Twin Rivers

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18 January 2002

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RECEIVED
18 JAN 2002
APPEALS CONVENOR

Mr Derek Carew-Hopkins
Office of the Appeals Convenor
13th Floor Allendale Square
77 St George's Terrace
Perth WA 6000

Dear Derek,

RE: PT LOT 211 BARNES AVENUE, AUSTRALIND

Please find enclosed further information in relation to the environmental and cultural heritage values of Pt Lot 211 Barnes Avenue in Australind. The additional information includes the results of the fauna survey by Ecologia Environmental Consultants and advice from McDonald Hales & Associates in relation to the archaeological and ethnographic surveys of the site. The information may be of assistance to you in determining the decision on the level of assessment appeals.

The fauna survey revealed several species of significance within the study area during the survey period, most of which were recorded within or near habitats associated with the wetland or river systems. The site was not considered to be of national or regional significance in terms of fauna. The survey identified the wetland area near the junction of the two rivers as being the primary area of local significance for fauna. This wetland area is not located within the area subject to these appeals.

The Aboriginal heritage survey did not reveal any archaeological sites but did locate four isolated artefacts within the study area. The ethnographic survey involving site assessment with eight representatives from the local Aboriginal community did not reveal any sites of significance within the property.

Should you have any queries in regard to the surveys and advice provided please do not hesitate to contact me.

Yours sincerely

Kaye Godwin

KAYE GODWIN
Senior Environmental Scientist

encl.

ENTERED ON GIS

Name: Lot 211 Barnes Avenue – Fauna Assessment Survey
Date: 01/05/2006
Capture Author: Thomas Leong

Comments:
Polygon
Created to match documented study area with acceptable level of accuracy

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- High = Document contained visual and or described spatial references easily copied, resulting in little or no polygon boundary errors
- Acceptable = Document contained visual references with complex boundaries, resulting in minor boundary errors
- Low = Document contained little or no visual references, resulting in polygon boundary errors

Attributes
Report Info – Captured without problems
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Marist Brothers Community Inc.

Lot 211 Barnes Avenue
Fauna Assessment Survey

Prepared by

ecologia
ENVIRONMENTAL CONSULTANTS

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ecologia **Environmental Consultants**
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CONTENTS

1.0 INTRODUCTION

A fauna assessment survey of Part Lot 211 Barnes Avenue, Australind, was conducted between the 24th – 29th November 2001, with a repeat visit on the 7th December 2001 to conduct further bird censuses and a microbat survey. The principal aim of the survey was to characterise the fauna communities within the region and to provide an inventory of the vertebrate species recorded within the study area.

2.0 METHODOLOGY

2.1 FAUNA SURVEY

The fauna assessment survey used both systematic and opportunistic methods to survey the vertebrate fauna communities within the four major habitats types. Although a mosaic of 11 habitat types were recognised within the study area (ATA, 2000), these can be grouped into four main habitats:

- Woodland
  A total of five Open Woodland and Low Open Woodland habitats were recognised within the area, with the dominant species being Marri *Corymbia calophylla*, Jarrah *Eucalyptus marginata*, Peppermint *Agonis flexuosa*, Slender Banksia *Banksia attenuata*, Grey Stinkwood *Jacksonia furcellata* and Swamp Paperbark *Melaleuca raphiophylla*.

- Forest
  Four types of Forest and Low Forest habitats were recognised within the area, with the dominant species being Flooded Gum *Eucalyptus rudis*, Marri *Corymbia calophylla*, Swamp Paperbark *Melaleuca raphiophylla*, Swamp Sheoak*Casuarina obesa* and *Kunzea ericafolia*.

- Scrub
  One type of scrub was recognised within the study area, surrounding the wetlands area. This habitat was dominated by Swamp Paperbark *Melaleuca raphiophylla* and Mohan *Melaleuca viminea*.

- Riparian/Wetland Vegetation
  This habitat is characterised by it's close proximity to waterbodies rather than by the presence of particular vegetation types.

It is expected that faunal communities of different species composition are likely to exist within the different habitats defined by changes in vegetation associations and landforms.

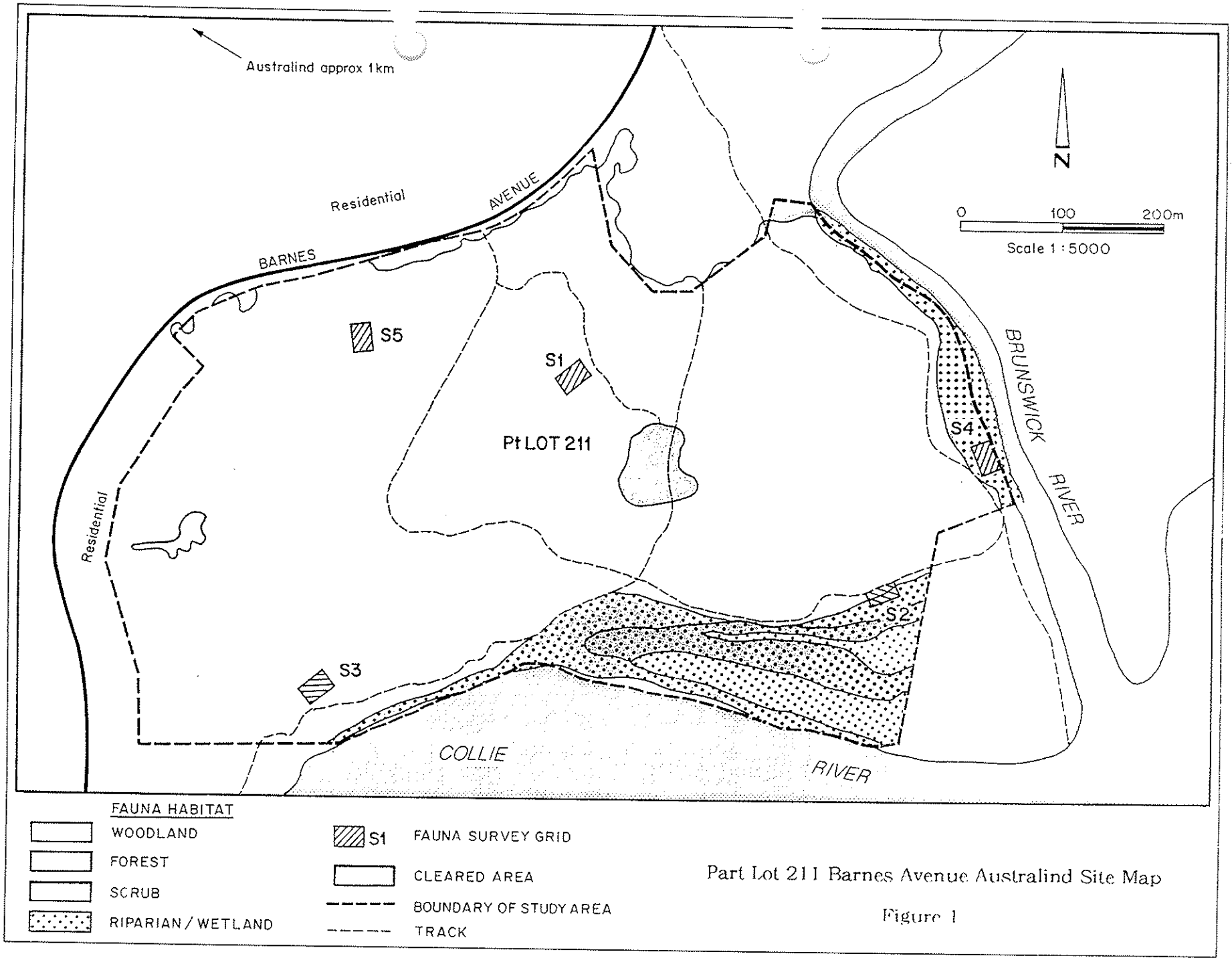
Assessment of the vertebrate fauna was carried out utilising a variety of trapping, searching and observation techniques. During the field work all fauna and secondary evidence of fauna, such as tracks, diggings and scats were recorded.

2.1.1 Survey Sites

A total of five survey grids were used to survey the major habitats. The details of the grids are given in Table 1 below. Their locations are shown in Figure 1.

Table 1: Description of Fauna Survey Grids within the Barnes Avenue Study Area

Site No. & Habitat Type
1) Open Low Woodland of Marri and Jarrah over a Low Open Woodland of Peppermint and Slender Banksia
2) A combination of Low Forest (Flooded Gum and Swamp Paperbark) and Scrub (Swamp Paperbark and Mohan)
3) Open Low Woodland of Marri and Jarrah over a Low Open Woodland of Peppermint and Slender Banksia
4) A combination of Low Forest with Flooded Gum and Swamp Paperbark, and Forest with Flooded Gum and Marri.
5) Open Low Woodland of Marri and Jarrah over a Low Open Woodland of Peppermint and Slender Banksia



Part Lot 211 Barnes Avenue Australind Site Map

Figure 1

Wetland

Open water surrounded
by Scrub Habitat

Woodland

Marri/Peppermint woodland

Scrub

Paperbark scrub with
dense sedge understorey

Woodland

Jarrah/Banksia woodland
with open understorey

2.1.2 Systematic Sampling

- Mammal and Reptile Fauna

Methods employed to census terrestrial small mammal and reptile fauna in the project area were based on a systematic trapping grid using three trap types. The trap layout used are shown in Figure 2 and described below;

(i) Pit-trap drift fence – 6 pits consisting of either PVC (16 cm diam., 40 cm deep) or 20 l bucket pits, each with 10 m flywire drift fence (30 cm high) bisecting the pit, were positioned in a single row, in the ground. All pit traps were open for a duration of five consecutive nights.

(ii) Elliott box traps - grids of 20 medium box traps were set in two lines of traps 25 m apart, baited with universal bait. The Elliott traps were in operation for four - five nights.

(iii) Cage Traps – within each trapping grid, a total of two cage traps were placed, with one at the beginning and end of each elliot trap line and one in the centre of the grid. These were baited with a mixture of universal bait and apple.

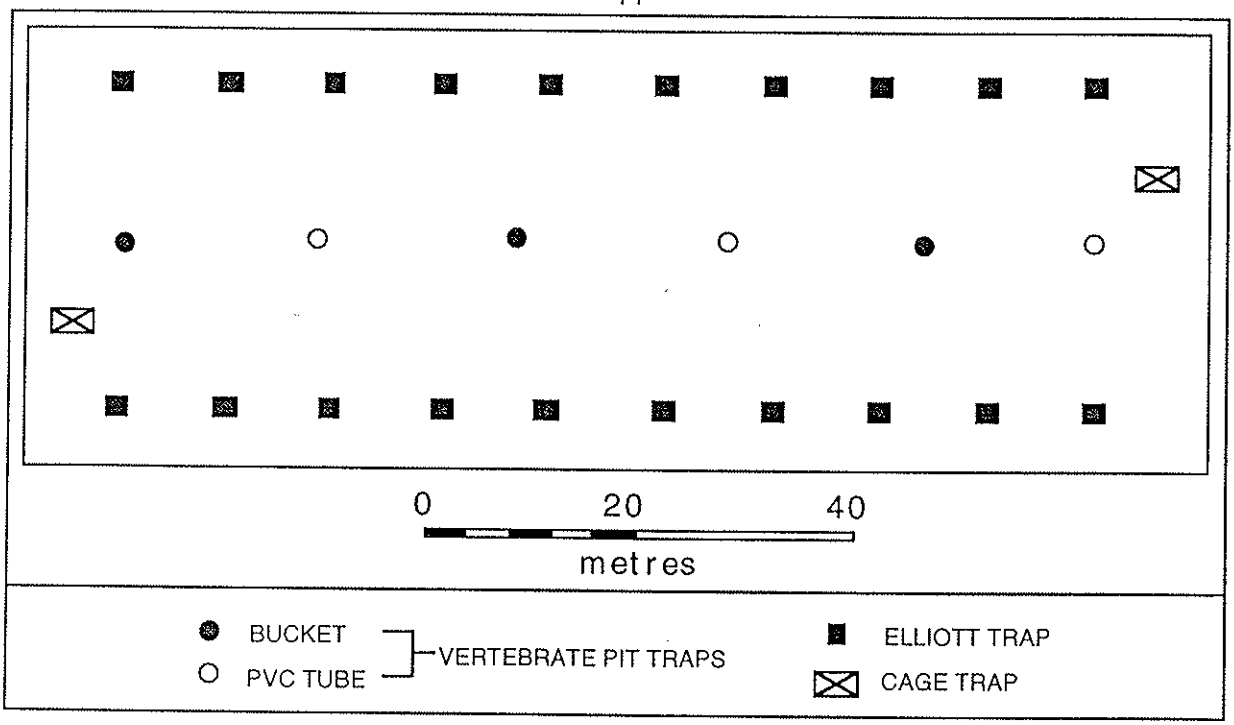


Figure 2 Layout of the Fauna Trapping Grids used in the Lot 211 Barnes Avenue Fauna Assessment Survey.

- Bird Fauna

All habitats containing systematic fauna survey grids were searched for bird species. A systematic "Set-time Period" census was employed, where quantitative data on total species richness and abundance of each species present are recorded within an unbounded quadrat. Sites were traversed by foot for a minimum of 0.5 person hours.

- Microhabitat Searching

All systematic fauna survey grids are searched for cryptic species, involving raking of leaf litter, over-turning logs and stones, searching beneath bark and investigating burrows. A total of 2.5 person hours were spent microhabitat searching within the study area.

- Spot-lighting

A total of 2 hrs were spent spotlighting for nocturnal species within the study area. Prior to the current survey, an intensive spotlight search for the Western Ringtail Possum *Pseudocheirus occidentalis* was conducted by ATA in conjunction with a CALM Officer

- Bat Censusing

An ANABAT detector and Sony MZR900 MiniDisc recorder were used to sample bat activity within the study area for a total of 2.5 hrs. The ANABAT bat detector is used to record bat calls, which are then analysed using computer software to assign a species to a particular call. Analysis and species identification was completed by Mr Norm McKenzie, CALM Wildlife Research Centre Woodvale.

In addition a total of 2.5 hours were spent mistnetting for bats near Site 2.

2.1.3 Inventory Sampling

To supplement the systematic sampling outlined above, the presence of species in all vertebrate groups was also assessed via:

(i) Secondary evidence - Tracks, diggings, scats, burrows and nests were recorded, where possible, for the species responsible.

(ii) Opportunistic sightings - The presence of species were recorded while searching, travelling and during trap establishment.

3.0 RESULTS

A total of 53 species of vertebrate fauna were recorded from the Lot 211 Barnes Avenue Study Area including three native mammals, four introduced mammals, 32 bird species, 10 reptiles and four amphibians.

Mammal Fauna

A total of seven mammal species were recorded from Lot 211 Barnes Avenue, including one kangaroo, one possum, one vespertilionid bat, two introduced rodents, the fox and the rabbit (see Appendix A1).

The most abundant species recorded from the survey area was the Western Grey Kangaroo *Macropus fuliginosus*, however other species such as Rabbits *Oryctolagus cuniculus* are expected to be as abundant, though not recorded as readily due to the sampling technique. The only bat species to be caught in mist nets was the Chocolate Wattled Bat *Chalinolobus morio*, all other species were identified from their call signatures.

Despite an intensive search for Western Ringtail Possums, both within the current survey and in the prior survey conducted by ATA in conjunction with a CALM Officer (Godwin, K. pers. comm.), the Common Brushtail was the only Possum species to be recorded. Therefore it is reasonable to assume that the Western Ringtail Possum either does not occur in this area, or only occurs in extremely low densities.

Avifauna

A total of 32 bird species were recorded from the Lot 211 Barnes Avenue study area, with the majority of species being either waterbirds (i.e. ducks, herons, waders) or insectivorous bush birds (e.g. pardalotes and allies, robins, whistlers and martins). The most abundant species were Striated Pardalotes *Pardalotus striatus* and Tree Martins *Hirundo nigricans*. It is expected that significantly more bird species would have been observed in the study area with a greater survey period.

There were two possible breeding records within the study area, the Grey Fantail *Rhiphidura fuliginosa* and Square-tailed Kite *Lophoictinia isura*. A family group of Grey Fantails, consisting of one adult bird and three fledglings were observed in Banksia/Marri Woodland (near Site 1) and a Square-tailed Kite was observed tending to a nest in the River Gum/Swamp Paperbark Forest (near Site 2). The latter would be quite significant if confirmed as a breeding record, as the Square-tailed Kite is currently classified as a Priority 4 species by CALM.

Two individuals of Baudin's Cockatoo *Calyptorynchus baudinii* were observed foraging briefly in the crown of a Jarrah (near Site 3). This species is currently classified as Vulnerable under both the Commonwealth EPBC Act and the WA Wildlife Act. A Rainbow Bee-eater *Merops ornatus*, two Great Egrets *Ardea alba* and five Greenshanks *Tringa rebularia* were observed during late afternoon in the wetland area.

Herpetofauna

A total of 14 herpetofauna species were recorded from the Lot 211 Barnes Avenue study area, including 10 reptiles and four amphibians. The reptiles included one Gecko, eight Skinks and one Blind Snake. The amphibians, included the Slender Tree Frog *Litoria adelaidensis* and three Myobatrachid frogs.

The most abundant and widespread herpetofauna species were the Squelching Froglet *Crinia insignifera*, *Hemiergis quadralineatum*, *Lerista elegans* and the Bobtail Skink *Tiliqua rugosa*

4.0 RARE AND SPECIALLY PROTECTED FAUNA

Fauna species that have been formally recognised as rare, threatened with extinction or as having high conservation value are protected by law under Western Australian and Commonwealth Legislation. Within Western Australia rare fauna are listed under the Western Australian Wildlife Conservation Act 1950, incorporating the Japan-Australia Migratory Bird Agreement (JAMBA). At the national level, fauna are protected under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act). The China-Australia Migratory Bird Agreement (CAMBA) covers migratory species of avifauna, particularly transequatorial waders. In addition, fauna are protected under the April 1991 Australian and New Zealand Environment and Conservation Council (ANZECC) convention. Species of significance recorded during the current survey are shown below in Table 2, along with their current status.

Table 2 Significant species recorded during the current survey and their current status.

Species	Status
Common Greenshank *Tringa nebularia*	Protected under JAMBA, CAMBA and the Bonn Convention as a migratory species
Square-tailed Kite *Lophoctinia isura*	Classified as a Priority 4 species by CALM
Baudin's Cockatoo *Calyptorhynchus baudinii*	Classified as Vulnerable under both the EPBC Act and the Western Australian Wildlife Conservation Act
Osprey *Pandion haliaetus*	Protected under the JAMBA as a migratory species
Great Egret *Ardea alba*	Protected under the JAMBA as a migratory species
Rainbow Bee-eater *Merops ornatus*	Protected under the JAMBA and Bonn Convention as a migratory species

4.1 SPECIES PROTECTED BY INTERNATIONAL AGREEMENTS

Three international agreements encompass the Australian fauna, with a focus on protecting those species that are migratory. These three agreements include the Japan-Australia Migratory Bird Agreement (JAMBA), the China-Australia Migratory Bird Agreement (CAMBA) and the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention). Four migratory species, the Rainbow Bee-eater *Merops ornatus,* Great Egret *Ardea alba,* Common Greenshank *Tringa nebularia* and the Osprey *Pandion haliaetus*, were recorded in the study area, however a further sixteen may occur, particularly in the wetland/riverbank area. These species include:

- Cattle Egret *Ardea ibis*
- Yellow Bittern *Ixobrychus sinensis*
- Glossy Ibis *Plegadis falcinellus*
- Whimbrel *Numenius phaeopus*
- Wood Sandpiper *Tringa glareola*
- Marsh Sandpiper *Tringa stagnatilis*
- Red Knot *Calidris canutus*
- Sharp-tailed Sandpiper *Calidris acuminata*
- Pectoral Sandpiper *Calidris melanotus*
- Red-necked Stint *Calidris ruficollis*
- Long-toed Stint *Calidris subminuta*
- Curlew Sandpiper *Calidris ferruginea*
- Ruff *Philomachus pugnax*
- White-bellied Sea-eagle *Haliaster leucogaster*

- Southern Boobook *Ninox novaeseelandiae*
- Fork-tailed Swift *Apus pacificus*

4.2 ENVIRONMENTAL PROTECTION AND BIODIVERSITY CONSERVATION ACT

Schedule 1 of the Commonwealth Environment Protection & Biodiversity Conservation Act 1999 contains a list of species that are considered Endangered, Vulnerable or that are Presumed Extinct.

The EPBC Act commenced on the 16 July 2000. Rare fauna species are currently listed under Part 7 - species and communities, but due to changes in the categories being used and amendments to the national list, these are likely to change in the near future.

Classification of species under the EPBC Act is as follows:

Endangered
The species is likely to become extinct unless the circumstances and factors threatening its abundance, survival or evolutionary development cease to operate; or its numbers have been reduced to such a critical level, or its habitats have been so drastically reduced, that it is in immediate danger of extinction.

Vulnerable
Wthin the next 25 years, the species is likely to become endangered unless the circumstances and actors threatening its abundance, survival or evolutionary development cease to operate.

Presumed extinct
A species is presumed extinct if it has not been located in the last 50 years, or it has not been located in the last 10 years despite thorough searching.

There are four vertebrate species contained within Part 7 of the EPBC Act 1999, that are known to occur in the region in habitats similar to those present in the Lot 211 Barnes Avenue Study Area. These include the Chuditch *Dasyurus geoffroii*, Western Ringtail Possum *Pseudocheirus occidentalis*, Carnaby's Cockatoo *Calyptorynchus latirostris* and Baudin's Cockatoo *Calyptorynchus baudinii*. Of these species, the Chuditch, Western Ringtail Possum and Baudin's Cockatoo are classified as Vulnerable, whilst Carnaby's Cockatoo is classified as Endangered. Only the Bauldins Cockatoo was recorded in the study area during the current survey.

Chuditch *Dasyurus geoffroii* - Vulnerable
Widespread in the past, the Chuditch is now rare and endangered, found in scattered populations around south-western Australia. It's reintroduction to areas that have been fox baited have allowed it to significantly increase it's range, though not to the extent of it's pre-European distribution. The species formerly occupied a wide range of habitats, but is now restricted to a range of forest, woodland, shrubland and heathland habitats occur in south-western Australia.

Western Ringtail Possum *Pseudocheirus occidentalis* – Vulnerable
The Western Ringtail Possum is classified as Vulnerable in the CALM threatened species list. This species is an endemic of the south west region, and appears to be somewhat restricted to forested areas, particularly those containing Peppermint *Agonis flexuosa*.

Carnaby's Cockatoo *Calyptorynchus latirostris* - Endangered
Carnaby's Cockatoo is a regionally migratory species that may utilise the suitable habitat found within the study area as a feeding area during it's southward summer movement. The species feeds on the flowers and seeds of a variety of both Myrtaceous and Proteaceous species, and also consumes arbivorus insects.

Baudin's Cockatoo *Calyptorynchus baudinii* - Vulnerable
Baudin's Cockatoo is an endemic species of the South West forest region, that feeds predominantly on the flowers and seeds of Marri *Corymbia calophylla*, and occasionally Jarrah *Eucalpytus marginata*. Baudins Cockatoo is frequently observed in woodland areas of the south-west. Two individuals were observed foraging briefly in the crown of a Jarrah near Site 3 in the study area.

4.3 WA WILDLIFE CONSERVATION ACT

Classification of rare and endangered fauna under the WA Wildlife Conservation (Specially Protected Fauna) Notice 1997, recognises four distinct schedules;

(a) Schedule 1 - "fauna which are rare or likely to become extinct, are declared to be fauna that is in need of special protection";

(b) Schedule 2 - "fauna which are presumed to be extinct, are declared to be fauna that is in need of special protection";

(c) Schedule 3 - "birds which are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, are declared to be fauna that is in need of special protection"; and

(d) Schedule 4 - "declared to be fauna that is in need of special protection, otherwise than for the reasons mentioned in paragraphs (a), (b) and (c)."

Scheduled species that may occur in the Australind Study Area are detailed in the following sections.

4.3.1 Schedule 1 Species

Schedule 1 species are fauna that is rare or likely to become extinct. One Schedule 1 species, Bauldin's Cockatoo was recorded during the fauna study. However three other species are known to occur in simialr habitats in the area and are therefore relevant to the current survey, Chuditch *Dasyurus geoffroii*, Western Ringtail Possum *Pseudocheirus occidentalis* and Carnaby's Cockatoo *Calyptorynchus latirostris*. All species are discussed above in Section 4.2.

4.3.2 Schedule 3 Species

No Schedule 3 species were recorded during the fauna survey. The Fork-tailed Swift *Apus pacificus*, a Schedule 3 species listed in the annex to the agreement, may occur within the region in similar habitats recorded in the study area. However due to its aerial habit, it is unlikely to be significantly affected by any land modification.

Fork-tailed Swift *Apus pacificus*
The Fork-tailed Swift potentially occurs throughout the region, however due to it's predominantly aerial nature it is not commonly recorded in standard sampling conditions. Many records of the species come from periods of inclement weather, particularly cyclones, when the birds tend to fly at lower altitudes (Blakers *et. al.*, 1984).

4.3.3 Schedule 4 Species

No Schedule 4 species were recorded during the fauna survey. However, two Schedule 4 species, the Peregrine Falcon *Falco peregrinus* and the Carpet Python *Morelia spilota imbricata* are both known to occur in habitats similar to those present in the Lot 211 Barnes Avenue Study Area.

Peregrine Falcon *Falco peregrinus*
The Peregrine Falcon is widely distributed throughout Australia. It is nomadic, sedentary or partly so, and prefers coastal or inland cliffs and gorges, timbered watercourses, plains and open woodlands. Its status is considered to be "generally uncommon, probably declining in settled regions; still well established in remote areas" (Pizzey, 1983). Blakers *et al.* (1984) consider that Australia is one of the strongholds of the species, since it has declined in other parts of the world.

Carpet Python *Morelia spilota imbricata* (SW subspecies)
This python is widespread but uncommon in south-west Western Australia. It is a semi-arboreal species that is frequently recorded in vegetation surrounding rock outcrops but also occurs in Eucalypt associations. It feeds on small to medium sized mammals and lizards. Although no

specimens were recorded during the current survey suitable habitats were observed within the project area.

4.4 CALM PRIORITY FAUNA

Species on the CALM Priority Fauna list include those removed from the scheduled fauna list and other species known from only a few populations or in need of monitoring. Four Priority Codes are recognised:

Priority one — Taxa with few, poorly known populations on threatened lands.
Taxa which are known from few specimens or sight records from one or a few localities, on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

Priority two — Taxa with few, poorly known populations on conservation lands.
Taxa which are known from few specimens or sight records from one or a few localities, on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

Priority three — Taxa with several, poorly known populations, some on conservation lands.
Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

Priority four — Taxa in need of monitoring
Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could if present circumstances change. These taxa are usually represented on conservation lands.

One priority fauna species (Square-tailed Kite) was recorded during the fauna survey.

Square-tailed Kite *Lophoictinia isura*
Though rare, this species is considered to be widespread and migratory in habit. Usually observed over woodland/forest areas, the species occasionally inhabits mallee and heath areas (Blakers *et al.*, 1984).

Of the priority fauna known to be present in the region, nine species utilise habitats similar to those present in the Australind Study Area. The details of these species are outlined below:

Brush-tailed Phascogale *Phascogale tapoatafa*
This small aboreal mammal preys on a variety of invertebrate and occasionally small vertebrate species for food as well as utilising the nectar from flowering eucalpyts. Habitat removal is thought to have significantly reduced its range (Strahan, 1995).

Southern Brown Bandicoot *Isoodon obesulus*
This medium sized mammal usually occurs in close proximity to densely vegetated water bodies where it forages on a variety of invertebrates including earthworms and insects, and subterranean plant matter including fungi. The loss of densely vegetated areas surrounding waterbodies appears to be the main threat to this species survival (Strahan,1995).

Western Brush Wallaby *Macropus irma*
Like many other medium sized mammal species, the Western Brush Wallaby appears to have been affected by fox predation, resulting in a significant decrease in the general population size. The species generally prefers woodland/open forest areas (Strahan, 1995).

Western False Pipistrelle *Falsistrellus mackenziei*
This small insectivorous bat is endemic to the southern forest area of Western Australia where it relies on trees for roost sites (Churchill, 1998).

Bush-stone Curlew *Burhinus grallarius*
Bush-stone Curlews generally inhabit open woodland areas with leaf litter layer that provides them with camouflage which they rely on for predator avoidance. This species is rare to uncommon in the southern parts of Western Australia and it is thought to be locally extinct in some areas due to predation by foxes (Johnstone & Storr, 1998).

Forest Red-tailed Black Cockatoo *Calyptorynchus banksii naso*
Similar to the Western False Pipstrelle discussed above, the Forest Red-tailed Black Cockatoo subspecies is endemic to the southern forest area of Western Australia (Johnstone & Storr, 1998). It's primary food sources are the Marri *Corymbia calophylla* and Jarrah *Eucalyptus marginata.*

Barking Owl *Ninox connivens connivens*
This southwest subspecies of the Barking Owl inhabits forest and woodland areas where it utilises large trees as roost sites (Pizzey, 1988) and preys on a range of vertebrate species.

Masked Owl *Tyto novaehollandiae*
Often confused with the more common Barn Owl *Tyto alba*, the Masked Owl *T. novaehollandiae* occupies a similar niche. The diet appears to consist predominantly of small vertebrates, and has a habitat preference for forest/woodland areas (Storr & Johnstone, 1998).

Crested Shrike-tit *Falcunculus frontalus leucogaster* (SW subspecies)
The distinctive Crested Shrike-tit *Falcunculus frontalus* inhabits open woodland and mallee areas where it forages for insects (Simpson & Day, 1996). The South-western subspecies *F. f. leucogaster* is thought to be in decline.

5.0 CONSERVATION SIGNIFICANCE

The significance of the biota and habitats of the fauna study area was assessed in three contexts: State and National, Regional and Local.

5.1 NATIONAL AND STATE SIGNIFICANCE

National and State significance refers to features of the environment that are protected at the Commonwealth or Western Australian State Government level. In relation to fauna this concerns taxa that are listed under the Commonwealth's Environmental Protection and Biodiversity Conservation Act or the Western Australian Wildlife Conservation Act.

A single species of state and national significance, Baudins Black-Cockatoo *Calyptorhynchus baudinii* was recorded in the study area. This species is listed as Vulnerable under the EPBC Act and as a Schedule 1 - Vulnerable species under the WA Wildlife Conservation Act. Two individuals were observed foraging and travelling over the study area, and it is likely that they may use the area for roosting.

Several other species of state or national significance potentially occur in the study area, these are the Western Ringtail Possum *Pseudocheirus occidentalis*, Carnaby's Cockatoo *Calyptorynchus latirostris*, Western Australian Carpet Python *Morelia spilota imbricata* and Peregrine Falcon *Falco peregrinus*. Many of these species occur at low densities and are infrequently recorded.

Based on current knowledge, the study area does not contain any particular habitat which supports significantly high biodiversity, site specific or fauna, or habitat which is poorly represented at the State level.

5.2 REGIONAL SIGNIFICANCE

Regional significance refers to elements of the environment that are important at the biogeographic region (bioregion) level. This may refer to south-western Australia (*i.e.* the Bassian zoogeographic region), the Swan Coastal Plain bioregion of the Interim biogeographic regionalisation for Australia (Thackway & Cresswell, 1995), or the southern Swan Coastal Plain.

In regional terms, the study area encompasses habitats and vegetation associations that are widespread throughout the southern Swan Coastal Plain. As there is representation of these features and associations within nearby conservation areas (e.g. Yalgorup National Park) the study area is not regionally significant. The landform - vegetation associations of the study area are generally in good condition. Those areas which have been affected by disturbance have been impacted by some grazing, clearing, motorcycle track formation, rubbish dumping and weed invasion due to vehicular access.

Significant birds of the Swan Coastal Plain recorded in the study area include the Square-tailed Kite *Lophoctinia isura* and the previously mentioned Baudin's Cockatoo *Calyptorynchus baudinii*. The loss of habitat within this area is not expected to have significant effects on either of these fauna species, although efforts should be made to ensure that any any land clearing is timed so as to avoid the breeding periods of both species.

A lack of significant terrestrial fauna species may be attributable to an abundance of introduced predator species, foxes and feral cats.

5.3 LOCAL SIGNIFICANCE

The following criteria were used to identify fauna habitats within the study area that could be considered to have local ecological significance:

- habitats poorly represented in the area;
- habitats with the capacity to support site-specific elements; and
- habitats in better condition than other similar locations.

The wetland area is considered to be the primary area of local significance within the study area. Although slightly degraded, this area still supports vegetation that is in relatively good condition and similar vegetation was not encountered elsewhere within the study area. In addition, several species of waterbirds were observed regularly at the site, including the migratory wader Common Greenshank *Tringa nebularia*, and were not recorded from other habitats. It is also likely to be a breeding site for several of the frog species recorded from the study area, and may support reptiles that preferentially inhabit wetland areas. It is likely that the pool/s are permanent or nearly so, which would increase the value of the site for fauna. Fringing woodland vegetation supports additional bushbirds, increasing the biodiversity of the site.

6.0 CONCLUSION

From the fauna assessment survey at Lot 211 Barnes Avenue Australind the following conclusions were reached;

- Fauna species recorded during the survey are typical of habitats or site.
- Habitats identified during the survey are not unusual in the South-West.
- Several species of significance were recorded during the fauna survey.
- Most significant species were recorded in the wetland and adjacent riverine areas.
- The upland area is not a significant feeding or breeding area for any significant species.
- The area is not of national or regional significance.
- The wetland area is considered to be the primary area of local significance.

Study Team

The Lot 211 Barnes Avenue Fauna Assessment Survey described in this document was planned, coordinated and executed by:

ecologia Environmental Consultants
76 Thomas St.
West Perth W.A. 6005

Project Staff

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Acknowledgements

1. Our thanks to Mr Norm McKenzie of CALM Woodvale for his aid in analysing and identifying the microchiropteran echolocation calls.

REFERENCES

ATA Environmental (2000) Part Lot 211 Barnes Avenue, Australind. 1:3000 Topographic Map. Vegetation Associations.

Blakers, M., S.J.J.F Davies and P.N. Reilly (1984). The Atlas Of Australian Birds. RAOU. Melbourne University Press.

Johnstone, R. E. and G.M. Storr (1998) Handbook of the Birds of Western Australia. Vol. 1. Western Australian Museum.

CALM. (2000) Threatened Fauna Information.

Churchill, S. (1998) Australian Bats. Reed- New Holland Books. Sydney.

Cogger, H.G. (1994). Reptiles and Amphibians of Australia. Reed Books. 775 pp.

Hopkins, A.J.M. and Griffin, E.A. (1989) Fire in the Banksia woodlands of the Swan Coastal Plain. *J. Roy. Soc. W.A.* **71**:93 - 94

Pizzey, G. (1983). A Field Guide to the Birds of Australia. Collins. Sydney.

Simpson, K and N. Day (1996). Field Guide to the Birds of Australia. 5th edn. Viking O'Neil, Penguin Books Australia Ltd.

Strahan, R. (Ed.) (1995). The Mammals of Australia. Reed Books, Sydney.

Thackway, R. and Cresswell, I.D. (1995) An Interim Biogeographic Regionalisation for Australia. ANCA, Canberra.

Fauna Protection Acts and Agreements cited in text:

ANZECC: List of Endangered Vertebrate Fauna April 1991, produced by the Australian and New Zealand Environment and Conservation Council

CAMBA: Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment.

JAMBA: Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment.

BONN: Agreement between the Government of Australia and other world Governments for the Protection of all Classes of Migratory Animals.

Western Australian Wildlife Conservation Act 1950

Wildlife Conservation (Specially Protected Fauna) Notice 1996

Environmental Protection and Biodiversity Conservation Act 1999

APPENDIX A

Lot 211 Barnes Avenue
Fauna Species List

A1 – Mammals
A2 – Avifauna
A3 – Herpetofauna

X = species recorded during field survey
S = signs of presence
recorded,nests,scats,diggings and tracks
+ = species expected to occur

Habitats

WD: Woodland
FO: Forest
SC: Scrub
RI: Riparian (includes waterbodies)

Appendix A1: Mammal records from the Lot 211 Barnes Avenue study area.

		WD	FO	SC	RI
TACHYGLOSSIDAE					
Tachyglossus aculeatus	Echidna	+	+	+	
BURRAMYIDAE					
Cercartetus concinnus	Western Pygmy-possum	+	+	+	
DASYURIDAE					
Antechinus flavipes	Yellow-footed Antechinus	+	+	+	
Dasyurus geoffroii	Western Quoll	+	+	+	
Phascogale tapoatafa	Brush-tailed Phascogale	+	+	+	
Sminthopsis crassicaudata	Fat-tailed Dunnart	+		+	
Sminthopsis griseoventer	Grey Bellied Dunnart	+	+	+	
PERAMELIDAE					
Isoodon obesulus	Southern Brown Bandicoot			+	+
MACROPODIDAE					
Macropus fuliginosus	Western Grey Kangaroo	x	x	+	
Macropus irma	Western Brush Wallaby	+	+	+	
PETAURIDAE					
Pseudocheirus peregrinus	Common Ringtail Possum	+	+		
PHALANGERIDAE					
Trichosurus vulpecula	Common Brushtail Possum	+	+	x	
TARSIPEDIDAE					
Tarsipes rostratus	Honey-possum	+			
MURIDAE					
Hydromys chrysogaster	Water Rat			+	+
Rattus fuscipes	Bush Rat	+	+	+	
VESPERTILIONIDAE					
Chalinolobus gouldii	Gould's Wattled Bat	+	+	+	+
Chalinolobus morio	Chocolate Wattled Bat	x	+	+	+
Vespadelus regulus	King River Eptesicus	+	+	+	+
Falsistrellus mackenziei	Western Pipistrelle	+	+	+	+
Nyctophilus geoffroyi	Lesser Long-eared Bat	+	+	+	+
Nyctophilus timoriensis	Greater Long-eared Bat	+	+	+	+
MOLOSSIDAE					
Mormopterus sp. 4	Little Mastiff-bat	+	+	+	+
Nyctinomus australis	White-striped Mastiff Bat	+	+	+	+
INTRODUCED MAMMALS					
Felis catus	Feral Cat	+	+	+	
Mus musculus	House Mouse	x	x	+	
Oryctolagus cuniculus	European Rabbit	x	+	+	
Rattus norvegicus	Brown Rat	+	+	+	
Rattus rattus	Black Rat	x	x	+	
Vulpes vulpes	Fox	x	+	+	

Appendix A2: Avifauna records from the Lot 211 Barnes Avenue Study Area.

		WD	FO	SC	RI	
PHASIANIDAE						
Coturnix ypsilophora	Brown Quail				+	— outside range.
ANATIDAE						
Anas castanea	Chestnut Teal				+	
Anas gracilis	Grey Teal				+	
Anas platyrhynchos	Mallard				+	
Anas rhynchotis	Australasian Shoveller				+	
Anas superciliosa	Pacific Black Duck				X	
Aythya australis	Hardhead				+	
Chenonetta jubata	Maned Duck				+	
Malacorhynchus membranaceus	Pink-eared Duck				+	
Oxyura australis	Blue-billed Duck				+	
Tadorna tadornoides	Australian Shelduck				+	
PODICIPEDIDAE						
Podiceps cristatus	Great Crested Grebe				+	
Poliocephalus poliocephalus	Hoary-headed Grebe				+	
ANHINGIDAE						
Anhinga melanogaster	Darter				X	
PHALACROCORACIDAE						
Phalacrocorax carbo	Great Cormorant				+	
Phalacrocorax melanoleucos	Little Pied Cormorant				X	
Phalacrocorax sulcirostris	Little Black Cormorant				+	
PELECANIDAE						
Pelecanus conspicillatus	Australian Pelican				X	
ARDEIDAE						
Ardea alba	Great Egret				X	
Ardeola ibis	Cattle Egret				+	
Botaurus poiciloptilus	Australasian Bittern				+	
Egretta garzetta	Little Egret				+	
Egretta novaehollandiae	White-faced Heron				+	
Ixobrychus flavicollis	Black Bittern				+	
Ixobrychus minutus	Little Bittern				+	
Nycticorax caledonicus	Nankeen Night Heron					
THRESKIORNITHIDAE						
Platalea flavipes	Yellow-billed Spoonbill				+	
Platalea regia	Royal Spoonbill				+	
Plegadis falcinellus	Glossy Ibis				+	
Threskiornis aethiopica	Sacred Ibis				X	
Threskiornis spinicollis	Straw-necked Ibis				+	
ACCIPITRIDAE						
Aquila audax	Wedge-tailed Eagle	+	+	+	+	
Circus aeruginosus	Swamp Harrier	+	+	+	+	
Circus assimilis	Spotted Harrier	+	+	+	+	— outside range.
Elanus axillaris	Black-shouldered Kite	+	+	+	+	
Haliastur sphenurus	Whistling Kite	+	+	+	+	
Hieraaetus morphnoides	Little Eagle	+	+	+	+	
Lophoictinia isura	Square-tailed Kite	+	+	X	+	
Pandion haliaetus	Osprey		+	+	X	
Accipiter cirrhocephalus	Collared Sparrowhawk	+	+	+	+	
Accipiter fasciatus	Brown Goshawk	+	+	+	+	
Milvus migrans	Black Kite	+	+	+	+	— outside range.
FALCONIDAE						
Falco berigora	Brown Falcon	+	+	+	+	
Falco cenchroides	Australian Kestrel	+	+	+	+	
Falco longipennis	Australian Hobby	+	+	+	+	
Falco peregrinus	Peregrine Falcon	+	+	+	+	
Falco subniger	Black Falcon	+	+	+	+	— outside range

= DEP 2002

= HGM 2002.

Appendix A2: Avifauna (cont.)

		WD	FO	SC	RI
RALLIDAE					
Fulica atra	Eurasian Coot				+
Gallinula tenebrosa	Dusky Moorhen				X
Gallinula ventralis	Black-tailed Native Hen				+
Gallirallus philippensis	Banded Land Rail				+
Porphyrio porphyrio	Purple Swamphen				+
Porzana fluminea	Australian Crake				+
Porzana pusilla	Baillon's Crake				+
Porzana tabuensis	Spotless Crake				+
TURNICIDAE					
Turnix varia	Painted Button-quail	+	+		
SCOLOPACIDAE					
Actitis hypoleucos	Common Sandpiper				+
Calidris acuminata	Sharp-tailed Sandpiper				+
Calidris ferruginea	Curlew Sandpiper				+
Calidris ruficollis	Red-necked Stint				+
Tringa glareola	Wood Sandpiper				+
Tringa nebularia	Greenshank				X
Tringa stagnatilis	Marsh Sandpiper				+
BURHINIDAE					
Burhinus grallarius	Bush Thick-knee	+	+		?
RECURVIROSTRIDAE					
Cladorhynchus leucocephalus	Banded Stilt				+
Himantopus himantopus	Black-winged Stilt				+
Recurvirostra novaehollandiae	Red-necked Avocet				+
CHARADRIIDAE					
Charadrius ruficapillus	Red-capped Plover				+
Elseyornis melanops	Black-fronted Plover				+
Thinornis rubricollis	Hooded Plover				+
Vanellus tricolor	Banded Lapwing				+
Erythrogonys cinctus	Red-kneed Dotterel				X
LARIDAE					
Larus novaehollandiae	Silver Gull				+
Sterna caspia	Caspian Tern				+
Sterna nilotica	Gull-billed Tern				+
COLUMBIDAE					
Columba livia	Feral Pigeon	+	+		
Ocyphaps lophotes	Crested Pigeon	+	+		
Phaps chalcoptera	Common Bronzewing	X	+		
Phaps elegans	Brush Bronzewing	+	+		
Streptopelia chinensis	Spotted Turtle-dove	+	+		
Streptopelia senegalensis	Laughing Turtle-dove	+	+		
CACATUIDAE					
Cacatua roseicapilla	Galah	+	+	+	
Cacatua tenuirostris	Long-billed Corella	+	+		
Calyptorhynchus banksii	Red-tailed Black Cockatoo	+	+		
Calyptorhynchus baudinii	White-tailed Black Cockatoo	+	+	+	
Calyptorhynchus latirostris	Carnaby's Black Cockatoo	+	+	+	
PSITTACIDAE					
Barnardius zonarius	Australian Ringneck	X	X	X	
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		+		
Neophema elegans	Elegant Parrot	+	+	+	
Platycercus icterotis	Western Rosella	+	+	+	
Polytelis anthopeplus	Regent Parrot	+	+	+	
Purpureicephalus spurius	Red-capped Parrot	X	+	+	
CUCULIDAE					
Cacomantis flabelliformis	Fan-tailed Cuckoo	+	+		
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	X	+		
Chrysococcyx lucidus	Shining Bronze-cuckoo	+	+		

Appendix A2: Avifauna (cont.)

		WD	FO	SC	RI	
CUCULIDAE (cont.)						
Cuculus pallidus	Pallid Cuckoo	+	+			
TYTONIDAE						
Tyto alba	Barn Owl	+	+			
Tyto novaehollandiae	Masked Owl	+	+			
STRIGIDAE						
Ninox connivens	Barking Owl	+	+			
Ninox novaeseelandiae	Southern Boobook	+	+			
PODARGIDAE						
Podargus strigoides	Tawny Frogmouth	+	+			
CAPRIMULGIDAE						
Eurostopodus argus	Spotted Nightjar	+	+			— outside range?
AEGOTHELIDAE						
Aegotheles cristatus	Australian Owlet-nightjar	+	+			
APODIDAE						
Apus pacificus	Fork-tailed Swift	+	+	+	+	
ALCEDINIDAE						
Dacelo novaeguineae	Laughing Kookaburra	X	+	X		
Todiramphus sanctus	Sacred Kingfisher	+	+	+	+	
MEROPIDAE						
Merops ornatus	Rainbow Bee-eater	+	X			
CLIMACTERIDAE						
Climacteris rufa	Rufous Treecreeper	+	+			
MALURIDAE						
Malurus elegans	Red-winged Fairy-wren	+		+		
Malurus splendens	Splendid Fairy-wren	+		+		
PARDALOTIDAE						
Acanthiza inornata	Western Thornbill	+	+			
Acanthiza apicalis	Inland Thornbill	+	+			
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	+	X	X		
Gerygone fusca	Western Gerygone	X	X	X		
Pardalotus punctatus	Spotted Pardalote	+	X			
Pardalotus striatus	Striated Pardalote	X	X	X		
Smicrornis brevirostris	Weebill	+	+			
Sericornis frontalis	White-browed Scrub-wren	+	+	+		
MELIPHAGIDAE						
Acanthorhynchus superciliosus	Western Spinebill	+		+		
Anthochaera carunculata	Red Wattlebird	X	+	+		
Anthochaera chrysoptera	Little Wattlebird	+	+	+		
Epthianura albifrons	White-fronted Chat				+	
Lichenostomus virescens	Singing Honeyeater	+	+	+		
Lichmera indistincta	Brown Honeyeater	+	X	+		
Manorina flavigula	Yellow-throated Miner	+	+			
Melithreptus brevirostris	Brown-headed Honeyeater	+	+	+		— outside range.
Melithreptus lunatus	White-naped Honeyeater	+	+	+		
Phylidonyris melanops	Tawny-crowned Honeyeater	+	+	+		
Phylidonyris nigra	White-cheeked Honeyeater	+	+	+		
Phylidonyris novaehollandiae	New Holland Honeyeater	+	X	+		
PETROICIDAE						
Eopsaltria georgiana	White-breasted Robin	+	+	+		
Eopsaltria griseogularis	Western Yellow Robin	+	+			
Melanodryas cucullata	Hooded Robin	+	+	+		
Microeca fascinans	Jacky Winter	+	+	+		
Petroica multicolor	Scarlet Robin	+	+	+		— ? outside range.
Petroica goodenovii	Red-capped Robin	X	+	+		
NEOSITTIDAE						
Daphoenositta chrysoptera	Varied Sittella	+	+	+		

Appendix A2: Avifauna (cont.)

		WD	FO	SC	RI
PACHYCEPHALIDAE					
Colluricincla harmonica	Grey Shrike-Thrush	+	+	+	
Falcunculus frontatus	Crested Shrike-tit	+	+	+	
Pachycephala pectoralis	Golden Whistler	+	+	+	
Pachycephala rufiventris	Rufous Whistler	X	X	X	
DICRURIDAE					
Grallina cyanoleuca	Australian Magpie-lark				+
Myiagra inquieta	Restless Flycatcher	+	+	+	+
Rhipidura fuliginosa	Grey Fantail	X	X	X	
Rhipidura leucophrys	Willie Wagtail	+	+	+	+
CAMPEPHAGIDAE					
Coracina maxima	Ground Cuckoo-shrike	+			
Coracina novaehollandiae	Black-faced Cuckoo-shrike	X	+	+	
Lalage sueurii	White-winged Triller	+	+	+	
ARTAMIDAE					
Artamus cinereus	Black-faced Woodswallow	+	+		
Artamus cyanopterus	Dusky Woodswallow	+	+		
Artamus personatus	Masked Woodswallow	+	+		
Cracticus torquatus	Grey Butcherbird	+	+	+	
Gymnorhina tibicen	Australian Magpie	+	+	X	
Strepera versicolor	Grey Currawong	+	+		
CORVIDAE					
Corvus bennetti	Little Crow	+	+		
Corvus coronoides	Australian Raven	X	X	X	
MOTACILLIDAE					
Anthus novaeseelandiae	Richard's Pipit				+
PASSERIDAE					
Neochmia temporalis	Red-browed Firetail	+	+	+	
Stagonopleura oculata	Red-eared Firetail	+	+	+	
DICAEIDAE					
Dicaeum hirundinaceum	Mistletoe Bird	+	+		
SYLVIIDAE					
Acrocephalus stentoreus	Clamorous Reed-Warbler				+
Cinclorhamphus mathewsi	Rufous Songlark	+			
Megalurus gramineus	Little Grassbird				+
HIRUNDINIDAE					
Hirundo neoxena	Welcome Swallow	+	+	+	
Hirundo nigricans	Tree Martin	X	X	X	
ZOSTEROPIDAE					
Zosterops lateralis	Silvereye	X	X	+	

Appendix A3: Herpetofauna records from the Lot 211 Barnes Avenue study area.

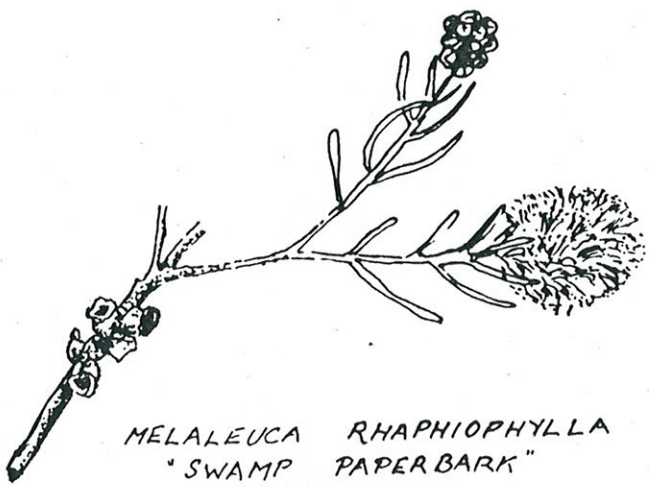
		WD	FO	SC	RI
FROGS					
HYLIDAE					
Litoria adelaidensis	Slender Tree Frog	X		+	
Litoria moorei	Bell Frog			+	+
MYOBATRACHIDAE					
Crinia georgiana	Quacking Frog	+	X	+	+
Crinia glauerti	Glauert's Froglet			+	+
Crinia insignifera	Squelching Froglet		X	X	+
Geocrinia leai	Lea's Frog			+	+
Heleioporus eyrei	Moaning Frog	X		+	+
Heleioporus psammophilus	Sand Frog			+	
Limnodynastes dorsalis	Banjo Frog			+	+
Myobatrachus gouldii	Turtle Frog	+	+	+	
Pseudophryne guentheri	Günther's Toadlet	+	+	+	
LIZARDS					
GEKKONIDAE					
Christinus marmoratus	Marbled Gecko	+	X	+	
Underwoodisaurus milii	Thick-tailed Gecko	+	+		
PYGOPODIDAE					
Aprasia repens	Fry's worm lizard	+	+		
Delma fraseri		+	+	+	
Lialis burtonis	Burton's Snake Lizard	+	+		
Pygopus lepidopodus	Common Scaly-foot	+	+		
SCINCIDAE					
Acritoscincus trilineatum			X	+	
Cryptoblepharus plagiocephalus	Fence Skink	X	+	+	
Ctenotus labillardieri		+	+	+	
Egernia kingii	King's Skink	+	X	+	
Egernia luctuosa		+	+	+	
Egernia napoleonis		+	+	+	
Glaphyromorphus gracilipes		+	+	+	
Hemiergis peronii		+	+	+	
Hemiergis quadrilineatum		X	X	X	
Lerista distinguenda		+	+	+	
Lerista elegans		X	+	X	
Lerista lineata		+	+	+	
Lerista microtis		+	+	+	
Menetia greyii	Grey's Skink	+	+	X	
Morethia lineoocellata		X	X	+	
Morethia obscura		+	+	+	
Bassiana trilineata		+	+	+	
Tiliqua rugosus	Shingle-back	+	+	+	
VARANIDAE					
Varanus gouldii	Gould's Monitor	+	+	Varanus sp	
Varanus rosenbergi	Rosenberg's Monitor	+	+		
SNAKES					
BOIDAE					
Morelia spilota	Carpet Python	+	+	+	
ELAPIDAE					
Acanthophis antarcticus	Common Death-adder	+	+		
Drysdalia coronata	Crowned Snake	+	+		
Echiopsis curta	Bardick	+	+		
Elapognathus minor	Little Brown Snake	+	+		
Notechis scutatus	Tiger Snake	+	+	+	
Pseudonaja affinis	Dugite	+	+		
Rhinoplocephalus bicolor	Square-nosed Snake	+	+		
Simoselaps bertholdi	Jan's Banded Snake	+	+		

Appendix A3: Herpetofauna (cont.)

		WD	FO	SC	RI
ELAPIDAE (CONT.)					
Simoselaps bimaculatus	Black-naped Snake	+	+		
Suta gouldii	Black-headed Snake	+	+		
Suta nigriceps	Black-backed Snake	+	+		
TYPHLOPIDAE					
Ramphotyphlops australis		X	+	+	
Ramphotyphlops pinguis		+	+	+	
TORTOISES					
CHELIDAE					
Chelodina oblonga	Long-necked Turtle			+	+

LESCHENAULT INLET MANAGEMENT AUTHORITY

Fringing vegetation of the Lower Collie and Brunswick Rivers 1992

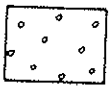


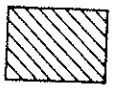
Waterways Commission
Report No 37
1993

LEGEND

SALT-MARSH VEGETATION

1  *Sarcocornia quinqueflora*
closed herbland

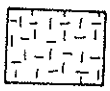
2  *Halosarcia indica bidens*
low open heath

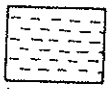
3  *Juncus krausii*
closed sedgeland

FRINGING VEGETATION

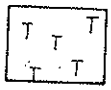
4 *Bolboschoenus caldwellii*
Not shown closed sedgeland

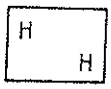
ESTUARINE FRINGING FOREST VEGETATION

5  *Casuarina obesa- Melaleuca rhaphiophylla-Eucalyptus rudis*
low-open forest

6  *Casuarina obesa-Eucalyptus rudis*
open-closed forest

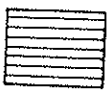
7  *Casuarina obesa-Melaleuca rhaphiophylla*
low closed forest

8  *Casuarina obesa*
open-closed forest

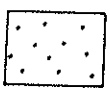
9  *Melaleuca viminea*
low open-closed forest

10  *Melaleuca rhaphiophylla*
low closed forest

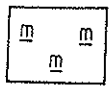
FRINGING FRESHWATER (RIVERINE) FOREST AND SANDY RISE VEGETATION

11  *Eucalyptus rudis-Melaleuca rhapyiophylla*
forest complex

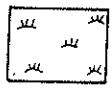
12  *Eucalyptus calophylla*
open-closed forest

13  *Eucalyptus calophylla-Agonis flexuosa*
open forest-tall open forest-woodland

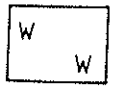
OTHER PLANT COMMUNITIES AND VEGETATION TYPES

14  *Melaleuca rhaphiophylla*
low closed-open forest

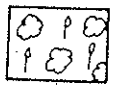
15  *Baumea articulata*
closed sedgeland

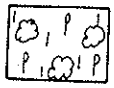
16  *Juncus pauciflorus*
open sedgeland

17  *Typha orientalis*
closed sedgeland

18  Mixed sedgeland and weed community

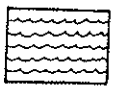
PASTURED WOODLANDS

19  *Eucalyptus rudis*
woodland

20  *Eucalyptus rudis-Agonis flexuosa*
woodland

21  *Eucalyptus calophylla-Agonis flexuosa*
woodland

22  *Eucalyptus rudis-Melaleuca rhaphiophylla*
woodland

 Standing water

Bg Bare ground

Sp Salt pan

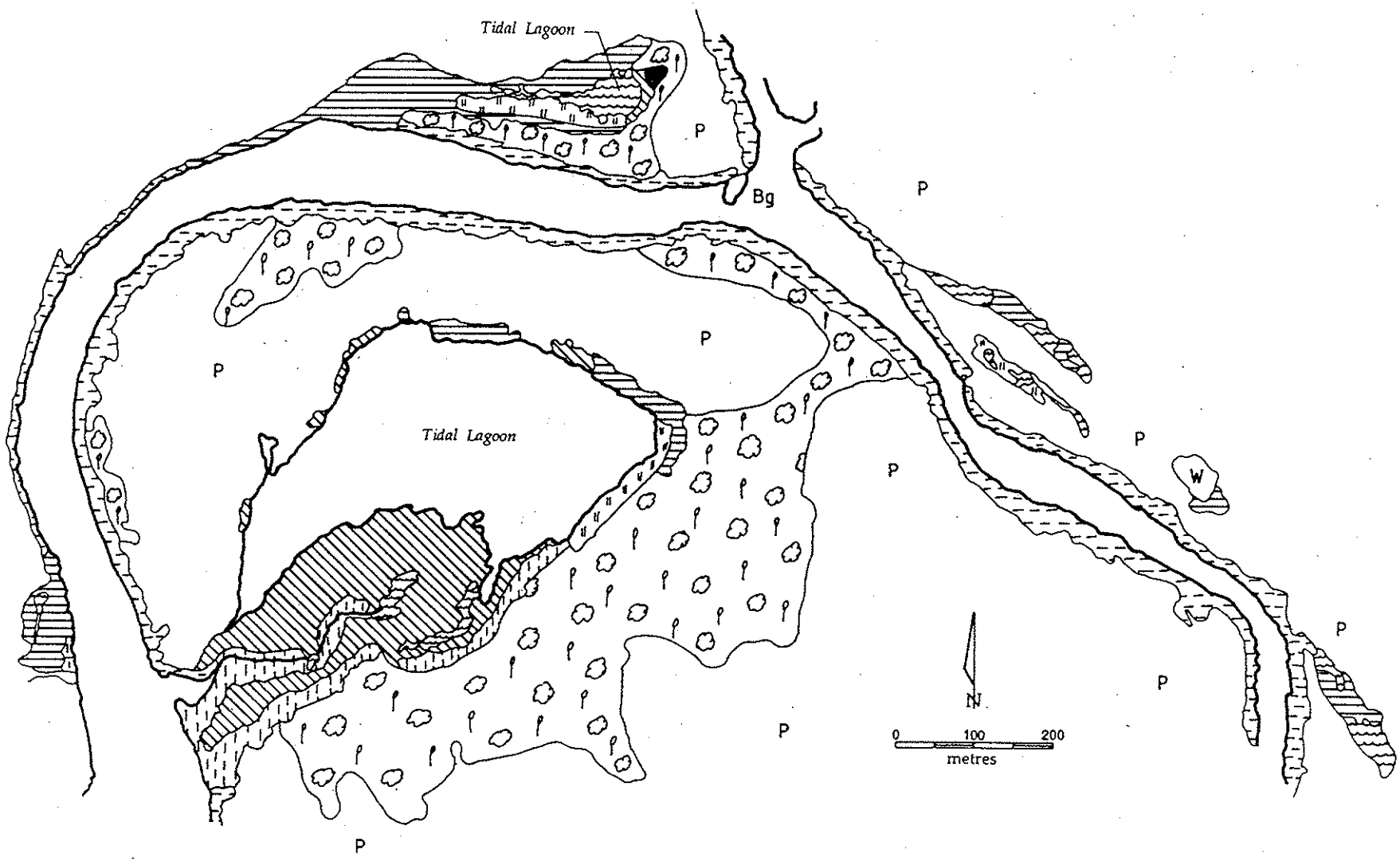
P Pasture

Pk Parkland

Gr Scattered grasses

D Developed land

MAP 3



ATA Environmental
environmental scientists

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Perth WA 6000
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Email: info@ataenvironmental.com.au
Website: www.ataenvironmental.com.au

17 October 2001

99166_030_pvdm

Mr Brenton Downing
Peet & Company
P.O. Box 7224
Cloisters Square WA 6850

Dear Brenton

RE: Pt LOT 211 BARNES AVENUE, AUSTRALIND, SPRING FLORA SURVEY

This letter is to provide you with the results of the spring flora survey undertaken on Pt Lot 211 Barnes Avenue.

The spring survey was conducted on 11 October 2001 by Dr Paul van der Moezel.

A provisional flora list for the property has previously been compiled following a survey of the site by our company in January 2001. That survey listed a total of 81 species for the site including one Declared Rare Flora (DRF) species, *Diuris drummondii*, and one Priority 2 species, *Lasiopetalum membranaceum* (now classified as a Priority 3 species).

Due to the timing of the initial survey in summer, many ephemeral species such as orchids and lilies were not able to be recorded in the survey. Several of the DRF and Priority species recorded on the Department of Conservation and Land Management's (CALM) database from near the site are ephemeral species. A spring survey was therefore recommended to obtain a more complete flora list for the site and to determine whether any additional DRF or Priority species were present.

The spring survey recorded an additional 66 species, comprising 48 native and 18 non-native species. The additional species included some perennial species which were not recorded previously and a large number of ephemerals, particularly in the orchid and daisy families.

The total flora list for the site now contains 147 species of which 119 are native. The most common families are the Papilionaceae (Pea family - 14 species, including 3 non-native), Asteraceae (Daisy family - 13 species, 4 non-native), Orchidaceae (Orchid family - 11 species), Cyperaceae (Sedge family - 11 species) and the Myrtaceae (Myrtle family - 9 species).

A comparison of the species richness of the site with other bushland areas in the Bunbury region is given in Table 1. The total of 119 native species in approximately 37ha is similar to the number of native species recorded in about 20ha of mostly Peppermint/Banksia/Jarrah woodland at Lot 632 Parade Road, Bunbury. The number is higher than the 88 native species recorded for

175620

the South Bunbury Tuart Woodland but is less than the 140 native species recorded at Manea Park. The higher species richness at Manea Park is due to the larger area as well as the greater diversity of vegetation communities occurring on the different soil and landform types.

TABLE 1
SPECIES RICHNESS OF BUSHLAND AREAS RECORDED IN THE VICINITY OF LOT 632 PARADE ROAD

Site	Native Species	Area (ha)	Reference
Manea Park	140*	72	Koch (1989)
Pt Lot 211 Barnes Road Australind	119	37	This Study
Lot 632 Parade Road	118	~20	ATA Environmental (2001)
Bunbury Tuart Woodland	88	128	Alan Tingay & Associates (1994)

* - actual totals will be higher as surveys were not conducted in optimal season

The identification of several orchid specimens was verified by Dr Andrew Brown, an orchid specialist at CALM. One additional Priority orchid species, *Caladenia speciosa*, was recorded on the site. This species, the Sandplain White Spider Orchid, was common throughout the bushland in the Jarrah/Peppermint/Banksia and Jarrah/Marri/Peppermint woodlands. It was not recorded in the wetland or riparian vegetation but was located in the dryland vegetation immediately adjacent to these areas.

Caladenia speciosa is closely related to the White Spider Orchid, *Caladenia longicauda*, and is known to occur in sandy *Banksia*/Jarrah woodlands on the Swan Coastal Plain from near Mundijong to Boyanup (Hoffman and Brown, 1992).

The actual number of individual *Caladenia speciosa* plants on the site was difficult to determine due to the large number of hybrid spider orchids present. The hybrids appeared to be crosses between *Caladenia speciosa* and *Caladenia georgei* and contained a variety of colour and size variations. One particular variation that was confirmed by Andrew Brown as a hybrid was very similar in appearance to the DRF species *Caladenia excelsa* and could quite easily be mistaken for that species. *Caladenia excelsa* occurs between Yallingup and Karridale on the Leeuwin-Naturaliste Ridge and has not been recorded in the Australind area.

Several additional populations of the Priority 3 species *Lasiopetalum membranaceum* were recorded on the site (Figure 1). The largest populations were located in the north-east corner of the site with at least 50 plants recorded in an area of approximately 4,000m^2.

Please contact me if you would like to discuss the results of this survey further.

Yours sincerely

DR PAUL VAN DER MOEZEL
Partner

REFERENCE

Hoffman, N. and Brown, A (1992). Orchids of South-West Australia. University of Western Australia Press.

TWIN RIVERS FLORA LIST OCTOBER 2001

*Introduced Species

FERNS

DENNSTAEDTIACEAE
**Pteridium esculentum*

GYMNOSPERMS

CYCADACEAE
Macrozamia fraseri

MONOCOTYEDONS

ANTHERICACEAE
Agrostocrinum scabrum
Arthropodium capillipes
Caesia parviflora
Chamaescilla corymbosa
Corynotheca micrantha
Sowerbaea laxiflora
Thysanotus multiflorus
Thysanotus patersonii

ARACEAE
**Zantedeschia aethiopica*

COLCHICACEAE
Burchardia umbellata

CYPERACEAE
Baumea juncea
Bolboschoenus caldwellii
Cyathochaete avenacea
Gahnia trifida
Isolepis cernua
Lepidosperma angustatum
Lepidesperma longitudinale
Lepidosperma sp
Lyginia barbata
Schoenus curvifolius
Schoenus grandfilorus

DASYPOGONAEAE
Dasypogon bromeliifolius
Lomandra sp.

HAEMODORACEAE
Anigozanthos manglesii
Conostylis aculeata
Haemodorum spicatum
Phlebocarya ciliata

IRIDACEAE
**Chasmanthe floribunda*
**Freesia affin. leichtlinii*
Patersonia occidentalis

JUNCACEAE
Juncus holoschoenus
Juncus pallidus

ORCHIDACAEAE
Burnettia nigricans
Caladenia attingens ssp attingens
Caladenia flava
Caladenia georgeii
Caladenia hirta ssp hirta
Caladenia latifolia
Caladenia speciosa (Priority 4)
Caladenia speciosa X *georgei*
Diuris drummondii (DRF)
Microtis media ssp media
Pterostylis vittata

POACEAE
**Aira caryophyllea*
**Avena fatua*
**Briza maxima*
**Briza minor*
**Cynodon dactylon*
Danthonia caespitosa
**Ehrharta calycina*

RESTIONACEAE
Desmocladus fasciculatus
Desmocladus flexuosus
Hypolaena exsulca
Lyginia barbata

XANTHORRHOEACEAE
Xanthorrhoea brunonis

DICOTYLEDONS

AMARANTHACEAE
Ptilotus stirlingii

APIACEAE
Centella cordifolia
Eryngium rostratum
Platysace compressa
Trachymene pilosa
Xanthosia pusilla

ASTERACEAE
**Arctotheca calendula*
Asteridia pulverulenta
**Carduus pycnocephalus*
Cotula coronopifolia
**Hypochaeris glabra*
Lagenifera huegelii
Millotia tenuifolia
Ozothamnus cordatus
Podotheca angustifolia
Rhodanthe chlorocephala ssp rosea
Senecio hispidulus
Senecio lautus ssp dissectifolius
**Ursinia anthemoides*

CARYOPHYLLACEAE
**Petrorhagia velutina*
**Silene gallica*

CASUARINACEAE
Casuarina obesa

CHENOPODIACEAE
**Atriplex hortensis*
Rhagodia baccata

DILLENIACEAE
Hibbertia amplexicaulis
Hibbertia hypericoides
Hibbertia racemosa

DROSERACEAE
Drosera erythrorhiza
Drosera macrantha
Drosera pallida
Drosera stolonifera

EPACRIDACEAE
Astroloma pallidum
Leucopogon capitellatus

EUPHORBIACEAE
Phyllanthus calycinus

GERANIACEAE
**Geranium molle*

GOODENIACEAE
Dampiera cauloptera
Dampiera linearis

GYROSTEMONACEAE
Gyrostemon ramulosus

LAMIACEAE
Hemiandra pungens

LAURACEAE
Cassytha racemosa

LOGANIACEAE
Logania serpyllifolia

MIMOSACEAE
Acacia huegelii
Acacia pulchella
Acacia saligna

MYRTACEAE
Agonis flexuosa
Astartea fascicularis
Corymbia calophylla
Eucalyptus marginata
Eucalyptus rudis
Kunzea ericifolia
Melaleuca rhaphiophylla
Melaleuca thymoides
Melaleuca viminea

OROBANCHACEAE
**Orobanche minor*

PAPILIONACEAE
Bossiaea eriocarpa
Chorizema ilicifolium
Daviesia decurrens

Daviesia divaricata
Gompholobium tomentosum
Hardenbergia comptoniana
Hovea pungens
Jacksonia furcellata
Jacksonia stricta
Kennedia prostrata
**Lupinus consentinii*
**Meliolotus indica*
Nemcia capitata
**Pisum sativum*

POLGALACEAE
Comesperma sp

POLYONACEAE
**Rumex brownii*
**Rumex crispus*

PRIMULACEAE
**Anagallis arvensis*

PROTEACEAE
Banksia attenuata
Banksia grandis
Hakea prostrata
Persoonia saccata
Petrophile linearis
Synaphea polymorpha
Xylomelum occidentale

RUBIACEAE
Opercularis hispidula
**Rubus fruticosus*

RUTACEAE
Eriostemon spicatus

SCROPHULARIACEAE
**Parentucellia viscosa*

STERCULIACEAE
Lasiopetalum membranaceum (Priority 3)

STYLIDIACEAE
Stylidium brunonianum
Stylidium piliferum
Stylidium schoenoides

TREMANDRACEAE
Tetratheca hirsuta

VALERIANACEAE
**Centranthus macrosiphon*

VIOLACEAE
Hybanthus calycinus

PRINTED: Thu 18 Oct

CHECKED: EO 18-10-01

DRAWN: TE/GLM 18-10-01

99166/let17-10-01.dgn

metres

0 50 100 150 200

SCALE 1 : 3 000

BARNES AVENUE

Pt Lot 211

Study Area Boundary

COLLIE RIVER

WETLAND

CcEm/AfBa

Cc/AfJf

CcEm/AfJf

ErMr[1]

CcEr

AfBa

ErMrCoKe

MrMv

ErMr[2]

CoErMr

VEGETATION

CcEm/AfBa	*Corymbia calophylla/Eucalyptus marginata* Open Woodland over *Agonis flexuosa/ Banksia attenuata* Low Open Woodland
AfBa	*Agonis flexuosa/Banksia attenuata* Low Open Woodland
CcEm/AfJf	*Corymbia calophylla/Eucalyptus marginata* Open Woodland over *Agonis flexuosa/ Jacksonia furcellata* Low Open Woodland
Cc/AfJf	*Corymbia calophylla* Woodland over *Agonis flexuosa/Jacksonia furcellata* Low Open Woodland
CcEr	*Corymbia calophylla/Eucalyptus rudis* Forest
ErMr[1]	*Eucalyptus rudis/Melaleuca rhaphiophylla* Low Forest
ErMr[2]	*Eucalyptus rudis /Melaleuca rhaphiophylla* Open Woodland
MrMv	*Melaleuca rhaphiophylla/Melaleuca viminea* Scrub
CoErMr	*Casuarina obesa/Eucalyptus rudis/Melaleuca rhaphiophylla* Low Forest
ErMrCoKe	*Eucalyptus rudis/Melaleuca rhaphiophylla/Casuarina obesa/Kunzea ericifolia* Low Forest
///	Riparian / Wetland Vegetaion

SIGNIFICANT FLORA

- *Diuris drummondii* (DRF) approx. location
- *Lasiopetalum membranaceum* (Priority 3)
- *Lasiopetalum membranaceum* (Priority 3) Population

BASE SOURCE: TME, May 2000.

ATA Environmental
environmental scientists

PART LOT 211
BARNES AVENUE, AUSTRALIND
VEGETATION ASSOCIATIONS
FIGURE 1

ENTERED ON GIS

Name: PT Lot 211 Barnes Avenue, Australind – Environmental Description
Date: 01/05/2006
Capture Author: Thomas Leong

Comments:
Polygon
Created to match documented study area with acceptable level of accuracy

Accuracy Levels:

- High = Document contained visual and or described spatial references easily copied, resulting in little or no polygon boundary errors
- Acceptable = Document contained visual references with complex boundaries, resulting in minor boundary errors
- Low = Document contained little or no visual references, resulting in polygon boundary errors

Attributes
Report Info – Captured without problems
Custodial/Contact – Captured without problems
Content – Captured without problems

THIS PLAN HAS BEEN PREPARED FOR PLANNING PURPOSES. AREAS, CONTOURS AND DIMENSIONS SHOWN ARE SUBJECT TO SURVEY.


BARNES
AVE
RD
CHURCH SITE 4375m²
POS AND DRAINAGE
GROUP HOUSING 4121m²
GROUP HOUSING 4711m²
LOCAL CENTRE 4236m²
GROUP HOUSING 3555m²
GROUP HOUSING 3567m²
566m²
596m²
618m²
590m²
586m²
589m²
593m²
553m²
593m²
576m²
587m²
588m²
591m²
581m²
596m²
591m²
609m²
654m²
697m²
677m²
657m²
662m²
744m²
670m²
745m²
648m²
776m²
599m²
673m²
605m²
688m²
617m²
707m²
638m²
632m²
649m²
671m²
678m²
755m²
833m²
653m²
722m²
703m²
786m²
832m²
839m²
704m²
776m²
732m²
748m²
683m²
631m²
639m²
640m²
655m²
658m²
669m²
648m²
870m²
917m²
817m²
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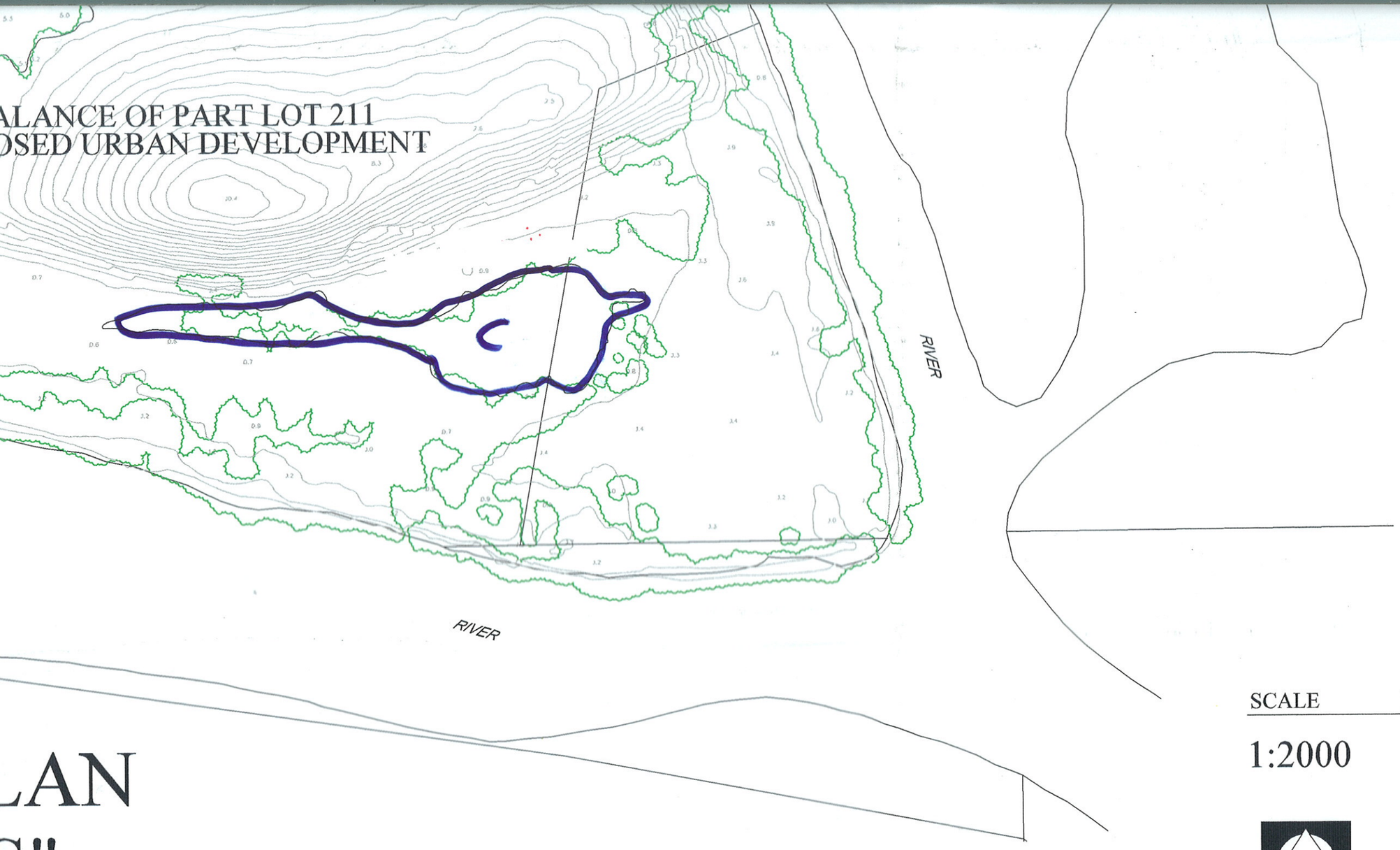
870m²
764m²
776m²
735m²
756m²
773m²



LAN
S"
AVENUE
D

OUNDARY

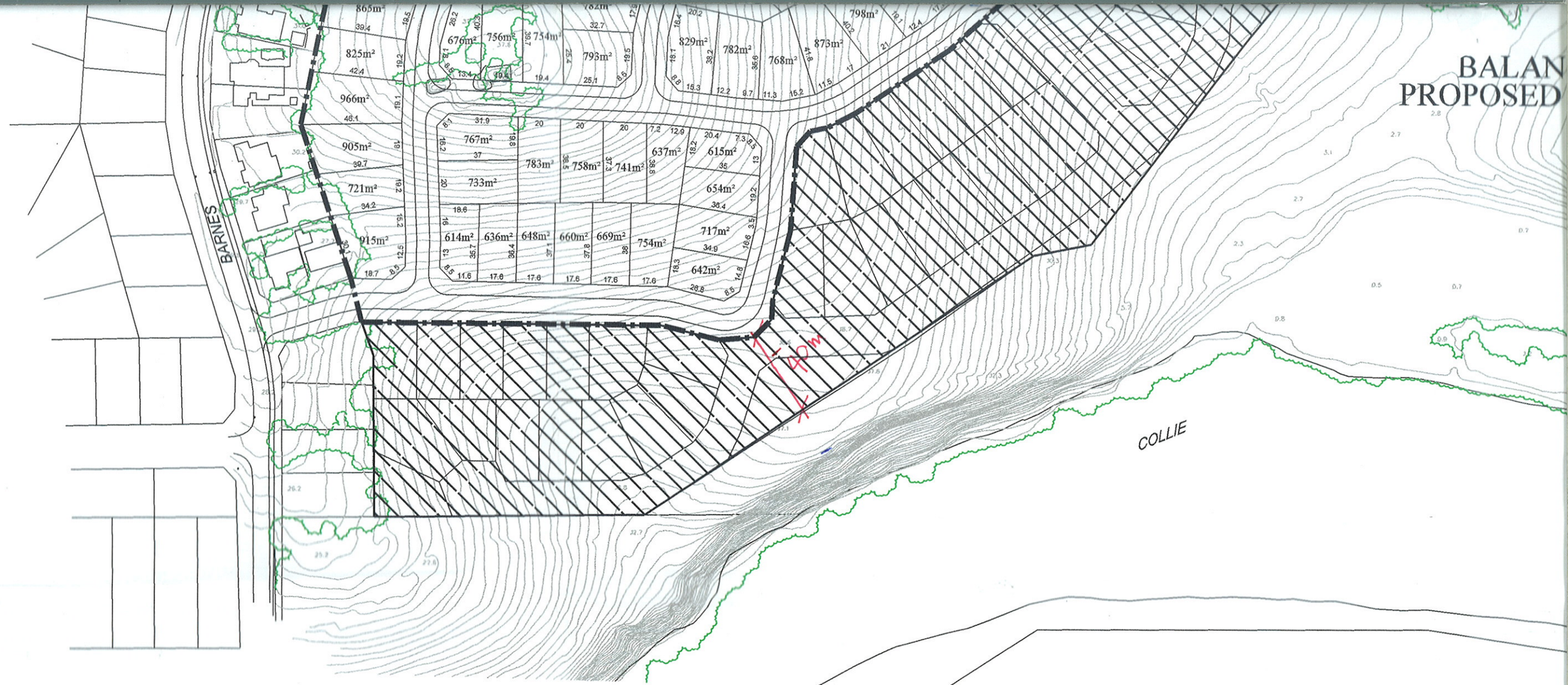
GE 2

SCALE 1:2000

DATE JUNE 2001

PLAN No. 99016P-08

TME



BALAN
PROPOSED

SUBDIVISION PLA
"TWIN RIVERS"
PT LOT 211 BARNES AV
AUSTRALIND

APPLICATION BOUNDA

PROPOSED STAGE 2

THOMPSON McROBERT EDGELOE 26 Wittenoom Street, Bunbury WA 6230 Telephone: (08) 9791 4411 Email: tmebunbury@tmebunbury.com

marist brothers
PROVINCE CENTRE

7 Tuscany Rise, Templestowe, Victoria 3106
Phone: National (03) 9846 1533
International 613 9846 1533
Facsimile (03) 9846 3350
e-mail: marist@maristmelb.org.au

Submission N° 231

16 February, 2001

The Secretary
Western Australian Planning Commission
61 Victoria Street
BUNBURY WA 6230

Dear Sir

RE: SUBMISSION ON THE DRAFT GREATER BUNBURY REGION SCHEME

INTRODUCTION

The Marist Brothers Community Incorporated is the registered proprietors of Part Lot 211 on Diagram 64207 and described in Certificate of Title Volume 2167 Folio 6628. We note that under the Draft Greater Bunbury Region Scheme that a significant portion of this landholding has been proposed to be reserved for Region Open Space.

BACKGROUND HISTORY

The Marist Brothers have been the registered proprietors of this land since 1962 following purchase, and the land has been in private ownership in one form or another since approximately 1835.

At that time, a Joint Stock Company was formed, with attractive land at Australind given to the Company on the condition that the Company brought out English settlers and sold the land to them. These sales were made on a 'terms' basis, and, under the existing provisions for the transfer of land by conveyance, the land remained in the name of the Joint Stock Company until the final payment was made. Before the Company was able to complete the sale it went bankrupt, therefore there was nobody able to serve conveyance on the land. The owners of the land within Australind became squatters and eventually achieved title by adverse possession. The Torrens system of title registration and the Transfer of Land Act did not develop until the 1890's.

In the 1960's the Marist Brothers purchased the land from the existing landowners, contrary to rumours, the land was not acquired by bequest or gift, but purchased at arms length.

MARIST BROTHERS' ROLE IN THE COMMUNITY

The Marist Brothers are concerned that the Western Australian Planning Commission may have received submissions that suggest the Marist Brothers should cede the land for free to the government. We understand that the public has made use of the site over a number of years regardless of the fact that this is private property.

The Marist Brothers, having owned this land for many years, have paid rates and taxes and incurred other expenses such as maintaining fire breaks and removing rubbish from this site. There has been considerable cost in maintaining this parcel of land. The land development activities of the Marist Brothers provide the ability for the Marist Brothers to participate in a wide

range of activities that benefit the broader community such as, welfare, primary and secondary education. It is extremely disappointing that those same people who have enjoyed unencumbered use of this parcel of land now seek to limit the ability of this organisation to continue its activities in the provision of a range of services to the broader community. We acknowledge the community's concern over the loss of parts of this site, however the site is currently difficult to access for the majority of the public and impossible for others.

During the course of development of this area the Marist Brothers propose to provide dual use paths and walk trails, roads and car parking to provide access for a wide range of people, both able bodied and those not so able bodied. Development along the lines of the Subdivision Application proposal that is currently before the Western Australian Planning Commission, and subject of appeal, would provide significant residential and special sites. It will offer sites for other uses such as a church, shop and retirement housing, all of which are in short supply in the vicinity. The proposal will provide the ability for the currently degraded foreshores to be protected from unimpeded vehicle traffic.

The Marist Brothers' activities within the Twin-Rivers area have never been a secret. Appendix A and Appendix B of this report contain a newspaper article identifying the development proposed over the whole Twin Rivers area, and a copy of the sales brochure available at the Allwest First National Real Estate agency. This information is also available through most of the real estate agents within the Greater Bunbury district.

The sales brochure has been used in the marketing of stages 10, 11 and 12 of the Australind Heights development on Lisa Road and also for the last two stages at the Peet & Company development of Rivers Edge.

The Marist Brothers are also concerned that should the reservation of land proposed under the draft Greater Bunbury Region Scheme remain at its current level over Part-Lot 211, or in fact be extended, that it will have a significant impact on the local community. Obviously under the region scheme such a reservation will be the subject of an acquisition or compensation.

Our consultants advise that the lost opportunity for the Marist Brothers is very significant, this would have serious financial implications for the West Australian Planning Commission and the greater community of Australind.

The money used in funding compensation would have provided funds for a range of other activities including extending the Recreation Centre and Swimming Centre, major infrastructure items such as additional expansion of Kemmerton Industrial Area or the Bunbury Port facilities, or additional funding towards the new Peel Deviation Road.

PLANNING

Accompanying this submission are submissions from Peet & Company and Thompson McRobert Edgloe which outline in more detail the planning issues associated with this land.

From the Marist Brothers' perspective we have been working on proposals for developing this land since the 1980's. We have an adopted a structure plan which has provided for the residential zoning of this land. We have shown good faith by working with all of the service authorities and local authorities in trying to ensure the best possible outcome for this site. We are highly concerned over the location of the reserve boundaries, which appear to have no valid justification from an environmental point of view or from a riverine protection basis.

We have been involved in the appointment of environmental consultants and undertaken assessments on this site on two separate occasions to satisfy the concerns of various referral

agencies. All of these concerns have been addressed and the normal requirement for a foreshore reserve surrounding this area would provide suitable protection for the river and vegetation and provide a vegetated corridor for the movement of flora and fauna.

Reports by the environmental consultants are appended to the earlier mentioned submissions.

We note that the draft Greater Bunbury Region Scheme does not outline any time-frame for acquisition or compensation for areas reserved under the scheme and this also is of great concern to the Marist Brothers.

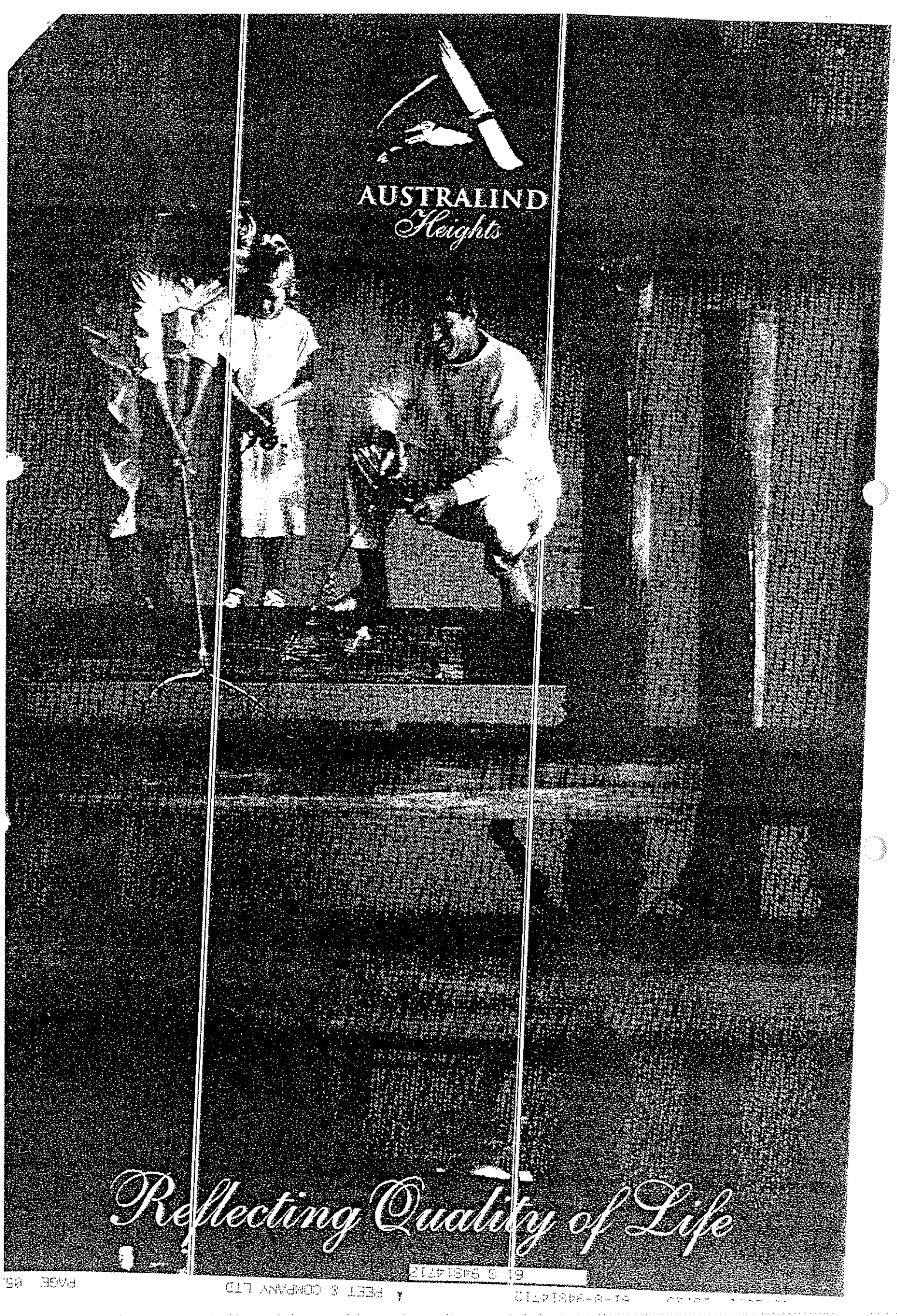
The loss of the additional land for houses will mean that future residents will be required to buy or build in further outlying areas and increase the hidden cost of continuing sprawl.

Summary

- The Marist Brother strongly objects to the size and location of the reservation over Part-Lot 211.
- The Marist Brothers' consultants have provided the planning rationale for the reduction of the regional open space.
- The Marist Brothers are concerned over the lack of clear provisions for acquisition or compensation should the whole reservation remain or be extended.
- The Marist Brothers are concerned for their lost opportunity and for the costs associated with nearly 20 years' work in relation to this site. Along with maintenance and holding costs for 40 years.
- The Marist Brothers are concerned that there appears to be no logical reason for the location of the regional open space boundary.
- The Marist Brothers are disappointed that a sub-division application lodged nearly 18 months ago has been postponed in one manner or another to draw it into the draft Greater Bunbury Region Scheme.
- The Marist Brothers are concerned at the cost to the community for acquiring land that the environmental consultants consider has little advantage in protecting the river environment.

Yours faithfully

L.R. Cambrey
Business Manager


AUSTRALIND
Heights
Reflecting Quality of Life

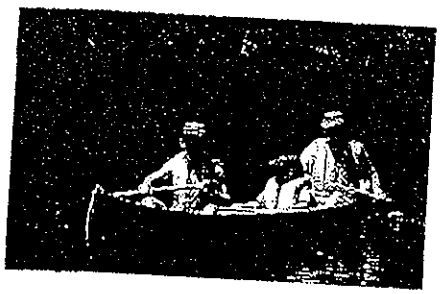
AUSTRALIND
Heights

Live the Lifestyle that Reflects your Dreams

Nestled between the wide calm waters of the Leschenault Estuary and the gentle, meandering turns of the Collie and Brunswick Rivers you'll find the many pleasures that is Australind Heights.

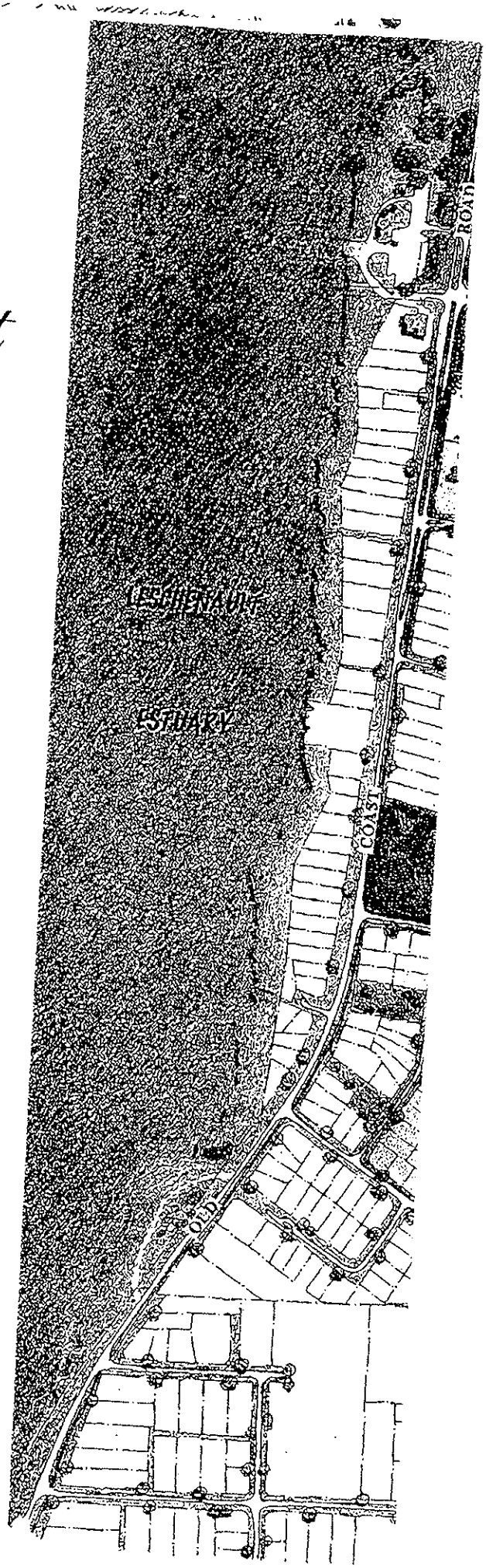
Discover for yourself the irresistible allure of one of South West's most sought after resses. You will be close to ate and public schools, pping and community facilities. can start living the lifesty e 've always dreamt of and really rve. Enjoy fishing, boating, walking, simply lazing in the or just getting away from it n this fantastic water ground and bushland gallery.

These prime homesites are superbly located. Many have exceptional views with glorious vistas looking across to the Darling Ranges, along the winding rivers, and for those higher on the hill—the spectacle of the Leschenault Estuary and glimpses of the Indian Ocean.



Everything about this truly magnificent estate has been thoughtfully developed. There's a wide variety of homesites, ranging from over 800m², with generous frontages, to smaller cottage style homesites. All the essential services are provided including underground power, scheme water, deep sewerage and telephone. Special covenants safeguard your lifestyle and support property value growth by maintaining high housing standards.

Australind Heights
Reflecting Quality of Life



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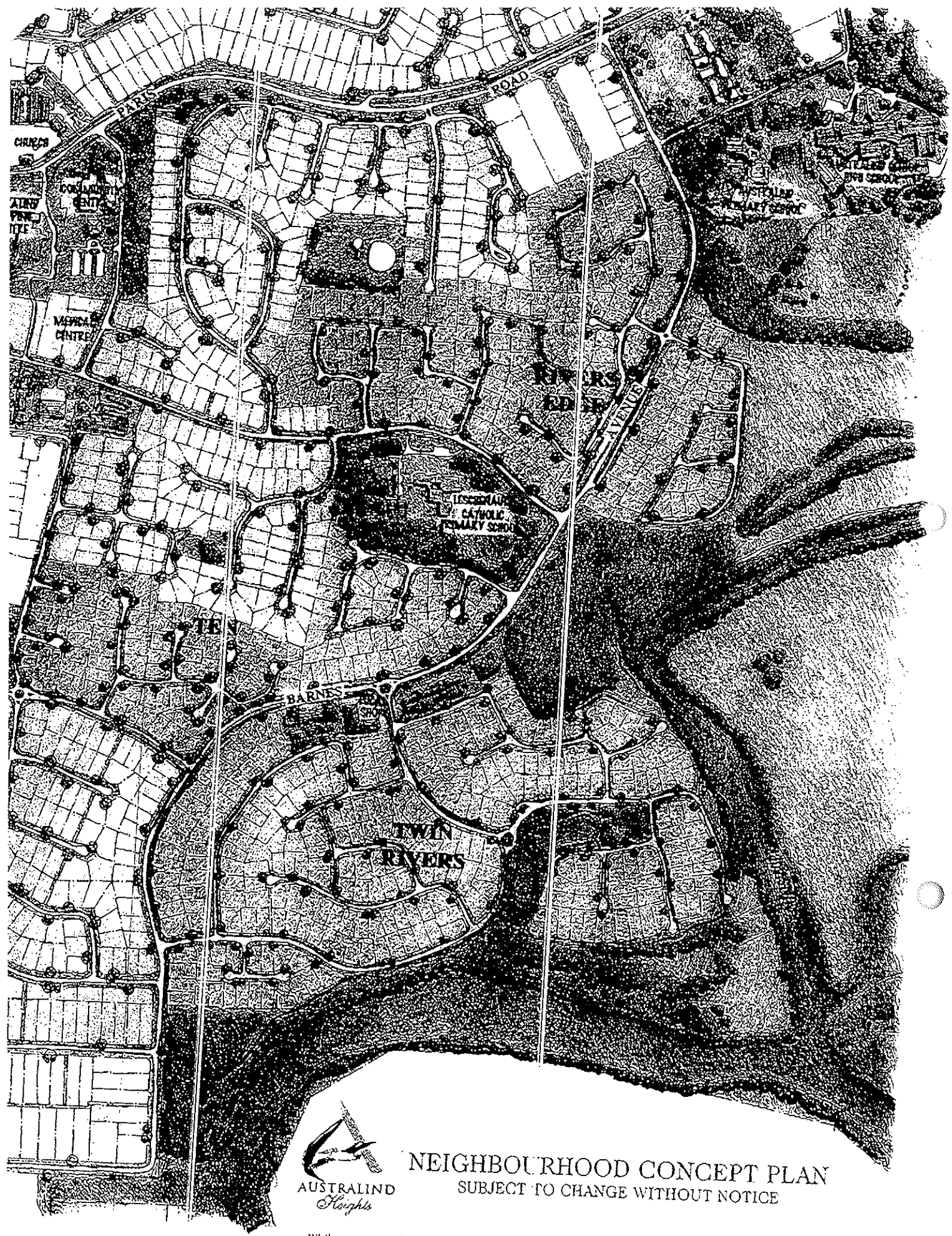

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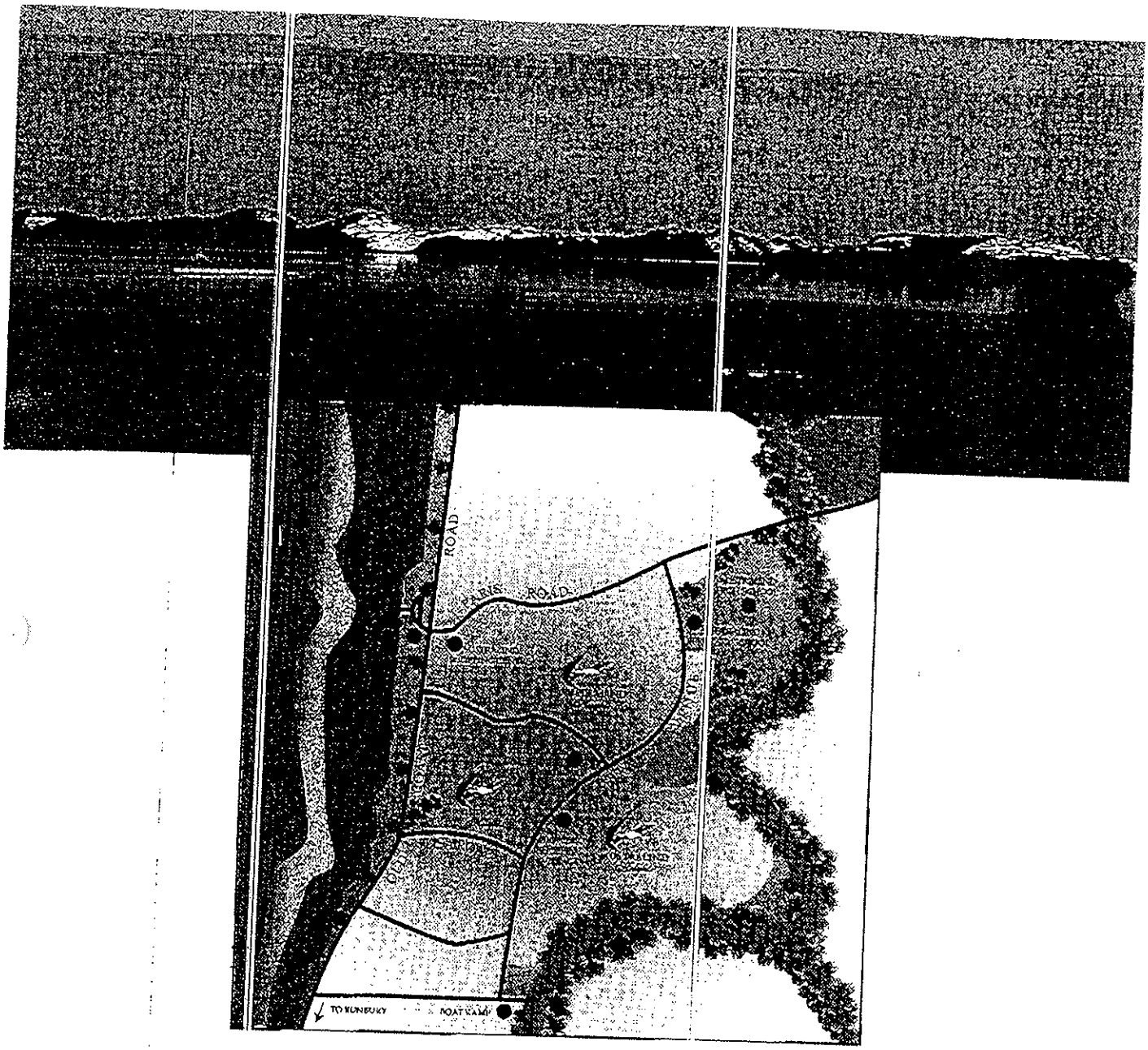

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Your ref:

FAXED 16/1/02

December 15, 2001

Marist Brothers
C/- Peet and Company Limited
PO Box 7224 Cloisters Square
PERTH WA 6850

Dear Mr Spencer

Re: Archaeological and Ethnographic Survey, Lot 211 Barnes Avenue, Australind

I am pleased to report that the archaeological and ethnographic surveys of the proposed Twin Rivers project (TRP), located at Lot 211 Barnes Avenue Australind, have been completed.

As a result of the archaeological survey, no archaeological sites were found within the TRP. However, four isolated artefacts were located. Descriptions of these artefacts will be provided in the forthcoming report.

The ethnographic survey included a site inspection of the TRP by Wayne Glendenning accompanied by eight representatives of the *Gnarla Karla Booja* native title claim (WC98_058), which encompasses the study area. As a result of the ethnographic survey, no new ethnographic sites were identified. The Aboriginal consultants noted previously recorded sites in the immediate area; the Brunswick and Collie Rivers. The Aboriginal consultants were also informed of the outcome of the archaeological survey and inspected the areas where the isolated artefacts had been found. The *Gnarla Karla Booja* representatives did not attribute any significance to the isolated artefacts. However, they pointed out that Aboriginal skeletal material has been found during previous developments undertaken in the Australind area and were of the view that there is a potential for Aboriginal skeletal material being found within the TRP.

The Aboriginal consultants made several requests with regard to both heritage and other matters in respect of the TRP development:

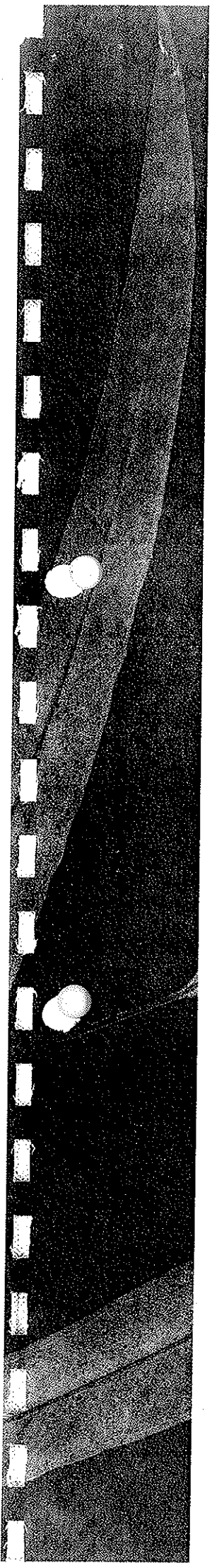
- The buffer zone between the TRP and the Brunswick and Collie Rivers is maintained;
- That a qualified archaeologist is engaged to undertake archaeological monitoring during ground clearing and earthworks;
- Features in the development, for example, streets, parks and so on, should be allocated Nyungar names to acknowledge Aboriginal historical associations with the Australind area;
- That members of the *Gnarla Karla Booja* association be permitted to remove timber from the TRP area as part of the ground clearing for the development;
- The developers employ local Aboriginal people in the earthworks and construction stage of the projects development;
- The developers consider providing assistance to the *Gnarla Karla Booja* in the form of office equipment and stationery.

The proponents are therefore reminded of their obligation under Section 15 of the *Aboriginal Heritage Act* (1972) to report any Aboriginal material found during the development works. A report on the archaeological and ethnographic surveys is being prepared and will be forwarded to you in the near future. We have taken this opportunity to enclose an invoice for the archival and field components of the surveys.

Should you have any queries, please do not hesitate to contact either Dr. Edward McDonald or Wayne Glendenning on 9328 5335.

Yours sincerely

Dr. Edward McDonald
Managing Director



PEET & COMPANY LIMITED

PT LOT 211 BARNES AVENUE, AUSTRALIND

ENVIRONMENTAL DESCRIPTION

FINAL REPORT

FEBRUARY 2001

REPORT NO: 2001/16

ATA Environmental
environmental scientists

PEET & COMPANY LIMITED

PT LOT 211 BARNES AVENUE, AUSTRALIND

ENVIRONMENTAL DESCRIPTION

FINAL REPORT

FEBRUARY 2001

REPORT NO: 2001/16

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An internal quality review process has been applied to each project task undertaken by us. Each document is carefully reviewed by core members of the consultancy team and signed off at Director level prior to issue to the client. Draft documents are submitted to the client for comment and acceptance prior to final production.

Document No:	99166_023_kg	
Report No:	2001/16	
Report Status:	Final	
Checked by:	Kaye Godwin	Date: 9 February 2001
Approved by:	Paul van der Moezel	Date: 9 February 2001

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1. INTRODUCTION

1.1 Purpose & Scope

This report has been prepared to provide information relating to the environmental features of Pt Lot 211 Barnes Avenue, Australind. The report has been commissioned by Peet & Company Ltd in order to provide a basis for assessing proposed development plans for the site in relation to environmental issues.

The report has been specifically compiled to provide relevant agencies with background information of environmental aspects in relation to the site to assist these agencies in the decision making process with respect to development proposals.

This report describes the environmental characteristics of the site drawing on available mapping and information together with site surveys and assessments that have been carried out.

1.2 Location & Land Use

The Pt Lot 211 Barnes Avenue is located approximately 600m east of the Leschenault Inlet at Australind, in the Shire of Harvey. The property is situated to the north-east of the confluence of the Collie and Brunswick Rivers, and encompasses approximately 37 hectares (Figure 1). The property is bounded along the western edge by Barnes Avenue, to the east by the Brunswick River and to the south by the Collie River. A drainage reserve is located immediately north of the site and a local reserve separates the property from the confluence of the two rivers.

The property presently supports remnant vegetation of variable quality due to previous land uses and access. Several sandy tracks have been developed throughout the property and along the river foreshore areas. Small clearings in the riparian vegetation are apparent and have been made supposedly to facilitate boat launching. Residential development lies to the west of the property and several established houses occur east of Barnes Avenue.

2. EXISTING ENVIRONMENT

2.1 Geomorphology & Topography

The property lies within the southern portion of the Swan Coastal and the major geomorphic unit of the Spearwood Dunes (Geological Society of Western Australia, 1981).

The landform is characterised by a small hill in the western section of the property, gently undulating terrain of the eastern portion and low lying areas associated with the river fringes. The western part of the property rises to over 35mAHD immediately east of existing houses along Barnes Avenue, dropping away toward the river and to the east.

The eastern portion of the site typically lies at 10mAHD or below with a small sand dune ridge to 10mAHD aligned roughly east-west in the south- east corner of the site (Figure 1). A low lying area about 3 to 4mAHD extends from the Collie River and arcs behind this dune connecting with the Brunswick River. The margins of the river lie at or below about 1mAHD. The topography is steep along a portion of the foreshore area of the Collie River in the western section of the property.

2.2 Geology & Soils

Soil unit mapping has been developed by the Geological Society of Western Australia (1981). This mapping indicates the property chiefly comprises the unit Qts, which is described as sand associated with Tamala Limestone and high dunes. Typically, soils from Tamala Limestone are mainly derived from aeolian calcarenite as a result of weathering processes. The sands are fine to medium grains, subangular to subrounded, and poorly to moderately sorted. The soils are generally off-white near the surface, becoming yellow at depth.

The south-eastern corner of the site toward the junction of the Collie and Brunswick Rivers is mapped as Qhao, which is alluvium of older river terraces. The alluvium consists of very fine grains in the river terraces to very coarse within watercourses. Sediment types include clay, silt, sand and pebbles in various proportions.

2.3 Groundwater

Regional information suggests groundwater within the superficial aquifer lies at less than 5mAHD (Geological Survey of Western Australia, 1981). The general area is underlain be sediments of Quaternary superficial formations which consist of Tamala Limestone. The Tamala Limestone is underlain by the Cretaceous Leederville Formation at a depth of -25mAHD (Commander, 1984).

On site investigations have been carried within low lying areas toward the centre of the property of the site near a large area of stockpiled sand. Three bores are located on the site, on the edge of the stockpile and to the east and south of the stockpile. The bores were installed at a nominal depth of 10m and constructed as long-term water

level monitor bores. The soil profile consisted essentially of sand up to 3.8m in depth underlain by a silty or clayey fine to medium grained sand with a high to medium permeability (Egis Consulting, 1999).

The depth of the watertable within the three bores has been monitored between August 1999 and October 2000 (Egis Consulting, 2000). The results suggest the watertable varies between about 2mAHD in spring to 0.3mAHD in late summer/early autumn.

The monitoring results together with topographical contours suggest small portions of the site along the rivers and in the area that extends behind a small dune between the two rivers may contain shallow watertables where the groundwater is within 2 metres of the surface during peak levels.

2.4 River Foreshores & Wetlands

The Brunswick and Collie Rivers border the property to the east and south. These rivers eventually discharge into Leschenault Inlet and are within the management area for the Inlet. The rivers are within System 6 Area C67.

In the western part of the property, the river foreshore area is restricted and narrow due to a steep rise of about 14m over a lateral distance of 25m. The topography along the Brunswick River rises more gently and provides a wider section of foreshore and riparian vegetation. The foreshore areas adjoining the rivers show signs of disturbance through loss of vegetation and weed infestation.

Floodplain (floodway and flood fringe) mapping provided by the Water & Rivers Commission indicates the area subject to inundation during a 1 in 100 year event is narrow along the western most section of foreshore of the Collie River and wider along sections of the Brunswick River (Figure 1).

A wide floodplain is evident along the Collie River near its junction with the Brunswick River. The floodplain includes a "lagoon" wetland within the Flood Fringe. The Flood Fringe extends into the low-lying land behind the small sand ridge that bounds the lagoon.

The lagoon area is mapped as part of the floodplain associated with the rivers in the Water & Rivers and Department of Environmental Protection wetland mapping (Hill *et al.*, 1996). The mapping indicates no other wetlands occur on the property. The lagoon is not protected under the Environmental Protection (Swan Coastal Plain Lakes) Policy, 1992. The System 6 report recommendations do not include the lagoon.

No management category has been assigned to the wetland by the DEP and WRC according published wetland mapping (Hill *et al.*, 1996). Based on evaluation of the wetland for this assessment of the site the wetland is considered to be consistent with a "Conservation" management category.

The lagoonal wetland contains water into the summer months although aerial photography for the site indicates the wetland dries out either seasonally or periodically. The lagoon contained surface water at the time of a site visit in early December 1999, however was found to be dry in January 2001.

2.5 Flora

The flora of the site was surveyed on 8 January 2001. The survey included foot and vehicle traverses of the site using a 1:1000 colour aerial photograph and 1:2000 contour map for navigation.

The objectives of the flora survey were as follows:

- To compile an inventory of the vascular flora on the site.
- To determine whether any significant flora occur or are likely to occur on the site.

A total of 82 plant species was recorded on the site. This comprised 1 fern, 1 cycad, 52 Dicotyledons and 28 Monocotyledons. Eleven non-native species were recorded. The dominant families were the Papilionaceae (10 species), Myrtaceae (9 species), Proteaceae (6 species) and Cyperaceae (6 species) (Appendix 1). The timing of the survey in mid-summer meant that ephemeral species such as orchids were not able to be recorded.

A search was made of the Department of Conservation and Land Management's Declared Rare Flora and Priority Species List and the Western Australian Herbarium Specimen database to determine whether any significant species are known to occur on the site or nearby (Appendix 2).

One of the species recorded during the survey was identified as most likely being the Priority 2 species *Lasiopetalum membranaceum*. As the plants were not in flower this determination cannot be completely verified. However, as *L. membranaceum* has been recorded previously from Australind it is considered highly likely that the plants recorded are the Priority species.

Lasiopetalum membranaceum is a small shrub about 30cm high. Ten plants were recorded in a small area of about 100m^2 in Marri/Jarrah/Peppermint Woodland in the eastern part of the site (Figure 2). Several plants were also recorded in similar vegetation located to the south of the central cleared area.

Priority 2 species are taxa known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

None of the other species listed in the CALM databases was recorded on site. Most of the species are perennial and would have been recorded if present. Two orchid species *Caladenia huegelii* (DRF) and *Caladenia speciosa* ms (P4) and a triggerplant *Stylidium longitubum* (P3) would not have been observable due to the timing of the survey. Both orchid species have been recorded in the Australind area and are known

to grow in dry sandy soils with woodlands similar to those on the site and their occurrence on the site cannot be ruled out.

A small population of the DRF orchid species *Diuris drummondii* was recorded from the wet northern margins of the lagoon during a preliminary site investigation in December 1999. The approximate location of the plants is shown in Figure 2. This species was not recorded during recent assessment despite the species having a flowering period from late November to January. Summer fires are known to stimulate flower production in this species with few flowers produced in years between fires. The taxon is found in low-lying depressions in peaty and sandy clay swamps that contain water into summer and would occur only along the margins of the rivers and lagoon on site. It is possible that water levels in the wetland were lower in January 2001 contributing to the fact the species was not found during the more recent flora survey.

DRF are defined as taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection.

2.6 Vegetation

The vegetation on the site was assessed in conjunction with the flora survey in January 2001. The aim of the vegetation survey was:

- To describe and map the vegetation types on the site.
- To assess the regional significance of the vegetation.

Vegetation associations mapped on the site are shown in Figure 2.

Vegetation over most of the site is predominantly woodland of Marri (*Corymbia calophylla*), Jarrah (*B. attenuata*) and Native Peppermint (*Agonis flexuosa*) on the dry sandy soils. There are subtle variations to the composition of the middle tree storey, however the vegetation is not significantly different as to be mapped as separate vegetation types. For example, Spearwood (*Kunzea ericifolia*) is common in the eastern part of the site, while Bull Banksia (*B. grandis*) and Woody Pear (*Xylomelum occidentale*) are common in the western half.

The high point on the site, near the mid-west boundary, has more *Banksia attenuata* and less Marri and Jarrah and has been mapped as a separate unit. However, there is evidence that Marri and Jarrah have been extensively logged from this hill and the resultant Banksia/Peppermint (*Agonis flexuosa*) woodland may be an artefact of this logging. The whole site has been logged heavily and the Marri and Jarrah regrowth is considerably smaller than the original trees as indicated by old stumps some 1 and 2m in diameter.

The understorey of the Marri/Jarrah/Peppermint woodland areas is very open with common shrubs *Bossiaea eriocarpa, Conostylis aculeata, Daviesia divaricata* and *Hibbertia hypericoides*. Weed species are mostly grasses such as veldtgrass (*Ehrharta calycina*) and Wild Oats (*Avena fatua*). The understorey in the western

section of the site is in better condition than the eastern section and has less weed disturbance and a greater density of native species.

A small depression exists in the south-east part of the site. The vegetation in the valley is similar to the Marri/Jarrah/Peppermint woodland of the upland areas except for the dominance of *Jacksonia furcellata*, *Dasypogon bromeliifolius* and *Phlebocarya ciliata*. These species indicate a high watertable, however they do not suggest the area is seasonally or periodically waterlogged or inundated. There is no indication that the area is flooded during extreme river flows due to the absence of Flooded Gums and Paperbarks in the depression.

The vegetation types of the lower areas fringing the Collie and Brunswick Rivers is more diverse than the upland area. The vegetation adjacent to the Brunswick River consists of a Flooded Gum (*Eucalyptus rudis*) and Paperbark (*Melaleuca rhaphiophylla*) Low Forest over dense reeds of *Juncus pallidus* and *Bulboschoenus caldwellii*. At a distance of about 10m away from the river's edge the reeds are replaced by a weedy understorey including Blackberry (*Rubus fruticosus*) and African Watsonia (*Watsonia bulbillifera*). Couch (*Cynodon dactylon*) and *Centella cordifolium* are common ground covers and *Platysace compressa* an abundant twining herb in these areas.

The vegetation fringing the Collie River is notably different from vegetation fringing the Brunswick River in that Salt Sheoak (*Casuarina obesa*) is prevalent within the Flooded Gum/Paperbark fringe of the Collie River. Flooded Gums, particularly along the Collie River, appeared in poor condition possibly as a result of insect attack, disease or parasites during the December 1999 assessment, however the trees seemed to have recovered to some extent in 2001.

The fringing riverine vegetation is generally narrow and backed by Marri Woodland with *Jacksonia furcellata* and Bracken Fern (*Pteridium esculentum*) in the understorey. However, the south-east corner of the site contains a wider section of floodplain near the confluence of the two rivers. This area includes some dense low forest vegetation containing Flooded Gum, Marri, Paperbark and Salt Sheoak over *Astartea fascicularis*, Watsonia and Bracken.

A salt lagoon occurs in the south-east corner of the site adjacent to the Collie River. The bare lagoon is fringed by a *Melaleuca rhaphiophylla*, *M. viminea* Scrub over a dense sedgeland with *Baumea juncea*, *Gahnia trifida*, *Juncus bufonius* and *Lepidosperma longitudinale* dominant.

Between the lagoon and the Collie River is a narrow elevated dune with clay soils containing scattered Flooded Gums and some Paperbark over a highly disturbed understorey mainly consisting of Couch Grass.

The vegetation of the site primarily belongs to the Karrakatta-Central and South Vegetation Complex. This vegetation complex currently has 66.7% of its original extent remaining in the Greater Bunbury Region with over 31.5% currently reserved (WAPC, 2000).

Vegetation along the margins on the rivers is assessed as belonging to the Swan Vegetation Complex. Only 17.8% of this complex remains within the Greater Bunbury Region (WAPC, 2000). There are 2 hectares of this complex protected within reserves in the region. This represents less than 0.1% of the original coverage in the region.

The vegetation over the site was not recognised as being regionally significant at the time of the System 6 study.

2.7 Fauna

Habitats within the property and the adjoining rivers are likely to support a variety of fauna. Faunal diversity at the site has probably been reduced to an extent due to disturbances to the vegetation and habitat along the rivers and within the upland areas. The rivers and lagoon together with their foreshores offer important habitat for a range of waterbirds, many of which could potentially breed in the area. The current level of passive recreational use the area receives such as camping, walking and fishing and disturbance is expected to impact on the native fauna occurring at the site.

The site is known to provide breeding habitat for the Osprey (*Pandion haliaetus*). The nesting site is located in a dead tree on the slope of the dune ridge behind the lagoon. The Osprey has been observed roosting in trees surrounding the nest site.

A search of the Department of Conservation and Land Management's Threatened Fauna database in January 2000 indicated 8 species of Specially Protected and Priority fauna have been recorded from the vicinity of the study area (Appendix 3). These comprise:

Schedule 1 (Fauna which is Rare or likely to become Extinct)

- Western Quoll or Chuditch (*Dasyurus geoffroii*): The species has recently been recorded from the north of Australind.
- Western Ringtail Possum (*Pseudocheirus occidentalis*): A population of this species has been established in Leschenault Conservation Park (Leschenault Peninsula) through translocation. Vagrants may also occur in the Australind area.
- Long-billed Black-Cockatoo or Baudin's Cockatoo (*Calyptorhynchus baudinii*): This species occurs in low numbers in this region of the Swan Coastal Plain.

Schedule 4 (Fauna which is Otherwise Specially Protected)

- Peregrine Falcon (*Falco peregrinus*): This species is an occasional visitor to areas of open woodland and along margins with farmland.

- Southern Carpet Python (*Morelia spilota imbricata*): This species may occur in areas of native vegetation along the coast from Australind to Yalgorup National Park.

Priority Taxa

- Southern Brown Bandicoot or Quenda (*Isoodon obesulus fusciventer*) P4: This species is moderately common in parts of the coastal plain where dense understorey vegetation occurs in woodland and around wetland areas. The species has been translocated to Leschenault Conservation Park and may occur in other surrounding areas where there is suitable vegetation.

- Brush-tailed Phascogale (*Phascogale tapoatafa*) P3: This species has recently been recorded from the outskirts of Bunbury. It occurs in forest and woodland where suitable tree hollows are available and may occur in the Australind area.

- Western Brush Wallaby (*Macropus irma*) P4: This species occurs in low numbers in areas of coastal forest and woodland supporting a dense shrub layer, and may potentially occur in the Australind area.

ATA Environmental, with assistance from Paul de Tores of CALM undertook a fauna assessment on 14 January 2001. The site assessment was specifically aimed at identifying rare or significant fauna, and particularly the Schedule 1 Western Ringtail Possum. Unconfirmed sightings of the Western Ringtail Possum at the site have been reported.

The assessment involved inspection of the habitats and active searching for possible evidence of significant species followed by several hours spotlighting throughout the site. Conditions during the survey were amenable for spotlighting with minimal wind, mild temperatures and reasonably good visibility through the vegetation.

The site assessment revealed the presence of a possum species from scats thought to be those of the Common Brushtail Possum. Occurrence of the Common Brushtail Possum on the site was confirmed during the spotlighting with a total 14 animals being recorded, including several with white tips to their tails which have occasionally been thought to be Western Ringtail Possums by inexperienced observers.

The Western Ringtail Possum was not recorded during the survey. Based on the population of Common Brushtail Possum recorded during the survey, the duration of the searching and the lack of records of the Western Ringtail Possum it is considered unlikely that the Western Ringtail Possum occurs on the site.

No evidence of any other significant species was recorded during the assessment and none were observed during the spotlighting exercise. Evidence of the fox and rabbit was detected and it is likely that domestic and/or feral cats predate on native fauna at the site reducing local populations and in some instances contributing to local extinctions.

Although no Specially Protected or Priority Fauna were recorded during the assessment, this does not prelude the potential for significant fauna to occur in the

area. It is possible that individuals may occasionally occur on the site as vagrants. Other species such as the Western Brush Wallaby and Southern Carpet Python would require connection with other larger areas of bushland in order for sustainable populations to survive in the area, and for these species to possibly occur on the site.

2.8 Aboriginal Heritage

A desktop study of the Aboriginal heritage issues relating to the site was undertaken in March 2000 (McDonald, Hales and Associates, 2000). The study revealed that no sites of archaeological significance had previously been recorded from the area.

Several archaeological and ethnographic sites have been recorded within a 2.5km radius of the study area. One site of ethnographic and cultural significance, the Collie River, is immediately adjacent to the property and there is potential for the nearby Brunswick River to also be reported as a mythological site of ethnographic significance. Rives continue to represent significant landscape features for the Nyungar people. They were used as movement corridors establishing camping grounds at locations with reliable freshwater and food resources. Freshwater sources also hold spiritual value in Aboriginal culture, especially with the mythology associated with the Waugal

One Native Title claim (the Gnaala Karla Booja claim) is registered over the subject land. It is likely that it has been extinguished in respect to the property, however the Collie and Brunswick Rivers may continue to be affected by the claim.

3. RELEVANT GUIDELINES AND STUDIES

3.1 System 6 Recommendations

Systems 6 Area C67 aims to protect the riverine environment along the lower Collie, Brunswick and Wellesley Rivers, and includes that part of the rivers adjacent to Pt Lot 211 Barnes Ave. The System 6 recommendations, however, do not specify the width of vegetation adjacent to the rivers required to meet this objective.

Area C67 is stated to be of regional significance because of its high conservation and recreation values and strategic location. Management aims are to preserve native flora and natural features and allow passive recreation in the area.

Parts of Area C67 such as those along the boundary of the property are not presently included in reserves.

3.2 Collie and Brunswick Rivers Foreshore Study

The Collie and Brunswick Rivers Foreshore Study undertaken for the Leschenault Inlet Management Authority proposed a Waterways Protection Precinct (WPP) along the river foreshore within the study area (Waterways Commission, 1994).

The WPP boundary was delineated to take into account future development and expected increased needs for access and recreational use. The WPP identified in this study provides a setback of about 70m from the edge of the river channel along most of the foreshore area. The WPP broadens near the confluence of the rivers to fully incorporate the wetland. The study did not include the entire small dune or the area of Flood Fringe extending north of the dune within the proposed WPP.

3.3 EPA Guidelines - Watercourse Buffers

The Environmental Protection Authority (EPA) guidelines (Environmental Protection Authority, 1997) recommend the following buffers for watercourses where the end use is not for public water supply:

- Watercourses - permanent water 50 metres
- Watercourses - seasonally flowing 30 metres
- Watercourses - flow in response to specific rain events 10 metres

The 50m guideline would apply for the Collie and Brunswick Rivers in the study area.

The EPA considers the above recommended buffers are a minimum, and an analysis of slope, soil drainage and fringing vegetation may require greater and variable buffer widths.

3.4 EPA Guidelines - Wetland Buffers

The EPA's guidelines with respect to wetland buffers is for a minimum 50m buffer or 1m AHD higher than the furthest extent of wetland dependent vegetation, whichever is greater.

3.5 Statewide Foreshore Policy

The Government has been developing a Statewide Foreshore Policy. As part of this process the Water & Rivers Commission has provided draft advice for determining a foreshore protection area based on biophysical criteria such as vegetation, hydrology, soils, and topography rather than on arbitrary setbacks.

The policy is applicable to watercourses including creeks, streams, rivers and estuaries in both private and Crown ownership.

Under the draft State Government policy, delineation of a Foreshore Reserve involves assessment of various factors and determination of the "area of influence". The "area of influence" is determined by assessing biophysical factors such as vegetation, hydrology, soil type, topography, habitat, cultural sites and land use pressure, and by identifying the purpose and function of the foreshore.

The limit of the "area of influence" is determined by overlapping the areas identified through assessment of each of the relevant factors, and is the edge of the areas that is furthest from the river channel. This represents the boundary of the area that influences the condition and integrity of the river, and the area that therefore requires protection and management. Determination of the boundary of the area of influence can be extremely difficult, however, as the biophysical factors considered do not always provide a readily definable area or boundary.

4. SUMMARY

Following are the key points concerning the environmental description of Pt Lot 211 Barnes Avenue, Australind:

- The site contains remnant native vegetation with a Jarrah/Marri/Peppermint woodland on the upland sandy soils and Flooded Gum, Paperbark, Sheoak vegetation adjacent to the river.
- The vegetation is mostly in good condition with a high proportion of weed species both in the dryland and riverine/wetland areas and there is evidence of previous activities such as logging that have significantly impacted on the vegetation.
- One wetland, or salt lagoon, containing native *Melaleuca* scrub, occurs adjacent to the Collie River.
- One small population of the Declared Rare Flora species *Diuris drummondii* and two small populations of the Priority 2 species *Lasiopetalum membranaceum* occur on the site.
- The dryland vegetation belongs to the Karrakatta Complex - Central and South which is adequately reserved (31.5% of the original extent) in the Greater Bunbury Region.
- The riverine/wetland vegetation belongs to the Swan Complex which is poorly reserved (<0.1% of the original extent) in the Greater Bunbury Region.
- The site currently provides habitat for a variety of fauna in dryland and riverine/wetland habitats.
- No Specially Protected or Priority Fauna are known to occur on the site.
- The Osprey is known to breed in the vicinity of the small dune to the north of the wetland.
- No sites of Aboriginal significance are known to occur on the site. The rivers are of ethnographic significance.
- The site is bounded on two sides by the Collie and Brunswick Rivers.
- Vegetation on the site was not identified as being regionally significant in the System 6 study.
- The System 6 Study and the Collie and Brunswick Rivers Foreshore Study both recommend protection of the foreshore areas for protection of natural features and to allow passive recreation.
- The EPA policies and State Foreshore Policy (draft) provide guidelines to determine the width of buffers around wetlands and watercourses.

REFERENCES

Commander, D.P. (1984) *The Bunbury Shallow-Drilling Groundwater Investigation.* Geological Survey of Western Australia, Department of Mines WA Report No 12.

Egis Consulting (1999). *Stage 1 Groundwater Conditions Investigation, Australind Heights, Australind.* Prepared for Peet & Company, August 1999.

Egis Consulting (2000). *Groundwater Monitoring, Twin Rivers Australind Heights, Australind.* Prepared for Peet & Company, November 2000.

Environmental Protection Authority (1997) *Guidelines for Environment and Planning.* Environmental Protection Authority, June 1997.

Geological Survey of Western Australia (1981). *Bunbury-Burkeup Urban Geology Sheet 2031 III and Part Sheet 2031 II.* Geological Survey of Western Australia, Perth.

Hill A.L., Semeniuk, C.A., Semeniuk, V. and Del Marco, A. (1996) *Wetlands of the Swan Coastal Plain Volume 2B; Wetland Mapping, Classification and Evaluation. Wetland Atlas.* Water & Rivers Commission and Department of Environmental Protection.

McDonald, Hales and Associates (2000) *Desktop Survey of Aboriginal Heritage Issues associated with the proposed subdivision of Lot 211, Barnes Avenue, Australind.* Prepared for Alan Tingay & Associates.

WAPC (2000) *Greater Bunbury Region Scheme For Public Comment, August 2000, Scheme Documents.* Western Australian Planning Commission.

Waterways Commission (1994) *Collie and Brunswick Rivers Foreshore Study.* Prepared for the Leschenault Inlet Management Authority. Waterways Commission Report No. 48, June 1994. Perth, Western Australia.

FIGURES

PRINTED: Thu 08 Feb 01

metres
0 50 100 150 200
SCALE 1 : 3 000

BARNES AVENUE

Pt Lot 211

CcEm/AfBa
Cc/AfJf
ErMr
CcEr
CcEm/AfJf
AfBa
ErMrCoKe
MrMv
CoErMr

VEGETATION

CcEm/AfBa	*Corymbia calophylla/Eucalyptus marginata* Open Woodland over *Agonis flexuosa/Banksia attenuata* Low Open Woodland
AfBa	*Agonis flexuosa/Banksia attenuata* Low Open Woodland
CcEm/AfJf	*Corymbia calophylla/Eucalyptus marginata* Open Woodland over *Agonis flexuosa/Jacksonia furcellata* Low Open Woodland
Cc/AfJf	*Corymbia calophylla* Woodland over *Agonis flexuosa/Jacksonia furcellata* Low Open Woodland
CcEr	*Corymbia calophylla/Eucalyptus rudis* Forest
ErMr 1	*Eucalyptus rudis/Melaleuca rhaphiophylla* Low Forest
ErMr 2	*Eucalyptus rudis /Melaleuca rhaphiophylla* Open Woodland
MrMv	*Melaleuca rhaphiophylla/Melaleuca viminea* Scrub
CoErMr	*Casuarina obesa/Eucalyptus rudis/Melaleuca rhaphiophylla* Low Forest
ErMrCoKe	*Eucalyptus rudis/Melaleuca rhaphiophylla/Casuarina obesa/Kunzea ericifolia* Low Forest
	Riparian / Wetland Vegetaion

SIGNIFICANT FLORA

Diuris drummondii (DRF) approx. location

Lasiopetalum membranaceum (Priority 2)

BASE SOURCE: TME, May 2000.

99166/21_J&F2.dgn DRAWN: EDS/GLM 8-2-01 CKED: KG 8-2-01

ATA Environmental
environmental scientists

PART LOT 211
BARNES AVENUE, AUSTRALIND
VEGETATION ASSOCIATIONS
FIGURE 2

APPENDICES

APPENDIX 1

FLORA SPECIES LIST

APPENDIX 1 – FLORA SPECIES LIST

FERNS

DENNSTAEDTIACEAE
**Pteridium esculentum*

GYMNOSPERMS

CYCADACEAE
Macrozamia fraseri

MONOCOTYEDONS

ANTHERICACEAE
Arthropodium capillipes

COLCHICACEAE
Burchardia umbellata

CYPERACEAE
Baumea juncea
Bolboschoenus caldwellii
Gahnia trifida
Lepidosperma angustatum
Lepidesperma longitudinale
Schoenus grandfilorus

DASYPOGONAEAE
Dasypogon bromeliifolius
Lomandra sp.

HAEMODORACEAE
Conostylis aculeata
Haemodorum spicatum
Phlebocarya ciliata

IRIDACEAE
**Chasmanthe floribunda*
Patersonia occidentalis

JUNCACEAE
Juncus holoschoenus
Juncus pallidus

ORCHIDACAEAE
***Diuris drummondii* (DRF)

POACEAE
**Avena fatua*
Briza maxima
**Cynodon dactylon*
Danthonia caespiosa
**Ehrharta calycina*

RESTIONACEAE
Desmocladus fasciculatus
Desmocladus flexuosus
Hypolaena exsulca
Lyginia barbata

XANTHORRHOEACEAE
Xanthorrhoea brunonis

DICOTYLEDONS

AMARANTHACEAE
Ptilotus stirlingii

APIACEAE
Centella cordifolia
Platysace compressa

ASTERACEAE
**Hypochaeris glabra*
Lagenifera huegelii
Ozothamnus cordatus
Senecio hispidulus
**Ursinia anthemoides*

CASUARINACEAE
Casuarina obesa

CHENOPODIACEAE
**Atriplex hortensis*
Rhagodia baccata

DILLENIACEAE
Hibbertia hypericoides

EPACRIDACEAE
Astroloma pallidum
Leucopogon capitellatus

EUPHORBIACEAE
Phyllanthus calycinus

GOODENIACEAE
Dampiera cauloptera

GYROSTEMONACEAE
Gyrostemon ramulosus

LAMIACEAE
Hemiandra pungens

LAURACEAE
Cassytha racemosa

MIMOSACEAE
Acacia huegelii
Acacia pulchella

MYRTACEAE
Agonis flexuosa
Astartea fascicularis
Corymbia calophylla
Eucalyptus marginata
Eucalyptus rudis
Kunzea ericifolia
Melaleuca rhaphiophylla
Melaleuca thymoides
Melaleuca viminea

OROBANCHACEAE
Orobanche major

PAPILIONACEAE
Bossiaea eriocarpa
Chorizema ilicifolium
Daviesia decurrens
Daviesia divaricata
Gompholobium tomentosum
Hardenbergia comptoniana
Hovea pungens
Jacksonia furcellata
Jacksonia stricta
Nemcia capitata

POLYONACEAE
**Rumex crispus*

PROTEACEAE
Banksia attenuata
Banksia grandis
Hakea prostrata
Petrophile linearis
Synaphea polymorpha
Xylomelum occidentale

RUBIACEAE
Opercularis hispidula
**Rubus fruticosus*

STERCULIACEAE
Lasiopetalum membranaceum (Priority 2)

*Introduced Species
** Recorded in December 1999

APPENDIX 2

CALM DATABASE SEARCH RESULTS - FLORA

HEAD OFFICE
Hackett Drive
CRAWLEY
Western Australia
6009
Ph (08) 9442 030
Fax (08) 9386 15
STATE OPERATIONS
HEADQUARTERS
Dick Perry Avenue
Western Precinct
Technology Park
NSINGTON WA
51
(08) 9334 033
(08) 9334 046
etype (08) 9334
Postal Address:
ked Bag 104
ley Delivery Centre
NTLEY WA 6983

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

Your Ref:
Our Ref: 045298F2000
Enquiries: John Riley
Phone: (08) 9334 0123

ATA Environmental
21 Howard Street
PERTH WA 6000

Attention: Faye Godwin

Dear Ms Godwin

REQUEST FOR RARE FLORA INFORMATION

I refer to your request of 3 January 2001 for information on rare flora in the Australind area. The search co-ordinates used were 33^0 15' - 33^0 20' & 115^0 41' - 115^0 46'.

A search was undertaken for this area of (1) the Department's *Threatened (Declared Rare) Flora* database (for results, if any, see "Summary of Threatened Flora Data"), (2) the Department's *Priority Species List* [this list contains species that are declared rare (Conservation Code R and/or T, or X for those presumed to be extinct), poorly known (Conservation Codes 1, 2 or 3), or require monitoring (Conservation Code 4) – for results, if any, see "Declared Rare and Priority Flora List"] and (3), the *Western Australian Herbarium Specimen* database for priority species opportunistically collected in the area of interest (for results, if any, see "WAHERB Specimen Database General Enquiry").

Attached also are the conditions under which this information has been supplied. Your attention is specifically drawn to the seventh point which refers to the requirement to undertake field investigations for the accurate determination of rare flora occurrence at a site. *The information supplied should be regarded as an indication only of the rare flora that may be present and maybe used as a target list in any surveys undertaken.*

An invoice for $200 (plus GST), being the standard fee for the supply of this information, will be forwarded.

It would be appreciated if any populations of rare flora encountered by you in the area could be reported to this Department to ensure their ongoing management.

If you require any further details, or wish to discuss rare flora management, please contact my Principal Botanist, Dr Ken Atkins, on (08) 93340425.

Yours faithfully

J. Riley

.....
for Dr Wally Cox
EXECUTIVE DIRECTOR
4 January, 2001
Attached

ATTACHMENT

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

RARE FLORA INFORMATION

CONDITIONS IN RESPECT OF SUPPLY OF INFORMATION

1. All requests for data to be made in writing to the Executive Director, Department of Conservation and Land Management, Attention: Administrative Officer Flora, Wildlife Branch.

2. The data supplied may not be supplied to other organisations, nor be used for any purpose other than for the project for which they have been provided, without the prior written consent of the Executive Director, Department of Conservation and Land Management.

3. Specific locality information for Declared Rare Flora is regarded as confidential, and should be treated as such by receiving organisations. Specific locality information for DRF may not be used in reports without the written permission of the Executive Director, Department of Conservation and Land Management. Reports may only show generalised locations or, where necessary, show specific locations without identifying species. The Administrative Officer Flora is to be contacted for guidance on the presentation of rare flora information.

4. Note that the Department of Conservation and Land Management respects the privacy of private landowners who may have rare flora on their property. Rare flora locations identified in the data as being on private property should be treated in confidence, and contact with property owners made through the Department of Conservation and Land Management.

5. Receiving organisations should note that while every effort has been made to prevent errors and omissions in the data provided, they may be present. The Department of Conservation and Land Management accepts no responsibility for this.

6. Receiving organisations must also recognise that the database is subject to continual updating and amendment, and such considerations should be taken into account by the user.

7. It should be noted that the supplied data do not necessarily represent a comprehensive listing of the rare flora of the area in question. Its comprehensiveness is dependant on the amount of survey carried out within the specified area. The receiving organisation should employ a botanist, if required, to undertake a survey of the area under consideration.

8. Acknowledgment of the Department of Conservation and Land Management as source of the data is to be made in any published material. Copies of all such publications are to be forwarded to the Department of Conservation and Land Management, Attention: Principal Botanist, Wildlife Branch.

WAHERB SPECIMEN DATABASE
GENERAL ENQUIRY

Acacia flagelliformis
Court (Mimosaceae)
CONSERVATION STATUS: P4
Coll.: E.M. Goble-Garrett s.n. Date: 12 1991 (PERTH 1764810)
LOCALITY Near abattoir N of Picton Junction, Bunbury WA
Lat.: 33^ 20' " S Long.: 115^ 41' " E
Winter wet depression. In deep woodland of Banksia littoralis and Melaleuca preissiana with
Melaleuca lateritia and Eutaxia virgata.

Anthotium junciforme
(de Vriese)D.A.Morrison (Goodeniaceae)
CONSERVATION STATUS: P4
Coll.: G.J. Keighery 3844 Date: 13 03 1981 (PERTH 1090682)
LOCALITY Waterloo WA
Lat.: 33^ 20' 0 " S Long.: 115^ 45' 0 " E
Tufted perennial herb 40 cm. Flowers deep blue-purple. Red damp clay lo am. Open low scrub.
Abundance: locally common.
Previous det.: Anthotium junciforme de Vriese & D.A. Morrison

Anthotium junciforme
(de Vriese)D.A.Morrison (Goodeniaceae)
CONSERVATION STATUS: P4
Coll.: P.G. Wilson 12145 Date: 20 12 1984 (PERTH 02889145)
LOCALITY Waterloo WA
Lat.: 33^ 20' " S Long.: 115^ 45' " E
Flowers deep blue.

Caladenia huegelii
Rchb.f. (Orchidaceae)
CONSERVATION STATUS: R
Coll.: G.S. McCutcheon GSM 2767 Date: 19 09 1993 (PERTH 05415411)
LOCALITY Australind, For.Ref. EG 44 WA
Lat.: 33^ 15' 25" S Long.: 115^ 42' 55" E
Previous det.: Caladenia huegelii Rchb.f.

Caladenia speciosa
Hopper & A.P.Brown ms (Orchidaceae)
CONSERVATION STATUS: P4
Coll.: S.D. Hopper 4639 Date: 22 09 1985 (PERTH 01200941)
LOCALITY Old Coast Road, 800 metres S of the Australind sign and a road to the E ca 13.5 km N of Bunbury WA
Lat.: 33^ 18' 0 " S Long.: 115^ 44' 0 " E
Deep sand. Gradual slope with a NW aspect. In Jarrah/Marri/Tuart w oodlands with Agonis flexuosa and Banksia
attenuata over low Daviesia scrub. Abundance: 10 plants i n full flower.

Chamaescilla gibsonii
Keighery ms (Anthericaceae)

CONSERVATION STATUS: P3
Coll.: B.J. Keighery & N. Gibson 380 Date: 27 09 1993 (PERTH 04382781)
LOCALITY Reserve between the South West Hwy and Railway Rd, Waterloo, 12 km E of Bunbury (plot Water-4), WA
Lat.: 33^ 19' 51" S Long.: 115^ 45' 32" E
Perennial herb. Soil: Brown clay. Topography/drainage: Seasonally wet p
oorly drained gentle N
facing slope. Geomorphology: Guildford formation (pinjarra plain).
Viminaria juncea, Hakea varia Open Scrub over Xanthorrhoea preissii,
Kunzea micrantha Low Heath C over Mixed Herbs over Cyathocheata avenacea, Mesome laena tetragona Open Low Sedges.
Previous det.: Chamaescilla corymbosa (R.Br.)Benth.

Pultenaea skinneri
F.Muell. (Papilionaceae)
CONSERVATION STATUS: P4
Coll.: E.A. Griffin 3304 Date: 19 05 1982 (PERTH 635065)
LOCALITY Just S of Eaton townsite WA
Lat.: 33^ 19' 0 " S Long.: 115^ 41' 0 " E
Erect shrub 1.5 m tall. Grey sand, adjacent to winter wet depression.
Jarrah-Marri open woodland with Banksia low tree understorey.

Pultenaea skinneri
F.Muell. (Papilionaceae)
CONSERVATION STATUS: P4
Coll.: R.M. Fitzgerald 57 Date: 25 09 1984 (PERTH 635073)
LOCALITY Marriot road, Brunswick Junction, Shire of Harvey WA
Lat.: 33^ 15' 0 " S Long.: 115^ 45' 0 " E
Shrub 1.5 m high. Stem green/brown. Leaves dark green. Flowers yellow orange, In low lying depression (swamp) on western side. Soil white to black sand, swamp soil.
Shrubland swampland association. Abundant.

Pultenaea skinneri
F.Muell. (Papilionaceae)
CONSERVATION STATUS: P4
Coll.: G.S. McCutcheon GSM 1210 Date: 19 08 1985 (PERTH 05484219)
LOCALITY Eaton, For.Ref. EN 4389, WA
Lat.: 33^ 19' 45" S Long.: 115^ 42' 20" E

Rhodanthe pyrethrum
(Steetz)Paul G.Wilson (Asteraceae)
CONSERVATION STATUS: P3
Coll.: P.G. Wilson 12241 Date: 02 11 1985 (PERTH 436143)
LOCALITY 2 km E of Eaton at junction of Eaton Road with Clifton Road WA
Lat.: 33^ 19' 0 " S Long.: 115^ 43' 0 " E
Growing in shallow water.
Previous det.: Anisolepis pyrethrum Steetz

Rhodanthe pyrethrum
(Steetz)Paul G.Wilson (Asteraceae)
CONSERVATION STATUS: P3
Coll.: A.S. Weston 14609 Date: 01 12 1984 (PERTH 436178)
LOCALITY Right angle bend in Eaton Road, E of Eaton. WA
Lat.: 33^ 19' 0 " S Long.: 115^ 46' 0 " E

Plants in water have two types of leaves: underwater leaves are long, narrow and horizontal. Phyllaries white; flowers yellow. In mud, at edge of sw amp and in water to 40 cm deep.
Wiath Aponogeton hexapetalus and an aquatic Cyperus. Swamp species include Melaleuca rhaphiophylla, pericalymma ellipticum, sedges, restionaceous p lants and Cassytha sp.
Abundance: locaally common.
Previous det.: Helipterum pyrethrum
FREQUENCY locaally common.

Schoenus benthamii
F.Muell. (Cyperaceae)
CONSERVATION STATUS: P3
Coll.: B J. Keighery & N. Gibson 378 Date: 27 09 1993 (PERTH 04382811)
LOCALITY Manea Park, S of Robinson Drive, Bunbury (plot manea-1). WA
Lat.: 33^ 19' 51" S Long.: 115^ 45' 32" E
Perennial herb. Soil: Grey sandy clay. Topography/drainage: Seasonally wet poorly drained flat.
Geomorphology: Bassendean sands over guildford formation.
Melalueca preissiana Low Woodland A over Pericalymma ellipticum, Hibbertia stellaris Dwarf Scrub D over Patersonia occidentalis Very Open Herbs over Lepidosperma longitudinale Tall Sedges.

Verticordia attenuata
A.S.George (Myrtaceae)
CONSERVATION STATUS: P3
Coll.: E.A. Griffin 3316 Date: 20 05 1982 (PERTH 1256459)
LOCALITY Just S of Eaton townsite WA
Lat.: 33^ 19' " S Long.: 115^ 41' " E
Erect shrub 40 cm tall. Flowers pink. Dark grey sand, winter wet.
Sedgeland fringed by Jacksonia scrub and Jarrah-Marri woodland.
Previous det.: Verticordia lindleyi

Verticordia attenuata
A.S.George (Myrtaceae)
CONSERVATION STATUS: P3
Coll.: G.S. McCutcheon GSM 1331 Date: 18 12 1985 (PERTH 05508339)
LOCALITY Eaton, WA
Lat.: 33^ 20' 0 " S Long.: 115^ 42' 0 " E
Compact shrub to 0.7 m tall, flowers pink. In depression on grey sand.
Low open woodland.
Previous det.: Verticordia drummondii Schauer

4/01/2001

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
DECLARED RARE AND PRIORITY FLORA LIST
20 December 1999

SPECIES / TAXON	CONS CODE	CALM REGION	DISTRIBUTION	FLOWER PERIOD
Acacia flagelliformis	4	CF	Harvey, Eaton, Bunbury, Capel, Busselton, Donnybrook	Jul-Sep
Aponogeton hexatepalus	4	CF,SW	Perth, Pinjarra, Capel, Bunbury, Boyanup, Nannup	Aug-Sep
Caladenia speciosa ms	4	CF,SW	Myalup, Eaton, Yarloop, Ludlow, Gingin	Sep-Oct
Jacksonia sparsa ms	4	CF	Whicher Range, Bunbury, Capel, Harvey, Pemberton, Boyanup, Dandalup, Nannup, Lake Clifton	Feb
Lasiopetalum membranaceum	3	CF,SW	Yalgorup, Capel, Dwellingup, Yandup, Australind, Dawesville, Yanchep	Oct-Nov
Rhodanthe pyrethrum	3	CF,SW	Bullsbrook, Boyanup, Kenwick, Waterloo, Harvey, Eaton	Sep-Oct
Stylidium longitubum	3	SW,WB, CF	Upper Swan, Bullsbrook, Bunbury, Midland, Busselton, Arthur River, Jandakot	Nov
Verticordia attenuata	3	CF	Ruabon - Tutunup (Busselton), Bunbury, Capel	Jan

)AN-01 Summary of Threatened Flora Data Page 1

ixon Name	Cons.	Pop ID	Latitude	Longitude	Purpose	Vesting
ponogeton hexatepalus	4	13	33^19'22"	115^43'45"	OTH	WAT
Aponogeton hexatepalus	4	16A	33^19'59"	115^45'12"	RRE	RAI
Aponogeton hexatepalus	4	16B	33^19'59"	115^45'12"	RRE	RAI
ponogeton hexatepalus	4	16C	33^19'57"	115^45'18"	RRE	RAI
ponogeton hexatepalus	4	16D	33^19'55"	115^45'21"	RRE	RAI
Aponogeton hexatepalus	4	16E	33^19'53"	115^45'26"	RRE	RAI
Aponogeton hexatepalus	4	16F	33^19'52"	115^45'28"	OTH	MWO
ponogeton hexatepalus	4	16G	33^19'47"	115^45'42"	OTH	NON
Aponogeton hexatepalus	4	16H	33^19'48"	115^45'45"	OTH	NON
Aponogeton hexatepalus	4	16I	33^19'50"	115^45'38"	RRE	RAI
ponogeton hexatepalus	4	16J	33^19'56"	115^45'22"	RRE	RAI
ponogeton hexatepalus	4	17A	33^19'02"	115^43'07"	PRI	
Aponogeton hexatepalus	4	17B	33^19'02"	115^43'09"	PRI	
laviena huegelii	R	49	33^15'25"	115^42'55"	UNK	UNK
p speciosa ms	4	1	33^19'13"	115^41'59"	VER	SHI
speciosa ms	4	8	33^18'00"	115^44'00"	UNK	
membranaceum	2	8	33^17'34"	115^43'04"	PRI	
tenaea skinneri	4	4	33^19'42"	115^42'58"	UNK	
odanthe pyrethrum	3	4A	33^19'15"	115^44'06"	VER	SHI
Rhodanthe pyrethrum	3	4B	33^19'20"	115^43'50"	OTH	WAT
rticordia attenuata	3	1	33^19'40"	115^42'50"	PRI	
llarsia submersa	4	3	33^19'22"	115^43'30"	WAT	MWA

otal of 22 records were printed.

APPENDIX 3

CALM DATABASE SEARCH RESULTS – FAUNA

99166 KG

HEAD OFFICE
Hackett Drive
CRAWLEY
Western Australia
6009
Ph (08) 9442 0300

STATE OF
HEAD
Avenue
Precinct
Technology Park
KENSINGTON WA
6151
Ph (08) 9334 0333
Fax (08) 9334 0466
Teletype (08) 9334 0546

Postal Address
Locked Bag 104
Bentley Delivery Centre
BENTLEY WA 6983

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

Your Ref:
Our Ref: 043805F1999
Enquiries: Mr Peter Orell
Phone: (08) 9334 0454

RECEIVED
12 JAN 2001

Ms Kay Godwin
ATA Environmental
21 Howard Street
PERTH WA 6000

Dear Ms Godwin

REQUEST FOR THREATENED FAUNA INFORMATION

I refer to your request of 3 January for information on threatened fauna occuring in the Australind area.

A search was undertaken for this area of the Department's Threatened Fauna database, which includes species which are declared as *'Rare or likely to become extinct* (Schedule 1)', *'Birds protected under an international agreement* (Schedule 3)', and *'Other specially protected fauna* (Schedule 4)'. Attached are print outs from these databases where records were found.

Attached also are the conditions under which this information has been supplied. Your attention is specifically drawn to the sixth point that refers to the requirement to undertake field investigations for the accurate determination of threatened fauna occurrence at a site. The information supplied should be regarded as an indication only of the threatened fauna that may be present.

An invoice for $110.00 (includes GST), being the set charge for the supply of this information, will be forwarded.

It would be appreciated if any populations of threatened fauna encountered by you in the area could be reported to this Department to ensure their ongoing management.

If you require any further details, or wish to discuss threatened fauna management, please contact my Senior Zoologist, Dr Peter Mawson on 08 93340421.

Yours sincerely

.....

for Dr Wally Cox
ACTING EXECUTIVE DIRECTOR

11 January, 2001.

Attachment

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

THREATENED FAUNA INFORMATION

Conditions In Respect Of Supply Of Information

* All requests for data to be made in writing to the Executive Director, Department of Conservation and Land Management, Attention: Senior Zoologist, Wildlife Branch.

* The data supplied may not be supplied to other organisations, nor be used for any purpose other than for the project for which they have been provided without the prior consent of the Executive Director, Department of Conservation and Land Management.

* Specific locality information for Threatened Fauna is regarded as confidential, and should be treated as such by receiving organisations. Specific locality information for Threatened Fauna may not be used in reports without the written permission of the Executive Director, Department of Conservation and Land Management. Reports may only show generalised locations or, where necessary, show specific locations without identifying species. The Senior Zoologist is to be contacted for guidance on the presentation of Threatened Fauna information.

* Receiving organisations should note that while every effort has been made to prevent errors and omissions in the data, they may be present. The Department of Conservation and land Management accepts no responsibility for this.

* Receiving organisations must also recognise that the database is subject to continual updating and amendment, and such considerations should be taken into account by the user.

* It should be noted that the supplied data do not necessarily represent a comprehensive listing of the Threatened Fauna of the area in question. Its comprehensiveness is dependent of the amount of survey carried out within a specified area. The receiving organisation should employ a biologist/zoologist, if required, to undertake a survey of the area under consideration.

* Acknowledgment of the Department of Conservation and Land Management as the source of data is to be made in any published material. Copies of all such publications are to be forwarded to the Department of Conservation and Land Management, Attention; Senior Zoologist, Wildlife Branch.

The search of the database indicated that the following threatened and priority fauna occur in the area in question.

Schedule 1 (Fauna which is Rare or likely to become Extinct)

Chuditch (*Dasyurus geoffroii*) This species has recently been recorded in the northern area of Australind.

Western Rintail Possum (*Pseudocheirus occidentalis*) A population of this species has been established in Leschenault Conservation Park (Leschenault Peninsula) through translocation. Vagrants may occur in the Australind area.

Baudin's Cockatoo (*Calyptorhynchus baudinii*) This species occurs in low numbers in this part of the Swan Coastal Plain.

Schedule 4 (Fauna which is Otherwise Specially Protected)

Peregrine Falcon (*Falco peregrinus*) This species is an occasional visitor to areas of open woodland and along margins with farmland.

Carpet Python (*Morelia spilota imbricata*) This species may occur in areas of native vegetation along the coast from Australind to Yalgorup National Park.

Priority Taxa

Quenda (*Isoodon obesulus fusciventer*) **P4** This species is moderately common in parts of the coastal plain where dense understorey vegetation occurs in woodland and around wetland areas. The species has been translocated to Leschenault Conservation Park and may occur in other surrounding areas where there is suitable vegetation.

Brush-tailed Phascogale (*Phascogale tapoatafa*) **P3** This species has recently been recorded on the outskirts of Bunbury. It occurs in forest and woodland where suitable tree hollows are available and may occur in the area in question.

Western Brush Wallaby (*Macropus irma*) **P4** This species occurs in low numbers in areas of coastal forest and woodland supporting a dense shrub layer, and may occur in the Australind area.