CAPRICORN VILLAGE JOINT VENTURE

FLORA AND FAUNA MANAGEMENT STRATEGY LOTS 2, 303 AND 304 TWO ROCKS ROAD, YANCHEP

VERSION 10

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Checked by:	Signed:		Date:	15 December 2008
	Name:	Renae Kaciuba Environmental Scientist		
Reviewed by:	Signed:		Date:	15 December 2008
	Name:	Paul van der Moezel Principal		

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1. INTRODUCTION

1.1 Background

In 1999 Tokyu Corporation, undertook planning and environmental studies to rezone properties in the Yanchep-Two Rocks area from primarily 'Rural' and 'Residential Development' areas to 'Urban Development', 'Centre' and 'Industrial Development' zones under the City of Wanneroo's Town Planning Scheme (Amendment 787). The proposed amendment to the Shire of Wanneroo scheme ensured consistency with land use allocations identified in the Metropolitan Region Scheme (MRS).

The Amendment 787 area is located about 50km north of Perth city centre and occupies roughly 4000ha. The area is bounded by a Coastal Foreshore Reserve and the Indian Ocean to the west, Eglinton to the south and extends to the boundary of the Metropolitan Region in the north, approximately 3km north of Two Rocks town site.

The amendment was formally assessed by the Environmental Protection Authority (EPA) in the form of an Environmental Review (Alan Tingay & Associates, 1999). Following assessment of the potential impacts of the proposal the EPA considered that the Amendment could be implemented to meet the EPA's objectives for environmental protection (EPA, 1999). The Minister for the Environment subsequently approved the rezoning in February 2000, subject to a number of environmental conditions (Ministerial Statement 538, Appendix 1). These environmental conditions were incorporated into the requirements of the City of Wanneroo District Planning Scheme No. 2 that relate to the entire Yanchep-Two Rocks amendment area.

The Capricorn Coastal Village Agreed Structure Plan was adopted and certified by the Western Australian Planning Commission (WAPC) in September 2004, subject to minor modifications. Amendment 1 to the Structure Plan incorporated the required modifications, and was approved by the Director, Planning and Development, under delegated authority in January 2006.

Minor modifications including the reconfiguration of sections of the local road network, incorporation of new residential mixed use and child care sites, modifications to areas of Public Open Space (POS) and other minor density coding variations were made in 2005, and formally adopted and certified as Amendment 2 in March 2006.

Since the conception of the current Structure Plan the ownership structure of the project has evolved into a joint venture between Yanchep Sun City Pty Ltd and Capricorn Investment Group Pty Ltd, known as Capricorn Village Joint Venture.

Amendment 3 to the Structure Plan was lodged in July 2006 in response to a comprehensive review of the physical and contextual elements of the northern two thirds of the Structure Plan area recently undertaken by Capricorn Village Joint Venture. Amendment 3 was adopted by the City of Wanneroo in December 2006, but has yet to be adopted by the WAPC.

The proposed amendment will provide greater retention and recognition of the unique coastal landscape and the linking of places and destinations within the new community.

1.2 Study Area and Surrounding Land use

The Capricorn Coastal Village study area comprises Lots 2, 303 and 304 Two Rocks Road, Yanchep, encompassing approximately 220ha, located within the municipal boundary of the

City of Wanneroo approximately 50km north-west of the Perth Central Business District (Figure 1).

The western boundary of the site is the existing coastal foreshore reservation under the Metropolitan Region Scheme (MRS). The southern boundary abuts the Yanchep town site along Yanchep Beach Road. The Marmion Avenue Road reservation forms the eastern boundary of the site, with Two Rocks Road intersecting the site (Figure 2).

The study area is bisected by Two Rocks Road which runs north-south, dividing the study area into 'western' and 'eastern' sections (Figure 2). The western portion is mostly vegetated and contains Club Capricorn, a homestead, a 1.6ha Water Corporation wastewater treatment irrigation area and several tracks. The eastern area is predominantly comprised of cleared grazing land and plantations of trees (many Tuarts and some exotic species), there is also a small plant nursery on the site.

1.3 Environmental and Planning Approvals

The subdivision application for Lots 2, 303 and 304 Two Rocks Road, Yanchep has been approved by the Western Australian Planning Commission.

The implementation of the subdivision proposal will result in the clearing of most native vegetation on the subject land to meet the necessary engineering requirements to build the subdivision (ie. cut and fill, road construction etc). Native vegetation will be retained where identified in the Local Structure Plan in areas of POS and the larger R5 and R10 lots. Some plants will be relocated where possible for use in areas of POS.

The site does not require a clearing permit for the vegetation that will be cleared in order to implement the proposal as the study area was assessed as part of Amendment 787 under Section 48 of the *Environmental Protection Act 1986* and 'Vegetation' was one of the factors considered by the EPA in the assessment.

1.4 Purpose and Scope

As discussed in Section 2.1, the amendment was formally assessed by the EPA in 2000 and the subsequent environmental conditions (Ministerial Statement 538, Appendix 1) were incorporated into the requirements of the City of Wanneroo District Planning Scheme No. 2 which applies to the entire Yanchep-Two Rocks amendment area.

More specifically, condition 2.2 states:

> *2.2 Vegetation and Fauna Mangement*
>
> *2.2.1 Regionally significant vegetation (Bush Forever sites) which surrounds the amendment area (as shown in Figure 1 of the Ministers statement) shall be protected from indirect and direct impacts associated with the development of the amendment area by the following:*
>
> - *Clear delineation of regionally significant areas of vegetation from the amendment area through the use of dual use paths, public open space areas and the like.*
> - *Control of off-road vehicle use and dumping of rubbish.*

- *Fire management.*

- *Promotion of community awareness of bushland protection.*

This report updates the previous *Flora and Fauna Management Strategy* developed for the subject area (ATA, 2005), reflecting changes to the previous structure plan which will be enacted under Amendment No. 3 to the Capricorn Coastal Village Agreed Structure Plan No. 44. This *Flora and Fauna Management Strategy* outlines the methods by which the above conditions will be met by the Capricorn Village Joint Venture.

The preparation of this strategy is also a requirement of the City of Wanneroo as part of the Special Provisions of the Capricorn Coastal Village Structure Plan, namely:

> *The preparation of a flora and fauna management strategy prior to the subdivision of land within the Project Area (including any soil disturbance or earthworks) to provide for the relocation and/or propagation of native flora and fauna and implementation of the recommendations of the endorsed strategy.*

To meet the requirements of the above-mentioned conditions, this *Flora and Fauna Management Strategy* has been prepared to provide details on:

- The management of the interface between regionally significant areas of vegetation (Bush Forever sites) and the development;

- Seed collection strategies;

- Native vegetation clearing management;

- fauna trapping and relocation; and

- Revegetation using native species.

2. VEGETATION, FLORA AND FAUNA

2.1 Vegetation

2.1.1 Background

A detailed flora and vegetation survey of the Yanchep area (specifically the 7000ha Tokyu Corporation landholding which includes the study area) was conducted between September and November 1991. Vegetation description of the property in this survey was based on aerial photography review, sampling over a number of sites and computer classification analysis. A list of native species of the area was compiled from observations and collections made along a series of foot and vehicle traverses conducted during this period (further details are available in Alan Tingay & Associates (1991)). A review of the 1991 survey, including the preparation of a more detailed vegetation map was conducted in 2001 as part of the planning for the Capricorn Coastal Village area.

In addition, ATA Environmental conducted a survey of the Capricorn Coastal Village development area on 10 March 2003, focussing on the *Melaleuca huegelii* vegetation type to confirm the Floristic Community Type to which the vegetation type belongs.

2.1.2 General Description

The western portion of the study area contains vegetation representative of young Quindalup Dunes with some areas of Spearwood Dune vegetation. The eastern portion is mostly cleared with some Spearwood Dune vegetation remaining in pockets.

The young Quindalup Dune vegetation, made up of foredune, Q4 and Q3 vegetation types, is located along the coastline with little more than a few hundred metres extension inland. The foredune vegetation is either very narrow or absent, especially to the north of the study area where erosional processes are dominant. As a result, there is a quick progression to vegetation of the tall Q4 dunes dominated by *Olearia axillaris* and *Spyridium globulosum.* These dunes are usually fairly narrow along the coast and are replaced inland by the more extensive Q3 dunes, comprising predominantly *Acacia rostellifera* and *Spyridium globulosum*.

The Capricorn Coastal Village area comprises the *Melaleuca systena* Heath on Q1 dunes. The Q1 vegetation type is restricted to narrow bands, intermixed with Spearwood vegetation types. A significant area of the Q1 vegetation on the eastern section of the study area has been cleared for agriculture or is in a very degraded condition.

The Spearwood Dune vegetation includes shallow sand over limestone and outcropping limestone vegetation types and are mainly distributed in the eastern portion of the study area. In the study area the *Dryandra sessilis* Heath occurs on flat areas of limestone and low hills, while one taller limestone hill supports a stand of *Melaleuca huegelii*.

The deeper sand over limestone vegetation types are located in the central and eastern regions of the study area and include scattered Banksia Woodlands. Pockets of exposed and shallow limestone are scattered throughout the study area, however there is a distinct transition between the vegetation found on the limestone and the deeper sands.

The vegetation types found within the Capricorn Coastal Village study area are described below and displayed in Figure 3.

2.1.2.1 Young Quindalup Dune Heath

- ***Spinifex hirsutus* (Sh) on Foredunes and *Ammophila arenaria* (Aa) Grassland (Marram)**

These vegetation units are typical of accreting shorelines, generally being the first species to colonise the primary dune. In some areas, the *Spinifex* occurs in association with *Ammophila arenaria* (Aa).

- ***Olearia axillaris, Pelargonium capitatum* and *Spinifex hirsutus* (OaPcSh)**

Immediately inland of the Sh and Aa vegetation units the older beach ridges support a narrow band of *Olearia axillaris, Pelargonium capitatum* and *Spinifex hirsutus* (OaPcSh) Heath. This unit occurs between the leeward slope of the foredune and base of the primary dune.

- ***Olearia axillaris* and *Scaevola crassifolia* (OaSc) Shrubland**

The windward slope and crest of the primary dune supports an *Olearia axillaris* and *Scaevola crassifolia* (OaSc) Shrubland. Other species of this association include *Carpobrotus virescens, Senecio lautus, Trachyandra divaricata* and *Calocephalus brownii*. *Lepidosperma gladiatum* is dominant in patches.

- ***Olearia axillaris* and *Spyridium globulosum* Heath (OaSg) and *Olearia axillaris, Spyridium globulosum* and *Acacia rostellifera* Heath (OaSgAr)**

The OaSg vegetation association dominates the Q4 dunes and is generally the first unit to establish on stabilised blowouts. This unit also occurs in places with *Acacia rostellifera* and forms the OaSgAr vegetation type.

2.1.2.2 Old Quindalup Dune Heath

- ***Melaleuca acerosa* (now *M. systena*) Closed Heath (Ma)**

The older Quindalup dunes (Q1-inland and Q2-old coastal dunes) which occur close to the coast have a more developed soil profile than the Q3 and Q4 sites with an accumulation of organic matter in the topsoil and moderate cementation of the subsoil. The vegetation characteristic of this soil type occurs on rolling parabolic dunes generally with convex slopes.

The Q1 dunes are limited in the study area and have mostly been degraded. Where it remains in good condition the flanks and crests are dominated throughout by the Ma association which also commonly includes *Conostylis candicans, Hibbertia racemosa, Diplopeltis huegelii, Phyllanthus calycinus* and *Nemcia reticulata*. No other species is routinely co-dominant with *Melaleuca acerosa* but in some places some species assume equal importance and occur scattered throughout the Ma association.

- ***Acacia saligna* (As) Open Scrub to Tall Shrubland**

On some dune slopes, flat areas and swales of the Q1 dunes the Ma association is covered by a sparse to dense cover of *Acacia saligna* with *Xanthorrhoea preissii* also common up to 2.5m tall. The soil type covered by this association is both Q1 and Qs soils which is generally dark brown sand and probably indicates the proximity of the Tamala Limestone to the surface. The common species of the As/AsXp unit are similar to that of the Ma association with *Conostylis candicans, Diplopeltis huegelii* and *Melaleuca acerosa* but differ slightly with the

inclusion of the two dominant species *Acacia saligna* and *Xanthorrhoea preissii* as well as the inclusion of *Lepidosperma angustatum* and *Rhagodia baccata*. These areas appear to have a higher number of introduced species due to either the increased nutrients of the soil type, higher moisture availability or increased grazing pressure.

2.1.2.3 Limestone Heath Types

- ***Dryandra sessilis* Heath to Closed Heath (Ds)**

The limestone heaths dominated by *Dryandra sessilis* are by far the most widespread throughout the area. It can be the sole dominant species or can be found associated with other dominants including *Hibbertia hypericoides, Acacia pulchella, Hakea trifurcata, Calothmnus quadrifidus* (DsCq) and mixtures of these co-dominants. These associations tend to occur mainly on the lower, mid and upper slopes of limestone rises and hills. Where the limestone abuts areas of deeper sand, occasional emergent *Banksia* and Tuart trees occur. However, usually the transition from Ds to *Banksia* Woodland is more abrupt.

Common understorey species include *Melaleuca systena, Mesomelaena pseudostygia, Hibbertia hypericoides, Xanthorrhoea preissii, Desmocladus flexuosus, Conostylis candicans* and *Hybanthus calycinus.*

- ***Melaleuca huegelii* Open Heath to Heath (Mh)**

The top of one limestone hill area contains the Mh Heath association. The soil type typically contains abundant limestone with very little sand present. The exposed limestone is more weathered than that exposed in the Ds Heath. The *Melaleuca huegelii* occurs in associations with *Melaleuca systena, Dryandra sessilis, Spyridium globulosum, Scaevola nitida* and *Acacia cyclops* and to a lesser extent *Templetonia retusa, Leucopogon parviflorus, Desmocladus flexuosus, Austrostipa flavescens, Lepidosperma angustatum* and *Rhagodia baccata*.

- ***Melaleuca cardiophylla* Closed Scrub (Mc)**

This association occurs as isolated patches in the western region of the study area. The association occurs mostly on bare limestone but unlike the Mh association (which occurs on heavily fractured limestone on hilltops) the Mc association occurs on solid smooth limestone on flat valley terrain. The *Melaleuca* shrubs can attain a height of up to 3m with a dense canopy inhibiting the development of a dense understorey. *Melaleuca huegelii* and *Templetonia retusa* are common shrub species in the understorey. The association appears to be the main habitat of two *Thomasia* species, *T. cognata* and *T. triphylla*, and the creeper *Billardiera erubescens.*

2.1.2.4 Sand over Limestone Vegetation

- ***Banksia attenuata* Low Open Forest (Ba)**

The Banksia vegetation type includes a variety of different associations based mainly on the dominance of four low tree species, *Banksia attenuata, B. menziesii, Eucalyptus todtiana* and *Allocasuarina fraseriana*. While there is a range of understorey shrub types there is no clear division into distinct groupings.

Banksia associations are distributed mainly in the eastern half of the study area. They occur as large areas such as in the central and northern region of the site or intermixed with

limestone vegetation or occasionally as small stands throughout valleys in the older Quindalup Dunes. The understorey vegetation is usually dominated by *Hibbertia hypericoides* with *Mesomelaena pseudostygia, Xanthorrhoea preissii, Macrozamia fraseri* and *Sowerbaea laxiflora*.

2.1.3 Vegetation Condition

Information on the condition of the vegetation was gathered during the 1991 vegetation survey with an emphasis on the degree of disturbance and the extent of weed invasion.

The condition of the vegetation was assessed using the condition rating scale of Keighery published in *Bush Forever* (Government of Western Australia, 2000). Keighery's condition rating scale ranges from Pristine (which the vegetation exhibits no visible signs of disturbance) to Completely Degraded (where the vegetation structure in no longer intact and without native plant species).

Descriptions of the vegetation condition ratings in *Bush Forever* (Government of Western Australia 2000) are outlined in Table 1.

TABLE 1
VEGETATION CONDITION RATING SCALE

Pristine Pristine or nearly so, no obvious signs of disturbance.
Excellent Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
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.
Good Vegetation structure significantly altered by very obvious signs of multiple disturbance. 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.
Degraded Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Completely Degraded The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Source: Government of Western Australia, 2000.

The condition of the vegetation in the study area is mapped in Figure 4 and ranges from Completely Degraded to Very Good.

The coastal vegetation is mostly in Good to Very Good condition in those areas not developed. Outbreaks of garden plants in the sand dune vegetation are common around developed areas.

Approximately 100ha of the study area (40%) has been totally cleared for agriculture or degraded as a result of associated activities. The majority of these cleared areas exist east of Two Rocks Road (Figure 4). Apart from clearing, the main impact on the native vegetation is grazing by stock. The lack of fencing around areas of native vegetation means that cattle are allowed to graze freely. Some areas of the eastern section of the study area have been planted with tree species including Tuarts (*Eucalyptus gomphocephala*), Moort (*Eucalyptus platypus)* and Rottnest Island Teatree (*Melaleuca lanceolata*) which form plantations or groves.

2.1.4 Floristic Community Types and Threatened Ecological Communities

The vegetation associations identified in the study area can be related to the Department of Environment and Conservation's (DEC) Floristic Community Types (FCT) (Gibson *et al*., 1994) as summarised in Table 2. A study initiated by the City of Wanneroo to investigate the conservation values of remnant vegetation in the region provides further information regarding the FCTs present in the study area (Trudgen, 1996). The FCTs identified in the study area include the following:

24 Northern Spearwood shrublands and woodlands.

28 Spearwood *Banksia attenuata* or *Banksia attenuata-Eucalyptus* Woodlands.

29a Coastal Shrublands on shallow sands.

29b *Acacia* Shrublands on taller dunes.

S7, S11, S13, S14 (the strand) and S15 – recent Quindalup divisions.

Gibson (*et al*., 1994) provides the following description of the Floristic Community Types found in the study area:

> FCT 24 and 28 are restricted to the Spearwood Dune system. FCT 24 includes heaths or heaths with scattered Tuart (*Eucalyptus gomphocephala*) occurring on the deeper soils north from Woodmans Point. Within the study area FCT 24 corresponds to the vegetation associations dominated by *Melaleuca huegelii, M. acerosa* or *Dryandra sessilis* on the skeletal soil on ridge slopes and ridge tops. FCT 28 is largely made up of the *Banksia* Woodlands and has been recorded from Thompson's Lake north to Seabird.
>
> FCT 29 is largely restricted to the Quindalup System and contains two distinct subgroups. FCT 29a comprises mostly heaths on shallow sands over limestone close to the coast. These communities do not have a single dominant but important species include, *Spyridium globulosum, Rhagodia baccata* and *Olearia axillaris*. This community occurs between Seabird and Garden Island. FCT 29b is dominated by *Acacia* Shrublands or mixed heaths of the larger dunes and ranges from Seabird to south of Mandurah. There is no consistent dominant in the FCT however, species such as *Acacia rostellifera, Acacia lasiocarpa* and *Melaleuca acerosa* are important.

The Mc vegetation association also corresponds to FCT 29b. Although it occurs on limestone there is sufficient Quindalup dune species in this unit that classifies the Mc unit with the Quindalup vegetation types rather than the Spearwood types.

The vegetation surveys undertaken in 1991 and 2003 have shown no Floristic Community Types (FCTs) listed as Threatened Ecological Communities (TEC) (English and Blyth, 1997) occur in the study area. The study area however, does support two communities recommended for listing as Threatened communities due to their poor reservation status and susceptibility to human activities and threatening processes (Gibson *et al*, 1994). These comprise FCTs 29a and 29b, as shown in the following table. Areas of these communities (FCT 29a and 29b) will be protected in the Foreshore Reserve.

Site investigations to collect floristic data in March 2003 revealed that the *Melaleuca huegelii* Open Heath to Heath (Mh) vegetation unit corresponds to FCT 24 or 29 and not 26a due to the absence of typical species usually recorded from FCT 26a and the presence of some species commonly associated with Quindalup Dune FCTs such as FCT 29. This result was confirmed by botanist Greg Keighery from CALM during a site investigation in June 2003.

TABLE 2
CONSERVATION STATUS OF FLORISTIC COMMUNITY TYPES RECORDED IN THE STUDY AREA

Floristic Community Type		Reservation Status	Conservation Status
24	Northern Spearwood Shrublands and Woodlands	Well Reserved	Susceptible
28	Spearwood *Banksia attenuata* or *Banksia attenuata* - *Eucalyptus* Woodlands	Well Reserved	Low Risk
29a	Coastal Shrublands on shallow sands	Poorly Reserved	Susceptible
29b	*Acacia* Shrublands on taller dunes	Poorly Reserved	Susceptible

2.1.5 Conservation Significance of Vegetation

The identification and delineation of Regional Open Space (ROS) within the Yanchep-Two Rocks area is based primarily on the recommendations of *The System 6 Study Report* (EPA, 1983) and more recently, *Bush Forever* (Government of WA, 2000).

The System 6 study identified three areas within the Yanchep-Two Rocks area including Area M1 which encompasses an area of bushland immediately south of Wilbinga and Caraban MPA, Area M2 comprising the coastal area from Two Rocks to Burns Beach and Area M3 which includes the westward extension of the Yanchep National Park.

Bush Forever was jointly prepared by the Ministry for Planning (MFP), and the former Departments of Environmental Protection (DEP), the former Department of Conservation and Land Management (CALM) and the former Water & Rivers Commission. It builds on the System 6 Update and the findings of the Perth Environment Project and identifies areas of regional significance worthy of protection to conserve the biodiversity of the vegetation on the Swan Coastal Plain portion of the Perth Metropolitan Region. The principal objective of Bush Forever is to protect at least 10% or 400ha, whichever is the largest, of each vegetation complex in at least five separate areas in the Perth Metropolitan Region. Other key criteria for the identification of regionally significant areas include the protection of threatened ecological communities, floristic communities and verified conservation category wetlands associated with bushland. In addition, elements such as size, vegetation condition, relationship with other areas and land use zoning constraints were also considered during the selection process.

The Bush Forever sites in the Yanchep-Two Rocks area generally coincide with, or are adjacent to, the System 6 areas. The Capricorn Coastal Village area is adjacent to the Foreshore Reserve and Bush Forever Site 397, as shown in Figure 2 and described below:

BF Site 397 Bush Forever site 397 corresponds to the existing coastal Foreshore Reserve between Mindarie and Wilbinga and is therefore identified in Bush Forever as a 'Site with some Existing Protection'. The Foreshore Reserve boundary was determined in 1996 as part of MRS Amendment 975/33 and is based on the *Coastal Planning Strategy* prepared for the Yanchep-Two Rocks area (Alan Tingay & Associates, 1993).

2.2 Flora

2.2.1 General Description

During the 1991 survey (Alan Tingay & Associates, 1992), 302 species were collected from the Yanchep-Two Rocks area. A specific list of flora from the Capricorn Coastal Village study area was not compiled in the 1991 survey.

2.2.2 Significant Flora

During the 1991 survey, two populations of the Declared Rare mallee, *Eucalyptus argutifolia*, were recorded in the Yanchep-Two Rocks area on tall limestone outcrops near the north-east corner of the property. These populations do not occur within the study area.

No Declared Rare Flora (DRF) or Priority Flora have been found in the study area.

Bush Forever also identifies significant species other than DRF and Priority plants, mostly on the basis of their geographic distribution. One of these species, *Melaleuca cardiophylla* occurs in several small stands in the study area. Due to engineering requirements these stands cannot be retained. Seed collection is recommended from this species prior to clearing.

2.2.3 Conservation Significance of Flora

The flora survey undertaken in 1991 provided a number of recommendations relating to the protection of flora and significant species. In particular, local conservation initiatives such as POS allocation, should aim to preserve viable-sized areas of native vegetation within each of the main vegetation types for species conservation. This is evident in a number of examples within the Local Structure Plan.

No DRF or Priority Flora recorded on the DEC database were recorded in the study area during the 1991 survey.

2.3 Vertebrate Fauna

2.3.1 Background and General Description

A vertebrate fauna survey of the Yanchep-Two Rocks area was undertaken by Alan Tingay and Associates in 1991 (Alan Tingay & Associates, 1991). The total number of vertebrate species recorded during the 1991 survey was 96 native and 8 introduced species. The survey revealed a relatively diverse, but generally typical fauna for the region. The diversity is related to the range of different habitats that remain in the area despite use of much of the land

for agricultural purposes. The main habitats are the tracts of remnant vegetation and planted stands of Tuart trees on pasture land.

In a regional context the vertebrate fauna in the Yanchep-Two Rocks study area is similar to that found elsewhere in the region within National Parks and Conservation Reserves, particularly Yanchep National Park.

Further details on vertebrate fauna can be found in Yanchep Subdivision Plan Vertebrate Fauna Survey (Alan Tingay & Associates, 1991).

2.3.2 Significant Fauna

Two species currently listed as 'in need of special protection' under the provisions of the *Wildlife Conservation Act 1950*, including the Schedule 1 Short-billed Black-Cockatoo or Carnaby's Cockatoo (*Calyptorhynchus latirostris*), and the Schedule 4 Peregrine Falcon (*Falco peregrinus*) were recorded in the Yanchep-Two Rocks area. It is expected that the Short-billed Black-Cockatoo and Peregrine Falcon are occasional visitors to habitats within the Capricorn Village study area.

The Short-billed Black-Cockatoo typically migrates to the coastal regions during non-breeding periods, feeding commonly in *Banksia* and Eucalypt woodlands, *Dryandra* heath and other proteaceous species as well as pine plantations. This species typically breeds in the semi-arid and sub-humid zones in smooth-barked Eucalypt woodlands, and is not known to breed on the Swan Coastal Plain. The status of this species is threatened as a result of clearing for agriculture and associated loss of habitat. Carnaby's Cockatoo is also protected by the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The proposal to subdivide the Capricorn Coastal Village study area for residential purposes was referred to the Commonwealth Department of Environment and Heritage (DEH) under the EPBC Act and on 23 February 2005 the DEH determined that the proposal was not a 'controlled action'.

The Peregrine Falcon is uncommon, although widespread throughout much of Australia excluding the extremely dry areas. It shows habitat preference for areas near cliffs along coastlines, rivers and ranges and within woodlands along watercourses and around lakes. Nesting sites include ledges along cliffs, granite outcrops and quarries, hollow trees near wetlands and old nests of other large bird species. This species predominantly preys and feeds on other birds.

Both of these species have been recorded in surrounding areas including Wilbinga and Yanchep National Park, or are expected to occur in areas of suitable habitat within these areas. Additional species of gazetted fauna may also be present in less disturbed habitats in these areas.

More recently, anecdotal reports by local residents of the Yanchep-Two Rocks area identified the possible presence of the Southern Brown Bandicoot (or Quenda), *Isoodon obesulus fusciventer*, in the study area. The estimated size of the population and distribution in the local areas is not known, however the population is presumed limited because of atypical habitat.

The preferred habitat of the Quenda is dense vegetation around wetlands on the coastal plain, and along watercourses in the Darling Range and southern forests. Dense shrubland, kwongan and sandplain heaths are preferred in wheatbelt reserves. In the study area the Quenda is likely to inhabit dense coastal scrub.

In November 1990, the Quenda was listed as Schedule 1: “Fauna which is rare or likely to become extinct”, under the *Wildlife Conservation Act 1950*. However, it was downgraded to Priority 4 in 1998 as it no longer met the criteria for threatened status as a result of effective fox control, successful translocation programs and an increase in known populations. It is however, still considered to be of conservation significance. The Quenda has now been downgraded again to Priority 5 due to further success with translocation programs and an increase in known populations.

The Quenda will be the focus of a fauna relocation strategy in the study area, as addressed in the following sections.

3. FLORA AND FAUNA MANAGEMENT STRATEGY

3.1 Management of Interface between Development and Bush Forever Site 397

Bush Forever Site 397 forms part of the coastal foreshore reservation and comprises a linear ROS stretching form Mindarie to Wilbinga. As shown in Figure 2, the proposed Capricorn Coastal Village development abuts Bush Forever Site 397 (also Parks and Recreation Reserve under the Metropolitan Region Scheme) for an approximately 2km section just north of the Yanchep town site.

The interface between Bush Forever site 397 and the Capricorn Coastal Village will be physically separated by a coastal road (Figure 2). POS area 15 is located west of the coastal road, immediately adjacent to Bush Forever site 397 (Figure 2). POS area 15 is proposed to be used as a Landscape Protection (Passive) area in conjunction with POS area 14 which is located on the eastern side of the coastal road.

Two areas of POS will be located on the western site of the coastal road to provide some coastal recreation opportunities for local residents and visitors to the beach. POS areas 1 (0.15ha) and 2 (0.79ha) will contain a range facilities from lawn areas, paths, seating opportunities, BBQs, shelters and drainage areas. The Mary Lindsay Homestead is located within POS area 1, and it is proposed that the portion of POS area 1 adjacent to the homestead, be developed as Civic and Cultural reserve with a small café kiosk, becoming a focal point for the community. The site will form part of the open space contribution requirement for the broader Capricorn development.

Beach access paths will be constructed to minimise the disturbance of native vegetation in the Foreshore Reserve, and fencing will be constructed along the Foreshore Reserve boundary to direct beach bound pedestrians to use the beach access paths only. The fencing of the Foreshore Reserve will prevent vehicles from entering the Foreshore Reserve and the dumping of rubbish. The Foreshore Reserve will be appropriately signed to promote community awareness of the protection of native vegetation. If a fire were to occur in the Foreshore Reserve, the coastal road that separates the Foreshore Reserve from the Capricorn Coastal Village development area would prevent the fire from reaching the residential area and would enable access to control the fire.

A *Foreshore Management Plan* (FMP) has been prepared for the Capricorn Coastal Village. The FMP contains more detail of the management of the Foreshore Reserve and Bush Forever site 397 where their common boundary abuts the development area (ATA Environmental, 2004 Draft).

3.2 Retention of Native Vegetation in Open Space Precincts

The subdivision plan for the Capricorn Coastal Village contains 29 POS areas. Wherever appropriate the native vegetation, particularly trees will be retained in POS areas. The POS areas have been designed for active and passive recreation for the community of the Capricorn Costal Village and may not have much opportunity to retain intact vegetation due to the requirement for the provision of grassed areas and associated subdivision earthworks.

POS areas 3, 10, 15, 20, 21 and Part of 29 have been allocated as *Landscape Protection* POS areas within Amendment 3 to the Structure Plan, with native vegetation to be retained within these areas wherever practicable. Subject to detailed design, Tuarts on the site will be retained where appropriate in POS areas 4, 10 and Part of POS area 29.

Where native vegetation has been identified for retention with the POS area (as above) and drainage disposal has also been identified within the POS, no clearing of vegetation will occur on the land until landscaping plans have been considered and approved by the City of Wanneroo. In the consideration of landscaping plans, the City will require the drainage facility to be designed and located in a manner to have the least impact on existing native vegetation.

Those areas identified for native vegetation retention will benefit from and be targeted for rehabilitation works (planting and propagation) and the use of mulched local vegetation as described in the procedures in Section 3.3.3.

In accordance with Amendment 3 to the Structure Plan, building envelopes will be designated on all R5 and R10 (Figure 5) lots to ensure maximum retention of native vegetation and topography. Dunes and coastal vegetation are to be protected through the siting of low density R5 and R10 housing within the Capricorn Village Precinct. Whilst these areas do not form part of the open space available to the public, the lots have been highlighted within the Structure Plan to illustrate the conservation linkages that will be achieved throughout the Structure Plan Area.

3.3 Pre-Construction Requirements

Based on several meetings with Capricorn Coastal Village Environmental Working Group it was identified that pre-construction activities to be implemented by the land owner at the Capricorn Coastal Village study area should include:

- Undertaking a seed collection program for *Melaleuca cardiophylla*;
- Identify appropriate plants for relocation prior to earthworks;
- Implementing a fauna trapping and relocation program prior to the clearing of native vegetation; and
- Implementing measures to protect native vegetation to be retained and effectively manage native vegetation to be cleared during construction activities.

3.3.1 Seed Collection and Propagation

The collection of local seed material of *Melaleuca cardiophylla* for the use in rehabilitation or landscaping within the study area will be carried out prior to clearing works and prior to the development of the surrounding area. This operation will contribute positively to on-going biodiversity within the study area and will further ensure the retention of local indigenous species.

The seed stock will then be stored, as required, by the land owner for use in the revegetation or landscaping works in the Capricorn Coastal Village Development.

The collection of Balgas (*Xanthorrhoea preissii*) and Zamia Palms (*Macrozamia riedlei*) is also recommended prior to clearing. Plants of these species will be excavated in the correct manner to ensure survival and stored appropriately prior to transplanting to landscaped areas in the development.

Comment [RK1]: This was included in the previous version of this report, however ATA has not been engaged previously to conduct this work, and we are unsure as to the status of this item. Can you please provide information as to whether this has been conducted, or plans to do so in the future.

3.3.2 Fauna Trapping and Relocation Program

The fauna trapping and relocation program was completed in October 2006. The fauna trapping and relocation program was implemented in three phases. Phase 1 was undertaken between 4 and 15 October 2004, Phase 2 between 4 and 15 April 2005 and Phase 3 on 31 October 2006. All trapping conducted during Phase one was under CALM licence # SF004726 and Phase two # SF004920.

A list of all individuals captured during Phase 1and 2 of fauna relocation is provided as Appendix 2. No fauna were captured during Phase 3.

Forty-six individuals were trapped or hand collected during Phase 1 and twenty-eight individuals were hand collected during Phase 2 of the relocation program. All individuals with the exception of the one Quenda captured were relocated to unburnt bushland adjacent to Yanchep National Park. All fauna caught during Phase 1 and 2 were predicted for the area and were not significant range extensions.

Phase 1

The first phase of the fauna trapping program was undertaken in Spring 2004 and targeted selected species of mammal such as the Quenda. Initially the proposed timing for clearing was February 2005. Therefore, the Quenda trapping was conducted in Spring to avoid potential heat stress on the mammals in accordance with the requirements of CALM. Quenda are particularly susceptible to heat stress and trapping during cooler periods reduces this stress.

The relocation program involved eight nights of cage trapping using 60 cage traps distributed throughout the area proposed for clearing. This trapping technique targeted medium sized mammals including the Quenda and Brushtail Possums. This technique for capturing medium sized mammals has been used in other areas on the Swan Coastal Plain and is an acceptable method advised by CALM. The exact trap locations of each cage trap was dependant on microhabitat. It is appreciated that all Quenda will not be captured on site during the trapping period.

As discussed earlier, forty-six individuals were trapped or hand collected and relocated to unburnt bushland adjacent to Yanchep National Park. One Quenda was captured during Phase one and was taken to the DEC's (formerly CALM) Wildlife Conservation office in Kensington.

Phase 2

Phase 2 targeted all small reptiles and mammals, with other species of fauna also caught opportunistically. No trapping was conducted during Phase two and all individuals were captured by hand.

Active searching included digging out holes, removing bark from logs and trees, turning over rocks and sorting through leaf litter with rakes. It is recognised that this strategy is likely to only capture a limited assemblage of vertebrate fauna in any area as many species are cryptic and not readily caught by active searches. However given the warm weather during the Phase 2 period, many reptiles were still caught using this technique.

As discussed earlier, twenty-eight individuals were hand collected and relocated to unburnt bushland adjacent to Yanchep National Park.

It should be noted that a hatching Carpet Python was found dead on bitumen road just south of the Club Capricorn resort turn off during on 4 April 2005. The presence of a hatchling indicates that other Carpet Pythons (hatchlings and adults) are likely to be in the area. The Carpet Python (*Morelia spilota imbricate*) is a Schedule 4 fauna species – *Other specially protected fauna* at the State level under the *Wildlife Conservation Act 1950*. Schedule 4 is the lowest level of protection under the *Wildlife Conservation Act*.

Carpet Pythons are infrequently caught on the Swan Coastal Plain due to their behaviour and the low density in which they usually occur. The most cost effective method of capturing these species is regular nocturnal spotlighting of the sandtracks and bitumen roads in the area on warm evenings, however substantial effort in appropriate weather conditions may result in only a few or no individuals being captured.

It is highly unlikely that any Carpet Pythons will be captured with further effort. The most likely chance of observing Carpet Pythons in the area will be during clearing operations. It is recommended that the clearing contractor be advised as to the possible presence of Carpet Pythons before undertaking any works.

Phase 3

Phase 3 was undertaken in October 2006 to cover an additional area of land surrounding the Club Capricorn Resort which had been previously unsurveyed. As reported earlier, no fauna was captured during Phase 3.

3.3.3 Clearing of Vegetation

The location and limit of clearing of vegetation within all work areas will be clearly identified on site and delineated on appropriate plans. These will be supplied to contractors and personnel prior to commencement of works.

The work areas will include:

- Road carriage way widths plus adjacent service corridors;
- Service corridors away from roads;
- Areas of bulk earthworks; and
- The construction operations area.

Where necessary, the landowner will install a temporary standard of fencing around areas of POS and the Foreshore Reserve to protect the natural vegetation from further degradation by off-road vehicle use, pedestrians and earthmoving equipment to the specification and satisfaction of the City of Wanneroo.

Cleared native vegetation will be used to generate chipped mulch material. This will be used in areas requiring stabilisation and rehabilitation. Mulch material can make a substantial contribution to the on-site seed bank and when re-spread in the relatively short term (ie. within 6 months) is usually very successful in re-establishing vegetation on site. Mulching of cleared native vegetation will be conducted as a concurrent operation with clearing works and the mulched material will be stockpiled close to the source of mulch for reuse within the immediate proximity, where appropriate.

The Site Engineer will require contractors and nominated subcontractors to adhere to the following clearing procedures within the development area:

- Native vegetation to be cleared will be removed in a systematic manner and stockpiled for mulching and/or chipping for later use in rehabilitation and landscaping works.

- The stockpiling of cleared vegetation of a poor quality will be separate to that of good quality to minimise the spread of weeds into conservation areas. Only vegetation of good quality will be used for mulch and rehabilitation.

- Stockpile larger logs that may be suitable for rehabilitation works, site stabilisation and access control and deliver to rehabilitation stockpiles.

- Cleared areas will be temporarily stabilised with water or hydro-mulch or other stabilising material until final use can be implemented.

- No burning of cleared vegetation will be permitted during any stage of construction.

- No vehicles involved in clearing or earthworks will be permitted to go onto Bush Forever site 397, and no soil or mulch from clearing activities will be moved to Bush Forever site 397 to avoid the spread of any pathogens to an area of Regionally Significant Vegetation.

4. SUMMARY OF ACTIONS

The following actions listed in Table 3 have been identified as key components of the Flora and Fauna Management Strategy within the Capricorn Coastal Village study area.

TABLE 3
SUMMARY OF ACTIONS

Strategy	Timing	Response
Implement a seed collection program for key species identified in Section 3.3.1.	Prior to clearing and preferably Summer 2005.	Land owner
Implement a Fauna Trapping and Relocation Program.	Completed see Section 3.3.2	Land owner
Delineate areas of regionally significant vegetation adjacent to the study area and areas of bushland to be retained in the development.	Prior to clearing.	Land owner
Implement vegetation clearing procedures as identified in Section 3.3.3.	During clearing.	Land owner

Comment [RK2]: This was included as an action in the previous version of this report, however ATA has not been engaged previously to conduct this work, and we are unsure as to the status of this item. Can you please provide information as to whether this has been conducted, or plans to do so in the future.

Relocation of flora and fauna is not a common procedure conducted by developers before land clearing. In this case, it is not a requirement of the land clearing at Capricorn Coastal Village and the initiative by the land owner to relocate flora and fauna shows its commitment towards positive environmental outcomes.

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ACRONYMS

CALM	Department of Conservation and Land Management (former)
DEC	Department of Environment and Conservation
DEH	Department of Environment and Heritage (Commonwealth)
DEP	Department of Environmental Protection (former)
DRF	Declared Rare Flora
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FCT	Floristic Community Type
FMP	Foreshore Management Plan
ha	hectare
km	kilometre
m	metre
MFP	Minister for Planning
MRS	Metropolitan Region Scheme
POS	Public Open Space
ROS	Regional Open Space
TEC	Threatened Ecological Community
WAPC	Western Australian Planning Commission

FIGURES

PRINTED: Wed 04 Apr 07

metres

0 100 200 300 400 500

SCALE 1 : 8 500 @ A3

LEGEND

- Structure Plan Boundary
- Cadastral Boundary
- Structure Plan Detail
- Vegetation Condition Boundary

VEGETATION CONDITION (Source: Bush Forever, 2000)

P **Pristine**
Pristine or nearly so, no obvious signs of disturbance

E **Excellent**
Vegetation structure intact, disturbance affecting individual species and weeds are non aggressive

VG **Very Good**
Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.

G **Good**
Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.

Deg **Degraded**
Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.

CD **Completely Degraded**
The structure of the vegetation is no longer intact and the areas is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora composing weed or crop species with isolated native trees or shrubs.

Developed Area

Developed Area

SOURCE: IMAGERY - McMullen & Nolan, 2003
CADASTRE & STRUCTURE PLAN: Roberts Day, 10-01-06

ATA Environmental
environmental scientists

FLORA & FAUNA MANAGEMENT STRATEGY
LOTS 2 303 & 304 TWO ROCKS, YANCHEP
VEGETATION CONDITION
FIGURE 4

CCJ-2005-003/FFMP/24_78f4.dgn DATUM: MGA DRAWN: MR 04-04-07 CHECKED: RK 04-04-07

metres

0 100 200 300 400 500

SCALE 1 : 8 500 @ A3

LEGEND

- Structure Plan Boundary
- Cadastral Boundary
- Structure Plan Detail
- Vegetation Boundary

QUINDALUP VEGETATION COMPLEX

Young Quindalup Dune Heath

Sh	*Spinifex hirsutus* on Foredunes
Aa	*Ammophila arenaria* Grassland
OaPcSh	*Olearia axillaris, Pelargonium capitatum* and *Spinifex hirsutus* Heath
OaSc	*Olearia axillaris, Scaevola crassifolia* Heath
OaSg	*Olearia axillaris* and *Spyridium globulosum* Heath
OaSgAr	*Olearia axillaris* and *Spyridium globulosum* and *Acacia rostellifera* Closed Heath
SgAr	*Spyridium globulosum* and *Acacia rostellifera* Closed Heath
Ar	*Acacia rostellifera* Closed Heath

Old Quindalup Dune Heath

Ma	*Melaleuca acerosa* Closed Heath
As	*Acacia saligna* Open Scrub to Tall Shrubland
Nf	*Nuytsia floribunda* stand

COTTESLOE - NORTH VEGETATION COMPLEX

Limestone Heath Types

Ds	*Dryandra sessilis* Heath to Closed Heath
Mh	*Melaleuca huegelii* Open Heath to Heath
Mc	*Melaleuca cardiophylla* Closed Scrub

Sand over Limestone

Ba	*Banksia attenuata* Low Open Forest
Eg	*Eucalyptus gomphocephala* Woodland to Open Forest

Cleared Includes planted trees

ATA Environmental
environmental scientists

FLORA & FAUNA MANAGEMENT STRATEGY
LOTS 2, 303 & 304 TWO ROCKS, YANCHEP

VEGETATION TYPES

FIGURE 3

SOURCE: IMAGERY - McMullen & Nolan, 2003
CADASTRE & STRUCTURE PLAN: Roberts Day, 10-01-06

PRINTED: Wed 04 Apr 07
CHECKED: RK 04-04-07
DRAWN: MR 04-04-07
DATUM: MGA
CCJ-2005-003/FFMP/24_78f3.dgn

PRINTED: Thu 12 Apr 07

CCJ-2005-003/FFMP/24_78f2.dgn DATUM: MGA DRAWN: MR 04-04-07 CHECKED: RK 04-04-07

TORBORANGO AVENUE

311

310

PRIVATE SCHOOL K-12

POS 29

PAW

POS 28

PRIMARY SCHOOL

TWO ROCKS ROAD

MARMION AVENUE

SWAN L13321

R 45935

R 20561

312

POS 27

POS 26

MIXED USE

POS 25

POS 22

POS 21

AGED CARE SITE

DRAINAGE SUMP

POS 20

POS 23

POS 24

HOTEL SITE

302

303

POS 16

POS 17

POS 18

POS 19

8999 SWAN L 32810

POS 14

POS 13

POS 15

POS 12

POS 11

POS 10

304

Bush Forever Site 397

POS 9

MIXED USE CHILD CARE

POS 8

POS 7

MIXED USE

CULTURAL / CIVIC

POS 1

AGED CARE SITE

PRIMARY SCHOOL

POS 6

POS 2

POS 4

POS 3

POS 5

YANCHEP BEACH ROAD

metres

0 100 200 300 400 500

SCALE 1 : 8 500 @ A3

LEGEND

- Structure Plan Boundary
- Cadastral Boundary
- Subdivision Detail
- Bush Forever Site Boundary
- 1 Public Open Space/POS number

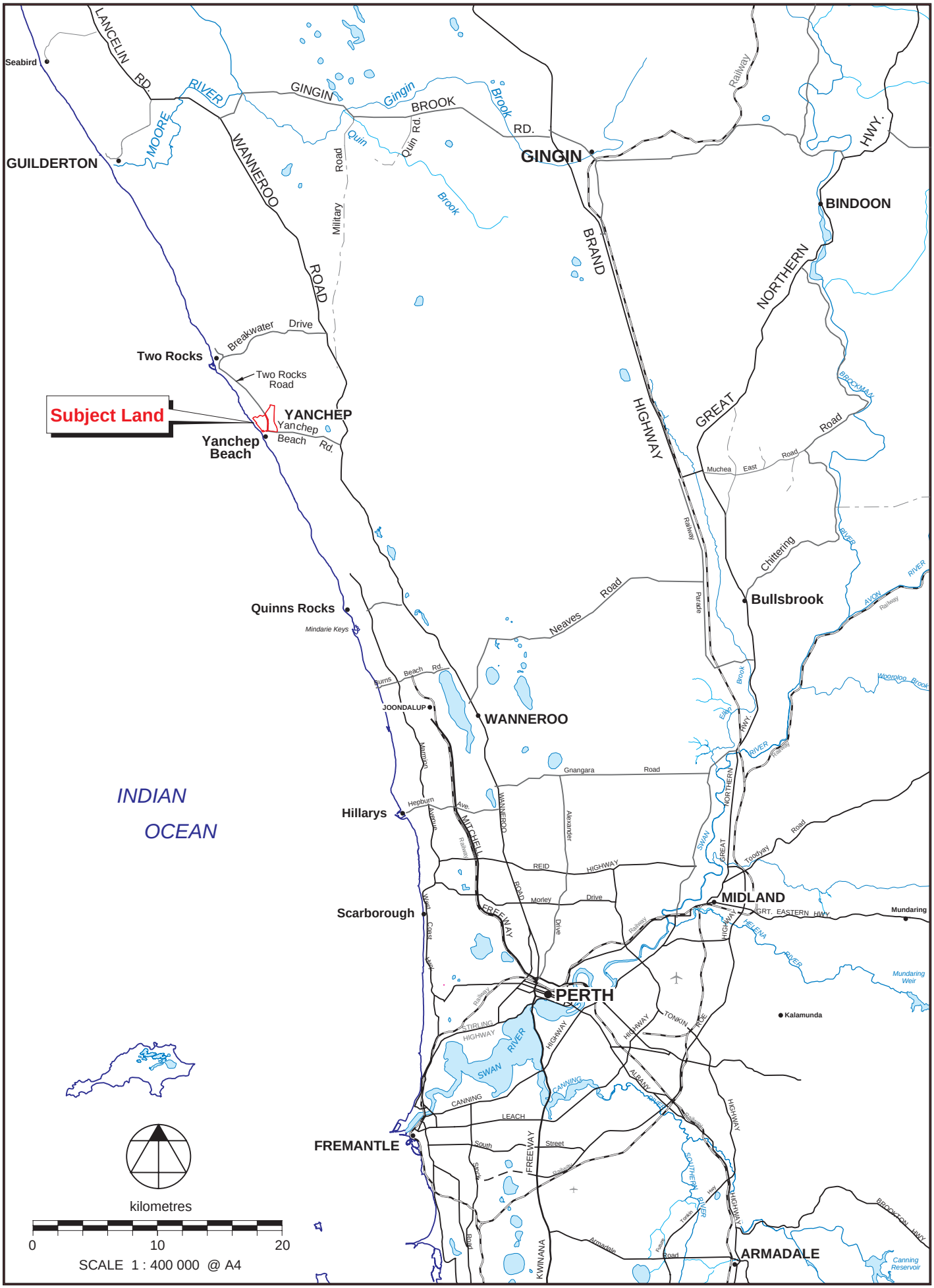
SOURCE: IMAGERY - McMullen & Nolan, 2003
CADASTRE & STRUCTURE PLAN - Roberts Day, 10-01-06

ATA Environmental
environmental scientists

FLORA & FAUNA MANAGEMENT STRATEGY
LOTS 2, 303 & 304 TWO ROCKS, YANCHEP

STRUCTURE PLAN AND PUBLIC OPEN SPACE

FIGURE 2



PRINTED: Wed 04 Apr 07 CHECKED: RK 04-04-07 DRAWN: MR 04-04-07 DATUM: MGA CCJ-2005-003/FFMP/24_78F1.dgn

ATA Environmental
environmental scientists

FLORA & FAUNA MANAGEMENT STRATEGY
LOTS 2, 303 & 304 TWO ROCKS ROAD, YANCHEP

REGIONAL LOCATION

FIGURE 1

SOURCE: Roberts Day - Structure Plan No 44 Amendment 3, July 2006 (modified February 2007)

PRINTED: Fri 13 Apr 07 CHECKED: RK DRAWN: MR 12-04-07 DATUM: Not spatially correct CCJ-2005-003/FFMP/24_78f5.dgn

ATA Environmental
environmental scientists

FLORA & FAUNA MANAGEMENT STRATEGY
LOTS 2 303 & 304 TWO ROCKS, YANCHEP

RETENTION OF NATIVE VEGETATION AND COASTAL LANDFORMS IN OPEN SPACE PRECINCTS

FIGURE 5

APPENDICES

APPENDIX 1

MINISTERIAL STATEMENT 538

000538

MINISTER FOR THE ENVIRONMENT;
LABOUR RELATIONS

STATEMENT THAT A SCHEME MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF DIVISION 3 OF PART IV OF THE ENVIRONMENTAL PROTECTION ACT 1986)

CITY OF WANNEROO TOWN PLANNING SCHEME NO. 1,
AMENDMENT NO. 787

Scheme Purpose:

(a) to rezone the portion of the Yanchep-Two Rocks area zoned "Central City Area" on the Metropolitan Region Scheme, being portions of Pt Lot 8 and Pt Lot M1689 from "Rural" and "Residential Development" to "Centre" Zone;

(b) to rezone the portion of the Yanchep-Two Rocks area zoned "Industrial" on the Metropolitan Region Scheme being portion of Pt Lot M1689 from "Rural" to "Industrial Development" Zone; and

(c) to rezone Lots 1, 101, 102, 103, Pt lot 8, Lot 12, Pt Lot 9, Pt Lot M1689, Lot 200, Lot 201, Reserve 41479, Lot 16, lot 8, Portion Lot 35, Lot 1011 and Pt Lot M1688, being those portions of the Yanchep-Two Rocks area which are zoned "Urban" or "Urban Deferred" under the Metropolitan Region Scheme and zoned "Rural", "Service Station", "Special Zone (Additional Use) Video Hire" and "Residential Development" under the City of Wanneroo Town Planning Scheme No. 1 to "Urban Development" Zone.

Responsible Authority: City of Wanneroo

Responsible Authority Address: 11 Moolanda Boulevard
KINGSLEY WA 6026

Assessment Number: 1136

Report of the Environmental Protection Authority: Bulletin 959

Subject to the following conditions, there is no known environmental reason why the town planning scheme amendment to which the above report of the Environmental Protection Authority relates should not be implemented:

Published on

15 FEB 2000

18th FLOOR, ALLENDALE SQUARE, 77 ST. GEORGE'S TERRACE, PERTH 6000 TELEPHONE: (08) 9421 7777 FACSIMILE: (08) 9221 4665/8

1 Environmental Conditions

1-1 In accordance with Section 7A4 of the Town Planning and Development Act, the environmental conditions imposed by the Minister for the Environment on the Scheme or amendments to the Scheme and contained in Statements published under Section 48F of the Environmental Protection Act, are to be incorporated into the Scheme by appropriate changes to relevant provisions and appropriate modifications to the Scheme Maps as required.

1-2 Where appropriate, the environmental conditions are to be indicated on the Scheme Map by the symbol EC to indicate that environmental conditions apply to the land.

1-3 The Responsible Authority shall maintain a register of all the Statements published under Section 48F referred to in sub-clause X.X.1 which shall be made available for public inspection at the offices of the Responsible Authority.

2. ENVIRONMENTAL CONDITIONS TO BE INCORPORATED INTO THE SCHEME BY INSERTION OF PROVISIONS IN SCHEME TEXT

2.1 Responsible Authority scheme provisions

2.1-1 The Responsible Authority shall incorporate the following environmental conditions documented in this statement into the scheme, the subject of this statement.

2.2 Environmental Management Plans

2.2-1 The following Environmental Management Plans shall be prepared in accordance with the specifications set out in Attachment 1 of the Minister for the Environment's Statement that a Scheme may be implemented No. (insert relevant statement number) published on (insert date):

- Stygofauna and/or Troglobitic Fauna Management Plan
- Drainage, Nutrient and Water Management Plan
- Karst Management Strategy
- Solid and Liquid Waste Management Plan
- Aboriginal Culture and Heritage Management Plan

2.2-2 The Environmental Management Plans referred to in condition 2.2-1 shall be prepared and implemented in accordance with the provisions of the Plans, to the requirements of the Responsible Authority.

2.3 Vegetation and Fauna Management

2.3-1 Regionally significant vegetation (draft *Perth's Bushplan* sites) which surrounds the amendment area (as shown on Figure 1) shall be protected from indirect and direct impacts associated with the development of the amendment area by the following:

- Clear delineation of regionally significant areas of vegetation from the amendment area through the use of dual use paths, roads, public open space areas and the like.

- Control of off-road vehicle use and dumping of rubbish.
- Fire Management.
- Promotion of community awareness of bushland protection.

2.4 Stygofauna and Troglobitic Fauna Management

2.4-1 If studies in relation to karst and hydrology (see 2.5-1) indicate the likelihood of significant stygofauna and/or troglobitic fauna assemblages being present in or immediately adjacent to the amendment area, the landowner (with assistance from relevant scientific experts) shall undertake a survey (at the Local Structure Planning Stage) to assess the nature and extent of any population/s.

This survey shall be completed prior to finalisation of the Local Structure Plan and to the requirements of the Responsible Authority on advice from the Department of Conservation and Land Management and the University of Western Australia (Department of Zoology).

2.5 Assessment of Karst Landform

2.5-1 At the **District and Local Structure Planning Stage**, the landowner shall review existing geotechnical information and undertake further site investigations to confirm the nature and extent of karst landform within the amendment area.

This review shall be completed prior to finalisation of the District and Local Structure Plan and to the requirements of the Responsible Authority on advice from the Department of Environmental Protection.

2.6 Solid and Liquid Waste Management

2.6-1 The landowner shall ensure that lots within the industrial zone are connected to the deep sewerage system for the disposal of appropriate liquid wastes as approved by the relevant Government Agency/ies.

2.7 Environmental Reporting

2.7-1 The Responsible Authority shall provide a report to the Environmental Protection Authority every five years, or at the time of the review of the existing town planning scheme (whichever is the earlier), as per Section 48H of the Environmental Protection Act.

CHERYL EDWARDES (Mrs) MLA
MINISTER FOR THE ENVIRONMENT

15 FEB 2000

1. Stygofauna and Troglobitic Fauna Management Plan

1-1 The landowner shall prepare a Stygofauna and/or Troglobitic Fauna Management Plan to ensure the protection of stygofauna and/or troglobitic fauna that may be affected directly or indirectly by development of the amendment area, to the requirements of the Responsible Authority on advice from the Department of Conservation and Land Management and the University of Western Australia (Department of Zoology).

This plan shall include:

- The identification of the environmental outcome (including sustainability indicators) to be achieved through the implementation of this plan.
- Management strategies for the protection of stygofauna and/or troglobitic fauna within and immediately adjacent to the Amendment area.
- Recommendations for ongoing sampling, as required, of karstic areas to determine number and species diversity of stygofauna and/or troglobitic fauna.
- Provision of details of contingency plans in the event that the investigations and monitoring surveys indicate that the development is having an adverse impact upon populations of stygofauna and/or troglobitic fauna.
- Allocation of responsibilities and identification of timing and duration of implementation.

2. Drainage, Nutrient and Water Management Plan

2-1 At the **Local Structure Planning Stage**, the landowner shall prepare a Drainage, Nutrient and Water Management Plan to ensure that surface and groundwater are managed to the minimum requirements of a Priority 3 Underground Water Pollution Control Area, to the requirements of the Responsible Authority on the advice of the Water and Rivers Commission and the Water Corporation.

This plan shall include:

- Identify the environmental outcome (including sustainability indicators) to be achieved through the implementation of this plan.
- Include provisions for the connection of all areas of development to the deep sewerage.
- Demonstrate that best practice Water Sensitive Urban Design principles are incorporated to maximise on-site water infiltration generally.
- Provide details of reporting mechanisms to demonstrate compliance with performance criteria specified in the Plan.

- Provide details of contingency plans in the event that the performance criteria specified in the plan are not achieved.

3 Karst Management Strategy

3-1 At the **Local Structure Planning Stage**, the landowner shall prepare a Karst Management Strategy to the requirements of the Responsible Authority on advice from the Department of Environmental Protection.

The Strategy shall include:

- The identification of the environmental outcome (including sustainability indicators) to be achieved through the implementation of this plan.

- Detailed geotechnical investigations in areas of karst or potential karst in accordance with the protocols described in Alan Tingay & Associates (1999) and summarised in Table 1 (attached).

- Provision to ensure that no development is permitted on areas immediately over large karstic structures unless approved by a qualified geotechnical consultant and environmental scientist and agreed to by the Responsible Authority.

- Provision for monitoring of high risk karstic features within the Amendment area to note enlargements in karstic features, new openings and recent collapse or subsidence.

- Provision of details of contingency plans in the event that the investigations and monitoring surveys indicate that the development has had an adverse impact upon karstic landforms.

- Allocation of responsibilities and identification of timing and duration of implementation.

4 Solid and Liquid Waste Management Plan

4-1 The landowner shall prepare a Solid and Liquid Waste Management Plan at the **Local Structure Planning Stage** to the requirements of the Responsible Authority on the advice of the Department of Environmental Protection.

This plan shall include:

- The identification of the environmental outcome to be achieved through the implementation of this plan.

- Options for recycling, and appropriate storage and disposal options for liquid and solid wastes from industry.

5 Aboriginal Culture and Heritage Management Plan

5-1 The landowner shall prepare an Aboriginal Culture and Heritage Management Plan at the **Local Structure Planning Stage** to the requirements of the Responsible Authority with the concurrence of the Aboriginal Affairs Department.

The plan shall include:

- The identification of the environmental outcome to be achieved through the implementation of this plan.
- Management strategies for the archaeological site (If it becomes necessary to disturb the archaeological site, the subdivider shall obtain the necessary clearances under the Aboriginal Heritage Act 1972).
- Management strategies to ensure that employees and workers involved in construction activities in the vicinity of the archaeological site receive training regarding protection of its values.
- Management strategies to ensure that prior to commencement of site works, staff undergo a briefing on Aboriginal Heritage issues, to enable staff to recognise materials that may constitute an Aboriginal Site. During earthworks, all contractors shall be supervised by a Site Manager, who shall seek specialist advice to confirm the identification of any suspected site.

TABLE 1

WORK SCHEDULE REQUIRED WITH RESPECT TO KARST TERRAIN APPRAISAL

	Structure Plan Assessment Prior to Subdivision	Placement of Building Envelopes/Drainage Design for Proposed Subdivision			Building Envelope Assessment Prior to Building				
	A further geotechnical appraisal of the high and medium risk karst areas with respect to the draft Local Structure Plan design **	Detailed interpretation of existing Ground Probing Radar (GPR) data	Detailed geotechnical inspection target location, drilling and possible remediation	Geotechnical inspection and recommendations for additional geotechnical site assessment prior to building [1]	Geotechnical Investigations for Foundation Assessment				
					Further GPR as recommended from the geotechnical evaluation	Drilling >1 borehole to total depth of 15m	Drilling at least 1 borehole to a total depth of no more than 15m	Testing Pitting to 3m depth[2]	Perth Sand Penetrometer Testing to 750mm[3]
					Further work on high risk only if specifically required/remediation work				
High	✔	✔	✔						
Medium	✔	✔		✔	✔*	✔		✔	✔
Low		✔		✔	✔*		✔	✔	✔
Very Low		✔		✔	✔*			✔	✔

* On the basis of advice from the geotechnical assessment.
** Geotechnical works likely to involve mapping and GPR. Program to be developed in consultation with City of Wanneroo and a geotechnical engineer.

1. Following the geotechnical assessment a reappraisal of the work program for building envelope assessment with respect to the risk rating may be required.
2. Test Pitting is generally carried out by a backhoe and refilled after logging and sampling.
3. The Perth Sand Penetrometer is a hand held portable device used for measuring the compaction of soils.

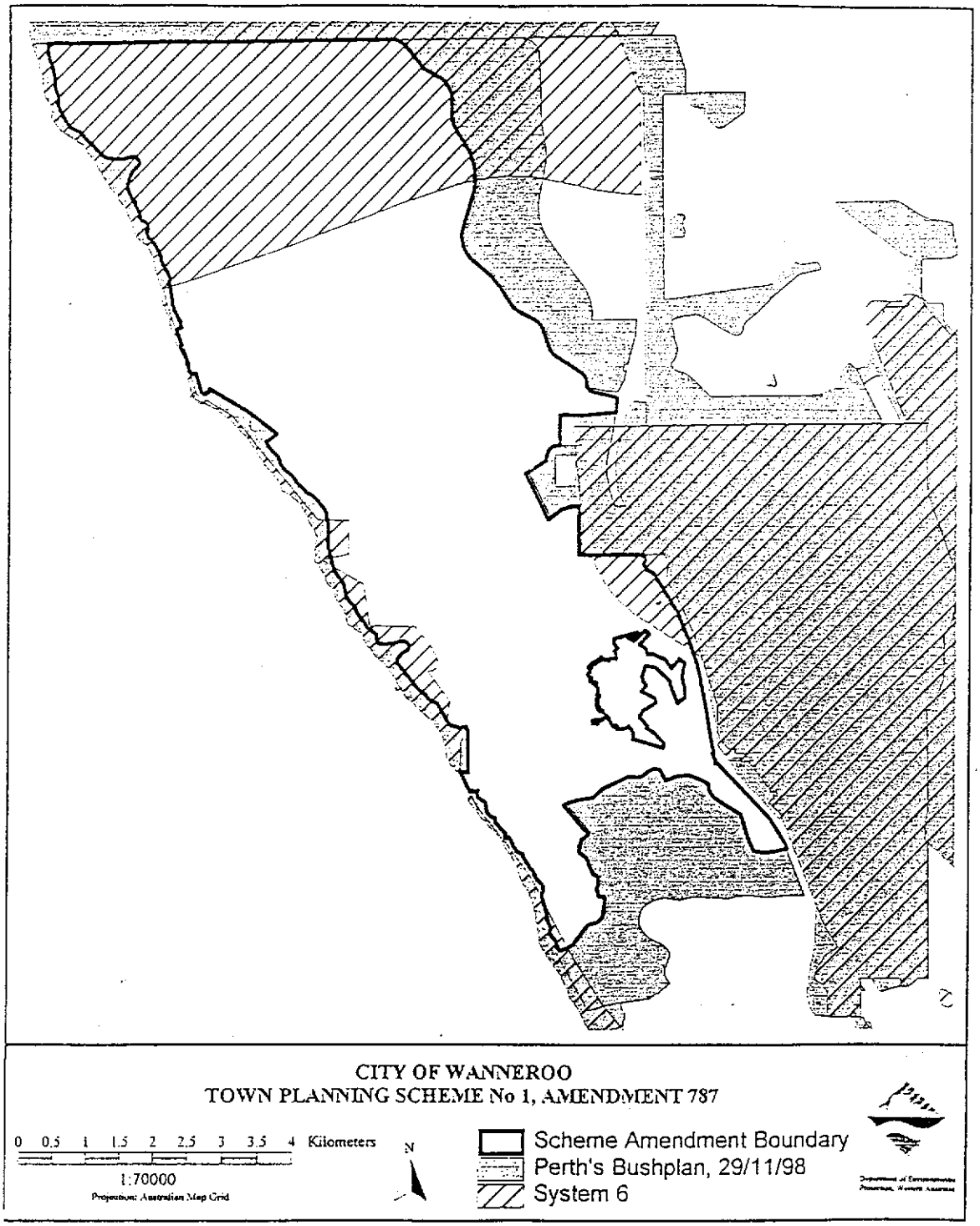


Figure 1. System Six Areas and Bushplan Sites.

APPENDIX 2

SPECIES LIST OF FAUNA CAPTURED DURING PHASE 1 AND 2 OF FAUNA RELOCATION PROGRAM

SPECIES CAPTURED DURING THE FAUNA RELOCATION AT CAPRICORN COASTAL VILLAGE

PHASE 1

4 October 2004
4 * Bobtails — *Tiliqua rugosa*
1 * Blue Tongue — *Tiliqua occipitalis*

5 October 2004
4 * Black Rats — *Rattus rattus*
1 * Bobtail — *Tiliqua rugosa*
1 * — *Pogona minor*

6 October 2004
4 * Black Rats — *Rattus rattus*
1 * Bobtail — *Tiliqua rugosa*
1 * — *Pygopus lepidopodus*
2 * King Skinks — *Egernia kingii*
1 * Quenda — *Isoodon obselus fusciventer*

7 October 2004
1 * King Skink — *Egernia kingii*
2 * Bobtails — *Tiliqua rugosa*
2 * Black Rats — *Rattus rattus*

8 October 2004
2 * Black Rats — *Rattus rattus*
1 * Bobtail — *Tiliqua rugosa*

12 October 2004
5 * Black Rats — *Rattus rattus*

13 October 2004
4 * Black Rats — *Rattus rattus*
2 * Bobtails — *Tiliqua rugosa*

14 October 2004
3 * Black Rats — *Rattus rattus*
2 * Bobtails — *Tiliqua rugosa*
3 * King Skinks — *Egernia kingii*

PHASE 2

4 April 2005
7 * skinks — *Hemiergis quattrolineta*
1 * Blue Tongue — *Tiliqua occipitalis*
2* *skinks* — *Ctenotus fallens*
2 * Bobtails — *Tiliqua rugosa*
3 * King Skinks — *Egernia kingii*
1* Carpet Python — *Morelia spilota imbricata* – road kill taken to WA Museum

11 April 2005
1 * *Limnodynastes dorsalis*
1 * *Simoselaps bertholdi*

12 April 2005
9 * *Limnodynastes dorsalis*
1 * *Strophurus spinigerus*