

**FLORA AND VEGETATION  
POINT PERON  
WESTERN AUSTRALIA**



**Prepared for:**  
strategen  
PO Box 660  
SOUTH PERTH 6951

**Prepared by:**  
Bennett Environmental Consulting Pty Ltd



*Sollya heterophylla*  
PO Box 341  
KALAMUNDA 6926

August 2005

# INDEX

SUMMARY .....	i
1. INTRODUCTION .....	1
1.1 Background .....	1
1.2 Scope of Works .....	1
2. REGIONAL BACKGROUND INFORMATION .....	3
2.1 Geology and Landform .....	3
2.2 Vegetation .....	3
2.3 Previous Studies in the Area .....	3
2.4 Significant Flora .....	4
3. METHODS .....	4
3.1 Field Methods .....	4
3.2 Vegetation Units .....	5
3.3 Vegetation Condition .....	5
3.4 Threatened Ecological Communities .....	6
4. RESULTS .....	6
4.1 Vegetation Units .....	7
4.2 Comparison With Previous Vegetation Survey .....	10
4.3 Floristic Community Types .....	11
4.4 Vegetation of Conservation Significance .....	12
4.5 Vegetation Condition .....	12
4.6 Species Recorded .....	13
4.7 Significant Species .....	13
4.8 Introduced Species (Weeds) .....	14
5. DISCUSSION .....	15
5.1 General .....	15
5.2 Potential Impact of Proposed Development .....	17
6. CONCLUSION .....	18
7. REFERENCES .....	19
APPENDIX A .....	21
Species listed under families and vegetation units .....	21
APPENDIX B .....	27
Site Data .....	27
APPENDIX C .....	88
Maps .....	88

## SUMMARY

Bennett Environmental Consulting Pty Ltd undertook a vegetation survey of Point Peron on 14<sup>th</sup>, 20<sup>th</sup> and 21<sup>st</sup> June 2005. The geology of the study area included sandy beaches, rocky headlands, foredunes and stable dunes. There is also an artificial channel between Lake Richmond (to the east of the study area) and Cockburn Sound. No wetlands were recorded during the survey although vegetation unit 1, Open Low Heath of *Frankenia pauciflora* and scattered *Sarcocornia blackiana* in reddish yellow sand in depressions in limestone outcrops is recorded in Department of Environmental Protection as a seasonal wetland.

A total of 59 vascular plant families, 104 genera and 121 taxa, of which 66 are endemic, were recorded. A total of 53 weed taxa was recorded of which 7 were rated as high and 29 as medium for their environmental impacts (Department of Conservation and Land Management, 1999). The dominant weeds were *\*Euphorbia terracina*, *\*Trachyandra divaricata*, *\*Pelargonium capitatum*, *\*Lagurus ovatus* and *\*Romulea rosea*. In addition 4 cultivated species were recorded in some of the rehabilitation areas. Two of the cultivated species *\*Eucalyptus utilis* and *\*Schinus terebinthifolia* have become naturalized in some parts of the bushland.

The area enclosed by Lease Road, Memorial Drive and Safety Bay Road has been burnt many times; the most recent was 5 years ago (B. Goodale, pers. comm.). Keating and Trudgen (1986) in their report state that this area was highly degraded. At the current survey the area was still degraded but has the species to redevelop the structure in time and if there is no further disturbance. Several species were recorded from this area that were not recorded in other vegetation units.

No priority flora, but 6 taxa considered to be significant for the Quindalup Dunes were recorded during the survey. One potential threatened ecological community, FCT 30a2, *Callitris preissii* (or *Melaleuca lanceolata*) forest and woodlands was recorded from three sites.

A total of 25 vegetation units were recorded, one of which was a degraded unit. The abundance of plants of *Pittosporum ligustrifolium* is not common in metropolitan Perth. Although not listed as a TEC the vegetation unit Closed Heath of *Pittosporum ligustrifolium* with *Acacia rostelifera* and *Scaevola nitida* over an Open Sedgeland of *Lepidosperma gladiatum* is unusual and therefore worthy of conservation.

A comparison between the vegetation units recorded by Keating and Trudgen (1986) with the current survey indicated that the *Olearia axillaris* shrubland was not recorded in 2005. In addition they recorded a *Templetonia retusa* open heath and a *Melaleuca huegelii* open heath, neither of which were observed in 2005 but a Closed Low Heath of *Melaleuca huegelii* var. *huegelii* and *Templetonia retusa* was recorded. These two vegetation units are indicated on the Keating and Trudgen map as occurring where the one identified in 2005 was recorded.

It is recommended that where rehabilitation is undertaken plants endemic to that section of the bushland should be planted. Where plantings are around car parks then plants endemic to the study area can be used even if not recorded from that exact location.

The overall conclusion is that the area has many environmental features that are worthy of conservation. For these reasons it was listed as a System 6 area and as a Bush Forever site.

## **1. INTRODUCTION**

### **1.1 Background**

Bennett Environmental Consulting Pty Ltd was contracted by Strategen to undertake a flora and vegetation survey of Point Peron, Bush Forever Site 355, within the City of Rockingham. Point Peron is included in the Rockingham Lakes Regional Park and also includes the Department of Conservation and Land Management Marine Reserve 5.

The area surveyed was to the west of Safety Bay Road between the coast and Boundary Road, then south along Arcadia Drive to its intersection with Penguin Road. Another Bush Forever Site 358 is across Safety Bay Road to the east of Bush Forever Site 355. These two provide an excellent linkage. In addition it is included in Greenways 1, 93 and 97 (Tingay and Associates, 1998).

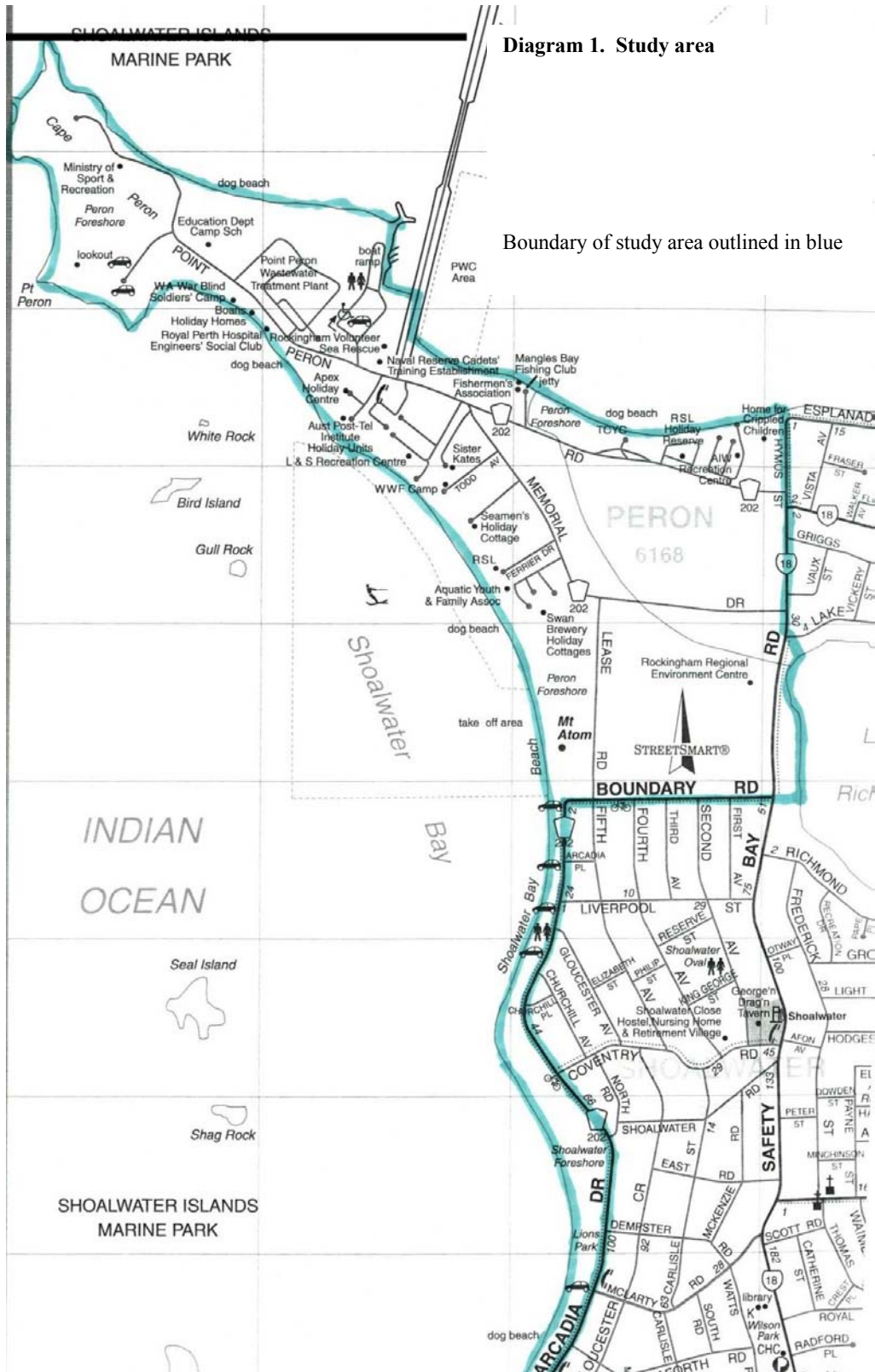
The total area of Bush Forever Site 355 is 174.5ha of which 106.1ha is bushland. The remaining 68.4ha consists predominantly of holiday cottages under sublease to various service groups, eg APEX, RSL. The Water Corporation has a treatment plant and the Education Department has a school camp. Remnants of vegetation are still present within some of the developed sites.

Reserve 30940, a drain from Lake Richmond to Mangles Bay bisects the area.

### **1.2 Scope of Works**

The requirements for this project were to:

- i. Undertake a botanical survey of the area stipulated.
- ii. Record the location of Declared Rare or Priority Flora.
- iii. Compare this survey with that of Keating and Trudgen (1986).
- iv. Map the vegetation.
- v. Map the vegetation condition.
- vi. Potential impacts of the proposed development.



## 2. REGIONAL BACKGROUND INFORMATION

### 2.1 Geology and Landform

One landform, the Quindalup unit was identified for the area (Churchward and McArthur, 1980). This unit consists of calcareous sands both as beach ridges and parabolic dunes. The Holocene beach and beach dunes are named the Safety Bay Sand (Biggs and Wilde, 1980). These overlie the Tamala Limestone and its derived sands and correspond to the Quindalup unit. The sand is made up of shell fragments (mainly foraminifer and mollusc) with various amounts of quartz and minor amounts of feldspar. Typically the carbonate content is in excess of 50% reaching 80% in places. The sand is slightly lithified below the dune surface in some areas. Deposition of the Safety Bay Sand is still continuing. The outcropping limestone cliffs are representative of the Spearwood Dunes.

### 2.2 Vegetation

Point Peron is in the Drummond Botanical Subdistrict of the Southwest Botanical Province (Beard, 1981). 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 of Point Peron as Scrub heath (xSZc), mixed shrubs and heathland, mainly Proteaceous and Myrtaceous. The pre-European extent of this vegetation was 57,809ha, of which 5,484ha remains vegetated which is 9.5% of the original area. Of the remaining vegetated area, 28.5% is protected in IUCN Class I-IV Reserves (Shepherd *et al.*, 2002).

Heddlé *et al.* (1980) in their study of the Darling System mapped the vegetation of Point Peron as in the Quindalup Complex. This vegetation complex is restricted to the coastal dunes and can be subdivided mainly into two alliances.

- i. The strand and foredune alliance contains *Angianthus cunninghamii*, *\*Arctotheca nivea*, *Atriplex isatidea*, *\*Cakile maritima*, *Calocephalus brownii*, *Carpobrotus virescens*, *\*Pelargonium capitatum*, *Senecio lautus*, *Spinifex longifolius* and *Tetragona implexicoma*.
- ii. The mobile and stable dune alliance contains *Acacia cyclops*, *Anthocercis littorea*, *Lepidosperma gladiatum*, *Myoporum insulare*, *Olearia axillaris*, *Scaevola crassifolia*, *Scaevola nitida*, *Spyridium globulosum* and *Wilsonia backhousei*.

The species composition of the vegetation varies from one place to another due to edaphic and topographical factors and the amount of shelter from the salt laden winds. In restricted localized pockets there are remnants of the once more widespread Low Closed Forest of *Melaleuca lanceolata* and *Callitris preissii*. Other localized remnants include occurrences of *Eucalyptus foecunda*, *Pittosporum ligustrifolium*, *Santalum acuminatum*, *Exocarpus sparteus* and *Acacia rostellifera*.

Bush Forever (Department of Environmental Protection, 2000) states that within the Swan Coastal Plain, 48% of the original area of the Quindalup Unit remains vegetated. This publication suggests that 20% of the original area of the Quindalup Unit be protected.

### 2.3 Previous Studies in the Area

Keating and Trudgen (1986) undertook an in-depth survey of Point Peron and Lake Richmond. For Point Peron they recorded the following 16 vegetation units:

- *Frankenia pauciflora*, *Sarcocornia blackiana*, *Wilsonia backhousei* Low Open Shrubland
- *\*Cakile maritima* Open Herbland
- *Spinifex longifolius* Open Grassland with *Tetragona decumbens*
- *Acacia rostellifera*, *Olearia axillaris* Shrubland with *Lepidosperma gladiatum*
- *\*Pelargonium capitatum* Low Closed heath with *\*Euphorbia terracina*
- *Templetonia retusa* Open Heath
- *Melaleuca huegelii* Open Heath
- *Olearia axillaris*, *Acacia rostellifera* Open – Closed Heath

- *Acacia rostellifera*, *Alyxia buxifolia* Open – Closed Heath
- *Olearia axillaris*, *Scaevola crassifolia*, *Tetragona decumbens* Low Shrubland with *Spinifex longifolius*
- *Acacia rostellifera*, *Melaleuca huegelii* Closed Scrub
- *Acacia rostellifera* Closed Scrub
- *Olearia axillaris* Shrubland
- Mixed *Calothamnus quadrifidus*, *Acacia rostellifera* Shrubland
- Mixed *Acacia rostellifera*, *Olearia axillaris* Open Scrub
- *Acanthocarpus preissii*, *Scaevola holosericea* Low Shrubland with *Lomandra maritima*

In Bush Forever (Department Environmental Protection, 2000) the above mapping is listed as the structural units at the site. The vegetation condition was assessed to be >50% very good to good; <50% degraded with areas of severe localized disturbance. A total of 69 native taxa are recorded and this is estimated to be 60% of the total flora.

The special attributes for this site are listed in Bush Forever as:

- Quindalup dunes – youngest dune, older dune and beach ridge plain;
- Continuing natural processes with the Quindalup dunes extending to 3.1km inland from the point;
- Shoreline varying between sandy and rocky;
- Contains Quindalup/Spearwood dunes (Tamala limestone) interface;
- Typical Quindalup/Spearwood vegetation units; and
- Fauna habitats.

## 2.4 Significant Flora

One Priority Flora, *Dodonaea hackettiana*, a Priority 4 flora has been recorded from the vicinity of Point Peron. *Dodonaea hackettiana* is an erect shrub or tree, 1–5 m high. The flowers are yellow, green and red, occurring between July and October. It grows in sand, often associated with outcropping limestone.

Priority 4 Flora are defined as “Taxa which are considered to have been adequately surveyed and which whilst being rare, are not currently threatened by any identifiable factors”.

No additional significant flora are listed in Bush Forever (Department of Environmental Protection, 2000) as occurring at Point Peron but there are 29 species listed as significant flora for the Quindalup Dunes.

## 3. METHODS

### 3.1 Field Methods

The remnant vegetation in the area was surveyed using the methods stated in the EPA Guidance No 51 (2004). All tracks were walked or driven where vehicle access was possible at some of the sublease areas. Good quality aerial photographs were provided prior to undertaking the field work so all access tracks were obvious.

Temporary 10m x 10m quadrats were set up using a compass and placed due N,S,E,W. Where the environment was fragile, as on the limestone outcrops, or where the vegetation unit was less than 10m wide eg *\*Cakile maritima* at the beach front, releves rather than quadrats were monitored. A relevee records all flora within a 5m radius or within a 10m transect.

The vegetation, flora and weed surveys were conducted concurrently. For each quadrat and relevee, 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 of quadrats and centre for relevees.
- 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.
- 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 age since fire, predators, erosion, weeds, grazing, tracks etc.
- All species will be listed together with their percentage cover within the quadrat or relevee 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 rare or priority flora specimens will be sent to the Western Australian Herbarium for inclusion in their collection.

### 3.2 Vegetation Units

The vegetation units recorded during the survey were described using the vegetation layers as given in Table 1. This is the accepted method for the Swan Coastal Plain.

**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

### 3.3 Vegetation Condition

The vegetation condition was also to be reported and the rating in Table 2 was used. This is the 6-point condition scale in Bush Forever.

**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.



### 3.4 Threatened Ecological Communities

Ecological communities are defined as naturally occurring biological assemblages that occur in a particular type of habitat (Department of Environmental Protection, 2000). English and Blythe (1997) have developed a procedure for identifying and assigning TEC's to one of four categories depending upon the threat to the community (Table 3).

**Table 3. Conservation categories for TEC recognised by CALM and Minister for the Environment (English and Blythe, 1997)**

CODE	DEFINITION
Presumed Totally Destroyed	An ecological community, which has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrences of it is likely to recover its species composition and/or structure in the foreseeable future.
Critically Endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally or limited distribution and is facing severe modification or destruction throughout its range but capable of being substantially restored or rehabilitated.
Endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.
Vulnerable	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

Commonwealth legislation also protects vegetation communities with the Environmental Protection and Biodiversity Conservation (EPBC) Act, 1999 (Environment Australia, 2005). Under this Act a person must not take an action that is likely to have a significant impact on a listed threatened ecological community without approval from the Minister for the Environment and Heritage. The definitions of these categories of TEC are listed in Table 4.

**Table 4. Conservation Categories for Threatened Ecological Communities under the EPBC Act, 1999**

CODE	DEFINITION
Critically Endangered	A community can be included in the Critically Endangered category if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	A community can be included in the Endangered category if, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
Vulnerable	A community can be included in the Vulnerable category if, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

Department of Environmental Protection (2000) did not assess the area to determine if there were any Threatened Ecological Communities for Point Peron.

## 4. RESULTS

Field work was undertaken over three days, 14<sup>th</sup>, 20<sup>th</sup> and 21<sup>st</sup> June 2005. By June most, if not all the weed species had germinated, so a vegetation condition assessment could be undertaken with confidence. Any native annual species should also have germinated but may

not have been in flower at the time of the survey. One of the objectives of the survey was to record the vegetation condition so this was readily assessed when the survey was undertaken.

A total of 38 quadrats/relevees were surveyed, but in addition, other locations of the same vegetation unit were also recorded, resulting in 67 GPS points being mapped. All sites are recorded in Appendix B. Those sites represented by PP and a number are where the quadrat was undertaken. Those with B, C etc after the number are additional sites where this vegetation unit was located.

#### 4.1 Vegetation Units

A total of 25 different vegetation units were recorded during the survey. Each description is followed by the site(s) representative of the unit.

##### Shoreline

**1. Open Low Heath of *Frankenia pauciflora* and scattered *Sarcocornia blackiana* in reddish yellow sand in depressions in limestone outcrops. (Sites PP2 and PP10)**

*Sporobolus virginicus* was often located in this vegetation unit.

This was the dominant vegetation on the edge of limestone outcrops at the Point. It was recorded on the north, west and south sides of the Point. For a full species list see Appendix A. This vegetation unit was recorded by Keating and Trudgen (1986) who also listed *Wilsonia backhousei* as a dominant species. This species was not recorded from the sites sampled.

**2. Very Open Herbland of *\*Cakile maritima* occasionally associated with *Carpobrotus virescens* and *\*Tetragonia decumbens* in cream sand. (Site PP7)**

This vegetation unit occurred as a very narrow strip along the sandy beaches just above the high water mark. It was recorded from the northern side of the point, but became a continuous vegetation unit on the southern side of Point Peron in Shoalwater Bay.

**3. Open Low Heath of *\*Tetragonia decumbens* and *Frankenia pauciflora* over grass weeds in brown sand with limestone outcropping. (Site PP9)**

This vegetation unit occurred behind vegetation unit 1 where sand was deeper and covered the limestone that was outcropping. There were only a few locations where this vegetation unit was recorded.

**4. Grassland of *Spinifex hirsutus* over a Low Shrubland of *\*Tetragonia decumbens* in cream sand. (Sites PP4, PP14 and PP36)**

This vegetation unit was restricted to a strip above vegetation unit 2 along a section of Shoalwater Bay.

##### Fore Dune

The vegetation of the foredunes varied considerably with aspect.

**5. Very Open to Open Grassland of *Spinifex longifolius* and Open Low Heath of *\*Pelargonium capitatum* in creamy yellow sand. (Sites PP20 and PP22)**

This vegetation unit was recorded on the northern side to the west of the Garden Island causeway and was dominant in the flat area above the shore line. A smaller more degraded area was recorded from an area above the beach to the north east of the tip. Two weeds *\*Euphorbia terracina* and *\*Trachyandra divaricata* were common in this vegetation unit.

**6. Open Low Heath of *Olearia axillaris* and *\*Pelargonium capitatum* over an Open Grassland of introduced species in cream sand. (Sites PP34, PP35 and PP37)**

This was the dominant vegetation on the seaside of the dune along Arcadia Drive. Scattered *Spinifex longifolius* also occurred in this unit.

**7. Open Low Heath of *Scaevola crassifolia* and *Olearia axillaris* over Grassland of introduced species in yellow sand. (Sites PP6 and PP28)**

This vegetation unit was recorded on the ocean side of the foredune on the southern and western sides of the Point.

**8. Open Shrubland of *Olearia axillaris* and *Acacia rostellifera* over a Low Shrubland of *Rhagodia baccata* and a Sedgeland of *Lepidosperma gladiatum* in yellow sand. (Site PP1)**

This was the dominant foredune vegetation at the north end. The density of *Acacia rostellifera* varied considerably forming dense areas in scattered locations.

**9. Open Heath of *Acacia rostellifera* over Sedgeland of *Lepidosperma gladiatum* over Grassland of weeds in brown sand. (Site PP11)**

The species associated with this unit were different to those recorded from Vegetation Unit 7. This vegetation unit was only recorded from a small area behind the northeast tip of Point Peron.

**10. Tall Open Shrubland of *Acacia rostellifera* over an Open Heath of mixed species dominated by *Spyridium globulosum* and *Alyxia buxifolia* in yellow sand above a limestone knoll. (Site PP18)**

This vegetation unit was only recorded from a small area to the east of the north west point. Scattered low trees of *Eucalyptus gomphocephala* were common in this unit.

**11. Closed Tall Scrub of *Acacia rostellifera* over a Low Shrubland dominated by *Olearia axillaris* and *Rhagodia baccata* over a Herbland/Grassland of weeds in dark brown sand over yellow sand. (Site PP38)**

This was the dominant taller vegetation unit along Arcadia Drive. It occurred directly behind the foredunes.

**Stable Dune**

**12. Low Shrubland of *\*Pelargonium capitatum* and Herbland of *Acanthocarpus preissii* over a Grassland/Herbland of introduced species. (Site PP 33)**

This was regenerating Open Shrubland in the lease area after a fire five years previously. The variety of species recorded was extensive.

**13. Closed Tall Scrub to Open Heath of *Acacia rostellifera* over an Open Low Heath of mixed species or a Closed Grassland of introduced species. (Sites PP3, PP5, PP17, PP19, PP24)**

Within this vegetation unit there were several small areas of diverse understorey vegetation. These are listed below:

- Open Low Heath dominated by *Phyllanthus calycinus*, *\*Pelargonium capitatum*, *Diplolaena dampieri* over a Sedgeland of *Lomandra maritima* and *Lepidosperma gladiatum*. (Site PP3)
- Closed Herbland of *\*Euphorbia terracina*. This occurred where the tall *Acacia rostellifera* nearly formed a closed canopy. (PP17)
- *Scaevola nitida*, together with *Acacia rostellifera* formed a Closed Tall Scrub. (PP19, PP24)
- Scattered to dense plants of *Pittosporum ligustrifolium* (PP5F)
- Scattered plants of *Melaleuca huegelii* var. *huegelii* (PP5G)
- Large number of *\*Eucalyptus utilis* (PP5D)
- Scattered trees to small stands of Tuarts (*Eucalyptus gomphocephala*) occurred scattered through areas of this Vegetation Unit

**14. Closed Heath of *Acacia rostellifera* and *Alyxia buxifolia* over an Open Herbland/Grassland of introduced species in yellow brown sand. (Site PP13)**

This vegetation unit was considered by Keating and Trudgen (1986) to be the dominant one through the stable dunes. Typically scattered plants of *Alyxia buxifolia* were associated with Vegetation Unit 13 but on the southern side of the Point where Vegetation Unit 14 was recorded the two species were present in equal cover.

- 15. Closed Tall Scrub of *Acacia rostellifera* over Open Shrubland of *Rhagodia baccata* and a Very Open Grassland of introduced species in cream sand. (Site PP23, PP25)**  
 This vegetation unit forms a dense area immediately behind the foredune along the northern coast line. \**Schinus terebinthifolia* was often a common component of this vegetation unit.
- 16. Closed Tall Scrub of *Acacia rostellifera* and *Olearia axillaris* over an Open Sedgeland of *Lomandra maritima* in yellow sand. (Site PP32)**  
 This was regenerating bushland after a fire about 5 years previously. There were some areas around the perimeter where the *Acacia rostellifera* reached up to 4m in height. It was the taller vegetation of the lease area.
- 17. Closed Low Heath of *Melaleuca huegelii* var. *huegelii* and *Templetonia retusa* over a Grassland/Herbland of weeds in brown sand. (Site PP8)**  
 Only recorded from this one crest although both species were recorded elsewhere in the study area. Area had been burnt within the last 3 years.
- 18. Closed Heath of *Pittosporum ligustrifolium* with *Acacia rostellifera* and *Scaevola nitida* over an Open Sedgeland of *Lepidosperma gladiatum* in brown sand. (Site PP12)**  
 The best example of this vegetation unit was recorded behind the northwest corner of the Point but it was also recorded around the rocky edge at the southeast corner and in an area close to the southern car park.
- 19. Shrubland of *Melaleuca huegelii* var. *huegelii* and *Melaleuca lanceolata* over Herbland of *Senecio pinnatifolius* and Grassland of introduced species in yellow sand. (Site PP15)**  
 The area surveyed at Site PP15 appeared to have been rehabilitated within the last 10 years but there were remnants of this unit in the surrounding vegetation. *Templetonia retusa* was also recorded at the GPS point, PP15B.
- 20. Closed Tall Scrub of *Melaleuca huegelii* var. *huegelii* over Low Shrubland of *Rhagodia baccata* and *Scaevola nitida* in pale yellow sand. (Site PP30)**  
 This was a small area on the crest of a small stable dune. The same unit was recorded in the same vicinity but lower on the landscape.
- 21. Low Open Forest of *Eucalyptus gomphocephala* over Shrubland of *Acacia rostellifera* over Herbland/Grassland of introduced species in yellow brown sand. (Sites PP16 and PP26)**  
 This was a small area at the south western side of the point (PP16) and a remnant but degraded site in the Water Corporation land (PP26).
- 22. Closed Forest of *Melaleuca lanceolata* and *Callitris preissii* over mulch in yellow sand. (Site PP21)**  
 This vegetation unit occurred on the western side of an oval on the Education Department land.
- 23. Closed Forest of *Agonis flexuosa* var. *flexuosa* over Sedgeland of *Lepidosperma gladiatum* in grey sand. (Site PP27)**  
 This vegetation unit was only recorded on the verge in front of the Water Corporation. On the other side of Point Peron Road there were a group of Tuarts with the understorey completely removed and the area used as a car park.
- 24. Open Forest of *Eucalyptus gomphocephala* over Low Open Forest of *Agonis flexuosa* var. *flexuosa*, *Callitris preissii* and *Melaleuca lanceolata* over a Herbland of introduced species in grey sand. (Site PP31)**  
 This vegetation unit occurred close to the intersection of Safety Bay and Boundary Roads. \**Schinus terebinthifolia* was common in some areas.  
**NOTE:** This vegetation unit occurred to the western side of an oval. The northern perimeter of the oval has been planted with *Eucalyptus gomphocephala*, *Agonis*

*flexuosa* var. *flexuosa* and *Callitris preissii* and although many are tall they are still in drums. This perimeter planting has not been included as this vegetation unit.

#### Degraded Area

#### 25. Closed Grassland of \**Hyparrhena hirta* over Herbland of \**Oxalis pes-caprae* in grey sand. (Site PP29)

This was a small area on the corner of Hymus and Point Peron Roads. Scattered very small areas were also recorded near to the lease area.

## 4.2 Comparison With Previous Vegetation Survey

Keating and Trudgen (1986) recorded 16 vegetation units from Point Peron when they undertook their survey.

Table 5 compares the Keating and Trudgen (1986) vegetation units with those recorded during this survey. One of the units recorded by Keating and Trudgen (1986) was not recorded during the current survey. An additional two units were not recorded individually during the 2005 survey but as a combined unit. Keating and Trudgen did not record any of the taller vegetation units recorded in the 2005 survey. Bennett Environmental Consulting Pty Ltd recorded 5 of the taller units (Vegetation Units 19, 21-24) and a completely degraded unit (Vegetation Unit 25).

**Table 5. Comparison between the vegetation units recorded in 1986 and 2005**

Keating and Trudgen (1986)	Bennett Environmental Consulting Pty Ltd (2005)
<i>Frankenia pauciflora</i> , <i>Sarcocornia blackiana</i> , <i>Wilsonia backhousei</i> Low Open Shrubland	Open Low Heath of <i>Frankenia pauciflora</i> and scattered <i>Sarcocornia blackiana</i> – Vegetation Unit 1 AND Open Low Heath of * <i>Tetragonia decumbens</i> and <i>Frankenia pauciflora</i> - Vegetation Unit 3
* <i>Cakile maritima</i> Open Herbland	Very Open Herbland of * <i>Cakile maritima</i> – Vegetation Unit 2
<i>Spinifex longifolius</i> Open Grassland with <i>Tetragonia decumbens</i>	Grassland of <i>Spinifex hirsutus</i> over a Low Shrubland of * <i>Tetragonia decumbens</i> - Vegetation Unit 4
<i>Acacia rostellifera</i> , <i>Olearia axillaris</i> Shrubland with <i>Lepidosperma gladiatum</i>	Open Shrubland of <i>Olearia axillaris</i> and <i>Acacia rostellifera</i> over a Low Shrubland of <i>Rhagodia baccata</i> and a Sedgeland of <i>Lepidosperma gladiatum</i> - Vegetation Unit 8 AND Open Heath of <i>Acacia rostellifera</i> over Sedgeland of <i>Lepidosperma gladiatum</i> over Grassland of weeds – Vegetation Unit 9
* <i>Pelargonium capitatum</i> Low Closed heath with * <i>Euphorbia terracina</i>	Open Low Heath of <i>Olearia axillaris</i> and * <i>Pelargonium capitatum</i> over an Open Grassland –Vegetation Unit 5 AND Very Open to Open Grassland of <i>Spinifex longifolius</i> and Open Low Heath of * <i>Pelargonium capitatum</i> – Vegetation Unit 7
<i>Templetonia retusa</i> Open Heath	Not recorded individually but in this combination. Closed Low Heath of <i>Melaleuca huegelii</i> var. <i>huegelii</i> and <i>Templetonia retusa</i> over a Grassland/Herbland of weeds – Vegetation Unit 17
<i>Melaleuca huegelii</i> Open Heath	
<i>Olearia axillaris</i> , <i>Acacia rostellifera</i> Open – Closed Heath	Closed Tall Scrub of <i>Acacia rostellifera</i> and <i>Olearia axillaris</i> over an Open Sedgeland of <i>Lomandra maritima</i> – Vegetation Unit 16

Keating and Trudgen (1986)	Bennett Environmental Consulting Pty Ltd (2005)
<i>Acacia rostellifera</i> , <i>Alyxia buxifolia</i> Open – Closed Heath	Tall Open Shrubland of <i>Acacia rostellifera</i> over an Open Heath of mixed species dominated by <i>Spyridium globulosum</i> and <i>Alyxia buxifolia</i> – Vegetation Unit 10 <b>AND</b> Closed Tall Scrub to Open Heath of <i>Acacia rostellifera</i> over an Open Low Heath of mixed species – Vegetation Unit 13 <b>AND</b> Closed Heath of <i>Acacia rostellifera</i> and <i>Alyxia buxifolia</i> over an Open Herbland/Grassland of introduced species – Vegetation Unit 14 <b>AND</b> Closed Heath of <i>Pittosporum ligustrifolium</i> with <i>Acacia rostellifera</i> and <i>Scaevola nitida</i> over an Open Sedgeland of <i>Lepidosperma gladiatum</i> – Vegetation Unit 18
<i>Olearia axillaris</i> , <i>Scaevola crassifolia</i> , <i>Tetragona decumbens</i> Low Shrubland with <i>Spinifex longifolius</i>	Open Low Heath of <i>Scaevola crassifolia</i> and <i>Olearia axillaris</i> – Vegetation Unit 6
<i>Acacia rostellifera</i> , <i>Melaleuca huegelii</i> Closed Scrub	Closed Tall Scrub of <i>Melaleuca huegelii</i> var. <i>huegelii</i> over Low Shrubland of <i>Rhagodia baccata</i> and <i>Scaevola nitida</i> – Vegetation Unit 20
<i>Acacia rostellifera</i> Closed Scrub	Closed Tall Scrub of <i>Acacia rostellifera</i> over Open Shrubland of <i>Rhagodia baccata</i> and a Very Open Grassland of introduced species – Vegetation Unit 15
<i>Olearia axillaris</i> Shrubland	Not Located
Mixed <i>Calothamnus quadrifidus</i> , <i>Acacia rostellifera</i> Shrubland	Closed Tall Scrub of <i>Acacia rostellifera</i> and <i>Olearia axillaris</i> over an Open Sedgeland of <i>Lomandra maritima</i> – Vegetation Unit 16. A few plants of <i>Calothamnus quadrifidus</i> were located in some areas of this unit.
Mixed <i>Acacia rostellifera</i> , <i>Olearia axillaris</i> Open Scrub	Closed Tall Scrub of <i>Acacia rostellifera</i> over a Low Shrubland dominated by <i>Olearia axillaris</i> and <i>Rhagodia baccata</i> over a Herbland/Grassland of weeds – Vegetation Unit 11
<i>Acanthocarpus preissii</i> , <i>Scaevola holosericea</i> Low Shrubland with <i>Lomandra maritima</i>	Low Shrubland of <i>*Pelargonium capitatum</i> and Herbland of <i>Acanthocarpus preissii</i> over a Grassland/Herbland of introduced species Vegetation Unit 12

Note that the 2005 survey only found scattered plants of *Calothamnus quadrifidus* in the area, so the Mixed *Calothamnus quadrifidus*, *Acacia rostellifera* Shrubland of Keating and Trudgen (1986) appears to have stabilized to the Closed Tall Scrub of *Acacia rostellifera* and *Olearia axillaris* over an Open Sedgeland of *Lomandra maritima* (2005 survey). This accounts for Vegetation Unit 16 appearing twice in the above table.

### 4.3 Floristic Community Types

The Floristic Community Type (FCT) 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 and in Bush Forever (Department of Environmental Protection, 2000). Gibson *et al.* (1994) provide a 2-way table where the species that occur with a frequency of at least 50% are recorded for each Floristic Community Type.

<b>FCT 16</b>	<b>Highly saline seasonal wetlands.</b> Vegetation Units 1 and 3
<b>FCT 29a</b>	<b>Coastal shrublands on shallow sands</b> Vegetation Units 2, 8, 9, 10, 11, 12, 15
<b>FCT 29b</b>	<b>Acacia shrublands on taller dunes</b> Vegetation Units 13, 14, 16, 17, 18, 20
<b>FCT S13</b>	<b>Northern <i>Olearia axillaris</i> – <i>Scaevola crassifolia</i> shrublands</b> Vegetation Unit 6 and 7
<b>FCT S14</b>	<b><i>Spinifex longifolius</i> grasslands and low shrublands</b> Vegetation Units 4 and 5
<b>FCT 30a</b>	<b><i>Callitris preissii</i> (or <i>Melaleuca lanceolata</i>) forest and woodlands</b> Vegetation Units 19?, 22 and 24
<b>FCT 30b</b>	<b>Quindalup <i>Eucalyptus gomphocephala</i> and/or <i>Agonis flexuosa</i> woodlands</b> Vegetation Units 21 and 23
<b>FCT S15</b>	<b>Weed Group</b> Vegetation Unit 25

#### 4.4 Vegetation of Conservation Significance

FCT 30a, *Callitris preissii* (or *Melaleuca lanceolata*) forest and woodlands is a Threatened Ecological Community listed by (English, 2002) as endangered (See Table 3). However the dense stand of this community observed in the Education Department area, Site PP21, was completely devoid of all understorey vegetation. The stand is worthy of conservation but does not really qualify as a Threatened Ecological Community due to its degraded state. The Education Department should be informed of its value to ensure that trees are not removed.

None of the other vegetation units are listed as Threatened Ecological Communities. In Gibson *et al.* (1994) they rate the reservation and conservation status of each FCT that is described. FCT 16 is listed as poorly reserved (known from a single A class National Park or Nature Reserve) and vulnerable (a community likely to move into the endangered category in the near future if the causal factors continue operating), both FCT 29a and 29b as poorly reserved and susceptible (a community of concern because there is evidence that it can be modified or destroyed by human activities, or would be vulnerable to new threatening processes), 30b as well reserved (known from 2 or more A class National Parks or Nature Reserves) and susceptible. The other FCT's, S13 and S14 are not listed in this publication.

Although not listed as a Threatened Ecological Community or by Gibson *et al.* (1994) the Closed Heath of *Pittosporum ligustrifolium* with *Acacia rostellifera* and *Scaevola nitida* over an Open Sedgeland of *Lepidosperma gladiatum* is unusual in metropolitan Perth. It should be conserved as it is worthy of conservation

As the dominant vegetation unit at the site is FCT29b, the vegetation of the survey area can therefore be considered as significant, if the conservation status of Gibson *et al.* (1994) is applied. However the only areas listed as Threatened Ecological Communities (English, 2002) were too small and too degraded to be considered of conservation status.

#### 4.5 Vegetation Condition

The vegetation condition was recorded for each site surveyed (See Appendix B) and is mapped in Appendix C. The dominant problem weed throughout the whole area was *Euphorbia terracina* being recorded from nearly every site. Even though this species was common the vegetation structure in many areas was intact, so typically the vegetation ranged from very good to good but with several areas degraded and completely degraded. The lease site, which in the 1986 survey was regarded as degraded is recovering well. There are the basics of the vegetation units developing and several species were recorded from that area that were not recorded elsewhere eg *Calothamnus quadrifidus*. It is anticipated that with time, that the vegetation will continue to recover and develop into a dense shrubland.

The completely degraded sites were those where there are holiday homes and other infrastructures or where fires have occurred at very frequent intervals. With time, and with no further disturbance, it would be expected that a lot of the good to degraded areas would improve in vegetation condition.

The Department of Conservation and Land Management are undertaking restoration projects at Point Peron itself with reasonable success. When plantings do occur it is essential that species relevant to the vegetation of the area are used. *Callitris preissii* had been planted around some of the car parks, but it was not recorded from the area. If it is planted as an aesthetic surround to the car park it is successful but if it is intended to blend in with the surrounding vegetation this will not be achieved. Similarly some areas have been planted with *Atriplex isatidea*, a species not recorded as occurring naturally anywhere else during the survey.

#### 4.6 Species Recorded

The names allocated to the taxa were confirmed using the database Max (Western Australian Herbarium, (2005b).

A total of 59 vascular plant families, 104 genera and 121 taxa, of which 66 are endemic, were recorded during the survey. The dominant four families are: Poaceae with 12 genera, 16 taxa of which 8 are introduced; Asteraceae with 11 genera and 11 taxa of which 8 are introduced; Myrtaceae with 5 genera and 9 taxa of which 1 is introduced and 3 are planted; and Papilionaceae with 6 genera and 6 taxa of which 2 are weeds. These four families represent 8.7% of the total number of families, 35.4% of the total number of genera and 37% of the taxa. A total of 69 native taxa were estimated by Department of Environmental Protection to have been recorded by Keating and Trudgen (1986). With the current survey a total of 58 endemic species were recorded.

The survey was undertaken after the annual species had commenced to germinate but many were still too small for positive identification. To obtain a more comprehensive species list a spring survey would be required. As weeds had germinated it did allow a more accurate assessment of the condition of the area.

#### 4.7 Significant Species

*Dodonaea hackettiana*, the only priority flora recorded for the area was not recorded during the survey. This taxon is a shrub and would have been visible at the time of the survey. Bush Forever (Department of Environmental Protection, 2000) lists species that are considered significant to the Quindalup Dunes for their geographical variation. Species recorded and listed in Bush Forever are set out in Table 6 below.

**Table 6. Significant species for the Quindalup Dunes (Department of Environmental Protection, 2000)**

SPECIES	SIGNIFICANCE CATEGORY	SITE NUMBER	FCT
<i>Agonis flexuosa</i> var. <i>flexuosa</i>	At northern extension of known range; Significant population	PP23, PP24	FCT30b
<i>Allocasuarina lehmanniana</i>	Significant population	PP19	FCT 29a
<i>Callitris preissii</i>	Significant population; <b>Endemic to Swan Coastal Plain in Perth metropolitan area</b>	PP22, PP24	FCT30a2
<i>Diplolaena dampieri</i>	At northern extension of known range; Significant population	PP3, PP24	FCT29a
<i>Hibbertia cuneiformis</i>	At northern extension of known range; Significant population	PP38	FCT29a



SPECIES	SIGNIFICANCE CATEGORY	SITE NUMBER	FCT
<i>Melaleuca lanceolata</i>	Disjunct population; Significant population	PP19, PP22 and PP24	FCT30a2

Six species considered to be of significance for the Quindalup dunes in metropolitan Perth were recorded.

#### 4.8 Introduced Species (Weeds)

A total of 53 weeds (45% of the total number of taxa) were recorded during the survey, all of which have all been determined as weeds by the Department of Conservation and Land Management (1999). In addition four cultivated species and a group of unidentifiable grasses were also recorded. 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 7. Weeds recorded during the survey classified according to CALM (1999)**

SCIENTIFIC NAME	COMMON NAME	CALM RATING	INVASIVENESS	IMPACTS
* <i>Euphorbia terracina</i>	Geraldton carnation weed	High	✓	✓
* <i>Hyparrhenia hirta</i>	Tambookie grass	High	✓	✓
* <i>Lagurus ovatus</i>	Hare's tail grass	High	✓	✓
* <i>Leptospermum laevigatum</i>	Victorian teatree	High	✓	✓
* <i>Malva dendromorpha</i>	Tree mallow	High	✓	✓
* <i>Pelargonium capitatum</i>	Rose pelargonium	High	✓	✓
* <i>Romulea rosea</i>	Guildford grass	High	✓	✓
* <i>Anagallis arvensis</i>	Pimpernel	Moderate	✓	
* <i>Arctotheca calendula</i>	Cape weed	Moderate	✓	
* <i>Avena barbata</i>	Bearded oat	Moderate	✓	
* <i>Cakile maritima</i>	Sea rocket	Moderate	✓	
* <i>Crassula glomerata</i>		Moderate	✓	
* <i>Cuscuta epithimum</i>	Dodder	Moderate	✓	
* <i>Cynodon dactylon</i>	Couch grass	Moderate	✓	
* <i>Cyperus congestus</i>	Dense flat sedge	Moderate	✓	
* <i>Disa bracteata</i>	South African orchid	Moderate	✓	
* <i>Ehrharta longiflora</i>	Annual veldt grass	Moderate	✓	
* <i>Erodium</i> sp.		Moderate	✓	
* <i>Euphorbia paralias</i>	Sea spurge	Moderate	✓	
* <i>Euphorbia peplus</i>	Petty spurge	Moderate	✓	
* <i>Ficus carica</i>	Fig	Moderate	✓	
* <i>Hypochaeris glabra</i>	Flat weed	Moderate	✓	
* <i>Lantana camara</i>	Lanatana	Moderate	✓	
* <i>Oenothera drummondii</i>	Beach evening primrose	Moderate	✓	
* <i>Olea europaea</i>	Olive	Moderate	✓	

SCIENTIFIC NAME	COMMON NAME	CALM RATING	INVASIVENESS	IMPACTS
* <i>Parentucellia</i> sp.	Bartsia	Moderate	✓	
* <i>Pennisetum clandestinum</i>	Kikuyu	Moderate	✓	
* <i>Physalis peruviana</i>	Cape gooseberry	Moderate	✓	
* <i>Rhamnus alaternus</i>	Buckthorn	Moderate	✓	
* <i>Schinus terebinthifolia</i>	Japanese pepper tree	Moderate	✓	
* <i>Solanum nigrum</i>	Black berry nightshade	Moderate	✓	
* <i>Sonchus oleraceus</i>	Sow thistle	Moderate	✓	
* <i>Stenotaphrum secundatum</i>	Buffalo grass	Moderate	✓	
* <i>Symphytotrichum subulatum</i>	Bushy starwort	Moderate	✓	
* <i>Tetragonia decumbens</i>	Sea spinach	Moderate	✓	
* <i>Ursinia anthemoides</i>	Ursinia	Moderate	✓	
* <i>Asphodelus fistulosus</i>	Wild onion	Mild		
* <i>Fumaria capreolata</i>	White fumitory	Mild		
* <i>Oxalis corniculata</i>	Yellow wood sorrel	Mild		
* <i>Oxalis pes-caprae</i>	Sour sob	Mild		
* <i>Phytolacca octandra</i>	Ink weed	Mild		
* <i>Raphanus raphanistrum</i>	Wild radish	Mild		
* <i>Rumex</i> sp.	Dock	Mild		
* <i>Trachyandra divaricata</i>	Onion weed	Mild		
* <i>Trifolium</i> sp.	Clover	Mild		
* <i>Ammophila arenaria</i>	Marram grass	Low		
* <i>Arctotis stoechadifolia</i>	White arctotis	Low		
* <i>Conyza parva</i>	Fleabane	Low		
* <i>Gazania linearis</i>	Gazania	Low		
* <i>Geranium molle</i>	Dove's foot cranebill	Low		
* <i>Medicago</i> sp	Medic	Low		
* <i>Plantago lanceolata</i>	Ribwort plantain	Low		
Annual grasses				
* <i>Eucalyptus utilis</i>	Coastal Moort	Cultivated		
* <i>Melaleuca diosmifolia</i>		Cultivated		
* <i>Melaleuca nesophila</i>	Mindiyed	Cultivated		
* <i>Westringia fruticosa</i>	Westringia	Cultivated		

The above table includes species that had been planted as part of the rehabilitation, mainly at the leased areas. Where cultivated plants had been planted to increase the aesthetic appeal around buildings etc these were not recorded. Many of the caretaker residences had several ornamental plants included in gardens.

Seven of the weeds are rated as High three of which, *\*Euphorbia terracina*, *\*Pelargonium capitatum* and *\*Romulea rosea* were widespread through the area. *\*Lagurus ovatus* is possibly dominant in the area. Most of the grass seedlings were too small for positive identification but the old flowering heads were still visible at one site. These weeds that are rated high should be targeted for removal. Another common weed in the area was *\*Trachyandra divaricata*, which is rated as mild, but this weed is aggressive in interdunal beach heathland (Hussey *et al.*, 1997) and in this situation should also be considered for removal. No *\*Asparagus asparagoides* (Bridal creeper) was recorded during the survey and this was confirmed by B. Goodale (pers. comm.)

## 5. DISCUSSION

### 5.1 General

The geology of the study area included sandy beaches, rocky headlands foredunes and stable dunes. There is also an artificial channel between Lake Richmond (to the east of the study area) and Cockburn Sound. No wetlands were recorded during the survey although vegetation

unit 1, Open Low Heath of *Frankenia pauciflora* and scattered *Sarcocornia blackiana* in reddish yellow sand in depressions in limestone outcrops is recorded in Department of Environmental Protection (2000) as a seasonal wetland. A total of 25 different vegetation units were described reflecting the variation in the geology and landform of the area.

A total of 59 vascular plant families, 104 genera and 121 taxa, of which 66 are endemic, were recorded during the survey which was less than the 69 native taxa inferred by Department of Environmental Protection (2000) from the Keating and Trudgen 1986 survey. No date for this survey is provided in their report but as the report was prepared in October, it is likely the survey was undertaken in August/September.

A total of 53 weed taxa, was recorded of which 7 were rated as high and 29 as medium for their environmental impacts (Department of Conservation and Land Management, 1999). The dominant weeds were *\*Euphorbia terracina*, *\*Trachyandra divaricata*, *\*Pelargonium capitatum*, *\*Lagurus ovatus* and *\*Romulea rosea*. In addition 4 cultivated species were recorded in some of the rehabilitation areas. *\*Eucalyptus utilis* appeared to have become naturalized in the *Acacia rostellifera* areas at the northwestern end of the point. This is a species that occurs naturally in coastal regions from Albany to east of Esperance so the environment at Point Peron would be ideally suited for its establishment. *\*Schinus terebinthifolia* has also become naturalized in some parts of the bushland. B. Goodale (pers. comm.) said that CALM is attempting to remove and have lease holders remove *\*Schinus terebinthifolia* trees. It would appear that birds spread the bright red berries of this species. Fewer disturbances to the remnant vegetation were recorded at the Point than around the developed and leased areas.

*\*Euphorbia paralias*, a common weed along beaches in the south coastal regions of Western Australia, was recorded above the strand line at some locations. At present there are not many of these plants so consideration should be given to their removal. This weed has become a dominant vegetation unit in some of the more southern areas.

The area enclosed by Lease Road, Memorial Drive and Safety Bay Road has been burnt many times; the most recent was 5 years ago (B. Goodale, pers. comm.). Keating and Trudgen in their report state that this area was highly degraded. At the current survey the area was still degraded but has the species to redevelop the structure in time and if there is no further disturbance. Several species were recorded from this area that were not recorded in other vegetation units. They also recorded a vegetation unit, Mixed *Calothamnus quadrifidus*, *Acacia rostellifera* Shrubland, which was not recorded during the current survey. A few plants of *Calothamnus quadrifidus* were recorded from this area but not in the density recorded in 1986. This reduction in the number of *Calothamnus quadrifidus* could be due to the several fires that have ravaged this area since that survey.

No priority flora, but 6 taxa considered to be significant for the Quindalup Dunes were recorded during the survey. One potential Threatened Ecological Community, FCT30a2, *Callitris preissii* (or *Melaleuca lanceolata*) forest and woodlands was recorded from three sites. The site with the largest trees of these species had the understorey replaced with mulch, another was a juvenile community which appeared to have been rehabilitated and the third has only a few trees of these species, with *Eucalyptus gomphocephala* being the dominant tree species. Therefore none of the sites located during this survey can be listed as examples of the Threatened Ecological Community, but all should be conserved as they do represent a valuable remnant of a potential TEC.

A total of 25 vegetation units were recorded, one of which was a degraded unit. The abundance of plants of *Pittosporum ligustrifolium* is not common in metropolitan Perth. Although not listed as a TEC the vegetation unit Closed Heath of *Pittosporum ligustrifolium* with *Acacia rostellifera* and *Scaevola nitida* over an Open Sedgeland of *Lepidosperma gladiatum* is unusual and therefore worthy of conservation. The area has been fenced by CALM. Very few plants of *Pittosporum ligustrifolium* were recorded away from the Point.

A comparison between the vegetation units recorded by Keating and Trudgen with the current survey indicated that the *Olearia axillaris* shrubland was not recorded in 2005. In addition

they recorded a *Templetonia retusa* open heath and a *Melaleuca huegelii* open heath, neither of which were observed in 2005 but a Closed Low Heath of *Melaleuca huegelii* var. *huegelii* and *Templetonia retusa* was recorded. The two vegetation units are indicated on the Keating and Trudgen map as occurring where the one identified in 2005 was recorded.

Where rehabilitation is undertaken plants endemic to that section of the bushland should be planted. Where plantings are around car parks then plants endemic to the study area can be used even if not recorded from that exact location.

## 5.2 Potential Impact of Proposed Development

A marina is proposed for the area bounded by Safety Bay Road to the east, Memorial Drive to the south, causeway to the Naval Base on the west and Mangles Bay to the north. Sections of this area are currently developed as a caravan park, fishing club etc.

There was one vegetation unit and one variation of a vegetation unit recorded from this area that was not recorded elsewhere on the site. The vegetation unit was the Open Forest of *Eucalyptus gomphocephala* over Low Open Forest of *Agonis flexuosa* var. *flexuosa*, *Callitris preissii* and *Melaleuca lanceolata* over a Herbland of introduced species. The variation of a vegetation unit was the Closed Tall Scrub of *Acacia rostellifera* over Open Shrubland of *Rhagodia baccata*, which included a dense stand of tall *Melaleuca huegelii* subsp. *huegelii* at the water's edge where the drain enters the ocean at Mangles Bay. This unit was recorded elsewhere during the survey but the habitat in this proposed development area was unique.

The first of these vegetation units is inferred to be an example of FCT30a, a Threatened Ecological Community (VU24, Figure 2 in Appendix C). Only a few areas of FCT30a were recorded during the survey but where the development is proposed the greatest number of native taxa were recorded (see Appendix A). Three of the dominant species in this vegetation unit, *Agonis flexuosa* var. *flexuosa*, *Callitris preissii* and *Melaleuca lanceolata*, are considered to be of significance for the Quindalup Dunes (see Table 6). Floristic community type 30a is restricted to a small area from Perth to Garden Island. Frequent fires and urban development have reduced the area of this FCT, but the extent of this FCT prior to European settlement is unknown. The best example of FCT30a is found on Garden Island (Gibson *et.al.*, 1994) due to the no burn policy and a native Tammar population which have reduced the impact of weeds. Tuart Woodlands are recorded within the region (Department of Conservation and Land Management, 2004) although these are all further inland than at the study area eg Rockingham Lakes Regional Park, east of Patterson Road.

The second vegetation unit, the Closed Tall Scrub of *Acacia rostellifera* over Open Shrubland of *Rhagodia baccata* included a dense stand of tall *Melaleuca huegelii* subsp. *huegelii*. *Melaleuca huegelii* subsp. *huegelii* combined with *Acacia rostellifera* was recorded in several areas of the study site, but elsewhere it was not as tall or recorded in the same habitat ie. on the vegetated beach edge.

Most of the area proposed for development is Closed Tall Scrub of *Acacia rostellifera* and *Olearia axillaris* over an Open Sedgeland of *Lomandra maritima* or Low Shrubland of *\*Pelargonium capitatum* and Herbland of *Acanthocarpus preissii* over a Grassland/Herbland of introduced species. These vegetation units have been severely disturbed, the most recent was a fire about 3 years ago. In Keating and Trudgen (1986) the proposed development area is discussed under commented the vegetation in the area of the Boundary Road – Point Peron Road, dune/swale complex. In their report they noted the highly degraded nature of this area but the current survey recording that the vegetation condition was good so it has improved the last 30 years. If no further disturbance occurred this area would over time regenerate back naturally to a vegetation unit resembling the natural vegetation. These same vegetation units occur to the south of Memorial Drive where the vegetation is also regenerating well.

The remnant vegetation of the proposed development area was assessed to be in good vegetation condition (the vegetation structure significantly altered by very obvious signs of multiple disturbances but it retains basic vegetation structure or has the ability to regenerate it). Only small areas were considered to be in degraded vegetation condition due to public access, clearing for

infrastructure, road and track edges. A few, tall but scattered *Eucalyptus gomphocephala* trees occurred along the road verge. There were several tracks though the area, most of which were well used by local residents. The edges of these were typically in poorer condition than the vegetation further away, but if closed could regenerate over time. The vegetation along the drain that bisects the area blended with the surrounding vegetation and in some sections included weedy area, but mostly was in good vegetation condition.

Areas of the same vegetation condition were common throughout the study area but those in better condition (very good or excellent) were recorded some distance to the west (see Figure 3, Appendix C). The same vegetation unit to the south of Memorial Drive recorded the same vegetation condition ie good as that within the proposed development area.

With infrastructure development inside the perimeter of the development area the plant community structure will be destroyed, but provided development guidelines are prepared and adhered to, it should not pose a threat to nearby vegetation. Improvement of nearby vegetation by weed removal and appropriate plantings would be beneficial on any nearby leases not renewed.

Specific weeds that should be considered for removal from the proposed development are:

- Trees of *\*Schinus terebinthifolia*. These trees were common in several areas of the site, including some of the lease areas on Shoal Water Bay, Education Department and Water Corporation land. It is essential that these plants not be allowed to become established in the CALM administered area.
- Plants of *\*Euphorbia terracina* and *\*Trachyandra divaricata*. Many weeds do not continue to survive once the shrub layer is dense, but these weeds are an exception. They were common throughout the whole study area and are both common weeds of coastal metropolitan Perth.
- *\*Euphorbia paralias* was only recorded from a few sections along the coast. This has become a common weed along the coastal areas of the south west and should be removed from the area now before it becomes a greater problem.
- *\*Leptospermum laevigatum* is a shrub that was only recorded infrequently. It also should be removed before it becomes more common.

However if any weed control is undertaken it is essential that it is followed up immediately with rehabilitation. Care must also be exercised to ensure that species natural to that area are planted to reconstruct the natural vegetation unit. This will ensure the rehabilitation will blend in with the surrounding vegetation and will also increase the aesthetic appearance of the area. Monitoring of any rehabilitation must occur to ensure that native species are becoming established and that weeds are controlled.

## 6. CONCLUSION

Although a large number of weeds (7 of which were rated as high for their environmental impacts) were recorded from the vegetation of the study area all the remnant bushland is worthy of conservation for the following reasons:

- Geological variation – beach sand, limestone cliffs, fore dunes and stable dunes.
- The rocky headland of Point Peron is unique in Metropolitan Perth.
- Size of the area still with remnant vegetation 106.1ha.
- Variety in the vegetation recorded - a total of 24 natural vegetation units were recorded.
- With time and no impact to the vegetation it would appear that the ‘lease’ area would rehabilitate to better vegetation condition than at present.
- The area, mainly the Point and along Arcadia Drive are well used by visitors.
- Solid tracks through the vicinity of the Point are assisting with the conservation of the environmental features of this area.
- One degraded, inferred TEC was recorded but there was another vegetation unit, which is considered uncommon in Perth metropolitan area.
- Six taxa considered as significant for the Quindalup dunes were recorded.

- Rehabilitation is currently being undertaken. With good planning this will increase the environmental value of the area.
- Weeds are abundant through the area. The tree weed, *\*Schinus terebinthifolia* is being targeted for removal, but three other weeds commonly associated with coastal areas, *\*Euphorbia paralias*, *Euphorbia terracina* and *\*Trachyandra divaricata* were recorded.

The overall conclusion is that the area has many environmental features that are worthy of conservation. For these reasons it is listed as a System 6 area and as a Bush Forever site.

## 7. REFERENCES

Beard, J.S. (1981). *Vegetation Survey of Western Australia, Swan*. University of Western Australia Press, Crawley

Biggs, E.R. and Wilde, S.A. (1980). *Geology, Mineral Resources and Hydrology of the Darling System, Western Australia*. Department of Conservation and Environment, Perth, Western Australia

Churchward, H.M. and McArthur, W.M. (1980). *Landform and Soils of the Darling System In Atlas of Natural Resources, Darling System, Western Australia*. Department of Conservation and Environment, Perth, Western Australia

Commonwealth of Australia (2001). *National Objectives and Targets for Biodiversity Conservation 2001-2005*. Environment Australia, Department of Environment and Heritage, Canberra

Department of Conservation and Land Management (1999). *Environmental Weed Strategy for Western Australia*. Department of Conservation and Land Management, Western Australia

Department of Conservation and Land Management (2004). *An Atlas of Tuart Woodlands on the Swan Coastal Plain Western Australia*. Published by the Department of Conservation and Land Management, Western Australia

Department of Conservation and Land Management (2005). *Declared Rare and Priority List for Western Australia*. Published list by the Department of Conservation and Land Management, Western Australia

Department of Environmental Protection (2000). *Bush Forever*. Government of Western Australia

English, V.J. and Blyth, J. (1997). *Identifying and Conserving Threatened Ecological Communities (TECS) in the South West Botanical Province*. Department of Conservation and Land Management

English, V.J. (2001). List of Communities on CALM's Threatened Ecological Community data base.

Environment Australia (2005). <http://www.erin.gov.au>

Environmental Protection Authority (2000). *Environmental Protection of Native Vegetation in Western Australia. EPA Position Statement No. 2*. EPA, Perth

Environmental Protection Authority (2004). *Guidance for the Assessment of Environmental Factors, Terrestrial flora and vegetation surveys for environmental impact assessment in Western Australia. No. 51*. EPA, Perth

Gibson, N., Keighery, B.J., Keighery, G.J., Burbidge, A.H., Lyons, M.N. (1994). *A Floristic Survey of the southern Swan Coastal Plain*. Unpublished report for the Australian Heritage

Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc.)

Hedde, E.M., Loneragan, O.W., Havell, J.J. (1980). *Vegetation of the Darling System In Atlas of Natural Resources, Darling System, Western Australia*. Department of Conservation and Environment, Perth, Western Australia

Hussey, B.M.J., Keighery, G.J., Cousens, R.D., Dodd, J., Lloyd, S.G. (1997). *Western Weeds – A guide to the weeds of Western Australia*. Plant Protection Society of Western Australia

Keating, C and Trudgen, M. (1986). *A Flora and Vegetation Survey of the Point Peron – Lake Richmond Area*. Unpublished report for the State Planning Commission WA

Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2002). *Native Vegetation in Western Australia Extent, Type and Status. Resource Management Technical Report 249*. Department of Agriculture Government of Western Australia

Tingay Alan and Associates (1998). *A Strategic Plan for Perth's Greenways – Final Report*. Prepared for Environment Australia, Ministry for Planning, Department Conservation and Land Management.

Western Australian Herbarium (2005a). *Florabase*. Department of Conservation and Land Management. <http://www.calm.wa.gov.au/science/florabase.html>

Western Australian Herbarium (2005b). *Max*. Department of Conservation and Land Management

## APPENDIX A

### Species listed under families and vegetation units

#### LEGEND

ABBREVIATION	EXPLANATION
subsp.	subspecies
var.	variety
sp.	species. Used where the genus but not the species is known
*	introduced species, weed
?	think this is the correct species name
VEG UNIT	DESCRIPTION
1	Open Low Heath of <i>Frankenia pauciflora</i> and scattered <i>Sarcocornia blackiana</i>
2	Very Open Herbland of <i>*Cakile maritima</i> occasionally associated with <i>Carpobrotus virescens</i> and <i>*Tetragonia decumbens</i>
3	Open Low Heath of <i>*Tetragonia decumbens</i> and <i>Frankenia pauciflora</i> over grass weeds
4	Grassland of <i>Spinifex hirsutus</i> over a Low Shrubland of <i>*Tetragonia decumbens</i>
5	Very Open to Open Grassland of <i>Spinifex longifolius</i> and Open Low Heath of <i>*Pelargonium capitatum</i>
6	Open Low Heath of <i>Olearia axillaris</i> and <i>*Pelargonium capitatum</i> over an Open Grassland
7	Open Low Heath of <i>Scaevola crassifolia</i> and <i>Olearia axillaris</i> over Grassland of introduced species
8	Open Shrubland of <i>Olearia axillaris</i> and <i>Acacia rostellifera</i> over a Low Shrubland of <i>Rhagodia baccata</i> and a Sedgeland of <i>Lepidosperma gladiatum</i>
9	Open Heath of <i>Acacia rostellifera</i> over Sedgeland of <i>Lepidosperma gladiatum</i> over Grassland
10	Tall Open Shrubland of <i>Acacia rostellifera</i> over an Open Heath of mixed species dominated by <i>Spyridium globulosum</i> and <i>Alyxia buxifolia</i>
11	Closed Tall Scrub of <i>Acacia rostellifera</i> over a Low Shrubland dominated by <i>Olearia axillaris</i> and <i>Rhagodia baccata</i> over a Herbland/Grassland of weeds
12	Low Shrubland of <i>*Pelargonium capitatum</i> and Herbland of <i>Acanthocarpus preissii</i> over a Grassland/Herbland of introduced species
13	Closed Tall Scrub to Open Heath of <i>Acacia rostellifera</i> over an Open Low Heath of mixed species or a Closed Grassland of introduced species
14	Closed Heath of <i>Acacia rostellifera</i> and <i>Alyxia buxifolia</i> over an Open Herbland/Grassland of introduced species
15	Closed Tall Scrub of <i>Acacia rostellifera</i> over Open Shrubland of <i>Rhagodia baccata</i> and a Very Open Grassland of introduced species
16	Closed Tall Scrub of <i>Acacia rostellifera</i> and <i>Olearia axillaris</i> over an Open Sedgeland of <i>Lomandra maritima</i>
17	Closed Low Heath of <i>Melaleuca huegelii</i> var. <i>huegelii</i> and <i>Templetonia retusa</i> over a Grassland/Herbland of weeds
18	Closed Heath of <i>Pittosporum ligustrifolium</i> with <i>Acacia rostellifera</i> and <i>Scaevola nitida</i> over an Open Sedgeland of <i>Lepidosperma gladiatum</i>
19	Shrubland of <i>Melaleuca huegelii</i> var. <i>huegelii</i> and <i>Melaleuca lanceolata</i> over Herbland of <i>Senecio pinnatifolius</i> and Grassland of introduced species
20	Closed Tall Scrub of <i>Melaleuca huegelii</i> var. <i>huegelii</i> over Low Shrubland of <i>Rhagodia baccata</i> and <i>Scaevola nitida</i>
21	Low Open Forest of <i>Eucalyptus gomphocephala</i> over Shrubland of <i>Acacia rostellifera</i> over Herbland/Grassland of introduced species
22	Closed Forest of <i>Melaleuca lanceolata</i> and <i>Callitris preissii</i> over mulch
23	Closed Forest of <i>Agonis flexuosa</i> var. <i>flexuosa</i> over Sedgeland of <i>Lepidosperma gladiatum</i>
24	Open Forest of <i>Eucalyptus gomphocephala</i> over Low Open Forest of <i>Agonis flexuosa</i> var. <i>flexuosa</i> , <i>Callitris preissii</i> and <i>Melaleuca lanceolata</i> over a Herbland of introduced species
25	Closed Grassland of <i>*Hyparrhena hirta</i> over Herbland of <i>*Oxalis pes-caprae</i>



VASCULAR PLANT FAMILIES	TAXA	VEGETATION UNITS																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
AIZOACEAE	<i>Carpobrotus virescens</i>	+	+	+		+	+							+	+		+	+	+	+						
	* <i>Tetragonia decumbens</i>	+	+	+	+	+	+	+			+		+	+	+		+	+			+		+			
ANACARDIACEAE	* <i>Schinus terebinthifolia</i>															+					+		+	+	+	
APOCYNACEAE	<i>Alyxia buxifolia</i>				+	+	+	+	+	+	+	+	+	+	+		+	+			+	+		+	+	
ASPHODELIACEAE	* <i>Asphodelus fistulosus</i>												+													
	* <i>Trachyandra divaricata</i>	+		+	+	+	+	+	+	+		+	+	+	+		+	+	+	+	+					
ASTERACEAE	* <i>Arctotheca calendula</i>																					+				
	* <i>Arctotis stoechadifolia</i>													+												
	* <i>Conyza parva</i>																						+			
	* <i>Gazania linearis</i>							+																		
	* <i>Hypochaeris glabra</i>	+		+						+					+											
	<i>Olearia axillaris</i>	+		+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+				+
	<i>Ozothamnus cordatus</i>								+					+								+				
	<i>Senecio pinnatifolius</i>				+	+		+	+					+						+	+					
	* <i>Sonchus oleraceus</i>	+		+		+		+	+	+	+			+	+	+	+				+	+				
	* <i>Symphyotrichum subulatum</i>																						+			
* <i>Ursinia anthemoides</i>													+													
BRASSICACEAE	* <i>Cakile maritima</i>		+		+	+	+												+							
	* <i>Raphanus raphanistrum</i>													+												
CASUARINACEAE	<i>Allocasuarina lehmanniana</i>																						+			
CHENOPODIACEAE	<i>Atriplex isatidea</i>								+																	
	<i>Rhagodia baccata</i>	+		+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+		+		
	<i>Salsola tragus</i>					+				+																
	<i>Sarcocornia blackiana</i>	+																								
	<i>Threlkeldia diffusa</i>	+		+	+	+			+	+			+	+				+	+		+					
CRASSULACEAE	* <i>Crassula glomerata</i>				+			+																		
CUPRESSACEAE	<i>Callitris preissii</i>					+																		+	+	+

VASCULAR PLANT FAMILIES	TAXA	VEGETATION UNITS																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
CUSCUTACEAE	<i>*Cuscuta epithymum</i>			+	+	+	+	+	+			+	+	+			+									
CYPERACEAE	<i>*Cyperus congestus</i>															+										
	<i>Ficinia nodosa</i>	+			+	+	+		+								+			+		+				
	<i>Lepidosperma gladiatum</i>	+		+			+	+	+	+	+		+						+	+		+		+		
	<i>Lepidosperma squamatum</i>												+	+			+									
	<i>Tetraria octandra</i>																				+					
DASYPOGONACEAE	<i>Acanthocarpus preissii</i>						+	+	+	+	+	+	+			+	+	+	+	+	+	+			+	+
	<i>Lomandra maritima</i>										+		+	+			+									+
DILLENiaceae	<i>Hibbertia cuneiformis</i>											+														
EPACRIDACEAE	<i>Leucopogon parviflorus</i>										+		+									+				+
EUPHORBIACEAE	<i>*Euphorbia paralias</i>	+			+	+		+																		
	<i>*Euphorbia peplus</i>											+											+			+
	<i>*Euphorbia terracina</i>			+		+	+	+	+	+	+	+	+			+	+	+	+	+	+	+	+		+	
	<i>Phyllanthus calycinus</i>												+	+			+									
FRANKENIACEAE	<i>Frankenia pauciflora</i>	+		+																+						
FUMARIACEAE	<i>*Fumaria capreolata</i>										+	+		+	+	+						+	+			
GERANIACEAE	<i>*Erodium sp.</i>										+															
	<i>*Geranium molle</i>													+					+							
	<i>*Pelargonium capitatum</i>			+		+	+	+	+	+		+	+	+		+	+		+		+	+		+	+	+
GOODENIACEAE	<i>Scaevola ancharifolia</i>										+		+	+			+									
	<i>Scaevola crassifolia</i>					+	+	+				+		+	+											
	<i>Scaevola nitida</i>	+			+			+	+					+	+	+		+	+		+	+				
HAEMODORACEAE	<i>Conostylis candicans</i>						+			+		+	+									+				
IRIDACEAE	<i>*Romulea rosea</i>	+		+	+		+	+				+	+			+				+		+			+	+
LAMIACEAE	<i>Hemiandra pungens</i>													+												
	<i>*Westringia fruticosa</i>																						+			
LAURACEAE	<i>Cassytha racemosa</i>					+		+			+			+		+	+		+		+					

VASCULAR PLANT FAMILIES	TAXA	VEGETATION UNITS																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
MALVACEAE	<i>*Malva dendromorpha</i>															+										
MIMOSACEAE	<i>Acacia cochlearis</i>													+												
	<i>Acacia cyclops</i>					+		+			+						+								+	
	<i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i>												+									+				
	<i>Acacia rostellifera</i>					+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+			+	
	<i>Acacia saligna</i>						+					+	+				+									+
MORACEAE	<i>*Ficus carica</i>																					+				
MYOPORACEAE	<i>Eremophila glabra</i> subsp. <i>albicans</i>												+							+						
	<i>Myoporum insulare</i>									+	+	+														
MYRTACEAE	<i>Agonis flexuosa</i> var. <i>flexuosa</i>					+							+		+	+					+		+	+		
	<i>Calothamnus quadrifidus</i>												+				+					+				
	<i>Eucalyptus gomphocephala</i>																					+			+	
	<i>*Eucalyptus utilis</i>									+													+			
	<i>*Leptospermum laevigatum</i>								+			+		+												
	<i>*Melaleuca diosmifolia</i>																						+			
	<i>Melaleuca huegelii</i> var. <i>huegelii</i>					+								+				+		+	+				+	
	<i>Melaleuca lanceolata</i>					+								+						+			+		+	
<i>*Melaleuca nesophila</i>													+									+				
ONAGRACEAE	<i>*Oenothera drummondii</i>					+																				
OLEACEAE	<i>*Olea europaea</i>																									+
ORCHIDACEAE	<i>*Disa bracteata</i>																									+
OXALIDACEAE	<i>*Oxalis corniculata</i>													+				+								
	<i>*Oxalis pes-caprae</i>						+				+		+		+							+			+	+
PAPILIONACEAE	<i>Hardenbergia comptoniana</i>				+		+	+	+	+	+	+	+	+	+	+					+			+		

VASCULAR PLANT FAMILIES	TAXA	VEGETATION UNITS																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
PAPILIONACEAE	<i>Jacksonia furcellata</i>												+				+									+
	<i>Kennedia prostrata</i>												+													
	* <i>Medicago</i> sp.			+																						
	<i>Templetonia retusa</i>													+				+		+						
	* <i>Trifolium</i> sp.	+	+		+					+				+						+		+				
PHORMIACEAE	<i>Dianella revoluta</i> var. <i>divaricata</i>												+				+								+	
PHYTOLACCACEAE	* <i>Phytolacca octandra</i>																+									
PITTOSPORACEAE	<i>Pittosporum ligustrifolium</i>								+					+					+							
PLANTAGINACEAE	* <i>Plantago lanceolata</i>																								+	
POACEAE	* <i>Ammophila arenaria</i>					+																				
	Annual grasses				+	+	+	+	+		+	+		+	+	+					+			+	+	
	<i>Austrostipa elegantissima</i>				+			+	+	+	+			+		+		+	+							
	<i>Austrostipa</i> sp.												+				+									
	* <i>Avena barbata</i>											+														
	* <i>Cynodon dactylon</i>											+		+		+						+		+		
	* <i>Ehrharta longiflora</i>														+	+						+				
	* <i>Hyparrhenia hirta</i>																								+	
	* <i>Lagurus ovatus</i>	+	+		+		+	+			+	+	+				+	+	+	+		+		+		
	* <i>Pennisetum clandestinum</i>						+																+			
	<i>Poa poiiformis</i>				+						+			+					+	+		+				
	<i>Poa</i> sp.												+													
	<i>Spinifex hirsutus</i>				+		+	+																		
	<i>Spinifex longifolius</i>	+	+		+	+	+	+			+			+		+										
	<i>Sporobolus virginicus</i>	+		+	+																			+		
* <i>Stenotaphrum secundatum</i>					+	+										+					+	+				
POLYGALACEAE	<i>Comesperma integerrimum</i>													+												

VASCULAR PLANT FAMILIES	TAXA	VEGETATION UNITS																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
POLYGONACEAE	<i>Muehlenbeckia adpressa</i>																+	+								+
	* <i>Rumex</i> sp.																						+			
PRIMULACEAE	* <i>Anagallis arvensis</i>			+					+					+	+	+		+								
RANUNCULACEAE	<i>Clematis linearifolia</i>								+	+		+	+	+	+	+	+	+		+	+				+	
RESTIONACEAE	<i>Desmocladius flexuosus</i>											+	+			+										
RHAMNACEAE	<i>Cryptandra mutila</i>											+														
	* <i>Rhamnus alaternus</i>																								+	
	<i>Spyridium globulosum</i>				+	+		+		+	+		+		+	+			+		+				+	
RUBIACEAE	<i>Opercularia vaginata</i>									+		+														
RUTACEAE	<i>Diplolaena dampieri</i>									+			+													
SANTALACEAE	<i>Exocarpos sparteus</i>							+			+															
	<i>Santalum acuminatum</i>						+																			
SAPINDACEAE	<i>Dodonaea aptera</i>													+												
SCROPHULARIACEAE	* <i>Parentucellia</i> sp.							+				+	+													
SOLANACEAE	* <i>Physalis peruviana</i>																								+	
	* <i>Solanum nigrum</i>																								+	
URTICACEAE	<i>Parietaria debilis</i>													+												
VERBENACEAE	* <i>Lantana camara</i>										+															

**APPENDIX B****Site Data****LEGEND**

<b>ABBREVIATION</b>	<b>EXPLANATION</b>
subsp.	subspecies
var.	variety
sp.	species. Used where the genus but not the species is known
*	introduced species, weed
?	think this is the correct species name

**SITE PP1**

Location: South point

GPS: 376311E; 6428776N

376314E; 6429077N

Soil type: Yellow sand

Outcropping: N/A

Topography: Mid to lower slope

Aspect: SW

Field vegetation description: *Olearia axillaris*, *Acacia rostelifera*, \**Tetragonia decumbens* over *Lepidosperma gladiatum*

Vegetation condition: 2-3

Other notes: Density of the *Acacia rostelifera* varies



Species	Height (cm)	% Cover
<i>Acacia rostelifera</i>	100	3
<i>Acanthocarpus preissii</i>	80	5
<i>Clematis linearifolia</i>	Twiner	5
* <i>Euphorbia terracina</i>	50	2
Grass weeds	50	15
<i>Lepidosperma gladiatum</i>	70	20
<i>Olearia axillaris</i>	150	10
<i>Rhagodia baccata</i>	50	25
<i>Senecio pinnatifolius</i>	10	<1
* <i>Sonchus oleraceus</i>	5	15
* <i>Tetragonia decumbens</i>	50	5
<i>Threlkeldia diffusa</i>	50	5
* <i>Trachyandra divaricata</i>	50	5
<i>Alyxia buxifolia</i>	opportunistic	
<i>Austrostipa elegantissima</i>	opportunistic	
* <i>Cuscuta epithymum</i>	opportunistic	
<i>Ficinia nodosa</i>	opportunistic	
* <i>Pelargonium capitatum</i>	opportunistic	
<i>Spinifex longifolius</i>	opportunistic	

**SITE PP2**

Location: Limestone knoll on water's edge at tip of south point

GPS: 376258E; 6428764N

376240E; 6429130N

376274E; 6429417N

Soil type: Reddish to yellow sand in hollows in limestone

Outcropping: Limestone

Aspect: South

Topography: Knoll above water

Field vegetation description: Low Shrubland of *Frankenia pauciflora* with a large amount of bare ground

Vegetation condition: 3

Other notes: Large number of walk trails through the area



Species	Height (cm)	% Cover
<i>Frankenia pauciflora</i>	40	40
* <i>Lagurus ? ovatus</i>	10	20
<i>Lepidosperma gladiatum</i>	60	2
<i>Rhagodia baccata</i>	30	2
* <i>Sonchus oleraceus</i>	5	2
* <i>Tetragonia decumbens</i>	5	1
<i>Threlkeldia diffusa</i>	30	5
<i>Carpobrotus virescens</i>	opportunistic	
* <i>Euphorbia paralias</i>	opportunistic	
<i>Ficinia nodosa</i>	opportunistic	
* <i>Hypochaeris glabra</i>	opportunistic	
<i>Olearia axillaris</i>	opportunistic	
* <i>Romulea rosea</i>	opportunistic	
<i>Sarcocornia blackiana</i>	opportunistic	
<i>Scaevola nitida</i>	opportunistic	
* <i>Sonchus oleraceus</i>	opportunistic	



* <i>Trachyandra divaricata</i>	opportunistic	
* <i>Trifolium</i> sp.	opportunistic	

**SITE PP3**

Location: Near observation bunker  
 GPS: 376477E; 6428883N  
 Soil type: Yellow sand  
 Outcropping: N/A  
 Aspect: SW  
 Topography: Middle to upper slope  
 Field vegetation description: Shrubland of mixed species  
 Vegetation condition: 3 (4)  
 Other notes: Small area in amongst *Acacia rostellifera* shrubland



Species	Height (cm)	% Cover
<i>Acacia cochlearis</i>	60	2
<i>Acacia rostellifera</i>	70	2
<i>Acanthocarpus preissii</i>	60	1
* <i>Anagallis arvensis</i>	5	1
<i>Carpobrotus virescens</i>	5	1
<i>Clematis linearifolia</i>	Twiner	1
<i>Conostylis candicans</i>	30	5
<i>Diplolaena dampieri</i>	70	5
* <i>Euphorbia terracina</i>	20	30
* <i>Fumaria capreolata</i>	5	<1
<i>Hardenbergia comptoniana</i>	Twiner	5
* <i>Lagurus ovatus</i>	20	10
<i>Lepidosperma gladiatum</i>	90	5
<i>Lepidosperma squamatum</i>	25	<1
<i>Lomandra maritima</i>	50	5

<i>Olearia axillaris</i>	70	1
<i>Ozothamnus cordatus</i>	90	1
* <i>Parentucellia</i> sp.	30	<1
* <i>Pelargonium capitatum</i>	40	15
<i>Phyllanthus calycinus</i>	30	15
<i>Pittosporum ligustrifolium</i>	50	5
<i>Poa drummondiana</i>	40	<1
<i>Rhagodia baccata</i>	40	<1
<i>Scaevola nitida</i>	100	1
<i>Senecio pinnatifolius</i>	20	2
* <i>Sonchus oleraceus</i>	5	<1
<i>Spyridium globulosum</i>	60	1
<i>Alyxia buxifolia</i>	opportunistic	
* <i>Trifolium</i> sp.	opportunistic	

**SITE PP4**

Location: At northern end

GPS: 376283E; 6428807N

Soil type: Yellow sand

Outcropping: Scattered limestone rocks

Aspect: North

Topography: Middle to lower slope

Field vegetation description: Shrubland of *\*Tetragonia decumbens* over a Grassland of *Spinifex longifolius*

Vegetation condition: 3-4

Other notes: Mainly on middle slope but does extend to the lower slope



Species	Height (cm)	% Cover
Grass weeds	10	15
<i>Olearia axillaris</i>	90	5
<i>*Romulea rosea</i>	20	2
<i>Scaevola nitida</i>	30	1
<i>Spinifex longifolius</i>	60	10
<i>*Tetragonia decumbens</i>	40	20
<i>Threlkeldia diffusa</i>	30	3
<i>*Trachyandra divaricata</i>	20	5
<i>*Cakile maritima</i>	opportunistic	



**SITE PP5**

Location: Primary dune and swale

GPS: 376326E; 6428852N

376345E; 6429141N

376531E; 6428919N

376346E; 6429248N

377891E; 6427569N

377882E, 6428069N

376612E, 6428932N

Soil type: Yellow sand

Outcropping: N/A

Aspect: SSW

Topography: Lower slope to middle slope of the primary dune

Field vegetation description: Dense to Open *Acacia rostellifera* Scrub

Vegetation condition: 3-4

Other notes: Burnt within the last 5 years. Vegetation still recovering



Species	Height (cm)	% Cover
<i>Acacia rostellifera</i>	150	70
<i>Carpobrotus virescens</i>	10	3
<i>Conostylis candicans</i>	40	10
* <i>Euphorbia terracina</i>	30	3
* <i>Fumaria capreolata</i>	80	1
* <i>Lagurus ovatus</i>	50	40
<i>Olearia axillaris</i>	50	2
* <i>Oxalis corniculata</i>	5	3
* <i>Pelargonium capitatum</i>	50	3
<i>Rhagodia baccata</i>	80	10

<i>Spyridium globulosum</i>	70	3
* <i>Trachyandra divaricata</i>	30	5
<i>Acanthocarpus preissii</i>	opportunistic	
<i>Agonis flexuosa</i> var. <i>flexuosa</i>	opportunistic	
* <i>Anagallis arvensis</i>	opportunistic	
* <i>Arctotis stoechadifolia</i>	opportunistic	
<i>Austrostipa elegantissima</i>	opportunistic	
<i>Cassytha racemosa</i>	opportunistic	
<i>Clematis linearifolia</i>	opportunistic	
* <i>Cuscuta epithymum</i>	opportunistic	
<i>Hardenbergia comptoniana</i>	opportunistic	
<i>Lepidosperma gladiatum</i>	opportunistic	
* <i>Leptospermum laevigatum</i>	opportunistic	
<i>Ozothamnus cordatus</i>	opportunistic	
<i>Scaevola nitida</i>	opportunistic	
<i>Spinifex longifolius</i>	opportunistic	
* <i>Tetragonia decumbens</i>	opportunistic	

**SITE PP6**

Location: Foredune facing ocean

GPS: 376347E; 6428948N

376325E; 6429089N

376506E; 6428656N

376473E; 6429151N

Soil type: Yellow sand

Outcropping: N/A

Aspect: W

Topography: Dune face

Field vegetation description: Shrubland of *Scaevola crassifolia* and *Olearia axillaris*

Vegetation condition: 3

Other notes: On lower side of track



Species	Height (cm)	% Cover
<i>Acanthocarpus preissii</i>	50	5
<i>Alyxia buxifolia</i>	70	1
Annual grasses	10	5
<i>Austrostipa elegantissima</i>	70	3
<i>Cassytha racemosa</i>	Twiner	<1
<i>Conostylis candicans</i>	30	1
* <i>Crassula glomerata</i>	5	5
* <i>Cuscuta epithymum</i>	Twiner	<1
* <i>Euphorbia terracina</i>	30	3
<i>Exocarpos sparteus</i>	60	2
<i>Hardenbergia comptoniana</i>	Twiner	3
* <i>Lagurus ovatus</i>	15	5
<i>Lepidosperma gladiatum</i>	90	4

<i>Olearia axillaris</i>	60	5
<i>Ozothamnus cordatus</i>	80	5
* <i>Parentucellia</i> sp.	10	<1
* <i>Pelargonium capitatum</i>	50	1
<i>Rhagodia baccata</i>	50	3
* <i>Romulea rosea</i>	109	2
<i>Scaevola crassifolia</i>	50	60
<i>Senecio pinnatifolius</i>	10	1
* <i>Sonchus oleraceus</i>	5	5
* <i>Trachyandra divaricata</i>	60	1
<i>Acacia cyclops</i>	opportunistic	
<i>Acacia rostellifera</i>	opportunistic	
<i>Spinifex longifolius</i>	opportunistic	
<i>Spyridium globulosum</i>	opportunistic	
* <i>Tetragonia decumbens</i>	opportunistic	



**SITE PP7**

Location: Beach front above strand line  
GPS: 376295E; 6429079N  
Soil type: Cream sand  
Outcropping: N/A  
Aspect: N  
Topography: Flat  
Field vegetation description: Shrubland of \**Cakile maritima*  
Vegetation condition: 2  
Other notes: About 3m in width



<b>Species</b>	<b>Height (cm)</b>	<b>% Cover</b>
<i>*Cakile maritima</i>	10	25
<i>Carpobrotus virescens</i>	5	1
<i>*Tetragonia decumbens</i>	5	1
<i>Spinifex longifolius</i>	opportunistic	



**SITE PP8**

Location: In stable soil above limestone cliffs at northern end

GPS: 376195E; 6429207N

Soil type: Brown sand

Outcropping: Small amount of outcropping limestone

Aspect: N/A

Topography: Ridge

Field vegetation description: Shrubland of *Melaleuca huegelii* and *Templetonia retusa*

Vegetation condition: Small areas of 3, mainly 5-6

Other notes: Area burnt. Only recorded from this crest



Species	Height (cm)	% Cover
<i>Acanthocarpus preissii</i>	50	2
<i>Alyxia buxifolia</i>	110	10
* <i>Anagallis arvensis</i>	5	5
<i>Austrostipa elegantissima</i>	80	3
* <i>Cakile maritima</i>	10	25
<i>Carpobrotus virescens</i>	10	5
<i>Clematis linearifolia</i>	Twiner	10
* <i>Euphorbia terracina</i>	20	25
* <i>Geranium molle</i>	10	15
* <i>Lagurus ovatus</i>	40	50
<i>Melaleuca huegelii</i> var. <i>huegelii</i>	100	50
<i>Olearia axillaris</i>	110	3
* <i>Oxalis corniculata</i>	5	25
<i>Poa drummondiana</i>	70	3
<i>Rhagodia baccata</i>	110	5

<i>Scaevola nitida</i>	110	1
<i>Templetonia retusa</i>	90	5
* <i>Tetragonia decumbens</i>	50	3
<i>Threlkeldia diffusa</i>	40	3
* <i>Trachyandra divaricata</i>	50	3

**SITE PP9**

Location: Swale above limestone edge

GPS: 376202E; 6429285N

376155E; 6429158N

376554E; 6428622N

Soil type: Brown sand

Outcropping: Small amount of limestone outcropping

Aspect: E

Topography: Swale

Field vegetation description: Low Shrubland of *Frankenia pauciflora* and *\*Tetragonia decumbens* over weeds

Vegetation condition: 4 but mostly 5

Other notes: Burnt several times



Species	Height (cm)	% Cover
<i>*Anagallis arvensis</i>	5	2
<i>Carpobrotus virescens</i>	40	15
<i>*Cuscuta epithymum</i>	Twiner	<1
<i>*Euphorbia terracina</i>	20	10
<i>Frankenia pauciflora</i>	50	25
<i>*Hypochoeris glabra</i>	5	3
<i>*Lagurus ovatus</i>	15	50
<i>*Medicago sp.</i>	5	<1
<i>Rhagodia baccata</i>	70	5
<i>*Romulea rosea</i>	20	10
<i>*Sonchus oleraceus</i>	5	<1
<i>*Tetragonia decumbens</i>	50	25
<i>Threlkeldia diffusa</i>	20	5

<i>*Trachyandra divaricata</i>	25	20
<i>Lepidosperma gladiatum</i>	opportunistic	
<i>Olearia axillaris</i>	opportunistic	
<i>*Pelargonium capitatum</i>	opportunistic	
<i>Sporobolus virginicus</i>	opportunistic	
<i>*Trifolium</i> sp.	opportunistic	



**SITE PP10**

Location: Limestone cliff at north west corner of point

GPS: 376214E; 6429336N

Soil type: Yellow sand

Outcropping: Limestone outcropping

Aspect: NW

Topography: At edge of limestone cliff

Field vegetation description: Low Shrubland of *Frankenia pauciflora* and *Sarcocornia blackiana* over Grassland of *Sporobolus virginicus*

Vegetation condition: 3

Other notes: Adjacent to PP9



Species	Height (cm)	% Cover
<i>Frankenia pauciflora</i>	10	5
<i>Sarcocornia blackiana</i>	5	3
<i>Spinifex longifolius</i>	50	1
<i>Sporobolus virginicus</i>	15	10
* <i>Tetragonia decumbens</i>	20	2
<i>Threlkeldia diffusa</i>	15	<1
<i>Ficinia nodosa</i>	opportunistic	

**SITE PP11**

Location: Slope

GPS: 376274E; 6429361N

Soil type: Brown sand

Outcropping: N/A

Aspect: SSW

Topography: Middle slope

Field vegetation description: Open Heath of *Acacia rostelifera* over Sedgeland of *Lepidosperma gladiatum*

Vegetation condition: 3

Other notes: Burnt within the last 5 years



Species	Height (cm)	% Cover
<i>Acacia rostelifera</i>	140	45
<i>Acanthocarpus preissii</i>	45	<1
* <i>Anagallis arvensis</i>	5	1
<i>Austrostipa elegantissima</i>	70	1
* <i>Euphorbia terracina</i>	30	15
* <i>Hypochoeris glabra</i>	5	1
* <i>Lagurus ovatus</i>	50	10
<i>Lepidosperma gladiatum</i>	120	45
* <i>Pelargonium capitatum</i>	60	2
<i>Rhagodia baccata</i>	50	1
* <i>Sonchus oleraceus</i>	5	<1
* <i>Trachyandra divaricata</i>	50	15
* <i>Trifolium</i> sp.	5	<1
<i>Alyxia buxifolia</i>	opportunistic	
* <i>Eucalyptus utilis</i>	opportunistic	



<i>Hardenbergia comptoniana</i>	opportunistic	
<i>Olearia axillaris</i>	opportunistic	
<i>Pittosporum ligustrifolium</i>	opportunistic	
<i>Scaevola nitida</i>	opportunistic	

**SITE PP12**

Location: Above ocean, very close to NW corner

GPS: 376249E; 6429374N

376552E; 6428635N

376551E; 6428866N

376630E; 6429078N

Soil type: Brown sand

Outcropping: Few limestone rocks

Aspect: SE

Topography: Ridge

Field vegetation description: Shrubland of *Pittosporum ligustrifolium* and *Acacia rostellifera*

Vegetation condition: 2-3

Other notes: Sometimes scattered through dominant vegetation



Species	Height (cm)	% Cover
<i>Acacia rostellifera</i>	140	15
<i>Alyxia buxifolia</i>	70	1
<i>Austrostipa elegantissima</i>	90	1
<i>Carpobrotus virescens</i>	50	5
<i>Cassytha racemosa</i>	Twiner	<1
<i>Lepidosperma gladiatum</i>	160	25
<i>Pittosporum ligustrifolium</i>	150	60
<i>Rhagodia baccata</i>	140	10
<i>Scaevola nitida</i>	120	20
<i>Senecio pinnatifolius</i>	30	5
* <i>Tetragonia decumbens</i>	70	5
<i>Threlkeldia diffusa</i>	40	1
* <i>Trachyandra divaricata</i>	50	1

<i>Acanthocarpus preissii</i>	opportunistic	
<i>Clematis linearifolia</i>	opportunistic	
* <i>Euphorbia terracina</i>	opportunistic	
<i>Frankenia pauciflora</i>	opportunistic	
* <i>Lagurus ovatus</i>	opportunistic	
<i>Olearia axillaris</i>	opportunistic	
* <i>Pelargonium capitatum</i>	opportunistic	
<i>Poa drummondiana</i>	opportunistic	
<i>Templetonia retusa</i>	opportunistic	

**SITE PP13**

Location: Limestone cliff on south side of point

GPS: 376515E; 6428692N

Soil type: Yellow brown sand

Outcropping: N/A

Aspect: N/A

Topography: Ridge although does continue to middle and lower slopes

Field vegetation description: Shrubland of *Alyxia buxifolia* and *Acacia rostellifera*

Vegetation condition: 4 with occasional patches of 3

Other notes: *Alyxia buxifolia* dominant in some sections



Species	Height (cm)	% Cover
<i>Acacia rostellifera</i>	175	50
<i>Alyxia buxifolia</i>	175	30
<i>Clematis linearifolia</i>	Twiner	<1
* <i>Ehrharta longiflora</i>	15	2
* <i>Fumaria capreolata</i>	10	2
Grass weeds	15	20
<i>Hardenbergia comptoniana</i>	Twiner	<1
* <i>Hypochaeris glabra</i>	5	3
<i>Rhagodia baccata</i>	40	1
<i>Scaevola nitida</i>	20	1
* <i>Tetragonia decumbens</i>	100	10
<i>Threlkeldia diffusa</i>	40	1
* <i>Trachyandra divaricata</i>	20	10
* <i>Anagallis arvensis</i>	opportunistic	
<i>Carpobrotus virescens</i>	opportunistic	
* <i>Sonchus oleraceus</i>	opportunistic	



**SITE PP14**

Location: Above beach at south west corner

GPS: 376537E; 6428651N

Soil type: Yellow sand

Outcropping: N/A

Aspect: SE

Topography: Middle slope

Field vegetation description: Open Grassland of *Spinifex longifolius*, Herbland of *Hardenbergia comptoniana* and Open Shrubland of *\*Tetragonia decumbens*

Vegetation condition: 3

Other notes: Small area only



Species	Height (cm)	% Cover
<i>Alyxia buxifolia</i>	50	5
<i>*Crassula glomerata</i>	5	<1
<i>Ficinia nodosa</i>	50	1
<i>Hardenbergia comptoniana</i>	Twiner	15
<i>Olearia axillaris</i>	100	3
<i>Rhagodia baccata</i>	50	5
<i>Scaevola nitida</i>	90	5
<i>Spinifex longifolius</i>	110	30
<i>*Tetragonia decumbens</i>	60	10
<i>*Trachyandra divaricata</i>	30	2
<i>Austrostipa elegantissima</i>	opportunistic	
<i>*Cuscuta epithymum</i>	opportunistic	
<i>Senecio pinnatifolius</i>	opportunistic	
<i>Spyridium globulosum</i>	opportunistic	

**SITE PP15**

Location: Above south car park

GPS: 376413E; 6428720N

376570E; 6428807N

Soil type: Yellow sand

Outcropping: Small amount of limestone outcropping

Aspect: NW

Topography: Upper to middle slope

Field vegetation description: Shrubland of *Melaleuca lanceolata*, *Melaleuca huegelii*, *Acacia rostellifera*

Vegetation condition: 4-5

Other notes: Large number of weedy open areas. Appears may have been planted out, ie rehabilitation area



Species	Height (cm)	% Cover
<i>Acacia rostellifera</i>	160	5
<i>Allocasuarina lehmanniana</i>	70	5
* <i>Euphorbia terracina</i>	30	20
* <i>Lagurus ovatus</i>	15	20
<i>Lepidosperma gladiatum</i>	70	<1
<i>Melaleuca huegelii</i> var. <i>huegelii</i>	150	10
<i>Melaleuca lanceolata</i>	140	10
<i>Olearia axillaris</i>	120	2
<i>Rhagodia baccata</i>	50	5
* <i>Romulea rosea</i>	20	5
<i>Senecio pinnatifolius</i>	10	20
<i>Spyridium globulosum</i>	70	1
<i>Templetonia retusa</i>	120	2

<i>*Trachyandra divaricata</i>	30	5
<i>*Trifolium sp.</i>	5	10
<i>Acanthocarpus preissii</i>	opportunistic	
<i>Carpobrotus virescens</i>	opportunistic	
<i>Eremophila glabra</i> subsp. <i>albicans</i>	opportunistic	
<i>Ficinia nodosa</i>	opportunistic	
<i>*Sonchus oleraceus</i>	opportunistic	
<i>Tetraria octandra</i>	opportunistic	



**SITE PP16**

Location: Near SE corner below south car park

GPS: 376616E; 6428774N

Soil type: Yellow brown sand

Outcropping: N/A

Aspect: N/A

Topography: In swale

Field vegetation description: Low Open Woodland of *Eucalyptus gomphocephala* over Shrubland of *Acacia rostellifera* over weeds

Vegetation condition: 4-5

Other notes: Very small patch of about 10 trees. Wind clipped



Species	Height (cm)	% Cover
<i>Acacia rostellifera</i>	170	30
<i>Alyxia buxifolia</i>	50	1
<i>Eucalyptus gomphocephala</i>	600	60
* <i>Euphorbia pepus</i>	10	1
* <i>Euphorbia terracina</i>	25	10
* <i>Fumaria capreolata</i>	5	10
<i>Lepidosperma gladiatum</i>	70	<1
* <i>Oxalis pes-caprae</i>	15	2
* <i>Pelargonium capitatum</i>	70	5
* <i>Pennisetum clandestinum</i>	30	15
<i>Rhagodia baccata</i>	70	10
* <i>Romulea rosea</i>	30	5
* <i>Tetragonia decumbens</i>	50	5
* <i>Trachyandra divaricata</i>	50	10
* <i>Arctotheca calendula</i>	opportunistic	
* <i>Cynodon dactylon</i>	opportunistic	
* <i>Ficus carica</i>	opportunistic	
* <i>Rumex</i> sp.	opportunistic	



**SITE PP17**

Location: At base of scarp on north side

GPS: 376460E; 6429139N

Soil type: Brown sand

Outcropping: N/A

Aspect: N/A

Topography: Swale

Field vegetation description: Dense Shrubland of *Acacia rostellifera* over weeds

Vegetation condition: 4-5

Other notes: Many weeds, Several non-endemic plantings. Area still being rehabilitated



Species	Height (cm)	% Cover
<i>Acacia rostellifera</i>	700	85
<i>Acanthocarpus preissii</i>	70	<1
<i>Austrostipa elegantissima</i>	110	<1
* <i>Euphorbia terracina</i>	20	60
* <i>Fumaria capreolata</i>	10	<1
Grass weeds	20	45
* <i>Melaleuca nesophila</i>	170	1
<i>Olearia axillaris</i>	50	<1
* <i>Oxalis pes-caprae</i>	20	2
<i>Rhagodia baccata</i>	110	3
* <i>Romulea rosea</i>	20	2
<i>Scaevola crassifolia</i>	70	<1
* <i>Sonchus oleraceus</i>	10	<1
* <i>Cynodon dactylon</i>	opportunistic	
<i>Eremophila glabra</i> subsp. <i>albicans</i>	opportunistic	
<i>Melaleuca huegelii</i> var. <i>huegelii</i>	opportunistic	
<i>Melaleuca lanceolata</i>	opportunistic	
<i>Spyridium globulosum</i>	opportunistic	
<i>Threlkeldia diffusa</i>	opportunistic	

**SITE PP18**

Location: On limestone rocks on NE side  
 GPS: 376437E; 6429251N  
 Soil type: Yellow sand  
 Outcropping: Above limestone knoll so are some outcropping rocks  
 Aspect: NE  
 Topography: Middle slope  
 Field vegetation description: Shrubland of mixed species  
 Vegetation condition: 3-4  
 Other notes: Behind becomes dominant *Acacia* scrub condition 4-5



Species	Height (cm)	% Cover
<i>Acacia rostellifera</i>	300	10
<i>Acanthocarpus preissii</i>	70	5
<i>Alyxia buxifolia</i>	100	2
<i>Austrostipa elegantissima</i>	90	5
<i>Cassytha racemosa</i>	Twiner	15
<i>Conostylis candicans</i>	25	5
<i>Diplolaena dampieri</i>	50	<1
* <i>Erodium</i> sp.	5	<1
* <i>Euphorbia pepus</i>	5	<1
Grass weeds	5	<1
<i>Hardenbergia comptoniana</i>	Twiner	2
<i>Lepidosperma gladiatum</i>	70	5
<i>Leucopogon parviflorus</i>	50	<1
<i>Myoporum insulare</i>	100	5
<i>Opercularia vaginata</i>	30	3

<i>Poa drummondiana</i>	70	5
<i>Spyridium globulosum</i>	120	2
* <i>Trachyandra divaricata</i>	50	10
<i>Clematis linearifolia</i>	opportunistic	
* <i>Euphorbia terracina</i>	opportunistic	
* <i>Fumaria capreolata</i>	opportunistic	
<i>Lomandra maritima</i>	opportunistic	
<i>Olearia axillaris</i>	opportunistic	
<i>Rhagodia baccata</i>	opportunistic	
<i>Salsola tragus</i>	opportunistic	
<i>Scaevola anchlussifolia</i>	opportunistic	
* <i>Sonchus oleraceus</i>	opportunistic	
<i>Threlkeldia diffusa</i>	opportunistic	



**SITE PP19**

Location: Amongst common Acacia scrub  
 GPS: 376386E; 6429222N  
 376747E; 6428962N  
 376643E; 6429035N  
 Soil type: Brown sand  
 Outcropping: N/A  
 Aspect: NW  
 Topography: Middle slope  
 Field vegetation description: Closed Heath of *Scaevola nitida* over weeds  
 Vegetation condition: 4  
 Other notes: Small area only



Species	Height (cm)	% Cover
<i>Acacia rostellifera</i>	170	10
* <i>Anagallis arvensis</i>	5	<1
<i>Clematis linearifolia</i>	Twiner	1
* <i>Euphorbia terracina</i>	30	20
* <i>Fumaria capreolata</i>	5	5
* <i>Geranium molle</i>	15	<1
Grass weeds	20	50
<i>Olearia axillaris</i>	90	1
<i>Rhagodia baccata</i>	90	5
<i>Scaevola nitida</i>	175	80
<i>Acanthocarpus preissii</i>	opportunistic	
<i>Austrostipa elegantissima</i>	opportunistic	
<i>Cassytha racemosa</i>	opportunistic	
* <i>Cynodon dactylon</i>	opportunistic	
<i>Templetonia retusa</i>	opportunistic	
<i>Threlkeldia diffusa</i>	opportunistic	
* <i>Trachyandra divaricata</i>	opportunistic	

**SITE PP20**

Location: Near NW corner

GPS: 376297E; 6429324N

Soil type: Yellow sand

Outcropping: N/A

Aspect: NW

Topography: Flat

Field vegetation description: \**Pelargonium capitatum* shrubland

Vegetation condition: 5-6

Other notes: Small area. On the beach front there is scattered *Spinifex longifolius*, \**Tetragonia decumbens* and \**Cakile maritima*.



Species	Height (cm)	% Cover
<i>Carpobrotus virescens</i>	5	5
* <i>Euphorbia terracina</i>	20	5
Grass weeds	10	5
<i>Olearia axillaris</i>	40	1
* <i>Pelargonium capitatum</i>	30	60
<i>Rhagodia baccata</i>	30	1
<i>Salsola tragus</i>	50	<1
<i>Senecio pinnatifolius</i>	20	<1
* <i>Trachyandra divaricata</i>	30	5
* <i>Trifolium</i> sp.	5	<1
<i>Alyxia buxifolia</i>	opportunistic	
* <i>Cakile maritima</i>	opportunistic	
<i>Cassytha racemosa</i>	opportunistic	
* <i>Cuscuta epithymum</i>	opportunistic	
<i>Ficinia nodosa</i>	opportunistic	

<i>*Lagurus ovatus</i>	opportunistic	
<i>Melaleuca huegelii</i> var. <i>huegelii</i>	opportunistic	
<i>Poa drummondiana</i>	opportunistic	
<i>Scaevola crassifolia</i>	opportunistic	
<i>*Sonchus oleraceus</i>	opportunistic	
<i>Spinifex longifolius</i>	opportunistic	
<i>*Tetragonia decumbens</i>	opportunistic	
<i>Threlkeldia diffusa</i>	opportunistic	



**SITE PP21**

Location: Education Department land. Western perimeter of oval. Relevee

GPS: 376886E; 6428940N

Soil type: Yellow sand

Outcropping: N/A

Aspect: N/A

Topography: Flat

Field vegetation description: Open Forest of *Melaleuca lanceolata* and *Callitris preissii* over mulch

Vegetation condition: 5

Other notes: Narrow area only. Must be retained



Species	Height (cm)	% Cover
<i>Callitris preissii</i>	1000	15
<i>Melaleuca lanceolata</i>	1000	85
* <i>Stenotaphrum secundatum</i>	5	5
<i>Rhagodia baccata</i> subsp. <i>dioica</i>	opportunistic	

**SITE PP22**

Location: Beach side of Education Department land

GPS: 37693E; 6428962N

Soil type: whitish yellow sand

Outcropping: N/A

Aspect: N/A

Topography: Above shore

Field vegetation description: Low Shrubland of *\*Pelargonium capitatum* and Grassland of *Spinifex longifolius*

Vegetation condition: 4

Other notes: A reasonably large area



Species	Height (cm)	% Cover
<i>Acacia cyclops</i>	70	<1
<i>Alyxia buxifolia</i>	50	<1
* <i>Cakile maritima</i>	5	<1
<i>Callitris preissii</i>	1000	15
* <i>Euphorbia terracina</i>	20	10
* <i>Lagurus ovatus</i>	15	25
<i>Melaleuca lanceolata</i>	1000	85
* <i>Pelargonium capitatum</i>	90	20 (+5% cover dead)
<i>Senecio pinnatifolius</i>	5	<1
<i>Spinifex longifolius</i>	90	50 (+10 cover dead)
<i>Sporobolus virginicus</i>	5	3
<i>Spyridium globulosum</i>	70	<1
* <i>Stenotaphrum secundatum</i>	15	10
* <i>Tetragonia decumbens</i>	30	<1
* <i>Trachyandra divaricata</i>	40	1



<i>Acacia rostellifera</i>	opportunistic	
* <i>Ammophila arenaria</i>	opportunistic	
<i>Cassutha racemosa</i>	opportunistic	
* <i>Cuscuta epithymum</i>	opportunistic	
* <i>Euphorbia paralias</i>	opportunistic	
* <i>Oenothera drummondii</i>	opportunistic	
<i>Olearia axillaris</i>	opportunistic	

**SITE PP23**

Location: Dense area behind PP22

GPS: 376992E; 6428909N

377009E; 6428868N

378157E; 6428220N

377830E; 6428368N

Soil type: Cream sand

Outcropping: N/A

Aspect: N.A

Topography: Flat

Field vegetation description: Dense *Acacia rostellifera* scrub

Vegetation condition: 3-4

Other notes: Forms a dense area behind PP22. Several tall *Melaleuca huegelii* on the beach front adjacent to where the drain empties into the sea



Species	Height (cm)	% Cover
<i>Acacia rostellifera</i>	400	95
<i>Alyxia buxifolia</i>	40	1
<i>Cassytha racemosa</i>	Twiner	5
<i>Clematis linearifolia</i>	Twiner	<1
* <i>Euphorbia terracina</i>	10	<1
Grass weeds	15	5
<i>Rhagodia baccata</i>	220	5
<i>Acanthocarpus preissii</i>	opportunistic	
<i>Austrostipa elegantissima</i>	opportunistic	
* <i>Cynodon dactylon</i>	opportunistic	
* <i>Ehrharta longiflora</i>	opportunistic	
* <i>Fumaria capreolata</i>	opportunistic	

<i>Muehlenbeckia adpressa</i>	opportunistic	
* <i>Pelargonium capitatum</i>	opportunistic	
* <i>Stenotaphrum secundatum</i>	opportunistic	

**SITE PP24**

Location: Water Corporation on western side

GPS: 376894E; 6428773N

376897E; 6428716N

Soil type: Yellow brown sand

Outcropping: N/A

Aspect: N/A

Topography: Ridge of sand dune

Field vegetation description: Dense shrubland of *Acacia rostellifera* and *Scaevola nitida* over lower shrubs

Vegetation condition: 3

Other notes: Reasonable sized remnant



Species	Height (cm)	% AliveCover	% Dead Cover
<i>Acacia rostellifera</i>	200	45	
<i>Acanthocarpus preissii</i>	90	8	
<i>Alyxia buxifolia</i>	70	1	
<i>Austrostipa elegantissima</i>	120	1	
<i>Clematis linearifolia</i>	Twiner	3	
<i>Diplolaena dampieri</i>	90	5	
* <i>Euphorbia terracina</i>	50	5	
* <i>Fumaria capreolata</i>	5	1	
<i>Hemiandra pungens</i>	10	1	
<i>Lomandra maritima</i>	50	<1	
<i>Desmocladius flexuosus</i>	10	1	
<i>Olearia axillaris</i>	90	1	
<i>Phyllanthus calycinus</i>	70	30	

<i>Pittosporum ligustrifolium</i>	70	1	
<i>Poa drummondiana</i>	50	5	
<i>Rhagodia baccata</i>	90	3	
* <i>Romulea rosea</i>	30	<1	
<i>Scaevola anchusifolia</i>	50	1	
<i>Scaevola nitida</i>	210	45	5
* <i>Sonchus oleraceus</i>	5	<1	
* <i>Raphanus raphanistrum</i>	10	<1	
<i>Agonis flexuosa</i> var. <i>flexuosa</i>	opportunistic		
<i>Conostylis candicans</i>	opportunistic		
<i>Melaleuca huegelii</i> var. <i>huegelii</i>	opportunistic		



**SITE PP25**

Location: Water Corporation in swale

GPS: 377015E; 6428780N

Soil type: Brown sand

Outcropping: N/A

Aspect: N/A

Topography: Swale

Field vegetation description: Tall dense shrubland of *Acacia rostellifera* over *Rhagodia baccata*

Vegetation condition: 4-5

Other notes: Many weeds



Species	Height (cm)	% Cover
<i>Acacia rostellifera</i>	300	20
<i>Acanthocarpus preissii</i>	180	5
* <i>Anagallis arvensis</i>	5	10
<i>Austrostipa elegantissima</i>	120	20
* <i>Euphorbia terracina</i>	20	5
* <i>Fumaria capreolata</i>	5	5
<i>Olearia axillaris</i>	300	15
* <i>Pelargonium capitatum</i>	50	<1
<i>Rhagodia baccata</i>	120	75
<i>Scaevola nitida</i>	70	1
* <i>Sonchus oleraceus</i>	10	<1
<i>Agonis flexuosa</i> var. <i>flexuosa</i>	opportunistic	
* <i>Malva dendromorpha</i>	opportunistic	
<i>Muehlenbeckia adpressa</i>	opportunistic	
* <i>Oxalis pes-caprae</i>	opportunistic	

<i>Spinifex longifolius</i>	opportunistic	
<i>Spyridium globulosum</i>	opportunistic	
* <i>Tetragonia decumbens</i>	opportunistic	
* <i>Trachyandra divaricata</i>	opportunistic	

**SITE PP26**

Location: Locked sump area at Water Corporation  
 GPS: 377137E; 6428603N  
 Soil type: Yellow sand  
 Outcropping: Limestone rocks  
 Aspect: N/A  
 Topography: Flat  
 Field vegetation description: Planted area with a few native species  
 Vegetation condition: 5-6  
 Other notes: Dense areas of *\*Eucalyptus utilis*



<i>Acacia lasiocarpus</i>
<i>Acacia rostellifera</i>
<i>Acanthocarpus preissii</i>
<i>Agonis flexuosa</i> var. <i>flexuosa</i>
<i>Alyxia buxifolia</i>
<i>Calothamnus quadrifidus</i>
<i>Clematis linearifolia</i>
* <i>Conyza parva</i>
* <i>Ehrharta longiflora</i>
<i>Eucalyptus gomphocephala</i>
* <i>Eucalyptus utilis</i>
* <i>Euphorbia terracina</i>
<i>Ficinia nodosa</i>
* <i>Fumaria capreolata</i>
* <i>Lagurus ovatus</i>
* <i>Melaleuca diosmifolia</i>



<i>Melaleuca nesophylla</i>
<i>Olearia axillaris</i>
* <i>Oxalis pes-caprae</i>
* <i>Pelargonium capitatum</i>
* <i>Physalis peruviana</i>
<i>Rhagodia baccata</i>
<i>Scaevola nitida</i>
* <i>Schinus terebinthifolia</i>
* <i>Solanum nigrum</i>
* <i>Sonchus oleraceus</i>
<i>Spyridium globulosum</i>
* <i>Stenotaphrum secundatum</i>
* <i>Symphyotrichum subulatum</i>
* <i>Trifolium</i> sp.
* <i>Westringia fructosa</i>

**SITE PP27**

Location: Road verge outside Water Corporation

GPS: 376994E; 6428616N

Soil type: Grey sand

Outcropping: N/A

Aspect: N/A

Topography: Flat

Field vegetation description: Dense Low Woodland of *Agonis flexuosa* over Sedgeland of

*Lepidosperma gladiatum*

Vegetation condition: 4

Other notes: Small remnant only on the road verge



Species	Height (cm)	% Cover
<i>Agonis flexuosa</i> var. <i>flexuosa</i>	1000	75
<i>Alyxia buxifolia</i>	50	<1
<i>Lepidosperma gladiatum</i>	95	50
<i>Rhagodia baccata</i>	70	<1
* <i>Tetragonia decumbens</i>	5	<1
<i>Callitris preissii</i>	opportunistic	
* <i>Cynodon dactylon</i>	opportunistic	
Grass weeds	opportunistic	
* <i>Pelargonium capitatum</i>	opportunistic	
* <i>Schinus terebinthifolia</i>	opportunistic	
<i>Sporobolus virginicus</i>	opportunistic	

**SITE PP28**

Location: Beach in front of APEX holiday homes

GPS: 377208E; 6428259N

Soil type: White-yellow sand

Outcropping: N/A

Aspect: Flat above beach and below *Acacia* scrub

Topography: Fore-dune

Field vegetation description: Low Open Shrubland of *Olearia axillaris* over Grassland of *Spinifex longifolius*

Vegetation condition: 3-4

Other notes: This unit then continues around the coast to the east and south with *\*Cakile maritima* vegetation unit on the sea side



Species	Height (cm)	% Cover
<i>*Euphorbia paralias</i>	20	1
Grass weeds	10	10
<i>Olearia axillaris</i>	100	15
<i>*Pelargonium capitatum</i>	60	10
<i>Scaevola crassifolia</i>	70	1
<i>Spinifex hirsutus</i>	90	2
<i>Spinifex longifolius</i>	90	40
<i>*Tetragonia decumbens</i>	20	5
<i>*Trachyandra divaricata</i>	40	10
<i>*Leptospermum laevigatum</i>	opportunistic	



**SITE PP29**

Location: Corner of Point Peron Road and Hymus Street

GPS: 378495E; 6428086N

Soil type: Grey sand

Outcropping: N/A

Aspect: N/A

Topography: Flat

Field vegetation description: Grassland of *\*Hyparrhenia hirta* over a Herbland of *\*Oxalis pes-caprae*

Vegetation condition: 6

Other notes: Very degraded site



Species	Height (cm)	% Cover
<i>Acacia saligna</i>	150	<1
<i>Acanthocarpus preissii</i>	50	<1
Annual grasses	40	20
<i>*Hyparrhenia hirta</i>	120	90
<i>Jacksonia furcellata</i>	150	<1
<i>*Oxalis pes-caprae</i>	20	90
<i>*Pelargonium capitatum</i>	40	<1
<i>*Romulea rosea</i>	40	10
<i>*Schinus terebinthifolia</i>	200	<1
<i>Olearia axillaris</i>	opportunistic	
<i>*Plantago lanceolata</i>	opportunistic	

**SITE PP30**

Location: Near Swan Brewery Holiday Cottages

GPS: 377917E; 6427500N

377917E; 6427578N

Soil type: Pale yellow sand

Outcropping: N/A

Aspect: W

Topography: Ridge and upper slope only

Field vegetation description: Dense Shrubland of *Melaleuca huegelii* var. *huegelii*

Vegetation condition: 4

Other notes: Dense areas of *Acacia rostellifera* over 3m tall. Plants of *\*Schinus terebinthifolia*



Species	Height (cm)	% Cover
<i>Acanthocarpus preissii</i>	30	2
<i>Alyxia buxifolia</i>	250	5
<i>Cassytha racemosa</i>	Twiner	2
* <i>Euphorbia terracina</i>	20	5
* <i>Fumaria capreolata</i>	5	5
Grass weeds	10	20
<i>Melaleuca huegelii</i> var. <i>huegelii</i>	300	75
<i>Rhagodia baccata</i>	70	5
<i>Scaevola crassifolia</i>	50	5
* <i>Trachyandra divaricata</i>	20	5
<i>Acacia rostellifera</i>	opportunistic	
<i>Clematis linearifolia</i>	opportunistic	
<i>Conostylis candicans</i>	opportunistic	
<i>Hardenbergia comptoniana</i>	opportunistic	
<i>Leucopogon parviflorus</i>	opportunistic	

<i>Ozothamnus cordatus</i>	opportunistic	
* <i>Pelargonium capitatum</i>	opportunistic	
<i>Poa drummondiana</i>	opportunistic	
<i>Threlkeldia diffusa</i>	opportunistic	



**SITE PP31**

Location: Corner Memorial Drive and Safety Bay Road

GPS: 378408E; 6427816N

Soil type: Grey sand

Outcropping: N/A

Aspect: Flat

Topography: Flat

Field vegetation description: *Eucalyptus gomphocephala* over *Agonis flexuosa*, *Melaleuca lanceolata*, *Callitris preissii* over *Acacia rostellifera* and *Spyridium globulosum*

Vegetation condition: 4

Other notes: Other areas of the same unit not in as good a condition



Species	Height (cm)	% Cover
<i>Acanthocarpus preissii</i>	70	<1
<i>Agonis flexuosa</i> var. <i>flexuosa</i>	600	45
<i>Alyxia buxifolia</i>	175	3
<i>Callitris preissii</i>	200	<1
<i>Clematis linearifolia</i>	Twiner	<1
<i>Dianella revoluta</i> var. <i>divaricata</i>	50	<1
* <i>Disa bracteata</i>	20	<1
<i>Eucalyptus gomphocephala</i>	1400	45
* <i>Euphorbia pepus</i>	5	20
* <i>Euphorbia terracina</i>	40	10
<i>Hardenbergia comptoniana</i>	Twiner	1
* <i>Lagurus ovatus</i>	30	20
<i>Leucopogon parviflorus</i>	50	<1
<i>Lomandra maritima</i>	40	<1
<i>Melaleuca huegelii</i> var. <i>huegelii</i>	125	<1

<i>*Olea europaea</i>	200	<1
<i>*Pelargonium capitatum</i>	30	<1
<i>*Rhamnus alaternus</i>	220	3
<i>*Romulea rosea</i>	15	5
<i>*Schinus terebinthifolia</i>	200	<1
<i>Spyridium globulosum</i>	200	5
<i>Acacia cyclops</i>	opportunistic	
<i>Acacia rostellifera</i>	opportunistic	
<i>Melaleuca lanceolata</i>	opportunistic	
<i>Muehlenbeckia adpressa</i>	opportunistic	
<i>*Oxalis pes-caprae</i>	opportunistic	

**SITE PP32**

Location: Lease area

GPS: 378485E; 6427594N

378148E; 6427865N

378173E; 6427480N

378384E; 6427832N

378116E; 6427117N

377882E; 6428069N

Soil type: Yellow brown sand

Outcropping: N/A

Aspect: N/A

Topography: Flat

Field vegetation description: Dense *Acacia rostellifera* over *Lomandra maritima*

Vegetation condition: 4

Other notes: Around the outside of the unit some Acacias up to 4m tall. Where did the quadrat it was regrowth after fire



Species	Height (cm)	% Cover
<i>Acacia rostellifera</i>	200	95
<i>Acacia saligna</i>	200	1
<i>Austrostipa</i> sp.	60	5
* <i>Euphorbia terracina</i>	10	<1
* <i>Lagurus ovatus</i>	20	40
<i>Lomandra maritima</i>	50	25
<i>Olearia axillaris</i>	120	5
* <i>Pelargonium capitatum</i>	30	5
* <i>Romulea rosea</i>	15	20
* <i>Sonchus oleraceus</i>	5	2
<i>Spyridium globulosum</i>	170	5

<i>Acacia cyclops</i>	opportunistic	
<i>Acanthocarpus preissii</i>	opportunistic	
<i>Agonis flexuosa</i> var. <i>flexuosa</i>	opportunistic	
<i>Calothamnus quadrifidus</i>	opportunistic	
<i>Carpobrotus virescens</i>	opportunistic	
<i>Cassytha racemosa</i>	opportunistic	
<i>Clematis linearifolia</i>	opportunistic	
* <i>Cuscuta epithymum</i>	opportunistic	
<i>Dianella revoluta</i> var. <i>divaricata</i>	opportunistic	
<i>Ficinia nodosa</i>	opportunistic	
<i>Hardenbergia comptoniana</i>	opportunistic	
<i>Jacksonia furcellata</i>	opportunistic	
<i>Lepidosperma squamatum</i>	opportunistic	
<i>Desmocladus flexuosus</i>	opportunistic	
<i>Muehlenbeckia adpressa</i>	opportunistic	
<i>Phyllanthus calycinus</i>	opportunistic	
* <i>Phytolacca octandra</i>	opportunistic	
<i>Rhagodia baccata</i>	opportunistic	
<i>Scaevola ancharifolia</i>	opportunistic	
* <i>Schinus terebinthifolia</i>	opportunistic	



**SITE PP33**

Location: Lease area  
 GPS: 378149E; 6427515N  
 378157E; 6427922N  
 378153E; 6427113N  
 378220E; 6428038N  
 Soil type: Yellow brown sand  
 Outcropping: N/A  
 Aspect: N/A  
 Topography: Flat  
 Field vegetation description: \**Pelargonium capitatum* and *Acanthocarpus preissii* Low Heath  
 Vegetation condition: 4  
 Other notes: Acacia shrubland regenerating after fire



Species	Height (cm)	% Cover
<i>Acacia rostellifera</i>	70	1
<i>Acanthocarpus preissii</i>	40	35
<i>Clematis linearifolia</i>	Twiner	<1
* <i>Euphorbia terracina</i>	20	40
<i>Hardenbergia comptoniana</i>	Twiner	1
* <i>Lagurus ovatus</i>	25	40
<i>Leucopogon parviflorus</i>	60	1
<i>Lomandra maritima</i>	60	5
<i>Desmocladius flexuosus</i>	25	1
<i>Opercularia vaginata</i>	30	<1
* <i>Parentucellia</i> sp.	5	<1
* <i>Pelargonium capitatum</i>	40	35
<i>Poa</i> sp.	60	5

<i>*Romulea rosea</i>	25	20
<i>Acacia lasiocarpa</i>	opportunistic	
<i>Acacia saligna</i>	opportunistic	
<i>Alyxia buxifolia</i>	opportunistic	
<i>*Asphodelus fistulosus</i>	opportunistic	
<i>Austrostipa sp.</i>	opportunistic	
<i>Calothamnus quadrifidus</i>	opportunistic	
<i>Conostylis candicans</i>	opportunistic	
<i>Cryptandra mutila</i>	opportunistic	
<i>*Cuscuta epithymum</i>	opportunistic	
<i>Dianella revoluta</i> var. <i>divaricata</i>	opportunistic	
<i>Jacksonia furcellata</i>	opportunistic	
<i>Kennedia prostrata</i>	opportunistic	
<i>Lepidosperma squamatum</i>	opportunistic	
<i>Myoporum insulare</i>	opportunistic	
<i>Olearia axillaris</i>	opportunistic	
<i>Phyllanthus calycinus</i>	opportunistic	
<i>Scaevola ancharifolia</i>	opportunistic	
<i>*Trachyandra divaricata</i>	opportunistic	



**SITE PP34**

Location: Arcadia Drive opposite Boundary Road

GPS: 377889E; 6427006N

Soil type: Cream sand

Outcropping: N/A

Aspect: W

Topography: Swale and primary dune face

Field vegetation description: Shrubland of *Tetragona decumbens* with Grassland of *Spinifex longifolius*

Vegetation condition: 4-5

Other notes: Opposite houses. Area well used. Beach front \**Cakile maritima* condition 2-3



Species	Height (cm)	% Cover
* <i>Cakile maritima</i>	10	<1
<i>Carpobrotus virescens</i>	10	2
* <i>Gazania linearis</i>	10	20
Grass weeds	20	30
<i>Lepidosperma gladiatum</i>	100	3
<i>Olearia axillaris</i>	175	5
* <i>Pelargonium capitatum</i>	60	1
* <i>Romulea rosea</i>	30	30
<i>Spinifex longifolius</i>	90	10
* <i>Stenotaphrum secundatum</i>	10	<1
* <i>Tetragonia decumbens</i>	70	10
* <i>Trachyandra divaricata</i>	80	5
<i>Acacia saligna</i>	opportunistic	
* <i>Euphorbia terracina</i>	opportunistic	
* <i>Oxalis pes-caprae</i>	opportunistic	
<i>Rhagodia baccata</i>	opportunistic	
<i>Santalum acuminatum</i>	opportunistic	
<i>Scaevola crassifolia</i>	opportunistic	

**SITE PP35**

Location: Arcadia Drive opposite Seaforth Street

GPS: 377872E; 6425397N

Soil type: Cream sand

Outcropping: N/A

Aspect: W

Topography: Fore dune

Field vegetation description: Grassland of *Spinifex longifolius* and Low Shrubland of *Tetragona decumbens*

Vegetation condition: 3-4

Other notes: By road edge small area of Sedgeland of *Lepidosperma gladiatum* and Low Shrubland of *Tetragona decumbens*



Species	Height (cm)	% Cover
<i>Acacia saligna</i>	200	<1
<i>Alyxia buxifolia</i>	50	<1
<i>Carpobrotus virescens</i>	5	10
* <i>Cuscuta epithymum</i>	Twiner	5
Grass weeds	10	10
<i>Olearia axillaris</i>	150	<1
<i>Spinifex hirsutus</i>	90	1
<i>Spinifex longifolius</i>	90	50
* <i>Tetragonia decumbens</i>	30	50
* <i>Trachyandra divaricata</i>	25	3
<i>Acacia rostellifera</i>	opportunistic	
<i>Lepidosperma gladiatum</i>	opportunistic	
* <i>Pennisetum clandestinum</i>	opportunistic	



**SITE PP36**

Location: Arcadia Drive opposite McLarty Street

GPS: 377924E; 6425581N

Soil type: Cream sand

Outcropping: N/A

Aspect: on the first low dune above the strand

Topography: Low dune

Field vegetation description: Grassland of *Spinifex hirsutus* and low Open Shrubland of *Tetragonia decumbens*

Vegetation condition: 2-3

Other notes: On the edge of the reserve there are several *Eucalyptus utilis* and *Callitris preissii* planted



Species	Height (cm)	% Cover
<i>*Cakile maritima</i>	5	<1
<i>*Euphorbia paralias</i>	20	2
<i>Spinifex hirsutus</i>	50	40
<i>*Tetragonia decumbens</i>	20	20
<i>*Trachyandra divaricata</i>	50	5

**SITE PP37**

Location: Arcadia Drive opposite Dempster Street

GPS: 377951E; 6425739N

Soil type: Cream sand

Outcropping: N/A

Aspect: W

Topography: Swale behind first dune

Field vegetation description: Low Shrubland of *Olearia axillaris* and *\*Pelargonium capitatum* over Herbland/Grassland of weeds

Vegetation condition: 5

Other notes: Beach front *\*Cakile maritima* with *Spinifex hirsutus*



Species	Height (cm)	% Cover
<i>Acanthocarpus preissii</i>	50	<1
Annual grasses	10	25
<i>Ficinia nodosa</i>	70	<1
<i>Olearia axillaris</i>	80	5
<i>*Pelargonium capitatum</i>	50	25
<i>Spinifex longifolius</i>	90	<5
<i>*Trachyandra divaricata</i>	50	25
<i>Agonis flexuosa</i> var. <i>flexuosa</i>	opportunistic	
<i>*Cakile maritima</i>	opportunistic	
<i>Scaevola crassifolia</i>	opportunistic	
<i>Spinifex hirsutus</i>	opportunistic	



**SITE PP38**

Location: Arcadia Drive

GPS: 377968E; 6426050N

378016E; 6425882N

Soil type: Dark brown sand over yellow sand

Outcropping: N/A

Aspect: W

Topography: Low dune

Field vegetation description: Dense *Acacia rostellifera* scrub

Vegetation condition: 3-4

Other notes: Where there is dense *Acacia rostellifera* there is a dense understorey of *\*Euphorbia terracina* and *\*Fumaria capreolata*



Species	Height (cm)	% Cover
<i>Acacia rostellifera</i>	250	95
<i>Acanthocarpus preissii</i>	50	<1
<i>Alyxia buxifolia</i>	90	1
<i>*Fumaria capreolata</i>	5	0-90
Grass weeds	10	0-60
<i>Olearia axillaris</i>	150	5
<i>*Pelargonium capitatum</i>	30	<1
<i>Rhagodia baccata</i>	100	10
<i>Spyridium globulosum</i>	120	<1
<i>Acacia cyclops</i>	opportunistic	
<i>Acacia saligna</i>	opportunistic	
<i>*Avena barbata</i>	opportunistic	
<i>*Cuscuta epithymum</i>	opportunistic	
<i>*Cynodon dactylon</i>	opportunistic	



<i>*Euphorbia terracina</i>	opportunistic	
<i>Exocarpos sparteus</i>	opportunistic	
<i>Hardenbergia comptoniana</i>	opportunistic	
<i>Hibbertia cuneiformis</i>	opportunistic	
<i>*Lagurus ovatus</i>	opportunistic	
<i>*Lantana camara</i>	opportunistic	
<i>Lepidosperma gladiatum</i>	opportunistic	
<i>*Leptospermum laevigatum</i>	opportunistic	
<i>Myoporum insulare</i>	opportunistic	
<i>*Oxalis pes-caprae</i>	opportunistic	
<i>Scaevola crassifolia</i>	opportunistic	
<i>Spinifex longifolius</i>	opportunistic	
<i>*Tetragonia decumbens</i>	opportunistic	

## **APPENDIX C**

### **Maps**

- 1. Quadrat Location**
- 2. Vegetation Units**
- 3. Vegetation Condition**