila drummondii*, *Ptilotus* ?*brevifolia*, *Persoonia helix* 5869, *Beaufortia schaueri* 5865, *Beaufortia micrantha* var. *puberula* 5870 and *Baeckea* sp. Fine leaf 848. *Neurachne alopecuroidea* (grass) and *Waitzia acuminata* (annual herb) were also recorded.



**Photograph 6.** Scrub Heath at site 6.

**Site 7**            **T**                    ***Allocasuarina* Thicket**

**Soils and Topography:** Loam soils over gravelly sub soils. Flat terrain.

**GPS (WGS 84)**        33° 05' 10.4"            119° 41' 56.3"

**Diagnosis:**        Thicket over Open Low Scrub B over Dwarf Scrub C over Open Dwarf Scrub D

**Vegetation Description**

**Stratum 1**        Shrubs 2.5-3 ms (30-70% canopy cover) including *Allocasuarina acutivalvis* (frequent), *Banksia elderiana*, *Hakea meisneriana* and *Allocasuarina corniculata*.

**Stratum 2**        Shrubs 1.0-1.5 ms (2-10% canopy cover) including *Grevillea didymobotrya*, *Banksia elderiana*, *Hakea scoparia*, *Philotheca gardneri* and *Isopogon scabriusculus*.

**Stratum 3**        Shrubs 0.5-1.0 (10-30% canopy cover) including *Thryptomene kochii*, *Melaleuca cordata*, *Beaufortia micrantha*, *Coleanthera myrtooides*, *Leucopogon cuneifolius*, *Acacia sulcata* var. *platyphylla*, *Acacia dielsii* and *Phebalium lepidotum*. *Lepidosperma* ?sp A2 Island Flat (sedge) was also recorded as occasional in this stratum.

**Stratum 4** Shrubs to 0.5m (2-10% canopy cover) including *Astroloma serratifolium*, *Beaufortia micrantha*, *Jacksonia nematoclada*, *Calytrix leschenaultii*, *Verticordia chrysantha*, *Hibbertia rostellata*, and *Hibbertia lepidocalyx* subsp *lepidocalyx*. *Lepidosperma ?brunonianum* (sedge) occasional.

**Site 8**            **M**                    **Open Mallee over Low Scrub**

**Soils and Topography:**      Loam soils over clay. Flat terrain.

**GPS (WGS 84)**            33° 05' 04.8"            119° 41' 35.5"

**Diagnosis:**      Shrub Mallee over Open Low Scrub A over Dwarf Scrub D

**Vegetation Description**

**Stratum 1**      Shrub Mallee to 5ms (30-70% canopy cover) including *Eucalyptus eremophila* , *Eucalyptus olivina*, *Eucalyptus calycogona* 5890 and *Eucalyptus flocktoniae* 5891.

**Stratum 2**      Shrubs 1.5-2sms (2-10% canopy cover) including *Melaleuca coronicarpa*, *Melaleuca pauperiflora*, *Daviesia benthamii* and *Melaleuca scalena*.

**Stratum 3**      Shrubs to 0.5m (10-30% canopy cover) including *Acacia crassuloides*, *Grevillea pectinata*, *Boronia inornata*, *Grevillea huegellii* and *Melaleuca johnsonii*.



**Photograph 8.** Open Mallee over Scrub.

**Site 9**            **M**            **Open Mallee over Low Scrub**

**Soils and Topography:**      Loam clay stony soils. Flat terrain.

**GPS (WGS 84)**      33° 05' 05.0"            119° 41' 29.3"

**Diagnosis:**      Open Shrub Mallee over Low Scrub B over Dwarf Scrub D

**Vegetation Description**

**Stratum 1**      Shrub Mallee to 4ms (10-30% canopy cover) including *Eucalyptus eremophila*, *Eucalyptus pileata* and *Eucalyptus flocktoniae*.

**Stratum 2**      Shrubs 1.0-1.5m (10-30% canopy cover) including *Daviesia benthamii*, *Melaleuca coronicarpa*, *Melaleuca scalena*, *Exocarpos aphyllus*, *Dillwynia divaricata*, *Melaleuca pauperiflora*, *Santalum acuminatum*, *Dodonaea stenozyga* 5871 and *Melaleuca teuthidoides*.

**Stratum 3**      Shrubs to 0.5m (10-30% canopy cover) including *Grevillea huegellii*, *Boronia inornata*, *Acacia crassuloides*, *Grevillea pectinata*, *Melaleuca johnsonii*, *Pultenaea heterochila*, *Phebalium tuberculosum*, *Gastrolobium tetragonophyllum*, *Hibbertia ?gracilipes*, *Rinzia communis*, *Westringia cephalantha*, *Microcybe multiflora*, *Pultenaea purpurea*, *Olearia muellerii*, *Acacia deficiens*, *Coopernookia strophiolata* and *Cryptandra minutifolia* subsp *brevistyla* 5872.



**Photograph 9.** Open Mallee over Low Scrub

**Site 10**      **SH**                      **Scrub Heath**

**Soils and Topography:**      Stony loam soils over gravelly sub soils. Flat terrain.

**GPS (WGS 84)**      33° 05' 01.4"                      119° 41' 25.5"

**Diagnosis:**      Open Scrub over Open Low Scrub B over Low Heath C over Dwarf Scrub D

### **Vegetation Description**

- Stratum 1**      Shrubs 3m (2-10% canopy cover) including *Allocasuarina acutivalvis*, *Grevillea excelsior*, *Leptospermum ?nitens*, *Hakea meisneriana* 5880 and *Allocasuarina corniculata*.
- Stratum 2**      Shrubs 1.0-1.5 (2-10% canopy cover) including *Acacia uncinella*, *Grevillea didymobotrya*, *Isopogon scabriusculus*, *Grevillea shuttleworthiana*, *Hakea scoparia* and *Allocasuarina acutivalvis*.
- Stratum 3**      Shrubs 0.5-1.0 (30-70% canopy cover) including *Thryptomene kochii*, *Grevillea pectinata*, *Baeckea crispiflora*, *Acacia uncinella*, *Phebalium tuberosum*, *Melaleuca cordata*, *Lysinema ciliatum*, *Isopogon scabriusculus*, *Beaufortia micrantha* (frequent), *Hakea scoparia*, *Verticordia chrysantha*, *Grevillea shuttleworthiana*, *Verticordia roei*, *Leucopogon cuneifolius* 5879 and *Lepidosperma* sp ?A2 Island flat (sedge) occasional.
- Stratum 4**      Shrubs to 0.5m (10-30% canopy cover) including *Westringia cephalantha*, *Gastrolobium tetragonophyllum*, *Cooperhookea strophiolata*, *Neurachne alopecuroidea* (grass), *Gastrolobium crassifolium*, *Astroloma serratifolium*, *Persoonia helix*, *Psammomoya choretroides*, *Hibbertia ?gracilipes*, *Beaufortia schaueri*, *Calytrix leschenaultii*, *Verticordia chrysantha* (frequent), *Acacia crassuloides*, *Chamelaucium ciliatum*, *Hibbertia rostellata*, *Hibbertia lepidocalyx* subsp *lepidocalyx* 5875, *Cyanostegia lanceolata* 5874, *Dampiera sacculata* 5877, *Baeckea crispiflora* 5876 and *Jacksonia nematoclada* 5878. *Lepidosperma ?brunonianum* (sedge) occasional.



**Photograph 10.** Scrub Heath at site 10.

**Site 11**                      **SH**                      **Scrub Heath**

**Soils and Topography:**      Stony soils (granite). Flat terrain.

**GPS (WGS 84)**      33° 05' 13.2"                      119° 41' 23.9"

**Diagnosis:**      Open Scrub/Scrub over Heath B/Open Tall Sedges over Dwarf Scrub D

**Vegetation Description:**

**Stratum 1**      Shrubs over 2m (10- 30% canopy cover - patchy) including *Grevillea excelsior* 5886, *Leptospermum ?nitens* 5884, *Melaleuca scalena*, *Allocasuarina acutivalvis*, *Santalum acuminatum*, *Allocasuarina huegeliana* 5885 and *Hakea multilineata*.

**Stratum 2**      Shrubs and sedges 1.0-1.5m (30-70% canopy cover) including *Persoonia helix*, *Micromyrtus erichsenii* 5881 (frequent), *Hakea scoparia*, *Acacia uncinella*, *Phebalium filifolium* 5882 and *Allocasuarina corniculata*. *Lepidosperma ?sp* A2 Island Flat sedge (frequent).

**Stratum 3**      Shrubs to 0.5m (10-30% canopy cover) including *Hibbertia rostellata*, *Psammomoya choretroides*, *Calytrix leschenaultii*, *Verticordia chrysantha*, *Astroloma serratifolium*, *Pityrodia terminalis*, *Hemigenia ?teretiusscula* 5883, *Microcorys ericifolia* 5887, *Pimelea ?brevifolia* 5888 and *Neurachne alopecuroidea* (grass).

**Area regenerating**

**R**

**Stratum 1** Shrubs 0.5 – 1.0m including *Hakea erecta*, *Melaleuca cordata*, *Gastrolobium crassifolium*, *Grevillea huegellii*, *Dodonaea stenozyga*, *Templetonia sulcata*, *Acacia* species and *Aristida contorta* (grass).

**Stratum 2** Shrubs to 0.5m including *Westringia cephalantha*, *Boronia inornata*, *Dodonaea bursariifolia* 5889, *Cooperhooia strophiolata*, *Angianthus tomentosus*, *Waitzia acuminata*, *Glischrocaryon aureum* and *Cyanostegia lanceolata*.

**Shrub Mallee Area**

**Stratum 1** Shrub Mallee to 4ms including *Eucalyptus eremophila* and *Eucalyptus flocktoniae*

**Stratum 2** Shrubs to 0.5ms including *Melaleuca johnsonii*, *Gastrolobium tetragonophylla* and *Acacia crassuloides*.



**Photograph 11.** Scrub Heath at site 11.



**Site 12**      **Mm**      **Open Shrub Mallee over mixed *Melaleuca* Heath**

**Soils and Topography:**      Shallow loam soils over clay. Flat terrain

**GPS (WGS 84)**      33° 04' 54.8"      119° 41' 35.8"

**Diagnosis:**      Very Open Shrub Mallee over Open Low Scrub B over Low Heath  
C over Open Dwarf Scrub D

**Vegetation Description**

**Stratum 1**      Shrub Mallee 2-5ms (2-10% canopy cover) including *Eucalyptus flocktoniae*, *Eucalyptus pileata* 5898, *Eucalyptus ?depauperata* (Priority 3) and *Eucalyptus eremophila* 5893, 5894.

**Stratum 2**      Shrubs 1.0-1.5m (2-10% canopy cover) including *Melaleuca ?scalena*, *Melaleuca sapientes*, *Melaleuca spicigera*, *Melaleuca teuthidoides* , *Melaleuca lateriflora* , *Melaleuca torquata*, *Exocarpos aphyllus*, *Grevillea huegelii*, *Acacia aff loxophylla* and *Acacia mutabilis*.

**Stratum 3**      Shrubs 0.5 – 1.0 ms (30-70% canopy cover) including *Melaleuca adnata* (frequent), *Melaleuca coroncarpa* (frequent), *Melaleuca glaberrima*, *Melaleuca johnsonii* , *Daviesia benthamii*, *Grevillea pectinata* , *Melaleuca teuthidoides*, *Hakea commutata* and *Acacia aff loxophylla*.

**Stratum 4**      Shrubs to 0.5m (2-10% canopy cover) in open spaces including *Acacia deficiens*, *Cassutha melantha*, *Westringia cephalantha*, *Acacia crassuloides* and *Boronia inconspicua* 5892.



**Photograph 12.** Open Shrub Mallee over mixed *Melaleuca* Heath at site 12.

**Site 13**                                **SH**                                **Scrub Heath**

**Soils and Topography:**        Loamy soils. Flat terrain.

**GPS (WGS 84)**            33° 05' 13.4"                    119° 41' 40.5"

**Diagnosis:**        Scrub over Open Low Scrub B over Low Heath C over Dwarf  
Scrub D/Open Low Sedges

**Vegetation Description**

**Stratum 1**        Shrubs 2.5-4ms (10-30% canopy cover) including *Allocasuarina acutivalvis* (frequent), *Grevillea excelsior*, *Banksia elderiana*, *Leptospermum nitens*, *Allocasuarina corniculata*, *Hakea erecta*, *Callitris preissii* and *Santalum acuminatum*.

**Stratum 2**        Shrubs 1.0-1.5 (2-10% canopy cover) including *Grevillea didymobotrya* and *Grevillea shuttleworthiana*.

- Stratum 3** Shrubs and sedges 0.5-1.0 (30-70% canopy cover) including *Thryptomene kochii*, *Micromyrtus erichsenii*, *Baeckea crispiflora*, *Acacia uncinella*, *Melaleuca cordata*, *Isopogon scabriusculus*, *Beaufortia micrantha*, *Lepidosperma* sp ?A2 island Flat 5896 sedge (frequent), *Lepidosperma ?brunonianum* sedge (frequent), *Gastrolobium crassifolium* and *Grevillea beardiana*.
- Stratum 4** Shrubs to 0.5m (10-30% canopy cover) including *Verticordia roei*, *Lepidosperma ? brunonianum* 5897, *Gastrolobium crassifolium*, *Calytrix leschenaultii*, *Verticordia chrysantha*, *Hibbertia rostellata* and *Hibbertia lepidocalyx* subsp *lepidocalyx*.



**Photograph 13.** Scrub Heath at site 13.

**Site 14**                      **T**                      ***Allocasuarina* Thicket**

**Soils and Topography:**      Loamy gravel over gravelly sub soils. Very gentle slope.

**GPS (WGS 84)**      33° 05' 08.9"                      119° 41' 41.1"

**Diagnosis:**      Thicket over Open Low Scrub B over Dwarf Scrub C over Open Dwarf Scrub D

**Vegetation Description**

- Stratum 1**      Shrubs 3-4 ms (30-70% canopy cover) including *Allocasuarina acutivalvis* (frequent), *Banksia elderiana* and *Hakea erecta*.
- Stratum 2**      Shrubs 1.0-1.5 ms (2-10% canopy cover) including *Grevillea didymobotrya*, *Hakea scoparia*, *Thryptomene kochii* and *Isopogon scabriusculus*.
- Stratum 3**      Shrubs 0.5-1.0 (30-70% canopy cover) including *Thryptomene kochii*, *Melaleuca cordata*, *Beaufortia micrantha*, *Gastrolobium crassifolium*, *Beyeria brevifolia* and *Verticordia roei*. *Lepidosperma* sp A2 Island Flat sedge (occasional).
- Stratum 4**      Shrubs to 0.5m (2-10% canopy cover) including *Calytrix leschenaultii*, *Verticordia chrysantha*, *Hibbertia rostellata* and *Hibbertia lepidocalyx* subsp *lepidocalyx*. *Lepidosperma ?brunonianum* sedge (occasional).



**Photograph 14.** *Allocasuarina acutivalvis* Thicket at site 14.

**Site 15      R      Regenerating vegetation**

**Soils and Topography:**      Previously cleared. Regenerating vegetation. Loam soils over clay. Flat terrain.

**Diagnosis:**      Low Scrub A over Open Low Scrub B over Open Dwarf Scrub D

**Vegetation Description**

**Stratum 1**      Shrubs to 2 ms (10-30% canopy cover) including *Hakea preissii* (frequent), *Daviesia benthamii* (frequent) and *Grevillea excelsior*.

**Stratum 2**      Shrubs 1.0-1.5ms (2-10% canopy cover) including *Hakea preissii*, *Daviesia benthamii* and *Grevillea pectinata*.

**Stratum 3**      Shrubs to 0.5ms (2-10% canopy cover) including *Hakea preissii*, *Wilsonia humilis*, *Acacia deficiens*, *Acacia crassuloides* and *Grevillea huegelii*. *Lepidosperma* species (sedge) and *Austrostipa elegantissima* (grass) were also recorded.

# **Appendix 2**

## **Plant Species List**

## Lake King UCL Species List 2007

	Taxon Name	Collecting Number	
054F	<b>Anthericaceae</b> Thysanotus manglesianus Kunth	5814	
345	<b>Asteraceae</b> Angianthus tomentosus J.C.Wendl. Olearia muelleri (Sond.) Benth. Waitzia acuminata Steetz		
70	<b>Casuarinaceae</b> Allocauarina acutivalvis (F.Muell.) L.A.S.Johnson Allocauarina corniculata (F.Muell.) L.A.S.Johnson Allocauarina huegeliana (Miq.) L.A.S.Johnson	5830 5885	
199	<b>Celastraceae</b> Psammomoya choretroides (F.Muell.) Diels & Loes.	5863	
307	<b>Convolvulaceae</b> Wilsonia humilis R.Br.	5901	
18	<b>Cupressaceae</b> Callitris preissii Miq.	5847	
32	<b>Cyperaceae</b> Lepidosperma ?brunonianum Nees Lepidosperma ?sp. A2 Island Flat (G.J. Keighery 7000)	5897 5896	? taxonomy ? taxonomy
226	<b>Dilleniaceae</b> Hibbertia ?gracilipes Benth. Hibbertia ?gracilipes Benth. Hibbertia lepidocalyx J.R.Wheeler subsp. lepidocalyx Hibbertia lepidocalyx J.R.Wheeler subsp. lepidocalyx Hibbertia rostellata Turcz. Hibbertia rostellata Turcz.	5792 5837 5823 5875 5822 5864	? no flowers ? no flowers
288	<b>Epacridaceae</b> Astroloma serratifolium (DC.) Druce Coleanthera myrtoides Stschegl. Leucopogon cuneifolius Stschegl. Leucopogon cuneifolius Stschegl. Leucopogon sp. Wheatbelt (S. Murray 257) Lysinema ciliatum R.Br.	5838 5819 5879 5843	
185	<b>Euphorbiaceae</b> Beyeria brevifolia (Muell.Arg.) Benth.	5860	
341	<b>Goodeniaceae</b> Cooperookia stropholata (F.Muell.) Carolin		

276	Dampiera sacculata Benth.	5877	
	<b>Haloragaceae</b>		
	Glischrocaryon aureum (Lindl.) Orchard		
313	<b>Lamiaceae</b>		
	Cyanostegia lanceolata Turcz.	5874	
	Hemigenia ?teretiuscula F.Muell.	5883	
	Hemigenia ?teretiuscula F.Muell.	5868	
	Microcorys ericifolia Benth.	5887	
	Microcorys ericifolia Benth.	5867	
	Pityrodia terminalis (Endl.) A.S.George		
	Westringia cephalantha F.Muell.	5773	
131	<b>Lauraceae</b>		
	Cassythia melantha R.Br.	5808	
302	<b>Loganiaceae</b>		
	Logania buxifolia F.Muell.	5844	
163	<b>Mimosaceae</b>		
	Acacia brachyclada W.Fitzg.	5800	
	Acacia crassuloides Maslin	5789	
	Acacia deficiens Maslin	5791	
	Acacia dielsii E.Pritz.	5850	
	Acacia glaucoptera Benth.	5787	
	Acacia aff. loxophylla Benth.	5776	
	Acacia aff. loxophylla Benth.	5788	
	Acacia mutabilis Maslin subsp. mutabilis	5777	
	Acacia mutabilis Maslin subsp. mutabilis	5835	
	Acacia singula R.S.Cowan & Maslin	5851	Priority 3
	Acacia sulcata var. platyphylla Maiden & Blakely	5849	
	Acacia uncinella Benth.	5852	
326	<b>Myoporaceae</b>		
	Eremophila densifolia subsp. pubiflora Chinnock ms	5812	
	Eremophila drummondii F.Muell.		
273	<b>Myrtaceae</b>		
	Baeckea crispiflora F.Muell.	5876	
	Baeckea sp. fine-leaved (C.M. Lewis 517)	5848	
	Beaufortia micrantha var. puberula Benth.	5870	
	Beaufortia schaueri Schauer	5865	
	Calothamnus quadrifidus R.Br.	5866	
	Calytrix leschenaultii (Schauer) Benth.		
	Chamelaucium ciliatum Desf.	5821	
	Eucalyptus calycogona Turcz.	5890	
	Eucalyptus calycogona Turcz.	5781	
	Eucalyptus cylindriflora Maiden & Blakely	5782	
	Eucalyptus ?depauperata L.A.S.Johnson & K.D.Hill	5895	? taxonomy
	Eucalyptus ?depauperata L.A.S.Johnson & K.D.Hill	5779	Priority 3 ? taxonomy Priority 3



Eucalyptus ?eremophila (Diels) Maiden	5899	? taxonomy
Eucalyptus ?eremophila (Diels) Maiden	5784	? taxonomy
Eucalyptus ?eremophila (Diels) Maiden	5893	? taxonomy
Eucalyptus ?eremophila (Diels) Maiden	5894	? taxonomy
Eucalyptus flocktoniae (Maiden) Maiden	5780	
Eucalyptus flocktoniae (Maiden) Maiden	5891	
Eucalyptus olivina Brooker & Hopper	5829	
Eucalyptus pileata Blakely	5898	
Eucalyptus pileata Blakely	5775	
Eucalyptus scyphocalyx (Benth.) Maiden & Blakely	5840	
Leptospermum ?nitens Turcz.	5817	? no flowers
Melaleuca adnata Turcz.	5785	
Melaleuca agathosmoides C.A.Gardner	5806	Priority 1
Melaleuca cordata Turcz.	5827	
Melaleuca coronicarpa D.A.Herb.	5813	
Melaleuca cucullata Turcz.	5801	
Melaleuca eleuterostachya F.Muell.	5832	
Melaleuca glaberrima F.Muell.	5794	
Melaleuca glaberrima F.Muell.	5842	
Melaleuca hamata Fielding & Gardner	5846	
Melaleuca johnsonii Craven	5797	
Melaleuca lateriflora Benth.	5778	
Melaleuca laxiflora Turcz.	5903	
Melaleuca pauciflora Turcz.	5811	
Melaleuca platycalyx Diels		
Melaleuca sapientes Craven	5783	
Melaleuca ?scalena Craven & Lepschi	5795	? no flowers
Melaleuca scalena Craven & Lepschi	5834	
Melaleuca scalena Craven & Lepschi	5818	
Melaleuca societatis Craven	5802	
Melaleuca spicigera S.Moore	5798	
Melaleuca teuthidoides Barlow	5803	
Melaleuca torquata Barlow	5804	
Melaleuca villosisepala Craven	5816	
Micromyrtus erichsenii Hemsl.	5881	
Rinzia communis Trudgen	5825	
Thryptomene kochii E.Pritz.	5861	
Verticordia chrysantha Endl.	5857	
Verticordia densiflora var. cespitosa (Turcz.) A.S.George	5856	
Verticordia eriocephala A.S.George	5855	
Verticordia picta Endl.	5858	
Verticordia roei Endl.		

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**Papilionaceae**

Daviesia benthamii Meisn.		
Dillwynia divaricata (Turcz.) Benth.	5836	
Gastrolobium crassifolium Benth.	5859	
Gastrolobium tetragonophyllum (E.Pritz.) Crisp	5833	
Jacksonia nematoclada F.Muell.	5878	
Pultenaea heterochila F.Muell.	5873	
Pultenaea purpurea (Turcz.) Crisp & Orthia	5839	

	Templetonia sulcata (Meisn.) Benth.	5786
<b>31</b>	<b>Poaceae</b> Neurachne alopecuroidea R.Br.	
<b>183</b>	<b>Polygalaceae</b> Comesperma spinosum F.Muell.	5796
<b>90</b>	<b>Proteaceae</b> Banksia elderiana F.Muell. & Tate Conospermum brownii Meisn. Grevillea beardiana McGill. Grevillea didymobotrya Meisn. Grevillea excelsior Diels Grevillea huegelii Meisn. Grevillea oligantha F.Muell. Grevillea pectinata R.Br. Grevillea shuttleworthiana subsp. obovata (Benth.) Olde & Marriott Hakea commutata F.Muell. Hakea erecta Lamont Hakea meisneriana Kippist Hakea multilineata Meisn. Hakea newbeyana R.M.Barker Hakea scoparia Meisn. Isopogon scabriusculus Meisn. Persoonia helix P.H.Weston Persoonia quinquenervis Hook.	5902 5815 5854 5886 5810 5790 5799 5853 5807 5826 5880      5869 5824
<b>215</b>	<b>Rhamnaceae</b> Cryptandra minutifolia subsp. brevistyla Rye Spyridium mucronatum Rye subsp. mucronatum	5872 5793
<b>175</b>	<b>Rutaceae</b> Boronia inconspicua Benth. Boronia inornata subsp. leptophylla (Turcz.) Burgman Microcybe multiflora Turcz. Phebalium filifolium Turcz. Phebalium lepidotum (Turcz.) Paul G.Wilson Phebalium tuberculosum (F.Muell.) Benth. Philotheca gardneri (Paul G.Wilson) Paul G.Wilson Philotheca rhomboidea (Paul G.Wilson) Paul G.Wilson	5892 5809 5845 5882 5841 5828 5862
<b>92</b>	<b>Santalaceae</b> Exocarpos aphyllus R.Br. Leptomeria preissiana (Miq.) A.DC. Santalum acuminatum (R.Br.) A.DC.	5805 5831
<b>207</b>	<b>Sapindaceae</b> Dodonaea bursariifolia F.Muell. Dodonaea stenozyga F.Muell.	5889 5871

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**Thymelaeaceae**

Pimelea ?brevifolia R.Br.

5888

? no flowers

Pimelea ?brevifolia R.Br.

5820

? no flowers