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2004 – 2009 MANAGEMENT PLAN FOR RESERVES 860 & 44657

CITY OF MANDURAH

Reserve ? UBD 2006 Map 553 F14 Wilderness Dve & GumNut Av

Reserve ? 44657 UBD 2006 Map 553 E/F/G-15

Reserve ? 860 UBD 2006 Map 553 H15

Need Maps

Spp List ?
Vegn Map - 10 comms
Vegn Cond Map

SB Tile 413

Reserve 860 & 44657

CALM Swan Region Map 107
372000mE
6388 000 mN

DEVELOPMENT SERVICES APPROVED
DATE 18/5/04
6.15/5/04
CITY OF MANDURAH

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The study area is contained within the South-West Coastal Groundwater Area. Licences for groundwater allocations in the Falcon Coastal Groundwater Sub-area are fully allocated at present (Johnson, 2004).

The study area contains Warrangup Springs, which is a surface expression of the water table, and a point at which a small amount of freshwater flows into the Peel-Harvey Estuary during winter.

3.4 Vegetation

3.4.1 Regional Vegetation Descriptions

The vegetation of the Spearwood System is dominated by an open forest of Jarrah (*Eucalyptus marginata*), Marri (*Corymbia calophylla*) and Tuart (*Eucalyptus gomphocephala*) (WAPC, 1999). The study area is classified by Beard (1981) as predominately Medium Woodland of Tuart and Jarrah.

Corresponding to the soil descriptions by Churchward and McArthur (1978) (above in Section 3.4) the vegetation complexes from east to west for the study area as described by Heddle *et al* (1980) are the:

- **Vasse Complex (along the estuary)**: Mixture of the closed scrub of *Melaleuca* species, fringing woodland of Flooded Gum and *Melaleuca* species and open forest of Tuart, Jarrah and Marri;
- **Karrakatta Complex – Central and South (most of Reserve 860):** Predominately open forest of Tuart, Jarrah and Marri and woodland of Jarrah and Banksia; and
- **Cottesloe Complex – Central and South (most of Reserve 44657):** Mosaic of woodland of Tuart and Open Forest of Tuart, Jarrah, and Marri with closed heath on exposed limestone.

Saltmarshes occur in the intertidal zone of the estuary. Saltmarshes are areas of land vegetated by herbs, grasses or low shrubs, bordering saline water bodies. In the Peel-Harvey Estuary the lower saltmarshes are dominated by Samphire (*Sarcocornia quinqueflora*) with communities of Grasswort (*Halosarcia* species), herbs and grasses occurring with increased elevation inland. Communities of Shore Rush (*Juncus kraussii*), Saltwater Paperbark (*Melaleuca cuticularis*) and Saltwater Sheoak (*Casuarina obesa*) occur further inland. (McComb *et al*, 1995)

Saltmarshes are dynamic systems and their extent varies over time. Whilst there has been no specific measurement of changes in the study area the general trend in the estuary has been a significant loss from 1965 to 1986, with the most rapid decline between 1965 and 1977. Between 1986 and 1996 there was no significant change. This decline may be due to changes in tidal and water level regimes caused by the permanent breaching of the Mandurah Channel and opening of the Dawesville Channel (McComb *et al*, 1995).

3.4.2 Site-specific Vegetation Descriptions

Bushland is 'Land on which there is vegetation which is either a remainder of the natural vegetation of the land, or if altered, is still representative of the structure and floristics of the natural vegetation, and provides the necessary habitat for native fauna' (WAPC, 2000).

Vegetation communities within the bushland were demarcated on the basis of the interpretation of 2002 aerial photographs and site assessment undertaken during March, July and October 2003. Vegetation Communities where defined by their uppermost strata in accordance with Table A6.1 in Appendix 6.

The 10 vegetation communities (as described by one dominant species), in order of decreasing height classes, within the study area are:

- Tuart Woodland;
- Peppermint Forest;
- Sheoak Forest;
- Mixed Tuart Forest;
- Mixed Forest without Tuart;
- Paperbark Forest;
- Rigid Wattle Thicket;
- Parrot Bush Thicket;
- Mixed Heath; and
- Pale Rush Sedgeland.

The location of these communities is shown in Map 2.

The extent of each of these vegetation communities, in order of extent, is shown in Table 3.1.

Table 3.1 Extent of Vegetation Communities

Vegetation Community	Area (ha)	% of Total
Mixed Tuart Forest	12.2	37.8
Sheoak Forest	5.1	15.9
Peppermint Forest	4.6	14.1
Pale Rush Sedgeland	3.0	9.4
Paperbark Forest	2.5	7.7
Rigid Wattle Thicket	1.8	5.5
Tuart Woodland	1.4	4.3
Mixed Forest without Tuart	0.9	2.9
Mixed Heath	0.6	1.9
Parrot Bush Thicket	0.1	0.5
Total	32.3	100.0

The vegetation communities in the study area reflect the soils and topography of the site. The presence of limestone is reflected in the occurrence of (Prickle Lily) *Acanthocarpus preissii* and (Cockie's Tongue) *Templetonia retusa*. WA Peppermints (*Agonis flexuosa*) more abundant on lower slopes. Tuart occurs within a number of these communities and this is significant given that 65% of Tuart woodlands have been cleared and there has been noticeable decline in the health of many of the remaining trees in the last decade.

More details for each of these communities, grouped by height and density classes (i.e. woodlands, forests, thicket, heaths and sedges) are given below.

Woodlands

Tuart Woodland (Tuart Woodland over Dense Low Grass)

The mapping of this area separately to the forests reflects the topography, increased limestone at the surface and the level of understorey clearing. The structure and composition of this vegetation community reflects the level of disturbance this site has previously experienced. The understorey and midstorey has almost been entirely cleared, leaving a stand of mature Tuarts over grass.

There is one small population of Coastal Sword Sedge (*Lepidosperma gladiatum*) in this woodland, probably reflecting a greater amount of soil moisture. In managing the site this population should be retained.

Forests

The boundaries of the communities were defined by the extent of particular species (Peppermints and Sheoaks) rather than variation in structure. The structure of these three forests varies little except along the northern edge of Reserve 860 and close to Estuary Road where the Peppermint dominates to the extent that almost all other species (including understorey) are excluded. Everywhere else the overstorey consists of a mixture of species and the understorey is Low Heath C.

Peppermint Forest (Dense Low Forest A of Agonis flexuosa)

The Peppermint Forest is mapped by the extent of Peppermint Trees (*Agonis flexuosa*) across the site. On the periphery of the population the Peppermints become less dense and intermingle with other overstorey species.

Sheoak Forest (Low Forest A of Allocasuarina fraseriana and Corymbia calophylla)

The Sheoak (*Allocasuarina fraseriana)* does not dominate to the extent that other overstorey species are excluded. The woodland has a mixed overstorey, which in addition to Sheaok has Tuart, Candle Bankisa and Marri. The understorey is the same as that for the Marri woodland.

Mixed Tuart Forest (Low Forest A of Corymbia calophylla, Eucalyptus marginata, Eucalyptus gomphocephala and Banksia attenuata)

The mixed Tuart Forest consists of an overstorey of Marri, Jarrah, Tuart, Candle Banksia (with the occasional Bull Banksia) in which no one species is dominant. The forest however, does not contain Peppermint or Sheoak. This forest in particular has components reflecting the limestone present. Indicator species include *Acanthocarpus preissii, Templetonia retusa,* and *Olearia axillaris.*

A typical area within this vegetation community is shown in Figure 3.1.

Figure 3.1 Low Forest A of Marri, Tuart and Banksia

Mixed Forest without Tuart (Low Forest A of Corymbia calophylla, Eucalyptus marginata and Banksia attenuata)

The mixed forest west of Wilderness Drive consists of an overstorey of Marri, Jarrah and Candle Banksia in which no one species is dominant. The forest does not contain Tuart nor limestone indicator species. Species not seen elsewhere in the study area such as *Leucopogon racemolosus* where noted, as was the abundance of Salt and Pepper (*Philotheca spicatus).*

Paperbark Forest (Low Forest B of Melaleuca rhaphiophylla* over Dense Low Sedges of *Juncus pallidus)

This vegetation community fringes the Peel-Harvey Estuary. The landward side of the community has been truncated by the construction of an unsealed road and Dual Use Path. This narrowing of the community has impaired its ability to adjust to changes in tidal regimes caused by activities such as the construction of the Dawesville Channel.

Thickets

Rigid Wattle Thicket (*Dense Thicket of *Acacia cochlearis)

This dense thicket of Rigid Wattle (*Acacia cochlearis*), which is associated with limestone, occupies the highest point in the Study Area. This thicket is almost impenetrable and is associated with a smaller dense thicket of Chenille Honeymyrtle (*Melaleuca huegellii)* which is also associated with limestone.

Parrot Bush Thicket (*Dense Thicket of *Dryandra sessilis)

This dense stand of native Parrot Bush is located on the western side of Estuary Road and reflects previous disturbance in this area. Parrot Bush will tend to colonise bare areas after fire or earthworks, before eventually senescing (dying) and being replaced by other species.

Heath

Mixed Heath (Heath B of *Grevillea preissii* and *Templetonia retusa*)
The heath contains a variety of understorey species including *Grevillea preissii* and Cockies Tongue (*Templetonia retusa*).

Sedgeland

Pale Rush Sedgeland (Dense Low Sedges of *Juncus pallidus*)
This community of Pale Rush (*Juncus pallidus*) sedges occupies the intertidal zone and has no overstorey.

3.4.3 Site-specific Vegetation Condition

Most of Reserve 860 is in Very Good to Excellent condition, though Bridal Creeper has become established over a significant area of the study area. The distribution of Bushland Condition and Bridal Creeper is shown in Map 3.

Bushland Condition	Area (ha)	% of Total
Very Good - Excellent	29.1	90.1
Fair - Good	1.0	3.1
Poor	0	0
Very Poor	2.2	6.8
Total	32.3	100.0

Table 3.2 Extent of Bushland Condition

The area to the west of Wilderness Drive is at the upper end of the Fair to Good category but is highly dissected and weeds are being established along its borders. The promontory above Warrangup Springs and the area immediately east of Wilderness Road are very degraded. As can be seen in Figure 3.2 the understorey and midstorey has almost been entirely cleared, leaving a stand of mature Tuarts over grass.

Figure 3.2 Degraded Area of Tuart Woodland On Limestone Ridge

The degradation of this area increases the options for siting a viewing platform to overlook the estuary, though not negating the need for considering the concerns of the traditional custodians of the site. A lookout could be placed on the western side of Estuary Road, but this would involve some clearing of the bushland, and would be further removed from the carpark on the Estuary.

Reserve 44657 is generally in Good condition. However this reserve has become highly fragmented by formal and informal paths, and due to its elongation a large proportion of it consists of degraded edges. There is a 1 km interface with urban development for its 2.69 ha area and a relatively extensive track network increases the opportunities for weed invasion. This reserve has the potential to decline rapidly if weeds (and in particular garden escapees and plantings) are not aggressively controlled.

It would appear from both the public meeting and observation that local residents are contributing significantly to the degradation of Reserves 860 and 44657 through planting exotics, collecting firewood and riding trailbikes. This can only partially be dealt with through coercion, and therefore education is a critical component of a conservation strategy.

3.5 Flora

3.5.1 Site-specific Flora

A total of 127 plant species were identified in the study area. The vegetation communities in the study area reflect the soils and topography of the site. In particular the presence of limestone close to the surface is reflected in the occurrence of species more commonly associated with coastal vegetation associations such as *Acanthocarpus preissii* and *Templetonia retusa*.

The site also supports a variety of orchids, one of which is shown in Figure 3.3.

Figure 3.3 Christmas Spider Orchid (Caladenia ?serotina)

3.5.2 Rare and Priority Flora

Species with limited distributions or for which little is known require measures to ensure their long-term survival. To assist in their management they are designated as belonging to the Conservation Codes listed in Table A5.4 in Appendix 5.

The rare and priority species within or likely to be within the City of Mandurah are listed in Table 3.4.

Table 3.3 Rare and Priority Flora within the City of Mandurah (adapted from City of Mandurah, 2003)

Species	Conservation Code	Confirmation
Caladenia huegelii	DRF	Site & specimen confirmed
Diuris purdiei	DRF	Site & specimen confirmed
Astroloma microcalyx	P2	Site & specimen confirmed
Lasiopetalum membranaceum	P3	Site & specimen confirmed
Platysace ramosissima	P3	Site & specimen confirmed
Conostylis pauciflora ssp pauciflora	P4	Site & specimen confirmed
Dillwynia dillwynioides	P3	Specimen confirmed
Hibbertia spicata	P3	Specimen confirmed
Blennospora doliiformis	P3	Expected
Conostylis pauciflora ssp euryhipis	P3	Expected
Hibbertia spicata ssp leptotheca	P3	Expected
Jacksonia sericea	P3	Expected
Pterostylis sp. Yalgorup	P3	Expected
Stylidium maritimum	P3	Expected
Eucalyptus rudis ssp cratyanhtha	P4	Expected
Hakea sp. Yalgorup	P4	Expected

The field surveys undertaken for this management plan included opportunistic searches for these species. A population of approximately half a dozen *Lasiopetalum membranaceum* (shown in Figure 3.4) were located within Reserve 860.

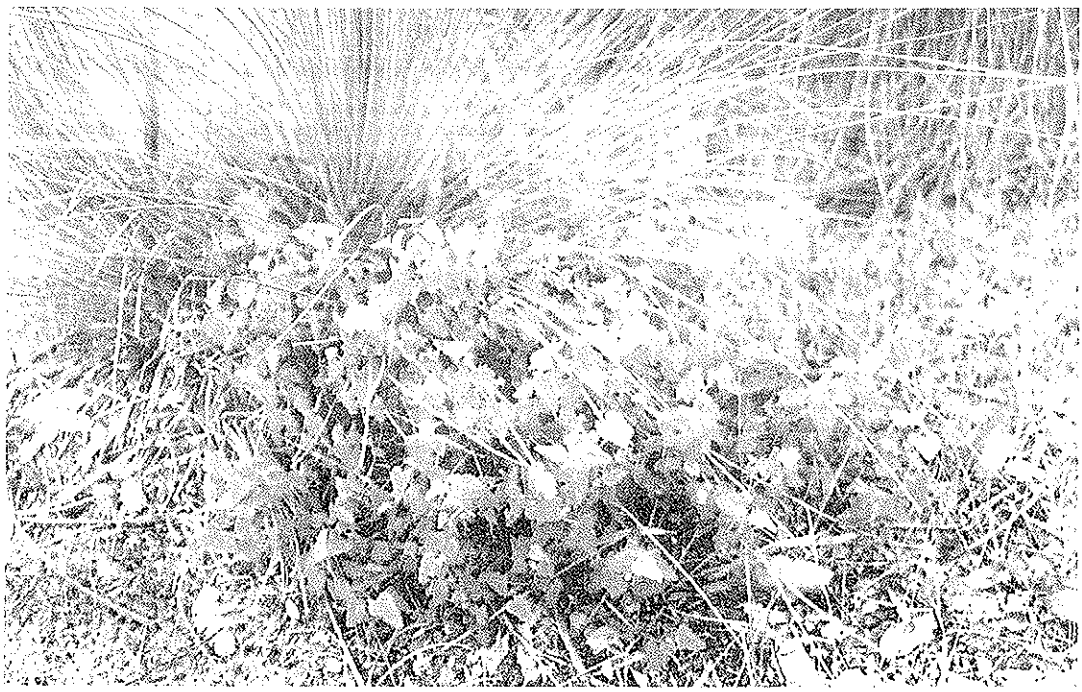

Figure 3.4 Lasiopetalum membranaceum (Priority 3 Species)

This is a Priority 3 species that is fire sensitive and it should be protected from wildfires where practical.

The presence of Priority Flora and potential presence of Rare Flora means that no clearing should be undertaken within the study area without a focused botanical survey at the appropriate time of year.

3.5.3 Introduced Flora

Of the 127 species recorded in the study area, 24% (30 species) are weeds. This is a typical ratio in urban bushland.

The weed of greatest concern in the study area is Bridal Creeper (*Asparagus asparagoides*). This weed has established over 5.8 ha within the Reserve 860. Its distribution, as mapped by Green Corps, is shown in Map 3.

Geraldton Carnation Weed (*Euphorbia terracina)* is present on the end of Estuary View Road and there are a number of other introduced species such as Jonquils (*Narcissus species*) and Canna Lillies (*Canna species*) along the periphery of the study area. These have been planted by residents to extend their gardens into the reserve. In some cases residents have installed reticulation within the reserves to ensure the establishment of these weeds, as shown in Figure 3.5.

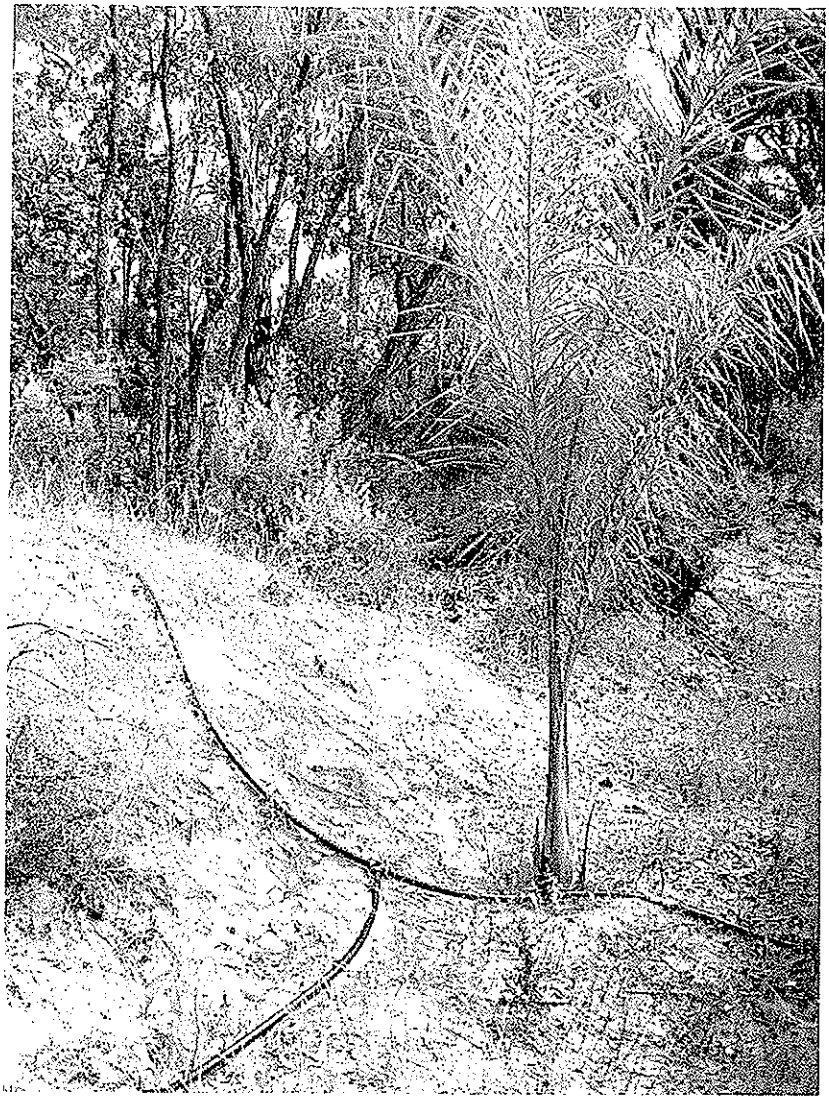

Figure 3.5 Reticulation used to establish weeds within the Bushland

3.6 Fauna

As the study area is located on the shores of the Peel-Harvey Estuary both terrestrial and estuarine fauna are considered below. Whilst there have been no formal fauna surveys within the study area there are a number of relevant studies that can be drawn upon.

Reserve 44657 provides one of the few examples of the transition between the estuarine vegetation to coastal vegetation, and one of the few natural corridors between these areas. The ability of the reserve to effectively function as a corridor is diminished by its elongation (it is 850 m long and 50 m wide) and it dissection by two major and one minor road.

The significance of the site as a refuge for fauna will increase as the clearing of nearby bushland for urban development continues. In the short term this has the potential to increase pressure on the site from animals as a source of food and shelter. In the long term the site's carrying capacity will determine the size of resident fauna populations.

A fauna list is included in Appendix 2.

Table 3.5 Terrestrial Macrofauna of Yalgorup National Park

Common Name	*Species Name*	Presence
Grey Kangaroos	*Macropus fuliginosus*	Presence Confirmed
Brush Wallabies	*Macropus irma*	Presence Confirmed
Quenda	*Isoodon obesulus*	Presence Confirmed
Chuditch	*Dasyurus geoffroii*	Presence Confirmed
Echidna	*Tachyglossus aculeatus*	Presence Confirmed
Water Rat	*Hydromys chrysogaster*	Presence Confirmed
Brush-tailed Possum	*Trichosurus vulpecular*	Presence Confirmed
Wambenger	*Phascogale tapoatafa*	Last seen 20-30 yrs ago
Ring-tailed Possum	*Pseudocheirus occidentalis*	Likely to be present
Honey Possum	*Tarsipes rostratus*	Likely to be present
Pygmy Possum	*Cercartetus concinnus*	Likely to be present
Quokka	*Setonix brachyurus*	Likely to be present
*House Mouse	*Mus domesticus*	Presence Confirmed
*Black Rat	*Rattus rattus*	Presence Confirmed
*Fox	*Vulpes vulpes*	Presence Confirmed
*Rabbit	*Oryctolagus cuniculus*	Presence Confirmed
*Feral Cat	*Felis catus*	Presence Confirmed
*Goat	*Capra hircus*	Presence Confirmed

* Indicates introduced species

Fauna requiring special protection under the Wildlife Conservation Act 1950 (due to their rarity, intergovernmental agreements or other considerations) are listed in the Wildlife Conservation (Specially Protected Fauna) Notice 2003. Specially Protected Fauna species are designated as belonging to one of the 4 Schedules listed in Table A6.3 in Appendix 6. Specially protected animals that have been recorded as present or likely to occur in Mandurah (City of Mandurah, 2003) are shown in Table 3.7.

Table 3.6 Fauna Requiring Special Protection Recorded or Likely to Occur in Mandurah

Common Name	*Species Name*	Schedule*	Habitat
Chuditch	*Dasyurus geoffroii*	S1	Forest & woodland
Western Ring-tailed Possum	*Pseudocheirus occidentalis*	S1	Forest & woodland
Baudin's Black Cockatoo	*Calyptorhynchus baudinii*	S1	Forest
Carnaby's Black-Cockatoo	*Calyptorhynchus latirostris*	S1	Heaths & adj. woodland
Shield-backed Trapdoor Spider	*Idiosoma nigrum*	S1	Patchy
Peregrine Falcon	*Falco peregrinus*	S4	Open woodland
Carpet Python	*Morelia spilota inbricata*	S4	Woodland

* Schedules explained in Table A5.3, Appendix 5

There is anecdotal evidence that Carpet Pythons (*Morelia spilota inbricata*) are resident within the study area. It is unlikely that Chuditch (*Pseudocheirus occidentalis)* or Western Ring-Tailed Possums (*Pseudocheirus occidentalis)* reside in the study area but Baudin's Black Cockatoos (*Calyptorhynchus baudinii*), Carnaby's Black-Cockatoos (*Calyptorhynchus latirostris*), and Peregrine Falcons (*Falco peregrinus*) could use the site occasionally.

3.6.1 Fish

Table 3.4 contains a list of the major species caught in the Peel-Harvey Estuary by recreational and commercial fishers.

Table 3.4 Major Catches of the Peel-Harvey Estuary

Common Name	Species Name
Yellow-eye Mullet	*Aldrichetta forsteri*
Sea Mullet	*Mugil cephalus*
Cobbler	*Cnidoglanis macrocephalus*
King George Whiting	*Sillaginodes punctata*
Western sand Whiting	*Sillago schomburgkii*
Tailor	*Pomatomus saltator*
Mulloway	*Argyrosomus hololepidotus*
Black Bream	*Acanthopagrus butcheri*
Western River Garfish	*Hyporhamphus regularis regularis*
Sea Garfish	*Hyporhamphus melanochir*
Skipjack (Trevally)	*Pseudocaranx wrighti*
Blue Manna Crab	*Portunus pelagicus*
River Prawn	*Metapenaeus dalli*
Western King Prawn	*Penaeus latisulcatus*
Australian Herring	Arripis georgianus

Murdoch University, 1998

3.6.2 Mammals

There have been no mammal surveys undertaken within the study area but there is evidence (scats and scratchings) of Brushtail Possums (*Trichosurus vulpecula vulpecula*), Grey Kangaroos (*Macropus fuliginosus*) and Rabbits (*Oryctolagus cuniculus)* onsite.

Brushtail possums are among the most adaptable of the native mammals, living in a variety of habitats including house roofs, chimneys and the like. Abundant over much of Australia, they can survive some disturbance and often flourish when other species struggle. (CALM, 2003)

Surveys have been undertaken by the Department of Conservation and Land Management at Kooljerrenup Nature Reserve and Yalgorup National Park, though not all of these animals would be present in the study area.

The native mammals recorded in Kooljerrenup Nature Reserve include (Love, 2003):

- Brushtail Possums (*Trichosurus vulpecula vulpecula*);
- Grey Kangaroos *(Macropus fuliginosus);*
- Honey Possums (*Tarsipes rostratus*); and
- Quendas/Bandicoots (*Isoodon obseulus*).

Thirty nine terrestrial animals are recorded as actually or possibly residing in Yalgorup National Park (CALM, 1994). Of these 12 are native mammals, 13 are lizards, eight are frogs and six are introduced mammals. The terrestrial macrofauna recorded in the Yalgorup National Park Management Plan 1995 – 2005 (CALM, 1994) are shown in Table 3.5.

MAP 553

4 GRID SQUARES MEASURE 1km

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SCALE 1:19 000 1km
Metres 500 1000

PRIMARY RECTANGLE MURRAY BF32
PRIMARY RECTANGLE MURRAY BG32

FREEWAY	PARK, RESERVE, OVAL	AMBULANCE STATION	CAR PARK
PROPOSED FREEWAY	SCHOOL, HOSPITAL	BARBECUE	COLLEGE - PRIVATE
HIGHWAY or MAIN ROUTE	MISCELLANEOUS AREA	BOAT RAMP	COLLEGE - PUBLIC
ALTERNATE ROUTE	MALL, PLAZA	BOWLING CLUB/GREEN	CYCLEWAY
TRAFFICABLE ROAD	SWAMP	CAMPING AREA	DISTANCE FROM GPO
PROPOSED ROAD		CARAVAN PARK	EMERGENCY TELEPHO

See GIS print-out


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44657