KENWICK ROAD BUSHLAND, KENWICK

Boundary Definition: bushland (part taken to zoning) boundary

SECTION 1: CADASTRAL INFORMATION

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

Bushplan Site no. 422 **Map no.** 63 **Map sheet series ref. no.** 2033–I NE

Other Names: not known

Local Authorities (Suburb)
City of Gosnells (Kenwick)

Area (ha): total 1.1; bushland 0.8

Zoning
MRS: Urban
TPS: Civic and Cultural, Parks and Recreation, Residential A

Ownership Categories
Local Government

Lot/Location/Reserve numbers (Purpose), Street name
1, 7, 51 Kenwick Rd

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS

Pinjarra Plain
Guildford Formation (Qpa: Cs)

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

VEGETATION AND FLORA

Vegetation Complexes

Pinjarra Plain
Guildford Complex

Floristic Community Types: *not sampled, types inferred

Supergroup 2: Seasonal Wetlands
*7 Herb-rich saline shrublands in clay pans
*8 Herb-rich shrublands in clay pans

WETLANDS

Wetland Types: sumpland (includes types not previously described, DEP 1998)

Natural Wetland Groups

Bassendean—Pinjarra transition OR Bassendean with fluvial features
Mungala (B/P.2)

Wetland Management Objectives: Conservation (DEP 1998)

Swan Coastal Plain Lakes EPP: none identified

THREATENED ECOLOGICAL COMMUNITIES

Vulnerable (floristic community types 7, 8)

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: vegetated wetland

Vegetation and Flora

Structural Units: limited survey (DEP 1998)
Wetlands: *Viminaria juncea* Tall Shrubland; *Verticordia densiflora* Low Open Heath; Sedgelands dominated by *Leptocarpus canus, L. aristatus, L. coangustatus* and *Eleocharis keigheryi*

Vegetation Condition: >75% Very Good to Excellent, <25% Good to Degraded, with areas of severe localised disturbance

Total Flora: not known

Significant Flora: *Eleocharis keigheryi* (R), *Aponogeton hexatepalus* (4)

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

Linkage: adjacent bushland to the west (cleared 1997)

Other Special Attributes: contains plant communities representative of the eastern side of the Swan Coastal Plain

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

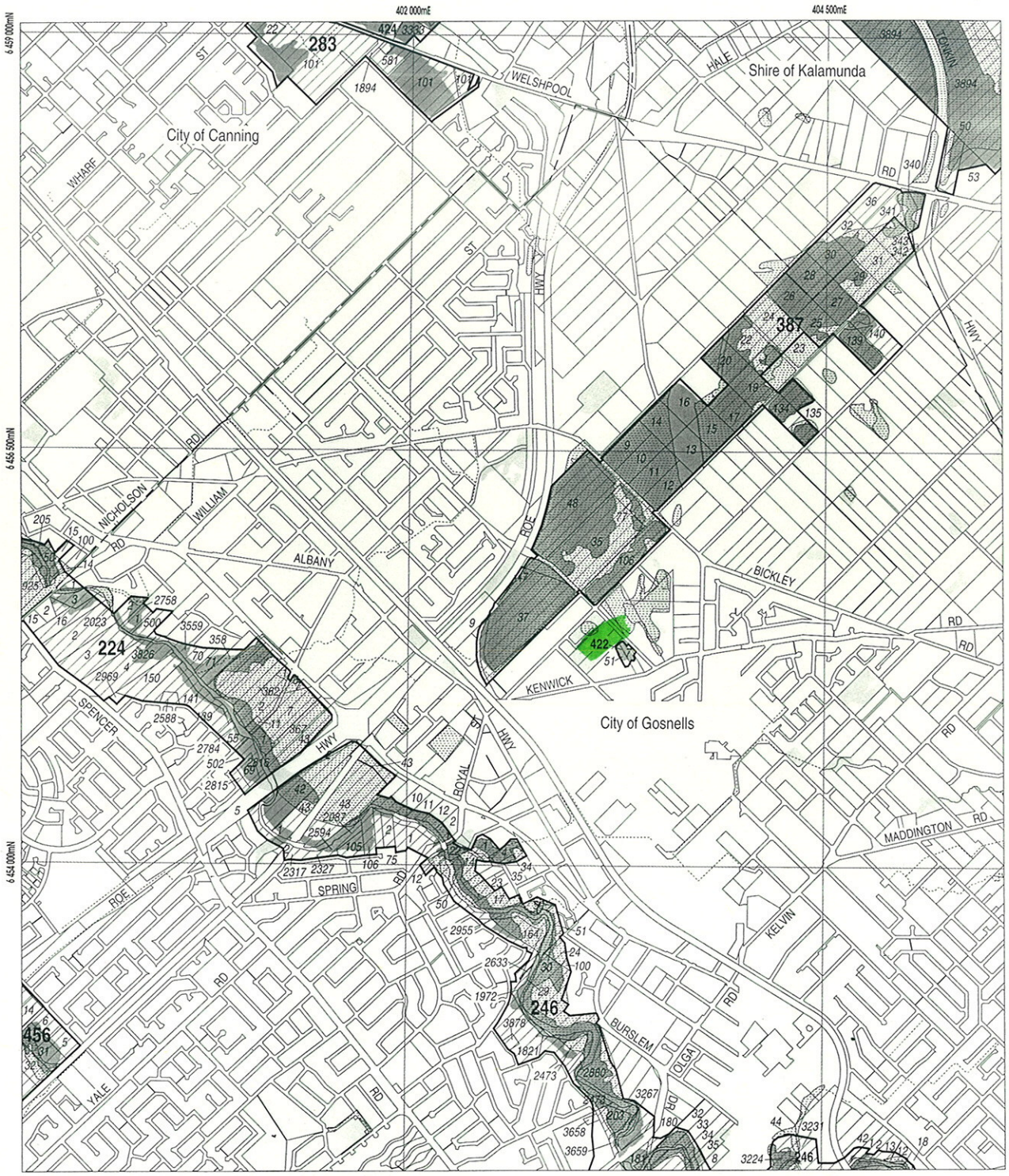
Criteria: Representation of ecological communities, Diversity, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation.

Opportunities and/or Constraints

Opportunities: Bushplan Site/part Bushplan Site subject to Swan and Canning Rivers EPP; location of Declared Rare Flora, conservation category wetlands; under TPS Parks and Recreation Zoning

Constraints: under MRS Urban zoning

Recommendation: The existing care, control and management intent of the reserve is endorsed. Long-term security and support for conservation management of the Bushplan Site to be enhanced by: amending the purpose of the reserve to include conservation; and applying appropriate mechanisms in consultation with the reserve management body.



LEGEND

472	Bushplan Sites With Regionally Significant Bushland
	Other Native Vegetation
	Conservation Category Wetlands
	Bushplan Sites With Some Existing Protection
696	Lot Number, Location Number
.....	Channel Wetlands
– ——	Local Government Boundary

2033 - I NE

IV | NW | NE 63 | SW | SE | III | 2033 | II

1 : 25 000 AMG Reference Grid showing Perth's Bushplan Map Sheet Breakdown

PERTH'S BUSHPLAN MAP INDEX

1 2 | 3 4 5 | 6 7 8 9 10 11 | 12 13 14 15 16 | 17 18 19 20 21 22 23 | 24 25 26 27 28 29 30 | 31 32 33 34 35 36 | 37 38 39 40 41 42 | 43 44 45 46 47 48 | 49 50 51 52 53 54 | 55 56 57 58 59 | 60 61 62 63 64 | 65 66 67 68 69 70 | 71 72 73 74 75 76 77 | 78 79 80 81 82 83 84 | 85 86 87 88 89 90 91 | 92 93 94 95 96 97 | 98 99 100 101 102 | 103 104 105 106

N

SCALE

0 500 1000

Metres

Produced by Project Mapping Section
Land Information Branch, Ministry for Planning, Perth W.A. November 1998

ntw-map//environ/bushplan//bushvol2_63.dgn

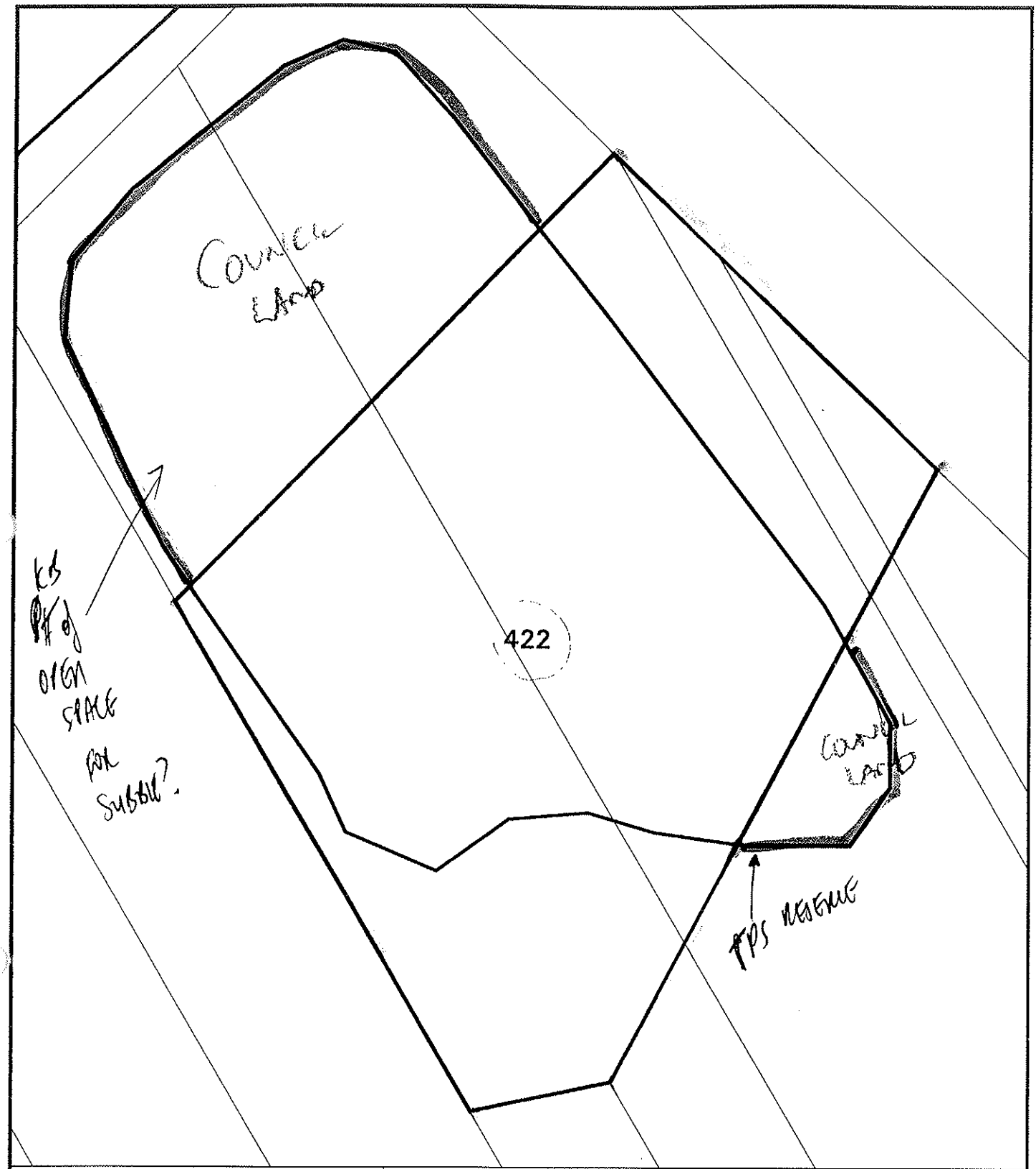
Cadastral Data supplied by Department of Land Administration, W.A.

Wetlands Data supplied by Water and Rivers Commission

Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

Bushplan Site Map

Map 63



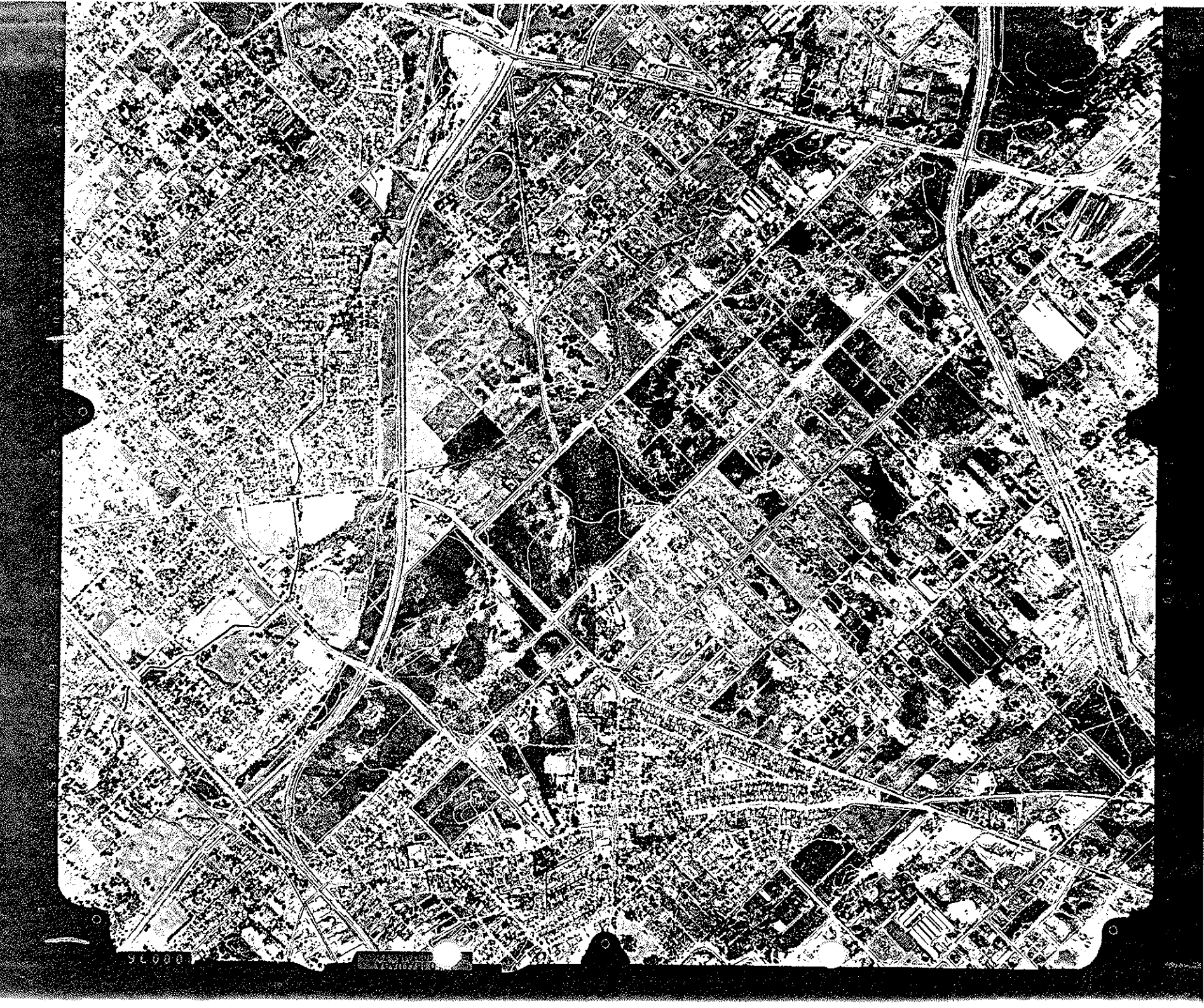
bp site 422

- Cadastre
- Bushplan sites refno 1-500 SCP BOUNDARY THEME
- AG VEG 1998 BOUNDARY THEME

MFP INTERNAL USE ONLY
Prepared By: Andrea Zappacosta
Prepared For:
Map Ident: plot980608_1
Date: 08 Jun 98
Scale 1:775

NT/SL 25/9
add bushland outside TPS
& also TPS use cadastre

Cadastral and part of Council complex (ie. pond dev'lp) exclude lots less than 1 ha.



Submitter 288 S
Foothills/Pinj
BS422

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 Kenwick Rd./Brixton St. wetland

Please give as accurate and detailed a description as possible of the site location

Please include either a hand drawn or copied map showing the area of the area

a) Bordering Roads: Wanaping Rd/Brixton St. Kenwick Rd

b) Nearest Corner: .....

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

d) Town/Suburb/Location: Kenwick

e) Local Council: Gosnells

f) Site Name (if any): .....

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

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

.....

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

j) Map no.: .....

k) Grid Ref: .....

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

Behind Kenwick Community Centre + Kenwick Primary.

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

Housing

.....

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) .....

.....

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) ..... Unlisted .....

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)

(1) Rich fauna - bandicoots, amphibians, birds

(2) + " flora (DRF) + Priority listed Species

6. What is/are the soil type/s and colours ? (3) Poorly represented in cons. reserves

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? .....

.....

.....

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

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? .....

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

.....

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

If yes, please give details of the work .....

.....

.....

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

m) Grazing: stock, overgrazing by feral or native mammals

n) Proliferation of tracks, fire breaks and walk trails

o) Off-road vehicle use

p) Use as service corridors by the SEC, Main Roads, Water Authority.

(Source: B Keighery. Bushland Plant Survey, September 1994)

15. Does the area contain any plant species of special interest that you know of?
(eg. declared rare flora, priority taxa, outlier populations) ..DRF r Remaining Spec
(like lots 37 + 47 Brixton St).

Do you know what they are? ....

....

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

....

....

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 ? ....

....

....

Are they already conservation reserves? ....

What is their approximate size? ....

19. Does the submitted area link other bushland areas? ....

....

....

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

BS 422
Foothills

Subm 16

(171)

SYSTEM 6 BUSHLAND SUBMISSION FORM
FOR CONSIDERATION IN THE UPDATE PROGRAMME

see 164 (S)

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

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: BRIXTON ST, WANAPING ROAD, KENWICK RD, AND PARK ROAD.

b) Nearest Corner: BRIXTON ST. AND WANAPING ROAD

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

d) Town/Suburb/Location: KENWICK

e) Local Council: GOSNELLS

f) Site Name (if any): .....

g) Approximate size of the area (ha): 12 - 15 ha

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

.....

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

j) Map no.: 85

k) Grid Ref: D - 10

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

BEHIND KENWICK LIBRARY KENWICK ROAD KENWICK

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

YES

.....

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) ..... PRIVATE OWNERS .....

.....

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) ..... ? .....

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

5. Why do you consider this area important? (Refer to Guiding Issues paper)

.....

..... RARE FLORA AND ENDANGERED FAUNA (BANDICOOTS) .....

6. What is/are the soil type/s and colours ? ..... SANDY CLAY .....

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

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

If yes, what are they? ..... EPHEMERAL CLAYPANS .....

.....

.....

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

If yes, what kind of a wetlands is it?

a) lake

b) river

c) stream

d) swamp

e) estuary

f) seasonally wet

g) other

9. What percentage of the wetland is open water in summer? ..... 0 % .....

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

10. What percentage of the area is indigenous vegetation? ..... 85 % .....

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

.....

12. Has any previous flora or fauna survey work been done on the area? ..... don't know

If yes, please give details of the work .....

.....

.....

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
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 ON EDGES ONLY
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 MOTOR BIKES

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) declared rare flora,

Do you know what they are? Aponogeton hexasepalus, Hydrocotyle lemnoides., Drosera occidentalis & lots more.

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

Can you list those you know of? (birds, mammals, reptiles, amphibians etc) Black ducks, wood ducks, herons, abounds w/- frogs. Snakes,

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

If yes, please name them and indicate source of information
have seen Bandicoots & diggings at all times.
✓ ✓ frogs, ducks at all times, herons, gonnas, snakes,

CAN YOU TELL US A LITTLE ABOUT THE SURROUNDING AREA

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

If yes, how close are they ? .....200 metre.....

.....

.....

Are they already conservation reserves? .....YES.....

What is their approximate size? .....19 Ha.....

19. Does the submitted area link other bushland areas? .....
.....ALMOST.....

.....

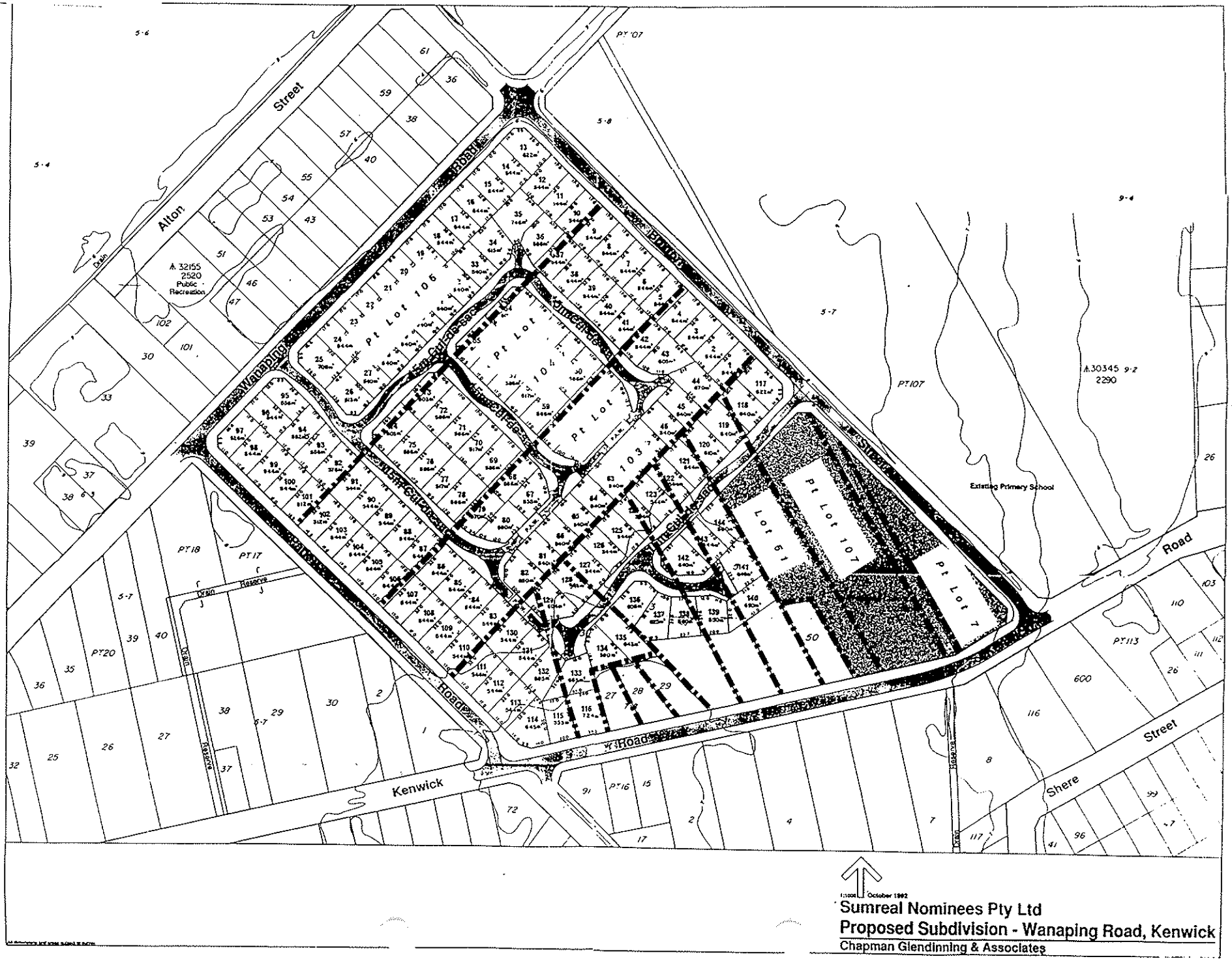
Please attach any additional information about the area which may be of use when assessing it.
2. maps attached.

Please Note

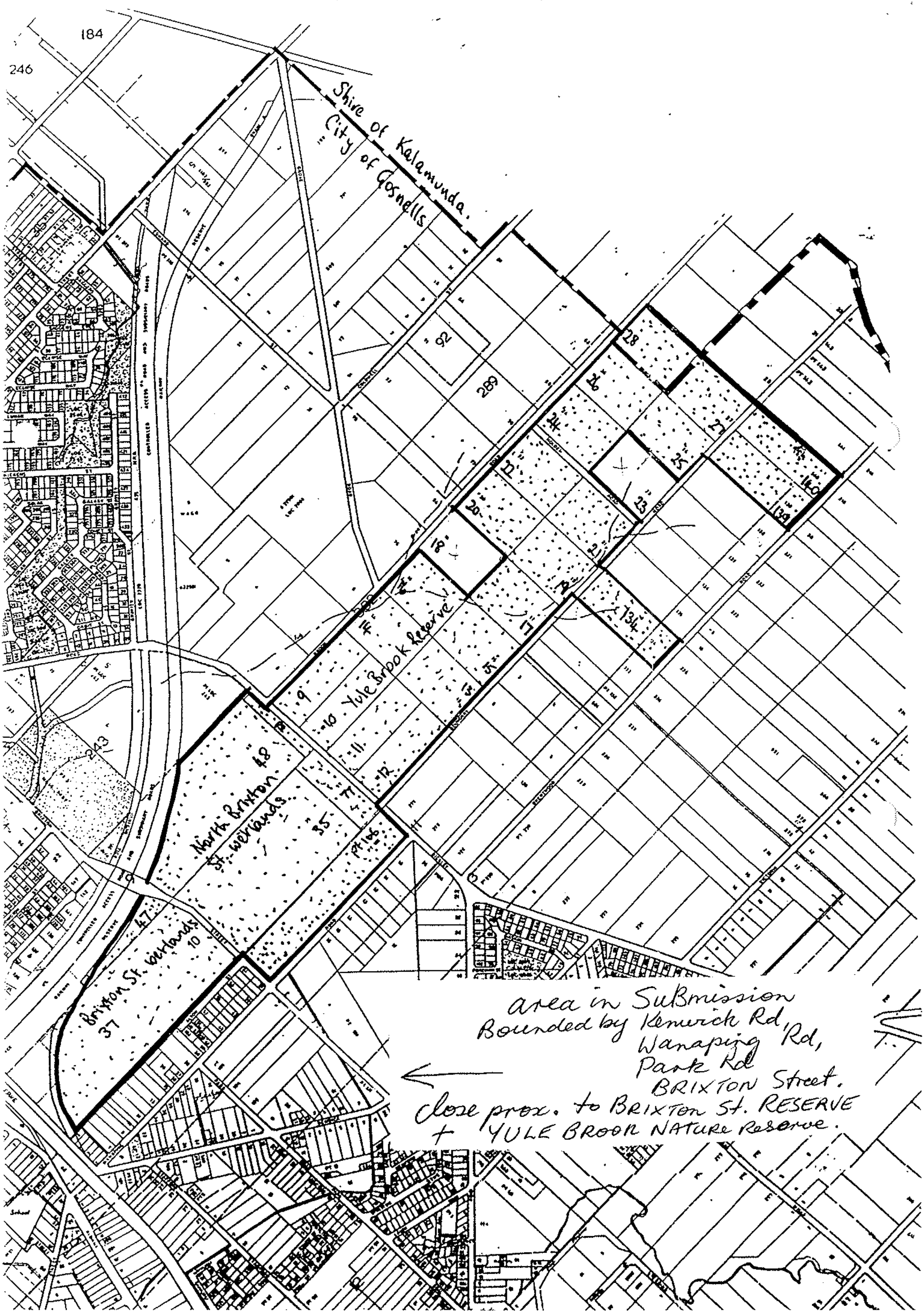
ATTACHED - MAP NO. 1
is of area in this submission.

MAP NO. 2

Shows area in this submission in relation to the Brixton St. wetlands in Kenwick, plus the proposed Yule Brook Nature Reserve.


Wanaping Road
Alton Street
Kenwick Road
Shere Street
Road
Existing Primary School
Pt Lot 106
Pt Lot 104
Pt Lot 103
Lot 61
Pt Lot 107
Pt Lot 7
PT107
PT18
PT17
PT20
PT16
PT113
A 32155
2520
Public Recreation
A 30345
2290
Drain
Drain Reserve
Sumreal Nominees Pty Ltd
Proposed Subdivision - Wanaping Road, Kenwick
Chapman Glendinning & Associates

MAP NO. 2


Shire of Kalamunda.
City of Gosnells
Yule Brook Reserve
North Brixton St. wetlands
Brixton St. wetlands
area in SuBmission
Bounded by Kenwick Rd, Wanaping Rd, Park Rd BRIXTON Street.
close prox. to BRIXTON St. RESERVE + YULE BROOK NATURE Reserve.

(156)

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

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: KENWICK, BRIXTON AND WANAPING ROADS

b) Nearest Corner: AS ABOVE

c) Lot Number: LOTS 103, 104, 105 ETC. AS ENCLOSED Street Number: .....

d) Town/Suburb/Location: KENWICK

e) Local Council: CITY OF GOSNELLS

f) Site Name (if any): .....

g) Approximate size of the area (ha): APPROXIMATELY 12 HECTARES

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

.....

i) Map: 30 Streetsmart /UBD/Other: UBD

j) Map no.: 30

k) Grid Ref: N 4

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?
NO

.....

.....

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) ..... PRIVATELY OWNED .....

.....

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) .....

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

5. Why do you consider this area important? (Refer to Guiding Issues paper)
..... RARE FLORA, SOUTHERN BROWN BANDICOOT HABITAT, WATERBIRD BREEDING AREA REPTILE HABITAT .....

.....

6. What is/are the soil type/s and colours ? ..... SAND CLAY WHITE GREY .....

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 YES

If yes, what are they? ..... SEASONAL WETLAND DAMPLAND EXTENSIVE FLORA SPECIES LIST INCLUDING RARE SPECIES .....

.....

.....

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

If yes, what kind of a wetlands is it?

a) lake

b) river

c) stream

d) swamp

e) estuary

f) seasonally wet SEASONALLY WET

g) other

9. What percentage of the wetland is open water in summer? NONE

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

10. What percentage of the area is indigenous vegetation? .....

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

.....

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

If yes, please give details of the work .....SIMILAR TO LOT 37.....ENCLOSED REPORT....

.....

.....

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

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

m) Grazing: stock, overgrazing by feral or native mammals

n) Proliferation of tracks, fire breaks and walk trails

o) Off-road vehicle use

p) Use as service corridors by the SEC, Main Roads, Water Authority.

(Source: B Keighery. Bushland Plant Survey, September 1994)

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

Do you know what they are? ....S ENCLOSED
DECLARED RARE FLORA
.....

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)
BIRDS (BREEDING), REPTILES, AMPHIBIANS,, MAMMALS (BANDICOOTS)
.....

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

If yes, please name them and indicate source of information
HAVE SEEN THEM WATERBIRDS BREED BIRDS OF PREY
.....

.....

CAN YOU TELL US A LITTLE ABOUT THE SURROUNDING AREA

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

If yes, how close are they ? .....200 METRES TO BRIXTON STREET NATURE RESERVE....
.....APPROXIMATELY AND ACCROSS ROAD TO LARGE AREA BUSHLAND.....
.....

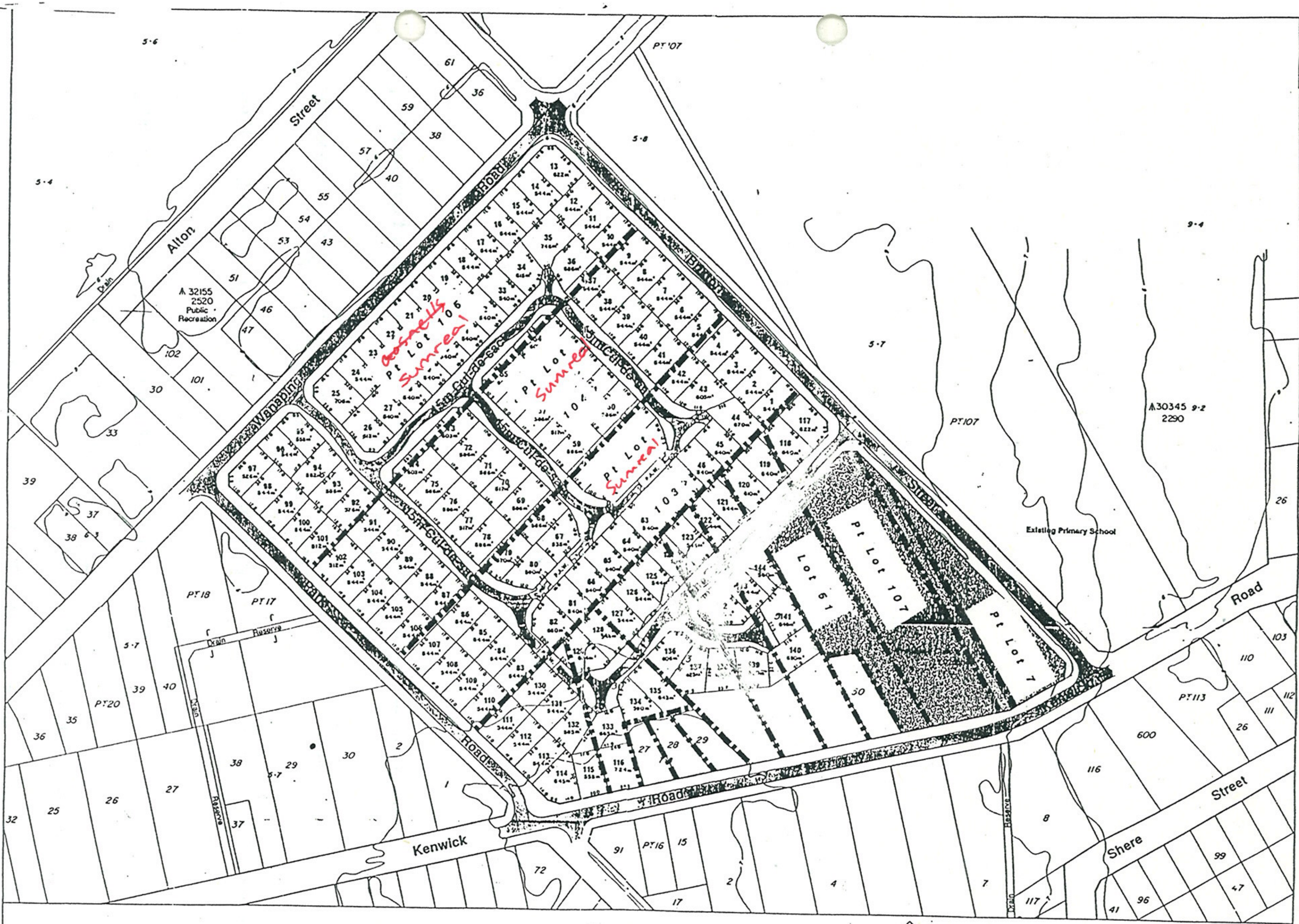
Are they already conservation reserves? ....YES BRIXTON STREET NATURE RESERVE.....

What is their approximate size? ....APPROXIMATELY 19 HECTARES. 30 HECTARES.....

19. Does the submitted area link other bushland areas? ....YES.....
ACROSS ROAD AND 200 METRES
.....

.....

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



1:1000 October 1992

Sumreal Nominees Pty Ltd

Proposed Subdivision - Wanaping Road, Kenwick

Chapman Glendinning & Associates

BRIXTON ROAD

CANNING LOCATION 10 - LOT 37, GOSNELLS, SHIRE

Report of Survey

G.J. Keighery and S.D. Hopper

MAJOR POINTS

Brixton Road site has several floral and biological features which make it one of the most outstanding sites for reservation on the Swan Coastal Plain.

1. Presence of rare flora, including Aponogeton hexatepalus and Hydrocotyle lemnoides.

2. Area of phytogeographical significance, containing several species at the northern extremities of their known ranges and species normally not present on the coastal plain but able to survive on heavy soils of this site.

3. Site of special scientific interest, containing hybridizing populations of Tribonanthes (flannel flowers) and Anigozanthos (Kangaroo Paws).

4. The claypans themselves are a rare habitat in the Metropolitan region.

5. The area could be a possible re-establishment site for the Short-necked Tortoise.

Description of the Site

The region consists of a series of interconnected claypans, dominated by Melaleuca laterita, which are inundated during winter and spring. These claypans are surrounded by higher ground, with sandy clay or lateritic soil carrying Viminaria juncea scrub, and a small sandy rise dominated by Eucalyptus calophylla (Marri).

The 170 species currently recorded from the area, are listed under these regions in the Appendix I. Further collecting, especially during spring and summer should greatly increase this listing, especially as the nearby Yule Brook Reserve which has been collected on since 1949 has a species list of over 370 (Speck and Baird, 1984). However, the lists are already significantly different despite the proximity of the areas.

Rare Flora

The claypans of Brixton Road, contain two species of gazetted rare flora, namely Aponogeton hexatepalus and Hydrocotyle lemnoides. Both are present in substantial numbers in this region. The Aponogeton population is the

largest known, and the species is currently not recorded from any nature reserve.

Phytogeographical Significance

Several orchid species (Caladenia ferruginea, Caladenia longicauda ssp. nov. and Thelymitra villosa) occuring here, are at the northern limits of their known ranges.

Because of the high water table and clayey soils the area supports many species normally associated with the lateritic or granitic soils of the northern jarrah forest and Darling Scarp. These species include: Lomandra micrantha, Anigozanthos bicolor (photo 6), Hakea erinacea, Grevillea bipinnatifida, Stirlingia tenuifolia and Synaphea acutiloba (photo 8).

Site of Special Scientific Interest

Apart from the scientific value of preserving rare flora, a rare habitat and outlying populations the site contains co-occurring populations of several related species which are of considerable genetic and taxonomic importance.

Several species of closely related spider orchids are found here (Caladenia ferruginea, Caladenia longicauda and Caladenia pectinata), and the sole known co-occurrence of the Star of Bethlehem Lilies (Calectasia cyanea and Calestasia grandiflora) (photo 9). These populations are of considerable significance in assessing taxonomic status of these plants.

Secondly, several well known species have hybridising populations at Brixton Road Tribonanthes australis x Tribonanthes brachypetala (photo 10); Tribonanthes australis x Tribonanthes variabilis; Anigozanthos bicolor x Anigozanthos manglesi : Anigozanthos manglesii x Anigozanthos viridis). The Tribonanthes hybrids are unique to Brixton Road, and have not been studied in detail, they are of considerable value for evolutionary studies in the genus, and should be preserved.

Rare Habitat

Melaleuca laterita swamps and claypans were once common on the poorly drained flatlands of the northern Swan Coastal Plain, edging the Darling Scarp. Most of this habitat type is now cleared. One of the few surviving sites is J.R. and B. Martyn Reserve, north of Midland.

Brixton Road is essentially similar to this reserve, in containing claypans which support a diverse annual herbfield. However, it is more extensive and is bordered by Viminaria scrub and Marri woodland. Hence, Brixton Road has a different flora.

Several species (currently not gazetted as rare) occuring in the claypans at Brixton Road deserve special note.

WATER RESOURCES MANAGEMENT PLAN

MIDDLE CANNING CATCHMENT

(STAGE 1 - VOLUME 1)

Prepared for the

Water Authority of Western Australia

By

Evangelisti & Associates
Consulting Engineers and Project Managers

in association with

Landvision
Consultants in Urban and Environmental Planning

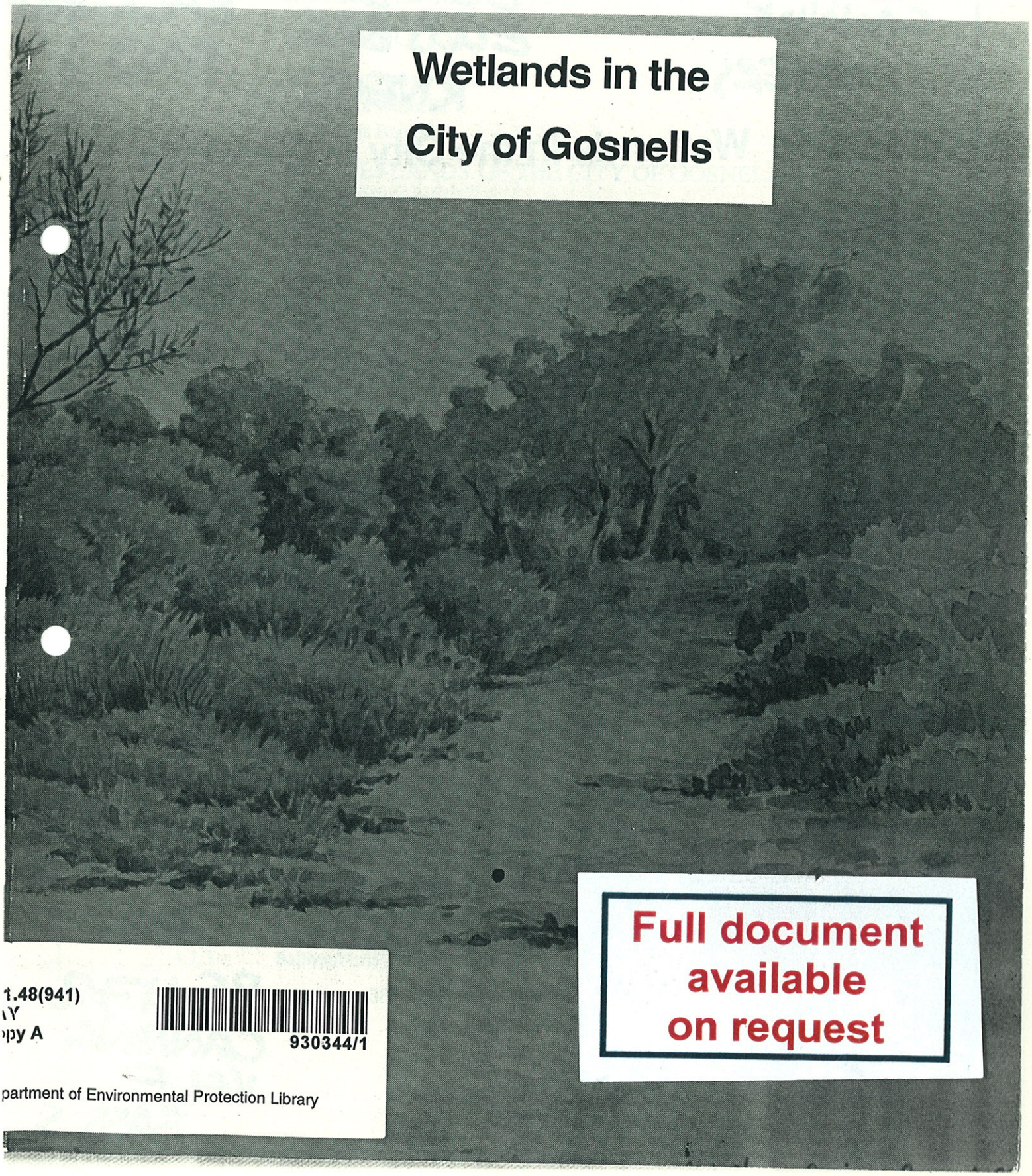
and

The V & C Semeniuk Research Group
Environmental Scientists

October 1995

Water Authority
of Western Australia

Wetlands in the City of Gosnells



Flora, Vegetation and Fauna
of
Bush Forever Site 422
Kenwick

Prepared for:
City of Gosnells
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22nd January 2002

CONTENTS

APPENDICES

SUMMARY

A flora survey was undertaken of Bush Forever Site 422 on December 16th 2001 and a fauna survey on December 20th 2001. The site is less than 1 ha in size, is surrounded by mown lawn, houses and an undeveloped site that has been planted with exotic *Eucalyptus* species with an understorey of weeds.

The following summarises the findings of the field work:

- *Eleocharis keigheryi*, a Declared Rare Flora was abundant through much of the Sedgeland of *Meeboldina* species and Scrubland of *Melaleuca lateritia*.
- *Aponogeton hexatepalus*, a Priority 4 Flora has previously been recorded from the site. Due to the timing of the survey there was no surface water and the ground had set very hard. Chaff-like, dead plant leaves, expected to be this species but would need to be be confirmed during the spring months when these vegetation communities are still inundated.
- *Schoenus pennisetis*, a Priority 1 Flora was recorded from the Scrubland of *Verticordia densiflora* and *Hypocalymma angustifolium*. As only one plants of this small sedge was located it would need to be mapped and searched for in more detail during spring.
- Two taxa listed as Significant in Bush Forever (Government of Western Australia, 2000) were located at the site - *Eryngium pinnatifidum* subsp. *palustre* and *Pimelea imbricata* var. *major*.
- Four vegetation communities were identified during the survey. These were a Tall Shrubland of *Viminaria juncea*, Scrubland of *Verticordia densiflora* and *Hypocalymma angustifolia*, Scrubland of *Melaleuca lateritia* and a Sedgeland of *Meeboldina* species.
- Two Vulnerable Ecological Communities (listed by the Department of Conservation and Land Management) Floristic Community Type 7 and 8 were recorded from the Site. Both are Floristic Community Types associated only with clay pans. The first three vegetation communities listed above are included in Floristic Community Type 8 and the last in Floristic Community Type 7.

- A total of 72 taxa were recorded from the Site of which 30 (41%) were weed taxa.
- The Department of Conservation and Land Management rated five of the most abundant weeds as High - **Brassica tournfortii, *Ehrharta calycina, *Eragrostis curvula, *Romulea rosea* and **Watsonia meriana* var. *bulbillifera.*

The Kenwick Road Bushland is of some importance for fauna in the following ways:

- It provides additional habitat to that at the Greater Brixton Street Bushland.
- It is located to provide a stepping stone between the much larger areas of habitat along the Canning River and around the Greater Brixton Street Wetlands. It is of most importance for frogs and birds and potentially for mammals, but the sparse understorey vegetation between the site and the Canning River currently restricts this role.
- As additional habitat, the Kenwick Road Bushland is probably most significant for species that have limited ability to move through the suburbs and therefore exist as small, semi-isolated populations in areas such as the Brixton Street Wetlands eg resident birds including fairy-wrens and thornbills, and to the Quenda.

FLORA AND VEGETATION

1 INTRODUCTION

Bennett Environmental Consulting was commissioned to undertake a vegetation and flora survey of the Bush Forever Site 422, Kenwick Road Bushland, Kenwick (the Site) situated on Brixton Road near the intersection with Kenwick Road. It is a wetland less than 1 ha in area. There is undeveloped land with planted *Eucalyptus* sp. over weeds to the south west, a housing complex to the north west, mown grassland to the south east and a bitumen road between the Site and Rehoboth Christian Secondary School to the north east.

The site occurs within the Guildford geological unit, in the Pinjarra Plain. This unit consists of Quaternary Superficial Deposits (Biggs and Wilde, 1980). It consists of lenticular interbeds and mixtures of sand, clay and conglomerate, which are locally calcareous. Most of the unit is fluvial in origin but it also includes estuarine and shallow-marine intercalations, especially near the base. The soil is clays with silts, sands and peat. This unit is typical of the low-lying areas. On the higher ground, another Quaternary Superficial Deposit, the Bassendean Sand overlies the Guildford Unit where the soil is light grey sands over silty sands.

This wetland is included in the Mungala Suite (Semeniuk, 1987). Geomorphically it is in the transition between the Bassendean Dunes and Pinjarra Plain. The underlying stratigraphy is a complex of sands, clays, calcrete and laterite. These wetlands lie along the depressions at the distributary ends of the creeks or adjacent to the intermittent disconnected drainage channels.

The Site is included in the Guildford Vegetation Complex of the Swan Coastal Plain (Heddle *et al.* 1980) described as being dominated by an open forest of *Corymbia calophylla* (Marri) - *Eucalyptus wandoo* (Wandoo) – *Eucalyptus marginata* (Jarrah) and a woodland of *Eucalyptus wandoo* (Wandoo), with minor components including the fringing woodland of *Eucalptus rudis* (Flooded gum) – *Melaleuca rhaphiophylla* (Paperbark).

Two Floristic Community Types (FCT) (Gibson *et al.*, 1994) were inferred from available data as occurring at the Site (Government of Western Australia, 2000):

FCT7 – Herb-rich saline shrubland in clay pan; and

FCT8 – Herb-rich shrubland in clay pan.

The Department of Conservation and Land Management (English, 2001) lists both Floristic Community Types as being Threatened Ecological Communities.

In Bush Forever (Government of Western Australia, 2000) the site is listed as including the Declared Rare Flora, *Eleocharis keigheryi,* and the Priority 4 Flora *Aponogeton hexatepalus.* *Eleocharis keigheryi* is a sedge which grows in damp to wet soils and *Aponogeton hexatepalus* is an aquatic plant with floating blades (Marchant et al., 1987).

2 METHODS

Field work was undertaken on December 16th 2001. As the area of the reserve was small, the whole site was traversed on foot, recording the different vegetation communities and the taxa present. The area is a wetland during the winter months but when the field work was undertaken the area was completely dry, large areas having set hard, resulting in most of the annual species being dead, some beyond recognition.

Taxa unknown or whose identification was unsure in the field were collected, pressed and later identified using plant identification keys and by comparison with collections at the Western Australian Herbarium.

3 RESULTS

3.1 Flora

Due to the timing of the field work many of the annual species had completed flowering and fruiting making identification for several species impossible. Also several taxa appeared not to have flowered during the spring months, possibly due to the low rainfall during the last winter.

3.1.1 Taxa Recorded

A total of 28 vascular plant families, 61 genera and 72 taxa were collected from the Site. The dominant families are listed in Table 1. These families represent 42% of the total number of taxa, 44% of the genera and 10% of the families recorded from the Site.

Table 1. Dominant vascular plant families recorded from Site 422.

FAMILY	No GENERA	TAXA		
		No NATIVE	No INTRODUCED	TOTAL
POACEAE	17	3	15	18
CYPERACEAE	4	6	0	6
ASTERACEAE	6	4	2	6

3.1.2 Rare and Priority Taxa

One Declared Rare Flora and one, possibly two Priority Flora were recorded from the Site. The Rare and Priority Flora categories are explained in Table 21.

Table 2. Code and description of Rare and Priority Flora categories

Code	Code Declared Rare and Priority Flora Categories
	CONSERVATION AND LAND MANAGEMENT
R	DRF (Declared Rare Flora) -Extant Taxa. Taxa, which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection.
X	DRF (Declared Rare Flora) -Presumed Extinct Taxa. Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently.
1	Priority One -Poorly Known Taxa. Taxa, which are known from one or a few (generally <5) populations, which are under threat.
2	Priority Two -Poorly Known Taxa. Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat.
3	Priority Three -Poorly Known Taxa. Taxa which are known from several populations, at least some of which are not believed to be under immediate threat.
4	Priority Four -Rare Taxa. Taxa which are considered to have been adequately surveyed and which whilst being rare, are not currently threatened by any identifiable factors.
	EPBC Act (1999)
E	Endangered - At this time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
V	Vulnerable - At this time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future

The Declared Rare Flora (R), *Eleocharis keigheryi,* a rhizomateous, clumped, grass-like perennial was widely distributed at the Site (Appendix E). Due to the timing of the survey most of the plants were dry, as illustrated in Appendix E. This taxon has been recorded from a few sites north and south of Perth. It grows

to 40cm high and occurs in seasonally water-filled clay pans and drainage lines in water to about 15cm deep, in clayey soils (Wilson, 1997). This is one of only two species of this genus that occur in the southwest of Australia as most species are recorded and common in the tropical regions.

Eleocharis keigheryi is listed as Rare under the Wildlife Conservation Act 1950 (Brown *et al*, 1998) and as a Vulnerable taxon under the Environmental Protection and Biodiversity Conservation Act 1999 (Environment Australia, 2001). This necessitates that if any plants of this taxon are to be "taken", Ministerial approval in writing must be obtained from both the State and Federal Ministers for the Environment.

Aponogeton hexatepalus a Priority 4 Flora (4) was tentatively identified from chaff collected in the Sedgeland of *Meeboldina* species, but a survey during the spring months is required for confirmation of this taxon. However it has previously been recorded from the site and once the clay pan becomes filled with water it is expected it will be recorded. In Marchant *et al.* (1994) it is recorded as occurring in clay-based permanent swamps. It is a perennial herb with an underground storage organ. The leaves have a stalk varying between 15-40cm in length with a narrow, floating blade up to 20cm long and 6mm wide. It extends to the extreme southwest corner of Australia but is limited by the conditions under which it occurs.

One plant of *Schoenus pennisetis,* a Priority 1 Flora was recorded. It is an annual sedge up to 13 cm high so individual plants are readily overlooked. The inflorescence is loose with several black spikelets. It was recorded from the Scrubland of *Verticordia densiflora* and *Hypocalymma angustifolium.* A survey of the site undertaken during spring may locate additional plants of this taxon.

Care must be taken to ensure that with any proposed development in the area these two Priority species are not adversely affected

In addition two taxa, *Eryngium pinnatifidum* subsp. *palustre* and *Pimelea imbricata* var. *major*, are listed as Significant Species in Bush Forever (Government of Western Australia, 2000). *Eryngium pinnatifidum* subsp. *palustre* was scattered through the Sedgeland of *Meeboldina* species and

Scrubland of *Melaleuca lateritia*. Less than 5 plants of *Pimelea imbricata* var. *major* were located in the tall Shrubland of *Viminea juncea* and the Scrubland of *Verticordia densiflora* and *Hypocalymma angustifolium*.

3.1.3 Weeds

A total of 30 weeds were recorded from the site. These are listed in Table 3. All have been determined as weeds by the Department of Conservation and Land Management (1999) and the Western Australian Herbarium (2001a,b) and their rating is given below in Table 3.

Table 3. List of weed taxa recorded from Site 422.

Scientific Name	Common Name	Rating	Invasiveness	Impacts
**Brassica tournfortii*	Wild turnip	High	✓	✓
**Ehrharta calycina*	Perennial veldt	High	✓	✓
**Eragrostis curvula*	African love grass	High	✓	✓
**Romulea rosea*	Guildford grass	High	✓	✓
**Watsonia meriana* var. *bulbillifera*	Bulbil lily	High	✓	✓
**Aira caryophyllea*	Silvery hairgrass	Moderate	✓	
**Avena barbata*	Bearded oats	Moderate	✓	
**Briza maxima*	Blowfly grass	Moderate	✓	
**Briza minor*	Shivery grass	Moderate	✓	
**Centauria erythraea*	Common centaury	Moderate	✓	
**Cynodon dactylon*	Couch	Moderate	✓	
**Glyceria maxima*		Moderate	✓	
**Hyparrhena hirta*	Tambookie	Moderate	✓	
**Hypochaeris glabra*	Flat weed	Moderate	✓	
**Juncus bufonius*	Toad rush	Moderate	✓	
**Juncus capitatus*	Reed sweetgrass	Moderate	✓	
**Lolium rigidum*	Annual rye grass	Moderate	✓	
**Lythrum hyssopifolium*	Lythrum	Moderate	✓	
**Parentucellia viscosa*	Sticky bartsia	Moderate	✓	
**Paspalum dilatatum*	Paspalum	Moderate	✓	
**Pennesetum clandestinum*	Kikuyu	Moderate	✓	
**Polypogon monspeliensis*	Annual beardgrass	Moderate	✓	
**Sonchus oleraceus*	Sowthistle	Moderate	✓	
**Trobolium uniolae*		Moderate	✓	
**Vulpia myuros*	Rat's tail grass	Moderate	✓	
**Watsonia borbonica*		Moderate	✓	
**Asphodelus fistulosus* ?	Wild onion	Mild		
**Juncus microcephalus*		Mild		
**Lotus suaveolens*	Hairy birdsfoot	Low		
**Trifolium angustifolium*	Narrowleaf clover	Low		

The rating allocated to each weed by CALM is based on three criteria:

- **Distribution** – wide current or potential distribution including consideration of known history of wide spread distribution elsewhere in the world.

- **Invasiveness** – ability to invade natural bushland in good to excellent condition or ability to invade waterways.
- **Environmental impacts** – Ability to change the structure, composition and function of ecosystems. In particular an ability to form a monoculture in a vegetation community.

Ratings indicate the following:

- **High** indicates this weed is prioritised for control and/or research ie prioritising funding to it.
- **Moderate** indicates control or research effort should be directed to it if funds are available, however it should be monitored (possibly a reasonably high level of monitoring).
- **Mild** indicates monitoring of the weed and control where appropriate.
- **Low** indicates that this species would require a low level of monitoring.

Five weeds recorded from the Site were rated as High, indicating these are taxa for prioritised control. Two taxa were rated Mild and two Low with the remaining 21 rated as Moderate. As the area is small and currently there are very few weeds present, eradication should be considered as a management issue. Although *Watsonia borbonica* is rated as Moderate, there is a large area of this taxon along the southern edge. It appears this weed is infiltrating into the bushland.

3.2 Vegetation

The vegetation communities identified at the Site are described using the vegetation layers as listed in Table 4.

Table 4. Vegetation layers. Adapted from: Bush Forever (Government of Western Australia, 2000)

Life Form/ Height Class	**Canopy Cover**			
	100-70%	**70-30%**	**30-10%**	**10-2%**
Trees over 30m	Tall Closed Forest	Tall Open Forest	Tall Woodland	Tall Open Woodland
Trees 10-30m	Closed Forest	Open Forest	Woodland	Open Woodland
Trees under 10m	Low Closed Forest	Low Open Forest	Low Woodland	Low Open Woodland
Tree mallee/Mallee	Closed Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
Shrub mallee	Closed Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
Shrubs over 2m	Closed Tall Scrub	Tall Open Scrub	Tall Shrubland	Tall Open Shrubland
Shrubs 1-2m	Closed Heath	Open Heath	Shrubland	Open Shrubland
Shrubs under 1m	Closed Low Heath	Open Low Heath	Low Shrubland	Low Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland

3.2.1 Vegetation Communities

Four vegetation communities were recorded from the Site. The distribution of the vegetation communities is illustrated in Appendix C - Map 1, the taxa recorded for each community listed in Appendix B and illustrated in Appendix D.

1. **Tall Shrubland of *Viminaria juncea* over a Scrubland of *Verticordia densiflora* and *Hypocalymma angustifolium*.**

   This community occurred mainly to the south of the area, in sandy soil above the wetland.

2. **Scrubland of *Verticordia densiflora* and *Hypocalymma angustifolium* over sedges.**

   This community was a narrow area between the Sedgeland and the Tall Shrubland of *Viminaria juncea*. In several areas it blended with the Tall Shrubland of *Viminaria juncea*.

3. **Scrubland of *Melaleuca lateritia* over sedges with *Eleocharis keigheryi* as a dominant sedge.**

   This community surrounded the community described below.

4. **Sedgeland of *Meeboldina* species and *Eleocharis keigheryi*.**

   This community together with the Scrubland of *Melaleuca lateritia* was dominant at the Site. Typically it occurred between and protected by the Scrubland of *Melaleuca lateritia*.

Vegetation communities 1, 2 and 3 are included in Floristic Community Type 8 and Vegetation community 4 in Floristic Community Type 7 (Gibson *et. al.*, 1994).

3.2.2 Endangered Vegetation Communities

Both Floristic Community Type 7 and 8 recorded from the Site are listed by the Department of Conservation and Land Management (English, 2001) as Threatened Ecological Communities and classified as Vulnerable. Vulnerable Ecological Communities "have been adequately surveyed and found to be declining and/or have declined in distribution and/or condition and whose ultimate security has not yet been assured, and/or a community that is still widespread but is believed likely to move into a category of higher threat in the

near future if threatening processes continue or begin operating throughout its range" (English, 2001).

3.2.3 Vegetation Condition

The condition of the vegetation present at the site was rated according to Table 5, mapped in Appendix C, Map 2 and illustrated in Appendix D.

The Site was in amazingly good condition when taking into account its small size (<1ha), proximity to development (housing complex on the west and school on the north east), proximity to a very degraded property on the south west, and the regular mowing that has occurred around the area.

Table 5. Condition rating scale from Bush Forever (Government of Western Australia, 2000)

Rating	Description	Explanation
1	Pristine	Pristine or nearly so, no obvious signs of disturbance.
2	Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
3	Very Good	Vegetation structure altered, obvious signs of disturbance.
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate it.
5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.
6	Completely degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

Most of the area is in Very Good to Excellent condition with very few weeds recorded, however the area is highly modified from its original condition. A few patches on the southern edge were Very Good to Good with a small area recorded as Good to Degraded. The Site is surrounded by Very Degraded areas of mown weeds to the north and east, privately owned with large numbers of *Hyparrhena hirta* to the south west and a firebreak and building sand on the north west.

3.3 Linkages

There are no vegetated linkages between the Site and other bushland. The Greater Brixton Street Wetlands, Kenwick occur some distance further west with many houses between the two areas. There many be movement of birds between the sites but the large distance would not allow seed transfer.

3.4 Importance of the Site

The Site includes the following important criteria:

- presence of two Vulnerable Ecological Communities, Floristic Community Type 7 and 8;
- presence of Declared Rare Flora *Eleocharis keighery*;
- protection under the Commonwealth Environmental Protection and Biodiversity Conservation Act, 1999;
- presence of Priority 4 Flora, *Aponogeton hexatepalus*;
- vegetation in Good or better condition; and
- includes an extensive area of wetland.

Although the Site is only a small area the above features were used to select it as a Bush Forever site (Government of Western Australia, 2000).

3.5 Management Concerns

Although weeds have been dealt with above the weeds tabulated below were recorded as invading the bushland from the edges, and their control should be implemented as a priority.

Table 6. Common weeds commencing to invade the bushland from the surrounding edges

EDGE	WEEDS	
North east edge, mown to road edge	*Eragrostis curvula* *Lolium rigidum* +	*Cynodon dactylon* *Paspalum dilatatum*
South west edge, adjoins private property	*Watsonia meriana* var. *bulbillifera* + *Watsonia borbonica* + *Avena barbata* *Ehrharta calycina* *Cynodon dactylon*	*Romulea rosea* *Briza maxima* *Tribolium uniolae* *Eragrostis curvula* *Romulea rosea* *Hyparrhenia hirta*
North west edge, housing complex	*Watsonia meriana* var. *bulbillifera* *Pennisetum clandestinum* % *Lolium rigidum* *Cynodon dactylon* + *Briza maxima* *Briza minor* *Brassica tournefortii*	*Romulea rosea* *Eragrostis curvula* *Trifolium angustifolium* *Juncus capitatus* *Juncus kraussii* *Hypochaeris glabra* *Centaurium erythraea*
South east edge, mown	*Lolium rigidum* *Eragrostis curvula* *Ehrharta calycina*	*Hyparrhena hirta* *Cynodon dactylon*

+ indicates a dominant weed in this area
% taxon a common weed under the *Melaleuca lateritia* shrubs

Where there has been mowing of the surrounding areas it has occurred up to the edge of the bushland, including the wetland. Weeds are invading into an area of *Eleocharis keigheryi* on the north east mown edge and should be controlled immediately. *Ehrharta calycina,* readily controlled with Fusilade, is penetrating into the Scrubland beneath the Tall Shrubland of *Viminaria juncea.* This should be a target for removal.

Rubbish has been dumped in small quantities throughout the bushland. There was a large sheet of plastic that had "blown" in from the surrounding residential area as illustrated in Appendix D. Sand used when the houses on the west side were built has spilled onto the edge of the wetland. It is in an area where the vegetation condition is Good but care must be taken to ensure this does not occur again.

There was one area where mature plants of *Meeboldina canus* appeared to have died. This should be monitored to determine if it is a temporary situation or if the number of plants dying is increasing. If the plant numbers dying continue to increase soil and water testing may need to be undertaken to determine possible reasons. The number of private bores in the area should be restricted, particularly with increases in the number of residences to ensure there is not too great a draw down of water in the area which will affect the wetland.

Residents adjacent to the Site should be informed of the importance and uniqueness of the Site and the Greater Brixton Street Bushland Site, and should be encouraged to become involved in the management of the Site. The high school students could also become active in using the area for studies and in its maintenance. Weed removal, especially from the perimeter areas of the Site, is an educational project which would quickly improve the vegetation condition of the area, and which show measurable positive results within a short time frame.

4 DISCUSSION

Bush Forever Site 422 at Kenwick is very interesting for several reasons, particularly its small size and proximity to development while retaining Very Good to Excellent quality vegetation. The edges, which abut the degraded property to the south and the housing development to the west, recorded a Good

to Degraded condition. The vegetation abutting the mown areas on the north and east generally recorded very few weeds around the perimeter.

Eleocharis keigheryi, a Declared Rare Flora was abundant through much of the Sedgeland of *Meeboldina* species and Scrubland of *Melaleuca lateritia*. This species is protected under both the Wildlife Conservation Act 1950 (State Government) and the Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth Government). Permission to "take" any of these plants must be obtained from the Minister for the Environment in both the Western Australian and Commonwealth Governments.

Aponogeton hexatepalus, a Priority 4 Flora has previously been recorded from the site. However when the survey was undertaken there was no surface water and the ground had set very hard. Chaff-like, dead plant leaves, expected to be this species were collected but this taxon could not be positively identified, even using a microscope. If the material collected is *Aponogeton hexatepalus* it would appear to be predominantly in the Sedgeland of *Meeboldina* species with some plants in the Scrubland of *Melaleuca lateritia*. The distribution of this species would need to be confirmed during the spring months when these vegetation communities are still inundated. A Priority 1 Flora, *Schoenus pennisetis*, was recorded from the Scrubland of *Verticordia densiflora* and *Hypocalymma angustifolium*. This small sedge would need to be mapped and searched for in more detail during spring. Both *Aponogeton hexatepalus* and *Schoenus pennisetis* are listed by the Department of Conservation and Land Management, so every care must be taken not to destroy any plants.

Two taxa listed as Significant in Bush Forever (Government of Western Australia, 2000) were located at the site. These are *Eryngium pinnatifidum* subsp. *palustre* and *Pimelea imbricata* var. *major* located in the Sedgeland of *Meeboldina* species /Scrubland of *Melaleuca lateritia* and Tall Shrubland of *Viminea juncea*/Scrubland of *Verticordia densiflora* and *Hypocalymma angustifolium*, respectively.

Two Vulnerable Ecological Communities, Floristic Community Type 7 and 8 were recorded from the Site. These are communities defined by the Department

of Conservation and Land Management as facing a high risk of total destruction or significant modification in the medium to long term future. Both are Floristic Community Types associated only with clay pans.

Four vegetation communities were identified during the survey. These were a Tall Shrubland of *Viminaria juncea*, Scrubland of *Verticordia densiflora* and *Hypocalymma angustifolia*, Scrubland of *Melaleuca lateritia* and a Sedgeland of *Meeboldina* species. The first three vegetation communities are included in Floristic Community Type 8 and the last in Floristic Community Type 7. A total of 72 taxa were recorded from the Site of which 30 (41%) were weed taxa. The Department of Conservation and Land Management rated four of the most abundant weeds as High. *Watsonia borbonica*, rated as Moderate was also common in the Tall Shrubland of *Viminaria juncea* and consideration should be given to its removal. Spraying with Fluazifop, when the grasses are actively growing, should readily control *Ehrharta calycina* and *Eragrostis curvula.* Most of the weeds were recorded on the perimeter of the Site, very few occurring through the wetland.

Children at the high school and local residents should be encouraged to become involved in developing a Friends Group that could assist with the maintenance of Bush Forever Site 422.

Signage at the Site, giving its name and a bit of information about the area should develop a local interest. Many people are aware of the signficance of the main Greater Brixton Street Wetlands, but possibly not so aware of the significance of this Site. It is worthy of local interest and participation in its maintenance.

5 REFERENCES

Biggs, E.R. and Wilde, S.A. (1980). *Geology, Mineral Resources and Hydrology of the Darling System, Western Australia.* Department of Conservation and Environment, Perth, Western Australia

Brown, A., Thomson-Dans, C., Marchant, N.G. (Eds) (1998). *Western Australia's Threatened Flora.* Department of Conservation and Land Management, Como

Churchward, H.M. and McArthur, W.M. (1980). *Landforms and Soils of the Darling System* In *Atlas of Natural Resources, Darling System, Western Australia.* Department of Conservation and Environment, Perth, Western Australia

Department of Conservation and Land Management (1999). *Environmental Weed Strategy for Western Australia.* Department of Conservation and Land Management, Perth

English, V. (2001). List of Communities on CALM's Threatened Ecological Community data base

Environment Australia. (2001). http://www.erin.gov.au

Gibson, N., Keighery, B.J., Keighery, G.J., Burbidge, A.H., Lyons, M.N. (1994). *A Floristic Survey of the southern Swan Coastal Plain.* Unpublished report for the Australian Heritage Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc.)

Government of Western Australia. (2000). *Bush Forever.* Department of Environmental Protection

Heddle, E.M., Loneragan, O.W., Havell, J.J. (1980). *Vegetation of the Darling System* In *Atlas of Natural Resources, Darling System, Western Australia.* Department of Conservation and Environment, Perth, Western Australia

Hussey, B.M.J., Keighery, G.J., Cousens, R.D., Dodd, J., Lloyd, S.G. (1997). *Western Weeds – A guide to the weeds of Western Australia.* Plant Protection Society of Western Australia

Marchant, N.G., Wheeler, J.R., Rye, B.L., Bennett, E.M., Lander, N.S., Macfarlane, T.D. (1987). *Flora of the Perth Region.* Western Australian Herbarium

Meney, K.A. and Pate, J.S. (1999). *Australian Rushes.* University of Western Australia Press, Crawley

Semeniuk, C.A. (1987). *Wetlands of the Darling System – consanguineous wetlands and their distribution in the Darling System, South Western Australia.* Journal of the Royal Society of Western Australia 70: 69-87

Western Australian Herbarium (2001a). *Florabase.* Department of Conservation and Land Management. http://www.calm.wa.gov.au/science/florabase.html

Western Australian Herbarium (2001b). *Max.* Department of Conservation and Land Management

Wilson, K. L. (1997). *New Species of Cyperaceae in Western Australia.* Nuytsia 11: 269-282

KENWICK ROAD BUSHLAND, KENWICK

Bush Forever Site No. 422

FAUNA

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FAUNA

6 INTRODUCTION

As part of a survey for rare and threatened flora of the Kenwick Road Bushland, Bush Forever Site No. 422, we have been commissioned by Bennett Environmental Consulting to assess the fauna values of the site, with particular emphasis on the role of the site with respect to fauna movements in the general area. The aim of this report is therefore not to produce a list of species observed or expected on the site, but to discuss the sorts of species that may rely on the site, both residents and species that may move through the site regularly.

7 METHODS

A visit to the site was carried out by Mr Brenden Metcalf of Bamford Consulting Ecologists on the 20th December 2001. This visit involved walking through the site and adjacent areas, noting the fauna habitats available, the relationship of the site to adjacent areas and recording fauna species present, either by direct observation or through evidence, such as diggings and scats.

Fauna of the Perth area is quite well documented (e.g. Van Delft 1997, Bush *et al.* 1995, Storr *et al.* 1978, Wykes 1991, How 1998, Turpin 1990, Storr and Johnstone 1988, and How and Dell 1994, Dell and How 1995 and Johnstone and Storr 1998). This documentation, together with personal experience in the region, including around the Brixton Street Wetlands, makes it possible to predict with a reasonable degree of accuracy the fauna species likely to make use of the study area.

8 SITE DESCRIPTION

The Kenwick Road Bushland has a bushland area of 0.8 ha, including a seasonal wetland. It is therefore a very small site, but it is adjacent to the Greater Brixton Street Wetland Site (Bush Forever Site 387) and is effectively an outlier of that site. It is less than 1.25 km north-west of the Canning River (Bush Forever Site

246). Degraded native vegetation lies between the Kenwick Road Bushland and the Brixton Street Wetland, while between the Kenwick Road Bushland and the Canning River there are paddocks with scattered large trees.

The site is dominated by a wetland area vegetated with *Melaleuca* Spp., Swishbush *Viminaria juncea* and sedge species, and is situated near the Brixton St – Kenwick Road Junction. The condition of most of the vegetation is very good to excellent (Department of Environmental Protection 2000). The vegetation is similar to much of that in the Brixton Street Wetland. At the time of the site inspection, the wetland was dry.

9 FAUNA OF THE SITE

9.1 Frogs

No frogs were observed during the site inspection but at least six frog species could be expected to regularly use the site for breeding. Several of these may remain on the site throughout the year, but others may move between the site and other, more permanent wetland areas such as the Canning River and in the Brixton Street site. Two of the species expected to use the site, the Moaning Frog *Heleioporus eyrei* and the Pobblebonk *Limnodynastes dorsalis,* disperse widely into upland habitats outside the winter breeding season.

Because of the small size of the site and the presence of large wetlands nearby, the Kenwick Road Bushland can really only be considered to support a small proportion of local frog populations. Its position between the Canning River and the Brixton Street wetlands, however, may mean that it has a function as a "stepping stone" in aiding movement of frogs between these larger wetlands. Particularly during the winter months, frogs are able to disperse widely away from wetlands, even across highly degraded habitat offering little cover (Bamford 1997), so frogs should have little trouble accessing the Kenwick Road Bushland.

9.2 Reptiles

The Perth region has a rich reptile fauna and even quite small bush remnants can support 25-30 species (Turpin 1990), but the Kenwick Road Bushland has very little reptile habitat because so much of the site is seasonal wetland. It may only support the few reptile species that survive in degraded habitat and those that live on the margins of wetlands. The Long-necked Tortoise *Chelodina oblonga* may be a seasonal visitor. Most reptiles have limited ability to cross badly degraded habitat (Bamford 1997), such as that separating the Kenwick Road Bushland from the Canning River. Therefore, the site probably only has a small role to play in the movement of reptiles through the area. Its main role may be in providing a small amount of reptile habitat additional to that found around the Brixton Street Wetlands.

The only reptile observed during the site inspection was a single unidentified skink that was caught and eaten by a Red Wattlebird.

9.3 Birds

The Kenwick Road Bushland has a limited array of habitats for birds, and therefore while 20-25 species can normally be found during a brief visit to remnant bushland in the Perth area, only seven species were observed (see Table 1). All are widespread species in the Perth area, utilising gardens and parks as well as remnant native vegetation, and the Laughing Turtle-Dove is introduced.

Despite this limited bird list, many more species are likely to visit the site regularly, and some of these would be on a seasonal basis, such as waterbirds when the wetland is inundated and nectar feeding species when plants are flowering. Because of the small size of the site, species such as fairy-wrens and thornbills would have been observed if present, and such species are significant as they are sedentary and only persist in large, high quality bushland remnants. They may be present along the Canning River and in the Brixton Street site and may use the Kenwick Road Bushland on occasions.

The mobility of birds means that large areas of degraded habitat are not a barrier to most species, so from the perspective of birds the Kenwick Road Bushland can be viewed as part of a mosaic of habitats in the region. It provides an extension to

the similar habitat present in the Brixton Street site but, more importantly, it helps to link the Brixton Street site with the Canning River.

Table 1. Bird species recorded during Site visit.

Species	No. Recorded
Australian Magpie *Gymnorhina tibicen*	4
Australian Ringneck *Barnardius zonarius*	1
Red Wattlebird *Anthochaera carunculata*	2
Australian Magpie-lark *Grallina cyanoleuca*	1
Silvereye *Zosterops lateralis*	5
Brown Honeyeater *Lichmera indistincta*	2
Laughing Turtle-Dove *Streptopelia senegalensis*	1

9.4 Mammals

The only mammal recorded during the site inspection was the Quenda or southern Brown Bandicoot *Isoodon obesulus fusciventer*, diggings of which were widespread. This species has previously been recorded from the site by Friend (1996) and is abundant in the Brixton Street Wetland. The Kenwick Road Bushland is effectively an extension of the Brixton Street site for the Quendas. The Quenda also occurs along the Canning River and some movement of the species may occur between the River and Brixton Street/Kenwick Road. The position of the Kenwick Road Bushland may facilitate this movement, as it is closer to the Canning River than the Brixton Street site. The intervening land, being largely pasture with scattered trees, is poor habitat for Quendas, making refuges such as the Kenwick Bushland particularly important.

Few other mammals may use the site although introduced species such as the House Mouse *Mus musculus* and Fox *Vulpes vulpes* are almost certainly present. The site could be used by Brush-tailed Possums *Trichosurus vulpecula* moving through the area and there is a record of a Brush-tailed Phascogale *Phascogale tapoatafa* in the Kenwick area from the mid 1990s (K. Karau pers. comm.). The White-striped Bat *Tadarida australis* also occurs in the region (pers. obs.) and may utilise remnant native vegetation. In addition to providing some habitat for

Quendas that is additional to habitat in the Brixton Street site, the Kenwick Road Bushland probably has some influence on the ability of other native mammals to move through the area.

10 CONCLUSIONS

Although a very small patch of habitat that is represented by similar habitat in the nearby Brixton Street Wetlands, the Kenwick Road Bushland is of some importance for fauna in two ways: it provides additional habitat to that at the Brixton Street site, and it is located so as to provide a stepping stone between the much larger areas of habitat along the Canning River and around the Brixton Street Wetlands.

As a stepping stone for fauna movements, the Kenwick Road Bushland is probably of most importance for frogs and birds. It is potentially important for mammals also, but the sparse understorey vegetation between the site and the Canning River currently restricts this role. This potential linkage could therefore be enhanced.

As additional habitat, the Kenwick Road Bushland is probably most significant for species that have limited ability to move through the suburbs and therefore exist as small, semi-isolated populations in areas such as the Brixton Street Wetlands. This could apply to resident birds including fairy-wrens and thornbills, and to the Quenda. Such species can persist for long periods of times as small, isolated populations, but they are vulnerable to local extinction. Small areas of additional habitat allow the isolated populations to be slightly larger and therefore give them some protection from local extinction. However, linkage with other habitat remnants is important in the long term, and the Kenwick Road Bushland provides a basis for such linkage.

11 REFERENCES

Bamford, M.J. (1997). *Frogs and Reptiles at the RGC Wetlands Centre, Capel, WA. Report on Studies from Autumn 1993 to Autumn 1995.* RGC Wetlands Centre Technical Report No. 32.

Bush, B., Maryan, B., Browne-Cooper, R. and Robinson, D. (1995). *A Guide to the Reptiles and Frogs of the Perth Region.* University of Western Australia Press, Perth.

Dell, J. and How, R.A. (1995). *Faunal Responses to Fire in Urban Bushland. pp. 35-41 in J. Harris (ed) Burning our Bushland.* Proceedings of a conference about fire and urban bushland. Urban Bushland Council (WA).

Department of Environmental Protection (2000). *Bush Forever. Volume 2 directory of Bush Forever Sites.* Government of Western Australia, Perth.

Friend, A (1996) CALM Bandicoot Survey 1991 – 1996. *Database of Bandicoot sightings reported by the public.* Department of Conservation and Land Management, Como, Western Australia.

How, R.A. and Dell, J. (1994). *The Zoogeographic Significance of Urban Bushland Remnants to Reptiles in the Perth Region, Western Australia.* Pacific Conservation Biology 1: 132-140.

How, R.A. (1998*). Long-term sampling of a herpetofaunal assemblage on an isolated urban bushland remnant , Bold Park, Perth.* J. Roy. Soc. WA 81: 143-148.

Johnstone, R.E. and Storr, G.M. (1998). *Handbook of Western Australian Birds Volume 1 – non-passerines (Emu to Dollarbird).* Western Australian Museum, Perth.

Storr, G.M., Harold, G., & Barron, G. (1978). *The amphibians and reptiles of the northern Swan Coastal Plain, Western Australia.* In: Faunal Studies of the Northern Swan Coastal Plain - a Consideration of Past and Future Changes. Western Australian Museum, Perth.

Storr, G.M. and Johnstone, R.E. (1988). *Birds of the Swan Coastal Plain and Adjacent Seas and Islands.* Records of the WA Museum Supplement 28: 1-76.

Turpin, M.C. (1990). *Ecological appraisal of an isolated Banksia woodland reserve No. 3694 south of the Swan River, Perth.* West. Aust. Nat. 18: 131-139.

Van Delft, R. (1997). *Birding Sites Around Perth. 2nd Edition.* Birds Australia – WA Group.

Wykes, B. (1991). *Perth Wildlife Watch.* World Wide Fund for Nature Project 134.

RECOMMENDATIONS

The following recommendations are made if the Bush Forever Site 422 is to be managed as a Reserve ensuring its long-term viability.

A. Access to the Area

Consideration should be given to fencing the site with an aesthetically pleasing barrier. Wooden poles and strainer wires will prevent people walking through the bushland and not impinge greatly on its appearance. It is important that ready access be retained for wildlife, especially for the quendas recorded at the site. No barrier fencing should be erected even if gaps are included every 20m, as cats and dogs etc would soon learn to wait at those entry points.

As the Declared Rare Flora, *Eleocharis keigheryi*, is common through most of the wetland, this area should not be disturbed. The vegetation communities recorded are all examples of Vulnerable Ecological Communities, 7 or 8 (English, 2001). Care should be taken to ensure these communities are not damaged.

To allow viewing of this area a viewing platform could be constructed taking care to cause minimal damage to the Vulnerable Ecological Communities and ensuring that no damage occurs to the *Eleocharis keigheryi* plants. This platform could be placed on the southeast side, near the southeast corner where the vegetation is more degraded or along the southwest side adjacent to the private property. Entrance to and from the platform would need to be obvious and convenient to ensure no 'short cuts' were taken.

An alternative or in addition to fencing, a board walk around the perimeter of the Site could be constructed with one or more viewing platforms. At each viewing platform information could be provided on the plants and animals that may be seen.

B. Weed removal

Most grass weeds are readily controlled with selective herbicides. Care will need to be taken with the use of any herbicide and the Waters and Rivers Commission should be approached for chemicals acceptable around wetlands.

Trials have been carried out using Fluazifop where it was not found to affect native taxa. For the higher areas see Appendix E. For Couch (*Cynodon dactylon*), Perennial veldt grass (*Ehrharta calycina),* Kikuyu (*Pennisetum clandestinum*) and Guildford grass (*Romulea rosea*) Fusilade or Glyphosate Spot Spray is recommended. For *Watsonia* sp. the plants should be slashed and Garlon 600 applied to the cut area.

It will take several years to gain control over weed populations. There would be a significant seed bank of weeds in the soil, which will come up over several years, and bulbous and cormous species will also resprout each year. The aim is to gradually wear down the seed bank and underground vegetative structures by killing-off emergent target plants.

A description of each of the chemicals suggested is given in Appendix F. However as the area is small and the number of weeds few, it is recommended that preferably they be removed by hand, especially if a group of volunteers are willing to assist.

C. Fauna

An attempt should be made to encourage other fauna species into the area. A major aim would be to improve the vegetation cover between the Greater Brixton Street Bushland and this Site, which due to the development between these areas is unrealistic.

A buffer of at least 20m around the current perimeter of the Site should be developed with local provenance plants (plant species that would have naturally occurred there, prior to development). The buffer should be demarcated from the grassed area with an accepted kerbing. Seed could be collected from the Greater Brixton Street Bushland of species that surround similar wetlands at that site. At present a limited number of honeyeaters frequent the site due to the lack of diversity of nectar producing species. This could be a project for volunteers or the school. Prior to planting, the area to be rehabilitated should be treated to remove all weeds.

D. Monitoring

During the survey it was noted that some of the *Meeboldina cana* clumps had died. Other plants in the near vicinity should be closely monitored to ensure there are no further deaths or if other plants die then the soil and water should be analysed to determine if there is a detrimental chemical present.

Monitoring of the bushland should be undertaken on an annual basis, preferably in spring. This can be done simply by using marked photo-points and comparing the photos. As weed removal occurs information should be kept on the date of removal, method used and success obtained. This information should be useful for other projects. If there is invasion of the area by other weeds, these should be identified and controlled.

There is a lot of information published on the area. Monitoring of fauna movements eg birds and insects is a project wherevolunteers and school children could readily become involved. This would add greatly to the biodiversity of the area and may assist with determining which fauna species are the pollinators of the plants at the Site

E. Development of Friends Group

Local residents should be encouraged to form a "Friends of .... Group" to assist with the maintenance and to provide 'policing' of the Site. Friends groups elsewhere have assisted with the removal of *Watsonia* and other weeds. However it is essential that the City of Gosnells provide support, otherwise the volunteers are likely to become frustrated and lose interest. There is an active group involved with the Greater Brixton Street Wetlands so some of that group may be willing to assist, however if residents in the housing estate on the southwest could be encouraged to become involved this would give them some ownership of the Site.

Staff at the Rehoboth High School should be approached about the possibility of involving some of the students with the Site. If the area around the perimeter is to be left as a mown area, trees appropriate to the area could be propagated from seed in nearby areas, grown to seedling stage and planted by the students. They could also become involved in the Site enhancement by pulling weeds and

monitoring the clumps of *Meeboldina cana*. Selecting one project at a time per student group (eg Watsonia removal) as individual projects would make targets more definable and attainable for them. The result would be very measurable.

F. Vehicle Movement

Any vehicles used around the Site should be washed to remove all soil and plant material before entering the site. This will apply to maintenance and construction vehicles. Any soil used at the site must be guaranteed to be free of disease or weed seeds and if a viewing platform is constructed the material for its use should be stored on the mown area away from the Site.

G. Information

As the area has several interesting environmental features signage about these should be included with any development. This could be in a gazebo or in part of a viewing structure where a lot of information can be readily displayed, or if a gate is erected an information sign could provide some information. This should include fauna and fauna considerations. A static display for use at all libraries within the City of Gosnells is a way of promoting the environmental importance of the Site to the wider public.

APPENDIX A

Taxa Listed Under Vascular Plant Families

Abbreviations Used in the Table

ABBREVIATION	EXPLANATION
*	Plant introduced (weed)
sp.	Insufficient material to identify to species
?	Uncertain if name is correct. Flowering or fruiting material would aid with identification
var.	variety
subsp.	subspecies
"Brixton Road"	tentative name given to species prior to publication

PLANT FAMILY	TAXON
ANTHERICACEAE	*Dichopogon preissii*
	Thysanothus patersonii
	Tricoryne elatior
ASPHODELACEAE	**Asphodelus fistulosus* ?
APIACEAE	*Eryngium pinnatifidum* subsp. *palustre*
	Schoenolaena juncea
ASTERACEAE	**Hypochaeris glabra*
	**Sonchus oleraceus*
	Cotula coronopifolia
	Hyalosperma cotula
	Podolepis gracilis
	Siloxerus humifusus
BRASSICACEAE	**Brassica tournefortii*
CENTROLEPIDIACEAE	*Centrolepis aristata*
CHENOPODIACEAE	*Halosarcia lepidosperma*
CYPERACEAE	*Chorizandra enodis*
	Eleocharis keigheryi
	Isolepis cyperoides
	Isolepis setiformis
	Schoenus pennisetis
GENTIANACEAE	**Centaurium erythraea*
GOODENIACEAE	*Goodenia filiformis*
HAEMODORACEAE	*Tribonanthes australis*
IRIDACEAE	**Romulea rosea*
	**Watsonia borbonica*
	**Watsonia meriana* var. *bulbillifera*
JUNCACEAE	**Juncus bufonius*
	**Juncus capitatus*
	**Juncus microcephalus*
	Juncus subsecundus
LILIACEAE	Liliaceae sp.
LOBELIACEAE	*Isotoma pusilla*
LYTHRACEAE	**Lythrum hyssopifolium*
MALVACEAE	*Lawrencia squamata*
MENYANTHACEAE	*Villarsia capitata*
MIMOSACEAE	*Acacia lasiocarpa* var. *lasiocarpa*
MYRTACEAE	*Astartea* sp. "Brixton Road"
	Hypocalymma angustifolium
	Melaleuca lateritia
	Melaleuca rhaphiophylla
	Verticordia densiflora
ORCHIDACEAE	*Prasophyllum pauciflorum*
PAPILIONACEAE	**Lotus suaveolens*
	**Trifolium angustifolium*
	Viminaria juncea
POACEAE	**Aira caryophyllea*
	**Avena barbata*

PLANT FAMILY	TAXON
POACEAE (cont.)	**Briza maxima*
	**Briza minor*
	**Cynodon dactylon*
	**Ehrharta calycina*
	**Eragrostis curvula*
	**Glyceria declinata*
	**Hyparrhena hirta*
	**Lolium rigidum*
	**Paspalum dilatatum*
	**Pennisetum clandestinum*
	**Polypogon monspeliensis*
	**Tribolium uniolae*
	**Vulpia myuros*
	Agrostis avenacea
	Austrodanthonia occidentalis
	Neurachne alopecuroidea
PORTULACACEAE	*Calandrinia* sp.
PROTEACEAE	*Hakea erinacea*
	Hakea varia
RESTIONACEAE	*Lepyrodia muirii*
	Meeboldina cana
	Meeboldina coangustata
SCROPHULARIACEAE	**Parentucellia viscosa*
	Gratiola peruviana
THYMELAEACEAE	*Pimelea imbricata* var. *major*

APPENDIX B

Species Recorded for Each Vegetation Community

Abbreviations Used in the Table

ABBREVIATION	EXPLANATION
Vj	Tall Shrubland of *Viminaria juncea* over a Scrubland of *Verticordia densiflora* and *Hypocalymma angustifolium*
Vd	Scrubland of *Verticordia densiflora* and *Hypocalymma angustifolium* over sedges
Ml	Scrubland of *Melaleuca lateritia* over sedges
Sd	Sedgeland of *Meeboldina* species and *Eleocharis keigheryi*
*	Plant introduced (weed)
sp.	Insufficient material to identify to species
?	Uncertain if name is correct. Flowering or fruiting material would aid with identification
var.	variety
subsp.	subspecies
"Brixton Road"	tentative name given to species prior to publication

TAXON	COMMUNITY			
	Vj	Vd	Ml	Sd
Acacia lasiocarpa var. *lasiocarpa*	✓			
Agrostis avenacea			✓	✓
**Aira caryophyllea*	✓			
**Asphodelus fistulosus* ?	✓		✓	
Astartea sp. "Brixton Road"				✓
Austrodanthonia occidentalis	✓			
**Avena barbata*	✓			✓
**Brassica tournefortii*			✓	
**Briza maxima*	✓			
**Briza minor*	✓	✓		
Calandrinia sp.		✓		
**Centaurium erythraea*			✓	
Centrolepis aristata		✓		✓
Chorizandra enodis			✓	✓
Cotula coronopifolia				✓
**Cynodon dactylon*			✓	✓
Dichopogon preissii				✓
**Ehrharta calycina*	✓			
Eleocharis keigheryi			✓	✓
**Eragrostis curvula*	✓			
Eryngium pinnatifidum subsp. *palustre*			✓	✓
**Glyceria declinata*			✓	✓
Goodenia filiformis				✓
Gratiola peruviana			✓	✓
Hakea erinacea	✓			
Hakea varia				✓
Halosarcia lepidosperma				✓
Hyalosperma cotula			✓	✓
**Hyparrhena hirta*	✓			
Hypocalymma angustifolium	✓			
**Hypochaeris glabra*	✓			
Isolepis cyperoides	✓	✓		
Isolepis setiformis			✓	✓
Isotoma pusilla			✓	✓
**Juncus bufonius*		✓		
**Juncus capitatus*		✓		✓
**Juncus microcephalus*			✓	
Juncus subsecundus			✓	
Lawrencia squamata				✓
Lepyrodia muirii				✓
Liliaceae sp.			✓	✓
**Lolium rigidum*			✓	✓
**Lotus suaveolens*		✓	✓	
**Lythrum hyssopifolium*		✓		✓
Meeboldina cana		✓	✓	✓
Meeboldina coangustata			✓	✓

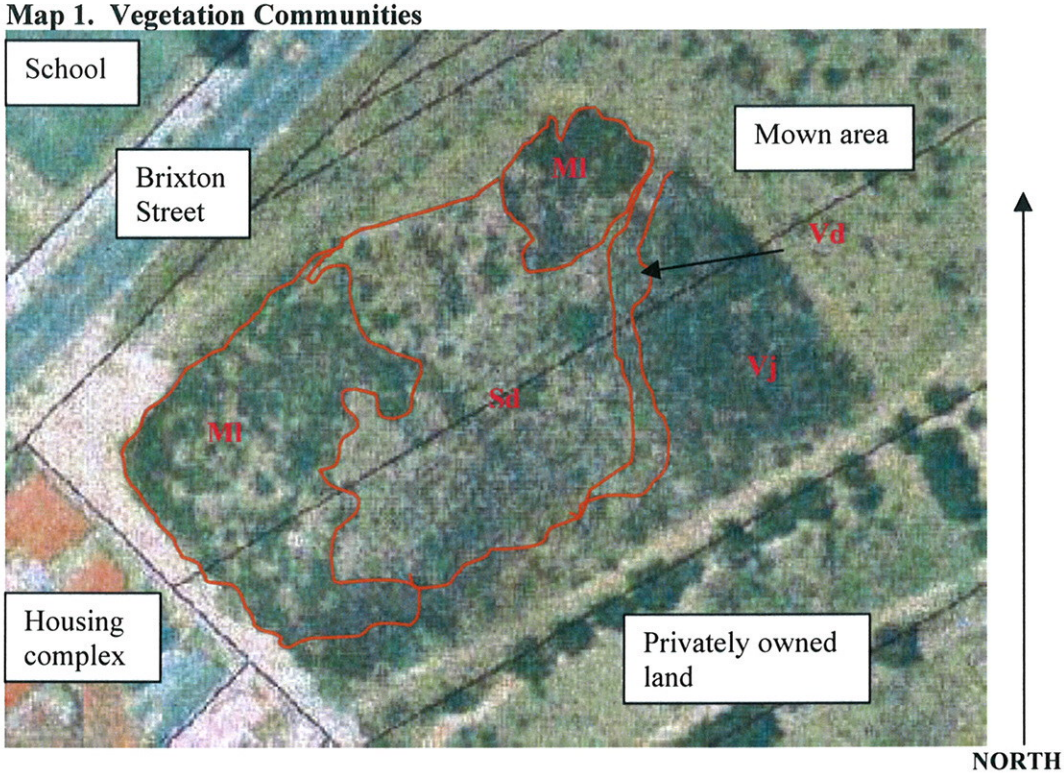
TAXON	COMMUNITY			
	Vj	Vd	Ml	Sd
Melaleuca lateritia	✓		✓	✓
Melaleuca rhaphiophylla	✓		✓	
Neurachne alopecuroidea	✓			
**Paspalum dilatatum*			✓	✓
**Parentucellia viscosa*		✓		
**Pennisetum clandestinum*			✓	
Pimelea imbricata var. *major*	✓	✓		
Podolepis gracilis	✓	✓		✓
**Polypogon monspeliensis*	✓			
Prasophyllum pauciflorum	✓			
**Romulea rosea*	✓	✓		
Schoenolaena juncea			✓	✓
Schoenus pennisetis		✓		
Siloxerus humifusus				✓
**Sonchus oleraceus*	✓			
Thysanothus patersonii	✓			
Tribonanthes australis	✓		✓	
Tricoryne elatior				✓
**Trifolium angustifolium*	✓			
**Trobolium uniolae*	✓			
Verticordia densiflora	✓			
Villarsia capitata				✓
Viminaria juncea	✓	✓		✓
**Vulpia myuros*				✓
**Watsonia borbonica*	✓		✓	
**Watsonia meriana* var. *bulbillifera*	✓			

APPENDIX C

Map 1: Vegetation Communities at the Site

Map 2: Vegetation Condition at the Site

Map 1. Vegetation Communities



EXPLANATION

Vj: Tall Shrubland of *Viminaria juncea* over *Verticordia densiflora* and *Hypocalymma angustifolium.*

Vd: Scrubland of *Verticordia densiflora* and *Hypocalymma angustifolium* over sedges. This community was between the Sedgeland and the Tall Shrubland of *Viminaria juncea.*

Sd: Sedgeland of *Meeboldina* species and *Eleocharis keigheryi*

Ml: Scrubland of *Melaleuca lateritia* over sedges with *Eleocharis keigheryi* a dominant sedge

Map 2. Vegetation Condition

EXPLANATION

Rating	Description
1	Pristine
2	Excellent
3	Very Good
4	Good
5	Degraded
6	Completely degraded

APPENDIX D

Photographic Record of Vegetation Communities

Two vegetation communities are illustrated in this photograph. Tall Shrubland of *Viminaria juncea* over Scrubland of *Verticordia densiflora* and *Hypocalymma angustifolium* in the background and Scrubland of *Verticordia densiflora* and *Hypocalymma angustifolium* over sedges in the foreground.

Sedgeland of *Meeboldina* species and *Eleocharis keigheryi* in the foreground with Scrubland of *Melaleuca lateritia* behind on the left hand side and Tall Shrubland of *Viminaria juncea* behind on the right hand side. This illustrates the relationship between the vegetation communities.

Scrubland of *Melaleuca lateritia* over sedges with *Eleocharis keigheryi,* a dominant sedge.

VEGETATION CONDITION

Vegetation Condition 4-5. *Watsonia* species dominant under *Viminaria juncea.*

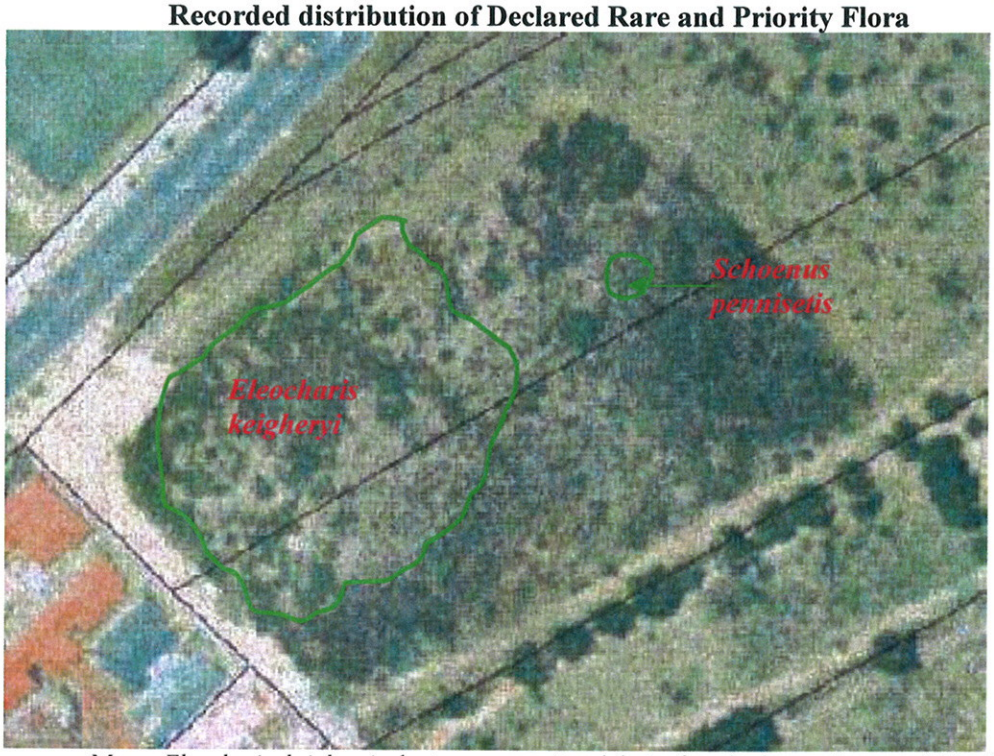
Vegetation Condition 5-6. Adjacent to housing complex. Vegetation condition 6 beside wall and 5 where there are weeds and native taxa growing together.

APPENDIX E

Rare and Priority Flora

Recorded distribution of Rare and Priority Flora

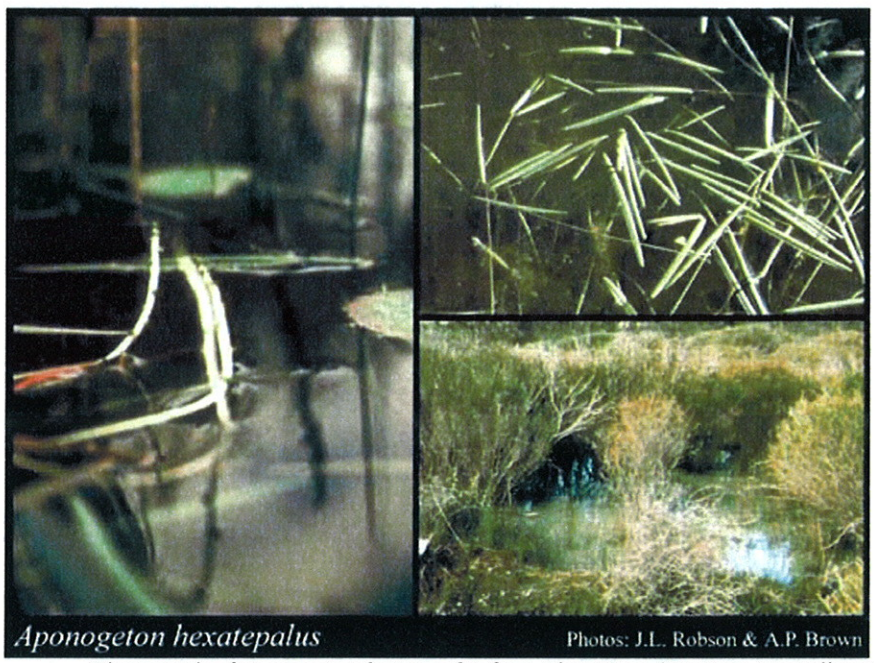
Photographs



Many *Eleocharis keigheryi* plants were scattered but often in large clumps within the area indicated

A large area of *Eleocharis keigheryi* in amongst shrubs of *Melaleuca lateritia*

Photograph *of Eleocharis keigheryi* from Flora Base (Western Australian Herbarium, 2001a), showing growing and flowering plants



Photograph of *Aponogeton hexatepalus* from Flora Base (Western Australian Herbarium, 2001a)

APPENDIX F

Weed Removal

Information on weed removal in wetlands must be obtained from the Waters and Rivers Commission. The following information is only applicable to upland sites. It is recommended that tests be undertaken before any herbicide treatment is undertaken in the wetland to ensure none of the plants are affected.

FUSILADE – Post Emergence Grass Selective Herbicide

Active Constituent:	212 g/L Fluazifop –P present as the butyl ester
Solvent:	685 g/L Hydrocarbon Solvent
Target Species:	Wild Oats, Barley Grass, Brome Grass, Ryegrass, Other Grasses
Manufacturer:	Crop Care
Available Size:	1, 5, 20 Litre Containers
Cost:	$1180/20L plus adjuvants
Main Purpose:	Used in agriculture as a grass-selective post-emergent herbicide

Fusilade should be used for areas that have large infestations of grass weeds. Fusilade can be applied randomly to native vegetation with the surety that plants other than grasses will not be killed. This makes it extremely valuable where large grass infestations occur amongst bushland. There is a risk that native grasses will also be affected during the grass weed spraying.

However, where the grass weeds are only in scattered populations, and where other weeds have to be controlled in the same area, knockdown Glyphosate should be used. This procedure would be more cost-effective. Note: Glyphosate Knockdown herbicide and Fusilade should not be applied within 10 days of each other.

Notes on Using Fusilade

- Fusilade will not effectively control weeds that are not actively growing or growing under stress (ie drought, waterlogging, frost, and high temperatures). Translocation through the weeds is inhibited in these situations thus reducing effectiveness.
- Annual grasses are best treated as early as possible, effectiveness of Fusilade is reduced when grasses are at the flowering stage. The more advanced the weeds the greater the dose of application.
- Fusilade is rapidly absorbed by leaves and green stems (ie rainfast within one hour) and rapidly translocated throughout the plant. It accumulates at growing

points, both above ground and in the roots, rhizomes and stolons of grass weeds. Weed growth stops within 48 hours. Growing points turn brown and rot, shoot tips can be easily pulled out after 2-3 weeks. Young leaves turn yellow or redden soon after, but more mature leaves may remain green for an extended period. Weed control is usually complete 3-5 weeks after spraying.

The Fusilade application needs to be applied during opportune weather in winter and early spring. Spraying should be under way by September in order to 'beat' the flowering season.

Bushland/Open Space Spot Spraying Using Knapsack

Rate per 10L water:	50mL Fusilade light infestations; 100mL for heavy infestations
Adjuvants:	BS1000 Non-ionic Surfactant (200mL per 100L spray solution)
Optional:	Redye Marking Dye

GARLON 600 – Control of woody weeds

Active Constituent:	600 g/L Triclopyr – present as the butoxyethyl ester
Target Species:	Woody weeds, timber trees, large shrubs, giant reed infestations
Manufacturer:	Dow Agrosciences
Available Size:	1, 5, 20, 200 Litre Containers
Cost:	$1300/20L plus adjuvants

Watsonia spp. is not a woody weed but is an extremely vigorous coloniser. These plants are best slashed when they have commenced flowering and sprayed with Garlon 600 using the same mix. A dosage of Glyphosate may also assist the decay of these weeds.

Note: the Garlon 600 must be applied as soon as the stump is created.

Notes on Using Garlon 600 and the Cut-Stump Method

- Nitrile Gloves need to be used when handling the Garlon 600/Diesel Mixture.
- The Garlon 600/Diesel Mixture can only be made on an 'as use' basis and cannot be stored.
- All knapsack sprayers with the mix must have seals capable of withstanding diesel properties.

- The mix needs to be sprayed or painted as a liberal dose over the freshly cut stump, including the cut surface and the sides of the stem.
- Garlon 600 cannot be applied if the stem is wet.
- Garlon 600 is rainfast within 1 hour (it is advisable to apply on fine days, however)

Knapsack/ or Paint Brush Application

Rate:	1L Garlon in 60L Diesel (effective concentration for all target species)
Adjuvants:	None
Optional:	Redye Marking Dye

GLYPHOSATE – Non Selective Knockdown Herbicide

Active Constituent:	360 g/L Glyphosate present as the isopropylamine salt
Target Species:	Non-selective systemic application on all plants
Manufacturer:	Various (Monsanto-Roundup), Davison Industries, NuFarm.
Available Size:	1, 5, 20 Litre Containers
Cost:	~ $130/20L plus adjuvants
Main Purpose:	Knockdown Herbicide

Glyphosate does not provide residual weed control. It is absorbed by green foliage and plant stems, moving into the root system. It is inactivated when sprayed onto the soil. Visible effects on annual weeds may take 3-7 days. Visible effects on perennial shrubs may not be obvious for 2-3 weeks, sometimes longer. Cool or cloudy weather prolongs the onset of visible plant decay. Visible signs of plant decay involve gradual yellowing and wilting of the plant followed by complete browning of the foliage and deterioration of the roots. Unemerged plant parts from rhizomes, rootstocks and underground lignotubers are not affected by the glyphosate application. It is therefore important to spray the Glyphosate at late growth stages before plants reach maturity.

Glyphosate should be used for all spot-spraying of grasses and other non-woody weeds where care does not have to be given to surrounding native vegetation. It is the most economical herbicide. Spray drift will kill native vegetation so it can

be used in open areas to be cleared or in scattered weed populations that are not amongst healthy native plants.

Notes on Using Glyphosate

- Reduced weed control occurs if plants are dormant, diseased, waterlogged (except tolerant species), insect damaged or frost-affected. Dust and silt pollutants around vegetation will also restrict herbicide performance.
- Rainfall occurring up to 6 hours after application may reduce effectiveness of the application. Heavy rainfall within two hours of application may wash the chemical off the foliage and a repeat treatment may be required. Delay treatment if plants are wet from recent rainfall.

  As with the other herbicide applications, reduced effectiveness is likely to occur in summer.

Spot Spraying Using Knapsack

Rate: 15mL per litre of water (Roundup® Brand)

Adjuvants: BS1000 Non-ionic Surfactant (100mL per 100L spray solution)

Optional: Redye Marking Dye