

YALLINGUP #1

= 1b

All 1b, possibly  
small areas of the  
wetland ~~that~~ would  
prove to be  
another f.c.t.

total area

= community type 1b

= 6.0416 ha

NB. There are possibly small  
areas of wetland that  
would prove to be another  
f.c.t.

YALLINGUP SIDING

orthophoto 1930 N5E  
Dec 1991

325400

AREA INFORMATION

System 6 Area (C or M) or Update Area (Update)

Conservation Area
Nature Reserve
Reserve No
National Park
Reserve No
Local Government
Reserve No ↑ 36717
Other DOLA Yallingup Siding
Proposed Conservation Areas
Local Government
Reserve No
Other

Conservation Area

Nature Reserve
Reserve No
National Park
Reserve No
Local Government
Reserve No
Other

TOTAL AREA

Bushland Area	6.0416	hectares
Completely Degraded		
area v disturbed overall, BRCA common, some patches from fire		

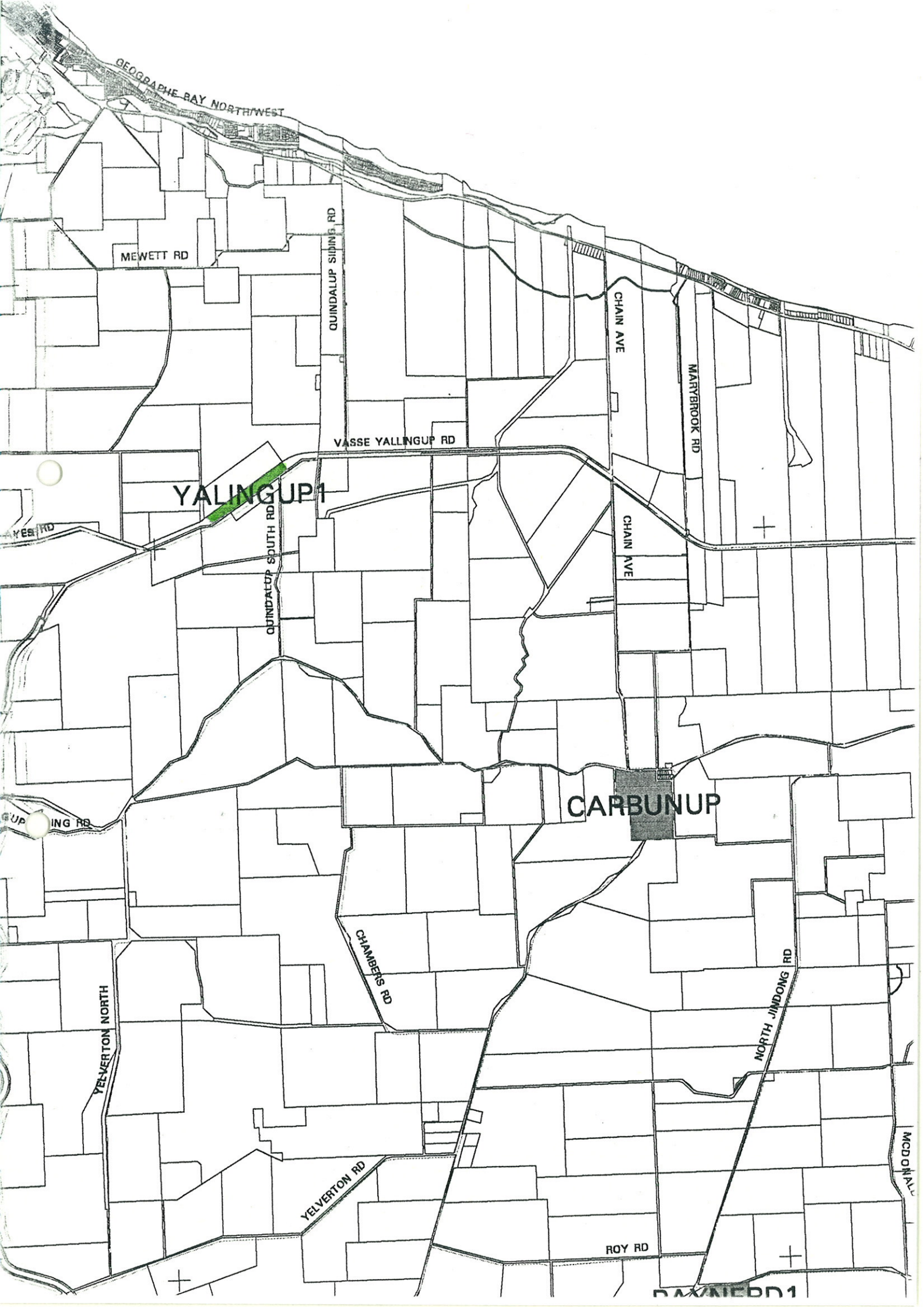
AREA MAPPED FLORISTIC UNITS

Units	Site (Condition)	Code	A: YALLINA	Bound	Area (ha)
1b	φ1 (3)			B	6.0416
	NB There are possibly small areas of wetland that would prove to be another unit				

Boundaries determined by use of

aerial photograph	Swan Coastal Plain run 2	28/11/90
orthophoto	1930 W SE	Dec 1991
vegetation map		
soil map		

Calm map - Busselton



GEOGRAPHE BAY NORTH/WEST

MEWETT RD

QUINDALUP SIDING RD

VASSE YALLINGUP RD

CHAIN AVE

MARYBROOK RD

YALINGUP 1

QUINDALUP SOUTH RD

CHAIN AVE

CARBUNUP

CHAMBERS RD

YELVERTON NORTH RD

NORTH JINDONG RD

YELVERTON RD

ROY RD

MCDONALD

RAKIEBD 1

## Issues

- inadequate survey - April
- one of few remaining remnants
- makes no reference to regional work (Gibson et al, English & Slyth)
- adj to TPPC's not mentioned
- other alternative locations
- further degradation of road reserve
- DKF known from nearby areas,



Reply to: RE>Dunsborough

Bev

Thanks for your note. As we did not get together on Friday I have listed the points of concern below and perhaps we can discuss them today

- Yallingup Siding, immediately to the left of junction Qindalup-Siding Rd and Vasse-Yallingup Rd on the latter road contains a threatened ecological community, which would be in the affected area on Vasse-Yallingup Rd
- Yallingup Siding also contains populations of *Caladenia busselliana* and *C. virescens*, both DRF these could also be in the affected area
- survey was in April when the above would not be found
- later draw down from the bores could impact on the vegetation and rare flora- there is so much cleared land in the area why don't they put the pipeline in the paddock and avoid adding further longterm disturbance to the area.

All the best Bronwen

-----  
Date: 30/7/98 7:40 AM

To: Bronwen Keighery

From: Bev Walker

hi bronwyn - I am out today but back tomorrow - I believe you want to discuss the Dunsborough proposal (construction of 6 bores and collector main) with me - I am concerned about the removal of vegetation corridor and I will also be recommending that the project be notified to the Soil Commissioner before we can set a level of assessment - speak to you tomorrow

## Memo

To: Maxine Dawson *via Peter Skelton*  
From: Guy Watson  
Date: 20 July 1998  
Subject: Water Corporation proposals - setting level of assessment

I refer to the two proposal - 'Dunsborough distributor main' and 'Dunsborough collector main', referred to the South West Regional Office for comment.

I note that both proposals involve the installation of a pipeline within or close to road reserves.

In relation to the distributor main proposal, the only real issue is the potential impact of the pipeline passing between EPP lakes. The document advises that the pipeline will remain within the road embankment and will not impact of the lakes. The proposed management appears to adequately address potential issues, so minimal impact is expected. A 'not assessed' level is recommended.

In relation to the collector main proposal, issues of rare flora and endangerment of fauna are highlighted. Again, the proposed management options appear to adequately address potential issues. I believe CALM needs to be closely involved with development close to these sensitive areas. A 'not assessed' or 'informal' level is recommended.

*Guy Watson*

*I support this proposal  
subject to further evaluation of  
the flora/fauna issues falling  
completely by eval. Div. with Calm.*

*[Signature]* 22/7/98.

## ENTERED ON GIS

**Name:** Interim Protection Areas (46) – Yallingup1  
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**Capture Author:** Thomas Leong

**Comments:**

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CONTACT DR N. GIBSON CALM WOODVALE for further information.

Flora list for Yallingup1 (extracted from Swan Coastal Plain database, Yaallin01, 80 taxa, 25/5/1995).

**Department of Environmental Protection System 6 Update: Site Based Flora List for Yallingup1**

(extracted from the CALM Swan Coastal Plain database, Yallin01, 80 taxa, 25/5/95)

Anthericaceae

- Caesia micrantha
- Chamaescilla corymbosa
- Thysanotus patersonii
- Thysanotus sparteus

Apiaceae

- Pentapeltis peltigera
- Platysace tenuissima
- Xanthosia candida
- Xanthosia huegelii

Asteraceae

- \* Hypochaeris glabra
- Lagenifera huegelii

Centrolepidaceae

- Centrolepis aristata

Colchicaceae

- Burchardia umbellata

Cyperaceae

- Cyathochaeta clandestina
- Lepidosperma angustatum
- Mesomelaena tetragona
- Tetraria octandra

Dasypogonaceae

- Lomandra brittanii
- Lomandra caespitosa
- Lomandra hermaphrodita
- Lomandra nigricans
- Lomandra preissii
- Lomandra purpurea
- Lomandra sericea

Dilleniaceae

- Hibbertia hypericoides

Droseraceae

- Drosera menziesii
- Drosera menziesii subsp. penicillaris

Euphorbiaceae

- Amperea ericoides
- Monotaxis occidentalis
- Poranthera huegelii

Goodeniaceae

- Dampiera linearis
- Scaevola calliptera

Haemodoraceae

- Conostylis setigera
- Haemodorum spicatum

Iridaceae

- Patersonia umbrosa var. xanthina

Lamiaceae

- Hemigenia ramosissima

Lindsaeaceae

- Lindsaea linearis

Mimosaceae

- Acacia flagelliformis
- Acacia mooreana
- Acacia myrtifolia
- Acacia stenoptera

Myrtaceae

- Eucalyptus calophylla
- Eucalyptus marginata
- Hypocalymma robustum

Orchidaceae

- Caladenia sp. scps
- Lyperanthus nigricans
- Prasophyllum parvifolium

Papilionaceae

- Daviesia decurrens
- Daviesia inflata
- Daviesia physodes
- Gompholobium confertum
- Gompholobium knightianum
- Gompholobium marginatum
- Gompholobium polymorphum
- Hovea chorizemifolia
- Hovea trisperma var. grandiflora
- Hovea trisperma var. trisperma
- Kennedia coccinea
- Sphaerolobium medium

Pittosporaceae

- Billardiera parviflora
- Billardiera variifolia

Poaceae

- Amphipogon amphipogonoides
- \* Briza maxima
- \* Briza minor
- Danthonia setacea
- Stipa semibarbata group scps
- Tetrarrhena laevis

Polygalaceae

- Comesperma virgatum

CONTACT DR N. GIBSON CALM WOODVALE for further information.

Flora list for Yallingup I (extracted from Swan Coastal Plain database, Yaallin01, 80 taxa, 25/5/1995).

Proteaceae

- Adenanthos intermedius scps
- Banksia grandis
- Hakea amplexicaulis

Restionaceae

- Loxocarya cinerea
- Loxocarya fasciculata

Rubiaceae

- Opercularia apiciflora
- Opercularia spermacocea

Rutaceae

- Eriostemon spicatus

Stackhousiaceae

- Stackhousia monogyna
- Tripterococcus brunonis

Stylidiaceae

- Stylidium amoenum
- Stylidium calcaratum

Xanthorrhoeaceae

- Xanthorrhoea gracilis





## ENTERED ON GIS

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**Capture Author:** Thomas Leong

**Comments:**

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**WATER CORPORATION**

**DUNSBOROUGH COLLECTOR MAIN**



**ENVIRONMENTAL ASSESSMENT &  
MANAGEMENT PLAN**

**JUNE 1998**

***ecologia***

**ENVIRONMENTAL CONSULTANTS**

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A	Photographs along the pipeline alignment
B	Flora species list in taxonomic order
C	Species list by site observed and bore location
D	Smapple lease document
E	Water and Rivers Commission conditions for pipeline crossing of Caribunup River and Anniebrook Drain.

## SUMMARY

The Water Corporation proposes to construct six bores and a collector main within a disused railway reserve near Busselton and then continue the collector main along the Quindalup Siding Road to the Quindalup Groundwater Treatment Plant (see Figure 1, page 2). Key aspects of the project environment are:

- the remnant vegetation along the railway reserve has conservation significance because it provides a corridor, is likely to contain rare flora, is in good condition in parts, is known to contain rare fauna and there is little similar vegetation within 15 km;
- fringing vegetation, such as occurs adjacent to the Carunup River is recognised as important by Western Australia's State of the Environment report;
- the Peppermint trees *Agonis flexuosa* provide habitat for the rare Schedule 1 gazetted Western Ringtail Possum *Pseudocheirus occidentalis*;
- environmental weeds are present in some parts of the railway reserve;
- vegetation along the Quindalup Siding Road generally only consists of remnant overstorey species and has little conservation value;
- some parts of the railway reserve have been leased by the Department of Land Administration; and
- the railway reserve, particularly the railway formation, is considered to have heritage value.

Main Roads Western Australia is currently examining route options from Vasse to Dunsborough, some of which parallel and/or cross the railway reserve.

Implementation of the following management recommendations should ensure that the project environment is adequately protected:

1. The pipeline will be located along the route recommended in Table 2 of this report to minimise clearing requirements.
2. The pipeline will bridge the Carunup River and Anniebrook Drain to a standard agreed to by the Shire of Busselton and bridgeworks will be planned to minimise impacts on the creek bed.
3. Clearing will be minimised by trimming vegetation rather than clearing it with earthmoving equipment where possible.
4. Survey pegs will be placed to mark all boundaries for the bore sites and pipeline. Dumping of soil and vegetation, turning of machinery and parking of vehicles will be prohibited in vegetation outside these boundaries.
5. Construction will be programmed to take place when soils are dry to minimise the spread of fungal diseases such as dieback.
6. Machinery will be cleaned of soil debris prior to entering the site.
7. Movement of soil will be minimised by careful stockpiling, re-using soil from where it was

- taken, and minimising vehicle movement along the rail corridor.
8. Weed regrowth will be monitored and controlled in early in the first spring after construction.
  9. Glyphosate that has wetting agents non toxic to frogs will be used for weed control near to wetlands.
  10. Fringing vegetation along the Carburnup River will be revegetated to about 30 m each side of the river following the completion of works.
  11. Revegetation of cleared areas will occur on sections of the pipeline which cross the railway reserve where vegetation associations remain intact (i.e. are not "cleared with remnant overstorey" - see Figure 5, page 8), around bores 1, 4, 5 & 6 and near the Carburnup River, and will be undertaken using local species identified by reference to the vegetation map (Figure 5, page 8) and description of the vegetation associations in Section 2.1.2, and to Appendix C for the bore sites.
  12. Arrangements will be made to collect all rubbish and construction waste and dispose of it at a licensed landfill site.
  13. Fires will not be permitted.
  14. Peppermint trees *Agonis flexuosa* will be trimmed rather than removed wherever possible.
  15. If clearing work using earthmoving equipment is required, Peppermint trees *Agonis flexuosa* will be examined for Schedule 1 Western Ringtail Possum *Pseudocheirus occidentalis dreys* (i.e. nests in the canopy) and their presence in tree hollows prior to commencement of works. Any findings will be reported to the Department of Conservation and Land Management.
  16. Drill holes will be securely covered immediately upon completion of drilling and all pits left overnight will include an escape path for fauna.
  17. To manage noise impacts, construction will occur between 7am and 7pm Monday to Saturday inclusive, be carried out in accordance section six of Australian Standard 2436-1991, and use the quietest reasonably available equipment.
  18. Pollution prevention measures normally used for construction activities, such as locating fuelling facilities in bunds and collecting and properly disposing of all waste oil and petroleum products will be implemented.
  19. The old railway formation will be re-instated to its original shape where the pipeline crosses the formation.
  20. The management recommendations in this report should be integrated into contracts let by the Water Corporation, and employees should be educated about the environmental commitments detailed in this plan.

## 1. INTRODUCTION

The Water Corporation proposes to construct six bores and a collector main within a disused railway reserve near Busselton and then continue the collector main along the Quindalup Siding Road to the Quindalup Groundwater Treatment Plant (see Figure 1, page 2). The pipeline will be a 400 mm diameter steel pipeline which will be generally be buried about 600 mm below the surface. *ecologia* Environmental Consultants were commissioned to prepare an environmental impact assessment and an environmental management plan for the proposal, which includes recommendations on where the pipe should be located within the railway and road reserves to minimise environmental impacts.

A rectangular drilling pad of about 40 by 25 m is required for drilling operations at each bore site.

### 1.2 Other proposals along the route

Main Roads Western Australia is currently considering a number of route options between Vasse and Dunsborough, two of which run along or near the rail reserve where the pipeline is proposed (see Figure 2, page 3). The Red option runs within the rail reserve, whilst the Orange option runs parallel and adjacent to the rail reserve, crossing it at two locations.

Main Roads Western Australia's route options study mapped environmental and heritage constraints within a study area which includes the area affected by the collector main. The environmental and heritage constraints map, prepared by Halpern Glick Maunsell and provided courtesy of Main Roads Western Australia is reproduced as Figure 3 (see page 4).

The Shire of Busselton is currently involved in a 'Rails to Trails' project which seeks to establish walking tracks along disused railway alignments. A trail is planned for the section of railway affected by the pipeline proposal. *ecologia* Environmental Consultants was advised that the trail would travel on top of the railway embankment and would not involve any clearing apart from some under-pruning of Peppermints.

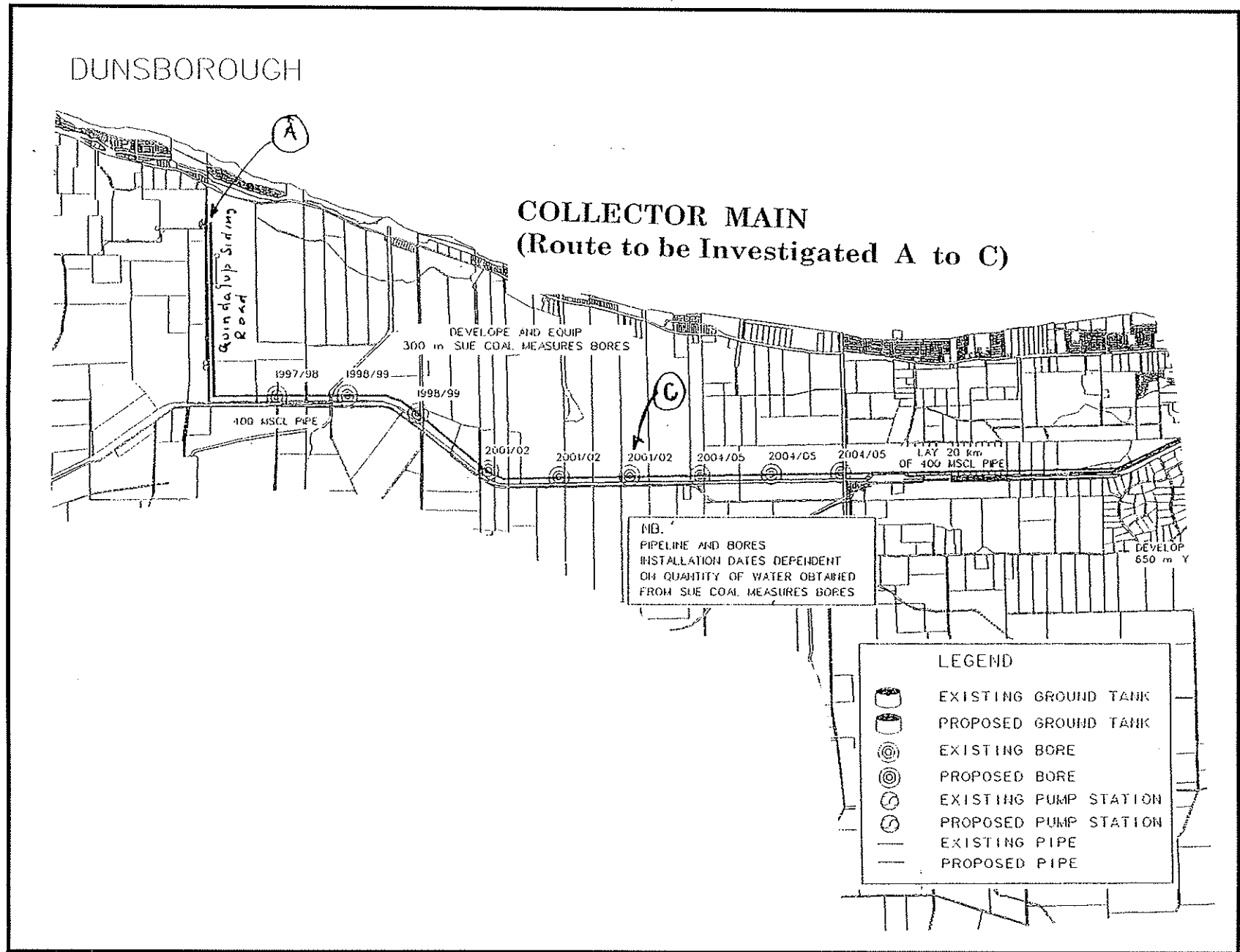
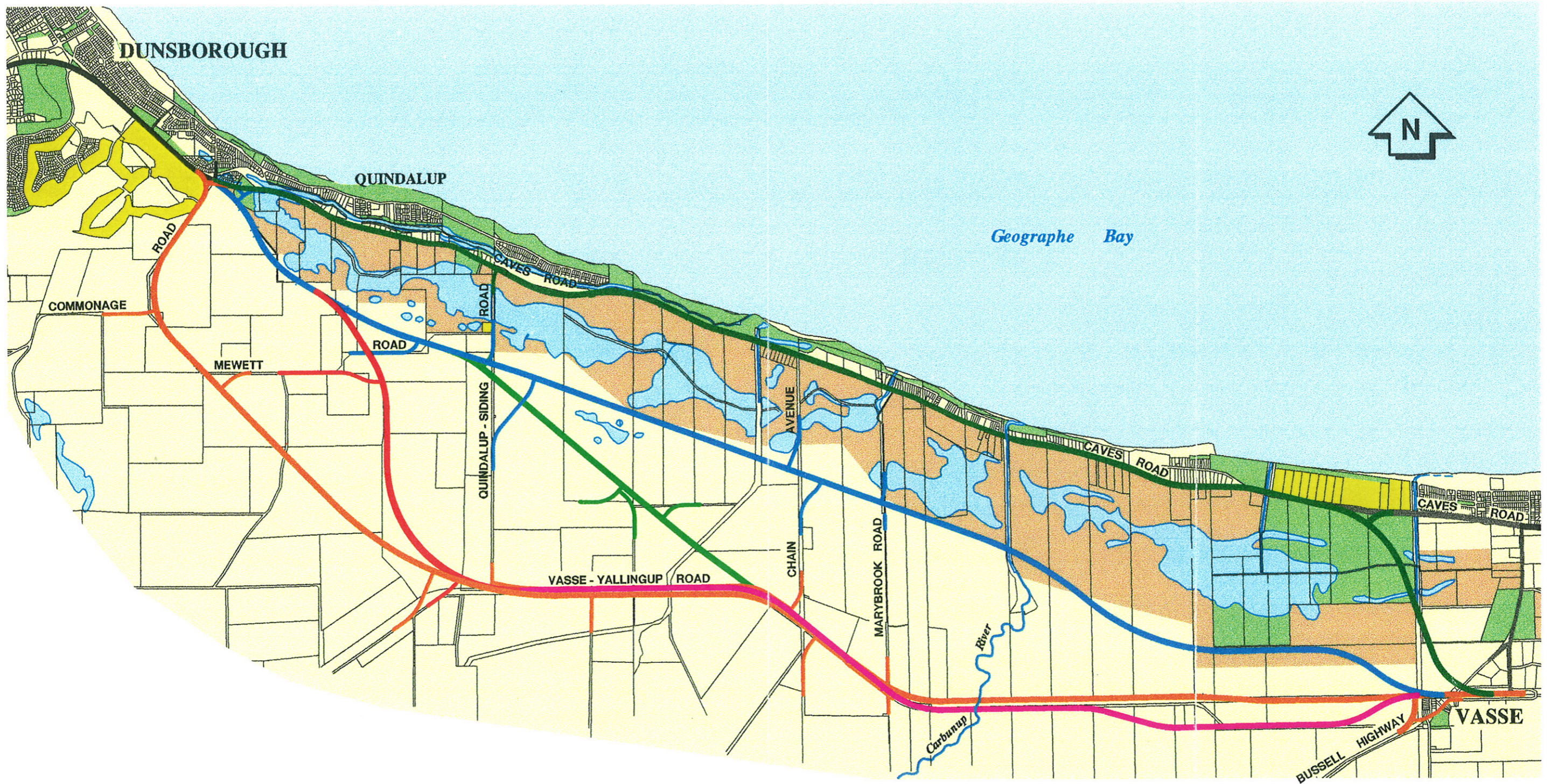


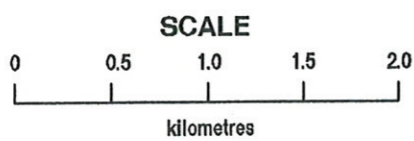
Figure 1: General route proposed for the collector main

**ecologia Environmental Consultants**  
76 Thomas St West Perth WA 6005 Phone 9322 1944



**LEGEND**

- Proposed Conservation Areas
- Recreation Reserve
- Rivers, Drains and Areas Subject to Inundation
- Special Purpose

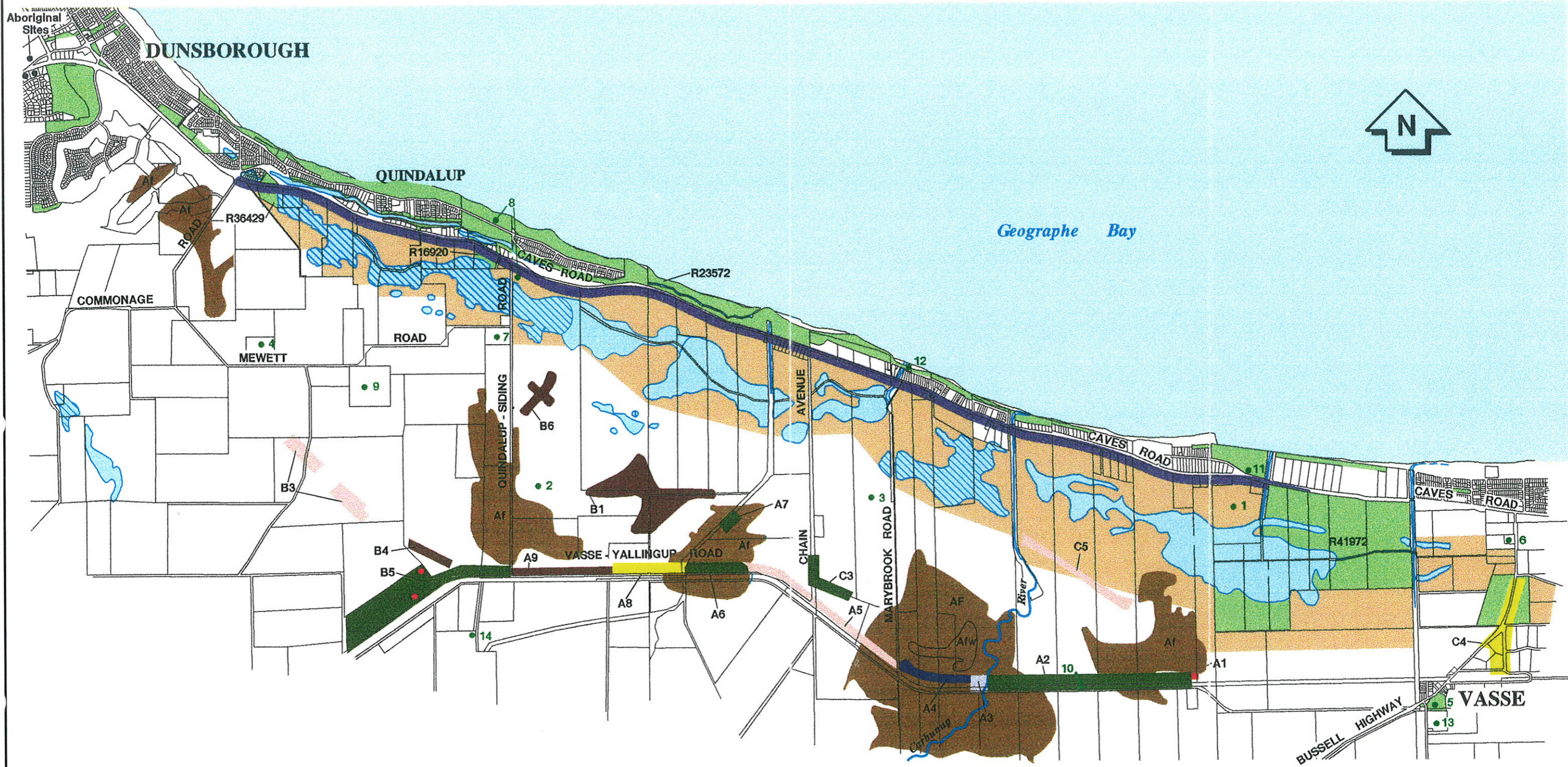


Halpern  
Glick  
Maunsell



Consulting Engineers and  
Environmental Scientists

**FIGURE 2 : VASSE - DUNSBOROUGH PLANNING STUDY  
FUTURE ROAD LINK - REFINED OPTIONS**



**Legend : Environment and Heritage Constraints**

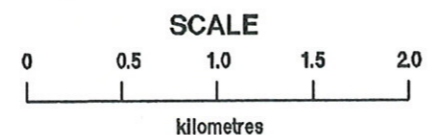
- European Heritage Sites
- Aboriginal Sites
- Declared Rare and Endangered Flora
- Recreation Reserves
- Survey Site
- Proposed Conservation Area

**Vegetation Associations in the vicinity of route alignment options**

- *Eucalyptus globulus* Plantation
- *Eucalyptus calophylla/Agonis flexuosa* Woodland
- *Eucalyptus rudis/Eucalyptus calophylla* Open Woodland
- *Agonis flexuosa* Low Closed Forest
- *Eucalyptus calophylla* Open Woodland
- *Eucalyptus marginata/Eucalyptus calophylla* Open Woodland
- *Eucalyptus rudis/Melaleuca raphiophylla* Low Woodland
- *Agonis flexuosa/Agonis juniperina* Closed Scrub

**Land Units**

- AF Well drained flats with deep red sands, loams and light clays (ie Marybrook Soils)
- AI Well drained flats with some red brown loams (ie. Marybrook Soils).
- AIV Slight depressions which are poorly drained in winter with deep red brown loams (ie.Marybrook Soils)
- EPP Wetlands
- Rivers Drains and Areas subject to inundation



**FIGURE 3 : VASSE - DUNSBOROUGH PLANNING STUDY ENVIRONMENTAL AND HERITAGE CONSTRAINTS**

## 2. PROJECT ENVIRONMENT

### 2.1 Climate

The South-west region is characterised by dry summers and wet winters resulting from a succession of high and low-pressure systems which move eastward.

Recorded extremes of average temperatures for Busselton, east of the project area, are 28.9 °C and 7.9 °C. Mean annual maximum temperature is 22.1 °C with average maximum temperatures ranging from 28.9 °C during February to 16.6 °C in July (Figure 4 below). The average annual rainfall for Busselton is 821 mm.

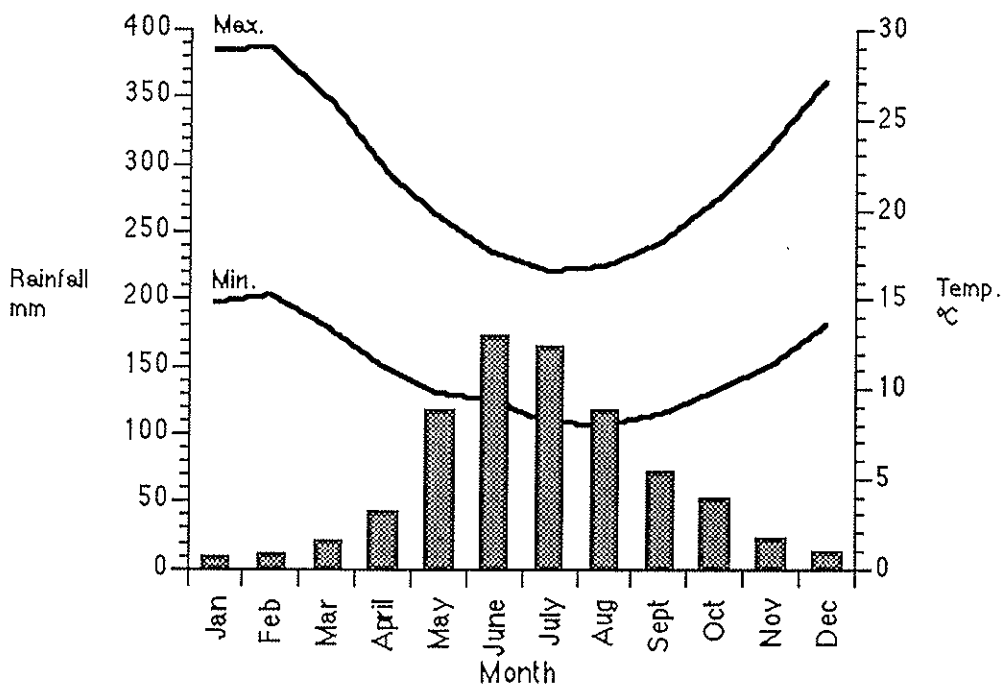


Figure 4: Mean monthly maximum and minimum temperatures and rainfall for Busselton.

### 2.1. Vegetation

In order to properly assess the project environment vegetation and flora an on-site survey was undertaken. The methodology for the survey, and the resultant project environment descriptions relating to vegetation associations, rare flora and introduced flora follow.

#### 2.1.1 Vegetation and flora survey methodology

The Quindalup Siding and railway reserve were surveyed on 29 April 1998. The methodology involved broadscale vegetation mapping, detailed survey sites, opportunistic collection and

observation of disturbance history including fire, disease and distribution of weeds. The methodology for each of these is provided below.

### Vegetation Mapping

Vegetation associations were mapped according to the composition and density of overstorey species, major shifts in understorey species and disturbance. This was done using field observation, opportunistic collections and data obtained from detailed flora sites.

### Detailed Survey Sites

10 x 10 m or 100 square metre equivalent detailed survey sites were located at bore sites where there is remaining vegetation. This size is used for the south west by the Department of Conservation and Land Management and enables the comparison of species richness to similar vegetation types to determine conservation value. This is required in accordance with the criteria in the publication, Environmental Evaluation of Native Vegetation in the Wheatbelt of Western Australia (Safstrom and Craig, 1996) and encourages the protection of vegetation that has 25 - 30 perennial species per 100 square metres. Detailed site description involves noting soil type, level of disturbance (weeds, disease, earthworks), vegetation strata and density, flora composition and fire history.

### Opportunistic Collections

Opportunistic collection of flora and weed species were made to confirm habitat and association boundaries. It also increases the likelihood of recording Declared Rare and Priority flora species present in the survey area.

### Disturbance History

Observation of disturbance such as fire, dieback, earthworks, clearing and weed invasion enable overall assessment for bushland and the implications for future protection and management.

Appendix A is a collection of photographs from along the alignment.

## **2.1.2 Vegetation Associations**

The vegetation along the siding road is broadly classified as Marri *Eucalyptus calophylla* and Peppermint *Agonis flexuosa* forest with some cleared areas with or without remnant overstorey. The variation in the Marri/Peppermint forest consists of minor shifts in density and understorey composition. These are as follows:

### **A. *Eucalyptus calophylla* woodlands/forest**

- i. *Eucalyptus calophylla*/*Agonis flexuosa* forest over *Melaleuca raphiophylla*/*Banksia* spp. open low woodland

*Eucalyptus calophylla*/*Agonis flexuosa* forest with sparse to occasional *Eucalyptus marginata* over sparse *Banksia grandis*, *B. littoralis* and *Xanthorrhoea gracilis* with *Melaleuca raphiophylla* and *M. preissiana* mainly in drains. This association occurs between Bore 6 and the river and also east of Bore 1. The condition is variable with disturbance common along drainage channels, the railway embankment, driveways and edges adjoining the road and farmland. Disturbance is mostly evident in the form of weed invasion. The density of the overstorey means few species are found in the understorey.

ii. *Eucalyptus calophylla/Agonis flexuosa* woodland over mixed low shrubland

*Eucalyptus calophylla/Agonis flexuosa* woodland over moderately dense mixed shrubs and sedges. The shrub species are dominated by open *Hakea lissocarpha*, *Leucopogon racemulosus* and *Macrozamia riedlei* but include *Grevillea quercifolia*, *Patersonia umbrosa*, *Daviesia decurrens*, *Xanthorrhoea gracilis*, *Lomandra sp. 1*, *Astroloma ciliatum* and *Dampiera linearis*. This association occurs in an area surrounding Bore 4 and is in reasonably good condition, probably the most representative section of what existed originally. Several weed species are present but at low density of 0-2%.

iii. *Eucalyptus calophylla* woodland over mixed low woodland of *Melaleuca raphiophylla*, *Hakea varia*, *Kingia australis* and mixed open shrubs.

*Eucalyptus calophylla* woodland over open tall shrubs/small trees of *Hakea varia*, *Melaleuca raphiophylla*, *Jacksonia furcellata*, *Viminea juncea*, *Kingia australis* over open *Xanthorrhoea gracilis*, *Hibbertia rhadinopoda* and sparse sedge *Mesomelaena tetragona*. This association occurs in a small area along the Vasse-Yallingup Road just east of the junction of the Quindalup road.

**B. *Melaleuca* low woodland**

i. Low lying *Melaleuca* sp. 1 flats on sedgeland

Low lying flats with degraded roadside vegetation consisting of open *Melaleuca* sp. 1 over open sedgeland of *Gahnia trifida* and *Meeboldiana sp. 1*. The understorey is dominated by open Couchgrass \**Cynodon dactylon* and pasture weeds. This association occurs along both sides of the Quindalup road 600 m immediately south of the water treatment plant.

**C. Cleared with Remnant Overstorey**

Much of the study area has been cleared historically for farming. This land is characterised by a scattered to open remnant overstorey of *Agonis flexuosa*, *Eucalyptus rudis* or *E. calophylla* with understorey of largely pasture weeds. Typical pasture weeds include Dandelion \**Arctotheca calendula*, oats \**Avena barbata*, Crabgrass \**Digitaria sanguinalis*, Flatweed \**Hypochaeris glabra* \**Setaria verticellata* and Buffalo Grass \**Stenopetalum secundatum*.

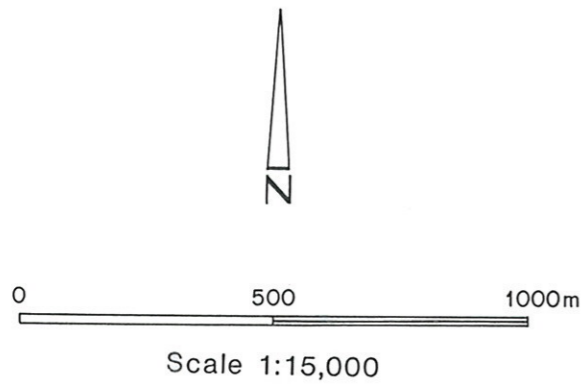
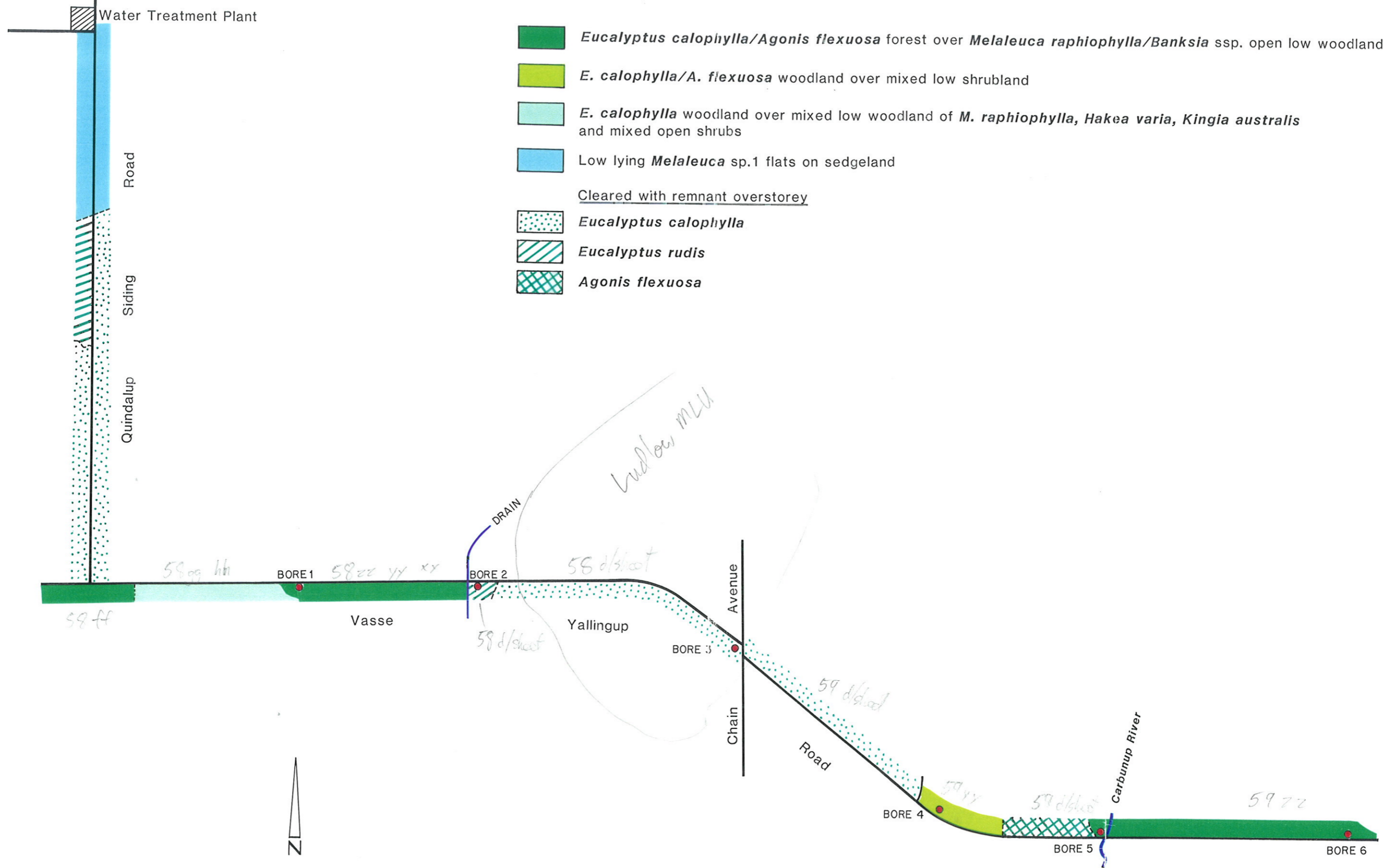
Diversity in the understorey, while being variously impacted is representative of the original vegetation, of which there is very little left in the region.

Figure 5 (see page 8) shows the occurrence of each of these vegetation associations and maps where the understorey has been disturbed to the extent that it has effectively been cleared.

## 2.2 Flora

Ninety eight species of flora were recorded on the site survey. Appendix B lists the species in taxonomic order and Appendix C lists species by site observed and at each bore location.

Thirty five weed species were recorded during the survey most of which were pasture weeds or garden escapees. This represents 36% of the total of 98 species recorded during the survey.



Vegetation of the Vasse-Yallingup and Quindalup Siding Roads

### 2.2.1 Rare Flora

No Declared Rare Flora or Priority flora species were recorded for the study area. However according to the Declared Rare and Priority flora list (Atkins, 1997) which is compiled from the Department of Conservation and Land Management and Western Australian Herbarium records, 24 Declared Rare Flora and 90 Priority species are known to exist within 100 km of the study area. Figure 3 (see page 4) identifies two sites with Declared Rare Flora about 1 km from the study area. Given this, and the fact that very little vegetation remains elsewhere it is possible that spring surveys would find some Declared Rare Flora present within the remnant vegetation of the Quindalup Siding Road.

### 2.3. Fauna

The project area lies in the South West zoogeographic sub-region. In this region the fauna is predominantly mesic Bassian species with some northern elements, resulting in a high species richness and degree of endemism (Serventy and Whittill, 1976; Tyler et al., 1984). The fauna of the region is relatively well known with general surveys including Christesen et al. (1985), How et al. (1987), Serventy and Whittill (1976), Storr and Johnstone (1988) and Worsley Alumina (1985). Within the greater Busselton area faunal survey and research has included *ecologia* (1992) and Jones et al (1992) and unpublished work by Mr W. H. Butler, CALM and AMC and Cable Sands mining projects.

#### 2.2.1 Potential faunal species

On the basis of literature searches and known habitat preferences the project area may support approximately 25 native and 8 introduced mammals, 122 species of bird, 45 species of reptiles and 15 frogs. Of these 215 species of fauna expected within the project area a subset of 22 mammals, 33 reptiles and 14 frogs have been lodged with the Western Australian Museum.

The eight species of introduced mammal that may potentially occur in the project area would be expected to occur in most habitat types. The main exception would be the Brown Rat *Rattus norvegicus* which would largely be restricted to habitats altered by humans (eg. open farmland) or along wet drainage lines.

#### 2.2.2 Rare and specially protected fauna

##### Scheduled Species

One species gazetted on the 1997 CALM Rare and Endangered Fauna Schedule as Schedule 1 "fauna that is likely to become extinct, or is rare" occurs in the study area, namely the Western Ringtail Possum *Pseudocheirus occidentalis*.

The Western Ringtail Possum is also listed as Endangered under the Endangered Species Protection Act (1996). Its presence in the project area was confirmed during the field survey by the discovery of a carcass in peppermint Woodland. The abundance of the Western Ringtail Possum in the South West has apparently been affected by land clearing and predation by foxes and cats (Burbidge, 1998). It was once considered abundant (How et al., 1987) but viable populations are now only recorded near the towns of Busselton, Quindalup, Dunsborough and Albany (How et al., 1987), in several forest locations (Christensen et al., 1985) and Two People's Bay Nature Reserve (Hopper, 1981). The species in the South-west is largely confined to Tuart *E. gomphocephala*/ Peppermint

*Agonis flexuosa* forests (Strahan, 1995). It is likely that clearing of *Agonis flexuosa* Woodland in the project area would impact on the local population of this species.

An additional Schedule 1 species, the Chuditch *Dasyurus geoffroii* may also occur within the project area. It is also listed as Endangered under the Endangered Species Protection Act (1996). In the early nineteenth century, the Chuditch was found throughout the southwest, and across the continent into Queensland, and western New South Wales. It is now restricted to the deep southwest of Western Australia where it has declined in abundance. Several sightings have been reported in the Leeuwin - Naturaliste Ridge between 1984-1986 (How *et al.*, 1987) and in the Loch Estate nature reserve located two kilometres west of the Bussell highway-Caves Road junction (Charlie Broadbent, CALM, Pers. Comm.). The small size of the remnant bush in the project area makes it unlikely to be utilised by the Chuditch and therefore impact is unlikely.

Additionally, two species gazetted as Schedule 4 as "specially protected fauna" may also occur in the area. They are:

Carpet Python *Morelia spilota imbricata* - The Carpet Python occurs over a wide area in the South-west, north to Geraldton and east to Kalgoorlie, Norseman and Cape LeGrand. It occupies most habitats in its range, sheltering in hollow logs, trunks, rock crevices and caves (Wilson & Knowles, 1988). While potentially occurring in the project area, it is not restricted to any habitat which is to be disturbed. Consequently, the development is not considered to present any significant impact to this species.

Peregrine Falcon *Falco peregrinus* - The Peregrine Falcon is a sedentary species that inhabits inland tree-lined watercourses, woodland, pasture, swamps and Eucalypt forest near the coast (Blakers *et al.*, 1984). It is unlikely that the proposed Project will affect the South-west populations given the small area of impact and wide-ranging nature of the species.

#### Priority Species

Four mammal species and four bird species that are listed on the CALM priority list may potentially occur within the project area. This list highlights species which although not included on the Schedule list are considered to warrant an increased conservation status. Priority 2 species are those with few, poorly known populations on conservation lands, Priority 3 species are taxa with several poorly known populations, at least some of which are on conservation lands and Priority 4 species are those considered in need of monitoring.

The four mammal species are:

Brush Tailed Phascogale *Phascogale tapoatafa* (Priority 3) - once widespread this species has declined in range and abundance. The small size of remnant bush within the project area makes its presence unlikely. There have been few records lodged from the Busselton area in recent decades.

Southern Brown Bandicoot *Isodon obesulus* (Priority 4) - This species has recently been removed from the Schedule 1 list and added to the Priority 4 list. Since European settlement, the Southern Brown Bandicoot has undergone a range contraction which is largely the result of land clearance and introduced predators such as the fox (Strahan, 1995). The species prefers scrubby habitats or areas with low groundcover that are burnt relatively frequently as this promotes an abundant supply of insect food. The narrow area of vegetation within the project area and the sparse and degraded condition of the understorey present only a low possibility of bandicoots being present in the project area.

Western Brush Wallaby *Macropus irma* (Priority 4) - This species is unlikely to occur in such a small area of remnant bush although recorded in similar habitat near Busselton and Yallingup in the 1970s.

Water Rat *Hydromys chryogaster* (Priority 4) - A specimen has been recorded from the Busselton area in the past with one record from Metricup in 1991. Its preferred habitat is along creeks and streams and may be present in the Riverine habitat within the project area.

The four bird species potentially occurring in the project area are the Barking Owl *Ninox connivens connivens* (Priority 2), Masked Owl *Tyto novaehollandiae* (Priority 4), Square-tailed Kite *Lophoictinia isura* (Priority 4) and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* (Priority 4). These species are not restricted to habitat found within the project area and are relatively wide-ranging, however, loss of suitable nesting trees could have a local effect on populations. No records of Forest Red-tailed Black Cockatoo were obtained from the project area during a recent survey (Abbott, 1998).

### 2.3. Watercourses and fringing vegetation

The pipeline crosses the Carburnup River and Anniebrook Drain. Aerial photography indicates the Carburnup River has fringing vegetation along much of its watercourse in the project area.

The firebreak on the north side of the railway reserve stops and is vegetated for about 30 m either side the centreline of the Carburnup River.

Western Australia's State of the Environment report prioritises the importance of environmental issues for Western Australia. Fringing vegetation was given a four star rating out of five, with a five being the most important, highlighting the need for action on this issue (Government of Western Australia, 1997).

### 2.4. Social surroundings

The railway reserve is vested in the Department of Land Administration. Five sections of the reserve have been leased to adjacent landholders, three sections are Vacant Crown Land and two sections are unvested reserves as detailed in Table 1 (see page 12). A sample of a lease document is provided in Appendix D. It would appear from the sample lease document that the Water Corporation is able to construct the pipeline across leased areas, provided notice is given. This is considered to be an administrative, rather than environmental matter.

**Table 1: Ownership and vesting of the railway reserve**

Leases	Current status	Leases	Leased to
3116/6396	Vacant Crown Land	6269	E J Mc Gregor
4924	Vacant Crown Land	4701 - now 7069	K Power
4925	Vacant Crown Land	6065	J Bell
Reserves	Purpose and vesting	6208	E Bell
36717	Parklands - unvested	4581 now 1168	A Phillips
30181	Drainage - unvested		

A house is located about 60 m south of the railway reserve midway between Marybrook Road and Chain Avenue. Adjacent land use is generally used for broad acre farming/ pasture with some horticultural use near Marybrook Road.

#### **2.4.1 Heritage**

The old railway reserve is considered to have heritage value. Site 10 on Figure 3 (see page 4) is meant to identify this value.

Concerns were raised regarding the significance of the remains of the wooden bridge which crosses the Carburnup River. Although the wooden bridge is not listed on the Shire of Busselton's Municipal Heritage Inventory, it does form part of the old railway alignment. The Shire of Busselton is currently reviewing its heritage inventory.

No Aboriginal heritage sites are located in proximity to the proposed pipeline alignment.

### 3. ENVIRONMENTAL IMPACTS AND MANAGEMENT

#### 3.1 Environmental evaluation of vegetation

##### Discussion

The significance of the vegetation of the study area was evaluated using "Environmental evaluation of native vegetation in the wheatbelt of Western Australia - Principles and criteria used to appraise land clearing proposals" by Saftstrom and Craig (1996).

Saftstrom and Craig (1996) identify three main principles with a set of evaluation criteria which could be used to assess vegetation significance, but state that "criteria are considered independently so that people can ascribe different weights according to their priorities. The evaluation is therefore not prescriptive but provides an indication of vegetation significance. The three principles used to evaluate significance are:

- Regional processes - the importance of the land in maintaining viable ecological processes;
- Representation - role in conserving genetic diversity of the region; and
- Viability - survival of natural values.

The criteria from each principle which identify some significance to vegetation in the project area are discussed below.

##### Regional processes

Criteria 1.3 Corridors and buffers states vegetation should be retained if: "the land provides a corridor or stepping stone between areas of conservation land or the land provides a buffer or is an inlier to areas reserved for conservation."

Whilst the vegetation does not strictly meet this criteria, the vegetation along the railway and Quindalup Siding Road is one of the few corridors of vegetation left in the region which could eventually be used to link with other remnant vegetation which occurs on private or public lands which are not specifically devoted to conservation.

##### Representation

Criteria 2.1.1 Flora states native vegetation should be retained if "it contains or is likely to contain threatened flora or flora of special interest"

As stated previously Declared Rare Flora and Priority species are likely to occur along the pipeline route. Several Declared Rare Flora occur in similar vegetation or conditions nearby (e.g. damplands & rivers). These species may not have been recorded during the survey because many rare species are ephemeral (seasonal), such as orchids and trigger plants.

Criteria 2.1.5 Local representation states native vegetation should be retained if:

"Within a 15 km radius of the remnant there is less than 20% of the original cover of any plant community on the land represented by:

- (i) viable occurrences in NPNCA National Parks or Nature Reserves.

- (ii) viable occurrences in other Crown Land or Remnant Vegetation Protection Scheme covenants".

There is little similar vegetation within 15 km of the pipeline corridor.

Criteria 2.3.1 Wildlife states native vegetation should be retained if "it contains or is likely to contain rare fauna." A Western Ringtail Possum *Pseudocheirus occidentalis* was collected 50 m west of Bore 6 and is probably present throughout the two *Eucalyptus calophylla/ Agonis flexuosa* vegetation associations as well as the remnant overstory *Agonis flexuosa* vegetation association. The Western Ringtail Possum *Pseudocheirus occidentalis* is gazetted on the 1997 CALM Rare and Endangered Fauna Schedule as Schedule 1 "fauna that is likely to become extinct, or is rare" and is listed as Endangered under the Endangered Species Protection Act (1996).

#### Viability

The criteria for viability include area, shape, intactness, diseases and pests, invasive plants and adjacent uses. The viability of a remnant is enhanced if it is large, not narrow, has a intact suite of plant species, is free of major diseases and pests, has few invasive plants and has adjacent land uses which do not impact adversely on the site.

The vegetation along the railway reserve varies in width, suffers some weed invasion and has adjacent land uses which contain or utilise plant species which can be invasive. The viability of the vegetation would be improved if the area was actively managed and if the narrowest areas are increased in width.

#### Environmental evaluation summary

Based on Safstrom and Craig (1996) the remnant vegetation has significance because:

- it is one of the few corridors of vegetation left in the region which could eventually be used to link up other remnant vegetation which occurs on private or public lands which are not specifically devoted to conservation;
- it is likely to contain rare flora;
- there is little similar remnant vegetation within 15 km;
- it contains rare fauna; and
- with appropriate management could remain viable.

Furthermore, natural bush is irreplaceable even using the latest revegetation techniques and small sections can be valuable for protecting local genotypes and vegetation associations.

#### Management strategies

Based on this assessment impacts such as clearing of the remnant vegetation and disturbance will be minimised. Several of the sections below include a focuss on protecting the vegetation to the greatest extent practicable.

### 3.2 Recommended pipeline route

#### Discussion

The alignment of the pipeline within the railway and road reserves largely determines the extent of impacts upon vegetation, fauna and social surroundings. How the pipe crosses watercourses affects the impacts on watercourses.

Following an on-site survey, the route described in Table 2 is recommended as the route with the least environmental impacts. These recommendations were developed on the basis that the area of impact along the pipeline will generally be confined to that required for machinery movement and temporary pipeline storage. Trench digging itself is expected to disturb only an area about 1.5 m wide for the trench itself and temporary soil storage.

**Table 2: Recommended pipeline route**

Section	Location within road/rail reserve
Bore 6 to Chain Avenue	Firebreak on north side
Chain Avenue to Anniebrook Drain	Firebreak on south side
Anniebrook Drain to Bore 1	Drain levee bank on south side
Bore 1 to Quindalup Siding Road	Firebreak on south side
Quindalup Siding Road to Treatment Plant	Western side

Consideration was given to the best method for crossing watercourses. Bridging the watercourses has fewer potential environmental impacts than burying the pipeline under the river because disturbance of the creek bed and the associated clearing and turbidity impacts can be avoided or minimised. The Carunup River and Anniebrook Drain should be crossed by bridging the pipeline over the watercourses.

The Water and Rivers Commission has assessed the proposal to bridge Carunup River and Anniebrook Drain, and its assessment appears as Appendix E. The conditions specified by the the Water and Rivers Commission have been built into the management strategies in the remainder of this report.

#### Management strategies

1. The pipeline will be located along the route recommended in Table 2 of this report to minimise clearing requirements.
2. The pipeline will bridge the Carunup River and Anniebrook Drain to a standard agreed to by the Shire of Busselton and bridgeworks will be planned to minimise impacts on the creek bed.

### 3.3 Clearing

#### Discussion

Based on the vegetation condition and the environmental evaluation of the vegetation, procedures should be put in place to minimise clearing and restrict it to those areas where clearing is necessary. This is particularly important at bore sites 1, 4, 5 & 6 which are located in good condition vegetation.

Clearing should be minimised by trimming vegetation rather than clearing it with earthmoving equipment where possible. Areas which are to be cleared with earthmoving equipment or which are necessary for movement of machinery should be clearly marked.

#### Management strategies

3. Clearing will be minimised by trimming vegetation rather than clearing it with earthmoving equipment where possible.
4. Survey pegs will be placed to mark all boundaries for the bore sites and pipeline. Dumping of soil and vegetation, turning of machinery and parking of vehicles will be prohibited in vegetation outside these boundaries.

### 3.4 Dieback

#### Discussion

The presence of dieback (*Phytophthora* spp.) is likely due to the accessibility and high usage of the study area, currently and historically. Indicator species Bull Banksia *Banksia grandis* and Jarrah *Eucalyptus marginata* showed symptoms of rapid death and disease not attributable to other factors such as waterlogging. Individuals showing dieback symptoms were not widespread.

*Phytophthora* dieback is difficult to diagnose in the field and its symptoms are similar to other causes of dieback such as waterlogging, insect attack, drought and other fungal diseases. Waterlogged soils were present in many areas of the study area, especially along drains and low lying flats. However it would be expected that all terrestrial species would be affected by waterlogging, especially other deep rooted ones not affected by dieback such as *Agonis* and Marri.

Waterlogging of the soils is likely to have increased as a result of widespread clearing. It appears that there has been a relatively recent transition from Marri *Eucalyptus calophylla* forest to *Melaleuca* spp. woodland in places. *Melaleuca* spp. woodland favours waterlogged soils. Poor aeration and drainage caused by waterlogging both weakens plants and favours fungal diseases such as dieback.

Native honey fungus *Armillaria* is a native fungal disease which causes dieback. Its presence is indicated by its infection of Marri *Eucalyptus calophylla* and not Jarrah *E. marginata* as in *Phytophthora* dieback. *Armillaria* infection could be devastating to the vegetation corridor as the overstorey is composed largely of Marri.

Careless earthworks and construction could result in the following:

- Transfer of soil on vehicles and equipment which could spread infection from site to site. The low lying moist soil present in much of the survey area is highly conducive to the proliferation of dieback, once introduced. Moist or waterlogged soils encourage the spread and growth of dieback as well as weakening the resistance of trees to the disease;
- Introduction of additional *Phytophthora* species and also Native honey fungus *Armillaria* on machinery entering the area after earthworks elsewhere. *Armillaria* affects *Eucalyptus calophylla*, one of the principal food sources and habitat for Western Ringtail Possum *Pseudocheirus occidentalis*;

- The spread of dieback through water movement towards drainage channels, particularly at bore sites near those channels if dieback infections are brought to the bores by machinery or contaminated soil.

Standard hygiene procedures can be used to prevent introduction or spread of dieback;

- restrict earthworks to when soil is dry to minimise the amount of soil sticking to machinery, boots and equipment;
- encourage personal responsibility in regards to transfer of mud on work boots and tools;
- clean machinery (including undercarriage) using compressed air or a high pressure hose before transferring to the survey area;
- careful stockpiling so soil is re-used from where it was taken, rather than being moved along the railway corridor; and
- minimise the off road use of contractors/employees private vehicles.

Treatment of forest for dieback is now available through injection or spraying of the systemic fungicide phosphonic acid. The treatment does not kill the dieback fungus but only increases plant resistance for a few years. The treatment is expensive and must be repeated when phosphonic acid levels in the plant dilute. This is a new field of science and the long-term outcomes of treating native plants with phosphonic acid are not known. Dieback treatment could be undertaken as a goodwill gesture, but is not standard practice and would need to be continued by the Shire of Busselton.

#### Management strategies

5. Construction will be programmed to take place when soils are dry to minimise the spread of fungal diseases such as dieback.
6. Machinery will be cleaned of soil debris prior to entering the site.
7. Movement of soil will be minimised by careful stockpiling, re-using soil from where it was taken, and minimising vehicle movement along the rail corridor.

### 3.5 Weeds

#### Discussion

Many opportunist and bushland weeds are present in the study area. Disturbance of bushland and soil inevitably will favour the proliferation of such species as Bracken, Arum lily \**Zantedeschia aethiopica*, Couchgrass \**Cynodon dactylon* and Watsonia \**Watsonia bulbifera*.

Weeds in bushland are often aggressive colonisers, smothering native vegetation, causing a decline in health and regeneration. In undisturbed bushland where a stable ecosystem exists, the effect is minimised.

It is imperative that disturbance be minimised in both the establishment of bore hole sites and the laying of the pipeline. Many of the measures to reduce clearing impacts, such as pipeline location, clearly marking machinery movement areas, and minimising activity in seasonally wet areas also assist in reducing the potential for weeds to establish. In particular, minimising the movement of soil significantly reduces the spread of bulbous species such as Watsonia \**Watsonia bulbifera*.

Minimising soil movement has already been recommended as a management strategy for dieback.

Disturbance in lowlands and seasonally wet areas such as the river, drainage channels and swampy flats should be especially minimised as they are particularly susceptible to weed invasion.

Weed regrowth should be monitored and controlled in early in the first spring after construction.

If chemical weed control is required Weedmaster® by Nufarm is recommended. This is a commercial brand of glyphosate that claims to have wetting agents non toxic to frogs and is apparently suitable for areas adjacent to wetlands. It should be used in preference to glyphosate based herbicides which use wetting agents toxic to frogs.

#### Management strategies

8. Weed regrowth will be monitored and controlled in early in the first spring after construction.
9. Glyphosate that has wetting agents non toxic to frogs will be used for weed control near to wetlands.

### **3.6 Watercourses**

#### Discussion

The State of the Environment report recommended large scale restoration of fringing vegetation on streamlines providing adequate width to meet ecological functions, and defines the important ecological functions of fringing vegetation as:

- (i) the reduction of erosion and sedimentation;
- (ii) filtering of nutrients and pollutants;
- (iii) reducing channel erosion by decreasing the speed of riverflow;
- (iv) maintenance of river habitats and aquatic biodiversity;
- (v) provision of habitats for important terrestrial fauna associated with riparian environments; and
- (vi) provision of ecological corridors for long-term ecological sustainability.

Ecological functions (iv) to (vi) require that indigenous vegetation is replaced if it is removed. The width of vegetation which should be replaced would depend on the importance of the particular watercourse in terms of conservation. It is considered that the Carburnup River provides a corridor for wildlife. For wildlife corridors, even a 30 m wide strip is quite possibly as useful for fauna as a 100 m wide corridor (Sanders, 1996).

#### Management strategies

10. Fringing vegetation along the Carburnup River will be revegetated to about 30 m each side of the river following the completion of works.

### **3.7 Revegetation**

#### Discussion

Revegetation will only be required for small sections of the pipeline which cross the railway reserve where vegetation associations remain intact (i.e. are not "cleared with remnant overstorey" - see Figure 5, page 8), around bores 1, 4, 5 & 6 and near the Carburnup River.

At the bore sites imported soil should be removed prior to commencing revegetation works.

Revegetation should be based on the characteristics of the existing vegetation *i.e.* density, species composition and species density. The vegetation map (Figure 5, page 8) and description of the vegetation associations in Section 2.1.2 should be used to determine species used for revegetation. Appendix C provides species lists specific to bores 1, 4, 5 & 6 which should be used to determine species for revegetation.

Direct seeding with seed collected locally often more accurately reflect genetic diversity, natural distribution patterns and produces stronger plants. (Seabrook, 1996). Treatment of the seed before use with smokewater will improve germination rates.

Cleared pasture areas that are to be seeded will require ripping up and the first weed crop sprayed using a chemical such as Weedmaster® by Nufarm. This is a commercial brand of glyphosate that claims to have wetting agents non toxic to frogs.

#### Management strategies

11. Revegetation of cleared areas will occur on sections of the pipeline which cross the railway reserve where vegetation associations remain intact (*i.e.* are not "cleared with remnant overstorey" - see Figure 5, page 8), around bores 1, 4, 5 & 6 and near the Carburnup River, and will be undertaken using local species identified by reference to the vegetation map (Figure 5, page 8) and description of the vegetation associations in Section 2.1.2, and to Appendix C for the bore sites.

### 3.8 Fauna

#### Discussion

The main potential impact to the fauna in the project area is from the destruction of fauna habitat. This can be as a result of clearing or indirect degradation through processes such as dieback or fire. The loss of fauna habitat can result in the direct and immediate deaths of fauna and an ongoing loss of faunal diversity. Planning and development procedures which minimise disturbance to intact *Eucalyptus callophylla/ Agonis flexuosa* habitat should ensure there is a minimal impact on potential protected and significant fauna such as the Barking Owl *Ninox connivens connivens* and Water Rat *Hydromys chryogaster*. Habitat management should also include procedures to effectively control fire, dieback and rubbish, including construction wastes.

The most significant potential impact is upon the intact areas of intact *Eucalyptus callophylla/ Agonis flexuosa* vegetation associations. These areas form preferred habitat for the Schedule 1 Western Ringtail Possum *Pseudocheirus occidentalis*. This species is present in the project area and habitat degradation could significantly effect local populations. Management of the Western Ringtail Possums *Pseudocheirus occidentalis* primarily involves maintaining habitat. Where impacts on suitable intact habitat is unavoidable Peppermint trees *Agonis flexuosa* should be examined for the Western Ringtail Possum's characteristic dreys (*i.e.* nests in the canopy) or their presence in tree hollows prior to commencement of works. Any findings should be reported to the Department of Conservation and Land Management, which may recommend their translocation to nearby secure habitat.

Minimal impact upon habitat has been achieved by positioning the pipeline and bores in degraded or cleared land such as along firebreaks and tracks wherever possible. Revegetation has been recommended for the intact *Eucalyptus callophylla/ Agonis flexuosa* vegetation associations in Section 3.7 Revegetation above and Section 3.4 addresses dieback.

Noise and vibrations from digging and drilling should cause only a temporary disturbance to nearby fauna but should be minimised where possible. Noise is addressed below under Section 3.10.1, Construction impacts.

Uncapped drill holes or steep sided pits can cause significant local fauna deaths. Drill holes should be securely capped immediately upon completion of drilling and all pits should include an escape path for fauna

#### Management strategies

12. Arrangements will be made to collect all rubbish and construction waste and dispose of it at a licensed landfill site.
13. Fires will not be permitted.
14. Peppermint trees *Agonis flexuosa* will be trimmed rather than removed wherever possible.
15. If clearing work using earthmoving equipment is required, Peppermint trees *Agonis flexuosa* will be examined for Schedule 1 Western Ringtail Possum *Pseudocheirus occidentalis* dreys (i.e. nests in the canopy) and their presence in tree hollows prior to commencement of works. Any findings will be reported to the Department of Conservation and Land Management.
16. Drill holes will be securely covered immediately upon completion of drilling and all pits left overnight will include an escape path for fauna.

### **3.9 Public water source areas**

#### Discussion

The aquifer from which the bores will be drawing from is not connected to the superficial aquifer at this location. The bores will be about 350 m deep. Pollution prevention measures which should be part of normal construction practice and be adequate to protect the aquifer are recommended under Section 3.10.1 Construction impacts below.

### **3.10 Social surroundings**

#### **3.10.1 Construction impacts**

##### Discussion

Noise and waste disposal are the main potential construction impacts associated with this proposal. Dust is not expected to be a problem because of the small area of disturbance and nature of the soils. Rubbish disposal has been addressed above under Section 3.8 Fauna.

Pollution prevention measures normally used for construction activities, such as locating fuelling facilities in bunds and collecting and properly disposing of all waste oil and other petroleum products should adequately protect the groundwater source.

The nearest noise sensitive premises to the pipeline is located 60 m to the south between Marybrook Road and Chain Avenue.

Noise is currently regulated by the Environmental Protection (Noise) Regulations 1997. The assigned noise levels do not apply to noise emitted from a construction site for construction works carried out between 7am and 7pm on any day which is not a Sunday or public holiday provided that:

- the construction works are carried out in accordance with the control of noise practices set out in section six of Australian Standard 2436-1991 "Guide to noise control on construction, maintenance and demolition sites"; and
- the equipment used for the construction work must be the quietest reasonably available.

The Chief Executive Officer of the Department of Environmental Protection may request that a noise management plan be submitted for the construction work at any time.

The assigned noise levels do also not apply to farming machinery operating in the daytime in agricultural areas provided the machinery complies with ADR 28/01 (Australian Design Rule 28/01).

#### Management strategy

17. To manage noise impacts, construction will occur between 7am and 7pm Monday to Saturday inclusive, be carried out in accordance section six of Australian Standard 2436-1991, and use the quietest reasonably available equipment.
18. Pollution prevention measures normally used for construction activities, such as locating fuelling facilities in bunds and collecting and properly disposing of all waste oil and petroleum products will be implemented.

### **3.10.2 Heritage**

#### Discussion

It is considered that the railway embankment formation itself provides significantly to the heritage value assigned to the railway alignment. Pipeline and bore construction will not affect the railway formation except at two crossing points near Chain Road and Quindalup Siding Road. Where the railway formation is crossed, the formation should be reinstated to its original shape.

A concern was raised that where the pipeline crosses the Carburnup River that it would be visible from the wooden bridge and detract from the heritage value of the bridge, particularly if it is restored as part of the "Rails to Trails" project. However, the on-site survey found that the views of the pipeline from the bridge would be obscured by dense vegetation.

#### Management strategy

19. The old railway formation will be re-instated to its original shape where the pipeline crosses the formation.

### **3.11 Contractors and employees**

#### Discussion

Contractors and employees involved in the construction of the bore sites and laying of the pipeline should be given copies of the summary of commitments section of this report, and be made aware why the commitments are important. Compliance with these management strategies should be

adopted as part of the contract/work ethic.

### Management strategy

20. The management recommendations in this report should be integrated into contracts let by the Water Corporation, and employees should be educated about the environmental commitments detailed in this plan.

## 5. SUMMARY OF COMMITMENTS

### 5.1 Summary

1. The pipeline will be located along the route recommended in Table 2 of this report to minimise clearing requirements.
2. The pipeline will bridge the Carburnup River and Anniebrook Drain to a standard agreed to by the Shire of Busselton and bridgeworks will be planned to minimise impacts on the creek bed.
3. Clearing will be minimised by trimming vegetation rather than clearing it with earthmoving equipment where possible.
4. Survey pegs will be placed to mark all boundaries for the bore sites and pipeline. Dumping of soil and vegetation, turning of machinery and parking of vehicles will be prohibited in vegetation outside these boundaries.
5. Construction will be programmed to take place when soils are dry to minimise the spread of fungal diseases such as dieback.
6. Machinery will be cleaned of soil debris prior to entering the site.
7. Movement of soil will be minimised by careful stockpiling, re-using soil from where it was taken, and minimising vehicle movement along the rail corridor.
8. Weed regrowth will be monitored and controlled in early in the first spring after construction.
9. Glyphosate that has wetting agents non toxic to frogs will be used for weed control near to wetlands.
10. Fringing vegetation along the Carburnup River will be revegetated to about 30 m each side of the river following the completion of works.
11. Revegetation of cleared areas will occur on sections of the pipeline which cross the railway reserve where vegetation associations remain intact (i.e. are not "cleared with remnant overstorey" - see Figure 5, page 8), around bores 1, 4, 5 & 6 and near the Carburnup River, and will be undertaken using local species identified by reference to the vegetation map (Figure 5, page 8) and description of the vegetation associations in Section 2.1.2, and to Appendix C for the bore sites.
12. Arrangements will be made to collect all rubbish and construction waste and dispose of it at a licensed landfill site.
13. Fires will not be permitted.

14. Peppermint trees *Agonis flexuosa* will be trimmed rather than removed wherever possible.
15. If clearing work using earthmoving equipment is required, Peppermint trees *Agonis flexuosa* will be examined for Schedule 1 Western Ringtail Possum *Pseudocheirus occidentalis* dreys (i.e. nests in the canopy) and their presence in tree hollows prior to commencement of works. Any findings will be reported to the Department of Conservation and Land Management.
16. Drill holes will be securely covered immediately upon completion of drilling and all pits left overnight will include an escape path for fauna.
17. To manage noise impacts, construction will occur between 7am and 7pm Monday to Saturday inclusive, be carried out in accordance section six of Australian Standard 2436-1991, and use the quietest reasonably available equipment.
18. Pollution prevention measures normally used for construction activities, such as locating fuelling facilities in bunds and collecting and properly disposing of all waste oil and petroleum products will be implemented.
19. The old railway formation will be re-instated to its original shape where the pipeline crosses the formation.
20. The management recommendations in this report should be integrated into contracts let by the Water Corporation, and employees should be educated about the environmental commitments detailed in this plan.

## 5.2 Commitments organised by phase

### 5.2.1 Pre-construction

1. The pipeline will be located along the route recommended in Table 2 of this report to minimise clearing requirements.
2. The pipeline will bridge the Carburnup River and Anniebrook Drain to a standard agreed to by the Shire of Busselton and bridgeworks will be planned to minimise impacts on the creek bed.
5. Construction will be programmed to take place when soils are dry to minimise the spread of fungal diseases such as dieback.
18. Pollution prevention measures normally used for construction activities, such as locating fuelling facilities in bunds and collecting and properly disposing of all waste oil and petroleum products will be implemented.
20. The management recommendations in this report should be integrated into contracts let by the Water Corporation, and employees should be educated about the environmental commitments detailed in this plan.

### 5.2.2 Construction

2. The pipeline will bridge the Carburnup River and Anniebrook Drain to a standard agreed to by the Shire of Busselton and bridgeworks will be planned to minimise impacts on the creek bed.

3. Clearing will be minimised by trimming vegetation rather than clearing it with earthmoving equipment where possible.
4. Survey pegs will be placed to mark all boundaries for the bore sites and pipeline. Dumping of soil and vegetation, turning of machinery and parking of vehicles will be prohibited in vegetation outside these boundaries.
6. Machinery will be cleaned of soil debris prior to entering the site.
7. Movement of soil will be minimised by careful stockpiling, re-using soil from where it was taken, and minimising vehicle movement along the rail corridor.
12. Arrangements will be made to collect all rubbish and construction waste and dispose of it at a licensed landfill site.
13. Fires will not be permitted.
14. Peppermint trees *Agonis flexuosa* will be trimmed rather than removed wherever possible.
15. If clearing work using earthmoving equipment is required, Peppermint trees *Agonis flexuosa* will be examined for Schedule 1 Western Ringtail Possum *Pseudocheirus occidentalis* dreys (i.e. nests in the canopy) and their presence in tree hollows prior to commencement of works. Any findings will be reported to the Department of Conservation and Land Management.
16. Drill holes will be securely covered immediately upon completion of drilling and all pits left overnight will include an escape path for fauna.
17. To manage noise impacts, construction will occur between 7am and 7pm Monday to Saturday inclusive, be carried out in accordance section six of Australian Standard 2436-1991, and use the quietest reasonably available equipment.
18. Pollution prevention measures normally used for construction activities, such as locating fuelling facilities in bunds and collecting and properly disposing of all waste oil and petroleum products will be implemented.
19. The old railway formation will be re-instated to its original shape where the pipeline crosses the formation.

### 5.2.3 Post-construction

8. Weed regrowth will be monitored and controled in early in the first spring after construction.
9. Glyphosate that has wetting agents non toxic to frogs will be used for weed control near to wetlands.
10. Fringing vegetation along the Carburnup River will be revegetated to about 30 m each side of the river following the completion of works.
11. Revegetation of cleared areas will occur on sections of the pipeline which cross the railway reserve where vegetation associations remain intact (i.e. are not "cleared with remnant overstorey" - see Figure 5, page 8), around bores 1, 4, 5 & 6 and near the Carburnup River, and will be undertaken using local species identified by reference to the vegetation map (Figure 5, page 8) and description of the vegetation associations in Section 2.1.2, and to Appendix C for the bore sites.

## 6. REFERENCES AND STUDY TEAM

### 6.1 References

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## 6.2 Study team

The Water Corporation Collector Main and Bores EAMP was planned, coordinated and executed by:

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WEST PERTH WA 6005  
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### Project staff

G. W. Connell	BSc. (Hons) (Zool)	Director & Senior Environmental Scientist
C. J. Macpherson	BSc. (Hons) (Bio./Phys.)	Director & Senior Botanist
R J Van Delft	B.Sc (Hons) Environmental Science	Senior Environmental Planner
K.J. McCreery	Dip. Horticulture	Botanist
M Fitzgerald		Administrative Assistant

### Acknowledgments

- Paul Davies of Main Roads Western Australia and Halpern Glick Maunsell for use of figures from the Main Roads Western Australia's Vasse to Dunsborough Planning Study;
- Jon Bettink and Tim Schilling of the Shire of Busselton; and
- Daniel Allen and Craig Jacques of the Water and Rivers Commission.

## APPENDIX A

Photographs along the pipeline  
alignment



▲ Plate 1: *Eucalyptus calophylla*/*Agonis flexuosa* woodland over mixed low shrubland. Bore 4.

▼ Plate 2: *Eucalyptus calophylla* woodland over low, open *Melaleuca raphiophylla*, *Hakea varia* and *Kingia australis*. West of Bore 1.



▲ Plate 3: *Eucalyptus calophylla*/*Agonis flexuosa* low forest over sparse *Banksia* spp. and *Melaleuca raphiophylla*. Bore 6.



▲ Plate 4: *Eucalyptus calophylla*/*Agonis flexuosa* low forest with scattered *Eucalyptus rudis*. Carbunup River east of Bore 5.

▼ Plate 5: *Eucalyptus calophylla*/*Agonis flexuosa* low forest with disturbed understorey of *Pteridium esculentum* (Bracken). Bore 5.





▲ Plate 6: Pipeline route option along firebreak north of Bore 6.

▼ Plate 7: Pipeline route option along railway embankment at Bore 6.



▲ Plate 8: Cleared pasture with remnant overstorey of sparse *Eucalyptus calophylla* and *E. rudis*. Bore 2.



▲ Plate 9: Cleared pasture with remnant overstorey of sparse *Agonis flexuosa*. West of Bore 5 looking west along pipeline route.

▼ Plate 10: Low lying flats with open *Melaleuca* sp. 1 on sparse sedges and open \**Cynodon dactylon* (Couchgrass). Quindalup Siding Road.



## APPENDIX B

Flora species list in taxonomic  
order

Classification and nomenclature according to Census of Australian Vascular Plants 1990., R.J. Hnatiuk Australian Government Publishing Service

Key: \* = introduced species  
† = flora of interest

FAMILY	SPECIES
DENNSTAEDTIACEAE	<i>Pteridium esculentum</i> ✓
ZAMIACEAE	<i>Macrozamia riedlei</i> ✓
POACEAE	* <i>Austrostipa</i> sp. 1 — <i>Avena barbata</i> ✓ * <i>Briza maxima</i> ✓ * <i>Cynodon dactylon</i> ✓ * <i>Digitaria sanguinalis</i> † * <i>Ehrharta ?erecta</i> — * <i>Eragrostis curvula</i> ✓ <i>Eragrostis elongata</i> † * <i>Lagurus ovatus</i> ✓ * <i>Paspalum dilatatum</i> † * <i>Setaria verticillata</i> † * <i>Sporobolus indicus</i> var. <i>capensis</i> † * <i>Stenopetalum secundatum</i> ✓
CYPERACEAE	* <i>Cyperus congestus</i> † * <i>Cyperus polystachyos</i> † <i>Gahnia trifida</i> ✓ <i>Lepidosperma ?longitudinale</i> ✓ <i>Lepidosperma gladiatum-effusum</i> — <i>Mesomelaena tetragona</i> ✓ <i>Stenopa ramosissima</i> ✓
ARACEAE	* <i>Zantedeschia aethiopica</i> ✓
RESTIONACEAE	<i>Empodisma gracillimum</i> ✓ * <i>Hypolaena caespitosa</i> — <i>Lepyrodia glauca</i> ✓ <i>Meeboldina</i> sp. 1 —
ASPARAGACEAE	* <i>Myrsiphyllum asparagoides</i> —
DASYPOGONACEAE	<i>Kingia australis</i> ✓ <i>Lomandra</i> sp. 1 —
XANTHORRHOEACEAE	<i>Xanthorrhoea ?preissii</i> ✓ <i>Xanthorrhoea gracilis</i> ✓
ANTHERICACEAE	* <i>Chlorophytum elatum</i> — <i>Thysanotus patersonii</i> ✓

HAEMODORACEAE	<i>Anigozanthos flavidus</i> ✓
AMARYLLIDACEAE	* <i>Amaryllis belladonna</i> †
IRIDACEAE	<i>Patersonia umbrosa</i> ✓ * <i>Watsonia bulbifera</i> †
PROTEACEAE	<i>Banksia grandis</i> ✓ <i>Banksia littoralis</i> ✓ <i>Grevillea quercifolia</i> ✓ <i>Hakea lissocarpa</i> ✓ <i>Hakea varia</i> ✓ <i>Persoonia longifolia</i> ✓ <i>Synaphea petiolaris</i> subsp. <i>triloba</i> ✓
POLYGONACEAE	* <i>Rumex crispus</i> † * <i>Rumex pulcher</i> †
AMARANTHACEAE	<i>Alternanthera nodiflora</i> †
PITTOSPORACEAE	<i>Billardiera variifolia</i> ✓
MIMOSACEAE	<i>Acacia pulchella</i> ✓ <i>Acacia saligna</i> ✓ <i>Acacia</i> sp. 1 —
FABACEAE	? <i>Bossiaea</i> sp. 1 — <i>Bossiaea linophylla</i> † — <i>siguit - ??</i> <i>Callistachys lanceolata</i> † <i>Chorizema ilicifolia</i> † <i>Daviesia decurrens</i> ✓ <i>Hardenbergia comptoniana</i> ✓ <i>Jacksonia furcellata</i> ✓ <i>Kennedia prostrata</i> ✓ <i>Nemcia dilatatum</i> † — <i>siguit</i> <i>Viminea juncea</i> ✓
GERANIACEAE	* <i>Pelargonium capitatum</i> ✓
OXALIDACEAE	* <i>Oxalis glabra</i> ✓ * <i>Oxalis pes-caprae</i> ✓
TREMANDRACEAE	<i>Tremandra</i> sp. 1 —
EUPHORBIACEAE	<i>Phyllanthus calycinus</i> ✓
DILLENIACEAE	<i>Hibbertia cuneiformis</i> † <i>Hibbertia rhadinopoda</i> ✓
THYMELACEAE	<i>Pimelea</i> sp. 1 —
MYRTACEAE	<i>Agonis flexuosa</i> ✓

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	<i>Astartea fascicularis</i> ✓
	<i>Eucalyptus calophylla</i> ✓
	<i>Eucalyptus rudis</i> ✓
	<i>Melaleuca cuticularis</i> ✓
	<i>Melaleuca preissiana</i> ✓
	<i>Melaleuca raphiophylla</i> ✓
	<i>Melaleuca</i> sp. 1 —
ONAGRACEAE	* <i>Oenothera glazioviana</i> †
APIACEAE	? <i>Hydrocotyle</i> sp. 1 —
EPACRIDACEAE	<i>Astroloma ?pallidum</i> ✓
	<i>Astroloma ciliatum</i> ✓
	<i>Leucopogon racemulosus</i> †
LOGANIACEAE	<i>Logania vaginalis</i> †
GENTIANACEAE	* <i>Centaurium erythraea</i> ✓
SOLANACEAE	* <i>Solanum migrans</i> ✓
OROBANCHACEAE	* <i>Orobanche minor</i> ✓
PLANTAGINACEAE	* <i>Plantago lanceolata</i> ✓
LOBELIACEAE	<i>Lobelia alata</i> ✓
GOODENIACEAE	<i>Dampiera lindleyi</i> —
	<i>Dampiera linearis</i> ✓
STYLIDIACEAE	<i>Stylidium ?brunonianum</i> ✓
ASTERACEAE	* <i>Arctotheca calendula</i> ✓
	* <i>Conyza bonariensis</i> †
	* <i>Hypochaeris glabra</i> ✓
	* <i>Lactuca serriola</i> †
	* <i>Sonchus oleraceus</i> ✓

## APPENDIX C

Species list by site observed and  
bore location

Appendix C: Species by site Matrix for the Dunsborough Water Supply EAMP Flora Survey

Species	Bore Sites						Opportunistic
	B1	B2	B3	B4	B5	B6	
* <i>Amaryllis belladonna</i>							W of road junction
* <i>Arctotheca calendula</i>			2				pasture weed
* <i>Avena barbata</i>							
* <i>Briza maxima</i>	1			1		1	1 on rail corridor at Bore 6
* <i>Centaurium erythraea</i>							Pasture weed
* <i>Chlorophytum elatum</i>					1		Garden escapee
* <i>Conyza bonariensis</i>				1			
* <i>Cynodon dactylon</i>						1	2 on rail corridor at Bore 6
* <i>Cyperus congestus</i>							Drain, Caribunup river
* <i>Cyperus polystachyos</i>							Near B5
* <i>Digitaria sanguinalis</i>							Firebreak at B6, Caribunup R
* <i>Ehrharta ?erecta</i>						1	
* <i>Eragrostis curvula</i>							Near B5
* <i>Hypochaeris glabra</i>			2			1	1 on rail corridor at bore 6
* <i>Lactuca serriola</i>							Caribunup river
* <i>Lagurus ovatus</i>							1 on rail corridor at bore 6
* <i>Myrsiphyllum asparagoides</i>				1	2		
* <i>Oenothera glazioviana</i>							Roadside/pasture weed
* <i>Orobanche minor</i>				1			1 on rail corridor at bore 6
* <i>Oxalis glabra</i>					1		
* <i>Oxalis pes-caprae</i>							
* <i>Paspalum dilatatum</i>				1			C.2
* <i>Pelargonium capitatum</i>				1			
* <i>Plantago lanceolata</i>				1	1		
* <i>Rumex crispus</i>							Drain at B6
* <i>Rumex pulcher</i>							Firebreak at B6
* <i>Setaria verticillata</i>							B1
* <i>Solanum migrans</i>	1						Quindalup road, Caribunup R
* <i>Sonchus oleraceus</i>							Near B6
* <i>Sporobolus indicus</i> var. <i>capensis</i>							Near B5
* <i>Stenopetalum secundatum</i>							C.3
* <i>Watsonia bulbifera</i>	3						A.4, Near B4, B2
* <i>Zantedeschia aethiopica</i>							Near B6
<i>Acacia pulchella</i>				1		1	
<i>Acacia saligna</i>							Caribunup river
<i>Acacia</i> sp. 1							Railway near B6
<i>Agonis flexuosa</i>				2	3	2	
<i>Alternanthera nodiflora</i>							Caribunup river
<i>Anigozanthos flavidus</i>						1	Caribunup river
<i>Astartea fascicularis</i>							Caribunup river
<i>Astroloma ?pallidum</i>							A.2
<i>Astroloma ciliatum</i>				1			
<i>Austrostipa</i> sp. 1				1			
<i>Banksia grandis</i>						2	
<i>Banksia littoralis</i>						2	mainly along drain
<i>Billardiera variifolia</i>				1			
<i>Bossiaea linophylla</i>							Near B6
? <i>Bossiaea</i> sp. 1				1			
<i>Callistachys lanceolata</i>							Caribunup river

\* = introduced species; Vegetation densities: 1 = 0-2%;

2 = 2-10%; 3 = 10-30%; 4 = 30-70%; 5 = 70-100% cover

Appendix C: Species by site Matrix for the Dunsborough Water Supply EAMP Flora Survey

Species	Bore Sites						Opportunistic
	B1	B2	B3	B4	B5	B6	
<i>Chorizema ilicifolia</i>							Near B4
<i>Dampiera lindleyi</i>				1			
<i>Dampiera linearis</i>				1			
<i>Daviesia decurrens</i>				1			
<i>Empodisma gracillimum</i>							Near B6, A.3
<i>Eragrostis elongata</i>							Near B6
<i>Eucalyptus calophylla</i>				5	4	4	
<i>Eucalyptus rudis</i>					2		Quindalup siding road, B2
<i>Gahnia trifida</i>							Quindalup siding road
<i>Grevillea quercifolia</i>				1			
<i>Hakea lissocarpha</i>				3			
<i>Hakea varia</i>							A.1, B.1, Near B6
<i>Hardenbergia comptoniana</i>				1		1	near B3
<i>Hibbertia cuneiformis</i>						1	
<i>Hibbertia rhadinopoda</i>						1	B.2 (2)
<i>Hydrocotyle</i> sp. 1							Carbunup river
? <i>Hypolaena caespitosa</i>							Near B6
<i>Jacksonia furcellata</i>							B.5, Near B6
<i>Kennedia prostrata</i>				1			
<i>Kingia australis</i>							W of B1
<i>Lepidosperma ?longitudinale</i>							Opp
<i>Lepidosperma gladiatum-effusum</i>					1		
<i>Lepyrodia glauca</i>							Opp
<i>Leucopogon racemulosus</i>				2		1	
<i>Lobelia alata</i>							Near 2
<i>Logania vaginalis</i>				1			
<i>Lomandra</i> sp. 1				2			
<i>Macrozamia riedlei</i>				2		1	
<i>Meeboldiana</i> sp. 1							C.4
<i>Melaleuca cuticularis</i>							*
<i>Melaleuca preissiana</i>							Near B6
<i>Melaleuca raphiophylla</i>							Drainage A.6 (4), near B6
<i>Melaleuca</i> sp. 1							C.1
<i>Mesomelaena tetragona</i>							A.4, Near B4
<i>Nemcia dilatatum</i>					2		
<i>Patersonia umbrosa</i>				2			
<i>Persoonia longifolia</i>							Near B5, B6
<i>Phyllanthus calycinus</i>				1			
<i>Pimelea</i> sp. 1				1			
<i>Pteridium esculentum</i>					2		X3
<i>Stenopa ramosissima</i>							B.3
<i>Stylidium ?brunonianum</i>							Near B4
<i>Synaphea petiolaris</i> subsp. <i>triloba</i>							Near B6
<i>Thysanotus patersonii</i>				1			
<i>Tremandra</i> sp. 1				2			
<i>Viminea juncea</i>							B.5
<i>Xanthorrhoea ?preissii</i>						2	Near B1
<i>Xanthorrhoea gracilis</i>				1			Near B1

\* = introduced species; Vegetation densities: 1 = 0-2%;  
2 = 2-10%; 3 = 10-30%; 4 = 30-70%; 5 = 70-100% cover

## APPENDIX D

Sample lease document

CL 0275 1990 F

FINAL

C/L 0275/1990



ISSUED UNDER THE LAND ACT, 1933

**SPECIAL LEASE**

(Under Section 116 of the Land Act, 1933, and the Amendments.)

CROWN LOCATIONS ALLOCATED

EXECUTIVE MINUTE 18/89  
D.L.A. FILE 2333/9593

REGISTRAR OF TITLES

Lease No.

**3116**  
7069SOUTH WEST DIVISION  
ANNIEBROOK ESTATE  
~~District of Sussex~~

Elizabeth the Second, by the Grace of God, Queen of Australia and Her other Realms and Territories, Head of the Commonwealth. To all to whom these presents shall come, GREETING: Know Ye that whereas by the Land Act, 1933 and Amendments, power is given to the Governor in Council of our State of Western Australia to grant leases of any portion of land to any person for any special purpose upon the terms and conditions set forth in section 116 of the said Act: And whereas Kieran Daniel Power of

Post Office Box 308 Busselton Farmer

, in the said State, has made application for a lease of the land hereinafter described for the special purpose of

Grazing

And whereas the said Governor in Council has approved the granting of the said lease; We of our especial Grace, and in consideration of the premises, and also in consideration of the rents hereinafter reserved and on the part of the said Kieran Daniel Power

his , Executors, Administrators, and Assigns (hereinafter called "the Lessee"), to be paid, and in exercise of the powers in that behalf to us given by the said Act, do by these Presents demise and lease to the said Lessee the natural surface ~~and so much of the land as is below the natural surface to a depth of~~ ~~metres~~ of ALL THAT piece or parcel of land being ~~in the~~ Anniebrook Estate Lot 21

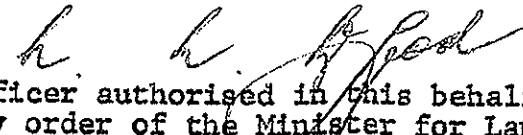
~~District of Sussex~~ and containing 4 hectares

as delineated by a border of green colour on the plan hereon, with the appurtenances: TO HAVE AND TO HOLD the premises hereby demised subject to the powers, reservations, and conditions herein and in the said Act contained, and with all the rights, powers, and privileges conferred by such of the said Act as are applicable hereto, unto the said Lessee, for the term of one years to be computed from the first day of January , 1979 , for the special purposes aforesaid: YIELDING AND PAYING therefor during the said term unto Us, Our Heirs and Successors, the yearly rent of \$20.00 without deduction, by equal payments half-yearly, in advance on or before the first day of March and the first day of September in every year, such rent to be paid to our Minister for Lands of Our said State: Provided, nevertheless, that it shall at all times be lawful for Us, our Heirs and Successors, or for any person or persons acting in that behalf by Our or Their authority, to resume and enter upon possession of any part of the said lands which it may at any time by Us, our Heirs and Successors, be deemed necessary to resume for roads, tramways, railways, railway stations, bridges, canals, towing paths, harbour or river improvement works, drainage or irrigation works, quarries, and generally for any other works or purposes of public use, utility, or convenience, and for the purpose of exercising the power to search for minerals, and gems hereinafter reserved, and such land so resumed to hold to Us, our Heirs and Successors, as of Our or Their former estate, without making to the said Lessee, or any person claiming under him , any compensation in respect thereof; so, nevertheless, that the lands so to be resumed shall not exceed one-twentieth part in the whole of the lands aforesaid, and that no such resumption be made of any part of the said lands upon which any buildings may have been erected, or which may be enclosed and in use as gardens, or otherwise for the more convenient occupation of any such buildings or on which any other improvements as defined by the said Act have been made without compensation: Provided also, that it shall be lawful at all times for Us, our Heirs and Successors, or for any person or persons acting

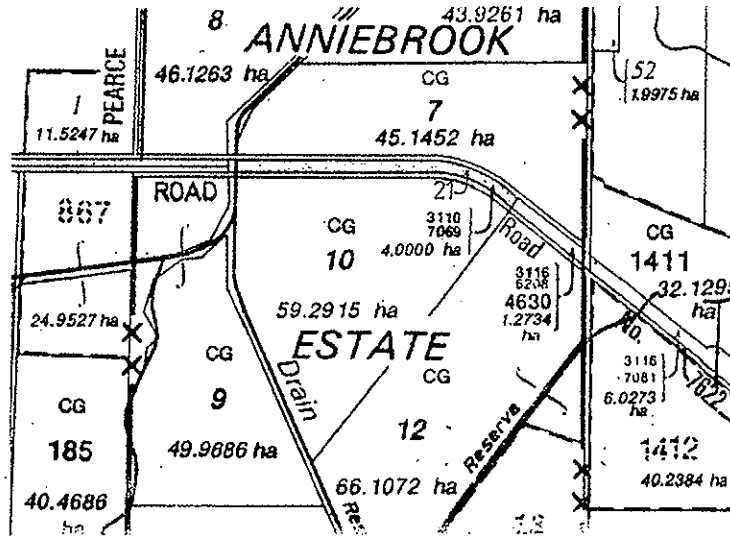
in that behalf by Our or Their authority, to cut and take away any such indigenous timber, and to search and dig for and carry away any stones or other materials which may be required for making or keeping in repair any roads, tramways, railways, railway stations, bridges, canals, towing paths, harbour works, breakwaters, river improvements, drainage, or irrigation works, and generally for any other works or purposes of public use, utility, or convenience, without making to the Lessee, or any person claiming under him, any compensation in respect thereof, and we do hereby save and reserve to Us, our Heirs and Successors, all mines of gold, silver, copper, tin or other metals, ore, and mineral, or other substances containing metals, and all gems and precious stones, and coal or mineral oil, and all phosphatic substances in and under the said land, with full liberty at all times to search and dig for and carry away the same; and for that purpose enter upon the said land or any part thereof; and we do hereby save and reserve to Us, our Heirs and Successors, all petroleum (as defined in the Petroleum Act, 1967, and all amendments thereof for the time being in force) on or below the surface of the said land with the right reserved to Us, our Heirs and Successors and persons authorised by Us, our Heirs and Successors to have access to the said land for the purpose of searching for and for the operations of obtaining petroleum in any part of the said land subject to and in accordance with the provisions contained in the Petroleum Act, 1967 and all amendments thereof for the time being in force or any Act repealing and enacted in substitution of that Act: Provided also, that if the said Lessee shall, during the term hereby created, at any time make default in payment of the rent hereby reserved, or shall fail or cease to use, hold, and enjoy the said land for the said special purpose, it shall thereupon be lawful for Us, our Heirs and Successors into and upon the said demised premises, or any part thereof in the name of the whole to re-enter, and the same to have again, repossess, and enjoy as if this deed-poll had never been executed, without making any compensation to the said Lessee.

This Lease is issued subject to the following additional conditions :

1. The land shall not be used for any purpose other than "Grazing" without the prior approval in writing of the Minister for Lands and Surveys.
2. The lease shall be renewable at the will of the Minister and subject to determination at three months' notice by either party after the initial term of one (1) year. Should the lease be so renewed, the rental fixed may be reappraised at such amount as the Minister may at any time and from time to time determine.
3. The lessee shall not cut down fell injure or destroy any living timber or scrub upon the demised land except for the purpose of destroying poisonous growth or by the agistment of stock in reasonable numbers.
4. No structures will be erected without the prior approval in writing of the Minister.
5. Compensation shall not be payable to the lessee in respect of any improvements effected by him on the demised land and remaining thereon at the expiration or earlier determination of the lease.
6. The lessee shall not without the previous consent in writing of the Minister assign, transfer, mortgage sublet or part with the possession of the demised land.
7. The Minister or his representative may enter the land for inspection at any reasonable time.
8. Power is reserved to the Minister to direct that the number of stock depasturing on the demised land shall be reduced if the Minister is of the opinion that the demised land is overstocked to an extent sufficient or likely to cause permanent damage to the land; failure to comply with any such direction will result in the forfeiture of the lease.

  
An Officer authorised in this behalf by the Governor  
By order of the Minister for Lands and Surveys

PLAN HEREIN REFERRED TO  
SUBJECT TO CLAUSE



CROWN LOCATIONS ALLOCATED  
 EXECUTIVE MINUTE 16/89  
 D.L.A. FILE 2333/959  
 REGISTRAR OF TITLES

Plans : Yallingup SE 1:25 000  
 Corr. : 1160/67  
 Acc. No : SL 2729  
 Drawn : GMB  
 Scale : 1:25000

Ex'd *[Signature]*

The area and measurements on the above plan are more or less.

IN WITNESS whereof we have caused Our said Minister for Lands to affix hereto his seal and set his hand. Dated this eleventh day of September 19 84.

*[Signature]*  
 An Officer authorised in this behalf by the Governor,  
 By order of the Minister for Lands.

## APPENDIX E

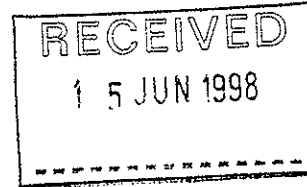
Water and Rivers Commission  
conditions for pipeline crossing  
of Carburnup River and  
Anniebrook Drain.



WATER AND RIVERS  
COMMISSION

YOUR REF  
OUR REF SW7455  
ENQUIRIES Daniel Allen  
DIRECT TEL 08 9721 0666

Ron Van Delft  
Ecologia Environmental Consultants  
76 Thomas St  
WEST PERTH WA 6005



Dear Ron

**RE: PROPOSED WATER CORPORATION PIPELINE CROSSING THE CARBUNUP RIVER  
AND ANNIEBROOK DRAIN**

Thankyou for referring the above proposal to the Water and Rivers Commission for our comment. The Commission has assessed the proposal and has no objections subject to the following conditions being incorporated within the development.

- The construction is to a standard as specified by the Local Authority.
- The developer takes the greatest care to ensure that the riverbed and banks have minimal disturbance and should there be impact on the bed and banks then remedial action shall be taken immediately to prevent further degradation.
- Disturbance to foreshore vegetation should be minimal. Any foreshore vegetation removed or affected by site works should be rehabilitated with local native species.
- All excess materials shall be removed from the construction site and disposed to an approved waste refuse site.
- The structure shall not impact on the marine and terrestrial ecology of the watercourse.
- The structure shall be designed to sound engineering practices.

Further Advice

- The Water and Rivers Commission recommends that Agriculture WA be consulted on clearing aspects related to the overall development. Any clearing greater than 1 Ha of indigenous vegetation must be formally assessed.

Should you require further information or clarification regarding any of the points raised above please contact Daniel Allen at the Water and Rivers Commission in Bunbury on (08) 9721 0666.

Yours sincerely

Mick Owens  
A/Manager, WRM&P  
Southwest Region

11 June, 1998

SOUTH WEST REGION

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