

NORTHERN CORRIDOR DEVELOPMENTS LTD

**LOT 3 ROMEO ROAD, ALKIMOS
FLORA & VEGETATION SURVEY**

VERSION 1

DECEMBER 2004

REPORT NO: 2004/210



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1. INTRODUCTION

1.1 Purpose and Scope

Lot 3 Romeo Road, Alkimos, is a relatively large (226ha) landholding in Perth's North-West Corridor, that is zoned for urban development. The lot is undeveloped and contains native vegetation over most of the site.

The lot is strategically placed in the North-West Corridor with respect to significant infrastructure requirements for the corridor, such as the extension of Marmion Avenue, the northern rail line and other major north-south and east-west roads.

A vegetation survey of the site was undertaken in 1996 (Woodward-Clyde, 1996). Due to the timing of the survey in summer, many ephemeral plant species were not able to be recorded. The owners of Lot 3, Northern Corridor Developments Ltd, have commissioned this spring survey and updated report to allow for the planning of the transport infrastructure routes as well as the future development of Lot 3.

The objectives of the report are to update the previous Woodward-Clyde report for Lot 3 and provide the following information:

- A list of all native and non-native plant species within the lot.
- Identification of any significant plant species.
- A description of the vegetation association, floristic community type and vegetation condition.
- Assessment of the significance of the vegetation in terms of Threatened Ecological Communities and other significance criteria listed in Bush Forever.

2. SITE DESCRIPTION

Lot 3 Romeo Road contains two major landforms that are common on the western side of the Swan Coastal Plain. The majority of the site contains soils of the Spearwood Dune System with areas of deep yellow sands over limestone ranging to shallow sand over limestone and large areas of outcropping limestone at the surface. This area is gently undulating with several high points up to 58m AHD and a low point along the eastern boundary of 30m AHD.

The western and north-western portions of the lot contain light grey to white sands of the Quindalup Dune System. The Quindalup soils are younger than, and overlie, the Spearwood soils. The Quindalup soils are part of an extensive parabolic dune that has migrated almost 4km from the coast and been stabilised by vegetation. The parts of the parabolic dune that exist on the lot are the outer 'arm' of the dune and a central 'bowl' section north of the arm. The dunal arm is up to 58 to 60m AHD and rises around 10m above the surrounding land. The soils in the bowl section are shallow with the underlying Spearwood soils outcropping in places.

The watertable beneath the site has an annual maximum of around 2m AHD on the eastern boundary to around 1m AHD on the western boundary. The depth to groundwater, therefore, is between 28m and 59m. Consequently there are no wetlands or wetland-dependent vegetation on the lot.

3. SURVEY METHODOLOGY

The survey of the proposed alignment of Joondalup Drive was undertaken by Dr Paul van der Moezel from ATA Environmental on 15 October 2004. Dr van der Moezel also conducted the summer 1996 survey for the Woodward-Clyde report on Lot 3.

The survey was undertaken in accordance with EPA Guidance Statement No. 51 (EPA, 2004) with vegetation condition assessed according to the Bush Forever rating scale (Government of WA, 2000).

The major vegetation types were identified by reviewing the vegetation map in the 1996 Woodward-Clyde report as well as examining aerial photography at a scale of 1:2,000. All tracks on the site were driven and a substantial area was traversed on foot due to the low number of tracks on the site. All plant species recorded during the traverses were recorded. In addition, eleven 10m x 10m non-permanent quadrats were sampled for plant species presence, cover and height. Areas of Banksia and Tuart woodland were relatively easy to walk through. However, the areas of outcropping limestone were difficult to traverse due to the density of plants.

Prior to the site investigation relevant data was reviewed including the CALM Declared Rare and Priority Flora database and the list of significant flora identified in Bush Forever (Government of WA, 2000) and the Floristics of Neerabup National Park (Keighery *et al.*, 1997).

The timing of the survey was considered optimal for the identification of annual and ephemeral species, including orchids, lilies, trigger plants and daisies.

4. VEGETATION

4.1 Vegetation Complexes

At the broad level of mapping vegetation complexes, the vegetation on the Spearwood Dune portion of the lot belongs to the Cottesloe Complex – Central and South while the vegetation on the western Quindalup Dune area belongs to the Quindalup Complex (Heddlé *et al.*, 1980). This vegetation complex is distributed on Spearwood soils on the western side of the Swan Coastal Plain between Yanchep and Lake Clifton south of Mandurah.

The Cottesloe Complex – Central and South is a broad unit of mapping vegetation which comprises many different vegetation types including Eucalypt woodlands, *Banksia* woodlands and heathlands on limestone soils.

4.2 Vegetation Associations

The vegetation association is a finer level of describing and mapping the different types of vegetation that occur in an area. The mapping of vegetation associations on the lot was undertaken by Woodward-Clyde in 1996. This map has been reproduced as Figure 2 in this report. The mapping was found to be accurate with one minor change to the location of the *Eucalyptus decipiens* woodland in the centre of the property.

The following vegetation associations were identified on the site:

- *Eucalyptus gomphocephala* (Tuart) Woodland
- *Eucalyptus marginata* (Jarrah) Woodland
- *Banksia attenuata*/*Banksia menziesii* Low Woodland
- *Banksia attenuata* Low Open Woodland over *Calothamnus quadrifidus* Heath
- *Calothamnus quadrifidus* mixed Heath
- *Dryandra sessilis* (Parrot Bush) Closed Scrub
- *Melaleuca huegelii* Low Open Shrubland
- *Eucalyptus decipiens* Low Woodland
- *Melaleuca systena* Low Open Shrubland over *Lomandra maritima* Herbland
- *Acacia cochlearis*/*Melaleuca systena* Low Shrubland
- *Acacia rostellifera* Closed Heath to Closed Scrub
- *Acacia saligna*/*Xanthorrhoea preissii* Open Shrubland

Descriptions of the individual associations follow. The numbers Q1 – Q11 refer to the 10mx10m quadrats. Detailed information for each quadrat is given in Appendix 2.

Vegetation of the Spearwood Dune System

Eucalyptus gomphocephala (Tuart) Woodland (Q1, Q10)

Three stands of Tuart Woodland occur on the site, one in the north-east corner and the other two located close to each other in the central southern part of the lot. The Tuart trees are up to 12m high and usually have a mid-stratum of *Banksia* species (*B.*

attenuata and *B. menziesii*) to 6m high although the *Banksia* trees can be absent in part. *Acacia rostellifera* and *Jacksonia sternbergiana* can sometimes form a third stratum 2-3m high. The understorey is fairly low and open with common shrub species including *Hibbertia hypericoides* and *Xanthorrhoea preissii*, and herbaceous species including *Alexgeorgea nitens*, *Acanthocarpus preissii*, *Avena fatua* (Wild Oats), *Anagallis arvensis*, *Trifolium campestre*, *Xanthosia huegelii*, *Bromus diandrus* and *Briza maxima*.

Eucalyptus marginata (Jarrah) Woodland

One small stand of Jarrah Woodland occurs on the mid-eastern boundary of the lot. The Jarrah trees are up to 15m high over *Eucalyptus tottiana* 6m and a low shrub layer with common species *Hibbertia hypericoides* and *Xanthorrhoea preissii*. A fenceline divides the stand into a northern half that is in good condition and a southern half that has been degraded from the activities of livestock grazing.

Banksia attenuata/Banksia menziesii Low Woodland (Q2, Q7, Q11)

The most common vegetation association on the lot is the *Banksia attenuata/Banksia menziesii* Low Woodland that occurs on deep sands in the central and eastern parts of the lot. *Banksia attenuata* is the more common of the two *Banksia* species. The trees range in height from 4 to 6m high. The WA Christmas Tree (*Nuytsia floribunda*) is common in some areas and Sheoak (*Allocasuarina fraseriana*) and *Eucalyptus tottiana* are present as trees scattered through parts of the *Banksia* woodland. The understorey typically contains *Hibbertia hypericoides*, *Gompholobium tomentosum*, *Lepidosperma angustatum*, *Mesomelaena pseudostygia*, *Xanthorrhoea preissii* and *Macrozamia fraseri* commonly occur but not in high densities. The dominant herbaceous weed species include *Hypochaeris glabra*, *Erodium moschatum*, *Ursinia anthemoides* and *Briza maxima*.

The understorey in the western *Banksia* woodland appeared to contain a different assemblage of species than the eastern woodland areas.

Banksia attenuata Low Open Woodland over *Calothamnus quadrifidus* Heath

Where the yellow sands are shallow over limestone, the *Banksia* woodland vegetation changes to a more open and lower *Banksia attenuata* Low Open Woodland 3-4m high with an understorey assemblage that reflects the shallow limestone soils with species such as *Calothamnus quadrifidus*, *Allocasuarina humilis*, *Hibbertia hypericoides*, *Jacksonia stricta*, *Hakea trifurcata* and *Dryandra lindleyana*.

Calothamnus quadrifidus mixed Heath

The *Calothamnus quadrifidus* mixed Heath vegetation association occurs on very shallow sand over limestone situated between areas of outcropping limestone with Parrot Bush and *Banksia* woodlands on deeper sands. Other common shrub species in this unit are *Hakea trifurcata*, *Hibbertia hypericoides*, *Hakea prostrata*, and *Xanthorrhoea preissii*.

Dryandra sessilis (Parrot Bush) Closed Scrub (Q4, Q9)

Areas of outcropping limestone with some sand at the surface as well contain dense stands of Parrot Bush (*Dryandra sessilis*) between 1-1.5m high. Areas of Parrot Bush are mostly located in the western half and central hilly portion of the site. Other common species in unburnt sections of Parrot Bush include *Hibbertia hypercoides*, *Calothamnus quadrifidus*, *Jacksonia stricta*, and *Xanthorrhoea preissii*. Some of the western portion of the site is recovering from a fire in recent years and *Acacia pulchella* is abundant in these areas.

Melaleuca huegelii Low Open Shrubland (Q8)

Four small pockets of *Melaleuca huegelii* Low Open Shrubland occur on the tops of low hills which have limestone outcropping and very little surface sand. The western stands are all recovering from a recent fire. The height of the *Melaleuca huegelii* shrubs pre-fire was around 1.5m and about 70% cover. The height at the time of the 2004 survey was about 0.3m and only 10% cover. *Acacia pulchella* was very abundant which appears to be a result of the fire. Several limestone indicator species were commonly found only in these stands and include *Acacia truncata*, *Grevillea preissii*, *Templetonia retusa*, *Scaevola holosericea*, and *Stylidium junceum*.

Eucalyptus decipiens Low Woodland (Q3)

Two small stands of Redheart (*Eucalyptus decipiens*) were recorded on shallow sand over limestone. One stand was located on the northern flank of the central hill area and the second on part of the western limestone soils.

The *Eucalyptus decipiens* trees are up to 6-7m high over an understorey containing an assemblage of shrubs indicating the shallow limestone soils such as *Dryandra sessilis*, *Acacia pulchella*, *Xanthorrhoea preissii*, *Hibbertia hypericoides*, and *Hakea trifurcata*.

Vegetation of the Quindalup Dune System*Melaleuca systema* Low Open Shrubland over *Lomandra maritima* Herbland (Q6)

The main vegetation association found on the parabolic arm section of the Quindalup dunes is a *Melaleuca systema* (formerly *M. acerosa*) Low Open Shrubland up to 0.5m high over an open very low understorey with *Lomandra maritima* very common. Other common species in this vegetation association include *Conostylis candicans*, *Lepidosperma angustatum*, *Podotheca angustifolia*, *Acanthocarpus preissii* and *Hardenbergia comptoniana*.

Acacia cochlearis/ *Melaleuca systema* Low Shrubland

This vegetation association is very similar to the *Melaleuca systema* Low Open Shrubland over *Lomandra maritima* Herbland except that it also contains *Acacia cochlearis* up to 1m as a dominant species. In places, *Anthocercis littorea* dominates up to 1.5m over the low shrubs.

Acacia rostellifera Closed Heath to Closed Scrub (Q5)

A large stand (about 8ha) of *Acacia rostellifera* Closed Heath to Closed Scrub occurs in the central northern part of the site. The *Acacia* shrubs are up to 1.5-3m high and mostly very dense, resulting in a species poor understorey. Other species commonly found in this vegetation type are mostly weed species such as *Lolium perenne*, *Bromus diandrus*, *Lagurus ovatus*, *Galium murale* and *Anagallis arvensis*. Native shrubs that occur occasionally include *Melaleuca systema*, *Desmocladus flexuosus*, and *Acanthocarpus preissii*, *Acacia lasiocarpa*, *Pimelea ferruginea*, *Lepidosperma angustatum* and *Lepidosperma gladiatum*.

Acacia saligna/*Xanthorrhoea preissii* Open Shrubland

The bowl section of the parabolic dune is in a degraded condition and contains an Open Shrubland with *Acacia saligna* and *Xanthorrhoea preissii* the most common species. The species associated with this unit and surrounding cleared areas include pasture grasses and clovers.

4.3 Vegetation Condition

The condition of the vegetation was assessed according to the condition rating scale of Bush Forever (Government of WA, 2000) as shown in the following table.

TABLE 2
VEGETATION CONDITION RATING SCALE

VEGETATION CONDITION RATING SCALE (Government of WA, 2002)	
P	Pristine Pristine or nearly so, no obvious signs of disturbance
Ex	Excellent Vegetation structure intact, disturbance affecting individual species and weeds are non aggressive species
VG	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.
G	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.
Deg	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 very aggressive weeds, partial clearing, dieback and grazing.
CD	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 composing weed or crop species with isolated native trees or shrubs.
C	Cleared The area is totally devoid of native vegetation.

The vegetation over most of the site is considered to be in Excellent condition according to the vegetation condition rating scale. The excellent condition is due to a large extent by the dense limestone vegetation which inhibits understorey weed growth, the low density of tracks through the site and a presumed low frequency of fires. There was no evidence of Jarrah Dieback occurring on the site.

Areas with some significant levels of disturbance are:

- The southern Tuart woodland which is in Good to Very Good condition with a partially cleared and weedy understorey as a result of grazing and vehicle movement.
- A 200m strip adjacent to the eastern boundary which has been cleared and partially cleared of native vegetation. This area is rated as being predominantly in Completely Degraded to Degraded condition with some better quality vegetation on limestone soils.
- The north-western bowl of the parabolic Quindalup dune which is in Degraded to Completely Degraded condition as a result of clearing for grazing purposes.

4.4 Floristic Community Types

The vegetation on the southern Swan Coastal Plain can also be classified into Floristic Community Types (FCT) according to its floristic composition rather than being based on soil and landforms such as with vegetation complexes. This classification of FCTs was initiated by the work of Gibson *et al.* (1994) and has been augmented in various subsequent studies. To date a total of 66 Floristic Community Types have been identified on the southern Swan Coastal Plain.

Using the data from the 10m x 10m quadrat and referencing the species to the tables contained in Gibson *et al.*, (1994) the vegetation in the proposed alignment is inferred as corresponding most closely with the following Floristic Community Types:

FCT 24 (northern Spearwood shrublands and woodlands)

FCT 28 (Spearwood *Banksia attenuata* or *B. menziesii* – *Eucalyptus* woodlands)

FCT 29b (*Acacia* shrublands on taller Quindalup dunes)

The allocation of vegetation associations to FCTs is shown in the following table.

Vegetation Association	Floristic Community Type
<i>Eucalyptus gomphocephala</i> (Tuart) Woodland	28
<i>Eucalyptus marginata</i> (Jarrah) Woodland	28
<i>Banksia attenuata</i> / <i>Banksia menziesii</i> Low Woodland	28
<i>Banksia attenuata</i> Low Open Woodland over <i>Calothamnus quadrifidus</i> Heath	28
<i>Calothamnus quadrifidus</i> mixed Heath	24
<i>Dryandra sessilis</i> (Parrot Bush) Closed Scrub	24
<i>Melaleuca huegelii</i> Low Open Shrubland	24

Vegetation Association	Floristic Community Type
<i>Eucalyptus decipiens</i> Low Woodland	24
<i>Melaleuca systema</i> Low Open Shrubland over <i>Lomandra maritima</i> Herbland	29b
<i>Acacia cochlearis</i> / <i>Melaleuca systema</i> Low Shrubland	29b
<i>Acacia rostellifera</i> Closed Heath to Closed Scrub	29b
<i>Acacia saligna</i> / <i>Xanthorrhoea preissii</i> Open Shrubland	29b

None of these FCTs is a Threatened Ecological Community (TEC) at the State or Commonwealth level. The two small areas of limestone heath vegetation with *Melaleuca huegelii* present are similar to FCT26a which is a TEC at the State level. FCT 26a is usually confined to massive limestone ridges although it has also been found on smaller limestone outcrops in the Wanneroo area. The areas containing *Melaleuca huegelii* on Lot 3 do not contain the other characteristic species of this FCT, *Melaleuca systema* (formerly *M. acerosa*). Keighery *et al.* (1997) also recorded similar *Melaleuca huegelii* dominated vegetation in Neerabup National Park which they concluded was FCT 24 rather than FCT 26a.

5. FLORA

A total of 185 plant species have been recorded on the property in the winter 1996 Woodward-Clyde survey and the spring 2004 ATA Environmental survey (Appendix 1). The list includes 149 native species and 36 introduced species.

The most common plant families represented in the list are the Proteaceae (21 species), Asteraceae (Daisy family – 16 species including 6 introduced), Poaceae (Grass family – 16 species, including 11 introduced) the Papilionaceae (Pea family – 14 species, including 4 introduced) and the Myrtaceae (10 species).

Eleven 10mx10m quadrats were recorded in the spring 2004 survey. The quadrat data are shown in Appendix 2 and quadrat locations shown in Figure 2.

The timing of the 2004 spring survey appeared optimal to identify ephemeral species as indicated by the number of orchid species (Orchidaceae – seven species) and daisies (Asteraceae – 16 species).

The following species are listed by CALM as occurring in the vicinity of Lot 3.

<i>Eucalyptus argutifolia</i>	DRF
<i>Acacia benthamii</i>	P2
<i>Conostephium minus</i>	P4
<i>Conostylis pauciflora</i> ssp. <i>euryhipis</i>	P3
<i>Grevillea evanescens</i>	P1
<i>Hibbertia spicata</i> ssp. <i>leptotheca</i>	P3
<i>Jacksonia sericea</i>	P3
<i>Lepidium pseudotasmanicum</i>	P4
<i>Melaleuca</i> sp. Yanchep (GJ Keighery 11242)	P2
<i>Thomasia triloba</i>	P3

The Declared Rare Flora (DRF) species *Eucalyptus argutifolia* was not recorded on the site. *Eucalyptus argutifolia* normally occurs on tall limestone ridges which are absent from the site. The species is readily identifiable at any time of the year and would have been recorded if present during both surveys. One Priority 3 species, *Conostylis pauciflora* ssp. *euryhipis*, was recorded on the site.

Conostylis pauciflora ssp. *euryhipis* (Haemodoraceae)

Priority 3 species are species which are known from several populations, and the species is not believed to be under immediate threat. Such species are under consideration for declaration as rare flora but are in urgent need of further survey. On the property this species was found commonly occurring on the ridge top of the parabolic dune with *Melaleuca systema* Low Open Shrubland over *Lomandra maritima* Herbland.

The following species recorded on the site are listed as significant in Bush Forever.

Grevillea preissii (Proteaceae)

Listed in Bush Forever as significant due to it being a limestone endemic species. On the property this species occurs in the two small stands of *Melaleuca huegelii*/*Acacia pulchella* Heath on limestone outcrops. This species is also found in Neerabup National Park

Lechenaultia linarioides (Goodeniaceae)

Considered in Bush Forever to be poorly reserved although not a DRF or Priority species. On the property this species was recorded in a range of habitats including the southern Tuart woodland and in Parrot Bush heath on limestone soils. This species is also found in Neerabup National Park.

Conospermum triplinervium (Proteaceae)

Considered in Bush Forever to be a significant species and poorly reserved although not a DRF or Priority species. On the property this species was recorded as only a few individuals near the southern boundary in limestone heath vegetation. This species is also found in Neerabup National Park.

Petrophile serruriae (Proteaceae) subsp. nov.

Considered in Bush Forever to be a poorly reserved species, although not a DRF or Priority species, and at the northern extent of its distribution. This pink flowered unnamed subspecies occurs on limestone ridges from Cervantes to Bunbury on the coastal plain. On the property this species was recorded fairly commonly in Parrot Bush vegetation on limestone soils. This species is also found in Neerabup National Park

The following species are listed in Keighery *et al.* (1997) (Floristics of Neerabup National Park) as being significant flora species of particular interest.

Persoonia comata (Proteaceae)

Identified in Keighery *et al.* (1997) as significant due to it being at the southern end of its range in Neerabup National Park. On the property this species was recorded in low numbers in the northern Tuart stand and the adjacent *Banksia* woodland.

Stylidium junceum

Identified in Keighery *et al.* (1997) as a distinct variant of this species which grows on limestone ridges from Yalgorup to Cliff Head. On the property this species was recorded occasionally in Parrot Bush vegetation on limestone soils

Acacia lasiocarpa (Mimosaceae)

Listed in Keighery *et al.* (1997) as a significant species but not elaborated as to the reasons why. This species commonly occurs on the property on the parabolic dune ridges.

6. CONSERVATION SIGNIFICANCE OF THE VEGETATION AND FLORA

The vegetation on Lot 3 Romeo Road is mostly in Excellent condition with minimal disturbance such as weed invasion. However, Lot 3 has not been identified in Bush Forever as being of regional significance requiring protection.

The main vegetation and flora criteria used in Bush Forever to determine regional significance were

- representation of ecological communities; and
- rarity.

The application of these criteria to Lot 3 using the results of the flora and vegetation survey in this report follows:

6.1 Representation of Ecological Communities

The study area comprises vegetation representative of the Cottesloe – Central and South Vegetation Complex and Quindalup Vegetation Complex. According to Bush Forever (Government of WA, 2000), the Cottesloe – Central and South Complex is adequately reserved with approximately 19% of its original extent on the Swan Coastal Plain portion of the Perth Metropolitan Region proposed to be protected through the implementation of Bush Forever. The target level of protection in Bush Forever is a minimum of 10% in at least five geographically separate areas. In the vicinity of Lot 3, the Cottesloe – Central and South Vegetation Complex is well reserved in Neerabup National Park which abuts the eastern side of the site. The Quindalup Complex is proposed to have 21% of its original extent protected by Bush Forever. In the vicinity of Lot 3, the Quindalup Complex is currently reserved in Bush Forever site 289 (Ningana Regional Open Space) about 6km to the north of the lot, and site 322 (Burns Beach Bushland) about 7km to the south-west of the site. The northern reserve (site 289) contains elements of parabolic dune vegetation similar to the Quindalup vegetation on the site.

The study area also comprises vegetation representative of FCTs 24, 28 and 29b which are all not listed as Threatened Ecological Communities at the state or Commonwealth level. FCTs 24 and 28 both occur in abundance in Neerabup National Park and FCT29b occurs commonly in the western half of the Ningana Regional Open Space and Burns Beach Bushland.

The lot contains two stands of Tuart trees. The significance of Tuart communities has increased in recent years with the culmination of the draft Tuart Conservation and Management Strategy prepared in October 2004 by the Tuart Response Group on behalf of the Government of Western Australia. The draft Strategy recognises the values of Tuart woodlands for their biodiversity functions as well as their landscape, cultural, social and economic reasons. According to the Status report on Tuart Conservation and Protection (Tuart Response Group, 2002), the Tuart woodlands on the site belong to the category of “Medium Woodland:Tuart” which originally extended from Yanchep to south of Bunbury. The Status Report estimates that of the

original 51,575ha of this Tuart ecosystem type, approximately 38.3% remains of which 10% is currently protected in reserves. Using the 10% protection level as target for protection, the Medium Woodland:Tuart ecosystem type just meets the minimum target level for protection. Accordingly, the future urban development of Lot 3 should attempt to retain some intact Tuart woodland in Public Open Space.

6.2 Rarity

No Declared Rare Flora were identified on the lot during the two surveys. One Priority species and several significant species listed in Bush Forever were recorded. There is currently no statutory protection for Priority listed flora or other lists of flora species considered significant in Bush forever or other reports. As far as we are aware the Environmental Protection Authority has not rejected any proposals on the grounds that significant (but not DRF or Priority) species will be affected.

All but one of the eight species listed as significant either in Bush Forever or Keighery *et al.* (1997) have been recorded in Neerabup National Park. The remaining species, *Conostylis pauciflora* ssp *euryhipis* has been recorded as widespread in Quindalup dunes in the Alkimos-Eglinton area including the Ningana Regional Open Space. The lot, therefore, does not have any particular species of significance that only occurs in that location.

7. SUMMARY

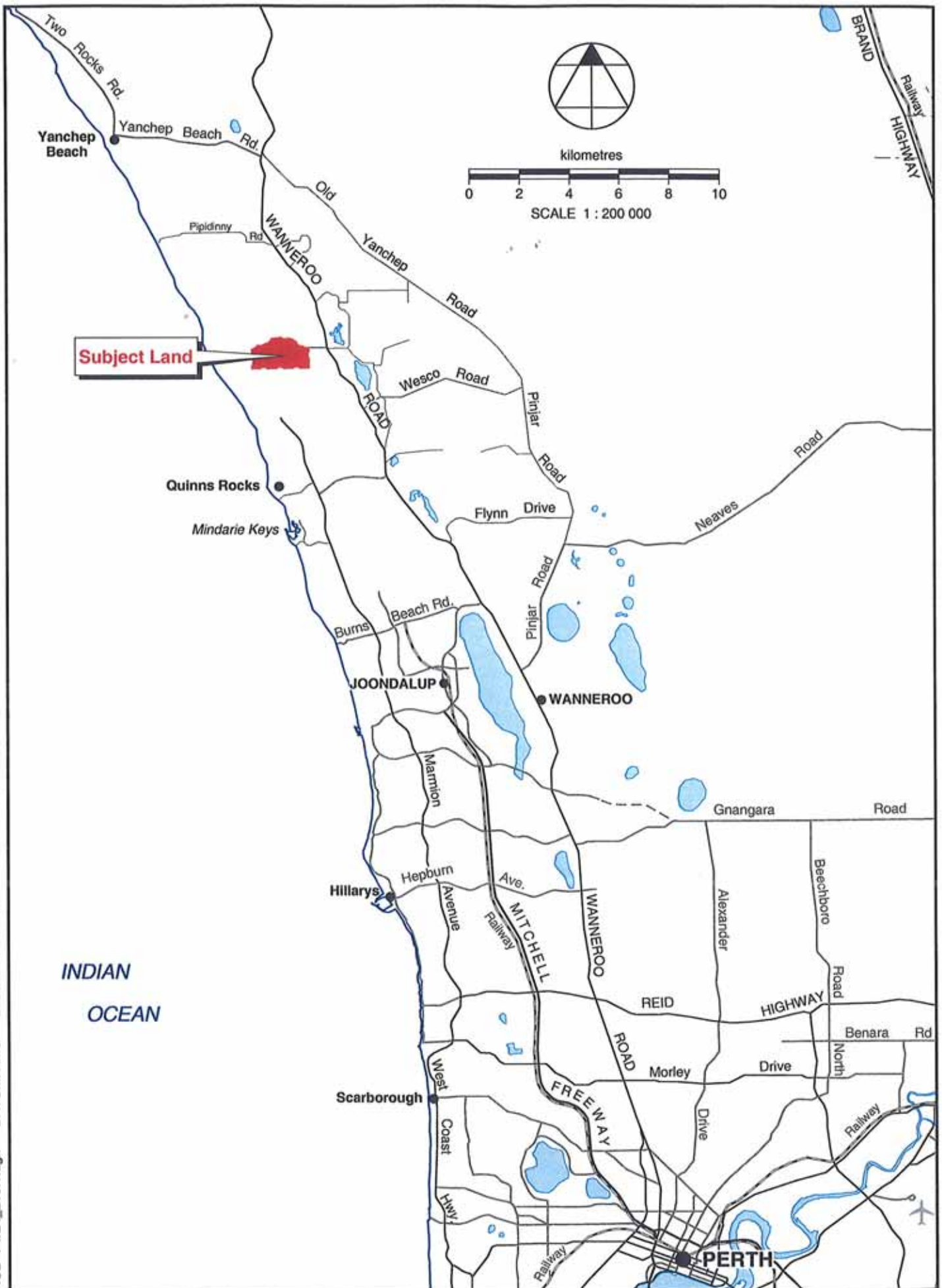
This flora and vegetation report for Lot 3 Romeo Road, Alkimos, has shown that:

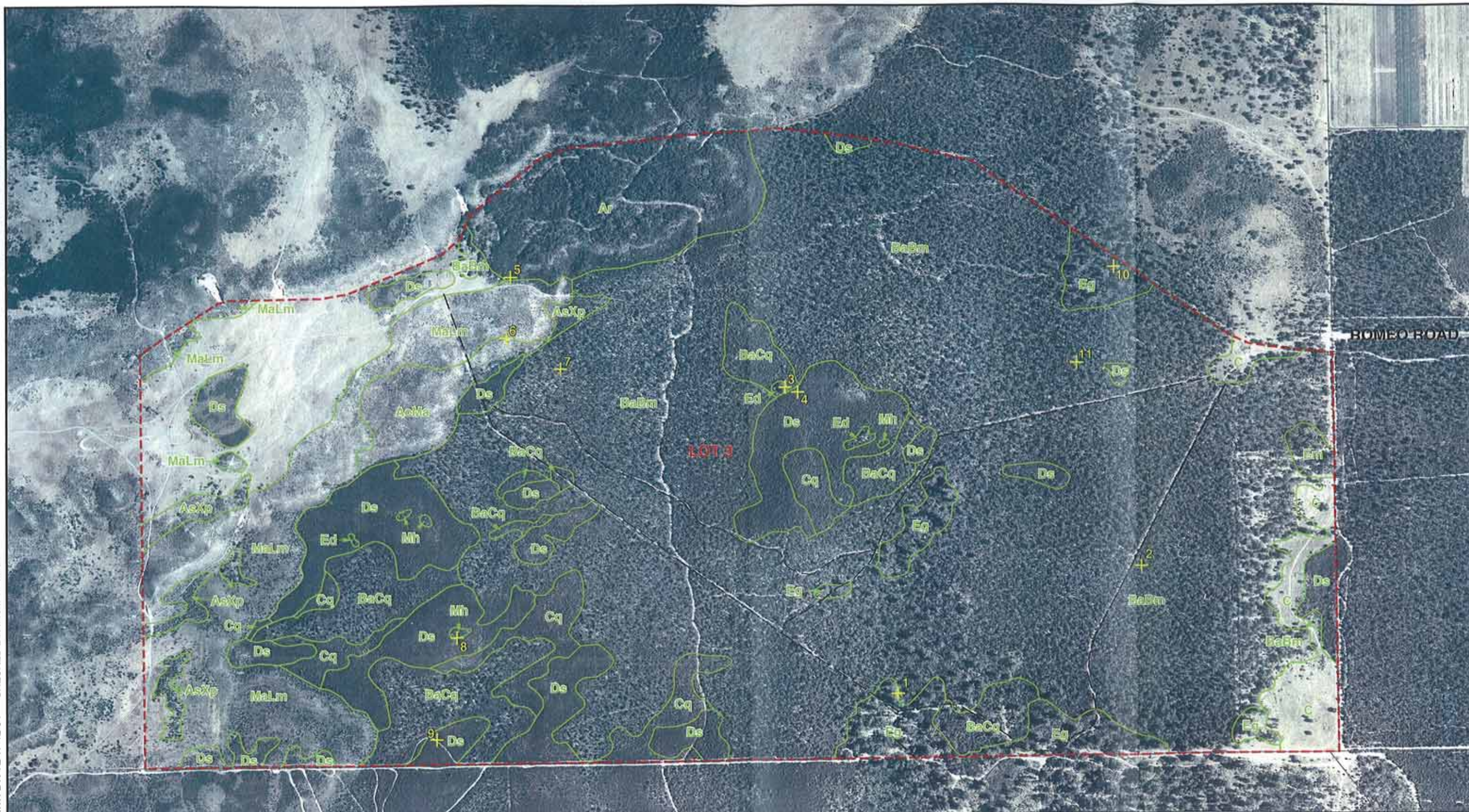
- The lot contains vegetation predominantly in Excellent condition with some areas that have been completely degraded and some areas where the understorey has been affected by partial clearing and weed-infestation.
- The lot contains vegetation representative of the Cottesloe – Central and South Vegetation Complex on Spearwood Dune soils and a portion of Quindalup Vegetation Complex on Quindalup Dune soils in the western part.
- Twelve vegetation associations are described and mapped on the site.
- The 12 vegetation associations belong to three Floristic Community Types (24, 28 and 29b). None of the Floristic Community Types is a Threatened Ecological Community.
- The areas containing good quality Tuart woodland vegetation should be considered for retention in Public Open Space in the future urban development.
- A total of 185 plant species was recorded for the site over two separate flora surveys in winter 1996 and spring 2004. This total included 149 native species and 36 introduced species.
- No Declared Rare Flora were recorded on the site.
- One Priority 3 species, *Conostylis pauciflora* ssp *euryhipis* was recorded as common on the Quindalup dune soils.
- Four other species listed as significant in Bush Forever and three species listed as significant in Keighery *et al.* (1997) were recorded on the lot. All species are found in Neerabup National Park or nearby Regional Open Space reserves.

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FIGURES





VEGETATION LEGEND

Eg	<i>Eucalyptus gomphocephala</i> (Tuart) Woodland
Em	<i>Eucalyptus marginata</i> (Jarrah) Woodland
BaBm	<i>Banksia attenuata</i> / <i>Banksia menziesii</i> Low Woodland
BaCq	<i>Banksia attenuata</i> Low Open Woodland over <i>Calothamnus quadrifidus</i> Heath
Cq	<i>Calothamnus quadrifidus</i> mixed Heath
Ds	<i>Dryandra sessilis</i> (Parrot Bush) Closed Scrub
Mh	<i>Melaleuca huegelii</i> Low Open Shrubland
Ed	<i>Eucalyptus decipiens</i> Low Woodland
MaLm	<i>Melaleuca systema</i> Low Open Shrubland over <i>Lomandra maritima</i> Herbland
AcMa	<i>Acacia cochlearis</i> / <i>Melaleuca systema</i> Low Shrubland
Ar	<i>Acacia rostellifera</i> Closed Heath to Closed Scrub
AsXp	<i>Acacia saligna</i> / <i>Xanthorrhoea pressii</i> Open Shrubland
C	Cleared

LEGEND

---	Track
- - -	Property Boundary
---	Vegetation Unit Boundary
+1	Plot Locations



APPENDIX 1

FLORA LIST

FLORA LIST
LOT 3 ROMEO ROAD

***Introduced Species**

GYMNOSPERMAE

CYCADACEAE

Macrozamia fraseri

MONOCOTYLEDONAE

ANTHERICACEAE

Corynotheca micrantha

Laxmannia squarrosa

Sowerbaea laxiflora

Thyssonatus arenarius

Thysanotus patersonii

Thysanotus triandrus

Tricoryne elatior

COLCHICACEAE

Burchardia umbellata

CYPERACEAE

Isolepis cernua

Isolepis ?marginata

Lepidosperma angustatum

Lepidosperma squamatum

Lepidosperma gladiatum

Lepidosperma leptostachyum

Mesomelaena pseudostygia

Schoenus grandiflorus

DASYPOGONACEAE

Acanthocarpus preissii

Lomandra hermaphrodita

Lomandra maritima

Lomandra preissii

HAEMODORACEAE

Anigozanthos humilis

Conostylis aculeata

Conostylis candicans

Conostylis pauciflora ssp. euryhipis

Conostylis setigera

Haemodorum paniculatum

IRIDACEAE

**Gladiolus caryophyllaceus*

Orthrosanthos laxus

**Romulea rosea*

ORCHIDACEAE

Caladenia deformis

Caladenia flava

Caladenia longicauda

Elythranthera brunonis

Microtis media

Pterostylis vittata

Pyrorchis nigricans

POACEAE

**Aira caryophyllea*

Austrostipa flavescens

Austrostipa semibarbata

**Avena fatua*

**Briza maxima*

**Briza minor*

**Bromus diandrus*

**Ehrharta calycina*

**Ehrharta longiflora*

**Lagurus ovatus*

**Lolium perenne*

Microlaena stipoides

Neurachne alopecuroides

**Piptatherum sp.*

Poa porphyroclados

**Vulpia membranacea*

PHORMIACEAE

Dianella divaricata

RESTIONACEAE

Alexgeorgea nitens

Desmocladius flexuosus

Lyginia barbata

Schoenus curvifolius

XANTHORRHOEACEAE

Xanthorrhoea brunonis

Xanthorrhoea preissii

DICOTYLEDONAE

AIZOACEAE

**Carpobrotus edulis*

APIACEAE

Eryngium rostratum
Homalosciadium homalocarpum
Trachymene pilosa
Xanthosia huegelii

ASTERACEAE

**Cotula turbinata*
**Arctotheca calendula*
**Conyza bonariensis*
**Hypochaeris glabra*
Lagenophora huegelii
Millotia myosotidifolia
Olearia axillaris
Podolepis lessonii
Podotheca angustifolia
Podotheca chrysantha
Podotheca gnaphalioides
Quinetia urvillei
Siloxerus humifusus
**Sonchus oleraceus*
Waitzia suaveolens
**Ursinia anthemoides*

BRASSICACEAE

**Heliophila pusilla*

CAMPANULACEAE

**Wahlenbergia capensis*
Wahlenbergia preissii

CARYOPHYLLACEAE

**Petrorhagia dubius*

CASUARINACEAE

Allocasuarina fraseriana
Allocasuarina humilis

CHENOPODIACEAE

Rhagodia baccata

CRASSULACEAE

**Crassula colorata*
**Crassula glomerata*

DILLENACEAE

Hibbertia hypericoides
Hibbertia racemosa

DROSERACEAE

Drosera erythrorhiza
Drosera macrantha

EPACRIDACEAE

Brachyloma preissi
Conostephium pendulum
Leucopogon parviflorus
Leucopogon polymorphus
Leucopogon propinquus
Leucopogon sprengelioides

EUPHORBIACEAE

**Euphorbia terracina*
Phyllanthus calycinus

GERANIACEAE

**Erodium moschatum*
**Pelargonium capitatum*

GOODENIACEAE

Lechenaultia linarioides
Scaevola canescens
Scaevola holosericea
Scaevola thesioides

LAURACEAE

Cassytha glabella

LOBELIACEAE

Isotoma hypocrateriformis

LORANTHACEAE

Nuytsia floribunda

MIMOSACEAE

Acacia cochlearis
Acacia cyclops
Acacia lasiocarpa
Acacia pulchella
Acacia rostellifera
Acacia saligna
Acacia truncata

MYOPORACEAE

Eremophila glabra

MYRTACEAE

Calothamnus quadrifidus

Calythrix sp.

Eucalyptus decipiens

Eucalyptus gomphocephala

Eucalyptus marginata

Eucalyptus tottiana

Kunzea ericifolia (one plant only)

Leptospermum spinescens

Melaleuca huegelii

Melaleuca systema

OROBANCHACEAE

**Orobanche minor*

PAPILIONACEAE

Bossiaea eriocarpa

Daviesia decurrens

Gastrolobium capitatum

Hardenbergia comptoniana

Hovea trisperma

Jacksonia sternbergiana

Jacksonia stricta

Kennedia prostrata

**Lupinus cosentinii*

**Meliolotus indica*

Sphaerolobium medium

Templetonia retusa

**Trifolium campestre*

**Trifolium arvense*

POLYGALACEAE

Comesperma calymega

PORTULACACEAE

Calandrinia liniflora

PRIMULACEAE

**Anagallis arvensis*

PROTEACEAE

Banksia attenuata

Banksia grandis

Banksia menziesii

Conospermum triplinervium

Dryandra lindleyana

Dryandra sessilis

Grevillea preissii

Grevillea vestita

Hakea costata

Hakea lissocarpha

Hakea prostrata

Hakea ruscifolia

Hakea trifurcata

Persoonia comata

Petrophile brevifolia

Petrophile linearis

Petrophile macrostachya

Petrophile serruriae

Petrophile striata

Stirlingia latifolia

Synaphea spinulosa

RUBIACEAE

**Galium murale*

Opercularia vaginata

RHAMNACEAE

Cryptandra pungens

Spyridium globulosum

Trymalium ledifolium

SOLANACEAE

Anthocercis littorea

**Solanum linearifolium*

**Solanum nigrum*

STACKHOUSIACEAE

Stockhousia huegelii

STYLIDIACEAE

Levenhookia stipitata

Stylidium amoenum

Stylidium brunonianum

Stylidium junceum

Stylidium piliferum

THYMELEACEAE

Pimelea ferruginea

Pimelea leucantha

VIOLACEAE

Hybanthus calycinus

APPENDIX 2

QUADRAT DATA

QUADRAT Q1

Vegetation Association: *Eucalyptus gomphocephala* Open Woodland over *Banksia attenuata*/*B.menziesii* Low Open Woodland

Coordinates (MGA84): 376709, 6499824

Soil: Orange-Brown Sand



QUADRAT Q1 (10x10m)

SPECIES	HEIGHT (M)	% COVER
<i>Eucalyptus gomphocephala</i>	12	20
<i>Banksia menziesii</i>	6	5
<i>Banksia attenuata</i>	6	10
<i>Jacksonia sternbergiana</i>	2	<1
<i>Xanthorrhoea preissii</i>	1	10
<i>Austrostipa semibarbata</i>	0.6	<1
* <i>Bromus diandrus</i>	0.5	<1
<i>Dianella revoluta</i>	0.5	<1
* <i>Ehrharta longiflora</i>	0.5	<1
<i>Hakea lissocarpha</i>	0.5	<1
<i>Lechenaultia linarioides</i>	0.5	<1
<i>Leucopogon propinquus</i>	0.5	<1
<i>Hibbertia hypericoides</i>	0.4	20
* <i>Carpobrotus edulis</i>	0.4	<1
<i>Phyllanthus calycinus</i>	0.4	<1
<i>Corynotheca micrantha</i>	0.3	<1
<i>Eryngium rostratum</i>	0.3	<1
<i>Mesomelaena pseudostygia</i>	0.3	<1

SPECIES	HEIGHT (M)	% COVER
<i>Sowerbaea laxiflora</i>	0.3	<1
* <i>Avena fatua</i>	0.2	<1
* <i>Ursinia anthemoides</i>	0.2	<1
* <i>Anagallis arvensis</i>	0.1	20
* <i>Trifolium campestre</i>	0.1	20
<i>Xanthosia huegelii</i>	0.1	10
<i>Acanthocarpus preissii</i>	0.1	<1
* <i>Briza maxima</i>	0.1	<1
* <i>Briza minor</i>	0.1	<1
<i>Desmocladius flexuosus</i>	0.1	<1
* <i>Hypochaeris glabra</i>	<0.1	<1
<i>Millotia myosotidifolia</i>	0.1	<1
* <i>Orobancha minor</i>	0.1	<1
* <i>Sonchus oleraceus</i>	0.1	<1
* <i>Trifolium arvense</i>	0.1	<1

QUADRAT Q2

Vegetation Association: *Banksia attenuata*/*B. menziesii* Low Open Woodland

Coordinates (MGA84): 377169, 6500064

Soil: Light Yellow Sand



QUADRAT Q2 (10x10m)

SPECIES	HEIGHT (M)	% COVER
<i>Banksia attenuata</i>	6	20
<i>Banksia menziesii</i>	6	20
<i>Nuytsia floribunda</i>	6	10
<i>Xanthorrhoea preissii</i>	2	<1
<i>Hibbertia hypericoides</i>	1	30
<i>Macrozamia fraseri</i>	1	<1
* <i>Gladiolus caryophyllaceus</i>	0.6	<1
<i>Leucopogon propinquus</i>	0.6	<1
<i>Petrophile macrostachya</i>	0.5	<1
<i>Leptospermum spinescens</i>	0.4	<1
<i>Burchardia umbellata</i>	0.3	<1
<i>Caladenia flava</i>	0.2	<1
* <i>Petrorhagia dubius</i>	0.2	<1
<i>Stylidium piliferum</i>	0.2	<1
* <i>Ursinia anthemoides</i>	0.2	<1
* <i>Erodium moschatum</i>	0.1	10
* <i>Hypochaeris glabra</i>	<0.1	10

SPECIES	HEIGHT (M)	% COVER
* <i>Anagallis arvensis</i>	0.1	>1
* <i>Briza minor</i>	0.1	<1
* <i>Bromus diandrus</i>	0.1	<1
<i>Desmocladius flexuosus</i>	0.1	<1
* <i>Heliophila pusilla</i>	0.1	<1
<i>Stylidium calcaratum</i>	0.1	<1
<i>Trachymene pilosa</i>	0.1	<1
* <i>Trifolium campestre</i>	0.1	<1
* <i>Trifolium arvense</i>	0.1	<1
<i>Xanthosia huegelii</i>		15
* <i>Briza maxima</i>		<1
* <i>Ehrharta calycina</i>		<1
<i>Mesomelaena pseudostygia</i>		<1
<i>Podotheca angustifolia</i>		<1
* <i>Sonchus oleraceus</i>		<1

QUADRAT Q3

Vegetation Association: *Eucalyptus decipiens* Open Woodland over *Xanthorrhoea preissii*/*Hibbertia hypericoides* Heath

Coordinates (MGA84): 376499, 650039

Soil: Orange-Brown Sand over Shallow Limestone



QUADRAT Q3 (10x10m)

SPECIES	HEIGHT (M)	% COVER
<i>Eucalyptus decipiens</i>	6	20
<i>Acacia pulchella</i>	1.5	10
<i>Xanthorrhoea preissii</i>	1.5	10
<i>Hibbertia hypericoides</i>	0.6	40
<i>Dryandra sessilis</i>	0.6	5
* <i>Gladiolus caryophyllaceus</i>	0.6	<1
<i>Phyllanthus calycinus</i>	0.6	<1
<i>Spyridium globulosum</i>	0.6	<1
<i>Lepidosperma squamatum</i>	0.4	<1
<i>Burchardia umbellata</i>	0.3	<1
<i>Melaleuca systena</i>	0.3	<1
<i>Mesomelaena pseudostygia</i>	0.3	<1
<i>Poa porphyroclados</i>	0.3	<1
<i>Conostylis aculeata</i>	0.2	<1
<i>Hovea trisperma</i>	0.2	<1
<i>Leucopogon propinquus</i>	0.2	<1

SPECIES	HEIGHT (M)	% COVER
<i>Podotheca angustifolia</i>	0.2	<1
* <i>Ursinia anthemoides</i>	0.2	<1
* <i>Anagallis arvensis</i>	0.1	<1
* <i>Briza maxima</i>	0.1	<1
<i>Desmocladus flexuosus</i>	0.1	<1
* <i>Hypochaeris glabra</i>	<0.1	<1
<i>Isolepis cernua</i>	<0.1	<1
<i>Lagenophora huegelii</i>	<0.1	<1
<i>Trachymene pilosa</i>	0.1	<1
<i>Xanthosia huegelii</i>	0.1	<1
<i>Hardenbergia comptoniana</i>	creeper	<1

QUADRAT Q4

Vegetation Association: *Dryandra sessilis*/*Calothamnus quadrifidus* Heath

Coordinates (MGA84): 376523, 6500390

Soil: Orange-Brown Sand over Limestone



QUADRAT Q4 (10x10m)

SPECIES	HEIGHT (M)	% COVER
<i>Dryandra sessilis</i>	1-1.5	20
<i>Hakea trifurcata</i>	1.5	5
<i>Hibbertia hypericoides</i>	0.5	60
<i>Calothamnus quadrifidus</i>	0.5	20
<i>Acacia pulchella</i>	0.4	<1
<i>Austrostipa flavescens</i>	0.4	<1
* <i>Gladiolus caryophyllaceus</i>	0.4	<1
<i>Spyridium globulosum</i>	0.4	<1
<i>Burchardia umbellata</i>	0.3	<1
<i>Lomandra hermaphrodita</i>	0.3	<1
<i>Melaleuca systena</i>	0.3	<1
<i>Mesomelaena pseudostygia</i>	0.3	<1
* <i>Briza maxima</i>	0.2	<1
<i>Conostylis aculeata</i>	0.2	<1
<i>Desmocladus flexuosus</i>	0.2	<1
<i>Orthrosanthos laxus</i>	0.2	<1
<i>Pterostylis vittata</i>	0.2	<1
* <i>Ursinia anthemoides</i>	0.2	<1

SPECIES	HEIGHT (M)	% COVER
<i>Acanthocarpus preissii</i>	0.1	<1
* <i>Aira caryophyllea</i>	0.1	<1
* <i>Anagallis arvensis</i>	0.1	<1
* <i>Briza minor</i>	0.1	<1
<i>Dryandra lindleyana</i>	0.1	<1
<i>Siloxerus humifusus</i>	0.1	<1
<i>Trachymene pilosa</i>	0.1	<1
* <i>Vulpia membranacea</i>	0.1	<1
<i>Caladrinia liniflora</i>	<0.1	<1
* <i>Hypochaeris glabra</i>	<0.1	<1
<i>Isolepis cernua</i>	<0.1	<1

QUADRAT Q5

Vegetation Association: *Acacia rostellifera* Scrub

Coordinates (MGA84): 375982, 6500606

Soil: Light Brown Sand



QUADRAT Q5 (10x10m)

SPECIES	HEIGHT (M)	% COVER
* <i>Bromus diandrus</i>	0.4	20
* <i>Ehrharta longiflora</i>	0.4	<1
<i>Spyridium globulosum</i>	0.4	<1
* <i>Lolium perenne</i>	0.3	90
* <i>Solanum linearifolium</i>	0.3	<1
* <i>Lagurus ovatus</i>	0.2	20
* <i>Anagallis arvensis</i>	0.2	<1
* <i>Galium murale</i>	<0.1	<1
* <i>Hypochaeris glabra</i>	<0.1	<1
<i>Acacia rostellifera</i>	1.5-2	80

QUADRAT Q6

Vegetation Association: *Melaleuca systema* Low Shrubland

Coordinates (MGA84): 375974, 6500492

Soil: White Sand



QUADRAT Q6 (10x10m)

SPECIES	HEIGHT (M)	% COVER
<i>Anthocercis littorea</i>	1.5	<1
<i>Acacia cochlearis</i>	1	<1
<i>Acacia saligna</i>	0.5	<1
<i>Melaleuca systema</i>	0.4	20
<i>Lomandra maritima</i>	0.3	10
<i>Austrostipa flavescens</i>	0.3	<1
<i>Eremophila glabra</i>	0.3	<1
<i>Olearia axillaris</i>	0.3	<1
<i>Phyllanthus calycinus</i>	0.3	<1
<i>Podothea corymbosa</i>	0.3	<1
<i>Conostylis candidans</i>	0.2	10
<i>Desmocladius flexuosus</i>	0.2	<1
<i>Isotoma hypocrateriformis</i>	0.2	<1
* <i>Lagurus ovatus</i>	0.2	<1
* <i>Lolium perenne</i>	0.2	<1
<i>Rhagodia baccata</i>	0.2	<1
<i>Scaevola thesioides</i>	0.2	<1
*? <i>Sagina</i>	0.1	10

SPECIES	HEIGHT (M)	% COVER
<i>Lepidosperma angustatum</i>	0.1	10
<i>Podotheca angustifolia</i>	0.1	10
<i>Acanthocarpus preissii</i>	0.1	<1
* <i>Anagallis arvensis</i>	0.1	<1
* <i>Bromus diandrus</i>	0.1	<1
<i>Crassula glomerata</i>	0.1	<1
<i>Crassula colorata</i>	0.1	<1
* <i>Heliophila pusilla</i>	0.1	<1
<i>Kennedia prostrata</i>	<0.1	<1
<i>Opercularia vaginata</i>	0.1	<1
<i>Cassytha glabella</i>	creeper	<1
<i>Hardenbergia comptoniana</i>	creeper	<1
<i>Thysanotus patersonii</i>	creeper	<1

QUADRAT Q7

Vegetation Association: *Banksia attenuata*/*B. menziesii* Low Open Woodland

Coordinates (MGA84): 375075, 6500434

Soil: Light Yellow Sand



QUADRAT Q7 (10x10m)

SPECIES	HEIGHT (M)	% COVER
<i>Banksia attenuata</i>	4	20
<i>Banksia menziesii</i>	4	10
<i>Macrozamia fraseri</i>	1	<1
<i>Xanthorrhoea preissii</i>	1	<1
<i>Hibbertia hypericoides</i>	0.4	10
<i>Austrostipa semibarbata</i>	0.4	<1
<i>Xanthorrhoea brunonis</i>	0.4	<1
<i>Acacia pulchella</i>	0.3	<1
<i>Burchardia umbellata</i>	0.3	<1
<i>*Gladolius caryophyllaceus</i>	0.3	<1
<i>Hakea lissocarpha</i>	0.3	<1
<i>Lepidosperma squamatum</i>	0.3	<1
<i>Leucopogon propinquus</i>	0.3	<1
<i>Mesomelaena pseudostygia</i>	0.3	<1
<i>Pimelea leucantha</i>	0.3	<1
<i>Stylidium brunonianum</i>	0.3	<1
<i>Synaphea spinulosus</i>	0.3	<1

SPECIES	HEIGHT (M)	% COVER
<i>Gompholobium tomentosum</i>	0.2	10
<i>Anigozanthos humilis</i>	0.2	<1
* <i>Briza maxima</i>	0.2	<1
<i>Conostylis aculeata</i>	0.2	<1
<i>Corynotheca micrantha</i>	0.2	<1
<i>Opercularia vaginata</i>	0.2	<1
<i>Petrophile brevifolia</i>	0.2	<1
* <i>Petrorhagia dubius</i>	0.2	<1
* <i>Ursinia anthemoides</i>	0.2	<1
* <i>Wahlenbergia preissii</i>	0.2	<1
<i>Lepidosperma angustatum</i>	0.1	10
* <i>Aira caryophyllea</i>	0.1	<1
<i>Alexgeorgea nitens</i>	0.1	<1
<i>Caladenia flava</i>	0.1	<1
* <i>Heliophila pusilla</i>	0.1	<1
* <i>Hypochaeris glabra</i>	<0.1	<1
<i>Lagenophora huegelii</i>	<0.1	<1
<i>Podotheca chrysantha</i>	0.1	<1
* <i>Romulea rosea</i>	0.1	<1
<i>Scaevola canescens</i>	0.1	<1
<i>Siloxerus humifusus</i>	0.1	<1
<i>Stylidium calcaratum</i>	0.1	<1
<i>Trachymene pilosa</i>	0.1	<1
* <i>Trifolium campestre</i>	0.1	<1
<i>Drosera macrantha</i>	creeper	<1
<i>Thysanotus patersonii</i>	creeper	<1

QUADRAT Q8

Vegetation Association: *Acacia pulchella*/*Melaleuca huegelii* Closed Heath
(regenerating after fire)

Coordinates (MGA84): 375879, 6499931

Soil: Shallow Orange-Brown Sand with Outcropping Limestone



QUADRAT Q8 (10x10m)

SPECIES	HEIGHT (M)	% COVER
<i>Acacia pulchella</i>	1	70
<i>Hakea trifurcata</i>	1	<1
<i>Xanthorrhoea preissii</i>	1	<1
<i>Acacia truncata</i>	0.5	10
<i>Dryandra sessilis</i>	0.4	<1
<i>Leucopogon parviflorus</i>	0.4	<1
<i>Spyridium globulosum</i>	0.4	<1
<i>Calothamnus quadrifidus</i>	0.3	<1
<i>Grevillea preissii</i>	0.3	<1
<i>Scaevola holosericea</i>	0.3	<1
* <i>Sonchus oleraceus</i>	0.3	<1
<i>Sphaerolobium medium</i>	0.3	<1
<i>Templetonia retusa</i>	0.3	<1
<i>Melaleuca huegelii</i>	0.3	10 (70% pre-fire)
<i>Bossiaea eriocarpa</i>	0.2	<1
<i>Lomandra maritima</i>	0.2	<1

SPECIES	HEIGHT (M)	% COVER
<i>Opercularia vaginata</i>	0.2	<1
* <i>Aira caryophylla</i>	0.1	<1
* <i>Anagallis arvensis</i>	0.1	<1
* <i>Carpobrotus edulis</i>	0.1	<1
<i>Crassula colorata</i>	0.1	<1
<i>Desmocladius flexuosus</i>	0.1	<1
<i>Lepidosperma angustatum</i>	0.1	<1
* <i>Pelargonium capitatum</i>	0.1	<1
<i>Trachymene pilosa</i>	0.1	<1
<i>Tricoryne elatior</i>	0.1	<1
* <i>Vulpia membranacea</i>	0.1	<1

QUADRAT Q9

Vegetation Association: *Dryandra sessilis*/*Acacia pulchella* Closed Heath
(recovering from fire)

Coordinates (MGA84): 375840, 6499739

Soil: Orange-Brown Soil with some Outcropping Limestone



QUADRAT Q9 (10x10m)

SPECIES	HEIGHT (M)	% COVER
<i>Acacia pulchella</i>	1.2	70
<i>Xanthorrhoea preissii</i>	1.2	5
<i>Dryandra sessilis</i>	1	20
<i>Hibbertia hypericoides</i>	0.5	30
<i>Austrostipa semibarbata</i>	0.5	<1
<i>Schoenus grandiflorus</i>	0.4	<1
<i>Spyridium globulosum</i>	0.4	<1
<i>Bossiaea eriocarpa</i>	0.3	<1
<i>Hovea trisperma</i>	0.3	<1
<i>Lepidosperma angustatum</i>	0.3	<1
<i>Lomandra maritima</i>	0.3	<1
<i>Melaleuca systema</i>	0.3	<1
<i>Mesomelaena pseudostygia</i>	0.3	<1
<i>Nemcia capitata</i>	0.3	<1
<i>Petrophile serruriae</i>	0.3	<1
<i>Podotheca chrysantha</i>	0.3	<1

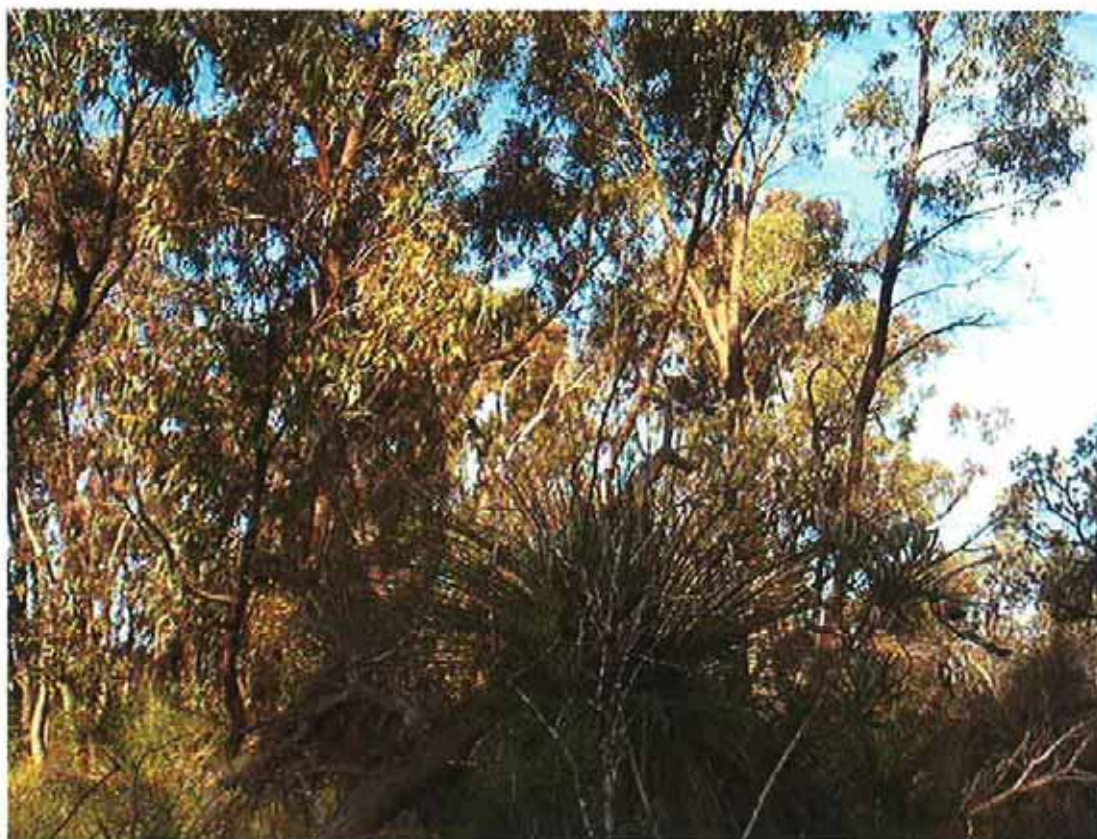
SPECIES	HEIGHT (M)	% COVER
<i>Scaevola holosericea</i>	0.3	<1
<i>Stylidium junceum</i>	0.3	<1
<i>Thysanotus triandrus</i>	0.3	<1
* <i>Wahlenbergia preissii</i>	0.3	<1
<i>Jacksonia stricta</i>	0.2	10
<i>Calothamnus quadrifidus</i>	0.2	<1
<i>Gompholobium tomentosum</i>	0.2	<1
<i>Conostylis aculeata</i>	0.2	<1
<i>Hybanthus calycinus</i>	0.2	<1
<i>Lechenaultia linarioides</i>	0.2	<1
<i>Opercularia vaginata</i>	0.2	<1
<i>Schoenus curvifolius</i>	0.2	<1
<i>Stylidium brunonianum</i>	0.2	<1
* <i>Ursinia anthemoides</i>	0.2	<1
* <i>Aira caryophylla</i>	0.1	<1
* <i>Carpobrotus edulis</i>	0.1	<1
<i>Conostylis setigera</i>	0.1	<1
<i>Desmocladius flexuosus</i>	0.1	<1
<i>Dryandra lindleyana</i>	0.1	<1
<i>Isolepis cernua</i>	<0.1	<1
<i>Trachymene pilosa</i>	0.1	<1
<i>Xanthosia huegelii</i>	0.1	<1
<i>Thysanotus patersonii</i>	creeper	<1

QUADRAT Q10

Vegetation Association: *Eucalyptus gomphocephala* Woodland

Coordinates (MGA84): 377118, 6500625

Soil: Orange-Brown Sand over Orange Sand



QUADRAT Q10 (10x10m)

SPECIES	HEIGHT (M)	% COVER
<i>Eucalyptus gomphocephala</i>	12	30
<i>Banksia attenuata</i>	3	5
<i>Xanthorrhoea preissii</i>	1	10
<i>Macrozamia fraseri</i>	1	<1
<i>Persoonia comata</i>	0.6	<1
<i>Austrostipa semibarbata</i>	0.4	<1
<i>Dianella divaricata</i>	0.4	<1
* <i>Gladiolus caryophyllaceus</i>	0.4	<1
* <i>Piptatherum sp</i>	0.4	<1
* <i>Sonchus oleraceus</i>	0.4	<1
* <i>Avena fatua</i>	0.3	10
<i>Phyllanthus calycinus</i>	0.3	5
<i>Burchardia umbellata</i>	0.3	<1
* <i>Ehrharta longiflora</i>	0.3	<1
<i>Hakea lissocarpa</i>	0.3	<1
<i>Hovea trisperma</i>	0.3	<1
<i>Leucopogon propinquus</i>	0.3	<1

SPECIES	HEIGHT (M)	% COVER
<i>Lomandra hermaphrodita</i>	0.3	<1
<i>Mesomelaena pseudostygia</i>	0.3	<1
<i>Orthrosanthos laxus</i>	0.3	<1
* <i>Petrorhagia dubius</i>	0.3	<1
<i>Sowerbaea laxiflora</i>	0.3	<1
* <i>Briza maxima</i>	0.2	20
<i>Conostylis aculeata</i>	0.2	<1
<i>Eryngium rostratum</i>	0.2	<1
* <i>Trifolium campestre</i>	0.1	20
* <i>Bromus diandrus</i>	0.1	10
<i>Desmocladius flexuosus</i>	0.1	<1
<i>Homalosciadium homalocarpum</i>	0.1	<1
* <i>Hypochaeris glabra</i>	<0.1	<1
<i>Kennedia prostrata</i>	<0.1	<1
* <i>Romulea rosea</i>	0.1	<1
* <i>Trifolium arvense</i>	0.1	<1
<i>Hardenbergia comptoniana</i>	creeper	<1

QUADRAT Q11

Vegetation Association: *Banksia attenuata*/*B. menziesii* Low Open Woodland

Coordinates (MGA84): 377048, 6500445

Soil: Yellow/Light Brown Sand



QUADRAT Q11 (10x10m)

SPECIES	HEIGHT (M)	% COVER
<i>Banksia attenuata</i>	4-6	20
<i>Banksia menziesii</i>	3-5	10
<i>Macrozamia fraseri</i>	1	<1
<i>Hibbertia hypericoides</i>	0.5	30
<i>Austrostipa semibarbata</i>	0.4	<1
* <i>Gladiolus caryophyllaceus</i>	0.4	<1
<i>Acacia pulchella</i>	0.3	<1
<i>Burchardia umbellata</i>	0.3	<1
<i>Calythrix</i> sp.	0.3	<1
* <i>Ehrharta calycina</i>	0.3	<1
<i>Leucopogon sprengelioides</i>	0.3	<1
<i>Neurachne alopecuroidea</i>	0.3	<1
<i>Persoonia comata</i>	0.3	<1
<i>Petrophile macrostachya</i>	0.3	<1
* <i>Petrorhagia dubius</i>	0.3	<1
<i>Sowerbaea laxiflora</i>	0.3	<1
<i>Stylidium brunonianum</i>	0.3	<1

SPECIES	HEIGHT (M)	% COVER
* <i>Briza maxima</i>	0.2	20
<i>Mesomelaena pseudostygia</i>	0.2	10
* <i>Ursinia anthemoides</i>	0.2	10
* <i>Anagallis arvensis</i>	0.2	<1
<i>Conostylis aculeata</i>	0.2	<1
<i>Hakea lissocarpa</i>	0.2	<1
<i>Petrophile brevifolia</i>	0.2	<1
<i>Podotheca angustifolia</i>	0.2	<1
<i>Stylidium piliferum</i>	0.2	<1
<i>Waitzia suaveolens</i>	0.2	<1
* <i>Aira caryophyllea</i>	0.1	<1
<i>Anigozanthus humilis</i>	0.1	<1
<i>Caladenia flava</i>	0.1	<1
<i>Conostylis setigera</i>	0.1	<1
<i>Desmocladius flexuosus</i>	0.1	<1
* <i>Erodium moschatum</i>	0.1	<1
<i>Homalosciadium homalocarpum</i>	0.1	<1
* <i>Hypochaeris glabra</i>	<0.1	<1
<i>Isolepis cernua</i>	<0.1	<1
<i>Laxmannia squarrosa</i>	0.1	<1
<i>Pyrorchis nigricans</i>	<0.1	<1
<i>Siloxerus humifusus</i>	0.1	<1
<i>Stylidium calcaratum</i>	0.1	<1
<i>Trachymene pilosa</i>	0.1	<1