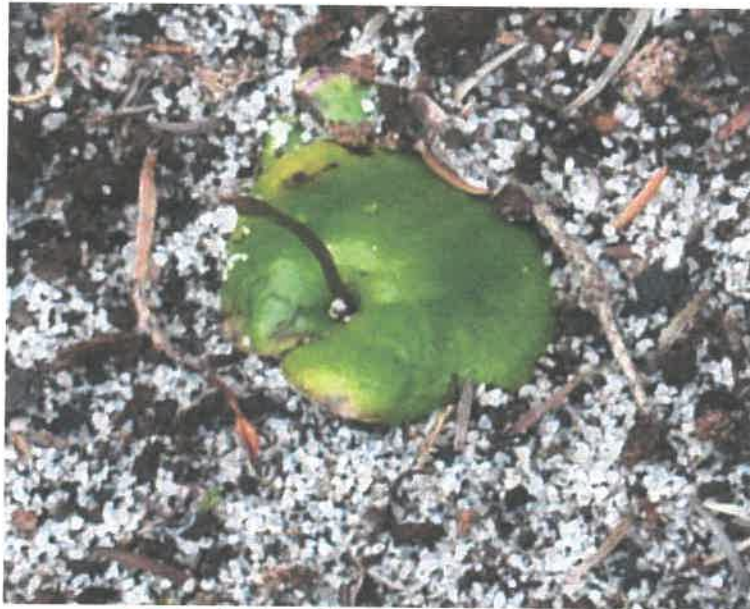


**FLORA AND FAUNA SURVEY  
LOT 871  
CAPEL**



*Drakaea elastica* – Glossy-leaved Hammer Orchid

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## SUMMARY

Bennett Environmental Consulting Pty Ltd was commissioned to undertake a vegetation and flora survey of Lot 871 Capel. The field work was undertaken on 25<sup>th</sup> July 2005. The property included two large areas of remnant vegetation. The remnant vegetation along Prowse Road, on the western side of the property, adjoined another area of remnant vegetation to the south on the adjacent property.

- Low Open Forest of *Agonis flexuosa* var. *flexuosa* over a Herbland of *Pteridium esculentum* or Grassland of *\*Ehrharta longiflora* in grey sand.
- Tall Open Scrub of *Kunzea glabrescens* with occasional *Agonis flexuosa* var. *flexuosa* over a Herbland dominated by *\*Hypochaeris glabra* in pale grey sand.
- Low Woodland of *Eucalyptus marginata* subsp. *marginata*, *Corymbia calophylla* and *Xylomelum occidentale* over a Tall Shrubland of *Kunzea glabrescens* over a Grassland of *\*Ehrharta longiflora* and a Herbland of *\*Hypochaeris glabra* in grey sand.
- Grassland dominated by *\*Vulpia bromoides* and a Herbland dominated by *\*Romulea rosea* and *\*Lotus* sp. and an Open Sedgeland of *Juncus* species with emergent *Corymbia calophylla*, *Eucalyptus marginata* subsp. *marginata* and *Agonis flexuosa* var. *flexuosa* in black sandy loam. This vegetation surrounded a small drainage line.
- Low Open Forest of *Banksia attenuata* and *Banksia ilicifolia* over a Tall Open Scrub of *Eremaea pauciflora* over an Open Herbland dominated by *\*Hypochaeris glabra* in pale grey sand.
- Tall Open Scrub of *Kunzea glabrescens* over an Open Heath of *Melaleuca thymoides* over an Open Herbland of *Dasyogon bromeliifolius* in grey sand.
- Tall Open Scrub of *Kunzea glabrescens* with occasional *Melaleuca preissiana* over an Open Low Heath dominated by *Hypocalymma angustifolium* in grey-black sand.
- Low Open Woodland of *Melaleuca preissiana* and *Agonis flexuosa* var. *flexuosa* over an Open Sedgeland of *Juncus pallidus*, in damp, dark brown sandy loam.

The first four vegetation units were recorded from the eastern vegetation remnant, the next three from the western vegetation remnant and the final one was scattered through the damper areas across the whole site. The vegetation condition of the eastern vegetation remnant was considered to be degraded and the western vegetation remnant to be in good or very good condition.

A total of 36 vascular plant families, 83 genera and 115 taxa of which 25 were weeds, were recorded during the survey. At three locations, plants of the Declared Rare Flora *Drakaea elastica* were located. A priority 3 flora, *Acacia semitrullata* was also recorded as well as a possible plant of a priority 4 species, *Caladenia speciosa*.

## 1. INTRODUCTION

### 1.1 Background

Bennett Environmental Consulting Pty Ltd was contracted by Australian Property Acquisition to undertake a flora, vegetation and fauna survey of Lot 871 within the Shire of Capel. The site is bounded to the east by Goodwood Road (main road to Donnybrook), to the north by houses, to the west by Prowse Road and to the south by a privately owned property.

The Capel Nature Reserve 16144, occurs about 500m southwest of Lot 871.

### 1.2 Scope of Works

The requirements for this project were to:

- i. Record the vegetation units and associated flora species.
- ii. Record Declared Rare and Priority Flora
- iii. Record all fauna observed during the field work.

Dr. Bennett of Bennett Environmental Consulting Pty Ltd undertook the vegetation and flora survey and Mr. G. Harewood the fauna survey. This report discusses the vegetation and flora of the area. The fauna report is attached.

## 3. REGIONAL METHODOLOGY

### 3.1 Geology and Landform

The area surveyed occurred within the Guildford formation, within the Bassendean Dune System of the Swan Coastal Plain (Department of Agriculture, 2003). The plain is generally of low relief and composed of Quaternary continental sediments. The scarp marks its eastern boundary.

This Guildford Formation consists of lenticular interbeds and mixtures of sand, clay and conglomerate, which are locally calcareous. The quartz sand ranges from very fine grained to medium grained, but contains a smaller amount of coarser material. In some areas where surface weathering has occurred, the clay content has clayey in clayey sand (Biggs and Wilde, 1980).

Department of Agriculture (2003) identified both the Bassendean System and the Abba System as occurring at the site. The Bassendean System is described as dune flats and swampy depressions of the Swan Coastal Plain with pale deep sands. The main vegetation is Banksia Woodlands and heath on the dunes and paperbark Woodlands in the flats. These sands are the most southern of the Bassendean Dunes as further south the sand occurs as shallow floats or occasionally deeper dunes overlying the Pinjarra Plain (Keighery *et al.*, 1996).

The Abba System is described as poorly drained flats on the souther Swan Coastal Plain. The main soils are grey, deep sandy duplex and wet soil. The principal vegetation is jarrah-marri-paperbark Woodland.

### 3.2 Vegetation

The site is in the Drummond Botanical Subdistrict of the Southwest Botanical Province (Beard, 1990). This subdistrict is mainly *Banksia* low woodland on leached sands with *Melaleuca* swamps where the area is poorly drained. Woodlands of *Eucalyptus gomphocephala* (Tuart), *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri) occur on less leached soils. Beard (1981) records the natural vegetation as b1, 2Li/e2,3Mi/mLi – a mosaic of *Banksia*

*attenuata* and *Banksia menziesii* Low Woodland/ *Eucalyptus marginata* and *Corymbia calophylla* Woodland/Teatree woodland. The pre-European extent of this vegetation was 119,340ha, of which 29,396ha remains vegetated which is 24.6% of the original area, 13% is protected in IUCN Class I-IV Reserves and 8.9 % in other reserved (Shepherd *et al.*, 2002).

Hedde *et al.*, 1994 in their study of the Darling System mapped the vegetation as occurring in one complex only, the Southern River Complex of the Pinjarra Plain. This is described as an Open Woodland of *Corymbia calophylla* – *Eucalyptus marginata* – *Banksia* species with fringing Woodland of *Eucalyptus rudis* – *Melaleuca rhapsiophylla* along creek beds.

It is estimated that 20% of the original area of the Southern River Complex remains vegetated. The objective of the EPA (2002) and Commonwealth of Australia (2001) is to retain 30% or more of each of the pre-clearing extent of each ecological community if the biodiversity is to be protected.

#### 4. BACKGROUND VEGETATION STUDIES

The Capel Nature Reserve occurs about 500m south of the study site. A vegetation survey was undertaken of the reserve (Keighery *et al.*, 1996) between 1992-1995. The reserve includes high low land, including seasonally inundated and water logged areas and was assessed to be in excellent condition.

They identified five principal plant communities:

- Jarrah (*Eucalyptus marginata*) and *Banksia* Woodland
- *Banksia* Woodland
- Marri (*Corymbia calophylla*) Woodland
- Mixed heath
- *Melaleuca* scrub.

They recorded a total of 381 taxa of which 30 were weeds. One Declared Rare Flora, *Drakaea elastica* was also recorded for the Capel Nature Reserve. It was recorded in *Kunzea glabrescens* Closed Tall Scrub associated with the low-lying *Banksia* Woodlands. This taxon is widespread though uncommon on the Swan Coastal Plain. In addition they recorded seven priority flora; *Acacia flagelliformis*, *Acacia semitrullata*, *Franklandia triaristata*, *Jackson sparsa* (no longer a priority flora), *Mitreola minima*, *Synaphea hians* and *Stylidium mimeticum*.

Keighery *et al.* (1996) considered the Capel Nature Reserve to be of significance as, together with the surrounding vegetation it forms the largest remnant of vegetation on the Plain south of Capel on the Bassendean Dunes.

#### 5. METHODS

The field survey was undertaken on 25<sup>th</sup> July 2005. There were two large areas of remnant vegetation with the remainder of the area developed for grazing, although scattered trees occurred in these open patches. Transects were walked through the remnant vegetation and where Declared Rare Flora was located the surrounding area was thoroughly searched.

The remnant vegetation in the area was surveyed using the methods set out in the EPA Guidance No 51 (2004). Where the vegetation had an understorey with remnant native species a 10m x 10m quadrat was set up using a compass and placed due N,S,E,W. All were temporary with the 4 pegs being removed at the end of the data collection.

The vegetation, flora and weed surveys were conducted concurrently. For each quadrat, the following was recorded in the field:

- GPS reading (WGS84, equivalent to Geocentric Datum of Australia 1994 (GDA94)) at NW corner.
- Digital photograph taken at the NW corner.
- Soil type.
- Presence, size and type of any outcropping rocks.
- Topography – eg. Ridge, upper slope, middle slope, lower slope, drainage line, minor creek, major creek, wetland.
- Aspect where this is applicable.
- Vegetation condition using the scale in Bush Forever (Department of Environmental Protection, 2000).
- Presence of any Declared Rare or Priority Flora or other significant flora.
- Additional information including dieback, age since fire, predators, erosion, weeds, grazing, tracks etc.
- All species will be listed together with their percentage cover within the quadrat and average height.

The area outside of the quadrat was also surveyed to record additional (opportunistic) species for that vegetation unit. All species unknown in the field were collected, pressed and identified later using appropriate keys and by comparison with collections housed at the Western Australian Herbarium. A collection of each Rare or Priority Flora was collected and forms will be completed and sent to the Rare Flora section of the Department of Conservation and Land Management. The pressed and dried specimens will be sent to the Western Australian Herbarium for inclusion in their collection. A list of Rare and Priority Flora for the area had been obtained from the Department of Conservation and Land Management prior to the field work being undertaken.

## 6. RESULTS

### 6.1 Vegetation Units

The vegetation units recorded during the survey were described using the vegetation layers as given in Table 1. The location of each vegetation unit is mapped in Appendix C.

**Table 1. Vegetation layers. Adapted from: Bush Forever (Department of Environmental Protection, 2000)**

Life Form/ Height Class	Canopy Cover			
	100-70%	70-30%	30-10%	10-2%
Trees over 30m	Tall Closed Forest	Tall Open Forest	Tall Woodland	Tall Open Woodland
Trees 10-30m	Closed Forest	Open Forest	Woodland	Open Woodland
Trees under 10m	Low Closed Forest	Low Open Forest	Low Woodland	Low Open Woodland
Tree mallee (8m tall)	Closed Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
Shrub mallee (under 8m tall)	Closed Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
Shrubs over 2m	Closed Tall Scrub	Tall Open Scrub	Tall Shrubland	Tall Open Shrubland
Shrubs 1-2m	Closed Heath	Open Heath	Shrubland	Open Shrubland
Shrubs under 1m	Closed Low Heath	Open Low Heath	Low Shrubland	Low Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland
Sedges	Closed Sedgeland	Sedgeland	Open Sedgeland	Very Open Sedgeland

#### **FOREST/WOODLAND**

**Low Open Forest of *Agonis flexuosa* var. *flexuosa* over a Herbland of *Pteridium esculentum* or Grassland of *\*Ehrharta longiflora* in grey sand. (Quadrat 1)**

This was the dominant vegetation on the track into the home on the property. Horses had grazed the area.

**Low Open Forest of *Banksia attenuata* and *Banksia ilicifolia* over a Tall Open Scrub of *Eremaea pauciflora* over an Open Herbland dominated by *\*Hypochaeris glabra* in pale grey sand. (Quadrat 7)**

Where the vegetation was more open, there were many *Banksia ilicifolia* dead and the understorey was dominated by *Dasypogon bromeliifolius*.

**Low Woodland of *Eucalyptus marginata* subsp. *marginata*, *Corymbia calophylla* and *Xylomelum occidentale* over a Tall Shrubland of *Kunzea glabrescens* over a Grassland of *\*Ehrharta longiflora* and a Herbland of *\*Hypochaeris glabra* in grey sand. (Quadrat 3)**

This was only a very small remnant on the eastern side of the property. There was a lot of timber on the ground.

**Low Open Woodland of *Melaleuca preissiana* and *Agonis flexuosa* var. *flexuosa* over an Open Sedgeland of *Juncus pallidus* in damp, dark brown sandy loam. (Quadrat 5)**

This vegetation unit was common throughout the site, but the density of the tree cover varied from 0-5%. There were large areas close to the western edge where *Juncus pallidus* formed a sedgeland with no trees.

#### **SCRUB**

**Tall Open Scrub of *Kunzea glabrescens* with occasional *Agonis flexuosa* var. *flexuosa* over a Herbland dominated by *\*Hypochaeris glabra* in pale grey sand. (Quadrat 2)**

This vegetation unit occurred slightly higher on the landscape than the *Agonis flexuosa* var. *flexuosa* vegetation unit. Horses had grazed the area.

**Tall Open Scrub of *Kunzea glabrescens* over an Open Heath of *Melaleuca thymoides* over an Open Herbland of *Dasypogon bromeliifolius* in grey sand. (Quadrat 6)**

This was the dominant vegetation on the western side of the block. Several sections in this area had recently been cleared for the placement of pegs, resulting in shrubs and lower vegetation being pushed over. Kangaroos had heavily grazed the area.

**Tall Open Scrub of *Kunzea glabrescens* with occasional *Melaleuca preissiana* over an Open Low Heath dominated by *Hypocalymma angustifolium* in grey-black sand. (Quadrat 8)**

This vegetation was a small area on the western edge of the property.

#### **GRASSLAND/HERBLAND**

**Grassland dominated by *\*Vulpia bromoides* and a Herbland dominated by *\*Romulea rosea* and *\*Lotus* sp. and an Open Sedgeland of *Juncus* species with emergent *Corymbia calophylla*, *Eucalyptus marginata* subsp. *marginata* and *Agonis flexuosa* var. *flexuosa* in black sandy loam. (Quadrat 4)**

This vegetation unit was recorded along a narrow drainage line.

Some parts of the property were fully cleared and devoid of natural vegetation. The pasture species in these parts were not surveyed.

## **6.2 Floristic Community Type**

The Floristic Community Type of each structural unit was inferred from a desktop comparison of the survey data to Gibson *et al.* (1994), in particular Table 12 in this publication. This is a 2-way

table where the species that occur with a frequency of at least 50% are recorded for each Floristic Community Type.

The vegetation units described for the site are inferred to be representative of four floristic community types (Gibson *et al.*, 1994).

- Floristic Community Type 4 – *Melaleuca preissiana* damplands (Quadrat 5)
- Floristic Community Type 21a – Central *Banksia attenuata* – *Eucalyptus marginata* woodlands (Quadrats 3 and 4)
- Floristic Community Type 21b – Southern *Banksia attenuata* woodlands (Quadrats 6,7,8)
- Floristic Community Type 25 – Southern *Eucalyptus gomphocephala* – *Agonis flexuosa* woodlands (Quadrats 1 and 2)

### 6.3 Vegetation Condition

The vegetation condition was assessed using the vegetation condition ratings in Bush Forever (Department of Environmental Protection, 2000) and is explained in Table 2.

**Table 2. Explanation of Vegetation Condition Rating (Department of Environmental Protection, 2000)**

Rating	Description	Explanation
1	Pristine	Pristine or nearly so, no obvious signs of disturbance.
2	Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
3	Very Good	Vegetation structure altered, obvious signs of disturbance.
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it.
5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.
6	Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

Typically the quadrats were placed and the vegetation assessment undertaken where the vegetation was in the best condition.

**Table 3. Condition Rating Recorded for each Quadrat – Remnant Bushland**

Condition Rating	Quadrat
3	6, 7 (sections only), 8
3-4	7 (sections only)
4	3
5	1, 2, 4,5

The remainder of the property was completely degraded with scattered trees and occasional clumps of *Juncus pallidus* over pasture species.

### 6.4 Threatened Ecological Communities

None of the vegetation units described during the survey were listed as Threatened Ecological Communities (English, 2005).

### 6.5 Flora

A total of 36 vascular plant families, 83 genera and 115 taxa were recorded from the remnant bushland at the site. The dominant families were Myrtaceae with 8 genera and 13 taxa; Orchidaceae with 7 genera and 11 taxa, one of which was a weed; Papilionaceae with 8 genera and



9 taxa, of which 5 were weeds and Poaceae and Proteaceae each with 6 genera and 7 taxa, but all the taxa in Poaceae were weeds and in the Proteaceae were natives. These 5 families represent 42% of the genera and 40% of the taxa.

## 6.6 Significant Flora

Species of flora are defined as rare or priority conservation status where their populations are restricted geographically or threatened by local processes. The Department of Conservation and Land Management recognised these threats of extinction and consequently applied regulations towards population and species protection. Rare Flora are gazetted under subsection 2 of section 23F of the Wildlife Conservation Act (1950) and therefore it is an offence to “take” or damage rare flora without approval from the Minister for the Environment.

**Table 4. Code and description of Rare and Priority Flora categories**

Code	Code Declared Rare and Priority Flora Categories
R	DRF (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.
X	DRF (Declared Rare Flora) -Presumed Extinct Taxa. Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently.
1	Priority One -Poorly Known Taxa. Taxa, which are known from one or a few (generally <5) populations, which are under threat.
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.
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.
4	Priority Four -Rare Taxa. Taxa which are considered to have been adequately surveyed and which whilst being rare, are not currently threatened by any identifiable factors.

Table 4 presents the definitions of Declared Rare and the four Priority Flora ratings under the Wildlife Conservation Act (1950) as extracted from Department of Conservation and Land Management (2005). Table 5 presents the definitions of the threatened species under the Environmental Protection and Diversity Conservation Act, 1999 (Environment Australia, 2005).

**Table 5. Categories of Threatened Flora Species (Environmental Protection and Biodiversity Conservation Act, 1999)**

Code	Code Declared Rare and Priority Flora Categories
Ex	Extinct Taxa which at a particular time if, at that time, there is no reasonable doubt that the last member of this species has died.
ExW	Extinct in the Wild Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	Critically Endangered Taxa which at any particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	Endangered Taxa, which is not critically endangered, and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance

	with the prescribed criteria.
<b>Code</b>	<b>Code Declared Rare and Priority Flora Categories</b>
V	Vulnerable Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	Conservation Dependent Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

Prior to undertaking the field work a list of the known Declared Rare and Priority Flora for the coordinates, 33° 32' - 33° 36' S and 115° 32' - 115° 35' E was obtained from the Department of Conservation and Land Management. This resulted in six Declared Rare Flora, 1 Priority 1 Flora, 3 Priority 2 Flora, 13 Priority 3 Flora and 6 Priority 4 Flora. These species are listed in Table 6 together with a brief description of the plant.

**Table 6. Declared Rare and Priority Flora recorded for the Capel area**

SPECIES	CODE	DESCRIPTION
<i>Caladenia busselliana</i>	R	Tuberous, perennial, herb, 0.2–0.3 m high. Fl. green, yellow, cream, Sep–Oct. Sandy loam. Winter-wet swamps.
<i>Caladenia huegelii</i>	R	Tuberous, perennial, herb, 0.25–0.6 m high. Fl. green, cream, red, Sep–Oct. Grey or brown sand, clay loam.
<i>Chamelaucium roycei</i> ms	R	Bushy shrub, 0.3–1.5 m high. Fl. white, pink, Aug–Dec. Sandy clay, clay, lateritic soils. Winter-wet flats, swamps, stream banks.
<i>Diuris drummondii</i>	R	Tuberous, perennial, herb, 0.5–1.05 m high. Fl. yellow, Nov–Jan. Low-lying depressions, swamps.
<i>Drakaea elastica</i>	R	Tuberous, perennial, herb, 0.12–0.3 m high. Fl. red, green, yellow, Oct–Nov. White or grey sand. Low-lying situations adjoining winter-wet swamps.
<i>Verticordia densiflora</i> var. <i>pedunculata</i>	R	Erect to spreading shrub, 0.3–0.6 m high. Fl. pink, white, Dec–Jan. Grey/yellow sand, sandy loam. Winter-wet low-lying areas.
<i>Boronia humifusa</i>	1	Low-growing, wiry perennial, herb, 0.1–0.2 m high. Fl. pink, red, Jun/Sep. Gravelly clay loam over laterite. Jarrah-marri open forest.
<i>Amperea micrantha</i>	2	Low, spreading, bushy perennial, herb, 0.1–0.3 m high. Fl. brown, Oct–Nov. Sandy soils.
<i>Mitreola minima</i>	2	Slender, erect annual, herb, 0.025–0.04 m high. Fl. white, Oct–Dec. Grey sand. Peaty swampy areas.
<i>Trichocline</i> sp. Treeton (B.J. Keighery & N. Gibson 564)	2	Tuberous, perennial, herb, to 1.6 m high. Sand over limestone, sandy clay over ironstone. Seasonally wet flats.
<i>Acacia semitrullata</i>	3	Slender, erect, pungent shrub, (0.1–)0.2–0.7(–1.5) m high. Fl. cream, white, May–Oct. White/grey sand, sometimes over laterite, clay. Sandplains, swampy areas.
<i>Boronia tetragona</i>	3	Perennial, herb, 0.3–0.7 m high, leaves sessile, entire, with papillate margins, branches quadrangular, sepals ciliate. Fl. pink, red, Oct–Dec. Black/white sand, laterite, brown sandy loam. Winter-wet flats, swamps, open woodland.
<i>Chamaescilla gibsonii</i>	3	Clumped tuberous, herb. Fl. blue, Sep. Clay to sandy clay. Winter-wet flats, shallow water-filled claypans.
<i>Chordifex gracilior</i>	3	Rhizomatous, erect perennial, herb, 0.3–0.5 m high. Fl.

SPECIES	CODE	DESCRIPTION
		brown, Sep–Dec. Peaty sand. Swamps.
<i>Eryngium ferox</i> ms	3	Erect, open tuberous, herb, 0.1–0.3 m high. Fl. green, Nov. Grey to brown loamy to sandy clay, brown cracking clay. Winter-wet flats, swamps, dried claypans, ridges.
<i>Isopogon formosus</i> subsp. <i>dasylepis</i>	3	Low, bushy or slender, upright, non-lignotuberous shrub, 0.2–2 m high. Fl. pink, purple, red, Jun–Dec. Sand, sandy clay, gravelly sandy soils over laterite. Often swampy areas.
<i>Lasiopetalum membranaceum</i>	3	Multi-stemmed shrub, 0.2–1 m high. Fl. pink, blue, purple, Sep–Dec. Sand over limestone.
<i>Pultenaea pinifolia</i>	3	Erect, slender shrub, 1–3 m high. Fl. yellow, orange, Oct–Nov. Loam or clay. Floodplains, swampy areas.
<i>Rhodanthe pyrethrum</i>	3	Erect, slender annual, herb, 0.05–0.2 m high. Fl. white, yellow, Oct–Dec. Clay, sandy clay. Winter-wet depressions, clay pans, swamps.
<i>Stylidium leeuwinense</i>	3	Erect perennial, herb, to 0.45 m high, leaves appressed, tile-like, spiral, lacking mucro. Fl. red, purple, Feb–May. Black sandy soil. Swampy heathland.
<i>Synaphea hians</i>	3	Prostrate or decumbent shrub, 0.15–0.6 m high, to 1 m wide. Fl. yellow, Jul–Nov. Sandy soils. Rises.
<i>Tetralitea parvifolia</i>	3	Small shrub, 0.2–0.3 m high. Fl. pink, Oct.
<i>Verticordia attenuata</i>	3	Shrub, 0.4–1 m high. Fl. pink, Dec–May. White or grey sand. Winter-wet depressions.
<i>Acacia flagelliformis</i>	4	Rush-like, erect or sprawling shrub, 0.3–0.75(–1.6) m high. Fl. yellow, May–Sep. Sandy soils. Winter-wet areas.
<i>Anthotium junciforme</i>	4	Open, erect to prostrate perennial, herb, 0.05–0.4 m high, leaves linear to terete, 0.5–1 mm wide; flowering stems 12–40 cm long. Fl. blue, violet, purple, Nov–Mar. Sandy clay, clay. Winter-wet depressions, drainage lines.
<i>Aponogeton hexatepalus</i>	4	Rhizomatous or cormous, aquatic perennial, herb, leaves floating. Fl. green, white, Jul–Oct. Mud. Freshwater: ponds, rivers, claypans.
<i>Caladenia speciosa</i>	4	Tuberous, perennial, herb, 0.35–0.6 m high. Fl. white, pink, Sep–Oct. White, grey or black sand.
<i>Franklandia triaristata</i>	4	Erect, lignotuberous shrub, 0.2–1 m high. Fl. white, cream, yellow, brown, purple, Aug–Oct. White or grey sand.
<i>Thysanotus glaucus</i>	4	Caespitose, glaucous perennial, herb, 0.1–0.2 m high. Fl. purple, Oct–Mar. White, grey or yellow sand, sandy gravel.

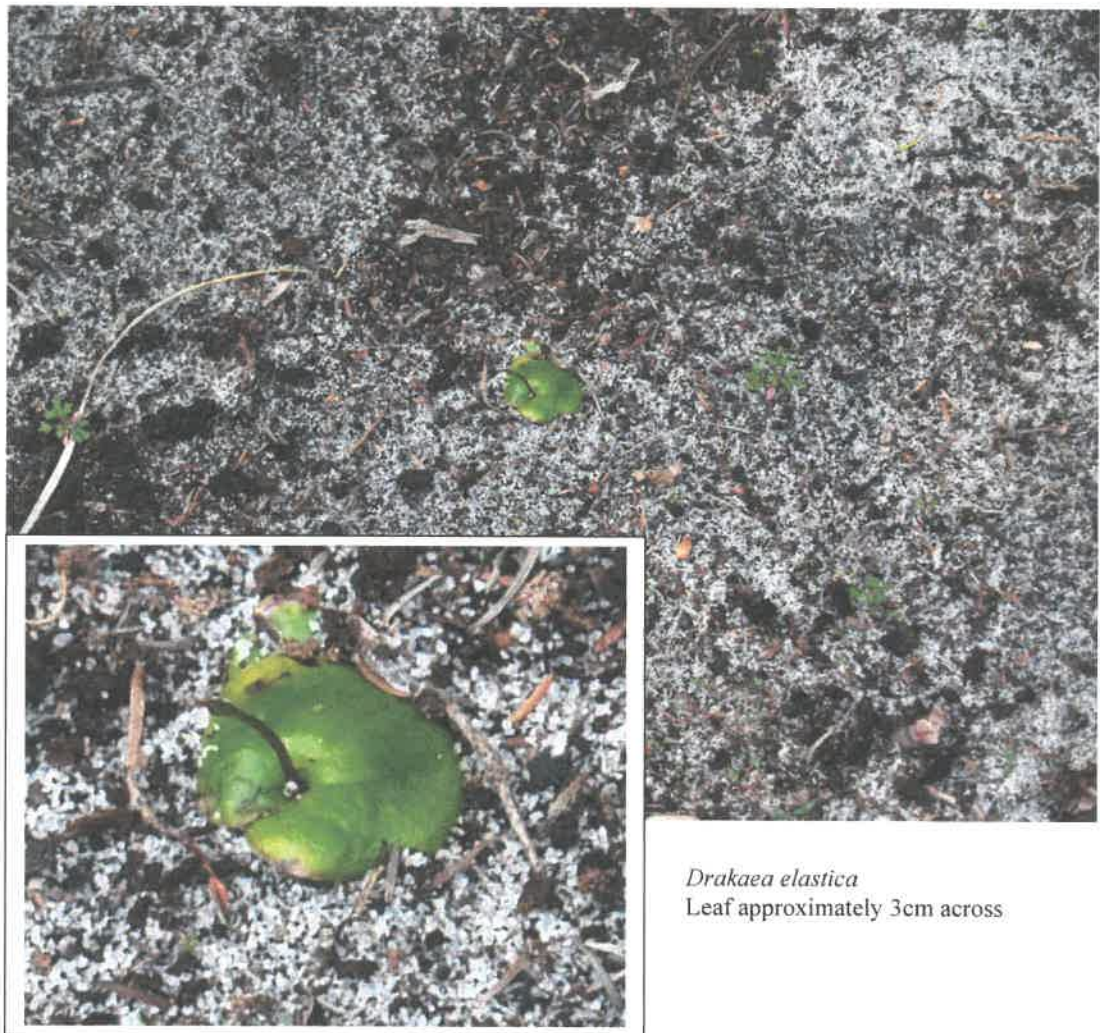
During the survey on the 25<sup>th</sup> July 2005, *Acacia semitrullata* a Priority 3 Flora was located. A sterile plant of a *Caladenia* species was also located and this could be *Caladenia speciosa* as it had a very hairy leaf with red spots at the base. This plant was not collected for confirmation as only one plant was located.

*Drakaea elastica* a Declared Rare Flora was recorded from three different areas all close to Prowse Road. There were only a few plants recorded in the more open bushland of the vegetation unit Tall Open Scrub of *Kunzea glabrescens* over an Open Heath of *Melaleuca thymoides* over an Open Herbland of *Dasypogon bromeliifolius* in grey sand. This species is also listed as Endangered under the Environmental Protection and Biodiversity Conservation Act. To be able to undertake any clearing within this area written permission must be obtained from the Minister for the Environment. It is illegal to clear land with a Declared Rare Flora and fines apply.

**Table 7. Location of *Drakaea elastica* plants**

EASTING	NORTHING	NUMBER PLANTS
366041	6284666	9 (20m East of peg TP18)
366027	6284734	2
366108	6284681	5

Table 7 indicates that the presence of *Drakaea elastica* plants will impact up to 50m east of TP18 which is most of the planned development in the western area. However the plants were only located on the southern side of the remnant vegetation and the road to the north of TP's 9, 12, 13, 15, 16, 17, 18 and 19 would not be affected.



*Drakaea elastica*  
Leaf approximately 3cm across

As only 2 significant species were recorded during the survey an assessment of the likelihood of the other significant species being located is documented in Table 8.

**Table 8. Significant species recorded from the Capel area and the possibility of these occurring at the survey site.**

SPECIES	CODE	POSSIBILITY AT SITE
<i>Caladenia busselliana</i>	R	Occurs in winter-wet swamps. Will not be recorded.
<i>Caladenia huegelii</i>	R	Occurs in grey or brown sand, clay loam. May be recorded.
<i>Chamaelaucium roycei</i> ms	R	Occurs in winter-wet flats, swamps, stream banks. Will not be recorded.
<i>Diuris drummondii</i>	R	Occurs in low-lying depressions, swamps. Will not be recorded.
<i>Verticordia densiflora</i> var. <i>pedunculata</i>	R	Occurs in winter-wet low-lying areas. May be recorded but is a shrub, so would have been visible at the time of the survey.
<i>Boronia humifusa</i>	1	Occurs in gravelly clay loam over laterite. This soil was not recorded at the site.
<i>Amperea micrantha</i>	2	Occurs in sandy soils. It is a small plant and may be recorded at the site.
<i>Mitreola minima</i>	2	Grey sand. Peaty swampy areas. Unlikely to be recorded from site.
<i>Trichocline</i> sp. Treeton (B.J. Keighery & N. Gibson 564)	2	Seasonally wet flats. Unlikely to be recorded.
<i>Boronia tetragona</i>	3	Occurs in winter-wet flats, swamps, open woodland. May be recorded at site.
<i>Chamaescilla gibsonii</i>	3	Occurs in winter-wet flats, shallow water-filled claypans. Will not be recorded.
<i>Chordifex gracilior</i>	3	Occurs in peaty sand. Swamps. Unlikely to be recorded.
<i>Eryngium ferox</i> ms	3	Occurs in winter-wet flats, swamps, dried claypans, ridges. Will not be recorded.
<i>Isopogon formosus</i> subsp. <i>dasylepis</i>	3	Occurs in sand, sandy clay, gravelly sandy soils over laterite. Often swampy areas. Unlikely to be recorded.
<i>Lasiopetalum membranaceum</i>	3	Occurs in sand over limestone. Will not occur at site.
<i>Pultenaea pinifolia</i>	3	Occurs in loam or clay. Floodplains, swampy areas. Plant is a shrub, so would have been visible at the time of the survey.
<i>Rhodanthe pyrethrum</i>	3	Occurs in clay, sandy clay. Winter-wet depressions, clay pans, swamps. Unlikely to be recorded.
<i>Stylidium leeuwinense</i>	3	Occurs in black sandy soil. Swampy heathland. Unlikely to be recorded.
<i>Synaphea hians</i>	3	Occurs in sandy soils. Could be recorded.
<i>Tetrateca parvifolia</i>	3	Loam over gravel. Will not be recorded.
<i>Verticordia attenuata</i>	3	Occurs in winter-wet depressions. Unlikely to be recorded.
<i>Acacia flagelliformis</i>	4	Occurs in winter-wet areas. Unlikely to be recorded.
<i>Anthotium junciforme</i>	4	Occurs in winter-wet depressions, drainage lines. Would not be recorded.
<i>Aponogeton hexatepalus</i>	4	Occurs in freshwater: ponds, rivers, claypans. Would not be recorded.
<i>Caladenia speciosa</i>	4	Occurs in white, grey or black sand. May have been recorded, vegetative only during current survey.
<i>Franklandia triaristata</i>	4	Occurs in white or grey sand. Would have been recorded during the survey as is a shrub, with characteristic leaves.
<i>Thysanotus glaucus</i>	4	Occurs in white, grey or yellow sand, sandy gravel.

		Unlikley to be recorded.
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Keighery et al. (1996) recorded from the Capel Nature Reserve, the declared rare flora, *Drakaea elastica*. In addition the following priority flora *Acacia flagelliformis*, *Franklandia triaristata*, *Mitreola minima*, *Synaphea hians* and *Stylidium mimeticum* (no longer listed as a priority flora) were also recorded. The Capel Nature Reserve does include swamps which will account for several of the priority flora being recorded.

In Table 8 are highlighted the other potential declared rare and priority flora that may be recorded if a survey was undertaken later in spring. As *Synaphea hians* was recorded from the Capel Nature Reserve it is possible that this species may be recorded from the site and as stated earlier in this report it is possible that *Caladenia speciosa* may have been recorded during this current survey.

## 6.7 Weeds

A total of 25 weeds were recorded from the survey area, 23 of which have been assessed and 2 are still to be assessed as weeds by the Department of Conservation and Land Management (1999). The rating allocated to each weed by CALM is based on three criteria:

**Invasiveness** – ability to invade natural bushland in good to excellent condition or ability to invade waterways.

**Distribution** – wide current or potential distribution including consideration of known history of wide spread distribution elsewhere in the world.

**Environmental impacts** – Ability to change the structure, composition and function of ecosystems. In particular an ability to form a monoculture in a vegetation community.

Ratings indicate the following.

**High** indicates this weed is prioritised for control and/or research ie prioritising funding to it.

**Moderate** indicates control or research effort should be directed to it if funds are available, however it should be monitored (possibly a reasonably high level of monitoring).

**Mild** indicates monitoring of the weed and control where appropriate.

**Low** indicates that this species would require a low level of monitoring.

**Table 9. Weeds recorded during the survey classified according to CALM (1999)**

Scientific Name	Common Name	CALM Rating		
		Rating	Invasiveness	Impacts
* <i>Asparagus asparagoides</i>	Bridal creeper	High	✓	✓
* <i>Ehrharta calycina</i>	Perennial veldt grass	High	✓	✓
* <i>Romulea rosea</i>	Guildford grass	High	✓	✓
* <i>Zantedeschia aethiopica</i>	Arum lily	High	✓	✓
* <i>Arctotheca calendula</i>	Cape weed	Moderate	✓	
* <i>Avena barbata</i>	Bearded oat	Moderate	✓	
* <i>Briza maxima</i>	Blowfly grass	Moderate	✓	
* <i>Disa bracteata</i>	South African orchid	Moderate	✓	
* <i>Ehrharta longiflora</i>	Annual veldtgrass	Moderate	✓	
* <i>Holcus lanatus</i>	Yorkshire fog	Moderate	✓	
* <i>Hypochaeris glabra</i>	Flat weed	Moderate	✓	
* <i>Orobanche minor</i>	Lesser broomrape	Moderate	✓	
* <i>Solanum nigrum</i>	Black berry nightshade	Moderate	✓	
* <i>Trifolium subterraneum</i>	Subterraneum clover	Moderate	✓	
* <i>Ursinia anthemoides</i>	Ursinia	Moderate	✓	
* <i>Vulpia bromoides</i>	Fescue	Moderate	✓	

<i>*Chamaecytisus palmensis</i>	Tagasaste	Mild		
Scientific Name	Common Name	CALM Rating		
		Rating	Invasiveness	Impacts
<i>*Fumaria capreolata</i>	White fumitory	Mild		
<i>*Ornithopus ? compressus</i>	Yellow serradella	Mild		
<i>*Rumex conglomeratus</i>	Clustered dock	Mild		
<i>*Cotula turbinata</i>	Funnel weed	Low		
<i>*Lotus sp.</i>	Birdsfoot	Low		
<i>*Lotus suaveolens</i>	Hairy birdsfoot	Low		
<i>*Glyceria ? declinata</i>	Sweetgrass	To be assessed		
<i>*Acetosella vulgaris</i>	Sheep's sorrel	To be assessed		

Of the above weeds, 4 were rated high, 12 as moderate, 4 as mild, and 3 as low. Those weeds rated as high should be targeted for removal, as they will cause the greatest environmental harm. Some plants of *\*Asparagus asparagoides* appeared to be infected with a rust.

## 7. DISCUSSION

There were two major sections of remnant vegetation on the site, Lot 871 Capel. The eastern remnant consisted of four vegetation units;

- Low Open Forest of *Agonis flexuosa* var. *flexuosa* over a Herbland of *Pteridium esculentum* or Grassland of *\*Ehrharta longiflora* in grey sand.
- Tall Open Scrub of *Kunzea glabrescens* with occasional *Agonis flexuosa* var. *flexuosa* over a Herbland dominated by *\*Hypochaeris glabra* in pale grey sand.
- Low Woodland of *Eucalyptus marginata* subsp. *marginata*, *Corymbia calophylla* and *Xylomelum occidentale* over a Tall Shrubland of *Kunzea glabrescens* over a Grassland of *\*Ehrharta longiflora* and a Herbland of *\*Hypochaeris glabra* in grey sand.
- Grassland dominated by *\*Vulpia bromoides* and a Herbland dominated by *\*Romulea rosea* and *\*Lotus sp.* and an Open Sedgeland of *Juncus* species with emergent *Corymbia calophylla*, *Eucalyptus marginata* subsp. *marginata* and *Agonis flexuosa* var. *flexuosa* in black sandy loam. This vegetation surrounded a small drainage line.

The western remnant consisted of three vegetation units:

- Low Open Forest of *Banksia attenuata* and *Banksia ilicifolia* over a Tall Open Scrub of *Eremaea pauciflora* over an Open Herbland dominated by *\*Hypochaeris glabra* in pale grey sand.
- Tall Open Scrub of *Kunzea glabrescens* over an Open Heath of *Melaleuca thymoides* over an Open Herbland of *Dasypogon bromeliifolius* in grey sand.
- Tall Open Scrub of *Kunzea glabrescens* with occasional *Melaleuca preissiana* over an Open Low Heath dominated by *Hypocalymma angustifolium* in grey-black sand.

The remaining vegetation unit occurred scattered through the lower lying areas. This vegetation unit often consisted only of a Sedgeland of *Juncus pallidus* but often was associated with *Melaleuca preissiana*, *Melaleuca raphiophylla* and occasionally with *Agonis flexuosa* subsp. *flexuosa*. None of the vegetation units were listed as Threatened Ecological Communities.

A total of 36 vascular plant families, 83 genera and 115 taxa were recorded from the site of which 25 taxa were weeds. *Acacia semitrullata*, a priority 3 flora and possibly *Caladenia speciosa*, a priority 4 flora were recorded from the site. One Declared Rare Flora, *Drakaea elastica* was recorded from three different areas. This species is listed as Endangered under the Environmental Protection and Biodiversity Conservation Act, 1999. The Priority and Declared Rare Flora were

all recorded from the western remnant. As the plants of *Drakaea elastica* were small and occurred often singly or in small groups they were difficult to locate. These three species were also located in the Capel Nature Reserve (Keighery *et.al.*, 1996) which is approximately 500m to the southwest of the study area. Written permission to clear Declared Rare Flora will need to be obtained from both the State and Commonwealth Governments. Until then no clearing of this area can occur.

Of the 25 weeds recorded, 5 were rated as high, indicating that these weeds should be targeted for removal. \**Asparagus asparagoides* was one of the weeds recorded from the eastern side of the site. One plant was recorded with rust spores on the leaves. Rust spores have been released onto some of these plants in an attempt to control their spread. Birds are the main culprit for the increase in distribution of this weed.

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**APPENDIX A**  
**Species listed according to vegetation unit**

**LEGEND**

<b>ABBREVIATION</b>	<b>EXPLANATION</b>
subsp.	subspecies
var.	variety
*	weed
forma	form, a minor variation
sp.	plant not in flower or fruit
?	unsure if species listed is correct

FAMILY	SPECIES	QUADRAT							
		C1	C2	C3	C4	C5	C6	C7	C8
ANARTHRIACEAE	<i>Anarthria prolifera</i>								+
ANTHERICACEAE	<i>Chamaescilla corymbosa</i>						+	+	+
	<i>Laxmannia sessiliflora</i>							+	
	<i>Sowerbaea laxiflora</i>						+		
	<i>Thysanotus patersonii</i>		+						+
APIACEAE	<i>Trachymene pilosa</i>						+	+	
	<i>Xanthosia huegelii</i>						+		
ARACEAE	* <i>Zantedeschia aethiopica</i>	+					+		
ASPARAGACEAE	* <i>Asparagus asparagoides</i>	+	+						
ASTERACEAE	* <i>Arctotheca calendula</i>	+	+	+		+			+
	* <i>Cotula turbinata</i>				+				
	* <i>Hypochaeris glabra</i>	+	+	+	+		+	+	+
	<i>Lagenifera huegelii</i>								+
	<i>Quinetia urvillei</i>						+	+	
	* <i>Ursinia anthemoides</i>	+	+	+	+				+
CRASSULACEAE	<i>Crassula colorata</i>		+					+	
CYPERACEAE	<i>Cyathochaeta avenacea</i>								+
	<i>Lepidosperma squamatum</i>								+
	<i>Schoenus breviculmis</i>								+
	<i>Schoenus caespitus</i>								+
	<i>Schoenus curvifolius</i>						+	+	
DASYPOGONACEAE	<i>Dasyopogon bromeliiifolius</i>			+			+	+	+
	<i>Lomandra hermaphrodita</i>						+		
	<i>Lomandra integra</i>								+
	<i>Lomandra nigricans</i>						+		
	<i>Lomandra sericea</i>								+
DENNSTAEDTIACEAE	<i>Pteridium esculentum</i>	+							
DILLENIAEAE	<i>Hibbertia hypericoides</i>						+	+	
	<i>Hibbertia racemosa</i>							+	
	<i>Hibbertia vaginata</i>						+	+	+
DROSERACEAE	<i>Drosera erythrorhiza</i>						+		
	<i>Drosera menziesii</i>						+	+	+
	<i>Drosera pallida</i>			+	+		+	+	+
	<i>Drosera stelliflora</i>								+
	<i>Drosera zonaria</i>						+	+	
EPACRIDACEAE	<i>Leucopogon nutans</i>							+	
	<i>Leucopogon propinquus</i>			+					
	<i>Lysinema ciliata</i>								+
FUMARIACEAE	* <i>Fumaria capreolata</i>	+							
HAEMODORACEAE	<i>Anigozanthos manglesii</i>							+	
	<i>Conostylis setigera</i>						+		
HYPOXIDACEAE	<i>Hypoxis occidentalis</i>							+	
IRIDACEAE	<i>Patersonia occidentalis</i>						+	+	+
	* <i>Romulea rosea</i>	+	+	+	+				+

FAMILY	SPECIES	QUADRAT							
		C1	C2	C3	C4	C5	C6	C7	C8
JUNCACEAE	<i>Juncus gregiflorus</i>				+				
	<i>Juncus holoschoenus</i>				+				
	<i>Juncus pallidus</i>				+	+			
LAURACEAE	<i>Cassytha racemosa</i> forma <i>pilosa</i>								+
LORANTHACEAE	<i>Nuytsia floribunda</i>			+			+	+	
MIMOSACEAE	<i>Acacia pulchella</i> var. <i>pulchella</i>			+				+	
	<i>Acacia semitrullata</i>						+	+	
MYRTACEAE	<i>Agonis flexuosa</i> var. <i>flexuosa</i>	+	+	+	+	+			
	<i>Calytrix flavescens</i>						+	+	
	<i>Calytrix fraseri</i>		+					+	
	<i>Corymbia calophylla</i>			+	+				
	<i>Eremaea pauciflora</i>								+
	<i>Eucalyptus marginata</i> subsp. <i>marginata</i>			+	+				
	<i>Eucalyptus rudis</i>					+			
	<i>Hypocalymma angustifolium</i>						+		+
	<i>Kunzea glabrescens</i>		+	+	+		+	+	+
	<i>Kunzea recurva</i>						+		
	<i>Melaleuca preissiana</i>					+	+		+
	<i>Melaleuca raphiophylla</i>					+			
	<i>Melaleuca thymoides</i>						+	+	+
	ORCHIDACEAE	<i>Caladenia flava</i>						+	+
<i>Caladenia speciosa</i>								+	
* <i>Disa bracteata</i>			+	+			+	+	
<i>Drakaea elastica</i>							+		+
<i>Drakaea glyptodon</i>							+	+	+
<i>Leporella fimbriata</i>							+	+	+
<i>Pterostylis recurva</i>								+	
<i>Pterostylis vittata</i>							+		+
<i>Thelymitra canaliculata</i>							+	+	+
<i>Thelymitra crinita</i>							+	+	
<i>Pyrorchis nigricans</i>							+	+	+
OROBANCHACEAE		* <i>Orobanche minor</i>		+					
PAPILIONACEAE	* <i>Chamaecytisus palmensis</i>		+						
	<i>Gastrolobium capitatum</i>							+	
	<i>Hardenbergia comptoniana</i>	+		+					
	<i>Isotropis cuneifolia</i>								+
	<i>Jacksonia horrida</i>		+				+	+	+
	* <i>Lotus</i> sp.			+	+	+			+
	* <i>Lotus suaveolens</i>						+		
	* <i>Ornithopus</i> ? <i>compressus</i>			+					+
	* <i>Trifolium subterraneum</i>			+					

FAMILY	SPECIES	QUADRAT							
		C1	C2	C3	C4	C5	C6	C7	C8
POACEAE	<i>*Avena barbata</i>	+							
	<i>*Briza maxima</i>	+	+	+	+		+	+	+
	<i>*Ehrharta calycina</i>	+	+	+	+				
	<i>*Ehrharta longiflora</i>	+		+					
	<i>*Glyceria ? declinata</i>						+		
	<i>*Holcus lanatus</i>						+		
	<i>*Vulpia bromoides</i>			+	+	+			
	POLYGONACEAE	<i>*Acetosella vulgaris</i>				+		+	+
<i>*Rumex conglomeratus</i>						+	+		
PROTEACEAE	<i>Adenanthos meisneri</i>								+
	<i>Banksia attenuata</i>				+			+	+
	<i>Banksia ilicifolia</i>							+	+
	<i>Persoonia longifolia</i>				+				
	<i>Petrophile linearis</i>								+
	<i>Stirlingia latifolia</i>								+
	<i>Xylomelum occidentale</i>						+		
RESTIONACEAE	<i>Hypolaena exsulca</i>							+	+
	<i>Lyginia imberbis</i>							+	+
RUTACEAE	<i>Philotheca spicata</i>							+	
SCROPHULARIACEAE	<i>Gratiola pubescens</i>					+			
SOLANACEAE	<i>*Solanum nigrum</i>	+						+	
STYLIDIACEAE	<i>Stylidium amoenum</i>							+	+
	<i>Stylidium brunonianum</i>							+	
	<i>Stylidium carnosum</i>								+
	<i>Stylidium piliferum</i>							+	
	<i>Stylidium repens</i>							+	+
TREMANDRACEAE	<i>Platytheca galioides</i>							+	+
XANTHORRHOEACEAE	<i>Xanthorrhoea brunonis</i>							+	+
	<i>Xanthorrhoea gracilis</i>							+	
ZAMIACEAE	<i>Macrozamia riedlei</i>				+				

**APPENDIX B**  
**Quadrat Data**

## QUADRAT 1

**Datum (WGS84):** 366697E, 6284815N

**Soil Type:** Grey sand

**Vegetation Description:** Low Open Forest of *Agonis flexuosa* var. *flexuosa* over a Herbland of *Pteridium esculentum* or Grassland of *\*Ehrharta longiflora*.

**Vegetation Condition:** 5

**Other Notes:** Area grazed by horses. Adjoins entrance road into house on property.



SPECIES	HEIGHT (cm)	% COVER
<i>Agonis flexuosa</i> var. <i>flexuosa</i>	1000	70
* <i>Arctotheca calendula</i>	10	5
* <i>Asparagus asparagoides</i>	twiner	<1
* <i>Avena barbata</i>	50	5
* <i>Briza maxima</i>	30	10
* <i>Ehrharta longiflora</i>	50	70
* <i>Fumaria capreolata</i>	20	2
* <i>Hypochaeris glabra</i>	5	5
* <i>Romulea rosea</i>	60	1
* <i>Solanum nigrum</i>	40	1
* <i>Ehrharta calycina</i>	opportunistic	
<i>Hardenbergia comptoniana</i>	opportunistic	
<i>Pteridium esculentum</i>	opportunistic	
* <i>Ursinia anthemoides</i>	opportunistic	
* <i>Zantedeschia aethiopica</i>	opportunistic	

**QUADRAT 2**

**Datum (WGS84):** 366684E, 6284851N

**Soil Type:** Pale grey sand

**Vegetation Description:** Tall Open Scrub of *Kunzea glabrescens* with occasional *Agonis flexuosa* var. *flexuosa* over a Herbland dominated by *Hypochaeris glabra*.

**Vegetation Condition:** 4-5

**Other Notes:** Area grazed by horses. Lot of rubbish (bricks, tins etc) on the ground. There was a lot of lichen on the ground and a lot of the *Kunzea* had been felled. Large amount of bare ground.



SPECIES	HEIGHT (cm)	% COVER
* <i>Briza maxima</i>	50	5
<i>Crassula colorata</i>	5	<1
* <i>Disa bracteata</i>	15	<1
* <i>Ehrharta calycina</i>	90	5
* <i>Hypochaeris glabra</i>	5	50
<i>Kunzea glabrescens</i>	800	70
* <i>Ursinia anthemoides</i>	25	1
* <i>Vulpia bromoides</i>	5	1
<i>Agonis flexuosa</i> var. <i>flexuosa</i>	opportunistic	
* <i>Arctotheca calendula</i>	opportunistic	
* <i>Asparagus asparagoides</i>	opportunistic	
<i>Calytrix fraseri</i>	opportunistic	
* <i>Chamaecytisus palmensis</i>	opportunistic	
<i>Jacksonia horrida</i>	opportunistic	
<i>Leucopogon propinquus</i>	opportunistic	
* <i>Orobanche minor</i>	opportunistic	
* <i>Romulea rosea</i>	opportunistic	
<i>Stylidium repens</i>	opportunistic	
<i>Thysanotus patersonii</i>	opportunistic	



## QUADRAT 3

**Datum (WGS84):** 366779E, 6284997N

**Soil Type:** Grey sand

**Vegetation Description:** Low Woodland of *Eucalyptus marginata* subsp. *marginata*, *Corymbia calophylla* and *Xylomelum occidentale* over a Tall Shrubland of *Kunzea glabrescens* over a Grassland of *\*Ehrharta longiflora* and a Herbland of *\*Hypochaeris glabra*.

**Vegetation Condition:** 4

**Other Notes:** Small remnant only. Lot of timber on the ground.



SPECIES	HEIGHT (cm)	% COVER
<i>*Acetosella vulgaris</i>	5	<1
<i>Agonis flexuosa</i> var. <i>flexuosa</i>	200	<1
<i>*Arctotheca calendula</i>	15	5
<i>*Briza maxima</i>	50	1
<i>Corymbia calophylla</i>	800	4
<i>*Disa bracteata</i>	30	2
<i>Drosera pallida</i>	twiner	<1
<i>*Ehrharta calycina</i>	50	60
<i>*Ehrharta longiflora</i>	50	10
<i>Eucalyptus marginata</i> subsp. <i>marginata</i>	600	2
<i>Hardenbergia comptoniana</i>	twiner	2
<i>*Hypochaeris glabra</i>	5	40
<i>Kunzea glabrescens</i>	300	10
<i>*Lotus</i> sp.	5	<1
<i>*Ornithopus ? compressus</i>	5	5
<i>Persoonia longifolia</i>	400	1
<i>*Romulea rosea</i>	50	5

SPECIES	HEIGHT (cm)	% COVER
* <i>Trifolium subterraneum</i>	10	<1
* <i>Ursinia anthemoides</i>	40	5
* <i>Vulpia bromoides</i>	5	30
<i>Xylomelum occidentale</i>	600	4
<i>Acacia pulchella</i> var. <i>pulchella</i>	opportunistic	
<i>Banksia attenuata</i>	opportunistic	
<i>Dasyogon bromelii/olius</i>	opportunistic	
<i>Macrozamia riedlei</i>	opportunistic	
<i>Nuytsia floribunda</i>	opportunistic	

## QUADRAT 4

**Datum (WGS84):** 366790E, 6284985N

**Soil Type:** Black sandy loam

**Vegetation Description:** Grassland dominated by *Vulpia bromoides* and a Herbland dominated by *Romulea rosea* and *Lotus* sp. and an Open Sedgeland of *Juncus* species with emergent *Corymbia calophylla*, *Eucalyptus marginata* subsp. *marginata* and *Agonis flexuosa* var. *flexuosa*.

**Vegetation Condition:** 5

**Other Notes:** Along a drainage line.



SPECIES	HEIGHT (cm)	% COVER
<i>Agonis flexuosa</i> var. <i>flexuosa</i>	500	2
* <i>Briza maxima</i>	90	2
<i>Corymbia calophylla</i>	800	1
* <i>Cotula turbinata</i>	5	<1
<i>Drosera pallida</i>	twiner	<1
* <i>Ehrharta calycina</i>	90	1
<i>Eucalyptus marginata</i> subsp. <i>marginata</i>	600	1
* <i>Hypochaeris glabra</i>	90	10
<i>Juncus gregiflorus</i>	50	5
<i>Juncus holoschoenus</i>	40	3
<i>Juncus pallidus</i>	80	5
<i>Kunzea glabrescens</i>	300	1
* <i>Lotus</i> sp.	5	20
* <i>Romulea rosea</i>	40	30
* <i>Rumex conglomeratus</i>	15	1
* <i>Ursinia anthemoides</i>	30	<1
* <i>Vulpia bromoides</i>	10	60
<i>Gratiola pubescens</i>	10	<1

## QUADRAT 5

**Datum (WGS84):** 366594E, 6284700N

**Soil Type:** Dark brown sandy loam

**Vegetation Description:** Low Open Woodland of *Melaleuca preissiana* and *Agonis flexuosa* var. *flexuosa* over an Open Sedgeland of *Juncus pallidus*.

**Vegetation Condition:** 5

**Other Notes:** Horses in this paddock. When survey undertaken the area was very wet.



SPECIES	HEIGHT (cm)	% COVER
* <i>Acetosella vulgaris</i>	30	5
<i>Agonis flexuosa</i> var. <i>flexuosa</i>	400	5
* <i>Holcus lanatus</i>	70	10
<i>Juncus pallidus</i>	220	25
* <i>Lotus</i> sp.	5	30
<i>Melaleuca preissiana</i>	600	5
* <i>Glyceria</i> ? <i>declinata</i>	30	60
* <i>Rumex conglomeratus</i>	120	25
* <i>Arctotheca calendula</i>	opportunistic	
<i>Melaleuca raphiophylla</i>	opportunistic	
* <i>Solanum nigrum</i>	opportunistic	

**QUADRAT 6**

**Datum (WGS84):** 366342E, 6284673N

**Soil Type:** Grey sand

**Vegetation Description:** Tall Open Scrub of *Kunzea glabrescens* over an Open Heath of *Melaleuca thymoides* over an Open Herbland of *Dasypogon bromeliifolius*.

**Vegetation Condition:** 3

**Other Notes:** Areas have been cleared recently and pegged. Shrubs and other vegetation has been pushed over.



SPECIES	HEIGHT (cm)	% COVER
* <i>Acetosella vulgaris</i>	5	3
<i>Banksia ilicifolia</i>	900	2
* <i>Briza maxima</i>	70	1
<i>Caladenia flava</i>	15	2
<i>Calytrix flavescens</i>	30	10
<i>Conostylis setigera</i>	20	<1
<i>Dasypogon bromeliifolius</i>	50	10
* <i>Disa bracteata</i>	30	2
<i>Drosera menziesii</i>	twiner	2
<i>Drosera pallida</i>	twiner	<1
<i>Drosera zonaria</i>	5	2
* <i>Hypochaeris glabra</i>	5	5
<i>Hypolaena exsulca</i>	50	1
<i>Kunzea glabrescens</i>	900	70
<i>Leporella fimbriata</i>	15	10
<i>Lomandra nigricans</i>	25	1

SPECIES	HEIGHT (cm)	% COVER
* <i>Lotus suaveolens</i>	5	<1
<i>Lyginia imberbis</i>	50	<1
<i>Melaleuca thymoides</i>	350	15
<i>Patersonia occidentalis</i>	60	1
<i>Pterostylis vittata</i>	15	<1
<i>Pyrorchis nigricans</i>	5	<1
<i>Quinetia urvillei</i>	5	<1
<i>Schoenus curvifolius</i>	40	1
<i>Stylidium amoenum</i>	5	<1
<i>Stylidium brunonianum</i>	5	<1
<i>Stylidium repens</i>	5	<1
<i>Thelymitra canaliculata</i>	35	<1
<i>Thelymitra crinita</i>	5	<1
<i>Trachymene pilosa</i>	5	<1
<i>Xanthosia huegelii</i>	5	<1
* <i>Zantedeschia aethiopica</i>	5	<1
<i>Acacia semitrullata</i>	opportunistic	
<i>Banksia attenuata</i>	opportunistic	
<i>Chamaescilla corymbosa</i>	opportunistic	
<i>Drakaea elastica</i>	opportunistic	
<i>Drakaea glyptodon</i>	opportunistic	
<i>Drosera erythrorhiza</i>	opportunistic	
<i>Hibbertia hypericoides</i>	opportunistic	
<i>Hibbertia vaginata</i>	opportunistic	
<i>Hypocalymma angustifolium</i>	opportunistic	
<i>Jacksonia horrida</i>	opportunistic	
<i>Kunzea recurva</i>	opportunistic	
<i>Lomandra hermaphrodita</i>	opportunistic	
<i>Melaleuca preissiana</i>	opportunistic	
<i>Nuytsia floribunda</i>	opportunistic	
<i>Philothea spicata</i>	opportunistic	
<i>Platytheca galioides</i>	opportunistic	
<i>Sowerbaea laxiflora</i>	opportunistic	
<i>Stylidium piliferum</i>	opportunistic	
<i>Xanthorrhoea brunonis</i>	opportunistic	
<i>Xanthorrhoea gracilis</i>	opportunistic	

**QUADRAT 7**

**Datum (WGS84):** 366228E, 6284693N

**Soil Type:** Pale grey sand

**Vegetation Description:** Low Open Forest of *Banksia attenuata* and *Banksia ilicifolia* over a Tall Open Scrub of *Eremaea pauciflora* over an Open Herbland dominated by *\*Hypochaeris glabra*.

**Vegetation Condition:** 3-4

**Other Notes:** Where the understorey was dense it was vegetation condition 3, where more open it varied between 3 and 4.



Vegetation condition 3



Vegetation condition 3-4

SPECIES	HEIGHT (cm)	% COVER
<i>Banksia attenuata</i>	800	40
<i>*Briza maxima</i>	70	5
<i>Caladenia flava</i>	10	<1

SPECIES	HEIGHT (cm)	% COVER
<i>Calytrix flavescens</i>	30	1
<i>Calytrix fraseri</i>	100	5
<i>Chamaescilla corymbosa</i>	5	5
* <i>Disa bracteata</i>	25	1
<i>Drosera menziesii</i>	twiner	<1
<i>Drosera pallida</i>	twiner	1
<i>Drosera zonaria</i>	5	<1
<i>Eremaea pauciflora</i>	175	60
<i>Gastrolobium capitatum</i>	30	1
<i>Hibbertia hypericoides</i>	70	<1
<i>Hibbertia vaginata</i>	30	1
* <i>Hypochaeris glabra</i>	5	20
<i>Hypoxis occidentalis</i>	30	<1
<i>Kunzea glabrescens</i>	300	1
<i>Leporella fimbriata</i>	5	10
<i>Leucopogon nutans</i>	30	<1
<i>Lyginia imberbis</i>	70	5
<i>Melaleuca thymoides</i>	50	1
<i>Patersonia occidentalis</i>	90	5
<i>Pterostylis recurva</i>	30	<1
<i>Pyrrochis nigricans</i>	3	5
* <i>Romulea rosea</i>	30	5
<i>Schoenus curvifolius</i>	20	1
<i>Stirlingia latifolia</i>	70	3
<i>Stylidium amoenum</i>	5	<1
<i>Stylidium repens</i>	5	<1
<i>Thysanotus patersonii</i>	twiner	<1
<i>Trachymene pilosa</i>	5	<1
* <i>Ursinia anthemoides</i>	10	1
<i>Acacia pulchella</i> var. <i>pulchella</i>	opportunistic	
<i>Acacia semitrullata</i>	opportunistic	
<i>Anigozanthos manglesii</i>	opportunistic	
* <i>Arctotheca calendula</i>	opportunistic	
<i>Banksia iliciifolia</i>	opportunistic	
<i>Caladenia speciosa</i>	opportunistic	
<i>Crassula colorata</i>	opportunistic	
<i>Dasypogon bromeliiifolius</i>	opportunistic	
<i>Drakaea glyptodon</i>	opportunistic	
<i>Hibbertia racemosa</i>	opportunistic	
<i>Jacksonia horrida</i>	opportunistic	
<i>Laxmannia sessiliflora</i>	opportunistic	
<i>Nuytsia floribunda</i>	opportunistic	
<i>Petrophile linearis</i>	opportunistic	
<i>Quinetia urvillei</i>	opportunistic	
<i>Thelymitra canaliculata</i>	opportunistic	
<i>Thelymitra crinita</i>	opportunistic	
<i>Xanthorrhoea brunonis</i>	opportunistic	



### QUADRAT 8

**Datum (WGS84):** 366027E, 6284734N

**Soil Type:** Grey black sand

**Vegetation Description:** Tall Open Scrub of *Kunzea glabrescens* with occasional *Melaleuca preissiana* over an Open Low Heath dominated by *Hypocalymma angustifolium*.

**Vegetation Condition:** 3

**Other Notes:** Occurred close to fire break near Prowse Road.



SPECIES	HEIGHT (cm)	% COVER
<i>Adenanthos meisneri</i>	120	1
<i>Anarthria prolifera</i>	50	3
* <i>Briza maxima</i>	20	5
<i>Caladenia flava</i>	10	<1
<i>Cassutha racemosa</i> forma <i>pilosa</i>	twiner	1
<i>Chamaescilla corymbosa</i>	5	<1
<i>Cyathochaeta avenacea</i>	80	1
<i>Dasypogon bromeliiifolius</i>	40	10
<i>Drosera menziesii</i>	twiner	<1
<i>Drosera pallida</i>	twiner	<1
<i>Drosera stelliflora</i>	2	<1
<i>Hibbertia vaginata</i>	30	1
<i>Hypocalymma angustifolium</i>	80	70
* <i>Hypochoeris glabra</i>	5	10
<i>Hypolaena exsulca</i>	80	1
<i>Isotropis cuneifolia</i>	5	<1
<i>Jacksonia horrida</i>	200	1
<i>Kunzea glabrescens</i>	800	40

SPECIES	HEIGHT (cm)	% COVER
<i>Lagenifera huegelii</i>	10	<1
<i>Lepidosperma squamatum</i>	70	<1
<i>Leporella fimbriata</i>	5	3
<i>Lomandra integra</i>	60	1
<i>Lomandra sericea</i>	40	<1
* <i>Lotus</i> sp.	5	<1
<i>Lyginia imberbis</i>	70	1
<i>Melaleuca preissiana</i>	1400	5
<i>Melaleuca thymoides</i>	210	5
* <i>Ornithopus ? compressus</i>	10	<1
<i>Patersonia occidentalis</i>	70	1
<i>Platytheca galioides</i>	30	<1
<i>Pterostylis vittata</i>	40	<1
<i>Pyrorchis nigricans</i>	5	1
<i>Schoenus caespitus</i>	70	<1
<i>Schoenus breviculmis</i>	10	1
<i>Stylidium carnosum</i>	10	1
<i>Xanthorrhoea brunonis</i>	120	1
<i>Drakaea elastica</i>	opportunistic	
<i>Drakaea glyptodon</i>	opportunistic	
<i>Lysinema ciliata</i>	opportunistic	
<i>Thelymitra canaliculata</i>	opportunistic	

## APPENDIX C

### Vegetation Map

#### LEGEND

MAP UNIT	DESCRIPTION
VU1	Low Open Forest of <i>Agonis flexuosa</i> var. <i>flexuosa</i> over a Herbland of <i>Pteridium esculentum</i> or Grassland of <i>*Ehrharta longiflora</i> in grey sand.
VU2	Tall Open Scrub of <i>Kunzea glabrescens</i> with occasional <i>Agonis flexuosa</i> var. <i>flexuosa</i> over a Herbland dominated by <i>*Hypochaeris glabra</i> in pale grey sand.
VU3	Low Woodland of <i>Eucalyptus marginata</i> subsp. <i>marginata</i> , <i>Corymbia calophylla</i> and <i>Xylomelum occidentale</i> over a Tall Shrubland of <i>Kunzea glabrescens</i> over a Grassland of <i>*Ehrharta longiflora</i> and a Herbland of <i>*Hypochaeris glabra</i> in grey sand.
VU4	Grassland dominated by <i>*Vulpia bromoides</i> and a Herbland dominated by <i>*Romulea rosea</i> and <i>*Lotus</i> sp. and an Open Sedgeland of <i>Juncus</i> species with emergent <i>Corymbia calophylla</i> , <i>Eucalyptus marginata</i> subsp. <i>marginata</i> and <i>Agonis flexuosa</i> var. <i>flexuosa</i> in black sandy loam. This vegetation surrounded a small drainage line.
VU5	Low Open Woodland of <i>Melaleuca preissiana</i> and <i>Agonis flexuosa</i> var. <i>flexuosa</i> over an Open Sedgeland of <i>Juncus pallidus</i> in damp, dark brown sandy loam.
VU6	Tall Open Scrub of <i>Kunzea glabrescens</i> over an Open Heath of <i>Melaleuca thymoides</i> over an Open Herbland of <i>Dasyogon bromeliiifolius</i> in grey sand.
VU7	Low Open Forest of <i>Banksia attenuata</i> and <i>Banksia ilicifolia</i> over a Tall Open Scrub of <i>Eremaea pauciflora</i> over an Open Herbland dominated by <i>*Hypochaeris glabra</i> in pale grey sand.
VU8	Tall Open Scrub of <i>Kunzea glabrescens</i> with occasional <i>Melaleuca preissiana</i> over an Open Low Heath dominated by <i>Hypocalymma angustifolium</i> in grey-black sand.
Areas not mapped are fully cleared pasture devoid of native vegetation or with scattered trees	



