

# 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 CLONTARF HILL

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: CLONTARF RD, Healy RD, NEWMARKET ST

b) Nearest Corner: CLONTARF RD & NEWMARKET ST

c) Lot Number: ..... Street Number: .....

d) Town/Suburb/Location: BEACONSFIELD

e) Local Council: CITY OF PEMBLE & CITY OF COCKLETON

f) Site Name (if any): CLONTARF HILL

g) Approximate size of the area (ha): 7.5 ha

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

i) Map:  UBD  Streetsmart  UBD  Other: .....

j) Map no.: 33

k) Grid Ref: L6 see attached

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

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

STURROV HUY extension will go through ONE-THIRD of CLONTARF HILL

**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) CROWN Land CONSERVATION MANAGER BY PAMA BENT'S DEPARTMENT

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, Part Controlled Access Highway (MLS) Inner Urban Controlled Access Highway (TPS)

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)

Open, sunny, TROPIC Forest, diverse network in this area, as well as habitat for birds & mammals & fulfills an important role as wildlife corridor to the south east coast.

6. What is/are the soil type/s and colours? KARAKATTA = COTTAGE ASSOCIATION

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? Chermside Hill reaches a height of 39 meters above sea level & provides a lookout over a considerable area, with 70% covering of natural vegetation. It is also the least developed & most protected area in private

8. Is the area a wetland or does it include a wetland? NO

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? ..... 70%

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

..... FORM PART of the Bushland / Riparian Reserve.

12. Has any previous flora or fauna survey work been done on the area?

..... YES

If yes, please give details of the work ..... Flora / Fauna & land use survey

was conducted by Friends of Clontarf Hill & Environmental Committee  
Ben Carr in 1992 (see enclosed)

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

a) pristine

b) excellent

c) very good

d) good 30%

e) degraded 60%

f) completely degraded 10%

g) don't know

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

a) Partial clearing ✓ 10%

b) fragmentation

c) Selective removal of species: timber cutting, wildflower picking, mowing  
dieback and other plant diseases NOT known

d) Fire regime, including intensity, season and frequency - arson only, no weeds kept

e) 'Enrichment plantings' that is plantings of species not found in that community

f) Weed invasion Victorian Tea tree, CASHEW, oak Eucalypt & Pepper trees, & exotic grasses 30%

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

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 - *occasional 4 wheel drive 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) ..... *NOT known* .....

Do you know what they are? .....

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

Can you list those you know of? (birds, mammals, reptiles, amphibians etc)

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

If yes, please name them and indicate source of information

CAN YOU TELL US A LITTLE ABOUT THE SURROUNDING AREA

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

If yes, how close are they? ..... *2-3 km* .....

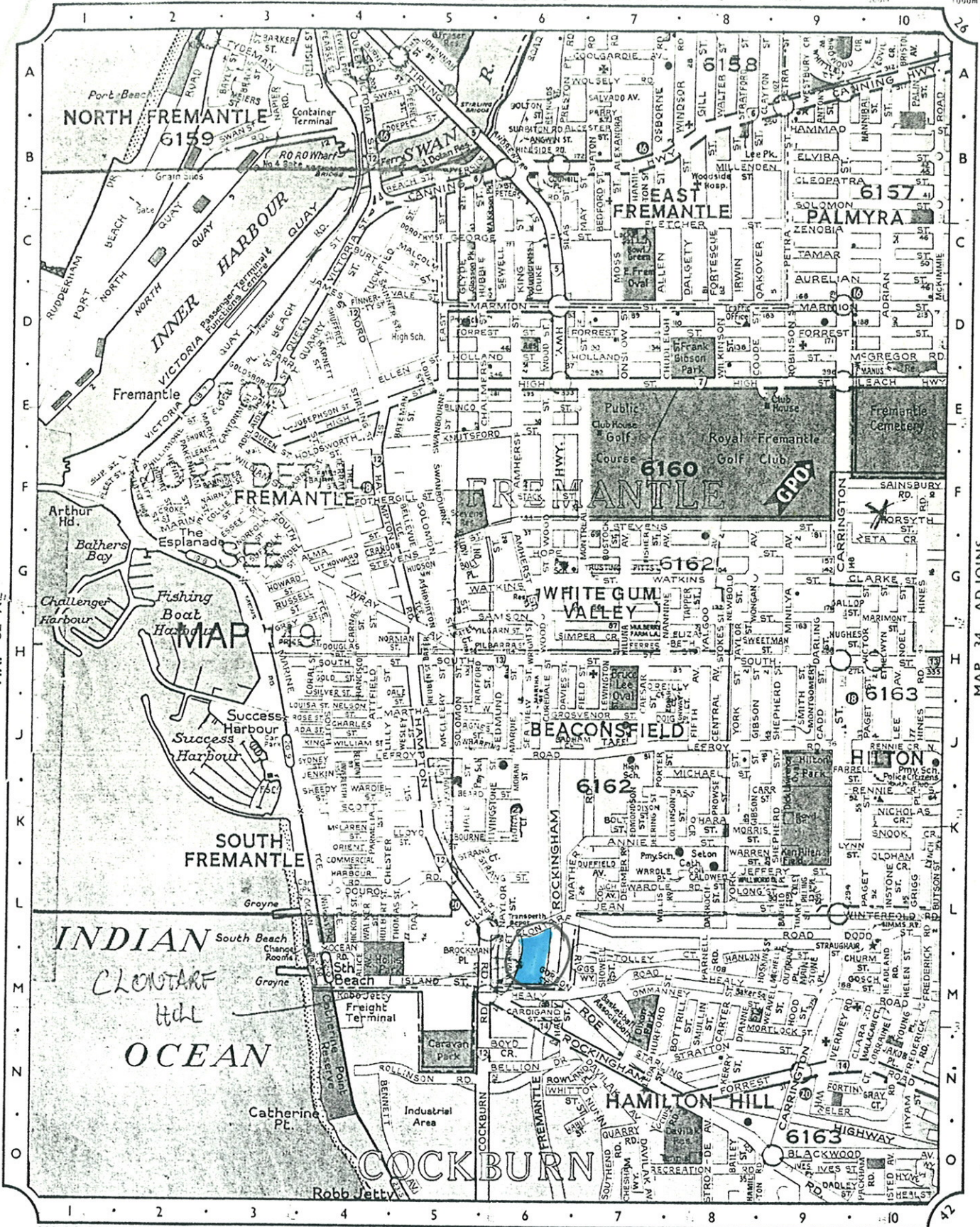
Are they already conservation reserves? ..... *Yes* .....

What is their approximate size? ..... *1 km<sup>2</sup>* .....

19. Does the submitted area link other bushland areas? ..... ~~Yes~~ ~~No~~ .....

..... *NO* .....

Please attach any additional information about the area which may be of use when assessing it.



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MAP 41 ADJOINS

# SLENDERTONE

ELECTRO THERAPEUTIC HEALTH SERVICES  
 SUPPLERS OF HAND HELD MASSAGERS, MASSAGE CHAIRS,  
 BEDS, THERMIC PADS, MASSAGE TABLES (Portable & Upright)

113 Wray Avenue Fremantle 6150

Telephone (09) 430 6764

Fax (09) 430 6762

PO Box 129, Nedlands 6009

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 CLONTARF HILL

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: Clontarf Rd, Healy Rd, Newmarket + MATHER Sts

b) Nearest Corner: HAMPTON + ROCKINGHAM Rds

c) Lot Number: See map attached - within green line Street Number: .....

d) Town/Suburb/Location: FREMANTLE HAMILTON HILL

e) Local Council: FREMANTLE

f) Site Name (if any): CLONTARF HILL

g) Approximate size of the area (ha): 10 ha all fold

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

i) Map: 1991 Streetsmart /UBD/Other: .....

j) Map no.: 90

k) Grid Ref: 10 D/E

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

200 m <sup>EAST</sup> North, off Hampton Rd, on Clontarf Rd - Hill to right

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

Proposed Eastern Bypass - tunnel one Main Roads option - Roe Freeway interchange

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) .....

Main Roads Dept

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) .....

N/A

4. What is the area zoned? (please indicate whether zoning is Town Planning Scheme or Metropolitan Region Scheme) ..... road reserve - part deleted - MRS

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 remnant limestone ridge + coastal vegetation (for F76 area) - good stand of E. decipiens

6. What is/are the soil type/s and colours? ..... grey sand limestone outcrops

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? ..... 40m height (40m) + large areas of relatively undisturbed mature trees - tuart + limestone marlock

8. Is the area a wetland or does it include a wetland? ..... - No - but adjacent

If yes, what kind of a wetlands is it?

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

to filled in wetland  
- Dixon Reserve, which could be partially restored

9. What percentage of the wetland is open water in summer? ..... <sup>Nil</sup> .....

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

10. What percentage of the area is indigenous vegetation? ..... <sup>65%</sup> (guess) .....

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

..... <sup>- buffer zone + potential to revegetate</sup> .....

12. Has any previous flora or fauna survey work been done on the area?

..... <sup>Yes</sup> .....

If yes, please give details of the work ..... <sup>Study by CALM</sup> .....

..... <sup>botanist (anonymous) done for Friends of</sup> .....

..... <sup>Clontarf Hill - see attached appendix - last page</sup> .....

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

a) pristine

b) excellent

c) very good

d) good

e) degraded

f) completely degraded

g) don't know

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

a) Partial clearing <sup>30%</sup>

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 <sup>35%</sup>

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

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 - Some present
- 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) .....

Do you know what they are? ..... Some significant Limestone  
Marlock (e. decipiens)

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

Can you list those you know of? (birds, mammals, reptiles, amphibians etc)

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

If yes, please name them and indicate source of information  
many bird species - esp Galah's displaced  
by local clearing esp at St Paul's estate

**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? ..... - about 1 km to Manning Lake  
at the start of the Beelcar R. Hope to be linked  
by Fremantle Green plan to all adjoining bushland to the Coast

Are they already conservation reserves? ..... - Some are, - Beelcar, Woodman's Pt etc

What is their approximate size? ..... large

19. Does the submitted area link other bushland areas? ..... Hopefully  
in the future by the Fremantle Green plan

Please attach any additional information about the area which may be of use when assessing it.

## CLONTARF HILL

A PROPOSAL FOR THE RETENTION, CONSERVATION AND  
REHABILITATION OF ONE OF FREMANTLE'S LAST  
REMAINING NATURAL AREAS.

Clontarf Hill Action Group

January 1993

## **INTRODUCTION**

Clontarf Hill is a relatively large area of publicly owned, undeveloped urban bushland. The area has high conservation and landscape values which should be protected and enhanced with land use planning and management appropriate to the site.

The proposed reserve has a great deal of potential for passive recreation and along with Cantonment and Monument Hills is one of the last of Fremantle's undeveloped areas which provide outstanding views and vistas of the surrounding land.

This proposal outlines the area's physical and biological attributes and will hopefully serve as an impetus to retain and rehabilitate Clontarf Hill as a unique park which will form an integral part of the local and regional open space system.

## **HISTORY**

The area's aboriginal history is unknown although its food and shelter resources would almost certainly have been used. No aboriginal name for the area has been recorded.

The european history of the reserve dates back to 1830 when it was included as part of a 2000 acre land grant to George Robb. A farm was developed by Robb to the south of the reserve, near the present day Cardigan Street and its address given in correspondence dated August 27th 1830 as Hamilton Hill. The contemporary name of the reserve may be wrong and Clontarf Hill may actually be the original "Hamilton Hill" from which the present suburb east of the reserve took its name.

Clontarf Hill, the accepted contemporary name for the site, takes its name from Clontarf Road which was named by John Healy another of the early settlers of the district and after which Healy Road south of the reserve is named.

The detailed later history of the area is unknown though part of the south-eastern section of the reserve was used for market gardening purposes up to the 1950's.

## PROPOSED DEVELOPMENTS

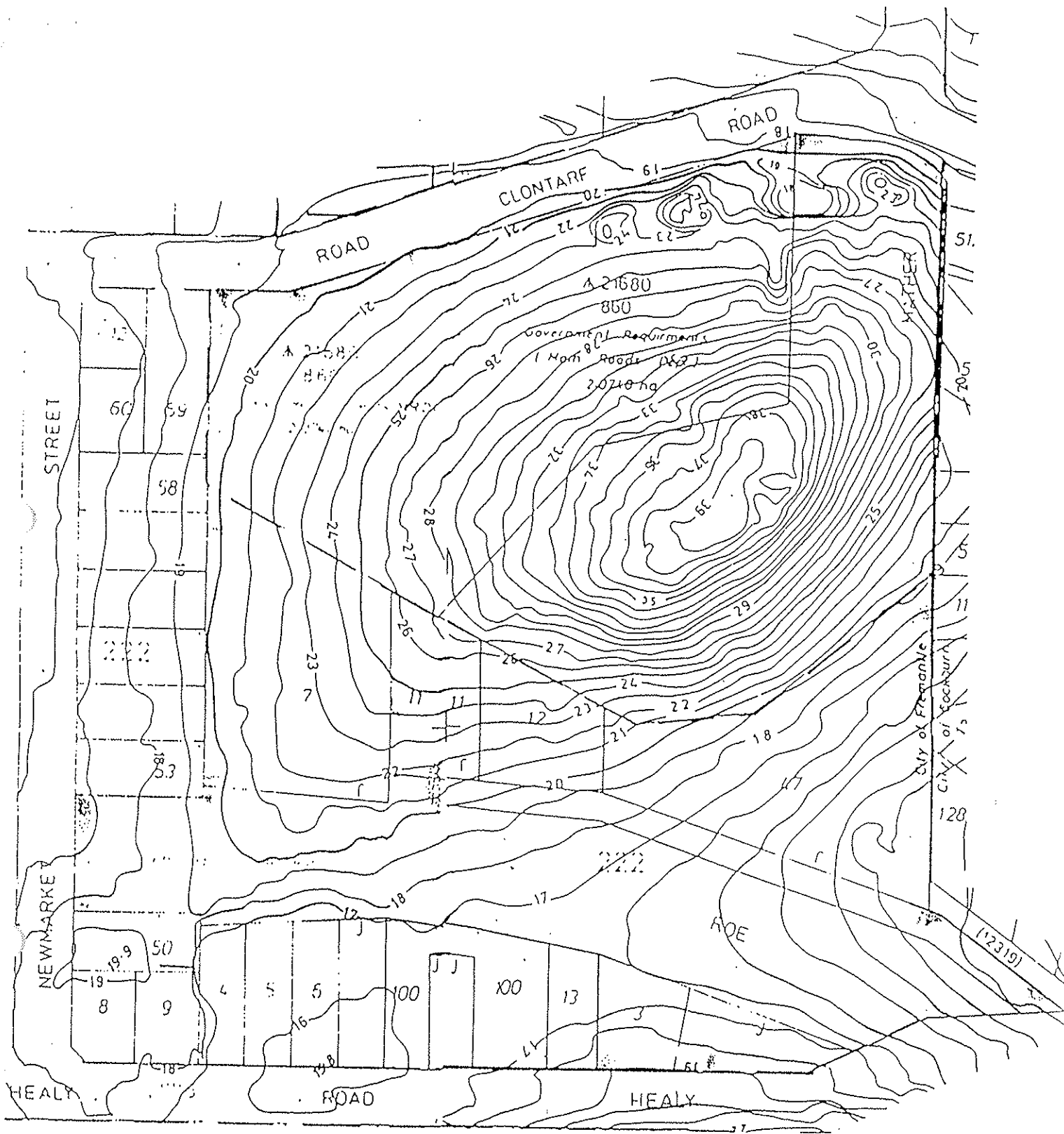
The area has been reserved since the 1970's for the construction of two major regional roads, plans for which have recently been abandoned as a result of changing transport needs and community values.

The largest proposed road was the Roe Highway, originally planned as a controlled access highway (freeway) which ran east-west across the southern part of the metropolitan area. The planned Roe Highway, east of Stock Road has been deleted due to traffic planning problems at its western end and the development of several alternative east-west roads in the area.

The second road planned for the area was the so called Fremantle Eastern Bypass which was to connect Stirling Highway to the Roe Highway and onto the proposed Cockburn Highway to the south. The Eastern Bypass was scrapped in 1992 as a result of strong community opposition.

The result of this revised road planning for the area is that Clontarf Hill can be saved and the land is available for alternative uses. Due to the area's location, unique landform and conservation value it is proposed that the opportunity be taken to create a park which offers local and regional residents recreational opportunities currently not available in the area. Concurrently the area's remnant natural vegetation can be retained and managed to enhance its conservation value.

Whilst the area was reserved for the proposed highway developments it was managed by the Main Roads Department in a holding capacity only. As a result of this lack of active management, rubbish dumping, weed invasion, erosion, bushfires, off-road vehicles, quarrying and other human disturbances have degraded the area. However the process of environmental degradation can be reversed through appropriate management and community involvement and the area's biological significance reinstated.



Scale 1:2000  
 ↑

North

**Figure One.** Clontarf Hill showing boundary of proposed reserve, lot boundaries and contours.

## **DESCRIPTION OF AREA**

### **Location**

Clontarf Hill is located 3 kilometres south of Fremantle and approximately 15 kilometres south-west of the Perth CBD. The reserve is 1 kilometre due west of the coast at South Beach. The area is located in the extreme south-east corner of the City of Fremantle and adjoins the City of Cockburn along its eastern and southern borders.

The area is bounded by Clontarf Road to the north and partially by Newmarket Street to the west and Healy Road to the south. The total area of the reserve as shown in Figure One is approximately 7.5 ha.

### **Surrounding Land Uses**

Adjoining land uses are varied and include low density residential areas, market gardening, manufacturing, a nursery, a transport depot and public open space.

### **Ownership and Vesting**

The area is comprised of publicly owned crown land currently controlled and managed by the Main Roads Department, road reserves e.g. Mather Road south of Clontarf Road and land owned in freehold by government departments, such as the Main Roads Department.

The area included in this proposal is made up of a number of surveyed parcels of land shown in Figure One and detailed below.

Reserves: No. C 21680, Gov't Requirements (Main Roads Dept) 2.0740 ha.

Lots: No's. 3,4,5,6,7,11,12,13,47,100. Total area of approx 2 ha.

Road Reserves: Mather Road (Closed Road?) Total area approximately 1.5 ha

Freeway Reserve: Roe Highway (Control of Access) Road No.16354. Approx 2 ha

### **Geology/Soils**

The reserve forms part of the coastal limestone ridge which runs north/south through the area. Clontarf Hill itself is comprised of coastal limestone which frequently outcrops near the summit and has been quarried adjacent to Clontarf Road.

The soils in the area are part of the remnant Spearwood dune system. This system is further divided into the Karrakatta soil association which is found in the south-

west of the reserve whilst the remainder is representative of the Cottesloe soil association. The Karrakatta soils are deeper and support the tallest remnant Tuart trees found on the reserve. Cottesloe soils by comparison are shallower, less fertile with frequent outcropping limestone.

## **Flora**

The original vegetation found on the reserve was a mixture of Tuart and Limestone Marlock woodlands on the more sheltered sites with deeper soils and Parrotbush and mixed heathland occurring on the exposed slopes which generally have shallower less fertile soils. The original vegetation would have been quite diverse reflecting the diverse topography, soils and aspect of the site. The heathlands currently exist over a reasonably large area in the western part of the reserve while the woodland areas of Tuart and Limestone Marlock are restricted to the south-east section. (Refer to Appendix One for a detailed flora list)

Large parts of the reserve are currently dominated by introduced grasses and weeds. There are also large infestations of invasive exotic trees particularly the Victorian Tea-tree, Caster Oil bush and Pepper trees. These weeds need to be controlled as a matter of priority if the reserve is to recover its original vegetation, and biological values.

## **Fauna**

The reserve supports a high number of bird species as well as some reptiles and possibly mammals. Birds use the area for feeding as well as roosting and nesting. The parrot bush dominated heathlands provide an important food resource to honeyeaters when flowering. The remnant mature Tuarts provide many hollow limbs for nesting birds, and are important habitat trees.

## **Landscapes**

The reserve contains a variety of different landscapes, including the hill itself, the exposed western slopes, the sheltered swale south of the hill and the eastern more sheltered slopes.

## **Views**

Clontarf Hill itself reaches a height of 39.9 metres above sea level and provides a lookout point out over a considerable area of the surrounding suburbs. Extensive views are available to the west and take in Hollis Park, Wilson Park, South Beach as well as the old South Fremantle tip site. Views are also available to the east over the suburbs of Hilton and Hamilton Hill. Clontarf Hill is the highest hill in the southern part of the City of Fremantle which is not developed and is accessible to the public.

## IDENTIFIED VALUES

**CONSERVATION:** The area supports remnant Tuart forest as well as limestone heathlands and woodland areas of the relatively uncommon limestone marlock, (*Eucalyptus decipiens*). This vegetation provide habitat areas, food and nesting resources for bird, mammal and some reptile species.

**SCIENTIFIC:** Clontarf Hill contains areas of relatively undisturbed coastal limestone heath and some Tuart woodlands. It is a good example of the geology and landform of these coastal limestone hills. The reserve provides the opportunity for researching environmental disturbance and rehabilitation techniques.

**EDUCATIONAL:** As one of the few remaining examples of remnant vegetation in the Fremantle area it provides an easily accessible and environmentally interesting area for local primary and secondary school students to study at first hand. It could also provide an ideal location for courses in bush regeneration and various field studies.

**RECREATIONAL:** With the panoramic views available from its summit, natural vegetation and animal life, Clontarf Hill lends itself to passive recreational pursuits and the development of passive recreational facilities including walk trails, cycle paths, lookout points, picnic areas and other facilities.

**REGIONAL:** With the increasing awareness of the importance of linkages between conservation areas that create 'rivers' of parkland rather than isolated 'islands', Clontarf Hill fulfils an important role as a wildlife as well as recreational corridor. Through Wilson and Hollis Parks and the previous tip site a link is available to the ocean. Likewise through Dixon reserve, Lucius Park and the southern limestone ridge there is a quite defined link to Manning Lake and onto the western section of the proposed Belliar Regional Park and Woodman Point reserve.

**SOCIAL:** With increasing urban population densities due to urban infill housing developments there is a need to create and preserve as much accessible public open space as possible. Clontarf Hill Reserve will help to fill this need in general but also specifically will help to balance the proposed medium to high density housing development likely to be built on the soon to be closed Clontarf Road bus depot immediately north of the reserve.

# ENVIRONMENTAL MANAGEMENT

## Current Management

The current management of the area appears to be restricted to the annual construction of firebreaks by the Main Roads Department. Firebreaks are a legal requirement for the area under the City of Fremantle's by-laws. Access is restricted to the southern portion of the reserve by houses and buildings on the old Environ Nursery site and chain mesh fencing along Healy Road. The fencing however is in poor condition and gates at the end of Gordon Road are currently open. Weed control appears to be non-existent and several major weeds were noted on the site.

## Management Problems

The current state of the site results from the lack of active management for many years. A major problem is the spread of weeds throughout the area which leads to competition with native species, lack of natural regeneration and frequent grass fires which compound other problems. It appears that fires have been relatively frequent over the area in recent years. Rubbish dumping is common and ranges from garden refuse to household rubbish, tyres and car bodies. Off road vehicles appear to use the graded firebreaks to access the reserve and then move into the native vegetation in places. Erosion is a problem and has been exacerbated by the grading of firebreaks sometimes up and down the steep slopes of the hill.

## Management Needs

As a first step a Management Plan is urgently needed that will provide a blue print for the future development and protection of the area. The management plan should:

- fully document the environment of the site, including social, biological and physical.
- contain management recommendations and detailed prescriptions for rehabilitation of the site.
- propose a concept plan which will identify key zones within the reserve and a development plan for recreational facilities.

## **PARKLAND PROPOSAL**

It is proposed that the area in question be retained and developed as a passive recreational and conservation reserve. Both of these land uses suit the site and with adequately planned are fully compatible.

### **Process of Retention**

For the area to be preserved it requires the support and co-operation of both State and Local government. Assuming that the City of Fremantle supports this proposal, the issue of the proposed roads and the disposal of the land by the Main Roads Department is the main obstacle to the creation of the park. The State Government can direct the Main Roads Department to relinquish control of the land to the City of Fremantle. The City of Fremantle could then plan the park and prepare a management plan which will serve as a blue print for its future rehabilitation and development as a passive recreation and conservation area.

## **COMMUNITY INVOLVEMENT**

The desire for this park has arisen from a 'grass roots' community desire to see the area conserved and enhanced. This community action will continue until the area is protected and then during its restoration and development. It is proposed that a community liaison committee and "Friends" group be set up and resourced by the City of Fremantle to act as the co-ordinating body's for community action. There is huge scope for the involvement and training of volunteers in such areas as rubbish removal, weed control, walk trail construction, rehabilitation and fund raising.

## Appendix One

### Preliminary Native Plant List

#### Common Name

Tuart

Limestone Marlock

Parrotbush

Cockies Tongue

Summer-Scented Wattle

Red-Eyed Wattle

Peppermint

Coastal Honey-myrtle

Chenille Honey-myrtle

Harsh Hakea

Blackboy

Native Wisteria

Basket Bush

Pearl Flower

Coast Daisy Bush

Prickle Lily

Flax Lily

*Eucalyptus gomphocephala*

*E. decipiens*

*Dryandra sessilis*

*Templetonia retusa*

*Acacia rostellifera*

*A. cyclops*

*Agonis flexuosa*

*Melaleuca acerosa*

*M. huegelii*

*Hakea prostrata*

*Xanthorrhoea preissii*

*Hardenbergia comptoniana*

*Spryidium globulosum*

*Conostephium pendulum*

*Olearia axillaris*

*Acanthocarpus preissii*

*Dianella divaricata*

**FIELD INSPECTION OF SYSTEM 6 UPDATE SUBMISSION 171:  
CLONTARF HILL****B.J. Keighery January 1997****Methods and Limitations**

Several traverses of the area were made in mid - summer. All native species observed and dominant weeds were recorded. Annual and annually renewed plant species were not necessarily evident, especially the native taxa expected in the area. Therefore assessment of vegetation condition is conditional as the proportion of native and weedy annual and annually renewed plants cannot be determined.

**Vegetation**

As described in the Fremantle Eastern Bypass Environmental Assessment (Carr 1996) the area contains six vegetation associations, that is: Tuart Woodland, Limestone Marlock Woodland, *Melaleuca huegelii* Shrubland, *Dryandra sessilis* Heath and a Weed Community. This description is comparable with the communities described by the Clontarf Hill Action Group's proposal (1993), that is: "...a mixture of Tuart and Limestone Marlock woodlands on the more sheltered sites with deeper soils and Parrotbush and mixed heathland on the exposed slopes with shallower less fertile soils."

**Flora**

Twenty six natives were identified in the area and 17 weeds (Appendix 1). Carr (1996) recorded a similar number of natives, 21 species, but many more weeds, 40 species. Most of the native species are trees and shrubs and a few perennial herbs. A series of shrubs and perennial herbs expected to be found in the vegetation on the outcropping limestone were not evident. The dominant annual and perennial herb species evident in the area were weed species such as *Scabiosa atropurpurea*, *Avena fatua*, *Bromus diandrus*, *Lagurus ovatus* and *Pennisetum villosum*.

**Vegetation Condition**

The southern third of the area has been cleared and the remainder of the area appears to have been disturbed by clearing and mining. The Tuart Woodland on the south eastern slope and patches of the steep eastern slope with *Melaleuca huegelii* Shrubland are in the best condition (Good) while the remainder of the vegetation is in Degraded to Good condition. In all areas there are a series of mature individuals of Tuart, Limestone Marlock and *Melaleuca huegelii*. Much of the vegetation appears to be regrowth from seed or rhizomes and lignotubers after a series of disturbances. Native perennial species such as *Eucalyptus gomphocephala*, *Eucalyptus decipiens*, *Kunzea ericifolia*, *Templetonia retusa* and *Dryandra sessilis* were regenerating from seed. The perennial weed species *Schinus teribinthifolius*, *Foeniculum vulgare* and *Leptospermum laevigatum* were also regenerating within the areas that are predominantly native species.

**Conservation Significance** (see also Appendix 2: Bushplan Draft Proforma; Appendix 3: Letter to ERM Mitchell McCotter Pty Ltd regarding area and System 6 Update)

While the vegetation on Clontarf Hill is representative of the vegetation of Spearwood Dunes (outcropping and underlying Tamala Limestone overlain with sand derived from Tamala Limestone) the condition and area of the vegetation does not have regional significance.

**References**

Carr, B. 1996 Fremantle Bypass Eastern Bypass environmental Assessment. Unpublished report to ERM Mitchell McCotter Pty Ltd

Clontarf Hill Action Group 1993 Clontarf Hill. A proposal for the retention, conservation and rehabilitation of one of Fremantle's last remaining natural areas.

**Appendix 1: Flora List 20/1/97**

Agavaceae

- \* *Agave americana*

Anacardiaceae

- \* *Schinus teribinthifolius*

Anthericaceae

- Tricoryne elatior*

Apiaceae

- \* *Foeniculum vulgare*

Asteraceae

- \* *Hypochaeris glabra*
- Olearia axillaris*
- \* *Sonchus oleraceus*

Asparagaceae

- \* *Asparagus asparagoides*

Cyperaceae

- Lepidosperma angustatum*

Dasyogonaceae

- Lomandra maritima*

Dipascaceae

- \* *Scabiosa atropurpurea*

Epacridaceae

- Leucopogon parviflorus*

Euphorbiaceae

- \* *Euphorbia terracina*
- Phyllanthus calycinus*
- \* *Ricinus communis*

Geraniaceae

- \* *Pelargonium capitatum*

Haemodoraceae

- Conostylis aculeata*

Iridaceae

- \* *Romulea rosea*

Mimosaceae

- Acacia cyclops*
- Acacia lasiocarpa*
- Acacia rostellifera*
- Acacia saligna*

Myrtaceae

- Eucalyptus decipiens*
- Eucalyptus gomphocephala*
- Kunzea ericifolia*
- \* *Leptospermum laevigatum*

Melaleuca acerosa  
Melaleuca huegelii

Papilionaceae

Hardenbergia comptoniana  
Templetonia retusa  
\* Trifolium campestre

Phormiaceae

Dianella revoluta

Poaceae

\* Avena fatua  
\* Bromus diandrus  
\* Lagurus ovatus  
\* Pennisetum villosum

Primulaceae

\* Anagallis arvensis

Proteaceae

Dryandra lindleyana  
Dryandra sessilis  
Hakea prostrata

Ranunculaceae

Clematis pubescens

Rhamnaceae

Spyridium globulosum

Rubiaceae

Opercularia vaginata

Thymeliaceae

Pimelea calcicola

Xanthorrhoeaceae

Xanthorrhoea preissii

**Appendix 2****NOT PICKED UP****Suggested name of area (1996)****Some Other Commonly used Names:**

Subm 171 Clontarf Hill (MfP Ref: )  
photo), no

**Local Authorities (Suburb  
planning)**

City of Fremantle (Beaconsfield)

**Ownership categories: Street name, Lot number Reserve Status**

**Area (ha):**

Total, % bushland (GIS aerial  
bushland mapped, %lake surface

**Zoning (MRS & town**

Urban

**LANDFORM AND SOIL**

**Geomorphology and soils**

**Spearwood Dunes**

Sands derived from Tamala limestone (Qts: S7)

Tamala limestone (Qtl: LS1)

**REGIONAL VEGETATION AND FLORA**

**Vegetation Complex**

**Spearwood Dunes**

Cottesloe Complex - Central and South

**Floristic Community Types:** not sampled types inferred (\*)

**Supergroup 4 - Uplands centred on Spearwood and Quindalup Dunes**

\*24 Northern Spearwood shrublands and woodlands

**REGIONAL WETLANDS**

No wetlands mapped

**THREATENED COMMUNITIES**

Not assessed

**AREA DESCRIPTION**

**Landscape features:** limestone ridge, vegetated uplands

**Vegetation and Flora**

**Structural units:** limited survey (DEP 1997), survey and mapping (Carr 1996)

*Eucalyptus gomphocephala* Woodland, *E. decipiens* Low Open Woodland, *Melaleuca huegelii* Tall Open Scrub to Open Heath, *Dryandra sessilis* Tall Open Scrub to Open Heath, *Acacia rostellifera* Tall Shrubland, mixed exotic Grassland

**Remnant Vegetation (canopy only):** *Eucalyptus gomphocephala* Woodland

**Vegetation Condition:** <20% Good with >40% Degraded to Good, 40% Completely Degraded with areas of severe localised disturbance

**Total Flora:** 26 native taxa (estimated >75% expected flora, DEP 1994 - 1997)

DRF/Priority and significant flora from survey and GIS: none recorded

**Fauna**

Mammals: not surveyed

**Linkage:** no adjacent bushland

**Special Attributes:** prominent limestone ridge with 360 degree views

**INTERNATIONAL AND NATIONAL SIGNIFICANCE**

Not listed

**CONSERVATION RECOMMENDATIONS**

**Criteria met for inclusion:** Criteria not relevant to determination of conservation value, but which may be applied when evaluating areas having similar values

**Constraints:** Road reserve for proposed major regional road

**Recommendation:**

Appendix 3

Ms Keryn James  
Associate  
ERM Mitchell McCotter  
PO Box 144  
WEST PERTH WA 6872

Your Ref 20616  
Our Ref 231/96:99583  
Enquiries B Hyder-Griffiths

Dear Ms James

**FREMANTLE EASTERN BYPASS**

Thank you for your letter of 29 July 1996 regarding the above proposal.

As you correctly pointed out Clontarf Hill was submitted to the System 6 update for consideration of its inclusion within the conservation estate.

Clontarf Hill has a range of conservation values which are of local significance. The site is also very important as it is one of the last bushland sites in Fremantle and probably represents the type of vegetation which would once have been widespread in the area. The site is also important from a cultural and recreational perspective. It is recommended that the proposed bypass should be located around the edge of the bushland to avoid the need for clearance and to preserve the bushland. Clontarf Hill has not been proposed for inclusion within Perth's Bushplan for its regional significance. The City of Fremantle have recognised the areas significance in their proposal to this Department.

The criteria against which areas are being assessed for inclusion within Perth's Bushplan are enclosed for your information these can be used to form the basis of your referral documentation to the Evaluation Division.

Yours sincerely

R.A.D. Sippe  
DIRECTOR  
POLICY COORDINATION DIVISION

15 October 1996

## Department of Environmental Protection

FIELD INSPECTION OF SYSTEM 6 UPDATE SUBMISSION 170: CLONTARF HILL  
B.J. Keighery 20th January 1997

### Methods and Limitations

Several traverses of the area were made in mid - summer. Annual and annually renewed plant species were not necessarily evident, especially the native taxa expected in the area. Therefore assessment of vegetation condition is conditional as the proportion of native and weedy annual and annually renewed plants cannot be determined.

### Vegetation

#### Agavaceae

1 \* *Agave americana*

#### Anacardiaceae

2 \* *Schinus teribinthifolius*

#### Anthericaceae

1 *Tricoryne elatior*

#### Apiaceae

\* *Foeniculum vulgare*

#### Asteraceae

3 \* *Hypochaeris glabra*

2 *Olearia axillaris*

4 \* *Sonchus oleraceus*

#### Asparagaceae

5 \* *Asparagus asparagoides*

#### Cyperaceae

3 *Lepidosperma angustatum*

#### Dasypogonaceae

7 *Lomandra maritima*

#### Dipsacaceae

6 \* *Scabiosa atropurpurea*

#### Epacridaceae

5 *Leucopogon parviflorus*

#### Euphorbiaceae

7 \* *Euphorbia terracina*

8 *Phyllanthus calycinus*

\* *Ricinus communis*

#### Geraniaceae

9 \* *Pelargonium*

#### Haemodoraceae

7 *Conostylis aculeata*

#### Iridaceae

10 \* *Romulea rosea*

## Department of Environmental Protection

### Mimosaceae

- ♀ Acacia cy
- ♀ Acacia lasiocarpa
- 10 Acacia rostellifera
- 11 Acacia saligna

### Myrtaceae

- 12 Eucalyptus decipiens
- 13 Eucalyptus gomphocephala
- 14 Kunzea ericifolia
- \* Leptospermum laevigatum
- 15 Melaleuca acerosa
- 16 Melaleuca huegelii

### Papilionaceae

- 17 Hardenbergia comptoniana
- 18 Templetonia retusa
- \* Trifolium campestre

### Phormiaceae

- 19 Dianella revoluta

### Poaceae

- 20 Avena fatua
- 21 Bromus diandrus
- 22 Lagurus ovatus
- 23 Pennisetum villasum

### Primulaceae

- 24 Anagallis arvensis

### Proteaceae

- 25 Dryandra lindleyana
- 26 Dryandra sessilis
- 27 Hakea prostrata

### Ranunculaceae

- 28 Clematis pubescens

### Rhamnaceae

- 29 Spyridium globulosum

### Rubiaceae

- 30 Opercularia vaginata

### Xanthorrhoeaceae

- 31 Xanthorrhoea preissii

26 Natives

17 Weeds

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# Fremantle Eastern Bypass Environmental Assessment

ERM Mitchell McCotter Quality System			
Referred to	JAB	Ref No.	26016
Date received	24 JUN 1996		
	<input checked="" type="checkbox"/>	refer to verification record	
	<input type="checkbox"/>	verification not required	
Signature:	<u>JAB</u>	Date:	24-6-96
	Project Manager		

DRAFT

Report to

ERM Mitchell McCotter Pty Ltd

Report by

Ben Carr  
Ben Carr and Associates

Job No. 543

**June 1996**

## 1.0 Introduction

This Environmental Assessment and Management Plan examines the environmental impacts of the Fremantle Eastern Bypass. The general location of the bypass and the proposed route are shown in Figure 1.0. Much of the route has supported a variety of landuse including urban, light industrial, quarrying, market gardening and government for a long period of time. Part of the route through the area known as Clontarf Hill and south of Rockingham Road has not been previously developed or cleared of its original vegetation. The assessment of the natural environment of the bypass route will focus on the Clontarf Hill location as this is the main area to be effected by the bypass that retains its natural environment values in a largely original state.

## 2.0 Landform and Soils

The study area is located on the western margin of the Swan Coastal Plain. The bypass route is located within the Cottesloe subtype of the Spearwood remnant dune system. The topography of the area is undulating with limestone hills with small scale swales between limestone ridges. There is a dominate north-south aligned limestone ridge which runs to the west of the northern end of the bypass route. Clontarf Hill forms part of this undulating ridge line and the bypass route intersects the ridge line from Clontarf Hill south to Bellion Drive. The elevation along the route varies from a low point of approximately 2 meters AHD at the bottom of the Lefroy Road quarry to a high point of 40m at the top of Clontarf Hill. The description of the area as part of the Spearwood dune system reflects the geological origin of the ridge as a coastal sand dune some 10 000 to 140 000 years ago. The sand has been consolidated and lime-cemented over time to form the characteristic coastal limestone which is known as Tamala limestone.

The soils along the bypass route are classified within the Cottesloe soil association. They are comprised of iron coated quartz particles of various sizes and have a distinctive colour ranging from yellow to deep reddish-brown. The distinctive colour results from the leaching of carbonate from the soils which is re-deposited as a hard capping to the underlying limestone. The soils overlay limestone at depths varying from 0 to 2 meters. In places along the bypass route there are extensive surface outcrops of the Tamala limestone. The limestone has been quarried in several locations along the route, most extensively in the area south of Lefroy Road. The soils are characterised by having moderately good water and nutrient retention capacities due to their high clay content. These soils are currently utilised for intensive horticulture north of Clontarf Road and historically within the Clontarf Hill area.

## 3.0 Land Use History

The current and historical landuse for the bypass route are detailed below.

High Street to Blinco Street	Urban
Blinco Street to Knutsford Street	Institutional (undeveloped along the bypass route)
Knutsford Street to Stack Street	Light industrial (hot mix bitumen plant, vehicle wreckers)
Stack Street to Hope Street	Residential
Hope Street to Watkins Street	White Gum Valley Primary School
Watkins Street to Grosvenor Street	Residential

Grosvenor Street to Lefroy Road	Vacant
Lefroy Road to Clontarf Road	Quarry and some market gardening in southern section
Clontarf Road to Healy Road	Remnant vegetation
Healy Road to Rockingham Road	Residential and some remnant vegetation
Rockingham Road to Bellion Road	Remnant native vegetation
Bellion Road south	Remnant native vegetation

## 4.0 Vegetation


Native vegetation along the bypass route exists in two main areas. These are the Clontarf Hill area and south of Rockingham Road. The route north of Clontarf Hill does not support any native vegetation and as such will not be discussed further. The vegetation of the Clontarf Hill area is variable in terms of its structure and condition. Some areas have been previously cleared and some areas retain aspects of their original vegetation structure and are in relatively good condition.

### 4.1 Vegetation Structure

The remnant vegetation varies in response to soil depth, amount of exposure and elevation. It also has been influenced by a number of human induced disturbances including fire and weed invasion, physical disturbance, rubbish dumping and off-road vehicles. The original vegetation communities are described below and mapped in Figure 2.0.


### 4.2 Vegetation Community Descriptions

#### *Tuart woodland*




This community occurs only on the south facing slopes of Clontarf Hill and in the valley between the hill and Healy Road. The Tuarts grow where the soil is deepest. The community is distinguished by mature Tuarts which reach a height of 30m. There are approximately 20 mature Tuarts in the area. The understorey has been grossly disturbed and is dominated by weed species however there are some stands of *Dryandra sessilis*. Other native species found in this community are *Hakea prostrata*, *Acacia saligna*, *Acacia cyclops*, *Acacia rostellifera*, *Hardenbergia comptoniana* and *Acacia pulchella*. There are also some Limestone Marlocks in this area.

#### *Limestone Marlock woodland*



This community occurs higher up slope than the Tuart community on shallower soils. It occurs in two main areas at Clontarf Hill one around the southern slopes of the hill and also in a small group adjacent to Clontarf Road in the north west corner of the Clontarf Hill block. The community has not been as disturbed as the Tuart area and the understorey consists of *Dryandra sessilis*, *Xanthorrhoea preissii*, *Leucopogon parviflorus*, *Phyllanthus calycinus* and *Lomandra maritima*.

#### *Melaleuca heuglii shrubland*



This community occurs in a relatively undisturbed area on the eastward facing slope of Clontarf Hill. It is dominated by the Chenille Honey-myrtle, *Melaleuca heuglii*. The understorey supports *Templetonia retusa*, *Melaleuca acerosa*, *Dryandra sessilis* and *Spyridium globulosum*. The *Melaleuca heuglii* grows as a small shrub to 2 meters tall on exposed limestone and very shallow soils.

*Acacia rostellifera shrubland*

There is only one small area of this community located between Cardigan street and Rockingham Road. It is comprised almost exclusively of *Acacia rostellifera*, the Summer scented wattle and several *Spyridium globulosum*. This community may have regenerated in this area following clearing as *Acacia rostellifera* is capable of regenerating rapidly from root suckers.



*Dryandra sessilis heath*

This is the most widespread and variable community along the bypass route. It grows around the western and northern slopes of Clontarf Hill and extensively between Rockingham Road and Bellion Drive. It grows in shallow soils often amongst outcropping limestone. The community is dominated by *Dryandra sessilis* however there are many other species present which at times are co-dominant with the *Dryandra*. These include *Acacia rostellifera* and *Hakea prostrata*. In the Clontarf Hill area other species found in this community include *Acacia rostellifera*, *Spyridium globulosum*, *Melaleuca heugelii*, *Melaleuca acerosa* and *Eucalyptus decipiens*. In the area adjacent to the eastern end of Boyd Crescent additional species include *Acacia rostellifera*, *Melaleuca heugelii*, *Melaleuca acerosa*, *Templetonia retusa*, *Hakea prostrata*, *Acanthocarpus preissii*, *Spyridium globulosum*, *Dianella divaricata*, *Grevillea thelemanniana*, *Dryandra nivea* and *Leucopogon parviflorus*. In the area south of Bellion Drive additional species include *Acacia rostellifera*, *Acacia cyclops*, *Acacia saligna*, *Melaleuca heugelii*, *Melaleuca acerosa*, *Templetonia retusa*, *Hakea prostrata*, *Acanthocarpus preissii*, *Spyridium globulosum*, *Dianella divaricata*, *Grevillea thelemanniana*, *Phyllanthus calycinus* and *Leucopogon parviflorus*.

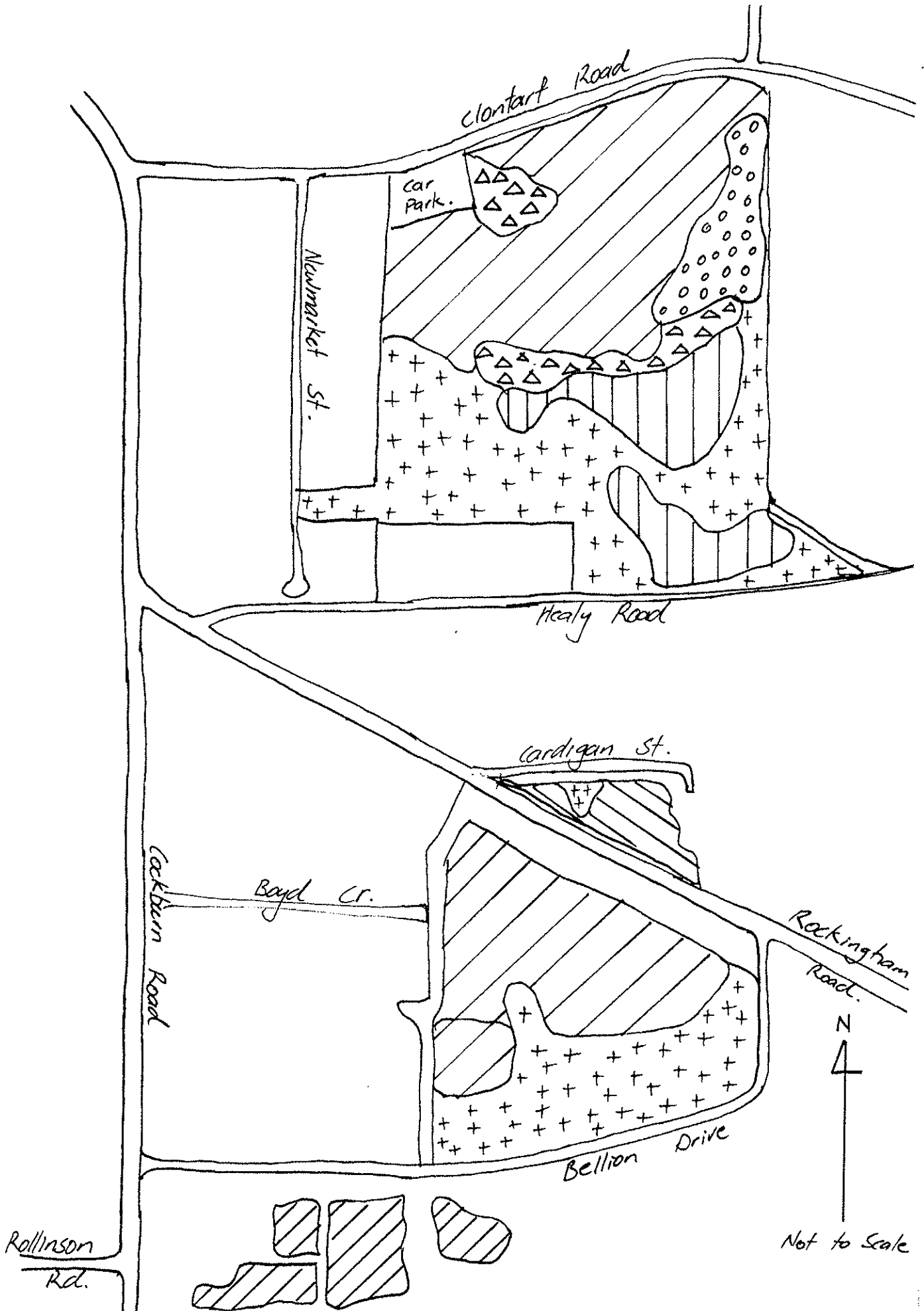


Weed Community

This community is widespread over large areas at Clontarf Hill and south of Rockingham Road. It is comprised of many weed species with the dominant ones being Soursob, Feather Grass, Fennell, Couch, Sandplain Lupin and Bridal Creeper. This community generally excludes all native species especially were it has become established due to previous disturbances.



Figure 2.0 Vegetation Communities: Clontarf Road to Bellion Drive



### 4.3 Vegetation Condition

The condition of the native vegetation along the route varies greatly. A lot of areas are in very poor condition with few native species left and a predominance of exotic weeds. The *Dryandra sessilis* community is generally in poorest condition due to frequent disturbance. There are several areas in moderate condition notably the eastward facing slopes and parts of the southern slopes of Clontarf Hill. These areas retain their original vegetation structure and generally have only moderate levels of disturbance and weed invasion. There are no area of remnant vegetation that can be classified as having good vegetation condition. The vegetation condition categories are not fixed i.e. depending on the management undertaken the vegetation condition of any area can be improved.

### 4.4 Flora

A vegetation survey of the bypass route in the Clontarf Hill area and the area between Rockingham Road and Bellion Drive has identified a total of 78 plant species. Of these 34 are indigenous to the area and 44 are weeds. In the Clontarf Hill block 21 indigenous species were identified and in the Boyd Crescent area 16 indigenous species. A list of indigenous plant species identified is shown in Appendix 1.0 and a list of weed species is shown in Appendix 2.0. The number of weed species (a weed is defined here as a plant not indigenous to the locality) is high which reflects the disturbed nature of the site and the impact of previous land uses.

### 4.5 Significant species.

No gazetted rare or endangered or priority listed flora species were identified in the Clontarf Hill area. However two plant species are considered significant due to their regionally restricted distributions or particular habitat value. These species are;

#### Limestone Marlock (*Eucalyptus decipiens*)

This species has a sporadic distribution on western parts of the Swan Coastal Plain and it is found elsewhere mainly in coastal regions of south west WA. At Clontarf Hill it grows in association with Tuarts on the southern and eastern slopes. Higher up the hill it replaces Tuart entirely. There are two isolated trees growing on the very top of the hill. Limestone Marlock flowers profusely in the spring and is an important pollen and nectar source for native fauna.

#### Tuart (*Eucalyptus gomphocephala*)

Tuarts are widespread in the south west of WA. At Clontarf Hill they are significant due to being the largest trees on the site. They also provide significant fauna habitat especially hollow limbs for nesting birds and possible mammal species including small insectivorous bats. Several species of bird have been observed using nesting hollows within Tuarts at Clontarf Hill.

## 5.0 Fauna

The native fauna that inhabits the bypass route is restricted due to the lack of suitable habitat areas. The Clontarf Hill block and the area south of Rockingham Road are the only areas of habitat that are used by native fauna. The diversity of fauna found on the site is limited due to its isolation, relatively small size and degree of disturbance. The existent fauna is restricted to species that can survive within small areas of urban bushland and those mobile species that use these small habitats as part of a much larger habitat. e.g. most common urban birds. To date a total of 12 bird species and 5 reptile species have been observed within the Clontarf Hill block. These are listed in Appendix 3.0.

### 5.1 Fauna Habitats

The most important fauna habitats within the Clontarf Hill block are the shrubland and heathland areas that retain their indigenous plant understorey. The *Dryandra sessilis* heathland is a particularly important habitat as it provides food resources for nectarivorous birds and protected nesting locations. The remnant mature Tuart trees provide tree hollows for bird nesting. These nesting areas are scarce elsewhere in the local area.

## 6.0 Significance of Bypass Route

The significance of the bypass route has been determined in two broad areas. These are the

- natural environment
- social environment

Where possible significance was determined at the following scales

- local scale (within 10 km of the route).
- regional scale (within 100 km of the route).

### 6.1 Natural Environment Significance

Other than the Clontarf Hill block and the area between Rockingham Road and Bellion Drive, the bypass route has little existing natural environment significance. This is a result of the route's long term residential and industrial landuse. There are some mature trees in places along the route which should be assessed to determine if they have particular value and if they can be incorporated within the detailed road design.

The Clontarf Hill block does have natural environment values based on its remnant vegetation, flora and habitats present. The Clontarf Hill block is locally significant as it is the northern most limestone hill in the area that retains some remnant vegetation. Cantonment Hill is the only other limestone ridge hill in the City of Fremantle south of the Swan River that retains its natural vegetation. Cantonment Hill however has a significantly different vegetation structure and composition to Clontarf Hill, as it doesn't support tree species and its vegetation is modified by its proximity to the river and sea. Cantonment Hill is managed by the City of Fremantle and is subject to an environmental management plan. On a local scale there are large areas of Spearwood Dune limestone ridge vegetation intact some 1-2 km south of Clontarf Hill. These areas are much larger than Clontarf Hill though they are also quite disturbed.

The bypass route does not have regional significance in terms of its natural environment. Similar vegetation and habitat areas are located in secure conservation reserves within the Perth metropolitan area, at Bold Park and at Yanchep and Yalgorup National Parks north and south of the metropolitan area respectively.

### 6.2 Social Significance

The bypass route has social significance which are related to the route values as an established residential area. The White Gum Valley Primary School grounds also have significant social values. The Clontarf Hill block has been determined to be of major significance socially due to two main factors. Firstly people's recognition of its habitat values and secondly their value of the hill as a major local landmark and topographical feature. The hill is a prominent landmark for local people though not many people actually visit the summit of the hill due to difficult access.

The hill is visually prominent from the suburb of Hamilton Hill to the east. The community value of Clontarf Hill led to the formation of a Friends of Clontarf Hill Group in 1992. The aims of this community group are to preserve and protect Clontarf Hill and surrounding land for conservation and passive recreation purposes.

### 6.3 Significance as a Linkage

The Clontarf Hill block has been identified as also having significance in terms of its role as a linkage point within the local area. This linkage function in two ways. Firstly in terms of ecological linkage it providing habitat for native species. This enables fauna to move or disperse through the metropolitan area using Clontarf Hill as a safe refuge.

Secondly the area also functions in terms of social linkage. Clontarf Hill is a pivotal point for passive recreation routes e.g. from Hamilton Hill to central Fremantle and to South Beach. The role of Clontarf Hill as an important linkage has been recognised by its incorporation in the Fremantle Green Plan. This is a proposal for a joint ecological and recreational circuit around Fremantle which links existing parks and conservation areas.

## 7.0 Road Design and Construction

The detailed design and construction phase of the Fremantle Eastern Bypass provides the opportunity for minimising environmental impacts. Design and construction elements which can minimise environmental impacts are listed below.

### 7.1 Detailed Design Phase

- Minimise road width.
- Incorporate noise reducing mounds.
- Avoid major remnant vegetation areas
- Landscape road reserve.
- Rehabilitate natural environment areas.

### 7.2 Construction Phase

- Minimise time period of construction.
- Minimise construction vehicle noise.
- Determine acceptable work hours and days.
- Minimise vibration impacts.
- Prevent wind and water erosion.

The Clontarf Hill block has the greatest potential for significant environmental impact during both the design and construction phases. These impacts relate to the significance of the area and the limited scope to redesign the route through the area. Impacts on the Clontarf Hill area can be minimised in the following general ways;

- Restrict road width to a minimum.
- Restrict cutting to a minimum.
- Rehabilitate all disturbed areas.
- Restrict the movement of vehicles and machinery to areas that are to be disturbed for road construction.
- Prevent the importation or spread of weeds.

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Based on the information gained in this report and discussions with members of the Friends of Clontarf Hill group, the following specific strategy is recommended for reducing impacts in the Clontarf Hill area to a minimum.

- Design the route to retain the top of the hill as it is a significant local landmark.
- If tunneling is feasible in terms of cost and engineering requirements, tunnel under the hill.
- Alternatively swing the route around the hill either on the east or west sides to achieve the above.
- If cutting is necessary through the hill, minimise the cutting area.
- If the above is not possible use a "cut and lid" method to retain linkages to the hill top.
- Minimise destruction of all areas of good vegetation condition.
- Minimise destruction of Tuart and Limestone Marlock vegetation. Refer to Figure 2.0.
- Rehabilitate disturbed areas back to original vegetation communities as shown in Figure 2.0.
- Provide passive recreation routes e.g. footpaths cycleways, dual use paths so that people can move through area especially in a east-west direction.
- Manage the natural environment of the area to minimise disturbance and maximise the area's habitat values both pre and post construction.

## **8.0 Bypass Rehabilitation Strategy**

This section briefly describes an environmental rehabilitation strategy for the construction of the Fremantle Eastern Bypass.

### **8.1 Rehabilitation along Route**

- Instigate a topsoil management program to collect and store the topsoil for later re-use.
- minimise storage time of the top soil.
- Store weed infested topsoil separately.
- Develop a weed control program for areas in which this topsoil is to be reused.
- Develop a vegetation management system aimed at harvesting and mulching/chipping vegetation for later reuse as a surface mulch in revegetation areas. Care should be taken not to harvest species with weed characteristics. e.g. Victorian Tea Tree.
- Develop a rehabilitation plan of the route in conjunction with the detailed road design. This plan should determine and document the rehabilitation species to be used, the planting layout, plant establishment techniques and post planting maintenance requirements.
- Rehabilitation species to be used should be indigenous to the location and be suitable for the soil types.

### **8.2 Rehabilitation within the Clontarf Hill Block**

The rehabilitation within the Clontarf Hill block should aim at recreating the indigenous vegetation communities. To achieve this aim the following guidelines should be followed.

- Only use indigenous plant species in all rehabilitation.
- Establish indigenous vegetation in a manner that mimics the plants' natural patterns of growth and distribution.
- Utilise natural regeneration e.g. from soil seed banks where possible.
- If possible use local propagation material i.e. seed or cuttings from the local area (within 10 km of Clontarf Hill).

- Instigate an environmental management program aimed at achieving the objectives listed below prior to construction commencing. This will ensure that the indigenous vegetation communities are healthy and best able to re-colonise disturbed areas.

Objectives for pre-bypass construction environmental management.

- Minimise weed growth in natural vegetation communities.
- Minimise disturbances e.g. off-road vehicles and rubbish dumping, by fencing perimeter of site.
- Prevent further wildfire within the site through controlling access and liaison with WAFB.

A list of suitable rehabilitation species for the Clontarf Hill area is given in Appendix 4.0. This list is based on those existing indigenous plant species that can be propagated for revegetation purposes. Several species are included in Appendix 4.0 which are not currently found in the Clontarf Hill area. They are included based on:

- their likelihood of being once found in the area.
- their significance in terms of limited current distribution.
- their suitability for rehabilitation/landscape planting.
- their ease of growth.

## 9.0 Summary

The Fremantle Eastern Bypass Route from High Street south to Rollison Road can be divided into two broad sections in terms of environmental assessment. These sections are;

- The Clontarf Hill Block bounded by Clontarf Road and Healy Street, Newmarket Street and the area between Rockingham Road and Bellion Drive.
- The remainder of the route.

The Clontarf Hill section has local significance, especially socially. The remainder of the route was found to have little natural environment significance. A total of 5 distinct vegetation types were identified at Clontarf Hill. These communities varied in their response to local elevation and soil depth. These 5 vegetation communities supported a total of 21 indigenous plant species and 41 weed species. The level of environmental disturbance at Clontarf Hill is high due to the area's historic land uses and small size.

It is recommended that the bypass be designed to minimise disturbance of Clontarf Hill as much as possible. Access to the summit of the hill which is a significant local landscape feature should be retained, especially east-west access through the site. Rehabilitation of the area should be carefully planned and carried out to replicate the existing plant communities.

## Appendix 1.0 Plant Species List

Botanical Name	Common Name	Notes
Acacia cyclops	Red eyed Wattle	
A. pulchella	Prickly Moses	
A. rostellifera	Summer scented Wattle	
A. saligna	Golden Wattle	
Acanthocarpus preissii	Prickle Lily	
Calothamnus quadrifidus	One-sided Bottlebrush	Current status uncertain
Clematis microphylla	Old Man's Beard	
Conostylis candicans	Grey Cottonheads	
Dianella divaricata	Flax-lily	
Drosera sp.		
Dryandra sessilis	Parrot Bush	
D. nivea		
Eucalyptus decipiens	Limestone Marlock	
Eucalyptus gomphocephala	Tuart	
Grevillea thelemanniana		
Hakea prostrata	Harsh Hakea	
Hardenbergia comptoniana		
Hibbertia hypericoides	Common Buttercups	
Lepidosperma angustatum		
Leucopogon parviflorus		
Lomandra maritima		
Loxocarya flexuosa		
Loxocarya sp.		
Melaleuca acerosa		
Melaleuca huegelii	Chenille Honey-myrtle	
Olearia axillaris	Coast Daisy Bush	
Phyllanthus calycinus		
Pimelea calcicola	Limestone Banjine	
Ptilotus polystachyus		
Rhagodia baccata		
Spyridium globulosum		
Templetonia retusa	Cookies' Tongue	
Tricoryne elatior	Yellow Lilly	
Xanthorrhoea preissii	Black Boy	

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## Appendix 2.0 Weed Species List

Botanical Name	Common Name	Notes
<i>Agave americana</i>	Agave	One infestation
<i>Arctotheca calendula</i>	Cape Weed	
<i>Asphodelus fistulosus</i>	Wild Onion	
<i>Avena fatua</i>	Wild Oats	
<i>Brassica tournefortii</i>	Mediterranean Turnip	
<i>Carpobrotus edulis</i>	Hottentot Fig	
<i>Cynodon dactylon</i>	Couch	Widespread
<i>Ehrharta calycina</i>	Veld grass	
<i>Eragrostis curvula</i>	African lovegrass	
<i>Erythrina x sykesii</i>	Coral Tree	Planted Tree
<i>Eucalyptus citriodora</i>	Lemon Scented Gum	Planted Tree
<i>Eucalyptus erythrocorys</i>	Illyarrie	Planted Tree
<i>Eucalyptus platypus</i>	Coastal Moort	Planted Tree
<i>Euphorbia terracina</i>	Geraldton Carnation Weed	
<i>Ficus carica</i>	Fig	
<i>Foeniculum vulgare</i>	Fennel	Widespread
<i>Freesia aff. Leichtlinii</i>	Freesia	
<i>Fumaria capreolata</i>	Whiteflower Fumitory	
<i>Gazania linearis</i>	Gazania	
<i>Geranium molle</i>	Cranesbill	
<i>Helianthus annuus</i>	Sunflower	
<i>Ipomoea indica</i>	Morning Glory	
<i>Lagurus ovatus</i>	Hares Tail Grass	
<i>Leptospermum laevigatum</i>	Victorian Tea Tree	Widespread large shrub
<i>Lupinus cosentinii</i>	Sandplain Lupin	
<i>Lycium ferocissimum</i>	African Boxthorn	
<i>Melia azedarach</i>	White Cedar	
<i>Myrsiphyllum asparagoides</i>	Bridal Creeper	
<i>Narcissus jonquilla</i>	Jonquil	
<i>Oenothera stricta</i>	Sweet-scented Evening Primrose	
<i>Olea europea</i>	Olive	
<i>Oxalis pes-caprae</i>	Soursob	Very Common
<i>Pelargonium capitatum</i>	Rose Pelargonium	
<i>Pennisetum clandestinum</i>	Kikuyu	
<i>Pennisetum setaceum</i>	Fountain Grass	Common
<i>Raphanus raphanistrum</i>	Wild Radish	
<i>Ricinus communis</i>	Castor Oil Bush	
<i>Romulea rosea</i>	Guildford Grass	
<i>Scabiosa atropurpurea</i>	Purple Pincushion	
<i>Schinus terebinthifolius</i>	Japanese Pepper Tree	
<i>Setenotaphrum secundatum</i>	Buffalo Grass	
<i>Trachyandra divaricata</i>	Onion Weed	
<i>Vicia sativa</i>	Common Vetch	
<i>Vitis vinifera</i>	Grape	

## Appendix 3.0 Animal Species List

### Birds

Scientific Name	Common Name	Notes
<i>Anthochaera carunculata</i>	Red Wattle Bird	
<i>Barnardius zonarius</i>	Port Lincoln Ring neck	
<i>Cacatua roseicapilla</i>	Galah	
<i>Caracticus torquatus</i>	Grey Butcherbird	
<i>Corvus coronoides</i>	Australian Raven	
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	
<i>Falco longipennis</i>	Australian Hobby	
<i>Grallina cyanoleuca</i>	Australian Magpie Lark	
<i>Gymnorhina tibicen</i>	Australian Magpie	
<i>Lichenostomus virescens</i>	Singing Honeyeater	
<i>Streptopelia chinensis</i>	Spotted Turtle Dove	
<i>Streptopelia senegalensis</i>	Laughing Turtle Dove	
<i>Zosterops lateralis</i>	Silvereye	

### Reptiles

Scientific Name	Common Name	Notes
<i>Tiliqua rugosa</i>	Bobtail	
<i>Pseudonaja affinis</i>	Dugite	
<i>Cryptoblepharus plagiocephalus</i>	Fence Skink	
<i>Hemiergus quadrilineata</i>	Yellow Bellied Skink	
<i>Lerista lineata</i>	Lerista	

## Appendix 4.0 Rehabilitation Species List

Botanical Name	Common Name	Notes
<i>Acacia cochlearis</i>		
<i>Acacia cyclops</i>	Red eyed Wattle	
<i>Acacia pulchella</i>	Prickly Moses	
<i>Acacia rostellifera</i>	Summer scented Wattle	
<i>Acacia saligna</i>	Golden Wattle	
<i>Acacia truncata</i>		
<i>Acacia xanthina</i>	White Stemmed Wattle	
<i>Agonis flexuosa</i>	Prickle Lily	
<i>Callitris preissii</i>		
<i>Calothamnus quadrifidus</i>	One-sided Bottlebrush	
<i>Clematis microphylla</i>	Old Man's Beard	
<i>Conostylis candicans</i>	Grey Cottonheads	
<i>Dianella divaricata</i>	Flax-lily	
<i>Dryandra nivea</i>		
<i>Dryandra sessilis</i>	Parrot Bush	
<i>Eremophila glabra</i>		
<i>Eucalyptus decipiens</i>	Limestone Marlock	
<i>Eucalyptus foecunda</i>	Fremantle Mallee	
<i>Eucalyptus gomphocephala</i>	Tuart	
<i>Grevillea thelemanniana</i>		
<i>Hakea prostrata</i>	Harsh Hakea	
<i>Hardenbergia comptoniana</i>		
<i>Hemiandra pungens</i>	Snake Bush	
<i>Isolepis nodosa</i>		
<i>Jacksonia furcellata</i>		
<i>Kennedia prostrata</i>		
<i>Lepidosperma gladiatum</i>		
<i>Melaleuca acerosa</i>		
<i>Melaleuca huegelii</i>	Chenille Honey-myrtle	
<i>Melaleuca lanceolata</i>	Common Buttercups	
<i>Olearia axillaris</i>	Coast Daisy Bush	
<i>Phyllanthus calycinus</i>		
<i>Pittosporum phylliraeoides</i>		
<i>Rhagodia baccata</i>		
<i>Santalum acuminatum</i>		
<i>Spyridium globulosum</i>		
<i>Stipa elegantissima</i>	Feather Spear Grass	
<i>Templetonia retusa</i>	Cockies' Tongue	
<i>Xanthorrhoea preissii</i>	Black Boy	

## References

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Freeman A.D & Reid G.P 1995, *APACE Revegetation Nursery Catalogue*. Species Lists and Locality Guide for the Swan Coastal Plain and Darling West. A publication of the Appropriate Technology Development Group Incorporated.

Friends of Clontarf Hill , 1993, *Clontarf Hill, A proposal for the retention, Conservation and rehabilitation of one of Fremantle's last remaining natural areas*. Unpublished document.

Powell, R. 1990, *Leaf and Branch*, Trees and Tall Shrubs of Perth, Department of Conservation and Land Management Perth WA.

Riphey.E, & Rowland, B.1995, *Plants of the Perth Coast and Islands*, University of Western Australia Press. Perth WA.

DRAFT

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Facsimile (09) 321 5262  
PO Box 144 West Perth  
WA 6872 Australia  
DX 60702 West Perth

19 December 1996

Mr Garry Middle  
Department of Environmental Protection  
141 St Georges Terrace  
PERTH WA 6000

DEPARTMENT OF ENVIRONMENTAL PROTECTION	
20 DEC 1996	
File No 1	231/96
File No 2	
Initials	

Our Ref. 26016

Dear Garry,

**RE: FREMANTLE EASTERN BYPASS - DETERMINATION OF LEVEL OF ENVIRONMENTAL IMPACT ASSESSMENT**

This letter is a referral for determination of the level of environmental impact assessment under Section 38 of the Environmental Protection Act 1986. The format generally follows that of the Environmental Review Application in Appendix II of the 1993 document "A Guide to Environmental Impact Assessment in Western Australia" published by the Environmental Protection Authority.

**1.0 Proponent**

PROPONENT:	Main Roads Western Australia (MRWA)
ADDRESS FOR CORRESPONDENCE:	2 Adams Drive WELSHPOOL WA 6106
CONTACT PERSON: (MRWA)	Mike Kapitola, Project Manager Phone : (09) 311-8333
SUBMITTED BY:	ERM Mitchell McCotter
ADDRESS FOR CORRESPONDENCE:	PO Box 144 WEST PERTH WA 6872
CONTACT PERSON: (ERM MITCHELL McCOTTER)	Keryn James, Project Director Phone : (09) 321-5200

**2.0 Proposal**

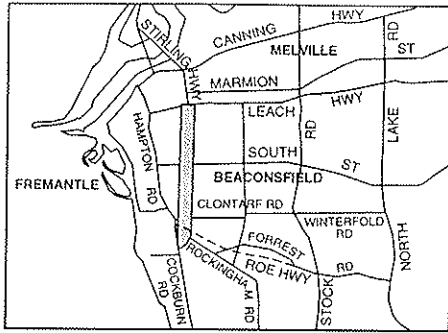
**TITLE:** Fremantle Eastern Bypass, High Street to Rollinson Road, Fremantle, White Gum Valley, Beaconsfield and Hamilton Hill.

**DESCRIPTION:**

The proposal is for the design and construction of a bypass between High Street in Fremantle to Rollinson Road in Hamilton Hill. The new road will effectively be an extension of the existing Stirling Highway, which currently terminates at High Street. The existing Wood Street will be retained as a local road. This is shown in Figure 2.1.

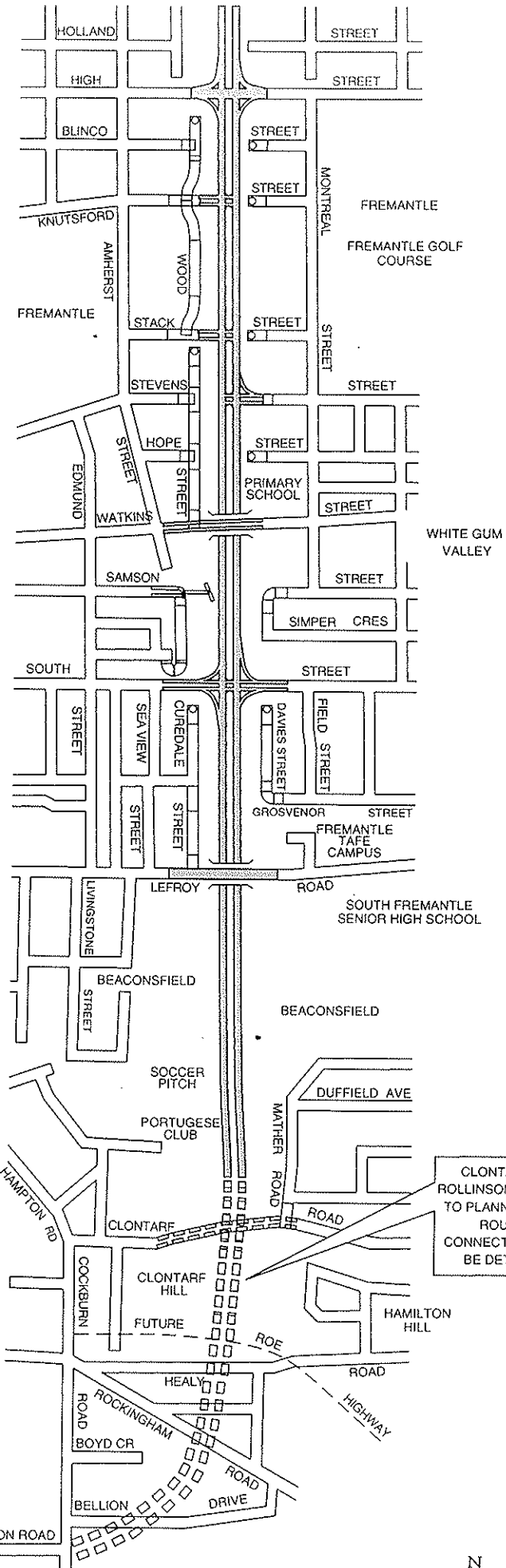


ERN 105150






LOCALITY PLAN

**FREMANTLE EASTERN BYPASS  
HIGH STREET TO ROLLINSON ROAD  
CONCEPT PLAN**



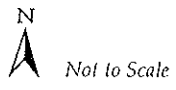
**LEGEND**

-  PROPOSED CARRIAGEWAY
-  PROPOSED CUL DE SAC
-  EXISTING ROAD

NOT TO SCALE

26016.fh.5

Figure 2.1 LOCALITY PLAN



The need for the bypass was identified in 1973 and land was reserved in the Metropolitan Region Scheme (MRS). Since this time, several review studies have been undertaken and have resulted in the reservation being altered from the original provision for a high standard six lane divided road, to the current reservation for a four lane divided arterial road.

The bypass will provide a key link in the arterial road network connecting the south-west area of Perth to the Fremantle Port and areas north of the Swan River. It will relieve future congestion on local roads in Fremantle, particularly Hampton Road, and provide improved access to Victoria Quay.

Planning and preliminary design for the bypass is currently being conducted on behalf of MRWA by design engineers, Snowy Mountains Engineering Corporation (SMEC). An Environmental Assessment and Management Plan (EAMP) is being prepared by ERM Mitchell McCotter for MRWA under the guidance of the MRWA Environmental Management Manual. The environmental impacts addressed in this EAMP are discussed in Section 4.

A preliminary plan for the section of the bypass between High Street and Clontarf Road was prepared in 1994. This is being reviewed in conjunction with an extensive community consultation program. Planning for the section south of Clontarf Road has also commenced and again includes extensive community consultation. An access route from the bypass to Victoria Quay, aimed at catering for truck traffic, is also the subject of investigations and is included in the scope of work for the project. The final plan will take into consideration community submissions, engineering requirements and environmental impacts. Construction is scheduled to commence by the year 2000.

### 3.0 Location

**PROPOSAL SITE:** Approximately sixteen kilometres south west of Perth CBD.

**ADJACENT LAND USE:** Residential, White Gum Valley Primary School, Light Industrial (hot mix bitumen plant, vehicle wreckers), Clontarf Hill, quarry, market gardens.

#### SITE DESCRIPTION:

The northern section of the bypass, between High Street and Stack Street comprises predominantly light industrial uses which are owned by the City of Fremantle or the Building Management Authority.

Single residential dwellings currently occupy the proposed route between Stack Street and Lefroy Road. These residences are of varying ages and condition with over half already owned by State or Local Government in anticipation of this project. The residences will be demolished as part of the project. The White Gum Valley Primary School is also located in this section. The bypass reservation includes part of the school's playground and MRWA are liaising with the school and Education Department regarding compensation.

A disused quarry is located in the section south of Lefroy Road and is owned by the City of Fremantle. South of this is a soccer pitch, the Portuguese Club and Clontarf Hill. The

bypass does not impact on the Portuguese Club land and measures for dealing with Clontarf Hill are discussed in Section 4.

#### 4.0 Environmental Impact

A high level of disturbance of the natural environment has occurred in the region between High Street and Clontarf Road. This section of the proposed bypass does not support any native vegetation, and thus the environmental impacts of any further developments will be minimal, with the most pertinent issues relating to potential impacts on the people and lifestyles of the local community. As a result, an extensive community consultation program is in progress.

The environmental issues, predicted impacts and likely management measures of the project are shown in *Table 4.1* attached. All of these issues will be considered in detail in the EAMP to be prepared for the project.

There are two additional issues which can be managed as part of the project, but require special investigation. These include:

- Clontarf Hill; and
- potential for site contamination.

Details of current investigations and proposed management of impacts are detailed below.

##### *i. Clontarf Hill*

There are two areas containing native vegetation south of Clontarf Road; namely the Clontarf Hill area and another area south of Rockingham Road. Earlier this year, the Friends of Clontarf Hill and the City of Fremantle made submissions to the Department of Environmental Protection (DEP) that Clontarf Hill be considered for inclusion in the conservation estate as part of the System Six update. Your department has informed us that consideration of this matter will not take place for some time and have supplied a copy of the criteria used to assess areas under consideration.

We have assessed the values of Clontarf Hill against these criteria. This evaluation is provided in *Table 4.2*.

In summary, Clontarf Hill has local significance, especially socially. Five vegetation communities support a total of 21 indigenous plant species and 41 weed species. The level of environmental disturbance is high due to the area's historic land uses and small size, however, there are some areas of vegetation in moderate condition, notably that which is located on the eastward facing slopes and part of the southern slopes. The natural and social significance of Clontarf Hill is recognised by MRWA and, therefore, the following measures are proposed to be undertaken:

- restrict road width to a minimum consistent with provision for vehicular and cyclist traffic;
- trench and cover on the western side of Clontarf Hill so as to retain the top of the hill and eastern facing slopes where vegetation is in the best condition;

- replacement of soil removed during trench and cover, to reinstate the original slope of the hill;
- rehabilitate disturbed areas back to original vegetation communities. This will provide an opportunity to improve the vegetation condition on Clontarf Hill;
- provision of passive recreation routes, for example, footpaths and cycleway, so that people can move through Clontarf Hill especially in an east-west direction without impacting on vegetation; and
- use of indigenous plant species in all rehabilitation.

On this basis, it is expected that the impact of the bypass on Clontarf Hill is acceptable and can be managed. In addition, the Friends of Clontarf Hill and the City of Fremantle have had, and will continue to have, ongoing input into the issues related to Clontarf Hill. Meetings have been held with the Friends of Clontarf Hill and City of Fremantle and both groups are represented on the Community Liaison Group (CLG) established for the project.

#### ii. *Potential for Site Contamination*

A preliminary site survey of the potential for contaminated sites along the proposed Fremantle Eastern Bypass route has been undertaken by ERM Mitchell McCotter. The preliminary investigation was prepared following a review of past land uses within the proposed road reserve, consultation with the City of Fremantle and site inspection. The report concluded that five sites located on, or near, the proposed route may contain some backyard contamination. The report recommended that a Phase II audit, including sampling, be carried out. The purpose of this is to determine whether remediation or disposal of any contaminated material is required based on the nature of contaminants, the proposed use of the area and the extent and potential for off-site contamination.

Based on these recommendations, MRWA directed ERM Mitchell McCotter to undertake a Phase II soil sampling exercise on the five identified sites. This is to be undertaken during December 1996 and January 1997. The results of this exercise, and the preliminary investigation, would be included in the Environmental Management Plan (EMP) being prepared for the project. It is anticipated that only minor surface contamination will be detected in the areas of concern. Based on the identification of contaminated areas through sampling, the EMP would identify appropriate procedures for dealing with contaminated material during construction including proper disposal of contaminated spoil. It is likely that contamination within the reserve will be limited and able to be managed through the EMP. We will, however, keep the DEP informed of the results of the sampling exercise.

## 5.0 Conclusion

Generally, the proposal will have a manageable level of environmental impact. There is a high degree of public interest and this is being addressed through the community consultation process. A Community Liaison Group (CLG) has been established for the project, which meets every six weeks. The group has 13 members including representatives from the City of Fremantle, Town of East Fremantle, City of Cockburn, local interest groups, Chambers of Commerce, White Gum Valley Primary School P & C as well as local residents.

In addition to having Councillors represented on the CLG, the City of Fremantle and City of Cockburn each have a Council officer who attends fortnightly team meetings held for the project. MRWA, SMEC, ERM Mitchell McCotter and landscape architects, Tract (WA) all attend these meetings to discuss the progress of the project.


The wider community also has a range of opportunities to get information about the project and raise issues. A newsletter is distributed to approximately 7,000 households every two months. Copies are also left at the Councils and provided to CLG members. The newsletter provides project information, invites people to participate in activities and gives contact details for members of the study team.

An Open Day was held at the White Gum Valley Primary School on 26-27 October 1996 to present options for the bypass to the community and allow them to make comments. Display material was left at the three Councils, each for two weeks, following the display and comments sheets were available. In addition, the study team meets with local interest groups on request, to discuss issues and press releases are issued every six weeks.

Particular issues relating to Clontarf Hill and site contamination are being addressed in detail and in a responsible manner by MRWA. Given these factors it is considered that formal assessment by the DEP is not required.

We would be happy to discuss any of these issues with you. Should you require any further information, please do not hesitate to call me.

Yours faithfully  
for ERM MITCHELL McCOTTER PTY LTD



Keryn James  
Project Director

encl.

BUSHLAND AREA CLONTARF HILL SITES YES/NO

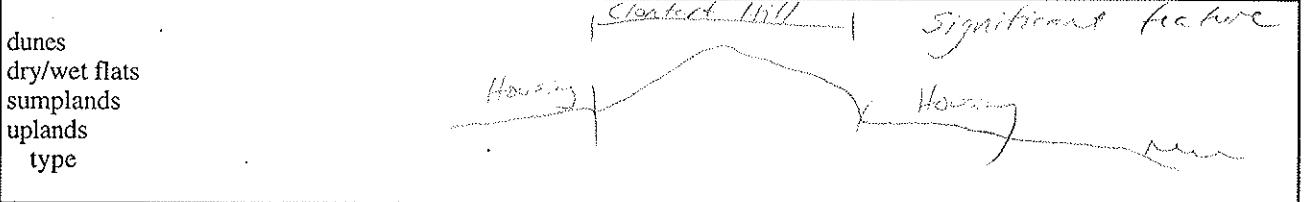
DATE 20/1/97 RECORDERS \_\_\_\_\_

Observations edge transects

Geographic Location	Latitude	S Longitude	E
---------------------	----------	-------------	---

Photograph	Photographer's Name	Photo No
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Transect of landscape units (draw in transect incorporating features listed and any other relevant unit)



Soil - surface	sub -soil
Exposed rock type <u>limestone</u>	% area <u>20%</u>

FLORA/VEGETATION (list dominant and significant plants below, see over for vege association descriptions)

Eucalypts	<i>E. calophylla</i>	<i>E. wandoo</i>	<i>E. marginata</i>	<i>E. todtianna</i>	<i>E. rudis</i>
	<u><i>E. decipiens</i></u>	<i>E. drummondii</i>	<i>E. haematoxylon</i>	<i>E. lanepolei</i>	<u><i>E. gomphocephala</i></u>
	<i>E. accedens</i>	<i>E. patens</i>	<i>E. laeliae</i>	<i>E. megacarpa</i>	
Sheoaks	<i>Allocasuarina fraserana</i>		<i>Casuarina obesa</i>		
Banksia	<i>B. attenuata</i>	<i>B. menziesii</i>	<i>B. prionotes</i>	<i>B. illicifolia</i>	<i>B. grandis</i> <i>B. littoralis</i>
Melaleuca	<i>M. preissii</i>	<i>M. raphiophylla</i>	<i>M. lanceolata</i>	<i>M. cuticularis</i>	
Others	<i>Callitris preissii.</i>				
Mallees	Eucalypts	<i>E. argutifolia</i>	<i>E. petrensis</i>	<i>E. decurva</i>	<i>E. foecunda</i> <i>E. latens</i>

Dominant

SIGNIFICANT SPECIES					
(see over for vegetation descriptions)					

Vegetation Condition - Keighery 1994 (Trudgen 1993) (show range and indicate predominant class)

1 = 'Pristine' (Excellent)	Appears to have been cleared except	
2 = Excellent (Very Good)	for trees & perhaps 1/2 Mill pines, regrowth	
3 = Very Good (Good)	part. weeds regrowth in nature, all	
4 = Good (Poor)	some 25% } no assessment possible of	
5 = Degraded (Very Poor)	predom 50% } mps. Ast. herbs, all obvious are	
6 = Completely Degraded	<45% } weeds	

Specific aspects of disturbance

partial clearing	young seedlings amongst weeds: temp ret, Myrsess, Teat, Eucalypt, big leaf, & Schinus				
weeds (list):	<i>Sesuvium</i> , Wild Oaks, <i>Leguminosae</i> , Fountain Grass, <i>Lept. laev.</i> , Ric corn, <i>Schinus</i> ter, Euph for Rom ros, <i>Tetralium</i> (solid ground cover for herbs/grasses)				
selective removal of species:	timber cutting	mowing	fire	grazing	dieback %area
fire frequency:	areas suffering fire 1996 summer				
'enrichment plantings' (list)	alongside back fences houses				
animal impact:	horse	foxes	rabbits	cats	dogs goats pigs overgrazing by native mammals
soil movement:	mining	dumping	# rubbish dumping	roadworks	
changes in water regimes:	NA	flooding	drainage	watering	nutrient influx
Tracks:	fire breaks	walk trails	off road vehicle use	animal tracks	
Service corridors:	SEC	Main Roads	Water Authority.	Telecom	
Other					

# all types of material, consistent pattern

LIFE FORM/HEIGHT CLASS	CANOPY COVER			
	DENSE 70-100%	MID-DENSE 30-70%	SPARSE 10-30%	VERY SPARSE 2-10%
Trees >30m Trees 15-30m Trees 5-15m Trees <5m	Dense Tall Forest Dense Forest Dense Low Forest A Dense Low Forest B	Tall Forest Forest Low Forest A Low Forest B	Tall Woodland Woodland Low Woodland A Low Woodland B	Open Tall Woodland Open Woodland Open Low Woodland A Open Low Woodland B
Mallee tree form Mallee shrub form	Dense Tree Mallee Dense Shrub Mallee	Tree Mallee Shrub Mallee	Open Tree Mallee Open Shrub Mallee	Very Open Tree Mallee Very Open Shrub Mallee
Shrubs >2m Shrubs 1.5-2.0m Shrubs 1.0-1.5m Shrubs 0.5-1.0m Shrubs 0.0-0.5m	Dense Thicket Dense Heath A Dense Heath B Dense Low Heath C Dense Low Heath D	Thicket Heath A Heath B Low Heath C Low Heath D	Scrub Low Scrub A Low Scrub B Dwarf Scrub C Dwarf Scrub D	Open Scrub Open Low Scrub A Open Low Scrub B Open Dwarf Scrub C Open Dwarf Scrub D
Mat plants Hummock Grass  Bunch grass >0.5m Bunch grass <0.5m Herbaceous spp.	Dense Mat Plants Dense Hummock Grass  Dense Tall Grass Dense Low Grass Dense Herbs	Mat Plants Mid-Dense Hummock Grass  Tall Grass Low Grass Herbs	Open Mat Plants Hummock Grass  Open Tall Grass Open Low Grass Open Herbs	Very Open Mat Plants Open Hummock Grass  Very Open Tall Grass Very Open Low Grass Very Open Herbs
Sedges >0.5m Sedges <0.5m	Dense Tall Sedges Dense Low Sedges	Tall Sedges Low Sedges	Open Tall Sedges Open Low Sedges	Very Open Tall Sedges Very Open Low Sedges
Ferns Mosses, Liverwort	Dense Ferns Dense Mosses	Ferns Mosses	Open Ferns Open Mosses	Very Open Ferns Very Open Mosses

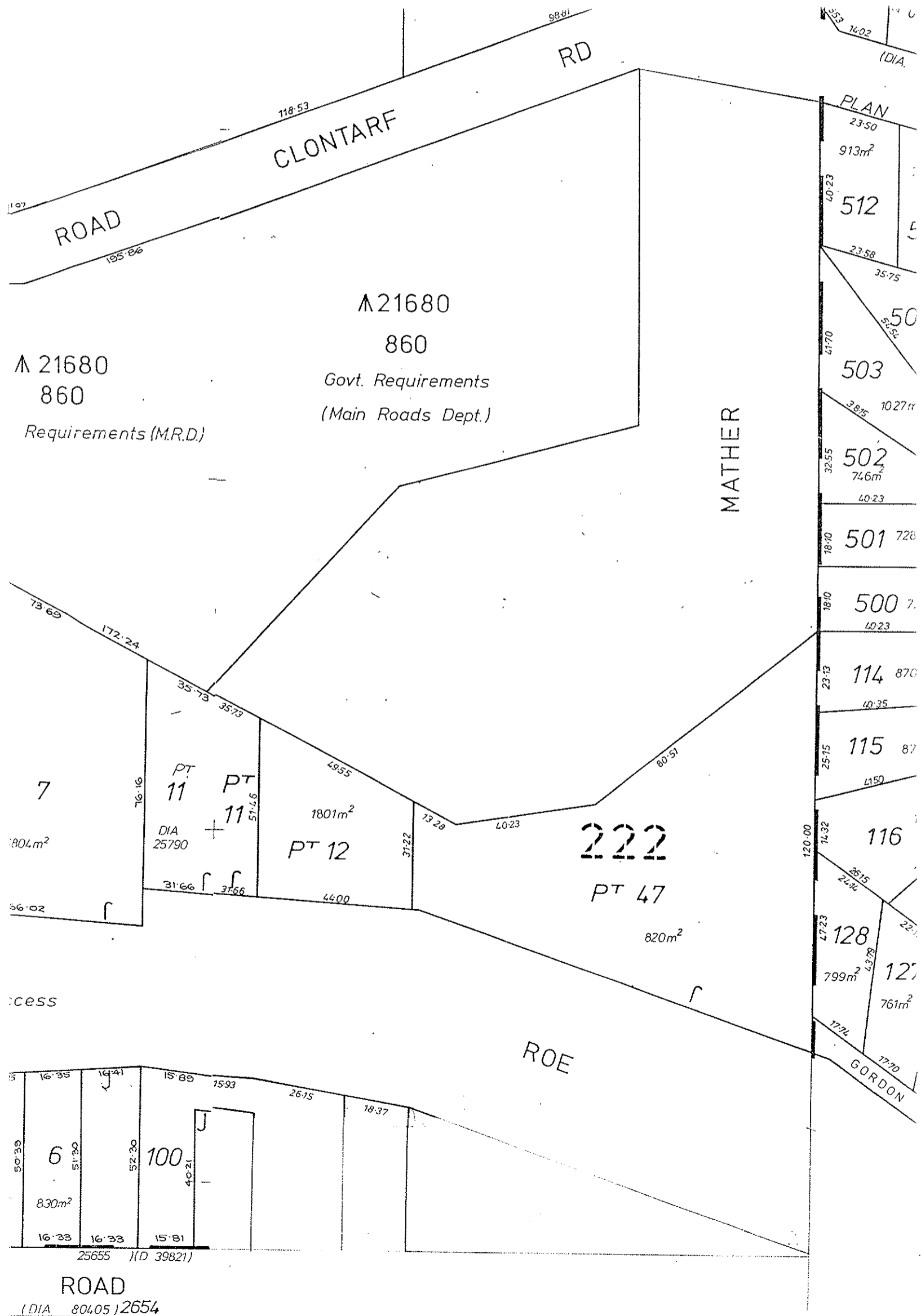
**VEGETATION** (describe each unit of vegetation using dominants and life form/height class and canopy cover according to the Muir codes above)

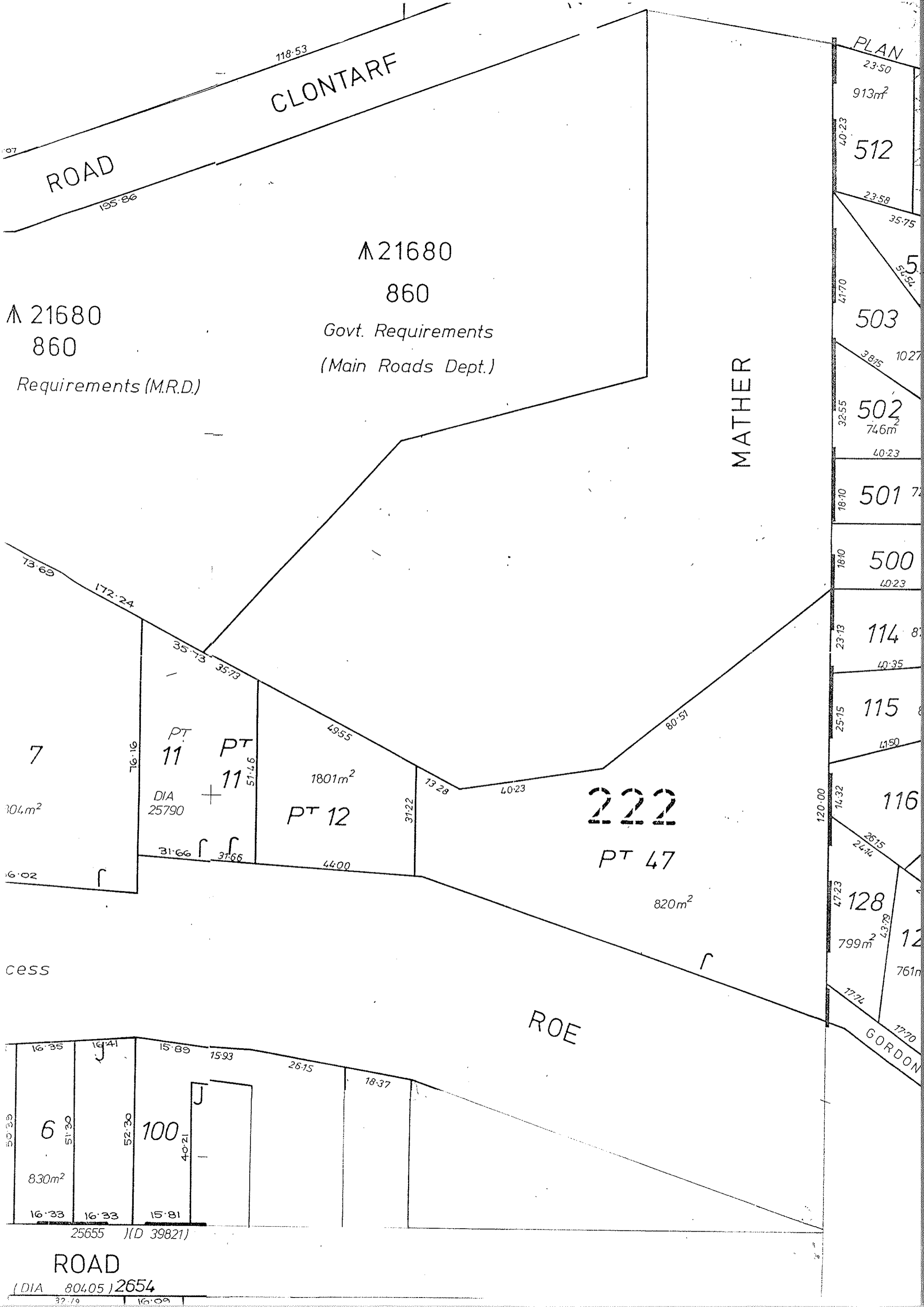
Limestone Species - Eu. dwarf  
 Eu. dec. Mel acer (D) Mel. hueg, Temp ret, Dry (D)  
 Syc. glob, Ac. cast, Kun. indica, Glear, Scaevola  
 Ac. Enclaps, Ac. lasio, Hakea prostr, Dry land  
 Ac. salign.  
 D = dominants  
  
 Ac. vantha (! planting)  
  
 Herbs (perennial) Acant. preiss, Hard comp, Tri. elat,  
 Low, maritima, Dian. revoluta, Clem, Tan. prostr  
 Leg. ang, Cal. brownii, spec. var.  
  
 Tuart & Species (young & old tuart) (D)  
 # Tuart & tath. prec. Mel. ac. Hakea prostr, Dry grass  
 Low, maritima, Dry land, Ac. egl, Ac. lasio, Mel. hueg  
 Degraded S (A & B area)  
 New# P. in? rosea

**Fauna comments**

Weeds (cont)  
 Mys. asp, Kennel, ? Ac. long, Pel. cap, Asp. hist  
 S. Brown, drake, Hakea (grey)

**Adjacent bushland** (refer to aerial photograph)





CLONTARF

ROAD

PLAN

Λ 21680

860

Govt. Requirements  
(Main Roads Dept.)

Λ 21680  
860

Requirements (M.R.D.)

MATHER

512

503

502  
746m<sup>2</sup>

501

500

114

115

116

128

12

222

PT 47

820m<sup>2</sup>

1801m<sup>2</sup>

PT 12

7

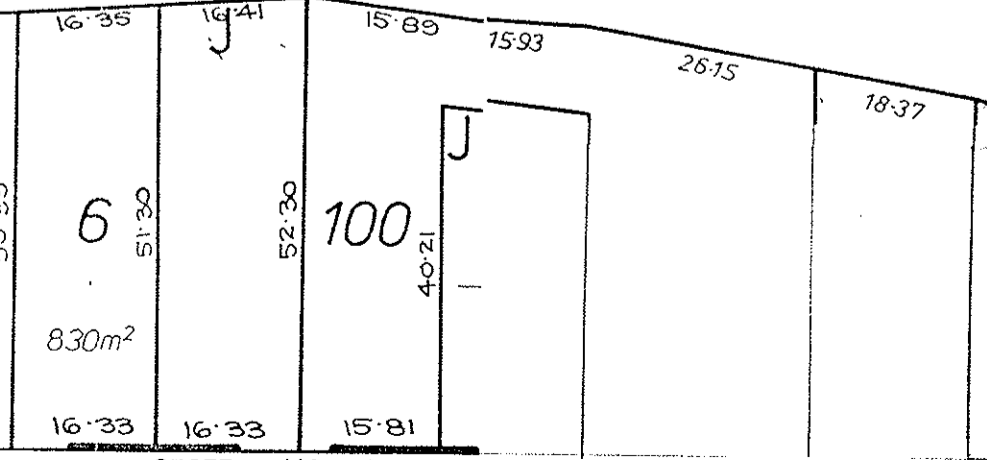
304m<sup>2</sup>

16.02

cess

ROE

GORDON



ROAD

(DIA 80405) 2654

25655 (D 39821)

APPENDIX 1. PLANT SPECIES FOUND AT SIR FREDERICK SAMSON PARK

This list has been compiled from the original Management Plan, a brief survey conducted by the Department of Environment (October, 1994), and observations over a three month period (February-May, 1995). A complete botanical survey has not as yet been done, and should take place in Spring 1995. Exotic species are marked with an asterisk (\*). Native, non-indigenous species are marked (#). Dubious records are denoted thus (?), and should be checked as part of the botanical survey, and with the W.A. Herbarium.

CYCADS

ZAMIACEAE

*Macrozamia reidleyi*

Zamia

MONOCOTYLEDONS

CYPERACEAE

*Lepidosperma angustatum*  
*Lepidosperma scabrum*  
*Mesomelaena pseudostygia*  
*Tetraria octandra*

HAEMODORACEAE

*Anigozanthos humilis*  
*Anigozanthos manglesii*  
*Conostylis aculeata*  
*Conostylis candicans*  
*Conostylis setigera*  
*Haemodorum ?spicatum*

Catspaw  
Mangles Kangaroo Paw

Bloodroot

IRIDACEAE

\**Freesia x leichtlinii*  
\**Gladiolus caryophyllaceus*  
\**Romulea rosea*  
\**Watsonia leipoldtii*

Freesia  
Gladiolus  
Guildford Grass  
Watsonia

LILIACEAE

\**Asphodelus fistulosa*  
*Burchardia umbellata*  
*Dianella revoluta* var. *divaricata*  
*Thysanotus dichotomus*  
*Thysanotus thyrsoides*

Onion Weed  
Milkmaids  
Flax Lily

*Tricoryne elatior*

ORCHIDACEAE

*Caladenia ?flava*

*Caladenia ?longicaudata*

*Caladenia ?patersonii*

*Pterostylis* sp.

Greenhood

OROBANCHACEAE

\**Orobanche minor*

Lesser Broomrape

POACEAE

\**Aira* spp.

\**Avena barbata*

\**Briza maxima*

\**Briza minor*

\**Bromus madritensis*

\**Cortaderia selloana*

\**Cynodon dactylon*

*Danthonia* spp.

\**Ehrharta calycina*

\**Eragrostis curvula*

\**Lagurus ovatus*

\**Lolium rigidum*

*Microlaena stipoides*

\**Pennisetum clandestinum*

\**Stenotaphrum* sp.

\**Sporobolus indicus*

*Stipa* spp.

Wild Oats

Shivery Grass

Quaking Grass

Brome Grass

Pampas Grass

Couch

Wallaby Grass

Veldt Grass

African Love-grass

Rabbit-tail Grass

Perennial Rye-grass

Weeping Grass

Kikuyu

Buffalo Grass

Rat's-tail Grass

Spear Grass

RESTIONACEAE

*Loxocarya flexuosa*

XANTHORRHOEACEAE

*Dasypogon bromeliifolius*

*Lomandra caespitosa*

*Xanthorrhoea preissii*

Pineapple Grass

Blackboy

DICOTYLEDONS

AMARANTHACEAE

*Ptilotus drummondii*

*Ptilotus polystachyus*

## ASTERACEAE

* <i>Conyza bonariensis</i>	Fleabane
* <i>Gazania splendens</i>	Gazania
<i>Helichrysum cordatum</i>	Tangle Diasy
* <i>Hypochoeris glabra</i>	Cat's Ear
<i>Podolepis gracilis</i>	
* <i>Sonchus asper</i>	Sow Thistle
* <i>Ursinia anthemoides</i>	
<i>Waitzia suaveolens</i>	

## CARYOPHYLLACEAE

* <i>Petrorhagia velutina</i>	
* <i>Silene gallica</i>	French Catchfly

## CASUARINACEAE

<i>Allocasuarina fraseriana</i>	Sheoak
<i>Allocasuarina humilis</i>	Dwarf Sheoak

## DILLENIACEAE

<i>Hibbertia hypericoides</i>	Native Buttercup
<i>Hibbertia racemosa</i>	

## DROSERACEAE

<i>Drosera spp.</i>	Sundew
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## EPACRIDACEAE

<i>Astroloma pallidum</i>	
<i>Conostephium pendulum</i>	Pearl Flower
<i>Leucopogon propinquus</i>	Beard Heath

## EUPHORBIACEAE

* <i>Euphorbia sp.</i>	
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## FABACEAE

<i>Bossiaea ornata</i>	Egg and Bacon
<i>Daviesia divaricata</i>	
<i>Daviesia juncea</i>	
<i>Daviesia nudiflora</i>	
<i>Gompholobium tomentosum</i>	
<i>Hardenbergia comptoniana</i>	Native Wisteria
<i>Hovea trisperma</i>	

<i>Isopogon cuneifolia</i>	
<i>Jacksonia furcellata</i>	
<i>Jacksonia sternbergiana</i>	
<i>Kennedia prostrata</i>	Running Postman
* <i>Lupinus consentii</i>	Sandplain Lupin
<i>Oxylobium capitatum</i>	
* <i>Trifolium angustatum</i>	Clover
* <i>Trifolium campestre</i>	

## GERANIACEAE

* <i>Erodium botrys</i>	
* <i>Pelargonium capitatum</i>	Pelargonium

## GOODENIACEAE

<i>Dampiera linearis</i>	
<i>Scaevola canescens</i>	
<i>Scaevola paludosa</i>	

## MIMOSACEAE

<i>Acacia ?alata</i>	
# <i>Acacia celastrifolia</i>	
<i>Acacia lasiocarpa</i>	
# <i>Acacia podalyriifolia</i>	Mt. Morgan Wattle
<i>Acacia pulchella</i>	
<i>Acacia saligna</i>	
<i>Acacia stenoptera</i>	

## MORACEAE

* <i>Ficus carica</i>	Fig
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## MYRTACEAE

# <i>Chamelaucium uncinatum</i>	Geraldton Wax
<i>Eucalyptus calophylla</i>	Marri, Red Gum
<i>Eucalyptus marginata</i>	Jarrah
<i>Eucalyptus gomphocephala</i>	Tuart
<i>Hypocalymma robustum</i>	

## PROTEACEAE

<i>Banksia attenuata</i>	Candle Banksia
<i>Banksia grandis</i>	Bull Banksia
<i>Banksia menziesii</i>	Firewood Banksia
<i>Dryandra nivea</i>	
<i>Dryandra sessilis (planted only)</i>	Parrot Bush
<i>Hakea prostrata</i>	
<i>Persoonia saccata</i>	

*Petrophile linearis*  
*Petrophile macrostachya*  
*Synaphea polymorpha*

Pixie Mops

RANUNCULACEAE

*Clematis microphylla*

Old Man's Beard

RUBIACEAE

\**Centranthus ruber*

Valerian

THYMELAEACEAE

*Pimelea rosea*

Rose Banjine

VERBENACEAE

\**Lantana camara*

Lantana

**APPENDIX 2. List of bird species found in Samson Park, with notes on occurrence and habitat requirements.**

This list was compiled from records from the previous Management Plan (Ecoscape, 1989), a long-term survey being conducted by Mrs. Barbara Parker of the Friends of Samson Park, and a brief survey by Dr. Harry Recher, who provided all the habitat notes and an indication of the occurrence of each species (Majer & Recher, 1995). The list was vetted by Peter Anson from the Royal Australasian Ornithologists Union (RAOU). Exotic species are marked with an asterisk (\*). ? denotes a questionable record (possible aviary escape or misidentification).

**Australian Hobby** (*Falco longipennis*)

An uncommon but wide-ranging species in the south-west. Not recorded in King's Park.

**Australian Kestrel** (*F. cenchroides*)

A common and widely distributed species often seen along road edges and in open areas. It requires open habitat and is unlikely to nest in Samson Park. Not recorded in King's Park.

**Australian Magpie** (*Gymnorhina tibicen*)

Common breeding resident throughout the Perth region.

**Australian Raven** (*Corvus coronoides*)

Common breeding resident throughout the Perth region. Requires tall trees for nesting.

**Black-faced Cuckoo Shrike** (*Coracina novaehollandiae*)

Frequent visitor throughout the Perth region. It nests on large horizontal branches, usually high in trees. This bird is sensitive to disturbance and is unlikely to nest in Samson Park due to the large number of visitors and dogs.

**Black Duck** (*Anas superciliosa*)

Resident throughout the Perth region. A casual visitor to Samson Park in periods where there is standing water.

**Brown Falcon** (*Falco berirogra*)

A wide-ranging but uncommon bird on the Swan Coastal Plain. It is most frequent in open habitats and low shrublands. Not recorded in King's Park.

**Brown Honeyeater** (*Lichmera indistincta*)

Abundant breeding resident throughout the Perth region. Brown honeyeaters build a small cup-shaped nest in low shrubs and in King's Park often builds nests close to frequently-used paths.

**Boobook Owl** (*Ninox novaeseelandiae*)

This is a hole-nesting species which requires a large hollow. The habitat area required by a breeding pair will depend on the abundance of large insects and other small mammals as food, but Samson Park is probably at the lower size limit for this species. It occurs and probably breeds in King's Park.

#### **Collared Sparrowhawk (*Accipiter cirrocephalus*)**

This bird is easily confused with the Brown Goshawk, as the two species are similar in appearance and habits. The Collared Sparrowhawk has not been recorded in King's Park, although both occur in the Perth region with the Brown Goshawk being more frequently recorded.

#### **Elegant Parrot (*Neophema elegans*)**

A tree hole nesting species that has increased in abundance and increased in range with agricultural clearing. The Elegant Parrot is a ground-foraging species which feeds on grass and weed seeds. It is uncommon in the Perth region, and has not been recorded in King's Park.

#### **?Fairy Martin (*Cecropis ariel*)**

The Fairy Martin has never been common on the Swan Coastal Plain and it has decreased in abundance over the last 50 years. It is possible that it has been confused with the Tree Martin, which is similar in appearance.

#### **Fan-tailed Cuckoo (*Cuculus pyrrhphanus*)**

This species has decreased in abundance throughout its southwestern distribution over the last 50 years and is uncommon in the Perth region. Its preferred hosts are the Broad-tailed Thornbill and the White-browed Scrubwren, neither of which occur in Samson Park. The decline of the Fan-tailed Cuckoo parallels that of its preferred hosts. It is an infrequent visitor to King's Park.

#### **\*Feral Pigeon (*Columba livia*)**

Common throughout the Perth region, although not recorded in King's Park.

#### **#Galah (*Cacatua roseicapilla*)**

The Galah has increased in abundance and distribution since the beginning of the century, colonising the Perth region after World War II. It will nest in tree hollows in close proximity to people. Galahs have only been recorded in King's Park since 1986.

#### **Grey Butcherbird (*Cracticus torquatus*)**

A breeding resident throughout the Perth region. The Butcherbird often builds its nest within a couple of metres of the ground and in King's Park has been found nesting quite near heavily used recreation facilities.

#### **Grey Fantail (*Rhipidura fuliginosa*)**

Common throughout the Perth region. A breeding resident in King's Park, with numbers increasing during winter with the arrival of migrants from cooler areas. The Grey Fantail is sensitive to disturbance when nesting. Nests may be found within a metre of the ground.

**#Laughing Kookaburra (*Dacelo novaeguineae*)**

The Kookaburra was introduced into the Perth region in 1897 and has spread throughout the southwest. It is a hole nesting species that commonly associates with people, but generally prefers to nest in less disturbed situations.

**\*Laughing Turtle-dove (*Streptopelia senegalensis*)**

The Turtle-dove is more typical of suburban habitats than bushland remnants in the Perth region. It was introduced to Perth, probably from Africa, in 1898. It will nest almost anywhere in the shrub layer.

**?Mallee Ringneck (*Platycercus zonarius barnardi*)**

This is one of four forms of the Ringnecked Parrot *Platycercus zonarius*. The form that occurs naturally on the Swan Coastal Plain is the "28" Parrot (*Platycercus zonarius semitorquatus*), while the Port Lincoln Parrot (*Platycercus zonarius zonarius*) is the form occurring throughout the rest of southern Western Australia. The Mallee Ringneck occurs in S.A., Vic., N.S.W. and Qld. in mallee, mulga and callitris woodlands. "Port Lincoln" and "Mallee" have frequently been applied mistakenly to the "28 Parrot" in the Perth region. If the species found was a Mallee Ringneck, it is likely to have been an aviary escape.

**New Holland Honeyeater (*Philidonyris novaehollandiae*)**

An abundant breeding resident throughout the southwest wherever there is a good supply of nectar-rich flowers. It is unlikely to find sufficient nectar resources in Samson Park to sustain breeding. An infrequent visitor to King's Park.

**Peregrine Falcon (*Falco peregrinus*)**

A wide-ranging but uncommon species. It feeds on other birds, including pigeons and gulls. It is unlikely to be more than a rare visitor to Samson Park. Not recorded from King's Park.

**?Pied Butcherbird (*Cracticus nigrogularis*)**

Uncommon in the Perth region. Normally a species of drier and more open woodlands. The Pied Butcherbird can easily be confused with the Grey Butcherbird.

**?Port Lincoln Ringneck (*Platycercus zonarius zonarius*)**

See notes under Mallee Ringneck.

**Purple-crowned Lorikeet (*Glossopsitta porphyrocephala*)**

An uncommon visitor to the Perth region. Not recorded in King's Park.

**Red Wattlebird (*Anthochaera carunculata*)**

Abundant breeding resident throughout the Perth region. Nests abundantly in King's Park, with nests placed from one to ten metres above the ground.

**Red-capped Parrot** (*Purpureicephalus spurius*)

This is a forest-dependent species that feeds on eucalypt seed, as well as those of sheoak and other trees. Requires hollows for nesting. Mrs. Parker has observed a breeding pair in the Park. This species has not been recorded in King's Park.

? **Regent Parrot** (*Polytelis anthopeplus*)

This parrot is an uncommon visitor to the higher rainfall districts of the southwest and birds in the Perth region could be aviary escapes.

? **Rock Parrot** (*Neophema petrophila*)

The Rock Parrot inhabits coastal islands and occurs on the southwest mainland in coastal dunes and rocky foreshores. It is easily confused with the Elegant Parrot.

**Rufous Whistler** (*Pachycephala rufiventris*)

A common breeding resident in larger bushland remnants in the Perth region. Nests may be placed from one to 30 metres above the ground in dense shrubs and large trees.

**Sacred Kingfisher** (*Halycon sancta*)

A tree-hole nester, the Sacred Kingfisher has declined in abundance throughout the southwest in the last 50 years. There are no recent records from King's Park, but formerly a breeding summer visitor.

**Silver Gull** (*Larus novaehollandiae*)

An abundant coastal species which often visit parks to scavenge for food.

**Silvereye** (*Zosterops lateralis*)

A flocking species with a wandering, wide-ranging habit, so that numbers may vary considerably. Nests are placed in thick shrubbery between one and three metres from the ground. This species is particularly susceptible to predation by cats. It is a common breeding resident of King's Park.

**Singing Honeyeater** (*Meliphaga virescens*)

After the Brown Honeyeater, this is the most common native bird in suburban Perth.

\* **Spotted Turtle-dove** (*Streptopelia chinensis*)

The Spotted Turtle-dove is more typical of suburban habitats than bushland remnants in the Perth region. It was introduced to Perth from southeast Asia in 1898. It will nest almost anywhere in the shrub layer.

**Striated Pardalote** (*Pardalotus striatus*)

A small tree-hole nesting species. Numbers are greatest in winter when individuals from cooler climatic regions disperse to warmer coastal regions. A breeding resident in Kings Park.

**Tawny Crowned Honeyeater** (*Philidonyris melanops*)

The Tawny Crowned Honeyeater is an uncommon resident in low and open heaths and shrublands in the southwest. Not recorded in Kings Park.

**Tree Martin** (*Cecropis nigricans*)

An uncommon visitor to Kings Park, although it may have nested there earlier this century. Numbers increase in the Perth region during summer with the arrival of dispersing flocks, probably from the inland. Tree Martins tend to nest in colonies, in tree hollows.

**Weebill** (*Smicrornis brevirostris*)

The Weebill feeds on lerps (sap-sucking psyllid insects) and builds a small hanging dome nest between one and 15 metres from the ground. It appears tolerant of people and will nest in close proximity to heavily used areas.

**Welcome Swallow** (*Hirundo neoxena*)

The Welcome Swallow is very tolerant of people and disturbance. It builds mud nests under eaves, in caves, and outside buildings. A common resident in the suburban area.

**Western Gerygone** (*Gerygone fusca*)

The Western Warbler builds a dome-shaped hanging nest within four metres of the ground. It is tolerant of people, and nests in Kings Park have been placed close to busy paths.

**Western Spinebill** (*Acanthorhynchus superciliosus*)

This species nests in thick scrub within three metres of the ground. It appears tolerant of people. It is an uncommon breeding resident of Kings Park.

**Western Thornbill**

**White-tailed Black Cockatoo**

**Yellow-rumped Thornbill**

**APPENDIX 3: Mammal and Reptile Species recorded at Samson park (Ecoscape, 1989)**

**MAMMALS**

Brush-tail Possum	<i>Trichosurus vulpecula</i>
Common House Mouse	<i>Mus musculus</i>
Rabbit	<i>Oryctolagus cuniculus</i>

**REPTILES**

Bobtail	<i>Tiliqua rugosa</i>
Dugite	<i>Pseudonaja affinis</i>

**APPENDIX 4: species for revegetation plantings**

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Nr 13037 152.72

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5042 WA 3165 (C) METRO REGIONAL AREA & EXT. RUN 7 (5001-5078) 1:20000 10-DEC-92 920676