

## TOMAH ROAD BUSHLAND, WATTLE GROVE

**Boundary Definition:** protected area boundary

### **SECTION 1: LOCATION INFORMATION**

**Bush Forever Site no. 282 Area (ha):** bushland 5.6

**Map no. 49**

**Map sheet series ref. no. 2034-II SE**

**Other Names:** Submission Area 274

**Local Authorities (Suburb):** Shire of Kalamunda (Wattle Grove)

### **SECTION 2: REGIONAL INFORMATION**

#### **LANDFORMS AND SOILS**

##### **Pinjarra Plain**

Guildford Formation (Qpa: Mgs1)

##### **Bassendean Dunes**

Bassendean Sands (Qpb: S8)

##### **Bassendean Dunes/Pinjarra Plain**

Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)

#### **VEGETATION AND FLORA**

##### **Vegetation Complexes**

###### **Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types:** not sampled, types not inferred

###### **Supergroup 2: Seasonal Wetlands**

###### **Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

#### **WETLANDS**

**Wetland Types:** sumpland, palusplain, creek, artificial channel

##### **Natural Wetland Groups**

###### **Bassendean—Pinjarra transition OR Bassendean with fluvial features**

Mungala (B/P.2)

**Wetland Management Objectives:** Conservation (1.2ha, 113.7m), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

#### **THREATENED ECOLOGICAL COMMUNITIES**

Not determined

### **SECTION 3: SPECIFIC SITE DETAIL**

**Landscape Features:** vegetated wetland, creek, vegetated uplands

**Vegetation and Flora:** detailed survey (LeProvost *et al.* 1987)

**Structural Units:** mapping (LeProvost *et al.* 1987)

Uplands: *Eucalyptus calophylla* Woodland

Wetlands: *Melaleuca raphiophylla* Low Forest with emergent *Eucalyptus rudis*; *Banksia attenuata*, *B. menziesii*, *B. ilicifolia* and *Kunzea ericifolia* Low Woodland; *Melaleuca raphiophylla* Tall Closed Scrub;

*Melaleuca viminea* Tall Closed Scrub; *Lepidosperma longitudinale* Sedgeland

**Vegetation Condition:** Very Good to Degraded, with areas of severe localised disturbance (inferred from LeProvost *et al.* 1987 and Submission no. 170d)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland; part of Greenway 109 (Tingay, Alan & Associates 1998a)

**Other Special Attributes:** Category One Area Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); contains plant communities representative of the eastern side of the Swan Coastal Plain

### **SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

### **SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

**Recommendation:** Site with Some Existing Protection; Existing Parks and Recreation Reserve (see Table 3, Volume 1).

## TOMAH ROAD BUSHLAND, WATTLE GROVE

**Boundary Definition:** protected area boundary

### SECTION 1: CADASTRAL INFORMATION

(Lots, locations and derived information to be updated in the public submission period)

**Bushplan Site no.** 282      **Map no.** 58      **Map sheet series ref. no.** 2034-II SE

**Other Names**      **Area (ha):** total 7.2; bushland 5.6

Submission Area 274

**Local Authorities (Suburb)**  
Shire of Kalamunda (Wattle Grove)

**Zoning**  
MRS: Parks and Recreation, Controlled Access  
Highways

TPS: Landscape

### Ownership Categories

State Government

**Lot/Location/Reserve numbers (Purpose),**

**Street name**

50 Tomah Rd; 51, 52 Saint John Rd

### SECTION 2: REGIONAL INFORMATION

#### LANDFORMS AND SOILS

##### Pinjarra Plain

Guildford Formation (Qpa: Mgs1)

##### Bassendean Dunes

Bassendean Sands (Qpb: S8)

##### Bassendean Dunes/Pinjarra Plain

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#### VEGETATION AND FLORA

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**Combinations of Bassendean Dunes/Pinjarra Plain**

Southern River Complex

**Floristic Community Types:** not sampled, types not inferred

**Supergroup 2: Seasonal Wetlands**

**Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau**

#### WETLANDS

**Wetland Types:** sumpland, palusplain, creek, artificial channel

##### Natural Wetland Groups

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Mungala (B/P.2)

**Wetland Management Objectives:** Conservation (1.2ha, 113.7m), Resource Enhancement

**Swan Coastal Plain Lakes EPP:** none identified

#### THREATENED ECOLOGICAL COMMUNITIES

Not determined

### SECTION 3: SPECIFIC SITE DETAIL

**Landscape Features:** vegetated wetland, creek, vegetated uplands

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**Structural Units:** mapping (Le Provost *et al.* 1987)

Uplands: *Eucalyptus calophylla* Woodland

Wetlands: *Melaleuca raphiophylla* Low Forest with emergent *Eucalyptus rudis*; *Banksia attenuata*, *B. menziesii*, *B. ilicifolia* and *Kunzea ericifolia* Low Woodland; *Melaleuca raphiophylla* Tall Closed Scrub; *Melaleuca viminea* Tall Closed Scrub; *Lepidosperma longitudinale* Sedgeland

**Vegetation Condition:** Very Good to Degraded, with areas of severe localised disturbance (inferred from Le Provost *et al.* 1987 and Submission no. 170d)

**Total Flora:** not known

**Significant Flora:** none recorded

**Fauna:** no systematic survey. Significant mammal species: Quenda (Friend 1996 D)

**Linkage:** no adjacent bushland; part of proposed Greenway 123 (Tingay, Alan & Associates 1997a)

**Other Special Attributes:** Category One Area Middle Canning Catchment Study (Evangelisti & Associates *et al.* 1995); contains plant communities representative of the eastern side of the Swan Coastal Plain

### SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed



**SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS**

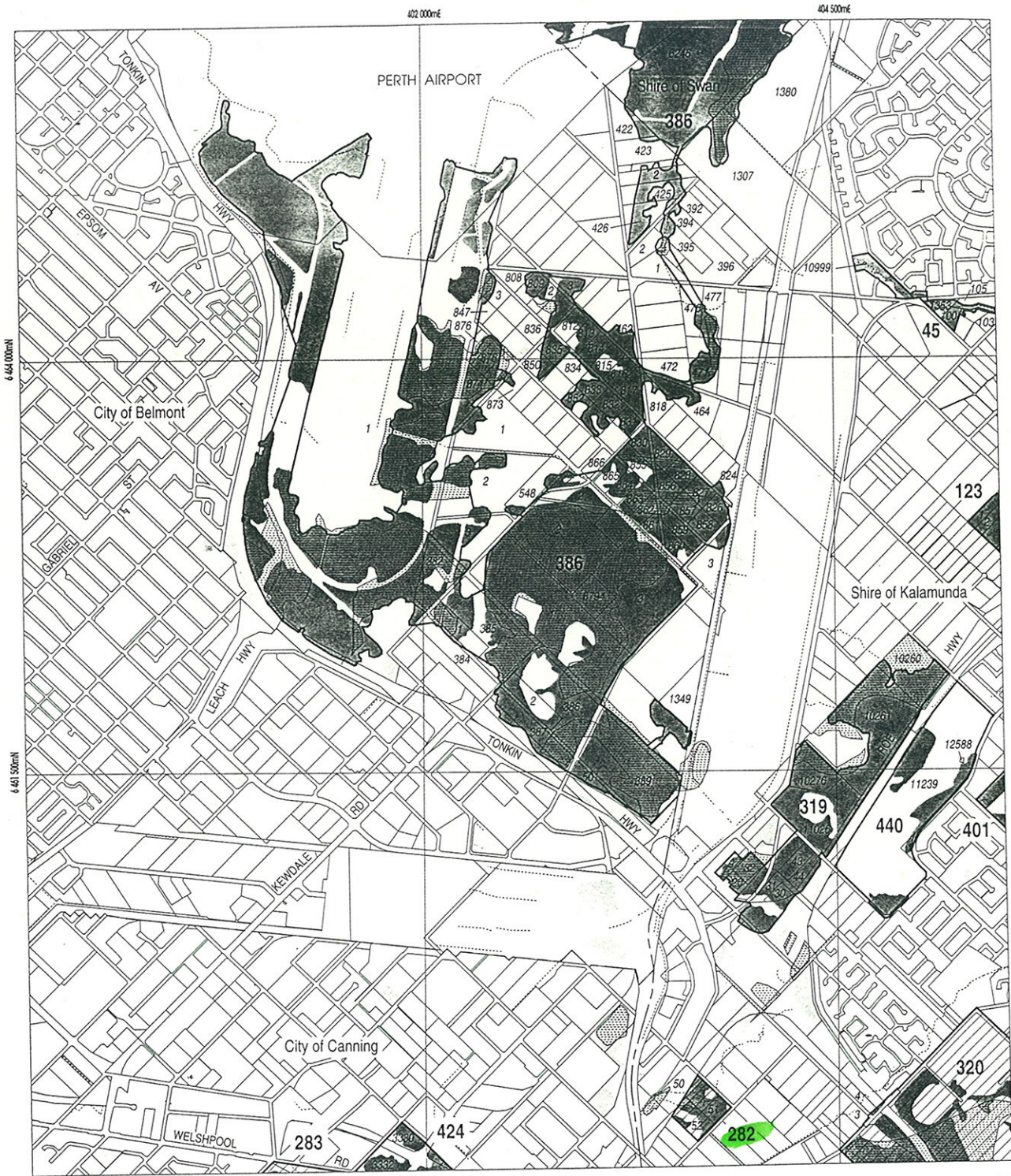
**Criteria:** Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

**Opportunities and/or Constraints**

Opportunities: Bushplan Site/part Bushplan Site subject to Swan and Canning Rivers EPP; location of conservation category wetlands; under MRS Parks and Recreation Reservation and TPS Landscape Zoning

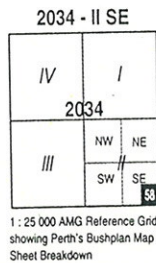
Constraints: under MRD regional road requirements

**Recommendation:** The most appropriate mechanism for the protection of this Bushplan Site be considered through the public comment period in consultation with the land owner(s).



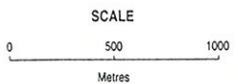
**LEGEND**

-  Bushplan Sites With Regionally Significant Bushland
-  Other Native Vegetation
-  Conservation Category Wetlands
-  Bushplan Sites With Some Existing Protection
-  Lot Number, Location Number
-  Channel Wetlands
-  Local Government Boundary



**PERTH'S BUSHPLAN MAP INDEX**

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Produced by Project Mapping Section  
Land Information Branch, Ministry for  
Planning, Perth W.A. November 1998  
nwl-map11//environ/bushplan/bushv2\_58.dgn

Cadastral Data supplied by Department  
of Land Administration, W.A.

Wetlands Data supplied by  
Water and Rivers Commission

Native Vegetation Extent for Study Area  
supplied by Agriculture Western Australia

COMPTON. aerial photo  
doesn't look good  
exclude  
NT/JA 30/a

# 282

282  
issue  
of  
decision

V.  
or  
de

looks good on  
aerial photo  
include NT/JA 30/a

Very Accurate?  
Elevation

veg mapping. inaccurate in  
this instance  
pieces of non vegetated  
tracts exclude in this  
instance. OK

were at these  
sites  
veg mapping  
accuracy  
can be questionable

Well  
OK to include  
CAH and local Reserve  
Southern River  
Subject to veg condition  
not wholly  
vegetated.  
not field checked

### BUSHPLAN SITES CORRECTED



WESTERN  
AUSTRALIAN  
PLANNING  
COMMISSION



CUSTOMER  
FOCUS  
WESTERN AUSTRALIA

OK except for road verge  
issue



BJK 8/98  
include  
subject to ~~compton~~ verification.

B 27/10/0



COMMON. aerial photo  
doesn't look good  
exclude  
NT/JA 30/a

# 282

Any accuracy?  
estimate

looks good on  
aerial photo  
include NT/JA 30

Will

OK to include  
CAH and local Resena  
Southern line  
Subject to veg condition

NOTE AT THESE  
SITES  
ALL VEG MAPPING  
ACCURACY  
CAN BE QUESTIONABLE

**BUSHPLAN SITES CORRECTED**



WESTERN  
AUSTRALIAN  
PLANNING  
COMMISSION

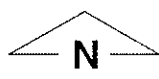


CUSTOMER  
FOCUS  
WESTERN AUSTRALIA

OK except for road verge  
issue

BJR 8/98

INCLUDE  
SUBJECT TO CONDITION VERIFICATION.



SYSTEM 6 BUSHLAND SUBMISSION FORM  
FOR CONSIDERATION IN THE UPDATE PROGRAMME

If you wish to submit more than one area for consideration in the System 6 update, please use a separate form for each area.

Please fill in each section giving as much information as possible.

LOCATION, OWNERSHIP AND ZONING OF THE AREA

1. Location Tomah Road Wetland.

Please give as accurate and detailed a description as possible of the site location. Please include either a hand drawn or copied map showing the area of the area

a) Bordering Roads: Tomah Road, St John Road

b) Nearest Corner: as above

c) Lot Number: Street Number:

d) Town/Suburb/Location: Wattle Grove

e) Local Council: Kalamunda

f) Site Name (if any): Tomah Road Wetland

g) Approximate size of the area (ha):

h) Please locate the area on a map and give us map references if possible:

i) Map: 30 Streetsmart (UBD) Other:

j) Map no.:

k) Grid Ref: CS

l) Please give any other information that may help us to find the location:

see map attached.

m) Are you aware of any development proposals that are likely to affect the area?

yes, urbanisation of Cell 9, Wattle Grove

NOTE: Areas that have already been given development APPROVAL should not be nominated

Please fill out those questions that you can answer

2. Who owns the area? (If owned by the person/s making the nomination please indicate) .....

..... WESTERN AUSTRALIAN PLANNING COMMISSION & PRIVATE .....

3. If you own the area, and may be interested in participating in conservation on private land initiatives please indicate (and leave your name and address at the end of this submission form) .....

4. What is the area zoned? (please indicate whether zoning is Town Planning Scheme or Metropolitan Region Scheme) ..... Urban (MRS) PARKS & RECREATION .....

CAN YOU TELL US A LITTLE ABOUT THE PHYSICAL CHARACTERISTICS OF THE AREA

5. Why do you consider this area important? (Refer to Guiding Issues paper) ..... Rare flora and fauna, hydrological characteristics .....

6. What is/are the soil type/s and colours? ..... sand over clay .....

Type: Sand/Clay/Gravel/Loam/Silt  
Colour: White/Grey/Brown/Orange/Yellow/Red/Black

7. Does the area have any special features such as unusual landforms / landscapes that still retain their natural vegetation? Yes/No

If yes, what are they? ..... wetland in reasonable good condition which is fed by tributaries of the Woodlupine Brook .....

8. Is the area a wetland or does it include a wetland? ..... yes .....

If yes, what kind of a wetlands is it?

- a) lake
- b) river
- c) stream
- d) swamp
- e) estuary
- f) seasonally wet
- g) other

9. What percentage of the wetland is open water in summer? .....=.....

CAN YOU TELL US A LITTLE ABOUT THE VEGETATION /FAUNA ON THE NOMINATED AREA.

10. What percentage of the area is indigenous vegetation? ...almost all remaining

11. If the area includes regions cleared of native bushland please indicate reasons for the inclusion. ....

12. Has any previous flora or fauna survey work been done on the area?  
...~~no~~ yes.

If yes, please give details of the work ..... Roe Highway Extension  
P.E.R.

13. How would you rate the condition of the native bushland? (see attached table)

- a) pristine
- b) excellent
- c) very good (fringing wetland)
- d) good (most of reserve)
- e) degraded
- f) completely degraded
- g) don't know

Location 72  
(K&F 1992)  
REFERENCE

14. Please indicate the disturbances affecting the area and where appropriate the percentage of the area disturbed.

- a) Partial clearing
- b) fragmentation
- c) Selective removal of species: timber cutting, wildflower picking, mowing dieback and other plant diseases
- d) Fire regime, including intensity, season and frequency
- e) 'Enrichment plantings' that is plantings of species not found in that community
- f) Weed invasion
- g) Animal impact: horses, foxes, rabbits, cats, dogs, camels, goats etc
- h) Soil movement, both removal and dumping
- i) Changes in water regimes; flooding, drainage and watering (possible in future)
- j) Salinity
- k) Fertiliser drift and along waterways nutrient influx
- l) Mining, including that for road works

- m) Grazing: stock, overgrazing by feral or native mammals
- n) Proliferation of tracks, fire breaks and walk trails
- o) Off-road vehicle use
- p) Use as service corridors by the SEC, Main Roads, Water Authority.  
(Source: B Keighery. Bushland Plant Survey, September 1994)

15. Does the area contain any plant species of special interest that you know of? (eg. declared rare flora, priority taxa, outlier populations) ..... Yes .....

Do you know what they are? ... a number of DRF species .....

16. Do you know of any native animals that use the area? .....

Can you list those you know of? (birds, mammals, reptiles, amphibians etc)  
..... birds, Mammals (possibly bandicoots) .....

17. Is the area used by any native animals of special interest? (eg. endangered species, large/important populations)..... Yes .....

If yes, please name them and indicate source of information  
..... Southern Brown Bandicoot, refer to Main Roads PER .....

**CAN YOU TELL US A LITTLE ABOUT THE SURROUNDING AREA**

18. Are there any bushland areas (including wetlands) near to this area?  
.....

If yes, how close are they? ..... woodlupine Brook and numerous damplands within highway reserve .....

Are they already conservation reserves? ..... no .....

What is their approximate size? .....

19. Does the submitted area link other bushland areas? ..... no directly, although opportunity exists to enhance drains into multiple use corridors during future subdivision .....

Please attach any additional information about the area which may be of use when assessing it.  
Hartfield Park also in fairly close proximity to the east

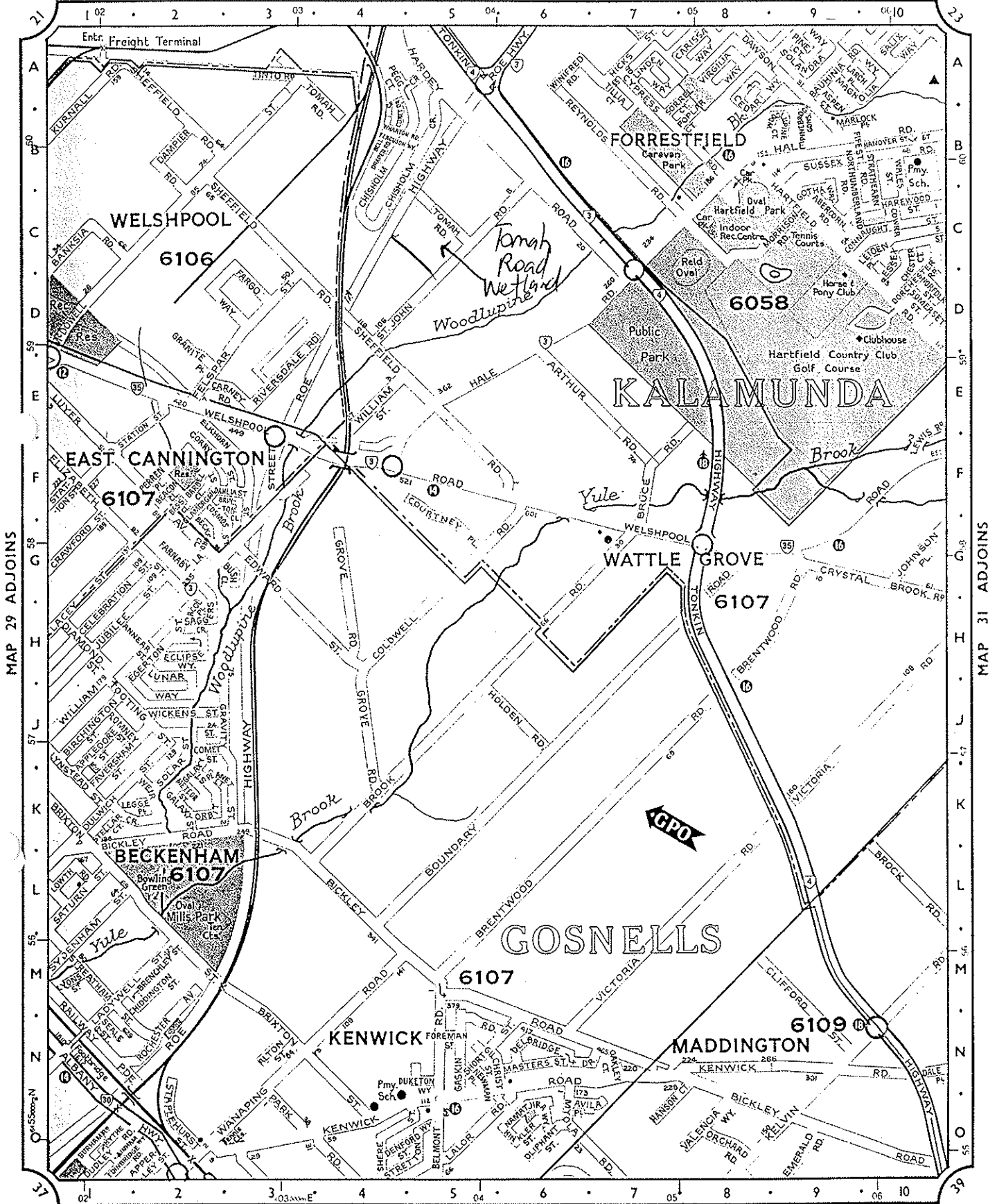
Kilometres 1km  
Metres 500m 1000m

POST OFFICE  
SCHOOL  
POLICE STATION

MAP 22 ADJOINS

PUBLIC TELEPHONE  
HOSPITAL  
COUNCIL OFFICE

MAP 30



MAP 38 ADJOINS

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MAIN ROADS DEPARTMENT  
ROE HIGHWAY  
TONKIN HIGHWAY TO WELSHPOOL ROAD  
ENVIRONMENTAL MANAGEMENT PLAN

prepared by

W G MARTINICK AND ASSOCIATES PTY LTD

for

GUTTERIDGE HASKINS AND DAVEY PTY LTD

SEPTEMBER 1990

**BS 282**  
**TOMAH**  
**FOOT/PIN**

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description was verified in 1990 by site visits by ecologists from W G Martinick and Associates.

#### 4.1 Landforms and soils

The study area is contained within the Pinjarra Plain Geomorphic system which is characterised by gently undulating dunes and swales. The predominant soil unit is the Southern River Soil Complex (Department of Conservation and Environment, 1980). The Southern River Soils are of aeolian origin and often occur as iron and humus podzols, peats and clays on the dunes and intervening wetlands.

#### 4.2 Hydrology

The surface hydrology of the study area is subject to seasonal influences. During the wet winter and spring months wetlands in the swales are inundated with water. During the summer the wetlands do not have surface water, but the groundwater table remains high.

Boreholes drilled in spring in the vicinity of the proposed roadworks indicate that the depths of the water table ranges from 1.4m to 2.75m (MRD, 1985).

Shallow drains of less than 20cm in depth have been excavated through the Tomah Road Wetland. These drain in a south-westerly direction into the Water Authority drain running parallel to the railway line.

#### 4.3 Vegetation and flora

##### 4.3.1 Vegetation

The area surrounding the road reserve has been cleared of much of its native vegetation for agricultural, residential and industrial land uses. The immediate margins of the swamp have been grazed. Remaining stands of native vegetation are confined to the wetland areas and these are fragmented by fence lines, narrow firebreaks and paths.

Le Provost, Semenuik and Chalmer (1987) undertook an assessment of the vegetation of the Tomah Road Wetland (Figure 1). Subsequent to the above survey, extensive clearing for industrial development has occurred, effectively removing a large percent of the low heath complex, and substantially reducing the area of the wetland (see Figure 2).

Seven vegetation types were identified within the road reserve and these are complimented by an additional flora survey, the results of which are presented in Table 1. The seven vegetation types can be divided into three structural groups, namely:

## Heath

1. **Low Closed Heath** - Dense heath of 1-2m in height. Astartea fascicularis, Pericalymma ellipticum, Leptospermum laevigatum, Verticordia densiflora and Hypocalymma angustifolium cover the majority of the area of the wetland. A small remnant stand of Banksia telmatiaea (see Table 1) also occurs with scattered Kingia australis. This vegetation also contains species similar to the understorey species of the Banksia-Kunzea association (Vegetation Type 3) such as Stirlingia latifolia, Hakea varia, Hakea prostrata, Dampiera linearis, Euchilopsis linearis, Acacia pulchella and Jacksonia floribunda, suggesting that a gradient between these two vegetation associations once occurred before clearing and disturbance. The wetter areas of the heath support isolated, more wetland shrubs and trees such as Viminaria juncea, Eucalyptus rudis and Melaleuca preissiana. Scattered Nuytsia floribunda also occurs throughout the heath. Introduced species such as the bulbous Watsonia pyramidata and Gladiolus caryophyllaceus, and the grasses Ehrharta calycina and Eragrostis setifolia are common adjacent to cleared areas.

## Forest

2. **Low Open Forest** - where this occurs in swampy areas it contains Melaleuca preissiana with an understorey of Agonis linearifolia whilst on higher ground Eucalyptus rudis and Melaleuca raphiophylla predominate. Where open water occurs, sedges Lepidosperma longitudinale, Schoenus spp. and Cyperus spp. occur.
3. **Low Banksia-Kunzea Woodland** - this association consists mainly of Banksia menziesii, Banksia attenuata, Adenanthos sericeus and occasionally Banksia ilicifolia trees and Kunzea micrantha and Kunzea ericifolia. The understorey vegetation is open and consists of Dampiera linearis, Acacia pulchella, Jacksonia floribunda, Hovea trisperma, Astroloma sp., Xanthorrhoea preissii, Conostylis filifolia, Patersonia occidentalis and scattered Nuytsia floribunda.
4. **Closed Eucalyptus calophylla (Marri) Woodland** - this vegetation occurs on the low ridges and contains patches of Melaleuca raphiophylla with scattered Nuytsia floribunda and Hakea prostrata.

## Scrub

5. **Melaleuca Closed Scrub** - a swampy area to the east contains Melaleuca raphiophylla and Melaleuca lateritia. The understorey consists of pasture grasses and scattered shrubs of Astartea fascicularis, Leptospermum laevigatum and

Hypocalymma angustifolium. Wet areas are reedy with stands of Typha domingensis and Juncus pallidus.

6. Tall Melaleuca-Agonis scrub - tall scrub of Melaleuca raphiophylla, Agonis linearifolia and Agonis parviceps is found on swampy ground. Astartea fascicularis and tall scrub of Hakea varia, Hakea prostrata and Pericalymma ellipticum is also present, and Stylidium sp. occurs on cleared sandy areas.
7. Tall Melaleuca viminea scrub - a small area of this scrubland occurs on drained, seasonally inundated sandy soils. The understorey is composed of short grasses and introduced weeds.

#### 4.3.2 Flora

A search of known records of Declared Rare Flora and Reserve List Flora was undertaken and showed the following species occur in the greater region of the study area. However, none of these species were found in the study area during detailed searches.

##### a) Declared Rare Flora

The following seven Declared Rare Flora species have been found in the greater region and occur in the habitats similar to that found in the study area:

Aponogeton hexatepalus,  
Caladenia sp. (Swan Coastal Plain),  
Diuris laxiflora aff.,  
Diuris purdiei,  
Drakaea micrantha,  
Drosera occidentalis, and  
Hydrocotyle lemnoides.

##### b) Reserve List Flora

The following species occur as Reserve List Flora for the areas of Wattle Grove and Cannington:

##### - Wattle Grove

Grevillea thelemanniana ssp. thelemanniana.

##### - Cannington

Anthotium junciforme,  
Haloragis aculeolata,  
Lepidosperma rostratum,  
Phlebocarya filifolia,  
Schoenus andrewsii,  
Schoenus natans,

Schoenus pennisetis, and  
Tetraria australiensis.

Of these species Phlebocarya filifolia is associated with heathlands. All others are associated with winter wet depressions or damp swampy areas. Haloragis aculeolata and Lepidosperma rostratum have only been located in the Cannington area.

#### 4.4 Fauna

Wetlands commonly serve as habitats for birds, reptiles and small vertebrate fauna. The report by Le Provost, Semenuik and Chalmers suggests that the area cannot be regarded as a significant vertebrate fauna habitat due to its reduced size. Although the wetlands within the road reserve are relatively small and have been bisected by existing roads, the complexity and diversity of vegetation types suggests that a range of fauna species may be present. Furthermore, due to the enclosure of these habitat areas by surrounding urban and rural development, it is likely that these areas have become "island" habitats for several species. A field survey of tracks, scats, signs and direct observation indicates that the area supports a surprisingly large diversity of fauna. Seven species of native mammals have been observed (Table 2), the most obvious being the Southern Brown Bandicoot (Isoodon obesulus). Diggings and burrows of these animals are common in the heath (Vegetation Type 1), and in particular the moister ground of the tall Melaleuca raphiophylla-Agonis scrub (Vegetation Type 6). Population densities of bandicoots are known to be highly variable and high densities have been found in moist areas (M. Howe pers. comm. Western Australian Museum). It is likely that these numbers have been accentuated by the recent extensive clearing of nearby heathland. In this event, it is unlikely that the carrying capacity of the open scrub habitat would support these high numbers indefinitely. Scats, tracks and signs of the Western Brush Wallaby (Macropus irma) were recorded and an isolated observation has been made (B. Holze pers. comm.), although the numbers of this animal are unknown. Other native mammals observed include the echidna (Tachyglossus aculeatus), the Honey-possum (Tarsipes rostratus), the Water-rat (Hydromys chrysogaster) the Yellow-footed Antechinus or Mardoo (Antechinus flavipes) and the Common Dunnart (Sminthopsis murina). Other native mammals not observed but which may occur include the Bush Rat (Rattus fuscipes), the Pygmy Possum (Cercartetus concinnus) and the Ash-grey Mouse (Pseudomys albocinereus).

The status of the Brush-tailed Possum (Trichosurus vulpecular) is known to have declined regionally, but it is likely that this species was present prior to the recent extensive clearing of the area for industrial development. Due to its requirement for mature eucalypt trees for nesting hollows, it is unlikely that this species has survived in the area.

Introduced mammals known to inhabit this area include the Black Rat (Rattus rattus), the House Mouse (Mus musculus), the Rabbit (Oryctolagus cuniculus), the Cat (Felis catus) and the Fox (Vulpes vulpes). In addition, domestic dogs are known to frequent the area regularly.

The wetland complex provides a habitat for a large number of bird species including many species of waterfowl. Over 87 species are likely to visit the area, of which 50 species have been observed at the Tomah Road wetlands (see Table 3).

Large tree nesting species such as the Straw-Necked Ibis (Threskiornis spinicollis) the White Ibis (Threskiornis molucca), the Little Egret (Egretta garzetta), several Heron species (Ardea pacifica, Ardea novaehollandiae) and the Spoonbill (Platalea sp.) have been observed in tall Melaleuca trees of the site. Other species are attracted to the nectar and insects associated with the Banksia-Kunzea woodlands and heath flora.

Frog and reptile species which are expected to occur at the site have been obtained from Western Australian Museum lists from an area south of the Swan River to Rockingham (Table 4). The frog fauna is expected to be quite large due to the diversity of wetland habitats available. Most species require free water for breeding except for Myobatrachus gouldii which breeds in damp burrows.

The reptiles are represented by 29 lizard species and 15 snake species. These are more likely to be associated with the drier habitats than the wetlands. The gecko Phyllodactylus marmoratus is almost certain to be present. Legless lizards and skinks are also likely to be diverse. Due to the small size of the remnant native vegetation, it is unlikely that any of the large dragon lizards or goannas (Varanus sp.) would be present in large numbers. Snake species are poorly known because they are cryptic and difficult to trap. Of the species which may occur on site only two common species have been recorded for the area, namely, the Dugite (Pseudonaja affinis) and the Tiger Snake (Notechis scutatus) (B. Holze pers. comm.).

Due to the vegetation complexity and the number of summer flowering plants, the invertebrate species are likely to be particularly abundant. Crustaceans observed include Gilgies (Cherax quinquecarinatus) and Marron (Cherax tenuimanus). Le Provost, Semenuik and Chalmers report several species of dragonflies, five species of butterfly, several species of orb-weaver spiders, bee-flies, hover-flies, assassin-bugs and several species of orthoptera.

#### 4.5 Aboriginal sites

An Aboriginal sites survey was undertaken between Tonkin Highway and Welshpool Road (MRD, 1989). Several sites were identified

but were not recorded as being of importance, and the Western Australian Museum has given approval for the sites to be disturbed for the purpose of the Roe Highway extension.

#### 4.6 Current degradation

The wetland complex is in parts badly degraded due to previous and current land usage. Large areas of land which have been cleared or disturbed contain introduced grasses and weeds including large stands of the noxious Caster-oil bush (Ricinus communis). Grazing of the area has resulted in little or no native understorey species remaining in the Melaleuca viminea vegetation association (Vegetation Type 7). Paths and firebreaks have been cut through the vegetation along property boundaries and parts of the wetland has been used as a small waste disposal site and contains several abandoned vehicles. Drainage lines associated with adjacent industrial development have been constructed recently through an area of wetland with subsequent altering of natural drainage.

### 5.0 ENVIRONMENTAL IMPACT ASSESSMENT

Some of the potential environmental impacts of the proposed highway extension are outlined in the Environmental Assessment Report prepared by the MRD (1989). A more detailed assessment is given below.

#### 5.1 Vegetation and flora

##### 5.1.1 Vegetation

Five of the seven vegetation associations in the study area will be affected by the proposed highway extension. As a percentage of total vegetation types, the development will have the greatest effect on the low Banksia-Kunzea woodland (Vegetation Type 3) followed closely by the low open forest of Melaleuca preissiana and Agonis sp. (Vegetation Type 2) and by the tall scrub Melaleuca raphiophylla, Agonis sp. and Astartea sp. (Vegetation Type 6). To a lesser extent the closed heath of Astartea sp., Leptospermum sp. and Verticordia sp. (Vegetation Type 1) and the closed scrub of Melaleuca raphiophylla and Melaleuca lateritia (Vegetation Type 5) will be affected. As a total percentage of developed area the closed heath will be most affected.

##### 5.1.2 Flora

Botanical searches suggest that no Declared Rare Flora or Reserve List Flora will be destroyed or affected by the proposed extension of the Highway.

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FIGURE 2  
CURRENT  
DISTRIBUTION OF  
VEGETATION OF THE  
TOMAH ROAD WETLAND

TABLE 1

FLORA OF THE STUDY AREA DISTRIBUTED  
ACCORDING TO VEGETATION ASSOCIATION

## VEGETATION TYPES

- |   |  |
|---|--|
| 1 - Low closed Heath                    | 2 - Low open forest (swamp)            |
| 3 - Low <u>Banksia-Kunzea</u> woodland  | 4 - Closed Marri woodland              |
| 5 - <u>Melaleuca</u> closed scrub       | 6 - Tall <u>Melaleuca-Agonis</u> scrub |
| 7 - Tall <u>Melaleuca viminea</u> scrub | * - Introduced species                 |

SPECIES	VEGETATION TYPE						
	1	2	3	4	5	6	7
<b>GYMNOSPERMAE</b>							
<b>ZAMIACEAE</b>							
Macrozamia riedlei	x						
<b>ANGIOSPERMAE - MONOCOTYLEDONEAE</b>							
<b>CYPERACEAE</b>							
Cyperus tenuiflorus							
Lepidosperma longitudinale	x						
Schoenus nanus		x			x	x	
<b>HAEMODORACEAE</b>							
Anigozanthos humilis	x						
Anigozanthos viridis	x						
Conostylis filifolia	x						
Haemodorum brevisepalum							x
<b>IRIDACEAE</b>							
* Gladiolus caryophyllaceus		x					
Homeria collina	x					x	
Patersonia occidentalis	x		x		x		
* Romulea rosea	x						
* Watsonia pyramidata	x	x					
<b>JUNCACEAE</b>							
Juncus pallidus	x	x			x		
<b>LILIACEAE</b>							
Burchardia umbellata	x		x				
Laxmannia ramosa							
Wurmbea dioica		x			x		
<b>ORCHIDACEAE</b>							
Caladenia sp.	x						

SPECIES	VEGETATION					TYPE	
	1	2	3	4	5	6	7
POACEAE							
Amhipogon turbinatus	x						
Ehrharta calycina	x	x					
Eragrostis setifolia	x	x					
RESTIONACEAE							
Leptocarpus coangustatus					x		x
Loxocarya flexuosa					x		
Lyginia barbata	x	x					
Restio sp.		x			x		
XANTHORRHOEACEAE							
Dasyogon bromeliifolius	x						
Lomandra caespitosa	x						x
Xanthorrhoea preissii	x						
ANGIOSPERMAE - DICOTYLEDONAE							
APIACEAE							
Centella asiatica						x	
ANTHERICACEAE							
Tricoryne elatior		x					
ASTERACEAE							
Arctotheca calendula						x	
Cotula coronopifolia						x	
Gnaphalium sp						x	
CASUARINACEAE							
Casuarina obesa						x	
CONVOLVULACEAE							
Wilsonia backhousei	x		x			x	
DILLENIAEAE							
Hibbertia hypericoides	x		x				
DROSERACEAE							
Drosera erythrorhiza	x						
Drosera macrantha							x
FABACEAE (PAPILIONACEAE)							
Aotus gracillima	x						x
Euchilopsis linearis	x						
Hovea trisperma	x						
Jacksonia floribunda	x		x				

SPECIES	V E G E T A T I O N					T Y P E	
	1	2	3	4	5	6	7
Jacksonia furcellata	x						
Jacksonia sternbergiana		x					
Kennedia prostrata							x
* Lupinus albus							x
Oxylobium capitatum	x	x	x		x		x
Sphaerolobium medium			x				
Viminaria juncea	x						
GERANIACEAE							
Pelargonium capitatum							x
GOODENIACEAE							
Dampiera linearis	x		x				
LAMIACEAE							
Hemiandra pungens	x						
LAURACEAE							
Cassytha sp.	x						
LORANTHACEAE							
Nuytsia floribunda	x						
MIMOSACEAE							
Acacia pulchella	x		x				
Acacia saligna							x
Acacia willdenowiana	x						
MYRTACEAE							
Agonis linearifolia		x			x		x
Agonis parviceps		x					x
Astartea fascicularis	x				x		x
Calothamnus lateralis	x						
Eucalyptus calophylla	x			x	x		
Eucalyptus rudis		x					
Hypocalymma angustifolium	x		x		x		
Kunzea ericifolia			x				
Kunzea micrantha			x		x		
Leptospermum laevigatum	x						
Melaleuca lateritia	x				x		
Melaleuca preissiana	x	x			x		
Melaleuca raphiophylla				x	x		x
Melaleuca scabra	x						
Melaleuca viminea							
Pericalymma ellipticum	x	x					x
Verticordia densiflora	x	x					

SPECIES	VEGETATION					TYPE	
	1	2	3	4	5	6	7
PROTEACEAE							
Adenanthos cygnorum			X				
Adenanthos sericeus			X				
Banksia attenuata							
Banksia ilicifolia			X				
Banksia menziesii			X				
Banksia telmatiaea	X						
Dryandra nivea	X		X				
Hakea prostrata				X		X	
Hakea sulcata	X					X	
Hakea varia	X						
Stirlingia latifolia	X		X				
RUTACEAE							
Eriostemon spicatus	X		X				
STYLIDIACEAE							
Stylidium sp.							X
TYPHACEAE							
Typha domingensis		X		X			

TABLE 2

## SPECIES OF MAMMALS RECORDED AT THE STUDY SITE

## NATIVE SPECIES

Echidna	Tachyglossus aculeatus
Brush Wallaby	Macropus irma
Pygmy Possum	Cercartetus concinnus
Honey Possum	Tarsipes rostratus
Southern Brown Bandicoot	Isodon obesulus
Bush Rat	Rattus fuscipes
Ash-grey Mouse	Pseudomys albocinereus
Common Dunnart	Sminthopsis murina

## INTRODUCED SPECIES

House Mouse	Mus musculus
Black Rat	Rattus rattus
Rabbit	Oryctolagus cuniculus
Cat	Felis catus
Fox	Vulpes vulpes

TABLE 3 BIRD SPECIES RECORDED OR EXPECTED TO OCCUR AT THE STUDY SITE

\* Species actually recorded on the site  
(this consultant and B. Holze Pers. Comm.)

* Australian Little Grebe	<i>Podiceps novaehollandiae</i>
* Straw-necked Ibis	<i>Threskiornis spinicollis</i>
* White Ibis	<i>Threskiornis molucca</i>
* Little Egret	<i>Egretta garzetta</i>
* White-necked heron	<i>Ardea pacifica</i>
* White-faced Heron	<i>Ardea novaehollandiae</i>
* Spoonbill	<i>Platalea sp.</i>
* Black Swan	<i>Cygnus artratus</i>
* Grey Teal	<i>Anas gibberifrons</i>
* Black Duck	<i>Anas superciliosa</i>
* Wood Duck	<i>Chenonetta jubata</i>
* Mountain Duck	<i>Tadorna tadornoides</i>
Black-shouldered Kite	<i>Elanus notatus</i>
Whistling Kite	<i>Haliastur spenurus</i>
Australian Goshawk	<i>Accipiter fasciatus</i>
Collared Sparrowhawk	<i>Accipiter cirrhocephalus</i>
Peregrine Falcon	<i>Falco peregrinus</i>
Little Falcon	<i>Falco longipennis</i>
Brown Falcon	<i>Falco berigora</i>
* Australian Kestrel or Nankeen Kestrel	<i>Falco cenchroides</i>
* Banded stilt	<i>Cladorhynchus leucocephalus</i>
* Diamond Dove	<i>Geopelia cuneata</i>
Common Bronzewing	<i>Phaps chalcoptera</i>
Brush Bronzewing	<i>Phaps elegans</i>
* White-tailed Black Cockatoo	<i>Calyptorhynchus sp.</i>
* Galah	<i>Cacatua roseicapilla</i>
Purple-crowned Lorikeet	<i>Glossopsitta porphyrocephala</i>
* Red-capped Parrot	<i>Purpureicephalus spurius</i>
* Port Lincoln Parrot or Ring-Necked Parrot	<i>Barnardius zonarius</i>
* Twenty-eight Parrot	<i>Barnardius zonarius semitorquatus</i>
* Western Rosella	<i>Platycercus icterotis</i>
Elegant Parrot	<i>Neophema elegans</i>
Pallid Cuckoo	<i>Cuculus pallidus</i>
Fan-tailed Cuckoo	<i>Cuculus pyrrhophanus</i>
Horsfield's Bronze-cuckoo	<i>Chrysococcyx basalis</i>
Shining Bronze-cuckoo	<i>Chrysococcyx lucidus</i>
* Boobook Owl	<i>Ninox novaeseelandiae</i>
Barking Owl	<i>Ninox connivens</i>
Barn Owl	<i>Ninox alba</i>
* Tawny Frogmouth	<i>Podargus strigoides</i>
* Spotted Nightjar	<i>Eurostopodus guttatus</i>

* Laughing Kookaburra	<i>Dacelo novaeguineae</i>
* Sacred Kingfisher	<i>Halcyon sancta</i>
* Rainbow Bee-eater	<i>Merops ornatus</i>
White-backed Swallow	<i>Cheramoeca leucosternum</i>
* Welcome Swallow	<i>Hirundo neoxena</i>
* Tree Martin	<i>Cecropis nigricans</i>
* Fairy Martin	<i>Petrochelidon ariel</i>
* Richard's Pipit	<i>Anthus novaeseelandiae</i>
or Australian Pipit	
* Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>
White-winged Triller	<i>Lalage sueurii</i>
* Scarlet Robin	<i>Petroica multicolor</i>
* Red-capped Robin	<i>Petroica goodenovii</i>
Golden Whistler	<i>Pachycephala pectoralis</i>
* Rufous Whistler	<i>Pachycephala rufiventris</i>
Grey Shrike-thrush	<i>Colluricincla harmonica</i>
* Grey Fantail	<i>Rhipidura fuliginosa</i>
* Willie Wagtail	<i>Rhipidura leucophrys</i>
Splendid Fairy-wren	<i>Malurus splendens</i>
Spotted Scrubwren	<i>Sericornis frontalis</i>
* Red-capped Robin	<i>Petroica goodenovii</i>
Weebill	<i>Smicrornis brevirostris</i>
* White-tailed Warbler	<i>Gerygone fusca</i>
or Western Flyeater	
* Broad-tailed Thornbill	<i>Acanthiza apicalis</i>
Western Thornbill	<i>Acanthiza inornata</i>
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>
Varied Sittella	<i>Daphoenositta chrysoptera</i>
* Red Wattlebird	<i>Anthochaera carunculata</i>
Little Wattlebird	<i>Anthochaera chrysoptera</i>
White-rumped Miner	<i>Manorina flavigula</i>
Singing Honeyeater	<i>Lichenostomus virescens</i>
* Brown Honeyeater	<i>Lichmera indistincta</i>
* New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>
White-cheeked Honeyeater	<i>Phylidonyris nigra</i>
* Western Spinebill	<i>Acanthorhynchus superciliosus</i>
White-fronted Chat	<i>Epthianura albifrons</i>
Mistletoebird	<i>Dicaeum hirundinaceum</i>
Spotted Pardalote	<i>Pardalotus punctatus</i>
Striated Pardalote	<i>Pardalotus striatus</i>
* Silvereye	<i>Zosterops lateralis</i>
* Zebra Finch	<i>Taeniopygia guttata</i>
Black-faced Woodswallow	<i>Artamus cinereus</i>
* Dusky Woodswallow	<i>Artamus cyanopterus</i>
Magpie-lark	<i>Grallina cyanoleuca</i>
* Grey Butcherbird	<i>Cracticus torquatus</i>
* Australian Magpie	<i>Gymnorhina tibicen</i>
* Australian Raven	<i>Corvus coronoides</i>

TABLE 4 FROGS AND REPTILES EXPECTED TO OCCUR AT  
THE STUDY SITE, BY HABITAT

	<u>BANKSIA WOODLAND</u>	LOW LYING AREAS
<b>FROGS</b>		
Heleioporus eyrei	x	x
Limnodynastes dorsalis	x	x
Myobatrachus gouldii	x	x
Ranidella insignifera		
<b>LEGLASS LIZARDS</b>		
Aprasia pulchella		
Aprasia repens	x	x
Delma fraseri	x	x
Delma greyii	x	x
Lialis burtonis	x	x
Pletholax gracilis	x	x
Pygopus lepidopodus	x	x
<b>Skinks</b>		
Cryptoblepharus plagiocephalus	x	x
Ctenotus fallens	x	x
Ctenotus gemmula	x	x
Ctenotus impar	x	x
Ctenotus lesueuri	x	x
Egernia luctuosa		x
Egernia napoleonis	x	x
Hemiergis peronii	x	x
Leilopisma trilineatum		x
Lerista elegans	x	x
Lerista lineata	x	x
Lerista praepedita	x	x
Menetia greyii	x	x
Morethia lineocellata	x	x
Morethia obscura		x
Tiliqua occipitalis	x	x
Tiliqua rugosa	x	x
<b>DRAGON LIZARDS</b>		
Pogona minor	x	x
Tympanocryptis adelaidensis	x	x
<b>GOANNAS</b>		
Varanus gouldii	x	x

Varanus rosenbergi	x	x
Varanus tristis	x	x

**SNAKES**

Demansia psammophis	x	x
Morelia spilota	x	x
Morelia stimsoni	x	x
Notechis coronatus	x	x
Notechis curtus	x	x
Notechis scutatus		x
Pseudonaja affinis	x	x
Pseudonaja nuchalis	x	x
Ramphotyphlops australis	x	x
Rhinoplocephalus gouldii	x	x
Rhinoplocephalus nigriceps	x	x
Vermicella bertholdi	x	x
Vermicella bimaculata	x	x
Vermicella calanotos	x	x
Vermicella semifasciata	x	x

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**VEGETATION AND FLORA**

**SURVEY**

**OF THE**

**SHIRE OF KALAMUNDA**

**VESTED RESERVES**

**VOLUME 1 - REPORT**

**OCTOBER 1992 TO MARCH 1993**

**PAUL ARMSTRONG RESEARCH OFFICER**

**SHIRE OF KALAMUNDA**

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VEGETATION AND FLORA  
SURVEY  
OF THE  
SHIRE OF KALAMUNDA  
VESTED RESERVES

VOLUME 2 - RESERVE SPECIES LIST

OCTOBER 1992 TO MARCH 1993

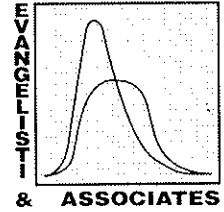
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# **WATER RESOURCES MANAGEMENT PLAN**

## **MIDDLE CANNING CATCHMENT**

(STAGE 1 - VOLUME 1)

Prepared for the

**Water Authority of Western Australia**

By

**Evangelisti & Associates**  
Consulting Engineers and Project Managers

in association with

**Landvision**  
Consultants in Urban and Environmental Planning

and

**The V & C Semeniuk Research Group**  
Environmental Scientists

October 1995