

Assessment of TEC 30a

Corner of Memorial Avenue and Safety Bay Road, Rockingham



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Prepared for
Strategen

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DRAFT**Quality Information**

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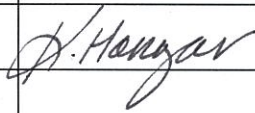
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			Name/Position	Signature
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1.0 Introduction

1.1 Project Background

In 2005, the City of Rockingham initiated studies with a view to creating a marina-based tourist precinct at Mangles Bay. Demand for boat pens in the area is considered high and there are strong social and economic benefits from an integrated development providing tourism, recreation and low-cost holiday accommodation facilities (Cedar Woods, 2011).

Cedar Woods Properties Ltd has been appointed as the nominated development partner for the Mangles Bay Marina Development and will progress the completion of the Phase 2 statutory approvals process. The Phase 2 statutory approvals require additional environmental studies to be carried out to finalise a concept plan which will then proceed to a formal public environmental review (LandCorp, 2011).

Strategen are undertaking the environmental impact assessment component of the project and as part of these studies, required verification and extent mapping of the vegetation in an area at Cape Peron, considered to be equivalent (Floristic Community Type (FCT)) to Threatened Ecological Community (TEC) Type 30a (. Previous assessment by various consultants and the Department of Environment and Conservation (DEC) have resulted in conflicting results as to the extent of TEC 30a, leading to the need for this verification study. In early November 2011, Strategen commissioned AECOM Australia Pty Ltd (AECOM) to undertake the verification. This report presents the results of the vegetation assessment and TEC verification conducted in spring (November) 2011.

1.2 Scope of Work

The scope of work, in accordance with information provided and discussions with by Strategen included undertaking the following tasks:

- Consider available information and data relating to vegetation at the site, including information to be provided by Strategen and as available from DEC
- Conduct a site inspection during spring and record floristic data from within 10m x 10m quadrats (either existing and/or newly established) in accordance with EPA Guidance and methods used by Gibson *et al* (1994) to enable statistical data analysis for FCT classification
- Map the observable spatial extent of the TEC 30a vegetation type
- Map the varying vegetation condition within the mapped extent of the TEC vegetation
- If viable, undertake a statistical analysis of the data collected to determine the inferred equivalence of the vegetation to FCTs and specifically to FCT 30a
- Liaise with DEC to discuss results and observations
- Prepare and submit a report that summarises the methodologies (including data analysis) ,, results outcomes of liaison with DEC and presents results in GIS prepared maps and shapefiles.

1.3 Location

The assessment site (herein referred to as "the site") is located to the north-west of the intersection of Memorial Drive and Safety Bay Road, Rockingham. The site is approximately 4.3 hectares in size, excluding a grassed parkland area approximately in the centre of the site.

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1.4 Threatened Ecological Communities

Threatened Ecological Communities (TECs) are naturally occurring biological assemblages that occur in a particular type of habitat, which are subject to processes that threaten to destroy or significantly modify the assemblage across its range (DEC, 2001).

Vegetation communities in Western Australia are described as TECs if they have been defined by the DEC's Species and Community Branch and found to be Presumed Destroyed (PD), Critically Endangered (CR), Endangered (EN) or Vulnerable (VU). The categories and the criteria for defining TECs have been described by English and Blyth (1997). A publicly available database, listing TECs within Western Australia, is maintained by DEC (2010) and is available on their website (www.dec.wa.gov.au).

There is currently no legislation covering the conservation of TECs at a state level in WA. However, some are protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act). The TECs on the Commonwealth register are also listed on the Department of Sustainability, Environment, Water, Populations and Communities (DSEWPaC) website. For those State TECs not listed on the Commonwealth register, land clearing legislation under the *Environmental Protection Act, 1986* (EP Act) also provides protection from clearing. The Environmental Protection Authority's position on TECs states that proposals resulting in the direct loss of TECs are likely to be formally assessed.

Additional to TECs, potential TECs that do not currently meet survey criteria or that are not adequately defined, are rare but not threatened, have been recently removed from the TEC list or require regular monitoring are considered to be Priority Ecological Communities (PECs) (DEC, 2010a) and DEC require them to be taken into consideration during environmental impact assessments.

1.4.1 Identification of TECs

The primary tool for classification of TECs on the Swan Coastal Plain is by assigning a Floristic Community Type (FCT), as classified by Gibson *et al.*, (1994). The Floristic Survey of the Swan Coastal Plain (Gibson *et al.*, 1994) identifies suites of dominant and indicator flora species, in combination with the landform complex, as characteristic of a specific FCT. Data collected in the field is compared to the Gibson *et al.* (1994) dataset and sites with similar species composition are confirmed for suitable distribution with regard to landform complexes to categorically determine FCTs.

1.4.2 TEC 30a

Gibson's described FCT; SCP (Swan Coastal Plain) 30a is listed as Vulnerable by DEC. The community type is not listed under the EPBC Act as a TEC of Commonwealth significance.

Callitris preissii and *Melaleuca lanceolata* forest and woodland is a threatened ecological community restricted to the Quindalup coastal dunes on white calcareous sands and sometimes brown sands near Perth. The community's dominant plant species include the Rottnest Island pine (*Callitris preissii*), the Rottnest Island teatree (*Melaleuca lanceolata*) and occasionally tTuart (*Eucalyptus gomphocephala*) (Jill Pryde, date not known).

The community was identified as rare in 1994 and historically occurred in a continuous belt along the coast. Since European settlement the community is thought to have been reduced by 70 to 90 percent due to clearing and probably by fire. Only about 500 hectares remain, of which about 20 hectares occur in conservation reserves (Jill Pryde, date not known).

DEC is conducting several studies and conserving this important plant community on Garden Island and other coastal sites with help from other groups and Department of Defence personnel, who manage some of the sites. In 2010, experienced DEC staff undertook a detailed assessment of the site using a department accepted methodology that focused on the identification of the presence of suitable indicator species; *Callitris preissii* (or *Melaleuca lanceolata*) and Tuart (*Eucalyptus gomphocephala*) that can all occur in the community, are coastal deep rooted trees. These species are considered indicators of the TEC due to their reliance on fresh groundwater (Jill Pryde, *pers. comm.* 2011).

Further information relating to TEC 30a is presented as Appendix A.

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2.0 Methodology

Prior to mobilising to site, AECOM reviewed available information and literature relating to TEC 30a, including:

- Gibson *et al.*, (1994) site data and information relating to FCT 30a, including:
 - dominant and indicator species of the community type
 - supporting landform and soil types
 - locations of confirmed sites
- information and anecdotes made available by DEC (Appendix A)
- results of previous assessments conducted at the site, including:
 - Bennett (2005)
 - ENV (2009).

The field assessment was conducted on 4 November 2011 by AECOM Principal Ecologist, Kellie Honczar, assisted by Environmental Technician, William Bauer-Simpson.

The field assessment involved traversing the entire site on foot and making opportunistic recordings focused on the presence of indicator species; *Callitris preissii* (or *Melaleuca lanceolata*) and Tuart (*Eucalyptus gomphocephala*) as key indicators of fresh groundwater, and other indicator species of the community; *Spyridium globulosum*, *Acanthocarpus preissii* and *Rhagodia baccata*.

Navigation across the site was achieved by using a Panasonic Toughbook, coupled with a GPS unit to map spatial location shown on aerial imagery and including layers of previous mapping (Bennett, 2005 and ENV, 2009). This ensured accurate representation of features observed on the ground into spatial mapping.

Where the vegetation was considered to be a good representation of FCT (TEC) 30a, permanent quadrats were established and recorded, in accordance with EPA Guidance. Two 10m x 10m quadrats were recorded at the site (Appendix B), with a dimension consistent with Gibson *et al.*, (1994) and the methods utilised by DEC's Threatened Species and Communities Branch. The field assessment did not focus on the collection of quadrat data, based on subsequent advice from DEC that quadrats are not necessarily useful in verifying floristic community types on the Swan Coastal Plain where vegetation has suffered a level of degradation and a full complement of species is no longer present. In the case of the study site, the presence of the TEC is confirmed where the *Callitris preissii* occurs in moderately good condition coastal vegetation of this general composition in this area, as this species is not present in other FCTs (Jill Pryde, *pers. comm.* 2011). Due to this advice, it was considered unnecessary to undertake statistical analysis of collected quadrat data.

In addition to spatially mapping the extent of the TEC (FCT 30a) across the site based on the presence of *Callitris preissii*, the condition of the vegetation throughout the mapped extent of the TEC was also carried out. Vegetation condition is determined in relation to the (perceived) ability of the bushland to maintain itself (Keighery, 1994). This is commonly interpreted primarily on the ratio of visible introduced species to native species. However, disturbance (e.g. grazing, erosion), degree of alteration to community and habitat structure, site ecology and other factors are also considered. In order to map vegetation condition of the site, the condition was determined at a range of locations and in between as necessary, where condition changed. The categories of vegetation condition used were consistent with a combination of methods developed by Keighery (1994) and the Braun-Blanquet Scale (Mueller-Dombois and Ellenberg, 1974), as summarised in Table 1. Given that effective measures of bushland condition are a measure of both the amount of change in community structure and the proportion of weeds present, a quantitative measure is considered to add value to interpretations and results. Accordingly, the described method incorporates the Keighery (1994) (descriptive and qualitative) and the Braun-Blanquet Scale (Mueller-Dombois and Ellenberg, 1974) (quantitative) methods.

DRAFT**Table 1 Bushland Condition Ratings (adapted from Keighery, 1994 and the Braun-Blanquet Scale of Cover Abundance (from Mueller-Dombois and Ellenberg, 1974))**

Descriptor	Explanation
Pristine	Pristine or nearly so, no obvious signs of disturbance. <i>0 - 1% weed cover</i>
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. <i>1 – 5% weed cover</i>
Very Good	Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing. <i>5 – 25% weed cover</i>
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing. <i>25 – 50% weed cover</i>
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance of vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing. <i>50 – 75% weed cover</i>
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as “parkland cleared” with the flora comprising weed or crop species with isolated native trees or shrubs. <i>75 – 100% weed cover</i>

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3.0 Results and Discussion

The presence of the TEC, FCT 30a was confirmed at the site during the field assessment conducted by AECOM on 4 November 2011. The AECOM mapped extent of TEC 30a is shown in Figure 1 and the condition of the vegetation within this extent is shown in Figure 2. Data collected from two permanent monitoring quadrats at the site also supports this result (Appendix B, Figure 3).

Based on DEC advice, spatial mapping of the extent of the TEC focused on the presence of *Callitris preissii* and the results of this mapping are presented in Figure 1. The extent of mapping of the TEC vegetation type is more widespread than previously mapped by Bennett (2005) and ENV (2009). The results align most closely with mapping conducted by DEC (2010) at the site.

Some locations that were previously mapped as TEC 30a vegetation type may have since been cleared or disturbed, including a location to the west of the parkland that supports only *Acacia rostellifera* and weeds, including Japanese Pepper (*Schinus molle*) (Figure 3). However, an area of *Callitris preissii* close to Memorial Drive near the corner of Safety Bay Road has recently been slashed, rendering the condition here to be poorer (Figure 2).

The mapping of vegetation condition within the mapped extent of the TEC vegetation type would be a useful tool for determining the sustainability and conservation potential of specific areas within the site. DEC's advice is that the true TEC is confirmed where *Callitris preissii* occurs in moderately good condition vegetation (Jill Pryde, *pers. comm.* 2011). Moderately good or better condition vegetation could be interpreted to be equivalent to "Good" condition or better, in accordance with the Keighery (1994) scale. In this regard, only about 65% of the site (2.8 hectares of a total of 4.3 hectares of the mapped TEC) would be considered to meet the criteria and be confirmed as the true TEC 30a.

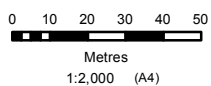
The areas of the TEC in better condition ("Good" or better, Figure 2), are considered to have the highest conservation potential. However, consultation with DEC would be required for any proposed actions that could result in direct or indirect impacts to the vegetation that represents the TEC. This would include any impacts to groundwater, as this community type relies on fresh groundwater for its survival (Jill Pryde, date not known).



Extent of TEC 30a

Figure 1

Coordinate System: GDA 1994 MGA Zone 50



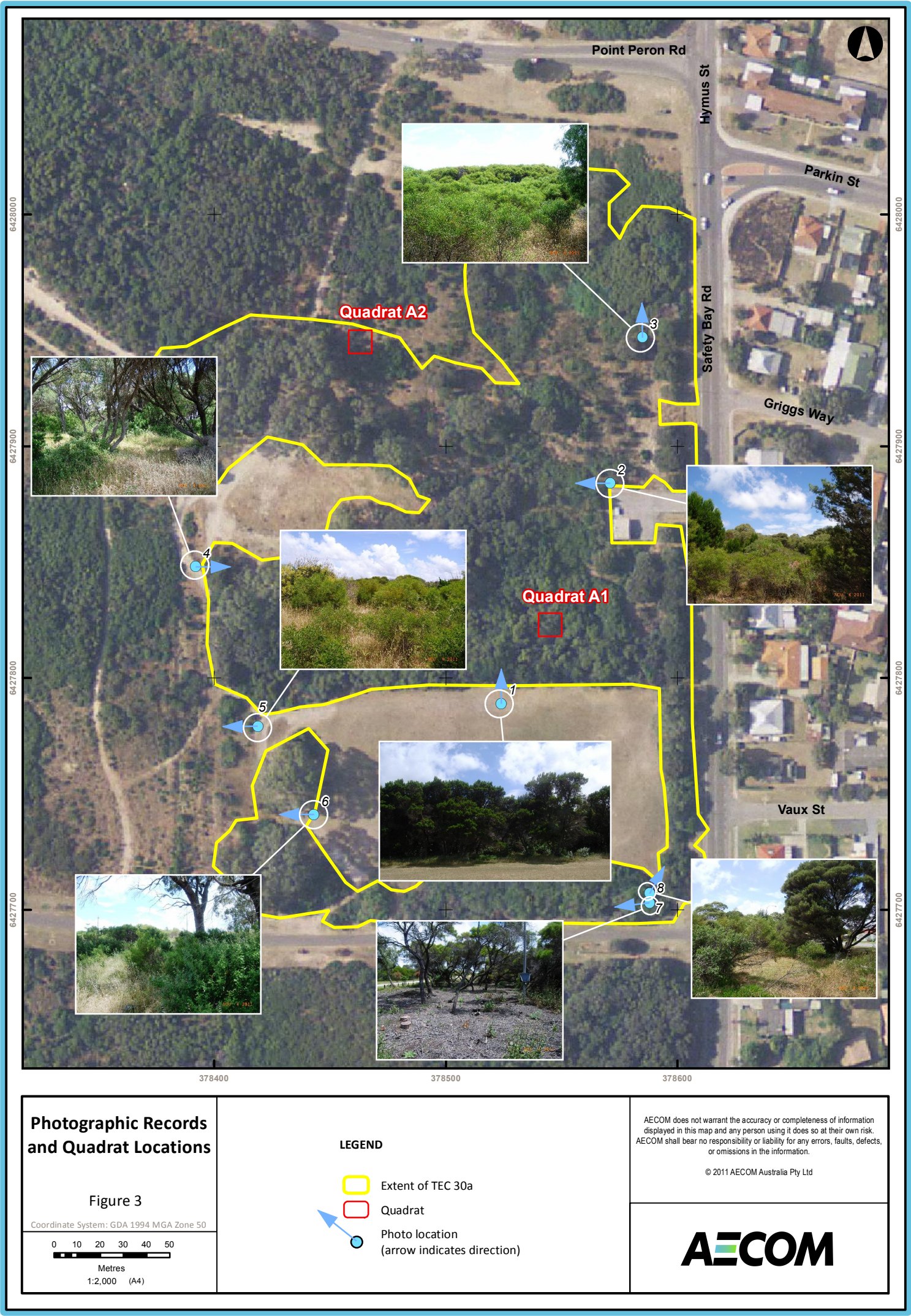
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Extent of TEC 30a

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Appendix A

Rottnest Island pine

endangered

by Jill Pryde



Rottnest Island pine community

Callitris preissii and *Melaleuca lanceolata* forest and woodland is a threatened ecological community restricted to the Quindalup coastal dunes on white calcareous sands and sometimes brown sands near Perth.

The community's dominant plant species include the Rottnest Island pine (*Callitris preissii*), the Rottnest teatree (*Melaleuca lanceolata*) and occasionally tuart (*Eucalyptus gomphocephala*). Although these species are found scattered in the State's south-west they only co-occur as a community with a group of mainly coastal-related shrubs, including basket bush (*Spyridium globulosum*), the spiky prickly lily (*Acanthocarpus preissii*), berry saltbush (*Rhagodia baccata*) and a suite of annual herbs including the pretty

blue lace flower (*Trachymene coerulea*) in locations around Perth.

While the community was identified as rare in 1994, it historically occurred in a continuous belt along the coast. The remaining occurrences extend from Trigg in the north to Woodman Point in the south with a few remaining disturbed stands along the Swan River around Peppermint Grove. It also occurs on Garden and Rottnest islands. Quokkas often take refuge under the dense canopies of Rottnest Island pine and Rottnest teatree while tammar wallabies inhabit the State's best example of this plant community on Garden Island. Since European settlement the community is thought to have been reduced by 70 to 90 per cent due to clearing and probably by fire. Only about 500 hectares remain, of which about 20 hectares occur in conservation reserves.

The *Callitris* plant community

is a very simple one and typically contains a very narrow range of flora species in the understorey. As a consequence, it is highly prone to weed invasion and is easily degraded by threats such as too frequent fire and recreational overuse. Most, if not all, occurrences have suffered some level of weed invasion. The Rottnest Island pine that generally typifies the community can live up to 100 years but mainly dies of old age from about 80 years. It is killed by fire, but regenerates well from seed if the fire occurs after it has reached maturity. Historically, *Callitris* forests were cut for timber and wood.

The Department of Environment and Conservation is conducting several studies and conserving this important plant community on Garden Island and other coastal sites with help from other groups and Department of Defence personnel, who manage some of the sites.

Photos by Sallyanne Cousans

Appendix B

Quadrats

Mangles Bay Development, TEC 30a Site Assessment Site A1

Described by K Honczar Date 4/11/2011 Type Q 10m x 10m

Season Spring

MGA Zone 50 378540 mE 6427828 mN

Soil Pale grey sandy loam

Vegetation Tall Shrubland of *Callitris preissii* over a Low Shrubland of *Acacia rostellifera* and *Spyridium globulosum* with *Clematis pubescens* and occasional annual weeds, including **Ehrharta calycina* and **Fumaria capreolata* in pale grey sandy loam.

Vegetation Condition Good to Very Good



SPECIES LIST

Name	Height (m)	No. A	Cover A (%)	No. D	Cover D (%)
<i>Acacia rostellifera</i>	3	3	20	3	10
<i>Callitris preissii</i>	7	2	15		
<i>Clematis pubescens</i>	cr	+	15	cr	5
<i>*Ehrharta calycina</i>	0.8	+	20		
<i>*Ehrharta longiflora</i>	0.8	+	20		
<i>*Fumaria capreolata</i>	0.6	+	5		
<i>*Schinus molle</i>	3.5	oh	30		
<i>Spyridium globulosum</i>	2.5	2	4		

cr = creeper

oh = overhang (not rooted in the quadrat)

+ = present in quadrat, no. not recorded

opp = opportunistic record (outside quadrat, but nearby)

Mangles Bay Development, TEC 30a Site Assessment Site A2

Described by K Honczar Date 4/11/2011 Type Q 10m x 10m

Season Spring

MGA Zone 50 378458 mE 6427956 mN

Soil Pale grey sandy loam

Vegetation Open Forest of *Eucalyptus gomphocephala* over Low Open Shrubland of *Agonis linearifolia*, *Acacia rostellifera*, *Spyridium globulosum* and *Rhagodia baccata* over various weed species, predominantly **Pennisetum clandestinum* and **Ehrharta longiflora* in pale grey sandy loam.

Vegetation Condition Degraded to Good



SPECIES LIST

Name	Height (m)	No. A	Cover A (%)	No. D	Cover D (%)
<i>Acacia rostellifera</i>	3	14	16	3	2
<i>Agonis longifolia</i>	6	2	30		
<i>*Annagallis arvensis</i>	0.1	+	2		
<i>*Bromus arenarius</i>	0.3			+	20
<i>Callitris preissii</i>	5	opp			
<i>*Ehrharta longifolia</i>	0.8	+	80		
<i>Eucalyptus gomphocephala</i>	16	2	70		
<i>Spyridium globulosum</i>	2.5	1	1.5		
<i>*Euphorbia peplus</i>	0.2	+	2		
<i>*Lagurus ovatus</i>	0.3	+	5		
<i>*Lolium rigidum</i>	0.3	+	2		
<i>*Pennisetum clandestinum</i>	0.6	+	30		
<i>Rhagodia baccata</i>	1.2	6	35		
<i>*Schinus molle</i>	1	5	2		
<i>*Sonchus oleraceus</i>	0.4	2			

cr = creeper

oh = overhang (not rooted in the quadrat)

+ = present in quadrat, no. not recorded

opp = opportunistic record (outside quadrat, but nearby)