QUEENS PARK BUSHLAND, QUEENS PARK

Boundary Definition: protected area/Western Australian Planning Commission-owned land boundary

SECTION 1: LOCATION INFORMATION

Bush Forever Site no. 283 **Area (ha):** bushland 14.4 (Site also includes open water.)
Map no. 48, 49 **Map sheet series ref. no.** 2033–I NE, 2034–II SE
Other Names: Part Submission Area 140, 31; Location 69 (Keighery, BJ, and Trudgen 1992)
Local Authorities (Suburb): City of Canning (Queens Park, East Cannington)

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS
Bassendean Dunes
Bassendean Sands (Qpb: S8)
Bassendean Dunes/Pinjarra Plain
Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)
VEGETATION AND FLORA
Vegetation Complexes
Combinations of Bassendean Dunes/Pinjarra Plain
Southern River Complex
Floristic Community Types: *not sampled, types inferred
Supergroup 1: Foothills/Pinjarra Plain
*3a *Eucalyptus calophylla — Kingia australis* woodlands on heavy soils
Supergroup 2: Seasonal Wetlands
*4 *Melaleuca preissiana* damplands
Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau
*23a Central *Banksia attenuata — B. menziesii* woodlands AND/OR
*20a *Banksia attenuata* woodlands over species-rich dense shrublands
WETLANDS
Wetland Types: dampland, artificial channel
Natural Wetland Groups
Bassendean—Pinjarra transition OR Bassendean with fluvial features
Mungala (B/P.2)
Wetland Management Objectives: Resource Enhancement
Swan Coastal Plain Lakes EPP: 1ha
THREATENED ECOLOGICAL COMMUNITIES
Not assessed, Critically Endangered (floristic community type 3a), possibly Endangered (floristic community type 20a)

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: open water, vegetated wetland, vegetated uplands
Vegetation and Flora: limited survey (DEP 1996, Hames Sharley Australia 1993); detailed survey (Tauss 1997)
Structural Units: mapping (Hames Sharley Australia 1993)
Uplands: *Eucalyptus calophylla* Woodland to Forest; *Banksia attenuata* and *B. menziesii* Low Woodland to Low Forest; *Jacksonia furcellata* Shrubland
Wetlands: *Eucalyptus calophylla* Woodland and *Melaleuca preissiana* Low Open Woodland
Scattered Native Plants: within protected area *Eucalyptus rudis* Woodland; *Melaleuca rhaphiophylla* Low Forest; some scattered and clumped trees in Completely Degraded area, habitat provided by drain into artificial lake
Vegetation Condition: >25% Very Good to Excellent, >70% Good to Degraded, with areas of severe localised disturbance
Total Flora: 167 native taxa (Tauss 1997) (estimated >85% expected flora)
Significant Flora: *Macarthuria keigheryi* (R) (Tauss 1997)
Fauna: not known
Linkage: adjacent bushland to the north across Welshpool Road (Site 424)
Other Special Attributes: contains plant communities representative of the eastern side of the Swan Coastal Plain

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

Criteria: Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

Recommendation: Site with Some Existing Protection; the existing care, control and management intent of the reserve is endorsed. The purpose of the reserve should be amended to include conservation and appropriate mechanisms applied in consultation with the management body (see Table 3, Volume 1).

QUEENS PARK BUSHLAND, QUEENS PARK

Boundary Definition: protected area/Western Australian Planning Commission owned land boundary

SECTION 1: CADASTRAL INFORMATION

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

Bushplan Site no. 283 **Map no.** 58, 63 **Map sheet series ref. no.** 2033–I NE, 2034–II SE

Other Names
Part Submission Area 140, 31; Location 69 (Keighery, BJ, and Trudgen 1992)

Local Authorities (Suburb)
City of Canning (Queens Park, East Cannington)

Ownership Categories
State Government, Local Government, Private (commercial organisation)

Area (ha): total 40.7 (includes open water); bushland 14.4

Zoning
MRS: Urban, Parks and Recreation
TPS: Landscape, Local Park and Recreation Area, Residential

Lot/Location/Reserve numbers (Purpose), Street name
1894 Gibbs St; 0, 101, 581 Welshpool Rd; 22 Wharf St Crown Reserve

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS

Bassendean Dunes
Bassendean Sands (Qpb: S8)

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

VEGETATION AND FLORA

Vegetation Complexes

Combinations of Bassendean Dunes/Pinjarra Plain
Southern River Complex

Floristic Community Types: *not sampled, types inferred

Supergroup 1: Foothills/Pinjarra Plain
*3a *Eucalyptus calophylla — Kingia australis* woodlands on heavy soils

Supergroup 2: Seasonal Wetlands
*4 *Melaleuca preissiana* damplands

Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau
*23a Central *Banksia attenuata — B. menziesii* woodlands AND/OR
*20a *Banksia attenuata* woodlands over species-rich dense shrublands

WETLANDS

Wetland Types: dampland, artificial channel

Natural Wetland Groups

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

Wetland Management Objectives: Resource Enhancement

Swan Coastal Plain Lakes EPP: 1ha

THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Critically Endangered (floristic community type 3a), possibly Endangered (floristic community type 20a)

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: open water, vegetated wetland, vegetated uplands

Vegetation and Flora: limited survey (DEP 1996, Hames Sharley Australia 1993), detailed survey (Tauss 1997)

Structural Units: mapping Hames Sharley Australia 1993
Uplands: *Eucalyptus calophylla* Woodland to Forest; *Banksia attenuata* and *B. menziesii* Low Woodland to Low Forest, *Jacksonia furcellata* Shrubland
Wetlands: *Eucalyptus calophylla* Woodland and *Melaleuca preissiana* Low Open Woodland

Scattered Native Plants: within protected area *Eucalyptus rudis* Woodland; *Melaleuca rhaphiophylla* Low Forest; some scattered and clumped trees in Completely Degraded area, habitat provided by drain into artificial lake

Vegetation Condition: >25% Very Good to Excellent, >70% Good to Degraded, with areas of severe localised disturbance

Total Flora: 167 native taxa (Tauss 1997) (estimated >85% expected flora)

Significant Flora: *Macarthuria keigheryi* (R) (Tauss 1997)

Fauna: no known information

Linkage: adjacent bushland to the north across Welshpool Road (BS424); part of proposed Greenways 88, 89 (Tingay, Alan & Associates 1997a)

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

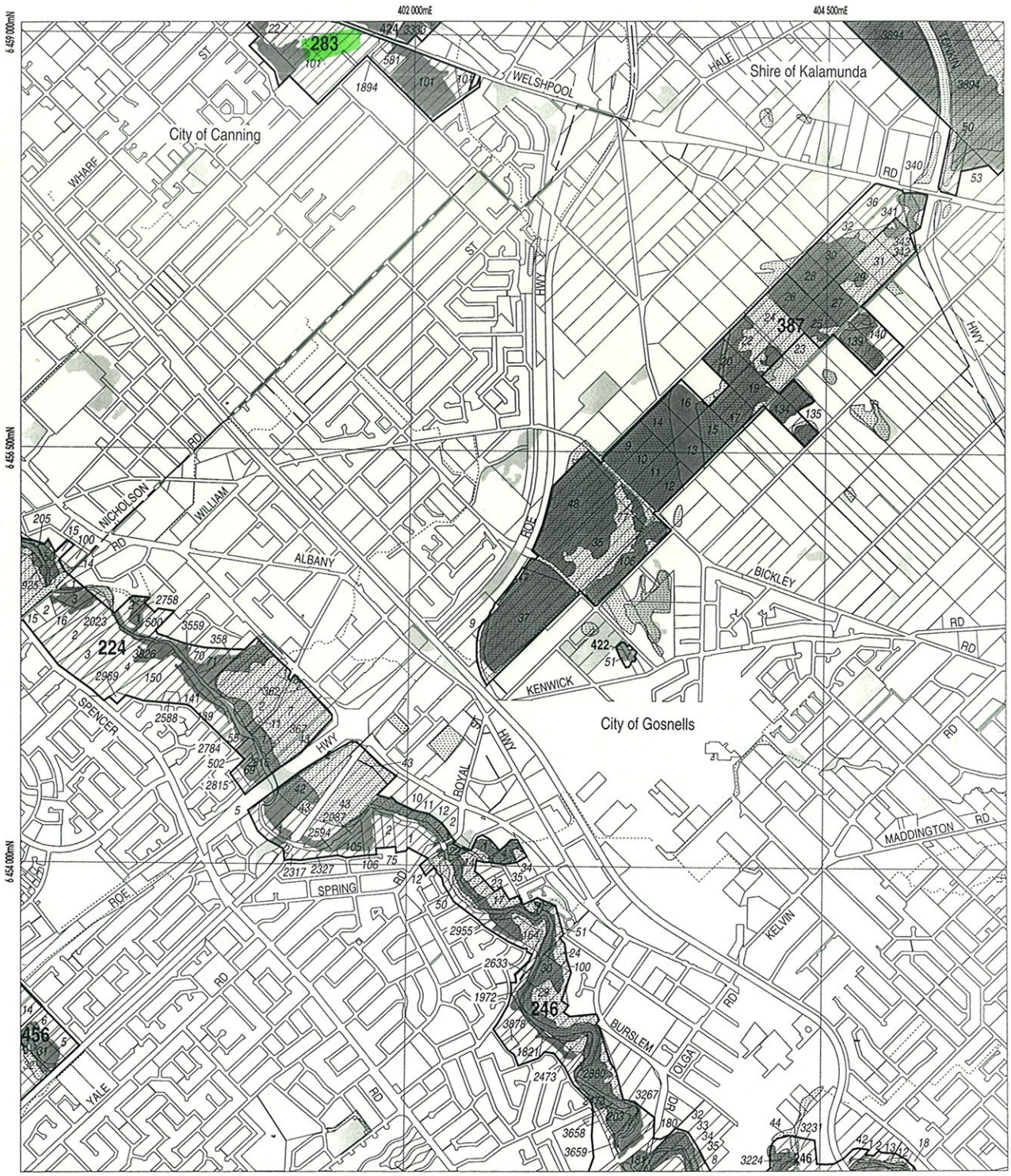
Criteria: Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of conservation value, but which may be applied when evaluating areas having similar values

Opportunities and/or Constraints

Opportunities: Bushplan Site/part Bushplan Site subject to Swan and Canning Rivers EPP, Swan Coastal Plain Lakes EPP; location of Declared Rare Flora; under MRS Parks and Recreation Reservation, TPS Landscape Zoning and Local Park and Recreation Area Zoning, Crown Reserve

Constraints: private land; 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	
2033 III		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

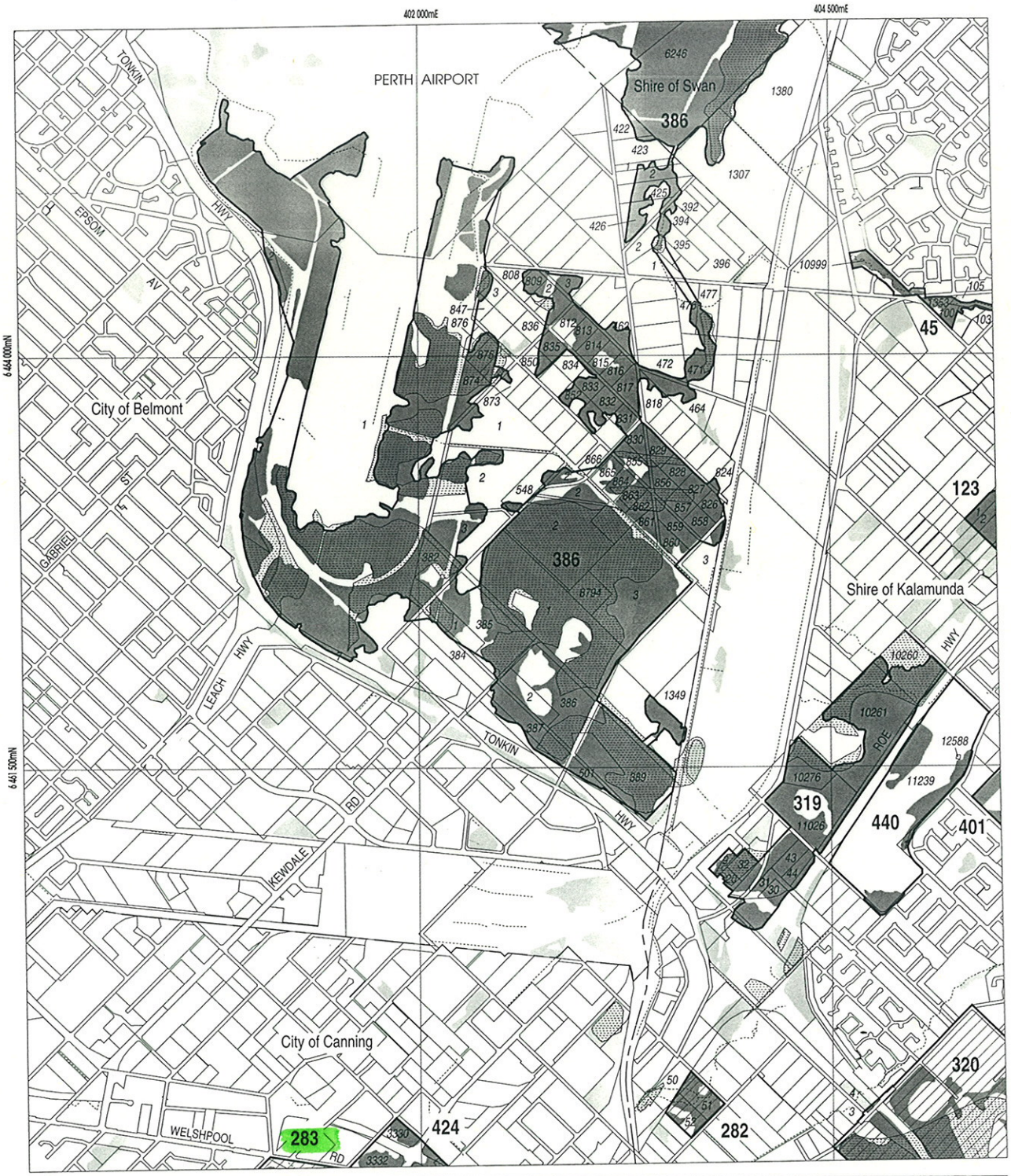
ntw-map//environ/bushplan//bushvol2_63.dgn

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



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

2034 - II SE

IV | I
2034
III | NW | NE / SW | SE (58)

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

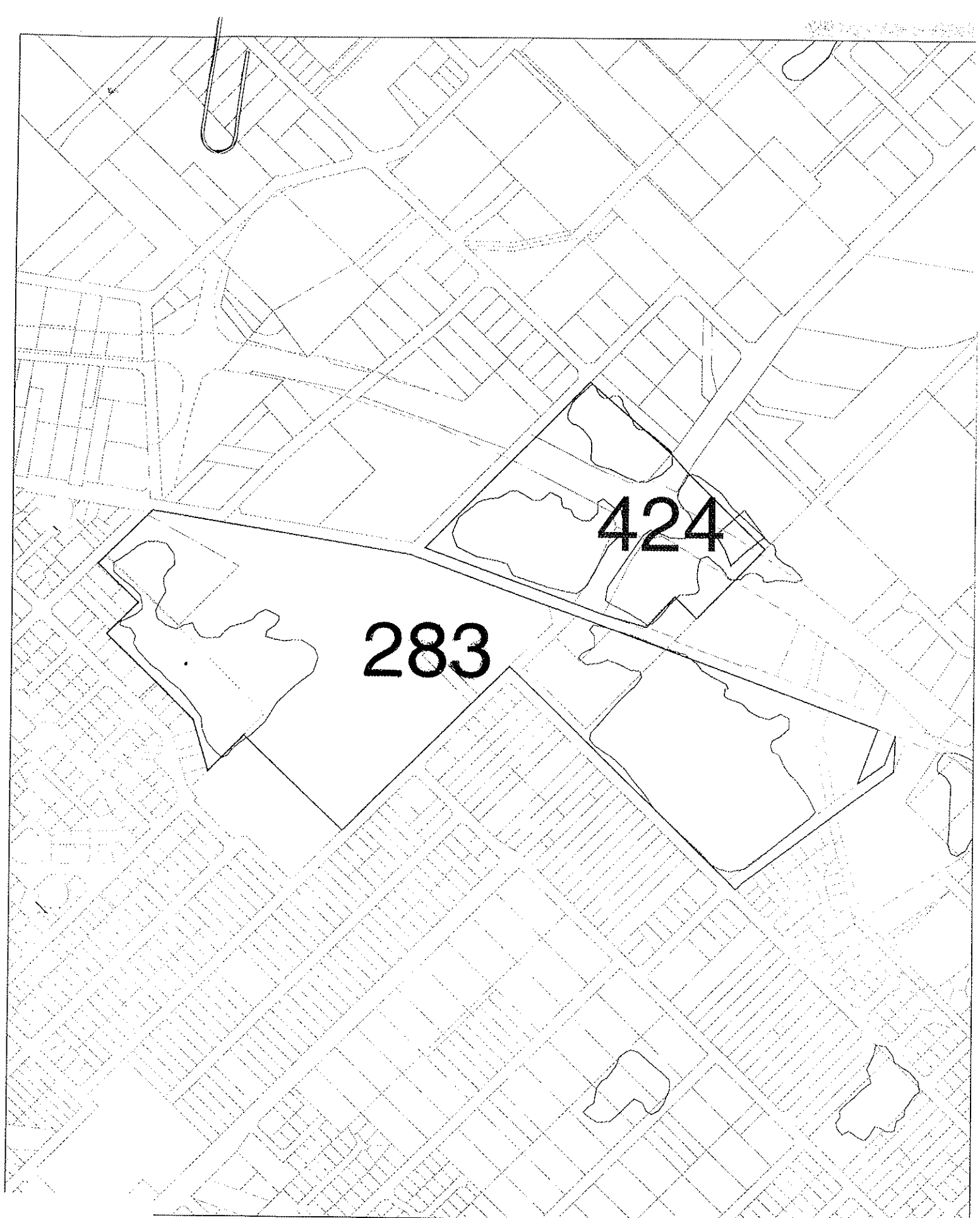
nwt-map11//environ/bushplan//bushv2_58.dgn

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

Wetlands Data supplied by Water and Rivers Commission

Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

Bushplan Site Map



ADGOTT

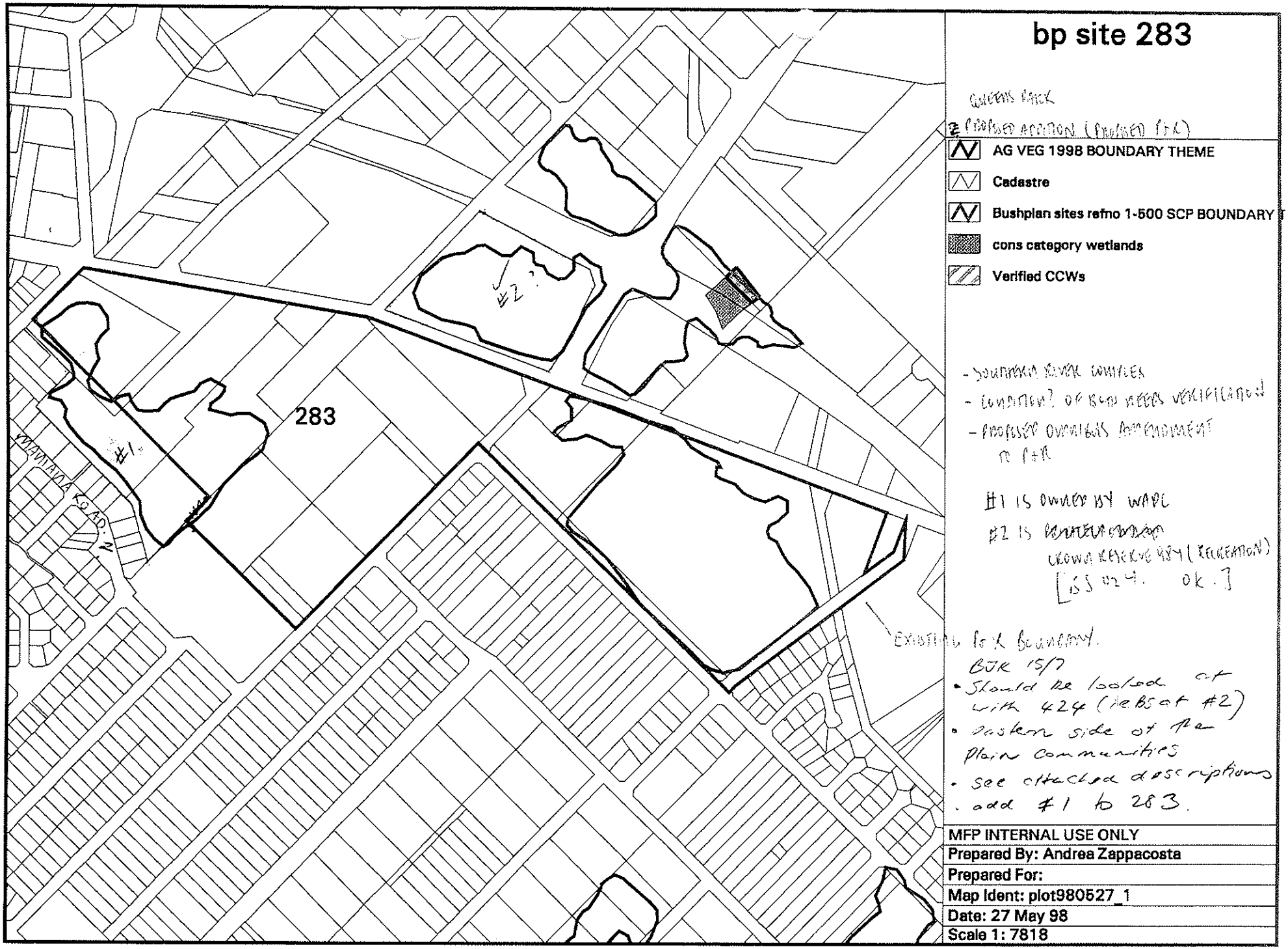
BUSHPLAN SITES CORRECTED

WESTERN AUSTRALIAN PLANNING COMMISSION

CUSTOMER FOCUS WESTERN AUSTRALIA

B 24/10/18

N



bp site 283

QUEENS PARK

* PROPOSED ADDITION (PROPOSED BY CK)

AG VEG 1998 BOUNDARY THEME

Cadastre

Bushplan sites refno 1-500 SCP BOUNDARY

cons category wetlands

Verified CCWs

- SOUTHERN RIVER WETLAND
- CONDITION OF BUSH NEEDS VERIFICATION!
- PROPOSED OWNERSHIP AMENDMENT TO P+R

#1 IS OWNED BY WAPC

#2 IS RESERVE 24824 UROWA BUSHLAND PARK (RECREATION) [ISSUE 4. OK.]

EXISTING P+R BOUNDARY.

BJK 15/7

- Should be looked at with 424 (re #2)
- eastern side of the plain communities
- see attached descriptions
- add #1 to 283.

MFP INTERNAL USE ONLY

Prepared By: Andrea Zappacosta

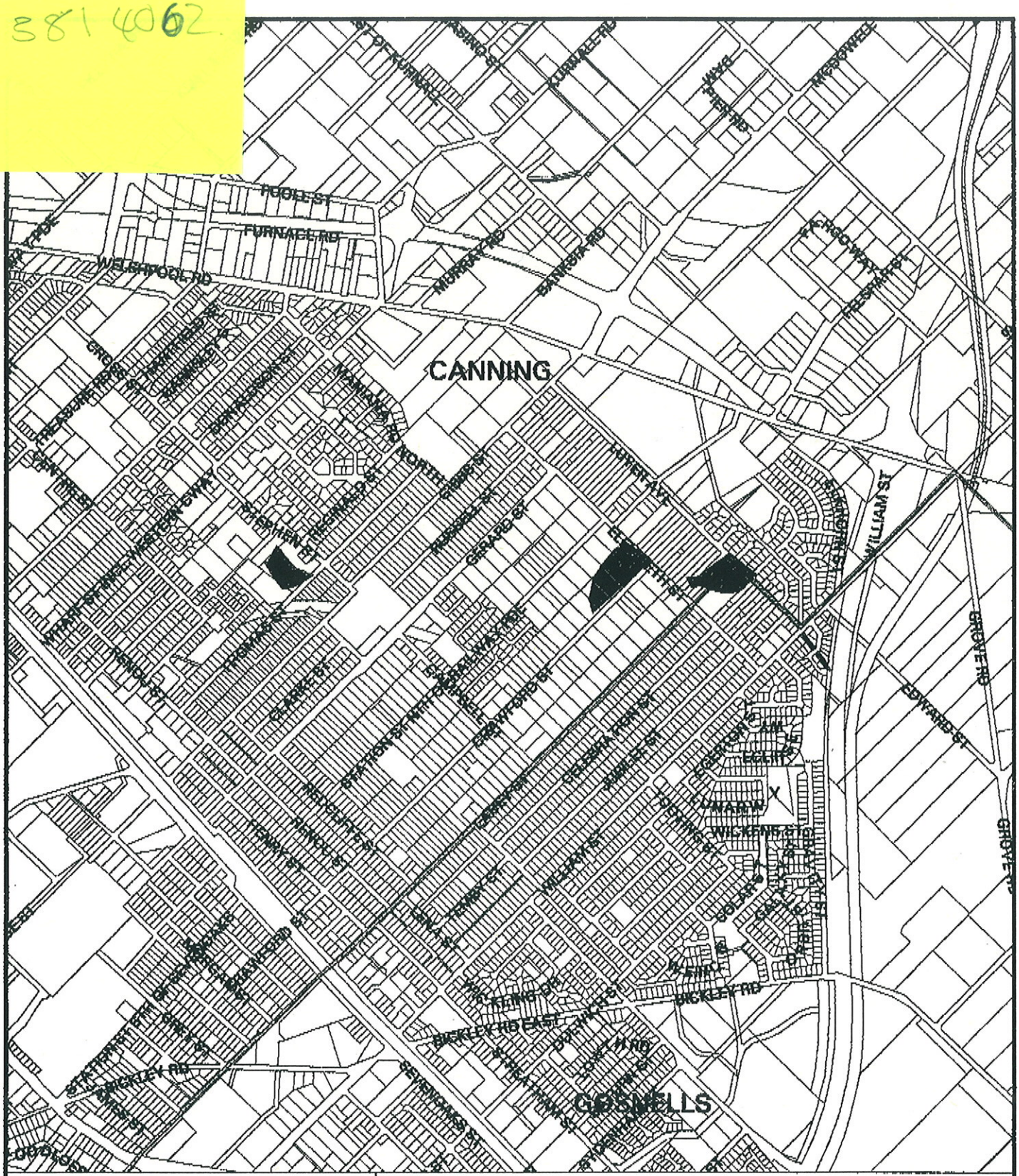
Prepared For:

Map Ident: plot980527_1

Date: 27 May 98

Scale 1: 7818

3814062



CANNINGTON COMPLEX

Cannington Complex

Cadastre

Local Government Areas - Metro

URGENT :

For : Bronwen Keighery

MFP INTERNAL USE ONLY
Prepared By: melanie price
Prepared For:
Map Ident: plot960925_1
Date: 25 Sep 96
Scale 1:20000

Sorry for delay. Melanie

CANNING

Cadastre

MFP INTERNAL USE ONLY
Prepared By: melanie price
Prepared For:
Map Ident: plot960925_1
Date: 25 Sep 96
Scale 1:20000

1000 38 38

WELSHPOOL

RD. WIDENING

HIGH PRESSURE GAS PIPELINE

FIRE STATION

Recreation

Hallsite

Controlled Access

ROAD

STREET

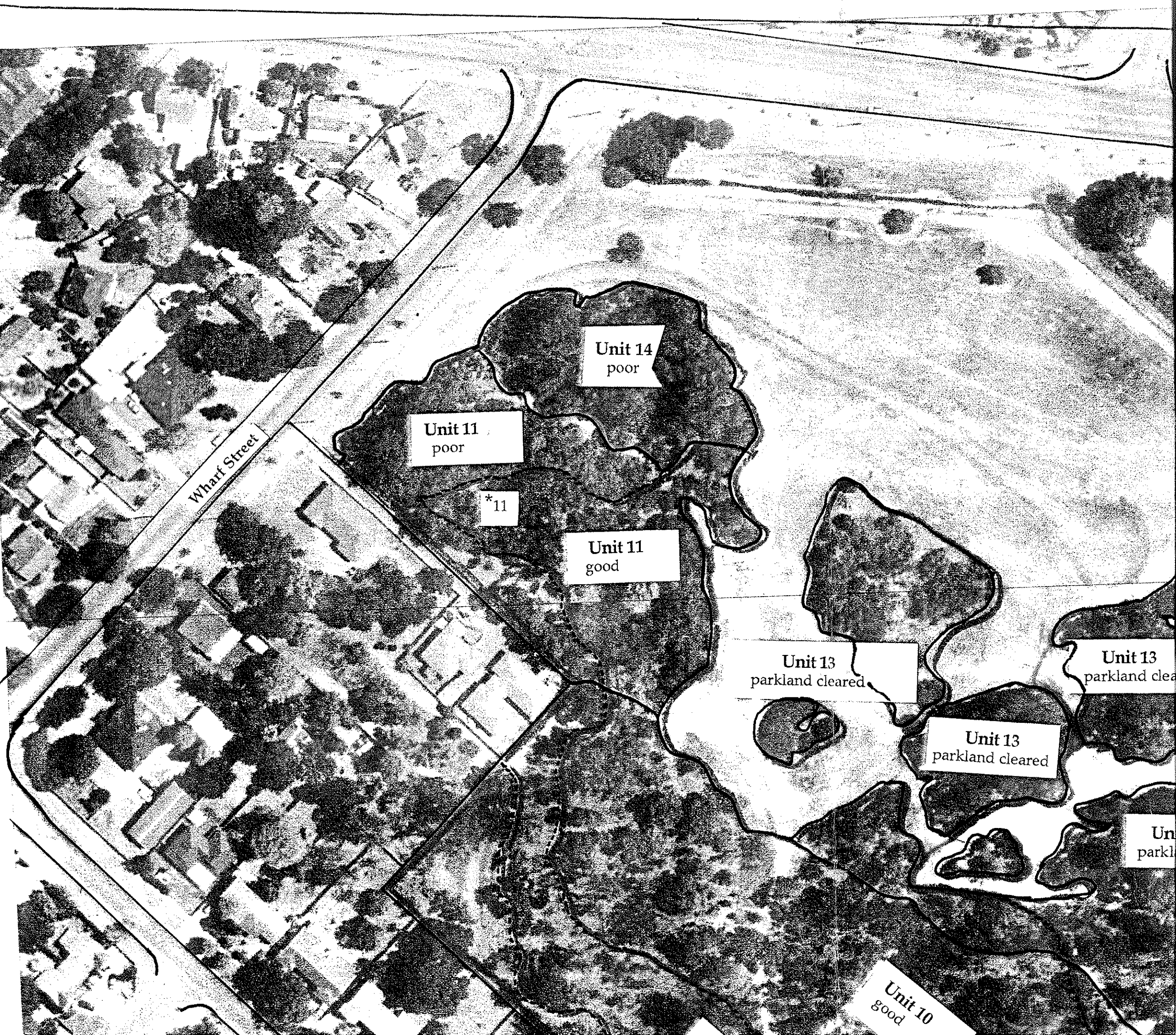
LUYER

HALF LOTS

PT 3

PT 8

245


Unit 14
poor
Unit 11
poor
*11
Unit 11
good
Unit 13
parkland cleared
Unit 13
parkland clea
Unit 13
parkland cleared
Unit 10
good
Wharf Stree

Unit 10
very poor
Maniana Road North
*9
Unit 9
poor to good
Unit 7
very poor
*7
Unit 7
poor
Unit 13
parkland clea
N

Welshpool Road

Unit 13
parkland cle

ed

t 13
nd cleared

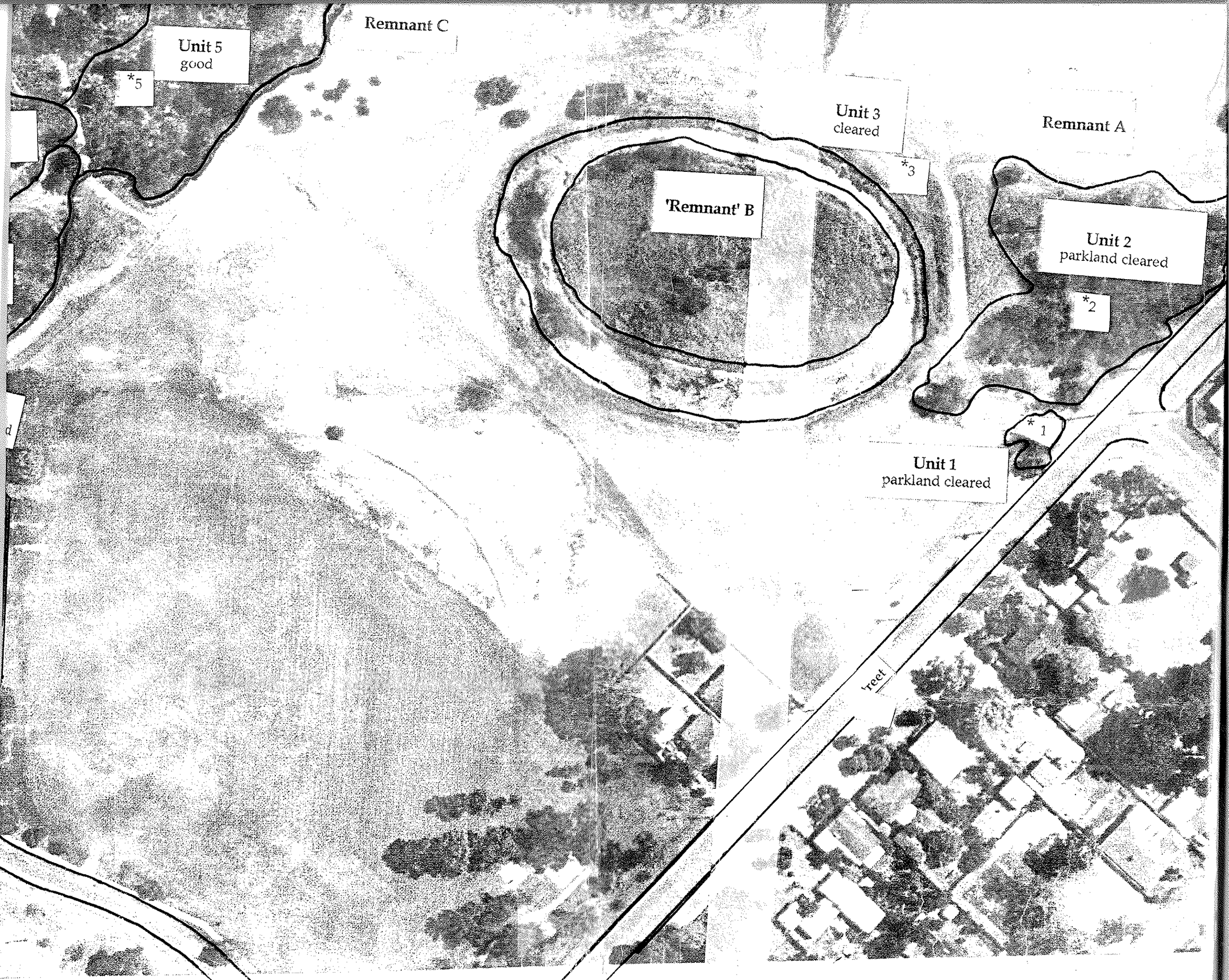
*4

Unit 4
good

Unit 13
parkland cleared

Unit 6

*6


Remnant C
Unit 5
good
*5
Unit 3
cleared
*3
Remnant A
'Remnant' B
Unit 2
parkland cleared
*2
*1
Unit 1
parkland cleared
feet

Unit 13
parkland cleared
red
Unit 12
poor
Unit 12
good
Unit 12
poor
Unit 13
parkland cleared
Unit 13
parkland cleared
Unit 13
parkland cleared
Unit 12
good
*12

(13)

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 Road: ...Station Street/Luyer Street/Gibbs Street/Welshpool Road.

b) Nearest Corner: .....Station Street/Luyer Street.....

c) Lot Number: .....Pt 3.... Street Number: ..N/A.....

d) Town/Suburb/Location: ...Perth/Queens Park.....

e) Local Council: .....City of Canning.....

f) Site Name (if any): .....Queens Park Ecological Recreation Area - Ecological Reserve

g) Approximate size of the area (ha): .....11.3555Ha.....

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

....See attached Map.....

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

j) Map no.: .....311.....

k) Grid Ref: ....2.E.....

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?

The area was identified in the Queens Park Regional Recreational Area, Concept Plan, prepared by Hames Sharley, July 1993, to be retained for its Conservation value.

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) ...D.P.U.D...owns..the..land,...which..is..leased..to..the..City..of..Canning.....

.....

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) ...Parks..and..Recreation..(Town..Planning.. Scheme No. 40).

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) See Note 2.....

.....

6. **What is/are the soil type/s and colours ?** ..Sand,..White..and..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

If yes, what are they? ...No special features.....

.....

.....

8. **Is the area a wetland or does it include a wetland?** Yes,..seasonally..wet..areas....

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? ....90%.....

11. If the area includes regions cleared of native bushland please indicate reasons for the inclusion. ...No clearing has been performed.....

.....

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

If yes, please give details of the work .....See Note 3.....

.....

.....

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

d) good

14. Please indicate the disturbances affecting the area and where appropriate the percentage of the area disturbed. See Note 4

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) ...Not Known.....

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

.....

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

Can you list those you know of? (birds, mammals, reptiles, amphibians etc)
See Note 5
.....

17. Is the area used by any native animals of special interest? (eg. endangered species, large/important populations)..Not Known.....

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?
See Note 6

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

.....See Note 6.....

.....

Are they already conservation reserves? .....See Note 6.....

What is their approximate size? .....See Note 6.....

19. Does the submitted area link other bushland areas? ....See Note 6.....

.....

.....

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

Table 2: Vegetation Condition Scale

Modified from Trudgen 1991 by B. J. Keighery for the Swan Coastal Plain Survey 1993.

1 = 'Pristine'

Pristine or nearly so, no obvious signs disturbance.

2 = Excellent

Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species

For example damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.

3 = Very Good

Vegetation structure altered, obvious signs of disturbance.

For example disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.

4 = Good

Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate to it.

For example disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.

5 = Degraded

Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.

For example disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.

6 = Completely Degraded

The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

These areas are often described as 'parkland cleared' with the flora composing weed or crop species with isolated native trees or shrubs.

Source: B Keighery. Bushland Plant Survey, September 1994

NOTES TO:

SYSTEM 6 BUSHLAND SUBMISSION FORM

Note: 2 The area is a relatively large piece of remnant Banksia woodland, representative of the Flora that once occurred on the Bassendean Dune System within the South Eastern Metropolitan area. There are no significant reserves to the same size within a radius of 10km. In addition the reserve could be seen to form a link for birds between the Canning River Regional Park and remnant bushland north of Tonkin Highway, surrounding the Perth Airport.

Note: 3 Under the concept plan compiled by Hames and Sharley, July 1993 a limited flora survey was performed. A total of 141 native species and 18 exotic species were identified within the area.

Note 4: The remnant bushland areas can be described to be in good condition with an intact canopy and a diverse understorey. The edges of internal tracks and surrounding roads are weedy. In addition, where the native bush borders onto cleared areas near Welshpool Road and adjacent to the Pigeon Club and Scout Hall, both situated on Gibbs Street, weed is encroaching.

Other disturbances notes are:-

- Frequent fire in past years is causing the encroachment of veldt grass from the Western boundary.
- The use of horses is evident, although they use pre-existing tracks.
- Some soil and rubbish dumping is evident along Station and Luyer Street boundaries.
- A maze of vehicle and footracks exists throughout the reserve.

Note 5: Clearly a number of birds inhabit the woodland. A comprehensive study of birds in the areas has not been done.

No mammals are evident, but this should not rule out their presence.

Evidence of reptiles is present.

Note 6: There are other, although smaller, pockets of remnant bushland close to the area under consideration in this application. These areas are to become part of the proposed Queens Park Regional Recreational area.

These areas of remnant bushland contain stands of Banksia Marri Woodland with some occurrence of Jarrah. All these sites are relatively level and sandy with several low lying areas which are seasonally inundated.

Adjacent areas of bushland are quite fragmented and more degraded than the portion of bushland under consideration, but could be considered to create a link with it. The total estimated size of the adjacent bush areas is approximately 5ha.

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

n) Proliferation of tracks, fire breaks and walk trails

o) Off-road vehicle use occasional but unofficial

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) 3 lists attached
Joan Payne, Hames Sharley , Richard Cowan.

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

Members of Wild Flower Society have visited the are and are keen to plan organised/supervised walks through various parts of the area.

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

Can you list those you know of? (birds, mammals, reptiles, amphibians etc)
Black shouldered Kite, Port Lincoln Parrot, Nan Keep Night Heron, Little Egret, Straw Neck Ibi
ick Faced Cuckoo Shrike, Black Cockatoo, Red Cap Parrot, Western Rosela Regent Parrc
Harrier(name unknown) Kookaburras, many variety hineyeaters, Doves. Various small reptiles.
Grey Fantail, Grebes, Pied Cormorant, Welcome Swallow (Sighting area)

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

If yes, please name them and indicate source of information
Southern Brown Bandicoot (source Karl Karu-) contact 0945333I9

An echidna has been sighted crossing the Welshpool Road at night

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? Black Swamp 2Kms/2 large compensating basins William Str/Welshpool Rd intersection (approx 10 hectares) 0.6 Kms. Canning River Regional Park 6 Kms . Many small compensating basins close by which help to maintain various species ducks.

Are they already conservation reserves? Ecological are. Canning City has declared area (I) an (II hectares) Application is being prepared for Perth Airport to Canning River corridor Habitat System

What is their approximate size? .....

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

This area would form an integral part of a larger Habitat area for a Viable Corridor System

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

Attachments one map and threelists of plant species .

9. What percentage of the wetland is open water in summer? miminal but absolutely essential for bird and reptile life.

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

10. What percentage of the area is indigenous vegetation? ~~(90% as areas marked.~~ I/ 3/4 plus small pockets

11. If the area includes regions cleared of native bushland please indicate reasons for the inclusion. ~~Some parts cleared for roads, soccer ground, dwellings see~~ map. However the entire area is an integral part of the corridor. Even within cleared areas indigenous trees remain.

12. Has any previous flora or fauna survey work been done on the area?
Yes but no survey can be regarded as fully comprehensive

If yes, please give details of the work ~~1) Richard Cowan Botanist~~ 2) Joan Payne (Conservation Council) 3) Hames Sharley

~~Understorey thriving in areas~~ I/ /3/4/ ~~in spite weed problems~~

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

a) pristine
b) excellent
c) very good areas (1) a na (3)
d) good to very good (4) (2)
e) degraded some areas degraded
f) completely degraded some areas cleared
g) don't know

Obtain from Canning Report

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

a) Partial clearing partially in areas not numbered
b) fragmentation Yes
c) Selective removal of species: timber cutting, wildflower picking, mowing dieback and other plant diseases
d) Fire regime, including intensity, season and frequency accidental
e) 'Enrichment plantings' that is plantings of species not found in that community encroachment
f) Weed invasion encroachment XX minimal
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 oval watered
j) Salinity No
k) Fertiliser drift and along waterways nutrient influx None known
l) Mining, including that for road works As seen on map

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) We have been informed that it is owned by DPUD and is presently on lease to Canning City Council

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) .....Recreation.....

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

5. Why do you consider this area important? (Refer to Guiding Issues paper)
Much local vegetation has been cleared for the establishment of freeways This area forms part of the corridor between Perth Airpot and th Canning River. Vital to providing habitat and feeding areas for many water and land birds

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

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? ...There are small swamp areas and also Black Creek.
.....Though Blackcreek has been adapted for use by WAWA.....
The Banksia and Marri trees are very old probably having been growing pre settlement days

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

If yes, what kind of a wetlands is it?

a) lake/ compensating basin see map attached

b) river

c) stream 1) Blackcreek modified by WAWA as drain , permanent running water
2) Drains through Rec area permanent water(feedfor cranes,ibis,egrets Nankeen Night Heron etc:

d) swamp Two swamps winter wet /Summer damp.

e) estuary

f) seasonally wet Yes - see above

g) other

(79)

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: Maniana Rd North-Gibbs St-Luyer St-Station St-WelshpoolRd
Wharf Str(on South Side Of Welshpool Rd)
North of Welshpool Road includes Banksia Rd and Mcdowell Str

b) Nearest Corner: .....

c) Lot Number: Pt 3 ..... Street Number: .....

d) Town/Suburb/Location: Queens Park/Maniana / Welshpool/ East Cannington

e) Local Council: Canning City Council

f) Site Name (if any): Queens Park Recreation Area

g) Approximate size of the area (ha): 40 hectares

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

UBD map 3/H1

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

j) Map no.: .....

k) Grid Ref: MAP ATTACHED
2E et al

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

Easily visible from Welshpool Road between Station St and Wharf Street as it is a particularly well established area of natural growth.

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

Active sporting facilities

.....

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

QUEENS PARK BUSHLAND

Boundary Definition: Parks and Recreation boundary

SECTION 1: CADASTRAL INFORMATION

Bushplan Site no. 283 **Map no.**

Map sheet series ref. no. 2033–I NE, 2034–II SE

Other Names
Part Submission Area 140, 31; Location 69 (BJ Keighery and Trudgen 1992)

Area (ha): Total: 37.520 (includes open water), Bushland: 13.200

Local Authorities (Suburb)
City of Canning (Queens Park, East Cannington)

Zoning
MRS: Parks and Recreation
TPS: Rural, Service Station

Ownership Categories (Purpose)	**Lot/Location numbers, Street name**
State Government	0, 8, 9, 10, 17, 1022 Welshpool Rd, 56, 57, 62, 78 Gibbs St, 60 Luyer Av, 61 Elizabeth St
Local Government	0, 22 Wharf St, 320 Welshpool Rd
Commercial Organisation	1894 Gibbs St, 4 Welshpool Rd
Multiple Owners	581 Welshpool Rd, 7 Gibbs St
Private Person	0, 3 Welshpool Rd
Vacant Crown Land	Road Albany Hwy

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS

Bassendean Dunes
Bassendean Sands (Qpb: S8)

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

VEGETATION AND FLORA

Vegetation Complexes

Combinations of Bassendean Dunes/Pinjarra Plain/Spearwood Dunes
Southern River Complex

Floristic Community Types: *not sampled, types inferred

Supergroup 1: Foothills/Pinjarra Plain
*3a *Eucalyptus calophylla — Kingia australis* woodlands on heavy soils

Supergroup 2: Seasonal Wetlands
*4 *Melaleuca preissiana* damplands

Supergroup 3: Uplands, centred on Bassendean Dunes and the Dandaragan Plateau
*23a Central *Banksia attenuata — Banksia menziesii* woodlands OR
*20a *Banksia attenuata* woodlands over species rich dense shrublands

WETLANDS

Wetland Types: dampland, artificial channel

Natural Wetland Groups

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

Wetland Management Objectives: Resource Enhancement

Swan Coastal Plain Lakes EPP: 1 ha

THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Critically Endangered (floristic community type 3a), possibly Endangered (floristic community type 20a)

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: vegetated wetland, vegetated uplands

Vegetation and Flora: limited survey (DEP 1996, Hames and Sharley 1993), detailed survey (Tauss 1997)

Structural Units: mapping Hames and Sharley 1993
Uplands: *Eucalyptus calophylla* Woodland to Forest; *Banksia attenuata* and *Banksia menziesii* Low Woodland to Low Forest, *Jacksonia furcellata* Shrubland
Wetlands: *Eucalyptus calophylla* and *Melaleuca preissiana* Low Open Woodland

Scattered Native Plants: *Eucalyptus rudis* Woodland, *Melaleuca rhaphiopylla* Low Forest, some scattered and clumped trees in Completely Degraded area, habitat provided by drain into artificial lake (total area >40% bushland, <60% Completely Degraded)

Vegetation Condition: >25% Very Good to Excellent with >70% Good to Degraded with areas of severe localised disturbance

For Public Comment

140

BS283

PB102

THE City of CANNING

ABOVE ALL SERVICE

Enquiries : Mr G Ponton
Telephone : 9231 0742
Our Ref : TA/4/1

25 March 1999

Submission on Perth's Bushplan
Western Australian Planning Commission
469 Wellington Street
PERTH WA 6000

Dear Sir/Madam

SUBMISSION ON PERTH'S BUSHPLAN

Council considered the above matter at its Meeting held on 23.3.99, and resolved as follows:

(a) Council RESOLVE to forward a submission on the report "Perth's Bushplan", to the Ministry for Planning indicating the City's support for the overall concept of Bushplan but including recommendations outlining concerns relating to the following specific issues:

(i) The inclusion of Lot 500 Johnston Road, Canning Vale within Bushplan Site No. [redacted] is not supported given the isolation of the land from the remainder of Site 388, the current usage of the land as a landfill site and the future options for the development of the site. In this regard clarification is sought in relation to the extent and level of vegetation protection proposed under Bushplan and the resultant impact on the City's development options for the land.

(ii) The identification of Bushplan Site No. [redacted] is supported, however, the possible requirement for a future extension of Gerard Street within or in the vicinity of the Bushplan site needs to be acknowledged in the Bushplan Report.

(iii) The appropriate protection and management of land within identified Bushplan Site's within the City of Canning needs to be secured through the continued acquisition of privately owned land by the Ministry for Planning, in particular Lot 15 Bacon Street, Wilson, Lots 14, 18, 42 and 43 Woodloes Street, Cannington and privately owned land within Bushplan Site 224 adjacent to Castledare, in particular Lot 4, 501 (62, 63,64), Fern Road, Wilson.

SUBMISSION NO. 384

MINISTRY FOR PLANNING
29 MAR 1999
805-2-1-32pt12
FILE

Please address correspondence to:
Locked Bag 80, Welshpool 6986

1317 Albany Highway,
Cannington 6107
Western Australia
Telephone: (08) 9231 0606
Facsimile: (08) 9458 2353

CITY OF CANNING

1317 Albany Highway, Cannington 6107, WA
Telephone: 451 0606
Fax No: 458 2353

ENGINEERING & TECHNICAL SERVICES

Enquiries: Mr Mark Jumeaux
Telephone: 231 0743
Our Ref: PP/2/1

Direct Fax: 356 2221

et90sep.95
20 September, 1995

The System 6 Study Team
Department of Environmental Protection
141 St Georges Terrace
PERTH WA 6000

ATTENTION: B Hyder

Dear Sir/Madam,

RE: SYSTEM 6 APPLICATION FOR QUEENS PARK ECOLOGICAL RECREATION AREA - ECOLOGICAL RESERVE

Please be aware of the following changes to our recently submitted System 6 Application.

The bordering roads to the area under consideration was incorrectly stated as Station Street, Luyer Street, Welshpool Road and Gibbs Street. In fact this should read Station Street, Luyer Street, Welshpool Road and the future extension of Gerrard Street. Please refer to the attached Tax Plan.

Please accept our apologies for any inconvenience this may have caused. If you require further information please contact Mark Jumeaux on 231 0743.

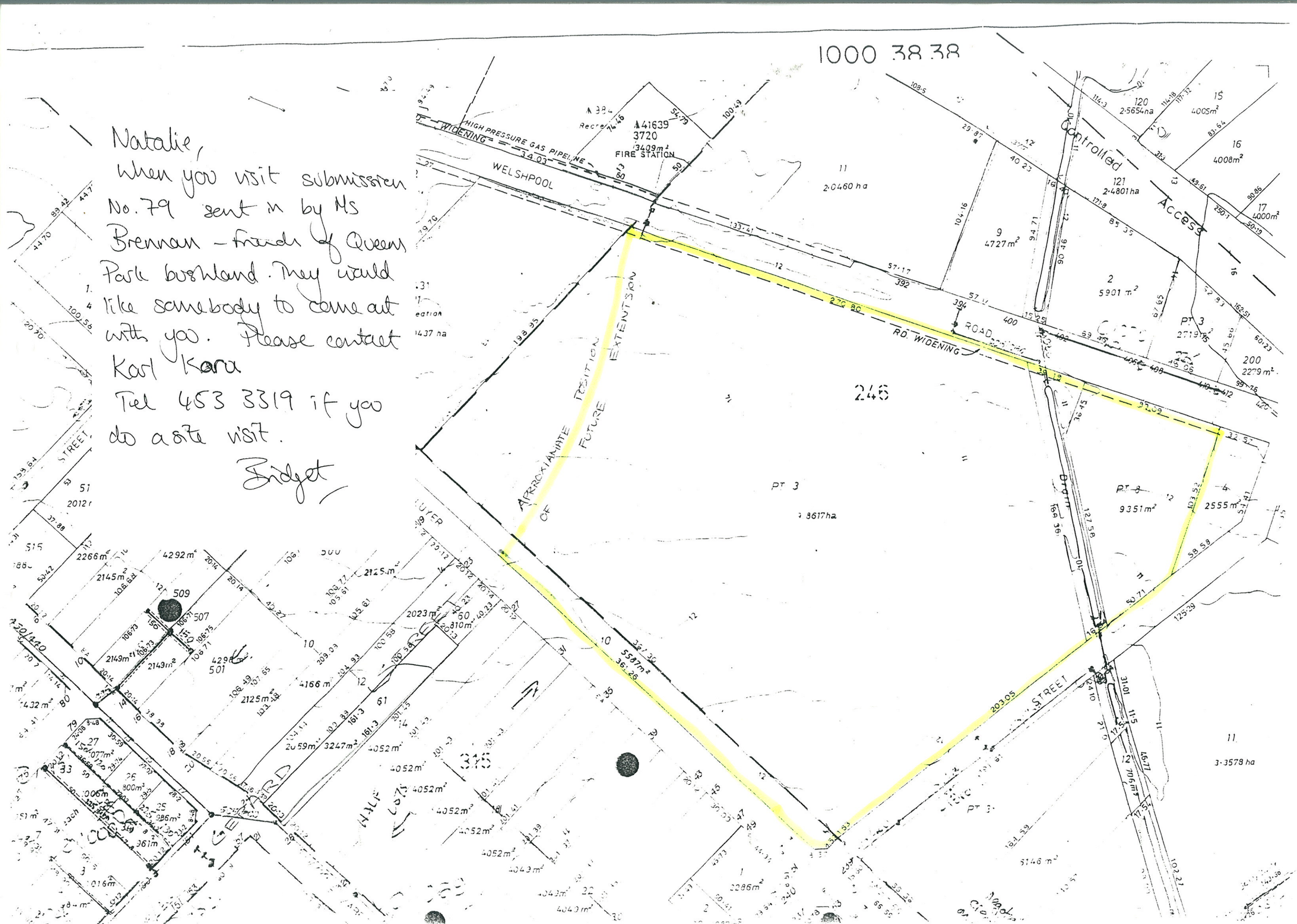
Yours faithfully,

I F KINNER
CHIEF EXECUTIVE/TOWN CLERK

1000 38 38

Natalie,
When you visit submission No. 79 sent in by Ms Brennan - friends of Queens Park bushland. They would like somebody to come out with you. Please contact Karl Kara
Tel 453 3319 if you do a site visit.

Bridget



PRELIMINARY LIST OF FLOWERING PLANTS IN
LUYER AVE/STATION STREET BLOCK WOODLAND

Area 1

79

Only native plants, minus grasses and sedges, primarily those flowering in October, are included in the following list.

CONFIDENTIAL

1	Acacia applanata Maslin	Grass Wattle
2	Acacia huegelii Benth.	
3	Acacia incrassata Hook.	
4	Acacia pulchella R. Br.	Prickly Moses
5	Acacia saligna (Labill.) H.L. Wendl.	Orange Wattle
6	Adenanthos cygnorum Diels subsp. cygnorum.	Woolly Bush
7	Anigozanthos humilis Lindley	Low Kangaroo Paw
8	Anigozanthos manglesii D. Don	Kangaroo Paw
9	Anigozanthos viridis Endl.	Green Kang. Paw
10	Banksia grandis Willd.	Bull Banksia
11	Banksia menziesii R. Br.	Firewood Banksia
12	Banksia prionotes Lindley	Acorn Banksia
14	Casuarina 2 sp.	
16	Conostylis - at least 2 species	
17	Dampiera linearis R. Br.	
18	Daviesia divaricata Benth.	
19	Daviesia physodes Cunn. ex Don	
20	Dasypogon bromeliifolius R. Br.	Pineapple Bush
21	Dianella sp.	
24	Diurus - at least 3 species	Donkey Orchids
26	Drosera - at least 2 species	Sundews
27	Eriostemum spicatus A. Rich.	Pepper & Salt
28	Eucalyptus marginata Donn ex Smith	Jarrah
29	Hakea prostrata R. Br.	
30	Hibbertia - at least 3 species	
31	Hovea trisperma Benth.	Common Hovea
32	Hypocalymma angustifolia (Endl.) Schauer	White Myrtle
33	Jacksonia sternbergiana Huegel	
34	Kennedia prostrata R. Br.	Running Postman
35	Laxmania squarrosa Lindley	
36	Lomandra sp.	
37	Macrozamia riedlei (Fischer ex Gaud.) C. Gardn.	Zamia
38	Melaleuca preissiana Schauer	Paperbark
39	Melaleuca sp. Yellow flower heads	
40	Nuytsia floribunda (Labill.) R. Br. ex Fenzl	Christmas Tree
41	Pattersonia juncea Lindley	
42	Petrophile linearis R. Br.	Pixie Mops
43	Sowerbaea laxiflora Lindley	Purple Tassels
44	Stirlingia latifolia (R. Br.) Steudel	
46	Stylidium diuroides Lindley (plus at least 2 other sp.)	Triggerplants
	Synaphea spinulosa (Burm. f.) Merr	
	Xanthorrhoea preissii Endl.	Grass Tree

FSAC 48 Collated by Richard Cowan Botanist

Extract Hames Sharley Report to Canning City Council

Appendix 5

CHECKLIST OF THE NATIVE VASCULAR PLANTS

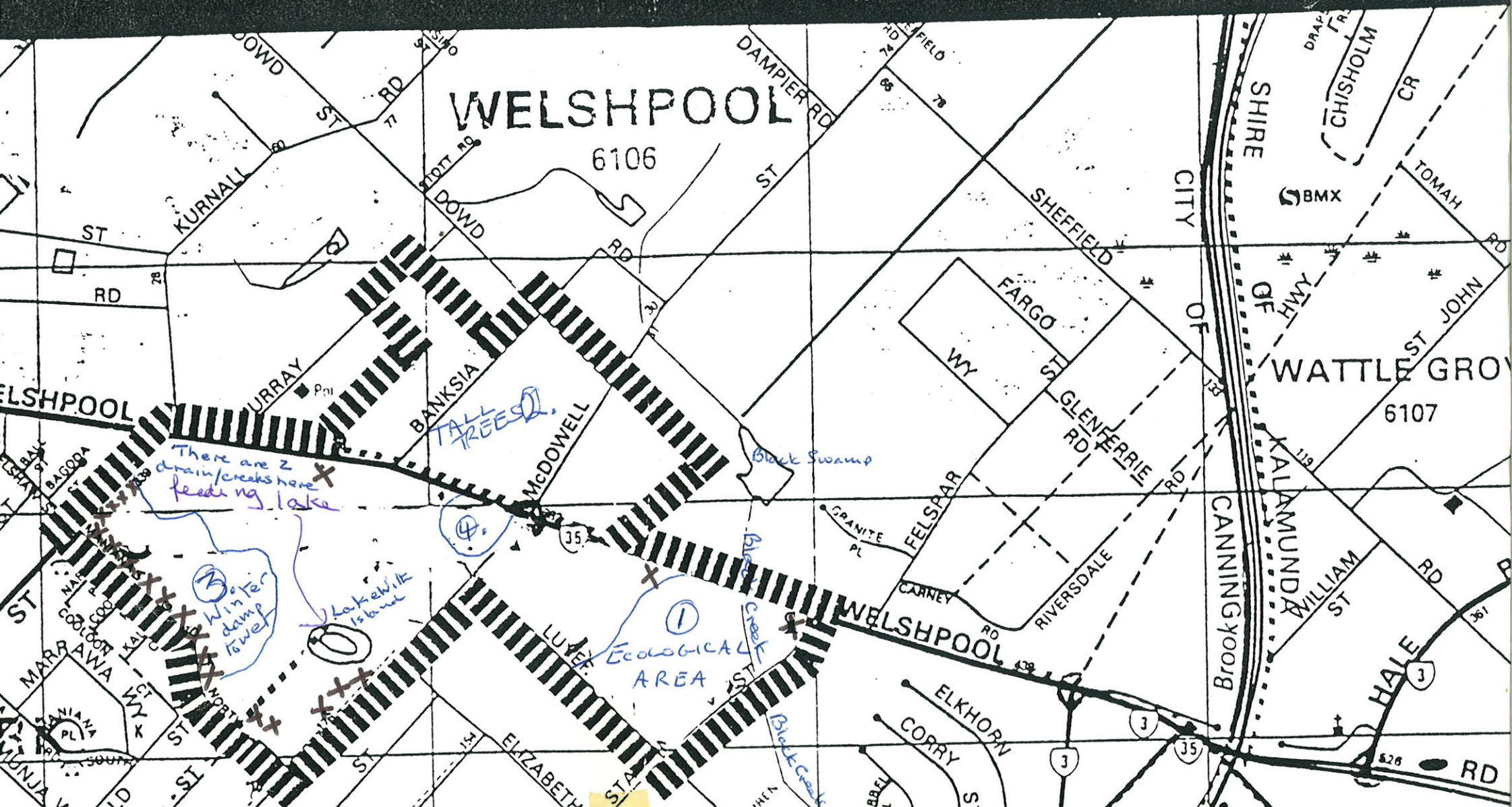
Acacia huegilii	Prickly Moses
Acacia pulchella	Orange Wattle
Acacia saligna	
Acacia sessilis	Grass Wattle
Acacia wildenowiana	Woolly Bush
Adenanthos cygnorum	Common Sheoak
Allocasuarina fraseriana	Dwarf Sheoak
Allocasurina humilis	
Amphipogon turbinatus	Cat's Paw
Anigozanthus humilis	Mangles Kangaroo Paw
Anigozanthus manglesii	
Banksia attenuata	Candle Banksia
Banksia grandis	Bull Banksia
Banksia ilicifolia	Holly Leaf Banksia
Banksia menziesii	Firewood Banksia
Boronia ramosa	
Bossiaea eriocarpa	Common Brown Pea
Burchardia multiflora	
Burchardia umbellata	Milkmaids
Caladenia flava	Cowslip Orchid
Caladenia latifolia	Pink Fairy Orchid
Caladenia longicauda	Common Spider Orchid
Calytrix fraseri	Pink Summer Calytrix
Chamaescilla corymbosa	Blue Squill
Conostephium pendulum	Pearl Flower
Conostylis aculeata	Prickly Conostylis
Corynotheca micrantha	
Dampiera linearis	Common Dampiera
Dasypogon bromeliifolius	Pineapple Bush
Daviesia decurrens	
Daviesia triflora	Common Donkey Orchid
Diuris longifolia	Red Ink Sundew
Drosera erythrorhiza	
Drosera pallida	
Eremaea pauciflora	Pepper and Salt
Eriostemon spicatus	Marri
Eucalyptus calophylla	Jarrah
Eucalyptus marginata	Flooded Gum
Eucalyptus rudis	Prickly Bark
Eucalyptus todtiana	
Gompholobium tomentosum	Hairy Yellow Pea
Hakea prostrata	Harsh Hakea
Hakea varia	
Hibbertia huegelii	Yellow Buttercups
Hibbertia hypericoides	Stalked Guinea Flower
Hibbertia racemosa	Common Hovea
Hovea trisperma	Wild Violet
Hybanthus calycinus	White Myrtle
Hypocalymma angustifolia	
Hypolaena exsulca	
Isotropis cuneifolia	Granny Bonnets
Jacksonia densiflora	
Jacksonia furcellata	Stinkwood
Jacksonia sternbergiana	A Rush
Juncus sp.	
Kennedia prostrata	Running Postman
Kunzea ericifolia	Spearwood
Laxmannia squarosa	Hoary Twine Rush
Leptocarpus canus	
Loxocarya fasciculata	
Loxocarya flexuosa	
Lyginia barbata	
Macarthuria australis	Cycad/Zamia
Macrozamia riedlei	Moonah
Melaleuca preissiana	
Melaleuca raphiophylla	Swamp Paperbark
Mesomelaena tetragona	Semaphore Sedge
Nuytsia floribunda	Christmas Tree
Opercularia vaginata	
Patersonia occidentalis	Purple Flag
Pericalymma elipticum	Swamp Teatree
Persoonia saccata	Snottygobble
Petrophile linearis	Pixie Mops
Phlebocarya ciliata	
Podolepis gracilis	Slender Podolepis
Pterostylis vittata	Banded Greenhood
Scholtzia involucrata	Spiked Scholtzia
Sowerbaea laxiflora	Purple Tassles
Stirlingia latifolia	Blueboy
Stylidium brunonianum	Pink Fountain Triggerplant
Stylidium repens	Matted Triggerplant
Synaphaea spinulosa	
Thysanotus manglesianus	Fringed Lily
Thysanotus triandrus	
Verticordia densiflora	A Featherflower
Viminaria juncea	Swishbush
Xanthorrhoea preissii	Blackboy
Xanthosia huegelii	

88 Species

Buildings marked ✕
Soccer ground ▫ inked
lake/compensating basin
Good condition nature bushland

Any inaccuracies due to inexperience.

1 = Ecological area
2 = Tall trees
3 = Natural bush
4 = Small swamp



DEPARTMENT of ENVIRONMENTAL PROTECTION

Memorandum

ATTENTION:	Joshua Smith, Water and Rivers Commission
FROM:	Bronwen Keighery
DATE:	**6th September, 2001**
SUBJECT:	**Conservation Category Wetlands in Bush Forever Site 283 east of McDowell Street**

General Background

In late 2000 advice was provided to the Water and Rivers Commission on a series of wetland areas identified from field survey of bushland included in Perth's Bushplan Sites but not identified in the Water and Rivers Commission 1996 database (WRC 1996). This information was derived from survey:

- as outlined the Site descriptions (the wetland part of Section 2 is annotated in Perth's Bushplan to indicate this); or
- post the release of Perth's Bushplan.

Most of these wetlands were considered to be conservation category wetlands on the basis of
(i) the quality of the vegetation on the wetland area (regionally significant vegetation); or
(ii) the presence of Declared Rare Flora; and/or
(iii) the presence of threatened ecological communities.
This advice was supplied as a matter of urgency and was not subject to further ground truthing.

Wetlands in Bush Forever Site 283 east of McDowell Street

Background

It appears, that as part of the process described above, two areas of conservation category wetland were located in the area of Bush Forever Site 283 (see Map 1 and Map 2). These maps reflect the areas of Marri Woodland depicted in Keighery and Trudgen (1992) (see Map 3). Areas of Marri Woodland in this site have been inferred to be floristic community type 3a which is a threatened ecological community. It appears that this is the basis by which the conservation category wetlands were identified as Marri does occur as dominant in wetland areas on the east of the Plain. However it is unclear how this was determined as there is an inconsistency between the mapping in Bush Forever and the Site description in Bush Forever. The Site description for Bush Forever Site 283 (Appendix 1) does not refer to an area of conservation category wetland. That is, it is unclear as to how and why these areas were identified as wetland as they are not referred to in Perth's Bushplan and further survey on the

Site was not done for Bush Forever. In response to this uncertainty and work by Brown & Root (2001)as part of their studies of the area for a Ministry for Housing 'urban revitalisation project within the Maniana Precinct', the delineation of wetland areas in this Site was examined in more detail. This involved a field visit and the consideration of a series of reports on the area (Tauss 1997, Trudgen and Henson 2000, Keighery and Trudgen 1992 and Brown & Root 2001). The field inspection was made by Bronwen Keighery (DEP) and Kate Williams and Kieron Beardmore (MfP) on 23rd July 2001. Approximately 1 hour was spent traversing the bushland on foot. Being July in very dry year there were relatively few plants flowering and annually renewed plants were immature. Therefore, vegetation condition assessments are subject to revision on a mid/late spring inspection.

Wetlands in Bush Forever Site 283 east of McDowell Street

Keighery and Trudgen (1992), Tauss (1997) and Trudgen and Henson (2000) map vegetation in the area of Bush Forever Site 283 east of Gibbs Street (see Maps 3, 4 and 5). However only Keighery and Trudgen (1992) map the vegetation in the entire area of Bush Forever Site 283 east of McDowell Street (part of Location 69). The mapping by Keighery and Trudgen (Map 3) is very general and there are no reference sites for each of the mapped units in Location 69 south of Welshpool Road. Mapping by Tauss and Trudgen and Henson is more detailed but only Tauss describes a reference site in any of the naturally vegetated areas under consideration (see Map 4. Plot). Using the mapping by Tauss as a guide the Bush Forever Site 283 east of McDowell Street was briefly ground surveyed to determine the extent and location of the wetland areas.

Tauss identified several vegetation mapping units in which species dependent on soils that are seasonally, intermittently or permanently waterlogged or inundated, these units being those identified in Map 4 as: Marri/*Melaleuca preissiana*, *Eucalyptus rudis* and *Melaleuca rhaphiophylla* (the underlined species are typically 'wetland' species). The 'Weed dominated' area appears , from the mapping, to also be an area of wetland. The field visit for this study clarified a series of issues, these are listed below.

(i) The mapping by Tauss is a good representation of the vegetation units in the area (see Map 4).

(ii) The area of native vegetation in the recreation reserve area (see Map 4, outside the area mapped by Tauss), is similar to the Marri/*Melaleuca preissiana* unit mapped by Tauss. Most of this area was 'parkland cleared' as described by Trudgen and Henson (see Map 4) but there was a small area with an intact understorey which further established that it was very similar to the unit mapped by Tauss.

(iii) The Marri/*Melaleuca preissiana* is a unusual wetland unit containing a series of 'wetland' species such as *Melaleuca preissiana* and *Jacksonia gracilis* which are typical of the dampland areas of wetlands.

There are several other issues that need to be addressed before a management category can be assigned to the wetland areas identified in the study area (see Map 4 and 5). These issues are all related to unusual features of the native vegetation in Bush Forever Sites 283 and 424 outlined below.

(i) Rare and Threatened species and ecological communities

This relatively small area of vegetation contains a series of species that are considered significant in the Perth Metropolitan Region, such as *Jacksonia gracilis*, *Cyathochaeta equitans* and *Macarthuria keigheryi* (see Table 13, Government of WA 2001). These species (and others) are associated with plant communities typical of the eastern side of the Swan Coastal Plain and the Bassendean Dunes which are central to the Plain. As such the area supports communities that are now extremely rare on the Plain. This can be illustrated by consideration of both the individual species in the area and the communities. The Marri

Woodland units in the area have been inferred to be floristic community type 3a (see Bush Forever Site description Appendix 1) and the Banksia Woodlands are possibly floristic community type 20a. These two floristic community types have been identified as threatened ecological communities, floristic community type 3a being critically endangered and subject to the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). *Macarthuria keigheryi* is gazetted as Declared Rare Flora and it is classed as critically endangered areas in which it is found are subject to the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). *Macarthuria keigheryi* is found in both Bush Forever Sites 283 (Tauss 1997) and 424 (Keighery and Trudgen 1992[1]). While *Macarthuria keigheryi* is uncommon in the bushland its presence in at least two plant communities indicates that under favourable conditions it could occur throughout the area of the two Bush Forever Sites. As wetlands supporting threatened ecological communities and DRF are determined as Conservation Category the presence of these in the area must be taken into account.

(ii) A 'rare remnant' in the local context

The native vegetation in the area of the Sites has additional value in being in an almost completely cleared and developed portion of the Perth Metropolitan region (see Map 2). In this context it is one of very few opportunities to retain an example of the original vegetation and topography in this part of Perth.

On consideration of the above information (field visit and reports) the location and extent of the wetland areas are now considered to be best mapped as shown in Map 6. The vegetation type and condition of 'Wetland area a' places it as Conservation Category and 'Wetland area b' as Resource Enhancement (in view of the condition of the vegetation). It is considered that 'Wetland area b' is worthy of protection. **Wetland 'areas a and b' are sections of a larger wetland area, part of which has been altered (see below). As these wetlands are parts of a 'whole' the management category of the entire wetland area needs to be addressed. The information provided in this report and the other references can be used to aid this determination, particular attention should be given to the rare species and plant communities in the general area.**

Note: Of interest on the field visit was the project observed in the weed dominated wetland area mapped by Tauss(see Map 3). This area has been altered to form a series of sumplands/lakes and associated dampland edges. This area appears to be outside the area of the Bush Forever Site but it may impinge on the Site at the margins. The newly formed wetlands are being re-vegetated with local wetland species (not sourced locally). Some of the *Melaleuca rhaphiophylla* clumps (see Map 3) have been transplanted into these modified wetlands. The wetlands have been constructed with clay bases so as to maintain the water levels in the adjacent bushland within the Bush Forever Site (for example in the Marri/*Melaleuca preissiana* unit). This is a project for Main Roads WA as part of the Roe Highway works (C Karu pers. comm. 23/7/01).

References

Brown & Root Services Asia Pacific Pty Ltd 2001 Bush Forever Site 283, Queens Park. Conservation Category Wetland Assessment. Unpublished report prepared for Landstart.

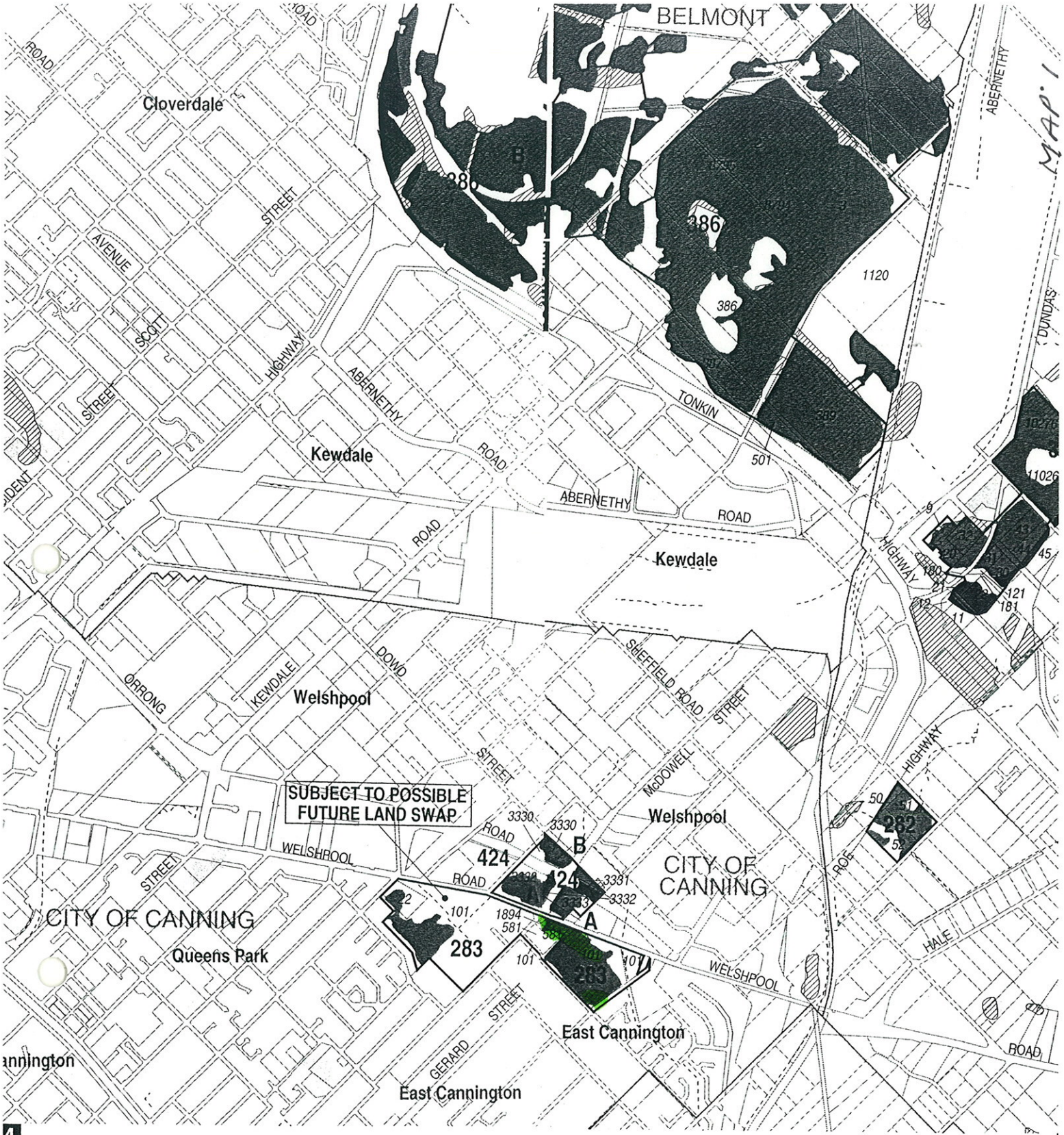
Government of Western Australia 2000b. *Bush Forever. Volume 2 - Directory of Bush Forever Sites.* Department of Environmental Protection, Perth, Western Australia.

[1] Keighery and Trudgen describe a *Macarthuria* sp. from Site 69b in Location 69 (Bush Forever Sites 283 and 424). Perusal of collections of this taxon have found it to be *Macarthuria keigheryi.*

Keighery BJ and Trudgen ME 1992 *The Remnant Vegetation of the Eastern Side of the Swan Coastal Plain.* Unpublished report to the Department of Conservation of Land Management for the National Estate Grants Program.
Tauss, C 1997 Flora of Queen's Park Ecological Area. Unpublished report for the City of Canning

Trudgen ME and Henson M 2000 A Vegetation and Flora Survey of part of the Queens Park Bushland. Unpublished report for Brown and Root.

WRC 1996 GIS *Conservation Category Wetlands* after Hill *et al.* 1996b. Water & Rivers Commission, Perth, Western Australia.



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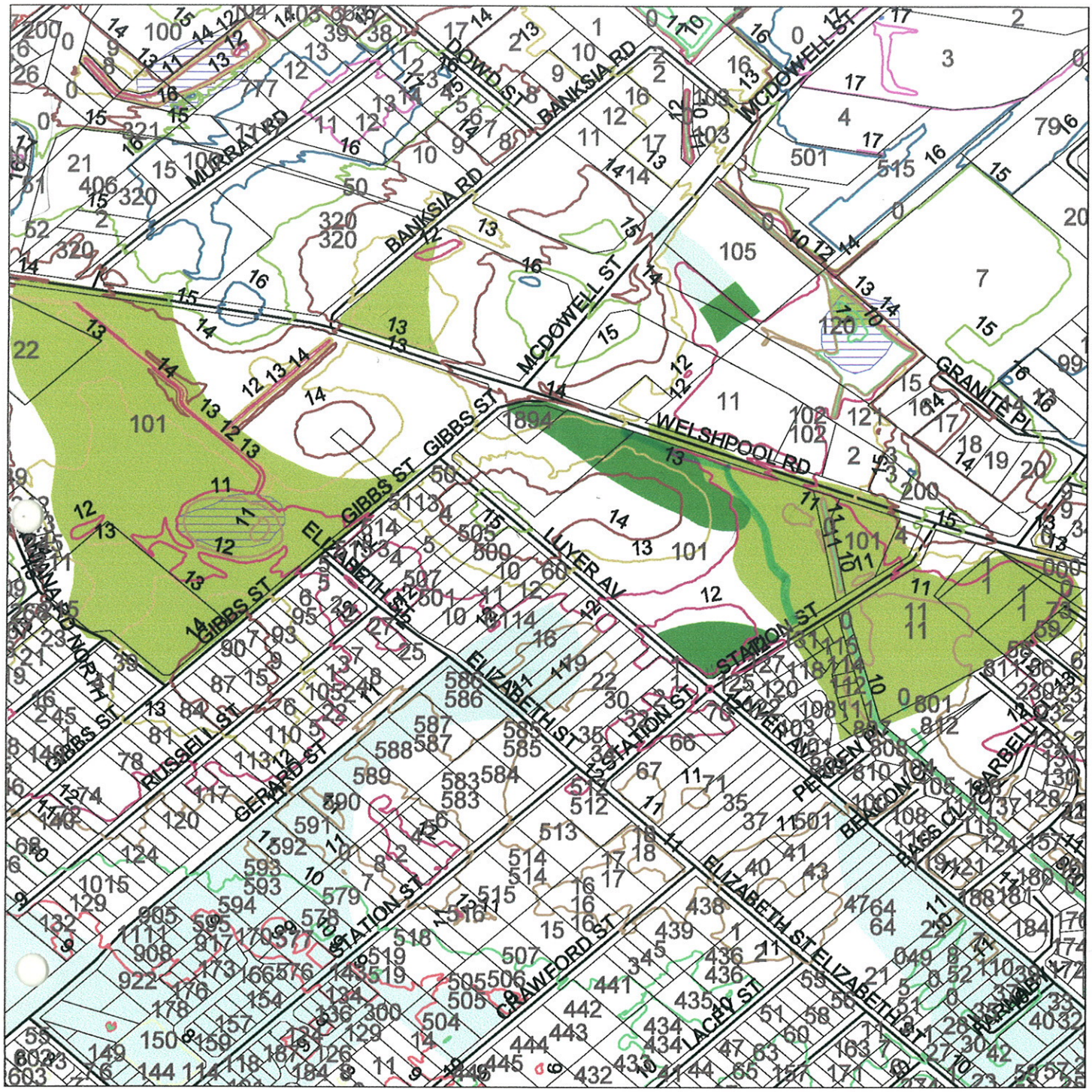
Conservation Category Wetland areas

Map

MAP 2

MAP 2



LEGEND

- Cadastre - VGO 8/00
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- State Roads - DOLA 12/99
- Lakes Policy Area - DEP 6/95
- Conservation
- Sustainable Use, Multiple Use
- Resource Enhancement

WATER AND RIVERS COMMISSION

N

0 ~250 m

Scale 1:9254

Geocentric Datum Australia 1994

WARNING

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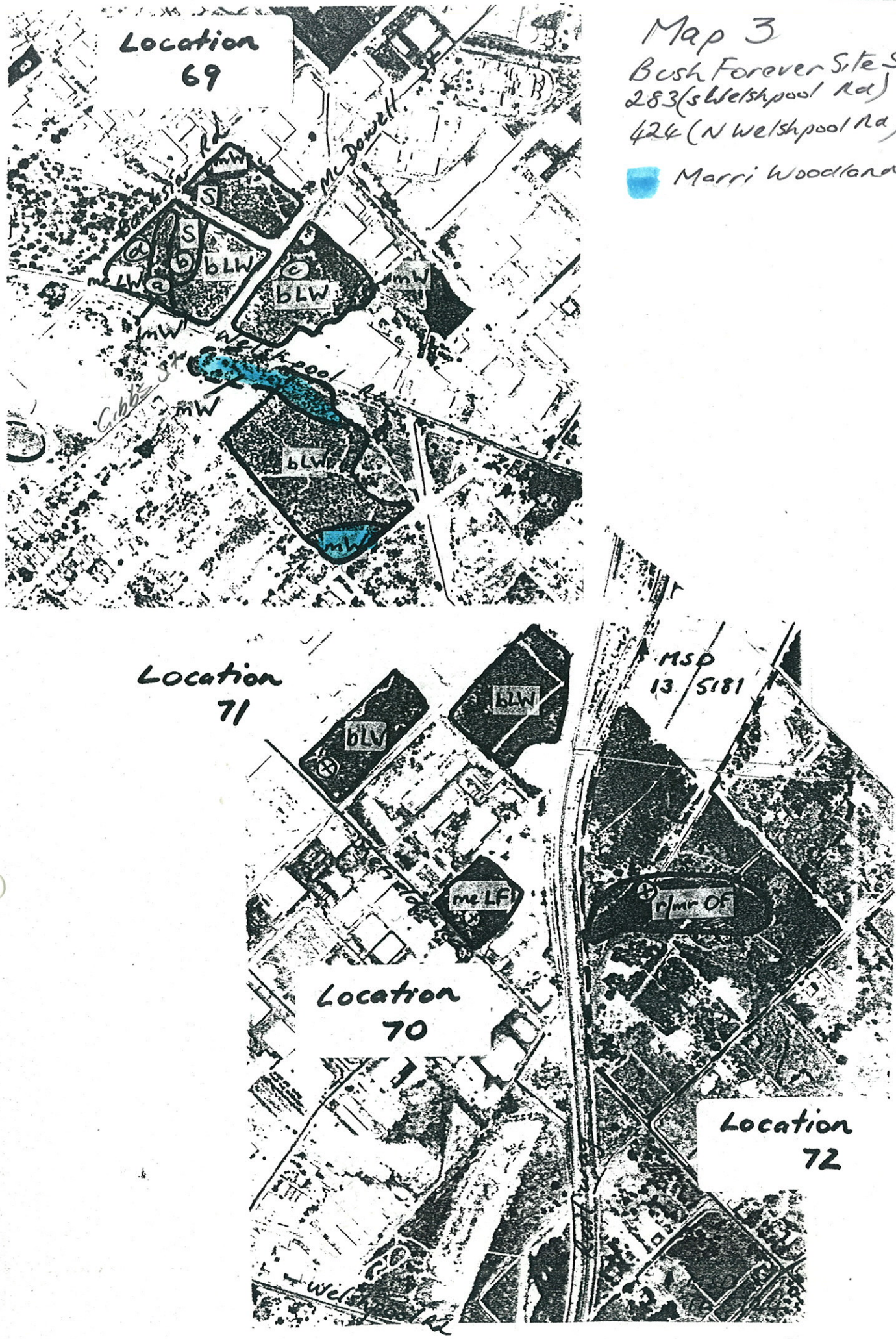
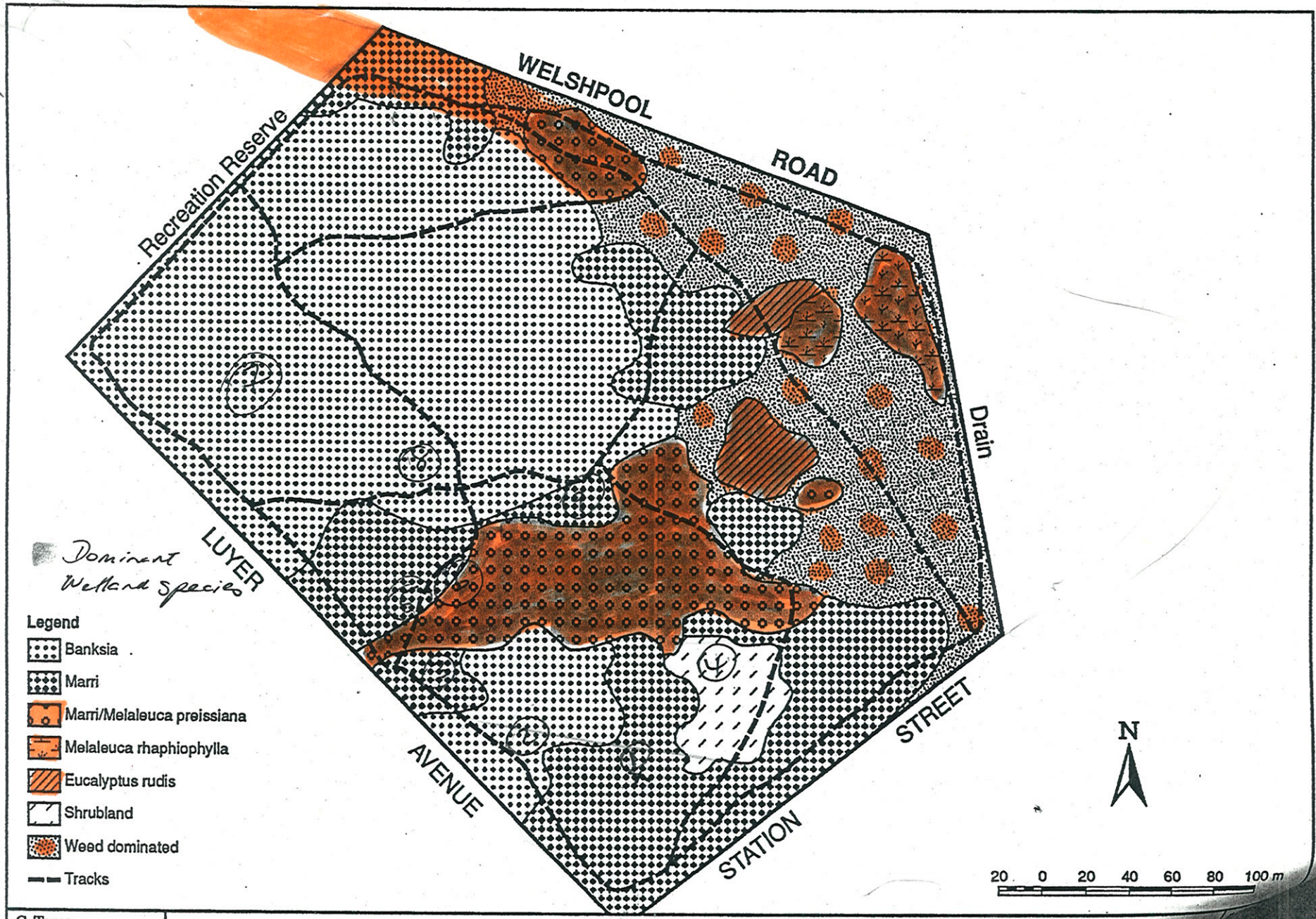
Prepared for:

Date: 04 July 2001 09:24

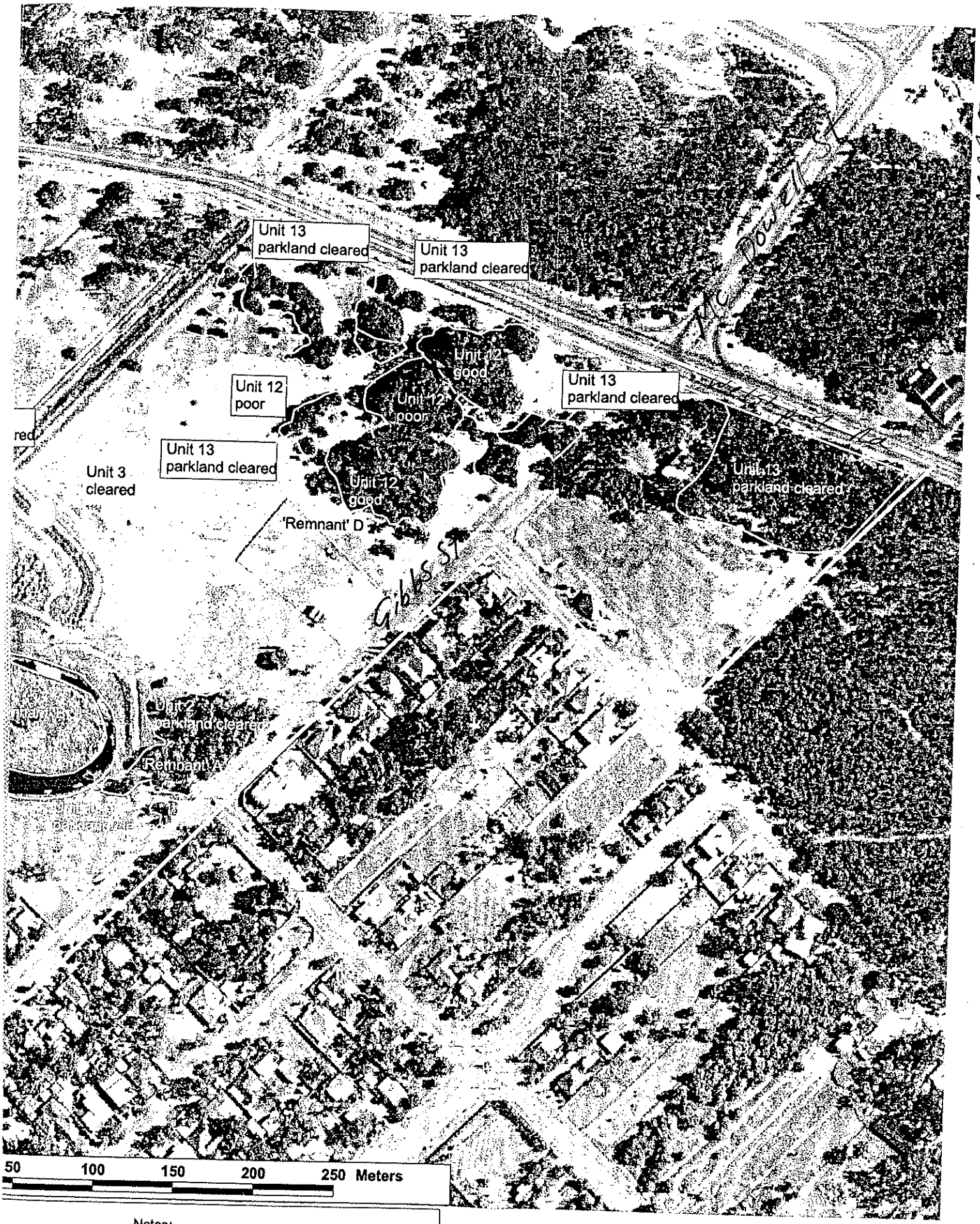

Location 69
Map 3
Bush Forever Sites
283 (s Welshpool Rd)
424 (N Welshpool Rd)
Marri Woodland
McDowell St
bLW
mW
S
Location 71
Location 70
Location 72
MSP 13/5181
mr OF
me LF
Welshpool Rd

MAP 4



C. Tauss
Bushranger Landcare

Queens Park Ecological Area: Vegetation Units



Notes:
Vegetation surveyed by M.E. Trudgen and Associates. Data digitised from hard copy maps supplied by M.E. Trudgen and Associates.

Colour aerial photography supplied by the Department of Land Administration (DOLA).

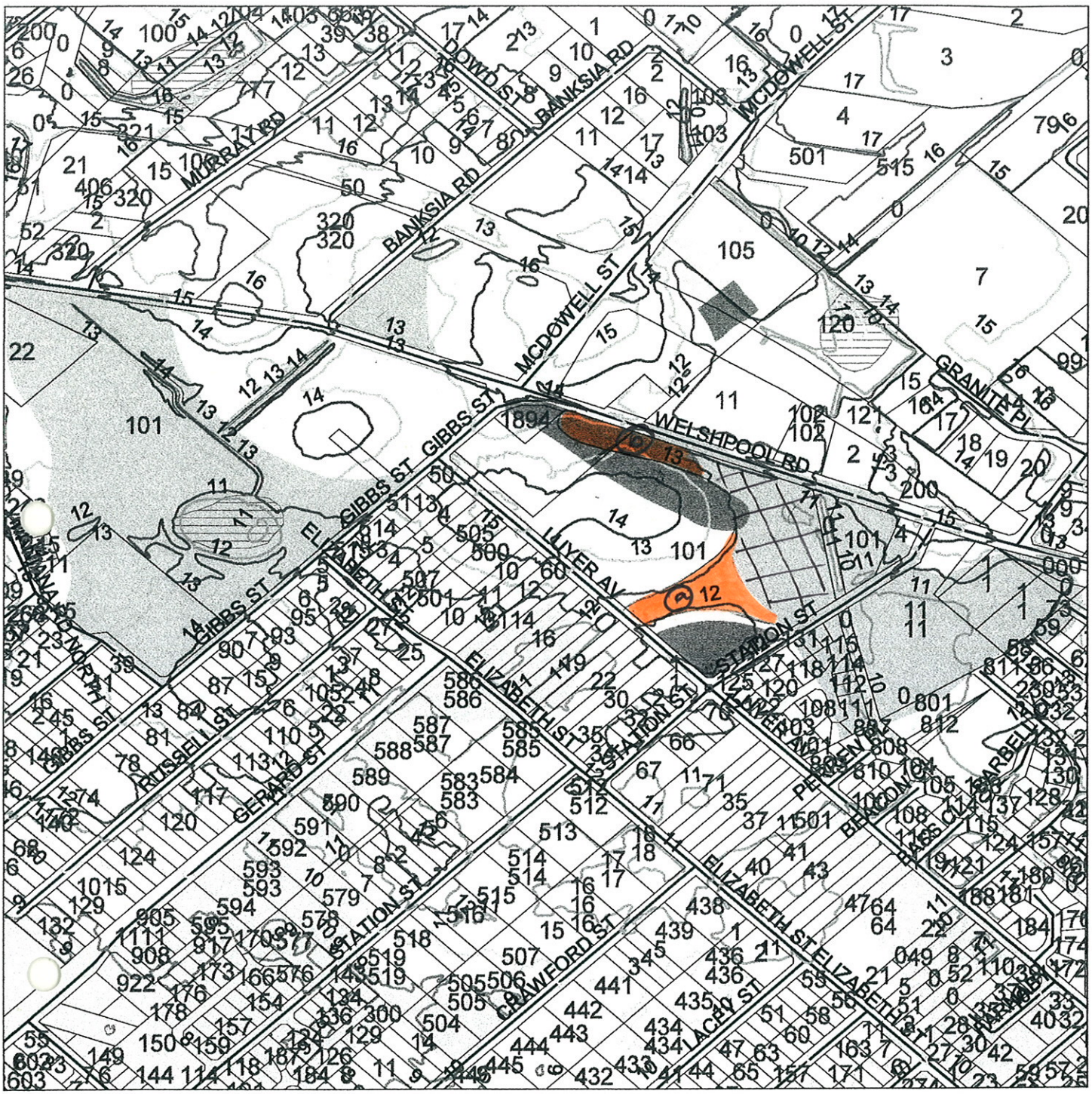
Unit descriptions can be found in Appendix A, (Section 7).

MAP 5

MAP 5

MAP 6

MAP 6



LEGEND

- Cadastre - VGO 8/00
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- 18
- State Roads - DOLA 12/99
- Lakes Policy Area - DEP 6/95
- Conservation
- Sustainable Use, Multiple Use
- Resource Enhancement

Wetland areas under discussion

Approximate area of 'modified' wetland

WATER AND RIVERS COMMISSION

N

0 ~250 m

Scale 1:9254

Geocentric Datum Australia 1994

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Prepared by: SmithJ

Prepared for:

Date: 04 July 2001 09:24

Queens Park Regional Recreation Area
Master Plan

by

HAMES SHARLEY
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Tel: (09) 381 9877
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Melbourne, Adelaide, Brisbane, Auckland

July 1993
9114

BS 283
QUEEN'S PK
FOOT/PIN

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4.3	South West Quadrant
4.4	North West Quadrant
4.5	North East Quadrant
4.6	Unexploded Small Arms
4.7	Conclusion
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5.1	Methods and Limitations
5.2	Physiography and Soils
5.3	Vegetation Types
5.4	Vegetation Condition
5.5	Flora
5.6	Recommendations
6.0	Regional Road Network
6.1	General
6.2	Roe Highway
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7.0	Engineering Services
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7.2	Sewer
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1.2	Consultant Team
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2.2.2	Participation by Age and Sex
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Appendix 5

CHECKLIST OF THE NATIVE VASCULAR PLANTS

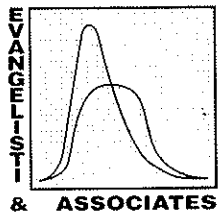
Acacia huegilii	
Acacia pulchella	Prickly Moses
Acacia saligna	Orange Wattle
Acacia sessilis	
Acacia wildenowiana	Grass Wattle
Adenanthos cygnorum	Woolly Bush
Allocasuarina fraseriana	Common Sheoak
Allocasurina humilis	Dwarf Sheoak
Amphipogon turbinatus	
Anigozanthus humilis	Cat's Paw
Anigozanthus manglesii	Mangles Kangaroo Paw
Banksia attenuata	Candle Banksia
Banksia grandis	Bull Banksia
Banksia ilicifolia	Holly Leaf Banksia
Banksia menziesii	Firewood Banksia
Boronia ramosa	
Bossiaea eriocarpa	Common Brown Pea
Burchardia multiflora	
Burchardia umbellata	Milkmaids
Caladenia flava	Cowslip Orchid
Caladenia latifolia	Pink Fairy Orchid
Caladenia longicauda	Common Spider Orchid
Calytrix fraseri	Pink Summer Claytrix
Chamaescilla corymbosa	Blue Squill
Conostephium pendulum	Pearl Flower
Conostylis aculeata	Prickly Conostylis
Corynotheca micrantha	
Dampiera linearis	Common Dampiera
Dasypogon bromeliifolius	Pineapple Bush
Daviesia decurrens	

Daviesia triflora	
Diuris longifolia	Common Donkey Orchid
Drosera erythrorhiza	Red Ink Sundew
Drosera pallida	
Eremaea pauciflora	
Eriostemon spicatus	Pepper and Salt
Eucalyptus calophylla	Marri
Eucalyptus marginata	Jarrah
Eucalyptus rudis	Flooded Gum
Eucalyptus todtiana	Prickly Bark
Gompholobium tomentosum	Hairy Yellow Pea
Hakea prostrata	Harsh Hakea
Hakea varia	
Hibbertia huegelii	
Hibbertia hypericoides	Yellow Buttercups
Hibbertia racemosa	Stalked Guinea Flower
Hovea trisperma	Common Hovea
Hybanthus calycinus	Wild Violet
Hypocalymma angustifolia	White Myrtle
Hypolaena exsulca	
Isotropis cuneifolia	Granny Bonnets
Jacksonia densiflora	
Jacksonia furcellata	
Jacksonia sternbergiana	Stinkwood
Juncus sp.	A Rush
Kennedia prostrata	Running Postman
Kunzea ericifolia	Spearwood
Laxmannia squarosa	
Leptocarpus canus	Hoary Twine Rush
Loxocarya fasciculata	
Loxocarya flexuosa	
Lyginia barbata	
Macarthuria australis	
Macrozamia riedlei	Cycad/Zamia
Melalaeuca preissiana	Moonah

Melaleuca raphiophylla	Swamp Paperbark
Mesomelaena tetragona	Semaphore Sedge
Nuytsia floribunda	Christmas Tree
Opercularia vaginata	
Patersonia occidentalis	Purple Flag
Pericalymma elipticum	Swamp Teatree
Persoonia saccata	Snottygobble
Petrophile linearis	Pixie Mops
Phlebocarya ciliata	
Podolepis gracilis	Slender Podolepis
Pterostylis vittata	Banded Greenhood
Scholtzia involucrata	Spiked Scholtzia
Sowerbaea laxiflora	Purple Tassles
Stirlingia latifolia	Blueboy
Stylidium brunonianum	Pink Fountain Triggerplant
Stylidium repens	Matted Triggerplant
Synaphaea spinulosa	
Thysanotus manglesianus	Fringed Lily
Thysanotus triandrus	
Verticordia densiflora	A Featherflower
Viminaria juncea	Swishbush
Xanthorrhoea preissii	Blackboy
Xanthosia huegelii	

88 Species

BS 283 Footprint



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

BFS # 283

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283
FOOT
PB102

Flora of the QUEEN'S PARK ECOLOGICAL AREA

Prepared by:

C. TAUSS
Bushranger Landcare
6 Spoonbill Grove Kingsley WA 6026

For:

CITY OF CANNING

February 1997

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INTRODUCTION

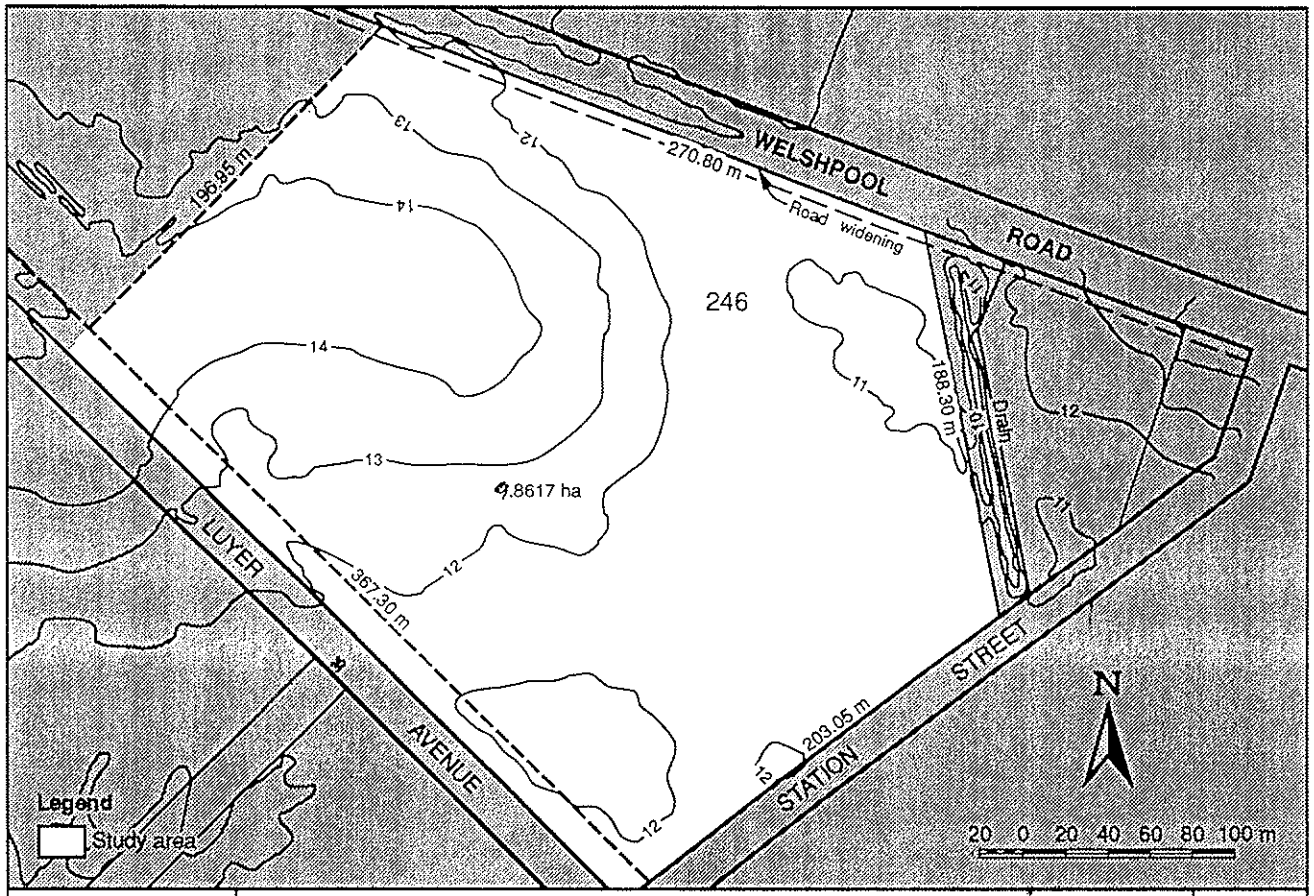
The Queen's Park Ecological Area (QPEA) is a small urban bushland area (9.8617 ha) vested in and managed by the City of Canning. It is situated in East Cannington bordered by Welshpool Road, a drain reserve to the north-east, Station Street, Luyer Street and a recreation reserve to the north-west (see Map 1).

In late 1995, the City of Canning Parks Department staff underwent training in a course provided by APACE North Fremantle called the Introduction to Bush Regeneration. This course is based on the Bradley Method of Bush Regeneration (Buchanan, 1989) which originated in Sydney. This method is now widely applied by local government authorities managing bushland.

Initially, the Canning horticultural staff were seeking training in the management of regionally scarce and valuable indigenous vegetation bordering Bullcreek at Yagan Park. Part of the course involved introductory training in bushland condition assessment and flora monitoring. QPEA was chosen to provide a focus for the students in upland vegetation assessment in contrast to the wetland vegetation available at Yagan Park. QPEA is the only area left in the City of Canning, with understorey in relatively good condition, under the control of the City where this experience could be provided.

The bushland has an active voluntary group (Friends of Queen's Park Ecological Area) who live locally, use the area for passive recreation and care for the bush in co-operation with the City of Canning. The City has recently fenced the area completely and is removing rubbish from the site.

This study was commissioned by the City of Canning mainly to record the floristics of the bushland, but also to map vegetation units, establish a baseline for monitoring the vegetation, make an assessment of the value of the bushland in terms of its indigenous vegetation and propose some initial management guidelines to preserve the biodiversity and other values of this area.



C. Tauss Bushranger Landcare	Queens Park Ecological Area: Study Area	Map 1

METHODS

The survey was conducted over the period May 1996 to February 1997 and involved setting up flora monitoring sites, opportunistic collecting throughout the bush, mapping vegetation units, condition and weeds and conducting basic observations of soils and water regime.

Vegetation units, bushland condition and distribution of major weeds, were mapped using colour aerial photos and verified by field work. Vegetation units were described after Specht, 1981.

Bushland condition was mapped by Kaesehagen's Bushland Condition Scale, as used in the APACE Introduction to Bush Regeneration course (Table 1). This scale differs from other scales used to assess bushland condition as it quantifies weed species cover as a major determinant of condition. It is a scale readily used by community volunteers to focus their minimum disturbance weed control on areas of bushland with the greatest potential of natural regeneration (ie, those areas where the soil seed bank of indigenous plants is still high).

Nine permanent 100 sqm study sites were established mainly in good to excellent condition vegetation. Information from each site about structure and floristics was recorded using a standard format (Keighery, 1994) which can be readily used by trained volunteers to monitor changes over time. Also this will enable data in this report to be compared to other work done recently on the Swan Coastal Plain (Gibson et al, 1995), if this is thought appropriate.

Flora samples from the sites and from other collections were pressed, dried, identified and labelled. These were verified at the WA Herbarium and the Herbarium was provided with duplicates of interest. A collection of pressed samples was presented to the City of Canning and the Friends group to enable them to mount a local herbarium which will be useful for management activities, further monitoring and as a general educational resource.

Two piezometers were installed (Nov 1996) to enable monitoring of groundwater levels over time.

TABLE 1: Bushland Condition Scale

Very Good -Excellent

- 80-100% native flora composition
- Vegetation structure intact or nearly so
- Cover/abundance of weeds less than 5%
- Minor signs of disturbance (tracks, rubbish dumping)

Fair-Good

- 50-80% native flora composition
- Vegetation structure modified or nearly so
- Cover/abundance of weeds 5-20%, any number of individuals
- Disturbance influence moderate

Poor

- 20-50% native flora composition
- Vegetation structure completely modified
- Cover/abundance of weeds 20-60%, any number of individuals
- Disturbance incidence high

Very Poor

- 0-20% native flora composition
- Vegetation structure disappeared
- Cover/abundance of weeds 60-100%, any number of individuals
- Disturbance incidence very high

D. Kaesehagen
ECOSCAPE Landscape Ecologists and Environmental Consultants

VEGETATION

Vegetation Habitats

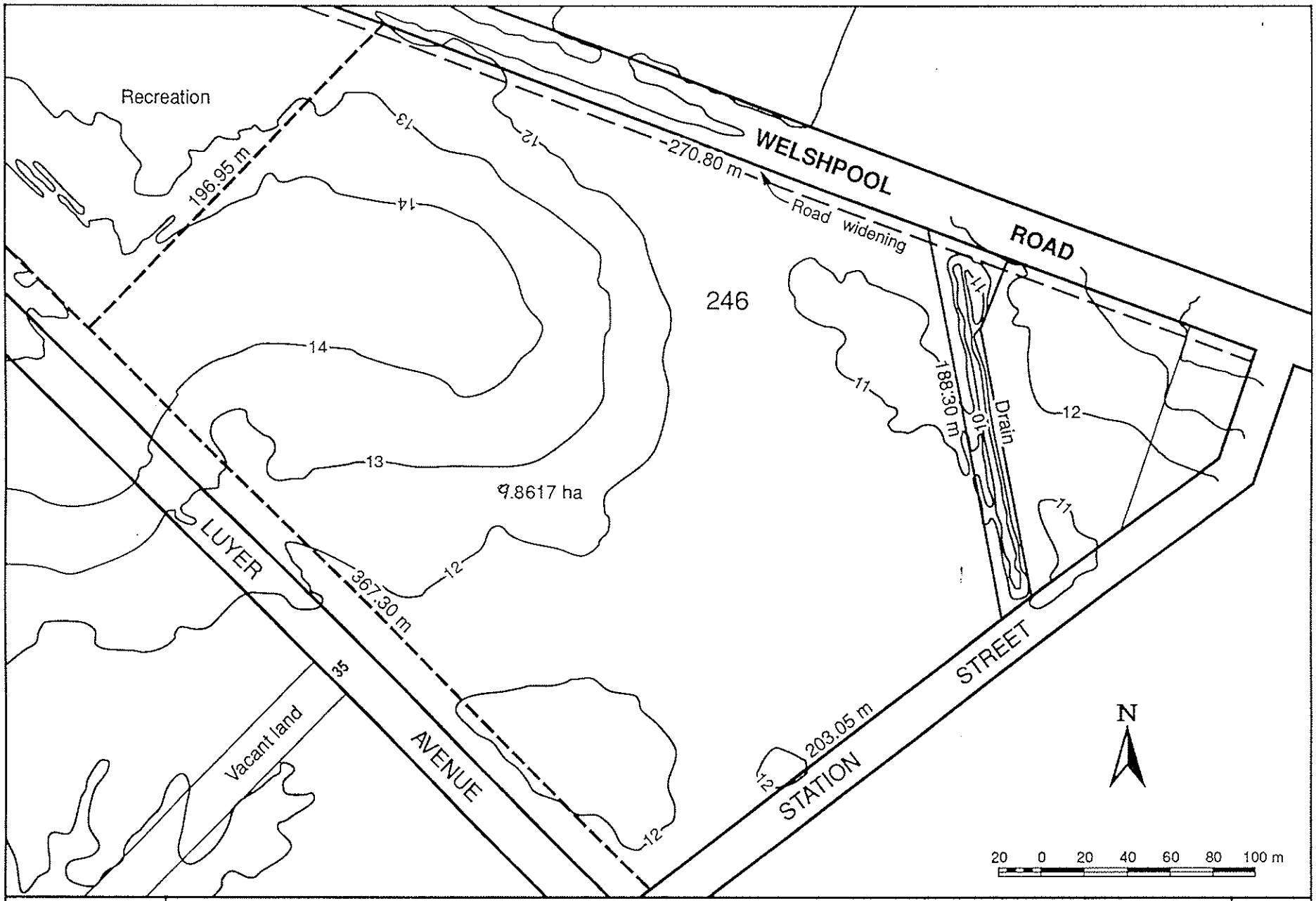
The Queen's Park Ecological Area is located on the eastern part of the Swan Coastal Plain where alluvial clays originating from the Darling Plateau meet grey Bassendean sands blown in from the west. The sands form shallow dunes and drifts over the clay and are indispersed with flat, lower lying clay soils. When this variation in depth of sand over clay is coupled with variations in depth to groundwater and the possibility of localised perched water tables, a mosaic of vegetation habitats occurs. This mosaic has been termed the Southern River Vegetation Complex (Heddle et al, 1980).

The vegetation units at QPEA can be seen as related to the topography (Map 2):

Banksia dominated assemblages occur on the low sandy dunes, Marri slightly lower in the landscape on shallow sand over clay and *Melaleuca preissiana* where it is seasonally damp at the surface.

The lowest lying areas at QPEA have remnant stands of *Melaleuca rhaphiophylla*, but unfortunately the original understorey has all been lost and replaced by weeds such as Arum Lilies, Bridal Creeper, Pampas Grass and exotic grasses. The *Melaleuca rhaphiophylla* area presumably had an understorey of *Restio stenostachyus* as is still present in the largely intact wetland vegetation nearby at the vacant block of 35 Luyer Street.

Unfortunately the clay soils at QPEA (potentially the richest areas floristically), have lost all but a few remnants of their original vegetation (eg, this area still has a small stand of *Melaleuca viminea*).



C. Tauss
Bushranger Landcare

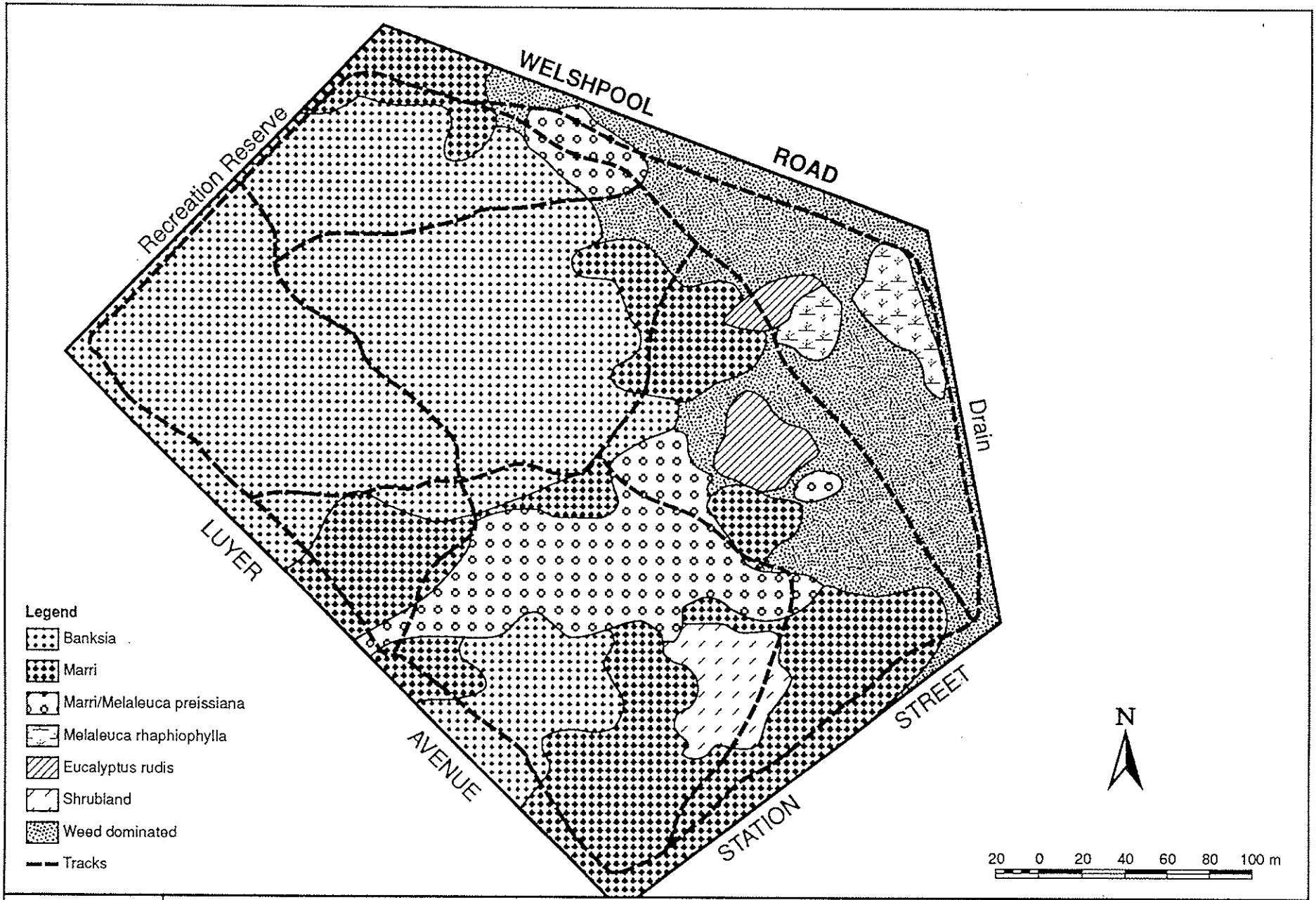
Queens Park Ecological Area: Location and Topograpy

Map 2

Vegetation Units

The vegetation units which were mapped are listed below and shown on Map 3:

1. *Banksia* low open forest to low forest.
2. Marri low woodland to low forest.
3. Marri/*Melaleuca preissiana* low woodland to low forest.
4. *Melaleuca rhaphiophylla* low forest with weedy understorey.
5. *Eucalyptus rudis* low woodland with weedy understorey.
6. *Jacksonia furcellata* shrubland.
7. *Watsonia* dominated low lying areas.



C. Tauss Bushranger Landcare	Queens Park Ecological Area: Vegetation Units	Map 3

Vegetation Condition

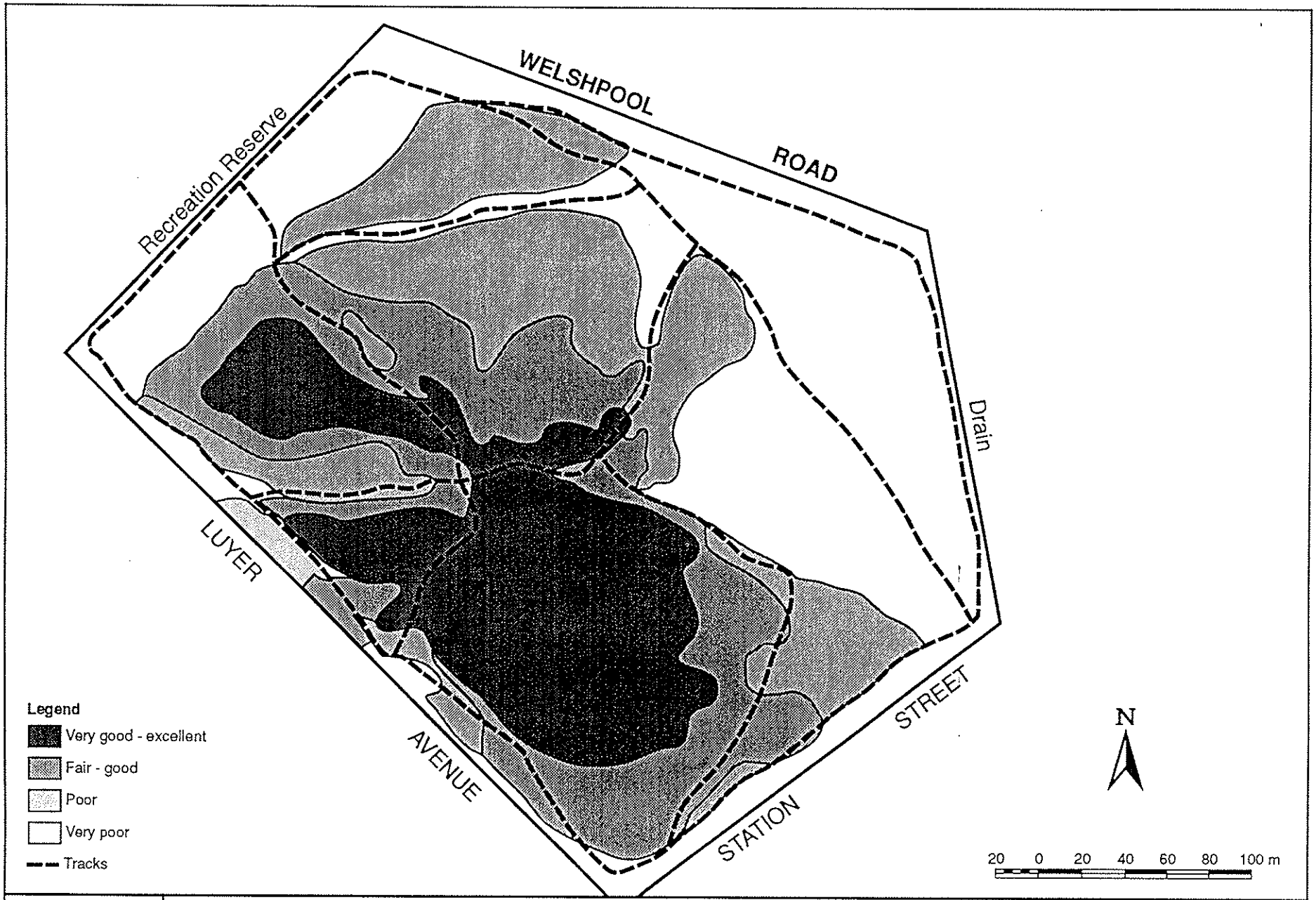
Four zones corresponding largely to understorey composition were mapped and are shown on Map 4.

* About one quarter of the reserve is in very good to excellent condition with cover of weeds less than 5%. **This area is very important as it contains most of the floristic diversity of the reserve**. However, this area does show signs of frequent fire in the past and this has affected the structure of the vegetation. For example, many of the *Banksia attenuata*, which have recruited from seed after a fire, have not as yet reached a mature height. Aggressive weeds - ie, Bridal Creeper, Arum Lilies, *Watsonia* and Perennial Veldt Grass are present in this area although, as yet, at low density. There has been considerable rubbish dumped in this area but this should cease now that the reserve has been fenced.

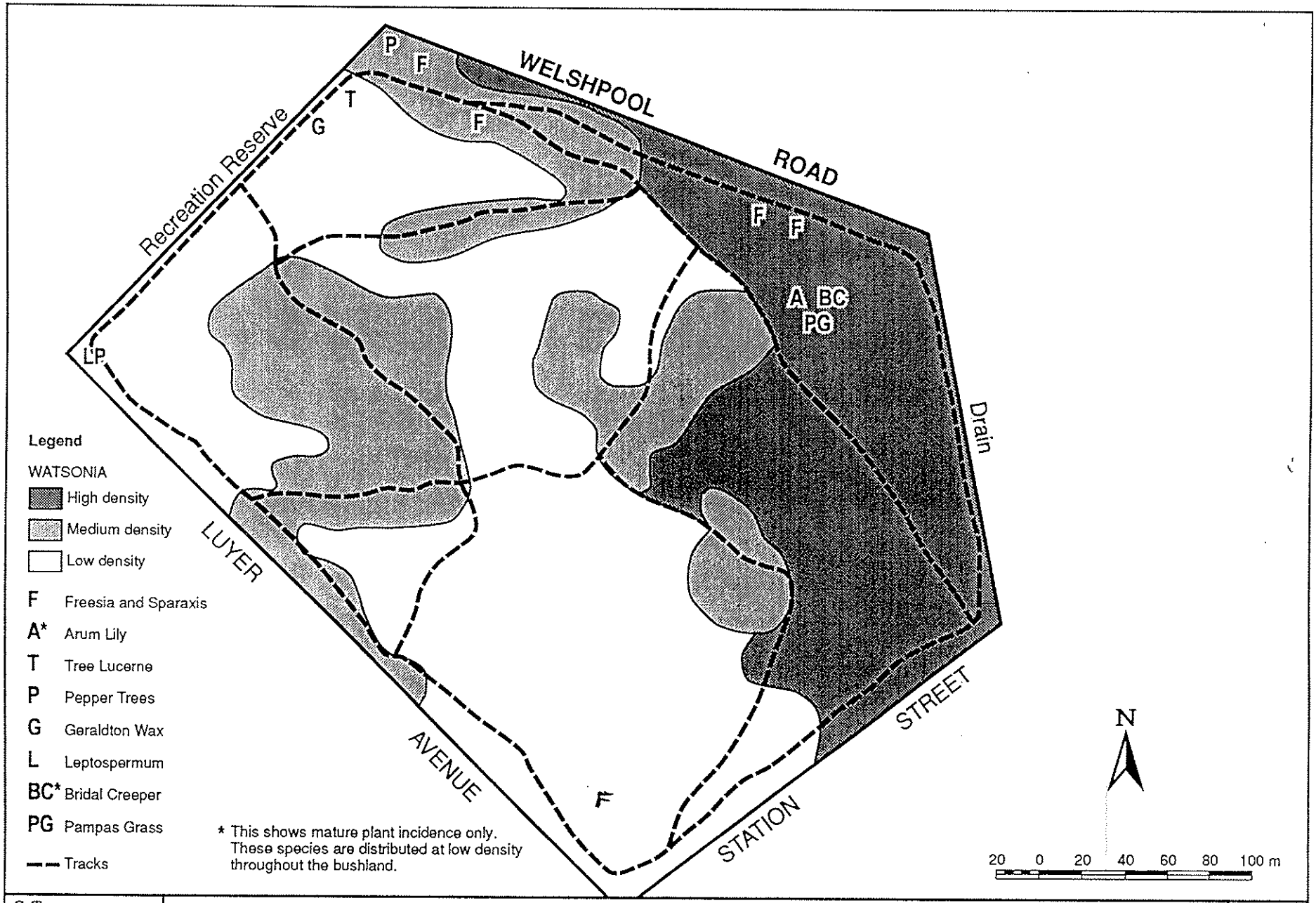
* The area in fair to good condition is similar in structure to the best condition bush but generally shows a greater density of the weeds, as above, as well as a small area of Freesia and Sparaxis in the Marri unit near the corner of Station Street and Luyer Street.

* The poor condition bushland is generally situated in the north-west of the reserve and is heavily invaded with Veldt Grass subsequent to frequent fires. This area has lost most of its indigenous annuals and most of the indigenous species which recruit after a fire primarily from seed. It does, however, still show a good diversity and cover of tree, shrub and perennial herb species which resprout from underground woody rootstocks or rhizomes after fire.

* The very poor condition bushland has an understorey almost totally replaced by *Watsonia* and/or Perennial Veldt Grass. In addition some areas have also lost their original tree and shrub cover. This is probably due to a combination of frequent fires, grazing, clearing and competition between weeds and indigenous species. Floristic diversity in this area is low and consists mainly of weed species.



C. Tauss Bushranger Landcare	Queens Park Ecological Area: Bushland Condition	Map 4



C. Tauss Bushranger Landcare	Queens Park Ecological Area: Major Weed Distribution	Map 5

FLORA

Flora study sites were located in good to very good condition vegetation in the *Banksia,* Marri, Marri/*Melaleuca preissiana* and *Jacksonia furcellata* shrubland vegetation units. The sites are described in Table 2 and the record sheets for these sites are attached in Appendix 2.

A total of 165 indigenous taxa and 64 naturalized alien taxa (weeds) were recorded (Appendix 1). One currently listed CALM Priority One species was found: *Macarthuria keigheryi.* This small and fairly inconspicuous shrub appears to be quite uncommon in the bushland; only two specimens were seen.

(Priority One taxa are those which are known from one or a few (generally less than 5) populations which are under threat, either due to small population size or being on lands under immediate threat. Such taxa are under consideration for declaration as "rare flora" but are in need of further study.)

Other uncommon species which occur in QPEA which have previously been listed as priority species but which are not currently listed include:

- *Cartonema philydroides*
- *Daviesia physodes*
- *Gonocarpus pithyoides*
- *Thysanotus arbuscula*
- *Restio stenostachyus*

Of interest also at QPEA is a prostrate shrub, *Grevillea bipinnatifida* which is normally confined to the Darling Range and Scarp and only a few sites on the Coastal Plain. It is found on the eastern side of the reserve, under *Hakea prostrata* bordering a grove of Marri trees.

Several of the most aggressive weeds occurring on the Swan Coastal Plain are present at QPEA. These include Bridal Creeper, *Watsonia* spp, Arum Lilies, Perennial Veldt Grass, *Freesia* and *Sparaxis.* The Arum Lilies and Bridal Creeper are distributed at low density throughout the bushland and at the seedling stage are difficult to see. The Bridal Creeper, which is spread through seed carried by birds, tends to be located under trees such as Marri and *Melaleuca preissiana.*

TABLE 2 - Flora Site Descriptions

Marri Low Woodland to Low Forest

QP1

Marri (*Corymbia calophylla*) low woodland over *Stirligia latifolia / Acacia pulchella* open shrubland, *Patersonia occidentalis / Lomandra* spp very open herbland and closed sedgeland of *Alexgeorgea nitens.*

Condition: very good. Soil: grey sand. Litter: 30-70%. Bare Ground: less than 2%. Aspect: gentle NE slope.

QP3

Marri (*Corymbia calophylla*) low woodland over *Hibbertia hypericoides/ Acacia pulchella* open shrubland over open herbland of *Phlebocaya ciliata/ Dasypogon bromeliifolius* and open sedgeland of *Alexgeorgea nitens.*

Condition: very good. Soil: grey-brown sand. Litter: 30-70%. Bare Ground: 0%. Aspect: flat.

Banksia Low Open Forest to Forest

QP2

Banksia attenuata / Banksia menziesii low open forest over heathland of *Hibbertia hypericoides / Bossiaea eriocarpa* over open herbland of *Patersonia occidentalis* and sedgeland of *Alexgeorgea nitens.*

Condition: very good. Soil: grey sand. Litter: 2 to 10%. Bare Ground: less than 2%. Aspect: gentle N slope.

QP5

Banksia attenuata low open forest over open heathland to heathland of *Eremaea pauciflora/ Melaleuca seriata* over open herbland of *Patersonia occidentalis* and open sedgeland of *Alexgeorgea nitens.*

Condition: very good. Soil: grey sand. Litter: greater than 70%. Bare Ground: 0%. Aspect: flat.

QP7

Banksia menziesii / Banksia attenuata low forest over open heathland of *Allocasuarina humulis / Hibbertia hypericoides* over open grassland of *Amphipogon turbinatus / *Briza maxima* and open sedgeland of *Mesomelaena pseudostygia.*

Condition: very good. Soil: grey sand. Litter: 30 to 70%. Bare Ground: less than 2%. Aspect: gentle SE slope.

QP8

Banksia attenuata / Allocasuarina fraseriana / Banksia menziesii low open forest over *Hibbertia hypericoides / Bossiaea eriocarpa* shrubland, *Patersonia occidentalis* open herbland and *Alexgeorgea nitens* open sedgeland.

Condition: very good. Soil: grey sand. Litter: greater than 70%. Bare Ground: 0%. Aspect: gentle slope to east.

Shrubland / Sedgeland

QP4

Sedgeland of *Cyathochaeta clandestina / Alexgeorgea nitens* with shrubland of *Jacksonia furcellata / Stirlingia latifolia* over very open herbland of *Podolepis gracilis.*

Condition: good. Soil: grey sand. Litter: 30-70%. Bare Ground: less than 2%. Aspect: flat.

Marri / Melaleuca Preissiana Low Woodland to Low Forest

QP6

Melaleuca preissiana / Marri / *Banksia menziesii* low open forest over open heathland *Jacksonia furcellata / Hibbertia hypericoides / Allocasuarina fraseriana,* open herbland of *Phlebocarya ciliata* and sedgeland of *Alexgeorgea nitens.*

Condition: very good. Soil: grey sand. Litter: 70% or more. Bare Ground: 0%. Aspect: flat.

QP9

Marri (*Corymbia calophylla*) / *Melaleuca preissiana* low woodland over open heathland of *Jacksonia furcellata / Corynotheca micrantha* over very open herbland of *Lomandra* spp / and sedgeland of *Loxocarya fasciculata / Alexgeorgea nitens.*

Condition: very good. Soil: grey sand. Litter: more than 70%. Bare Ground: 0%. Aspect: flat.

MANAGEMENT

Whilst it is beyond the scope of this report to present detailed management strategies, some broad principles in managing QPEA for conservation should include:

- Total exclusion of fire as a management strategy from the bushland and the rapid control of any wild fires which do occur.
- Creation of a programme to control the propagation of the most aggressive weeds from the bushland areas which are still in good or fair condition and gradually eliminate these weeds from the best condition bushland.
- Monitoring of management actions.

Fire

Fire control would be aided by reduction of fuel load associated with copious dry Veldt Grass and *Watsonia* in the bush in summer.

A programme of spraying the Veldt Grass with the selective herbicide Fusilade and manual removal or herbicide treatment of the *Watsonia* would be most advisable in the best condition bushland. In the areas massively infested with these weeds, total weed elimination is not practical unless coupled with high density replanting of indigenous species and high maintenance for several years (see Table 3 for species suitable for revegetation).

Fires originating in the mass of thick dry *Watsonia* in the north of the reserve would most probably spread rapidly under prevailing winds in summer to adjacent good condition bush. It would be possible to clear firebreaks in the thick *Watsonia* to help protect the southern areas of bush. However, care should be taken to avoid removing remnant indigenous vegetation in this zone when firebreaks are planned.

The Fire and Rescue Service is currently preparing contingency plans in co-operation with volunteer groups and local authorities for protecting significant areas of bushland in Perth from fire. The City of Canning could have an important role in initiating such a plan for the QPEA if it does not already exist.

Weed Control Priorities

The local Friends group have already commenced eliminating *Watsonia,* Arum Lilies, Pink Gladiolus and Bridal Creeper from the best condition bushland with the help of the City of Canning. It is important that these efforts continue as the weeds in this area are still at low density and the bushland will be greatly assisted in its regeneration by such action.

* If the Bridal Creeper (*Asparagus asparagoides*) is left unchecked, it will ultimately destroy the structure of the bush and decimate its current floral diversity. This can be clearly seen in bushland such as King's Park where parts of the Mt Eliza Scarp support virtually no original vegetation after Bridal Creeper has become securely established. Bassendean sand based bushland in good condition on the Swan Coastal Plain, (such as QPEA) as yet shows little documented evidence of serious Bridal Creeper infestation. **However, the presence of Bridal Creeper seedlings actively recruiting throughout the good condition bush at QPEA indicates a need to act promptly.**

Bridal Creeper is easily controlled as seedlings or one year old crowns by digging out the crowns with a knife, taking care to disturb the soil as little as possible. Older plants usually develop extensive underground rhizomes which are difficult to trace and remove totally. These older plants can be killed by spraying with a 1:100 solution of Glyphosate 360 (Dixon, 1996). Repeated applications of the herbicide may be necessary. Bridal Creeper is most conspicuous early in autumn as it starts producing green shoots before most local plants emerge from summer dormancy. Infestations usually begin under trees used by birds for roosting.

* Good control of *Watsonia* has been achieved with volunteers working together with local authority support in Darlington (Day, 1993). Methods such as removing flower spikes and wiping the plant with a 1:100 solution of Glyphosate 360 have been shown to be most effective at flowering time in spring.

* Arum Lilies (*Zantedeschia aethiopica*) are present throughout the reserve as seedlings which are difficult to see from a distance. These plants probably originate from seed transported by birds. The seedlings are easily removed with a knife, taking care to dig out the small underground rhizomes from which the plant will otherwise resprout. Larger plants are present in the *Melaleuca rhaphiophylla* area in the north of the reserve. These will need more extensive digging or herbicide treatment to eliminate.

* As mentioned above, Perennial Veldt Grass (*Ehrharta calycina*) control is important in reducing fuel loads and thus risk and intensity of wildfires. The north-west part of the reserve has been severely impacted upon by frequent fires and is heavily infested with Veldt Grass. There is also considerable cover of this weed in the good condition bushland, where it competes aggressively with indigenous species and must be controlled as a top priority if floristic diversity is to be maintained.

Control involves a planned programme of spraying with the herbicide Fusilade, which has been shown in research at King's Park to only affect exotic grasses and not indigenous species. Timing of the spray programme is important as the grass must be sprayed after parent plants have commenced active growth following winter rains and seeds dropped last year have germinated but before the grass starts setting the current seasons seeds.

It may be necessary to spray the bushland several times in the first season to kill both parent plants and seedlings. It is also, of course, important to apply the spray on a dry day so there can be sufficient contact of the spray with the grass before the next rain occurs.

Coupled with the high cost of this herbicide, these factors mean a Fusilade treatment programme needs to be carefully planned and supervised.

* Freesia (*Freesia aff. leichtlinii*) and Sparaxis (*Sparaxis bulbifera*) are aggressive weeds which are difficult to control once they get well established amongst indigenous species. Herbicide treatment of 1:100 Glyphosate 360 wiped or sprayed onto the plants in spring at early flowering stage is effective. Unfortunately, this herbicide also affects indigenous species.

Manual removal of corms is only practical when a small area is affected as it is very labour intensive and needs to be repeated diligently for about 4 consecutive years. Corms are inevitably missed in hand weeding and the soil seed bank does not all germinate in one season. **Hand weeding however is probably feasible in the small infestation of these weeds in the Marri unit near the corner of Luyer and Station Streets. This task should be one of the top priorities for the Friends group.** Where these weeds occur elsewhere in the reserve there is practically no indigenous understorey left and herbicide treatment is acceptable.

Monitoring

Nine permanent 100 sqm quadrants were established in good to very good condition bushland during this study and detailed information about these sites is presented in Appendix 2. These sites can be monitored periodically to record changes occurring in the vegetation under different management regimes. For example, it would be a valuable and relatively simple task to record the rate of recruitment of indigenous species such as *Banksia* tree seedlings and cover of weed species each year in these sites. In addition if fires do occur, re-survey of these sites after fire may show floristic change.

TABLE 3 - Some Local Species Suitable for Revegetation of the Wetland Zone

Acacia saligna
Baumea juncea *
Banksia littoralis
Carex sp. *
Cyathochaeta avenacea *
Cyathochaeta clandestina *
Eucalyptus rudis
Hakea varia

Hypocalymma angustifolia
Juncus caespititious *
Juncus pallidus
Lepidosperma longitudinale *
Melaleuca lateritia
Melaleuca preissiana
Melalueca rhaphiophylla
Melaleuca viminea
Pericalymma elliptica
Restio stenostachys *
Viminaria juncea

* It may be necessary to seek specialist advice regarding propagation of these species from King's Park.

DISCUSSION

A very large proportion of the Southern River Vegetation Complex has been cleared or otherwise degraded. This vegetation unit also varies a great deal across its range in terms of structure and floristics because of the complicated mix of habitats upon which the vegetation is based. Therefore any remaining areas of this type of vegetation in good condition are considered of conservation value because of their scarcity (Trudgen, 1995).

The Queen's Park Ecological Area is a small remnant of this vegetation type. It is unfortunate that what may have been, floristically, the richest section of this reserve has been cleared. However, good to excellent sections of the bushland on the low dunes are still intact and these have a diverse and aesthetically pleasing flora which is prized by the local community. The bushland is significant floristically because it is one of the few sites where *Macarthuria keigheryi* is found on the Swan Coastal Plain. It also contains *Grevillea bipinnatifida*, an unusual species for the coastal plain.

The Queen's Park Ecological Area is the last remaining reserve of this type of bush in the City of Canning and thus of high local significance. Although the good condition bush at QPEA is not very large, it can also be argued that it has regional significance pending a thorough review of remnants of the Southern River vegetation unit on the Swan Coastal Plain. It is therefore important that sufficient resources be devoted to this area to safeguard its conservation values.

REFERENCES

Buchanan, R. 1989. *Bushland Regeneration: Recovering Australian Landscapes.* New South Wales TAFE.

Day, P. Community experience in the Hills. In: *Watsonia* Workshop. Piggot, P.J. and Gray, M.C. (eds). *Plant Protection Quarterly* Vol.8 (3), 1993. Department of Conservation and Land Management , Western Australia.

Dixon, I.R. Control of bridal creeper (*Asparagus asparagoides*) and the distribution of *Asparagus declinatus* in King's Park bushland , 1991-1995. In: Bridal Creeper Symposium. Piggot, P.J., Lamont, D and Keighery, G. (eds). *Plant Protection Quarterly* Vol.11 (2) 1996. Department of Conservation and Land Management, Western Australia.

Gibson, N., Keighery, B.J., Keighery, G.J., Burbidge, A.H. and 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).

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

Keighery, B.J. 1994. *Bushland Plant Survey. A Guide to Plant Community Survey for the Community.* Wildflower Society of Western Australia.

Specht, R.L. 1981. *Foliage projective cover and standing biomass.* In: *Vegetation Classification in Australia,* pp 10-21 Gillison A.N and Anderson D.J. (ed). C.S.I.R.O.

Trudgen, M.E. 1995. *Objection Assessment for Perth Airport, flora values and advice on the flora values of bushland not currently listed.* Australian Heritage Commission.

APPENDIX 1

FLORA OF QUEEN'S PARK ECOLOGICAL AREA

February 1997

C Tauss
Bushranger Landcare
Ph: 309 5241

CYCADS

Zamiaceae

Macrozamia riedlei	Zamia

FLOWERING PLANTS

Anthericaceae

Arnocrinium preissii	
Caesia micrantha	Pale Grass Lily
Chamaescilla corymbosa	Blue Squill
Corynotheca micrantha	
Laxmannia ramosa	
Laxmannia sessiliflora	
Laxmannia squarrosa	
Sowerbaea laxiflora	Vanilla Lily
Thysanotus arbuscula	Fringe Lily
Thysanotus arenarius	Fringe Lily
Thysanotus manglesianus	Fringe Lily
Thysanotus multiflorus	Fringe Lily
Tricoryne elatior	Yellow Autumn Lily
Tricoryne tenella	

Anacardiaceae

**Schinus terebinthifolius*	Japanese Pepper Tree

Apiaceae

Xanthosia huegelii	
Daucus glochidiatus	Native Carrot
Trachymene pilosa	Native Parsnip

Note:
* Naturalised alien taxa
# CALM Priority taxa

Araceae	
**Zantedeschia aethiopica*	Arum Lily
Asparagaceae	
**Asparagus asparagoides*	Bridal Creeper
Asphodelaceae	
**Trachyandra divaricata*	Onion Weed
Asteraceae	
**Arctotheca calendula*	Cape Weed
**Aster subulatus*	
Asteridea pulverulenta	Common Bristle Daisy
**Conyza albida*	Tall Fleabane
Hyalosperma cotula	
**Hypochaeris glabra*	Flat Weed
**Lactuca saligna*	Wild Lettuce
Lagenifera huegelii	
**Osteospermum clandestinum*	Stinking Roger
Podolepis gracilis	Slender Podolepis
Podotheca gnaphalioides	
Siloxerus humifusis	
**Solidago canadensis*	Golden Rod
**Sonchus oleraceus*	Common Sowthistle
**Ursinia anthemoides*	
Brassicaceae	
**Raphanus raphanistrum*	Wild Radish
Caryophyllaceae	
**Petrorhagia velutina*	Velvet Pink
**Silene gallica*	French Catchfly
Casuarinaceae	
Allocasuarina fraseriana	Fraser's Sheoak
Allocasuarina humulis	Dwarf Sheoak
Colchicaceae	
Burchardia congesta	Milkmaids
Commelinaceae	
Cartonema philydroides	

Note:
* Naturalised alien taxa
# CALM Priority taxa

Cyperaceae

9 *Baumea juncea*
30 *Carex sp.*
1 *Cyathochaeta avenaceae*
2 *Cyathochaeta clandestina*
3 *Isolepis cernua*
4 *Isolepis marginata*
5 *Lepidosperma leptostachyum*
6 *Lepidosperma longitudinale*
7 *Lepidosperma pubisquamatum*
8 *Lepidosperma scabrum*
9 *Lepidosperma squamatum*
40 *Mesomelaena pseudostygia*
1 *Mesomelaena tetragona* Semaphore Sedge
2 *Schoenus curvifolius*
3 *Schoenus rigens*
4 *Tetraria octandra*

Dasypogonaceae

5 *Dasypogon bromeliifolius* Pineapple Bush
6 *Calectasia cyanea* Blue Tinsel Lily
7 *Lomandra caespitosa*
8 *Lomandra hermaphrodita*
9 *Lomandra micrantha*
50 *Lomandra preissii*
1 *Lomandra suavolens*

Dilleniaceae

2 *Hibbertia aurea*
3 *Hibbertia huegelii*
4 *Hibbertia hypericoides* Buttercups
5 *Hibbertia racemosa* Stalked Guinea Flower

Droseraceae

6 *Drosera erythrorhiza* Red Ink Sundew
7 *Drosera glanduligera*
8 *Drosera menziesii*
9 *Drosera stolonifera ssp. porrecta*

Epacridaceae

60 *Astroloma macrocalyx* Swan Berry
1 *Conostephium pendulum* Pearl Flower
2 *Conostephium preissii*
3 *Leucopogon conostephioides*
4 *Leucopogon propinquus*

Note:
* Naturalised alien taxa
# CALM Priority taxa

Euphorbiaceae	
**Euphorbia peplus*	Petty Spurge
**Euphorbia terracina*	Geraldton Carnation
Poranthera microphylla	
Fumariaceae	
**Fumaria capreolata*	Fumitory
Geraniaceae	
**Pelargonium capitatum*	Rose Pelargonium
Goodeniaceae	
Dampiera linearis	
Haemodoraceae	
Anigozanthus humulis	Cat's Paw
Anigozanthus manglesii	Kangaroo Paw
Conostylis aculeata	Prickly Conostylis
Conostylis juncea	
Conostylis setigera	Bristly Conostylis
Haemodorum spicatum	
Phlebocarya ciliata	
Haloragaceae	
Gonocarpus pithyoides	
Hyacinthaceae	
**Lachenalia reflexa*	
Iridaceae	
**Freesia aff. leichtlinii*	Freesia
**Gladiolus angustus*	Painted Lady
**Gladiolus caryophyllaceus*	Pink Gladiolus
**Hesperantha falcata*	
**Homeria flaccida*	Cape Tulip
Patersonia occidentalis	Purple Flag
**Romulea rosea*	Guildford Grass
**Sparaxis bulbifera*	Sparaxis
**Watsonia bulbillifera*	Watsonia
**Watsonia versfeldii*	Watsonia
Juncaceae	
**Juncus bufonius*	Toad Rush
Juncus caespititious	
Juncus pallidus	Pale Rush

Note:
* Naturalised alien taxa
# CALM Priority taxa

Lamiaceae

8 *Hemiandra pungens* — Snake Bush

Lobeliaceae

9 *Lobelia tenuior* — Slender Lobelia
**Monopsis simplex*

Loganiaceae

80 *Phyllangium paradoxa*

Loranthaceae

1 *Nuytsia floribunda* — W.A. Xmas Tree

Lythraceae

**Lythrum hyssopifolia*

Mimosaceae

7 *Acacia applanata*
3 *Acacia huegelli*
4 *Acacia pulchella* — Prickly Moses
5 *Acacia saligna* — Orange Wreath Wattle
6 *Acacia sessilis*

Molluginaceae

7 *Macarthuria australis*
8 # *Macarthuria keigheryi* — *PRIORITY 1* = DRF 1997

Myrtaceae

9 *Baeckea camphorosmae*
90 *Calytrix flavescens* — Yellow Star Flower
1 *Calytrix fraseri* — Pink Summer Star Flower
**Chamelaucium uncinatum* — Geraldton Wax
2 *Corymbia calophylla* — Marri
3 *Eremaea pauciflora*
4 *Eucalyptus rudis* — Flooded Gum
5 *Hypocalymma angustifolia*
6 *Kunzea ericifolia* — Spearwood
**Leptospermum laevigatum* — Victorian Coastal Tea Tree
7 *Melaleuca lateritia* — Robin Redbreast Bush
8 *Melaleuca preissiana* — Modong
9 *Melaleuca rhaphiophylla* — Freshwater Paperbark
100 *Melaleuca seriata*
1 *Melaleuca viminea*
2 *Scholtzia involucrata*
3 *Verticordia densiflora*

Note:
* Naturalised alien taxa
# CALM Priority taxa

/120

Oleaceae

**Olea europaea*	Olive

Orchidaceae

4 *Burnettia nigricans*	Red Beak Orchid
5 *Caladenia flava*	Cowslip Orchid
6 *Diuris corymbosa*	Donkey Orchid
7 *Diuris ?magnifica*	
8 *Microtis media ssp media*	Mignonette Orchid
9 *Microtis unifolia*	
**Monodenia bracteata*	
10 *Pterostylis nana*	Snail Orchid
1 *Pterostylis sanguinea*	
2 *Pterostylis vittata*	Greenhoods

Oxalidaceae

**Oxalis pes-caprae*	

Papilionaceae

3 *Bossiaea eriocarpa*	Common Brown Pea
**Cytisus prolifera*	Tree Lucernee
4 *Daviesia divaricata*	
5 *Daviesia physodes*	
6 *Gompholobium tomentosum*	Hairy Yellow Pea
7 *Hardenbergia comptoniana*	Native Wisteria
8 *Hovea trisperma*	
9 *Isotropis cuneifolia*	Granny's Bonnets
120 *Jacksonia densiflora*	
1 *Jacksonia furcellata*	
2 *Jacksonia sternbergiana*	Stinkwood
3 *Kennedia prostrata*	Red Runner
**Lotus angustissimus*	Narrowleaf Trefoil
**Lotus suavolens*	Hairy Birdsfoot Trefoil
**Lupinus consentinii*	Sandplain Lupin
4 *Nemcia capitata*	Eggs and Bacon
**Trifolium campestre*	Hop Clover
**Vicia sativa*	Vetch
5 *Viminaria juncea*	Swish Bush

Phormicaceae

6 *Dianella revoluta*	

Pittosporaceae

7 *Pronaya fraseri*	

Note:
* Naturalised alien taxa
# CALM Priority taxa

Poaceae

**Anthoxanthum odoratum*	Sweet Vernal Grass
**Aira cupaniana*	
Amphipogon turbinatus	
Austrostipa compressa	
Austrostipa semibarbata	
**Avena barbata*	Wild Oats
**Briza maxima*	Blowfly Grass
**Briza minor*	
**Bromus diandrus*	Great Brome
**Cortaderia selloana*	Pampas Grass
**Cynodon dactylon*	Couch
**Ehrharta calycina*	Perennial Veldt Grass
**Ehrharta longiflora*	Annual Veldt Grass
**Eragrostis curvula*	African Love Grass
**Hordeum leporinum*	Barley Grass
**Lagurus ovatus*	Hares Tail Grass
**Lolium perenne*	Perennial Rye Grass
Microlaena stipoides	Weeping Grass
**Pennisetum clandestinum*	Kikuyu Grass
**Pennisetum purpureum*	Elephant Grass
**Poa annua*	Winter Grass
**Polypogon monspeliensis*	

Polygalaceae

Comesperma virgatum	

Primulaceae

**Anagallis arvensis*	Pimpernel

Proteaceae

Adenanthos cygnorum ssp. *cygnorum*	Woolly Bush
Banksia attenuata	Candle Banksia
Banksia grandis	Bull Banksia
Banksia ilicifolia	Holly Leaf Banksia
Banksia littoralis	Swamp Banksia
Banksia menziesii	Firewood Banksia
Dryandra lindleyi	
Grevillea bipinnatifida	
Hakea prostrata	Harsh Hakea
Hakea varia	
Persoonia saccata	Snottygobble
Petrophile linearis	Pixie Mops
Petrophile media	
Stirlingia latifolia	Blueboy
Synaphea spinulosa	

Note:
* Naturalised alien taxa
# CALM Priority taxa

Restionaceae

8 *Alexgeorgea nitens*
9 *Desmocladus flexuosus*
150 *Hypolaena exsulca*
1 *Loxocarya fasciculata*
2 *Loxocarya pubescens*
3 *Lyginia barbata*

Rubiaceae

4 *Opercularia vaginata*

Rutaceae

5 *Boronia ramosa ssp. anethifolia*
6 *Eriostemon spicatus* — Pepper and Salt

Solanaceae

**Solanum americanum* — Glossy Nightshade

Stackhousiaceae

7 *Tripterococcus brunonis*

Stylidiaceae

8 *Levenhookia pusilla*
9 *Levenhookia stipitata*
160 *Stylidium brunonianum* — Pink Fountain Trigger Plant
1 *Stylidium calcaratum* — Book Triggerplant
2 *Stylidium diuroides* ssp.*diuroides* — Donkey Triggerplant
3 *Stylidium piliferum* — Common Butterfly Triggerplant
4 *Stylidium repens* — Matted Triggerplant

Valerianaceae

**Centranthus macrosiphon*

Violaceae

5 *Hybanthus calycinus* — Native Violet

Xanthorrhoeaceae

6 *Xanthorrhoea brunonis*
7 *Xanthorrhoea preissii* — Grasstree / Blackboy

167 Native Taxa
(165 in text)

Note:
* Naturalised alien taxa
# CALM Priority taxa

APPENDIX 2

FLORA SITES RECORD SHEETS

Note:
* Naturalised alien taxa
# CALM Priority taxa

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA Q.P.E.A. SITE NUMBER QP1

DATE TRIP 12/6/96 RECORDERS T.W

DATE TRIP _____ RECORDERS _____

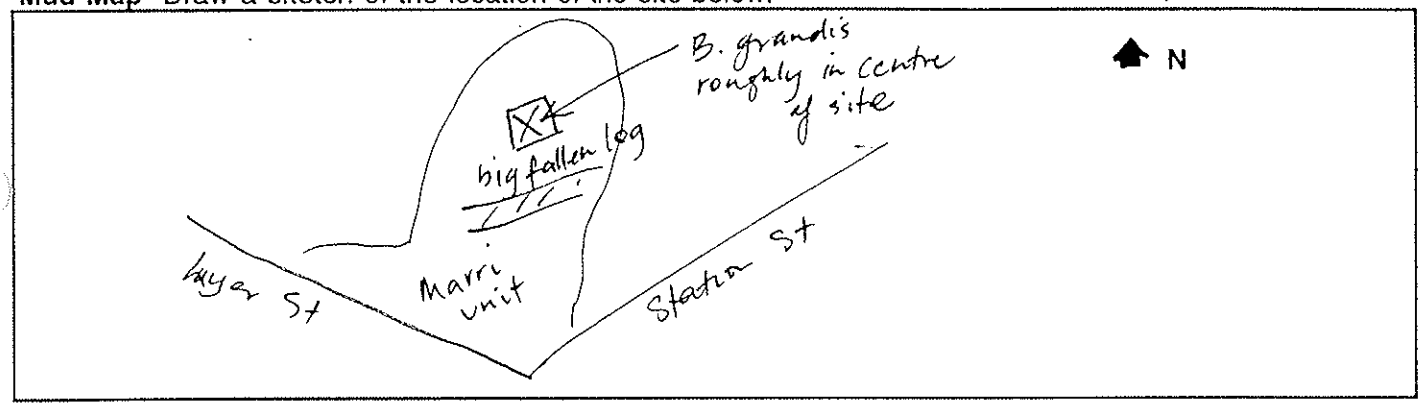
DATE TRIP _____ RECORDERS _____

BOTANIST C.T.

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

1. LOCATION of the QUADRAT

Mud Map Draw a sketch of the location of the site below.



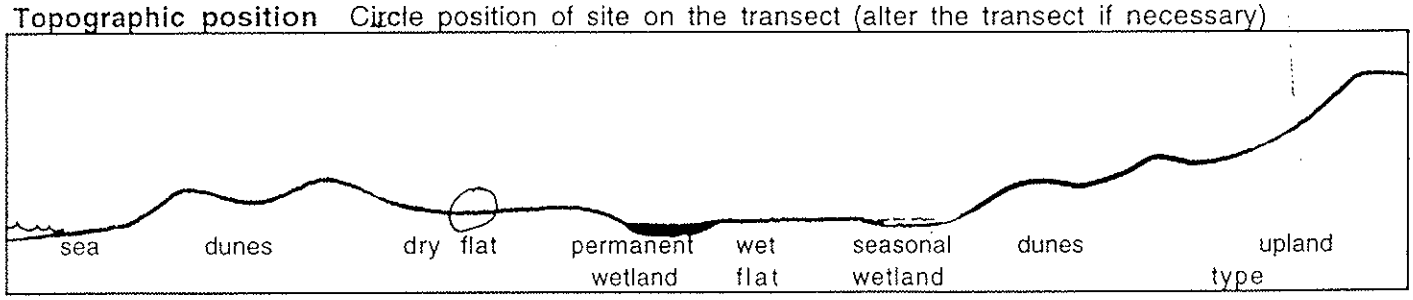
Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name Photo No

Topographic position Circle position of site on the transect (alter the transect if necessary)



2. SITE DATA Circle the correct response.

Slope flat (gentle) steep *Aspect* N (NE) E SE S SW W NW

Surface Soil sand *Colour* grey

Exposed rock – *type* – % surface

Sub-surface Soil clay *Colour* brown

Rock – *type* – depth to rock –

Drainage (well) mod poor depth water cm *Wet* all year winter/spring

Litter 30 – 70 % cover Depth 2 cm

Bare Ground ∠2 %cover

Q.P. 1.

BUSHLAND PLANT SURVEY RECORDING SHEET 2 - use pencil only

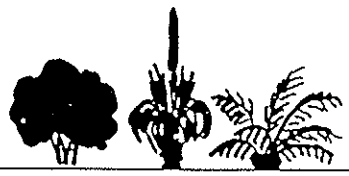
From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

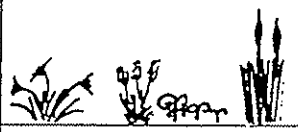
3. VEGETATION STRUCTURE AND COVER

For each layer **record** - appropriate **life form**, **cover class** (see below).and **dominant species** in each layer.

Cover Class - **2-10%** **10-30%** **30 - 70%** **over 70%**

	TREES			MALLEES	
	over 30m	10 - 30m	under 10m	over 8m	under 8m
LIFE FORM					30m 10m
COVER CLASS (%)	-	-	10 - 30%	-	-
DOMINANT SPECIES			Marri		
			B. grandis		

	SHRUBS		SHRUBS
	over 2m	2m - 1m	under 1m
LIFE FORM			2m 1m
COVER CLASS (%)	-	< 2%	2 - 10%
DOMINANT SPECIES		Acacia pulchella	Stirlingia latifolia
			Xanthorrhoea sp.
			Acacia pulchella

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				1m
COVER CLASS (%)	2 - 10%	2 - 10%	> 70%	
DOMINANT* SPECIES	Ehrharta	Patersonia	Alexgeorgea nitens	
	calycina	occidentalis	Meeboldina tetragona	

4. VEGETATION CONDITION

1 'PRISTINE'	
2 EXCELLENT	
3 VERY GOOD	✓
4 GOOD	
5 DEGRADED	

COMMENTS

Fire ~ 4 years ago

Wood harvesting

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

SITE No QP1

Date 12/6/96

Label each plant with plants number, site code, date and plant's name or working name if required

Record on Sheet

- Column 1 plant name-
- Column 2 plant number
- Column 3 flowering time- TICK if species flowering
- Column 4 identification check

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

TREES	No	Fl	ID
Marri (Corymbia calophylla)	1		✓
Banksia grandis	2		✓
B. attenuata	3		✓
Allocasuarina fraseriana	4		✓
MALLEES			
SHRUBS			
Acacia pulchella	5		✓
Stirlingia latifolia	6		✓
Bossiaea eriocarpa	7		✓
Hibbertia racemosa	8		✓
Hovea trisperma	9		✓
Xanthorrhoea ? brunonis	12		
Hibbertia hypericoides	14		✓
Dampiera linearis	15		✓
? Bossiaea sp - Hovea t. seedling	20		✓
Acacia applanata	25		✓
19/9/96			
Bursaria ramosa ssp anethifolia	46	✓	✓
Synaphea spinulosa	48	✓	✓

SHRUBS (cont.)	No	Fl	ID
GRASSES			
* Ehrharta calycina	35		✓
* Briza maxima (19/9/96)	44	✓	✓
HERBS			
Conostylis juncea	10		✓
Thysanotus manglesianus	11		✓
Lomandra preissii (yellow)	13	✓	✓
" " (purple)	16	✓	✓
Burchardia congesta	18		✓
seedlings (reduced leaf)	21		
* Hypochaeris glabra	22		✓
Dattersonia occidentalis	23		✓
Phlebocarya ciliata	26		✓
Pterostylis vittata	27		✓
Pterostylis nana	28		✓
Lomandra sp	29		
Lomandra sp	30		

HERBS (cont.)	No	Fl	ID
Sowerbaea laxiflora	31		✓
* Gladiolus caryophyllaceous	32		✓
* Ursinia anthemoides	34		✓
Thysanotus arbuscula	35		✓
Stricoyne elatior	37		✓
Haemodorum sp (N/S)	38		
* Zantedeschia aethiopica	41		✓
(seedlings - removed)			
19/9/96 Asteridea pulverulenta	42	✓	✓
Drosera stolonifera	43		✓
Caladenia flava	44		✓
Trachymene pilosa	45	✓	✓
SEDGES			
Mesomelaena tetragona	17		✓
Lepidosperma fasciculata	19		✓
Hypolaena exsulca	24		✓
Alexgeorgea nitens	33		✓
19/9/96			
* Watsonia sp	47		✓
* Anagallis arvensis	49		✓
Borya sphaerocephala	50		✓
ADJACENT			
Hypocalymma barbata			✓
Xanthosia huegelii			✓

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA Q.P.E.A. SITE NUMBER QP2

DATE TRIP 12/6/96 RECORDERS TW

DATE TRIP _____ RECORDERS _____

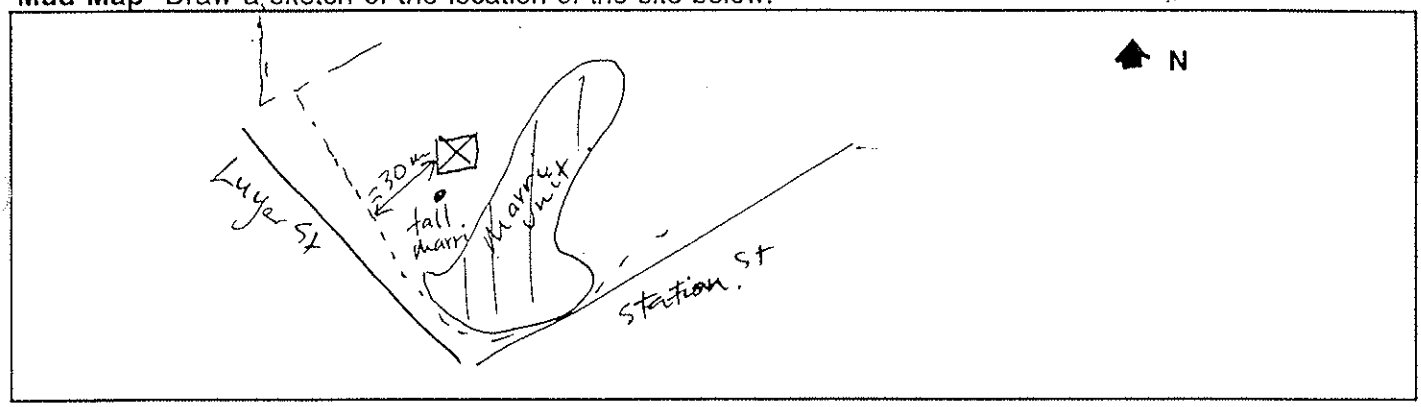
DATE TRIP _____ RECORDERS _____

BOTANIST C.T.

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

1. LOCATION of the QUADRAT

Mud Map Draw a sketch of the location of the site below.



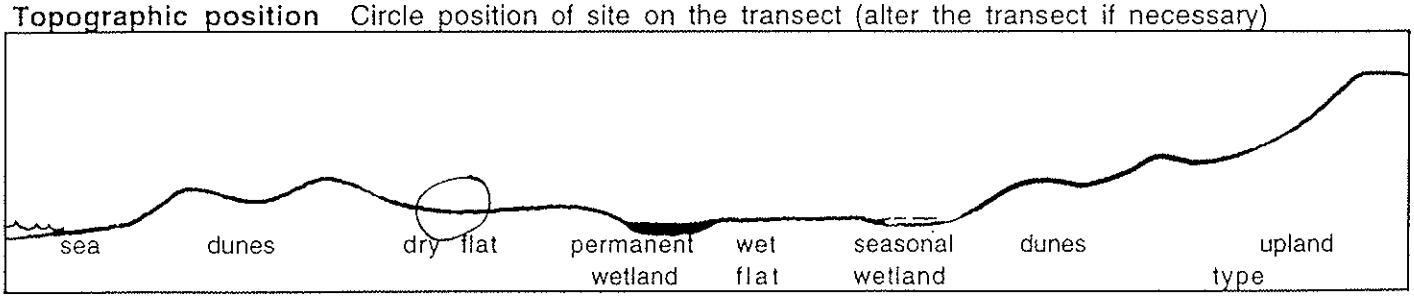
Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name Photo No

Topographic position Circle position of site on the transect (alter the transect if necessary)



2. SITE DATA Circle the correct response.

Slope flat (gentle) steep *Aspect* (N) NE E SE S SW W NW

Surface Soil sand *Colour* grey

Exposed rock *type* % surface

Sub-surface Soil sand *Colour* grey

Rock *type* depth to rock

Drainage well mod poor depth water cm *Wet* all year winter/spring

Litter 2 – 10 % cover

Depth <1 cm

Bare Ground <2 %cover

Q.P.2.

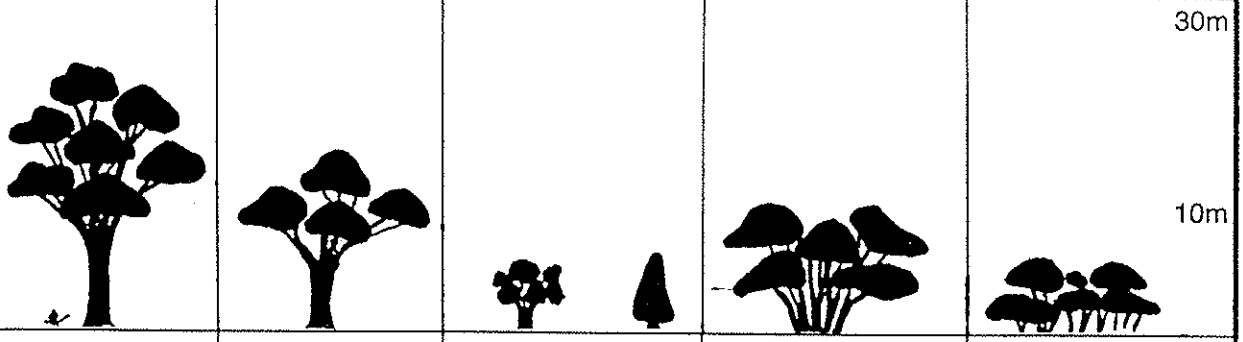
BUSHLAND PLANT SURVEY RECORDING SHEET 2 - use pencil only

3. VEGETATION STRUCTURE AND COVER

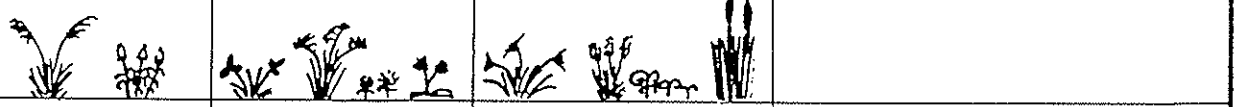
From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

For each layer **record** - appropriate **life form**, **cover class** (see below).and **dominant species** in each layer.

Cover Class - **2-10%** **10-30%** **30 - 70%** **over 70%**

	TREES			MALLEES	
	over 30m	10 - 30m	under 10m	over 8m	under 8m
LIFE FORM					
COVER CLASS (%)	–	–	30-70 %	–	–
DOMINANT SPECIES			Banksia attenuata. Banksia menziesii		

	SHRUBS		SHRUBS
	over 2m	2m - 1m	under 1m
LIFE FORM			
COVER CLASS (%)		< 2%	30 - 70%
DOMINANT SPECIES		Macrozamia reidlii	Jacksonia densiflora Hb. hypericoides Bossiaea eriocarpa.

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				
COVER CLASS (%)	< 2%	2 - 10%	30-70%	
DOMINANT SPECIES	*Briza maxima	Patersonia occ *Gladiolus	Meeboldina nitens Hypolaena barbata	

4. VEGETATION CONDITION

1 'PRISTINE'	
2 EXCELLENT	
3 VERY GOOD	✓
4 GOOD	
5 DEGRADED	

COMMENTS

Fire 7 yrs ago

*Gladiolus significant

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

SITE No QP2

Date 12/6/96

Label each plant with plants number, site code, date and plant's name or working name if required

Record on Sheet

- Column 1 plant name-
- Column 2 plant number
- Column 3 flowering time- TICK if species flowering
- Column 4 identification check

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

TREES	No	Fl	ID
Banksia attenuata	1		✓
Banksia menziesii	2		✓
Allocasuarina fraseriana	6		✓
MALLEES			
SHRUBS			
Macrozamia reidlii	3		✓
Jacksonia densiflora	4		✓
Hibbertia hypericoides	5		✓
Bossiaea eriocarpa	7		✓
Acacia huegelii	8		✓
Kriostemon spicatus	9		✓
Scholtzia involucrata	10		✓
Acacia applanata	11		✓
Petrophile linearis	12		✓
Stirlingia latifolia	14		✓
Hibbertia ? racemosa	15		✓
Hovea trispama	16		✓
Conostephium pendulum	17		✓
Stylidium repens	18		✓
Conostephium sp. = 17	19		✓
Boronia ramosa ssp anceth.	20		✓
Hibbertia huegelii	30		✓
Gompholobium tomentosum	38		✓

SHRUBS (cont.)	No	Fl	ID
GRASSES			
* Ehrharta calycina	21		✓
Grass "hairy kyle"	35		
HERBS (Podolepis gracilis)			
? Nodine daisy (hairy seedling)	22		
* Gnd. caryophyllaceous	23		✓
* Watsonia bulbillifera	24		✓
Burchardia congesta	25		✓
Patersonia occidentalis	26		✓
* Ursinia anthemoides	27		✓
Seedling (red under leaf) = 46	28		
Drosera erythrorhiza	29		✓
Lomandra caespitosa	31		✓
Lomandra sp	36		
Pterostylis hana	36		✓
Thysanotus manglesianus	37		✓
* Hypochaeris glabra	38		✓

HERBS (cont.)	No	Fl	ID
Laxmannia sessiliflora	39		✓
SEDGES			
Lyginia barbata	32		✓
(Mesomelaena) Mexgeorgia tenuis	33		✓
Loxocarya fasciculata	39		✓
19/9/96	40	✓	✓
Hydrocotyle pulverulenta			
Drosera stolonifera	41		✓
Trachymene pilosa ? = 28	42		✓
* Briza maxima	43	✓	✓
Sowerbaea laxiflora	44	✓	✓
Stylidium brunonianum	45		✓
Pyrorchis nigricans	46		✓
* Romulea rosea	47		✓
Lomandra preissii	48		✓

ADJACENT: Hibbertia aurea.

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA Q.P.E.A SITE NUMBER QP3

DATE TRIP 10/10/96 RECORDERS S.M.

DATE TRIP _____ RECORDERS _____

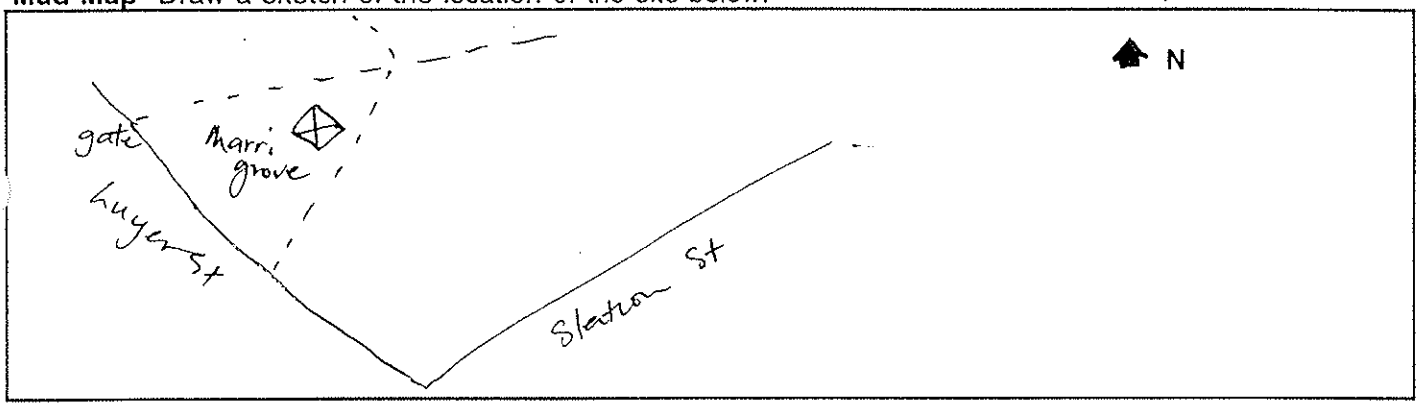
DATE TRIP _____ RECORDERS _____

BOTANIST C.T.

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

1. LOCATION of the QUADRAT

Mud Map Draw a sketch of the location of the site below.



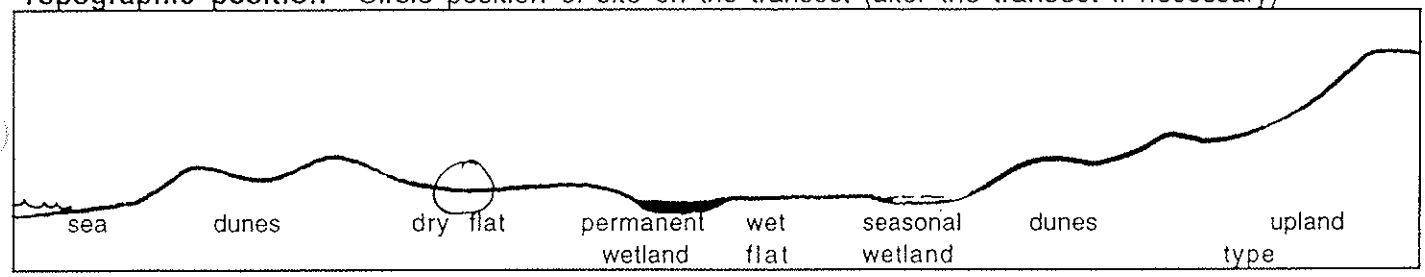
Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name Photo No

Topographic position Circle position of site on the transect (alter the transect if necessary)



2. SITE DATA Circle the correct response.

Slope (flat) gentle steep *Aspect* N NE E SE S SW W NW

Surface Soil sand *Colour* grey brown

Exposed rock – *type* – % surface –

Sub-surface Soil sand *Colour* grey

Rock – *type* – depth to rock

Drainage (well) mod poor depth water cm *Wet* all year winter/spring

Litter	30 – 70 % cover	*Bare Ground*	0 %cover
Depth	5 cm		

QP3

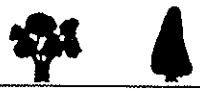
BUSHLAND PLANT SURVEY RECORDING SHEET-2 - use pencil only

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

3. VEGETATION STRUCTURE AND COVER

For each layer **record** - appropriate **life form**, **cover class** (see below).and **dominant species** in each layer.

Cover Class - **2-10%** **10-30%** **30 - 70%** **over 70%**

	TREES			MALLEES	
	over 30m	10 - 30m	under 10m	over 8m	under 8m
LIFE FORM					30m 10m
COVER CLASS (%)	–	–	10 - 30%	–	–
DOMINANT SPECIES			Marri Banksia attenuata.		

	SHRUBS		SHRUBS
	over 2m	2m - 1m	under 1m
LIFE FORM			2m 1m
COVER CLASS (%)	–	–	2-10%
DOMINANT SPECIES			Acacia pulchella Hybbertia spp. Jacksonia floribunda

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM			1m	
COVER CLASS (%)	< 2%	10 - 30%	30 - 70%	
DOMINANT SPECIES	*Ehrharta Calycina	Dhlebocarya ciliata Dasynotocon breviglumis (olivn	Alexgeorgea nitens	

4. VEGETATION CONDITION

1 'PRISTINE'	
2 EXCELLENT	
3 VERY GOOD	✓
4 GOOD	
5 DEGRADED	

COMMENTS

Frequent fires but weed invasion still minor.

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

SITE No QP3

Date 10/10/96.

Label each plant with plants number, site code, date and plant's name or working name if required

Record on Sheet

- Column 1 plant name-
- Column 2 plant number
- Column 3 flowering time- TICK if species flowering
- Column 4 identification check

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

TREES	No	Fl	ID
Marri	1		✓
Banksia attenuata	2		✓
MALLEES			
SHRUBS			
Acacia pulchella	3	✓	✓
Daviesia physodes	4	✓	✓
Persoonia saccata	5		✓
Hibbertia hypericoides	6		✓
Hibbertia racemosa ✓	7		✓
Conostephium pendulum	8		✓
Hovea trisperma	9		✓
Jacksonia furcellata	10		✓
Tricoryne elatior	11	✓	✓
Dampiera linearis	12	✓	✓
Gompholobium tomentosum	13	✓	✓
Eriostemon spicatus	14		✓
Dasypogen bromeliifolius	17	✓	✓
Adenanthos hugelii	27		✓
Boronia ramosa ssp. anethifolia	41	✓	✓
* Olea europaea	42		✓

SHRUBS (cont.)	No	Fl	ID
GRASSES			
* Ehrharta calycina	15	✓	✓
* Briza maxima	40	✓	✓
HERBS			
* Ursinia anthemoides	16	✓	✓
Phlebocarya ciliata	18		✓
Xanthorrhoea ? brunonis	19		
Podolepis gracilis	20		✓
Drosera sp.	21		
Lomandra preissii	22		✓
Burchardia congesta	23	✓	✓
* Gladiolus caryophyllaceous	24	✓	✓
Conostylis juncea	26		✓
* Hypochaeris glabra	28		✓
Pterostylis vittata	29		✓
Caladenia sp. ? flava	30		
Lomandra sp.	31		

HERBS (cont.)	No	Fl	ID
Dasypogon occidentalis	32		✓
Lomandra micrantha	33		✓
x Romulea rosea	34		✓
Lomandra sp.	35		
Trachymene pilosa	36	✓	✓
Caesia micrantha	37		✓
*Asparagus asparagoides	43		✓
Stackhousia monogyna	44	✓	✓
SEDGES			
Alexgeorgea nitens	25		✓
Loxocarya fasciculata	38		✓
Hypolaena exsulca	39		✓

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA QPEA SITE NUMBER QD4

DATE TRIP 10/10/96 RECORDERS S.M.

DATE TRIP _____ RECORDERS _____

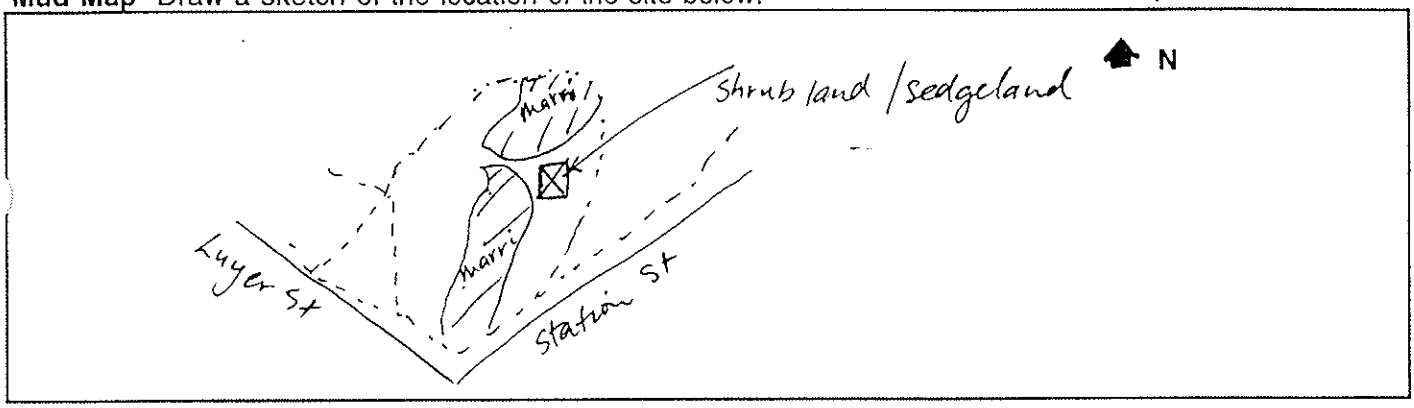
DATE TRIP _____ RECORDERS _____

BOTANIST C.T.

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

1. LOCATION of the QUADRAT

Mud Map Draw a sketch of the location of the site below.



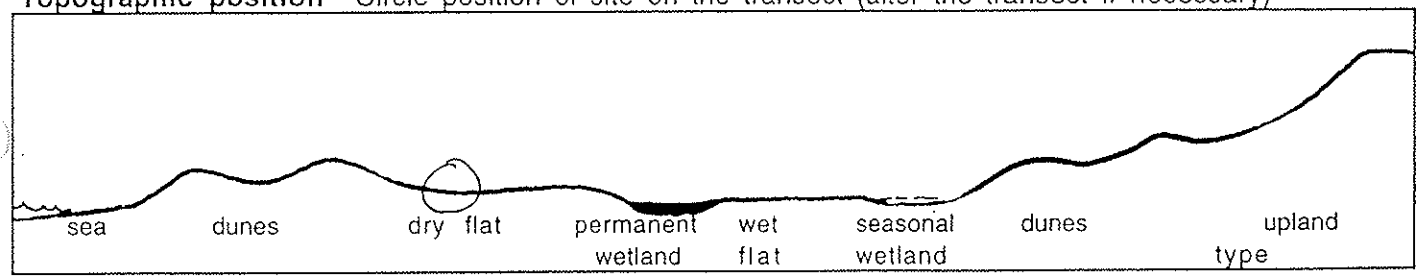
Road Location

Geographic Location Latitude S Longitude E **Altitude**

Reference Map

Photograph Photographer's Name Photo No

Topographic position Circle position of site on the transect (alter the transect if necessary)



2. SITE DATA Circle the correct response.

Slope (flat) gentle steep *Aspect* N NE E SE S SW W NW

Surface Soil sand *Colour* grey.

Exposed rock *type* – % surface –

Sub-surface Soil Sand *Colour* grey

Rock – *type* – depth to rock –

Drainage (well) mod poor depth water cm *Wet* all year winter/spring

Litter 30 – 70 % cover	*Bare Ground* <2 %cover
Depth 5 cm	

QP4

BUSHLAND PLANT SURVEY RECORDING SHEET 2 - use pencil only

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

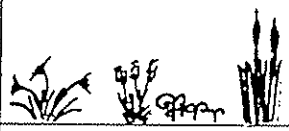
3. VEGETATION STRUCTURE AND COVER

For each layer **record** - appropriate **life form**, **cover class** (see below).and **dominant species** in each layer.

Cover Class - **2-10%** **10-30%** **30 - 70%** **over 70%**

	TREES			MALLEES	
	over 30m	10 - 30m	under 10m	over 8m	under 8m
LIFE FORM					30m 10m
COVER CLASS (%)	–	–	< 2%		< 2%
DOMINANT SPECIES			Allocasuarina fraseriana		Banksia ashbyi

	SHRUBS		SHRUBS
	over 2m	2m - 1m	under 1m
LIFE FORM			2m 1m
COVER CLASS (%)	–	–	10 - 30%
DOMINANT SPECIES			Jacksonia furcellata Stirlingia latifolia

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				1m
COVER CLASS (%)	< 2%	< 2%	> 70%	
DOMINANT SPECIES	*Ehrharta calycina	Sowerbaea laxiflora	Alexgeorgea nitens	
	*Briza maxima	Dodonaea viscosa	Cyathochaeta clandestina	

4. VEGETATION CONDITION

1 'PRISTINE'	
2 EXCELLENT	
3 VERY GOOD	
4 GOOD	✓
5 DEGRADED	

COMMENTS

? Depauperate in species probably due to fire + structure altered.

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

SITE No QD4
Date 10/10/96

Label each plant with plants number, site code, date and plant's name or working name if required

Record on Sheet

- Column 1 plant name-
- Column 2 plant number
- Column 3 flowering time- TICK if species flowering
- Column 4 identification check

From *'Bushland Plant Survey'* written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

TREES	No	Fl	ID
Allocasuarina fraseriana	1		✓
Marri	2		✓
Banksia attenuata	3		✓
MALLEES			
SHRUBS			
Jaeksonia furcellata	4	✓	✓
Stirlingia latifolia	5		✓
Acacia pulchella	6		✓
Gompholobium tomentosum	7		✓
Hovea trisperma	11		✓
Bossiaea eriocarpa	32		✓

SHRUBS (cont.)	No	Fl	ID
GRASSES			
* Briza maxima	25	✓	✓
* Ehrharta calycina	26	✓	✓
* Briza minor	27	✓	✓
HERBS			
Conostylis aurea	10	✓	✓
* Gladiolus caryophyllaceous	12		✓
(Anigozanthus) manglesii	13		✓
Burchardia congesta	14		✓
Corynotheca micrantha	15		✓
Tricoryne elatior	16		✓
* Hypochaeris glabra	18		✓
* Ursinia anthemoides	19		✓
Lomandra sp	20		✓
Trachymene pilosa	21		✓
Sowerbaea laxiflora	22		✓
Calodenia flava	23		✓
Siloxerus humifusis	24		✓

HERBS (cont.)	No	Fl	ID
Pterostylis vittata	28		✓
Thysanotus manglesianus	30		✓
Dobosera stoloniferа	31		✓
Podolepis gracilis	32	✓	✓
Romulea rosea	33		✓
15/1/96			
Lobelia tenuior	34	✓	✓
SEDGES			
Mesomelaena tetragona	8		✓
Cyathochaeta clandestina	9		✓
Lepidosperma fasciculata	17		✓
Alexgeorgea nitens	29		✓

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA QDEA SITE NUMBER QP5

DATE TRIP 18/10/96 RECORDERS S.M. CT.

DATE TRIP _____ RECORDERS _____

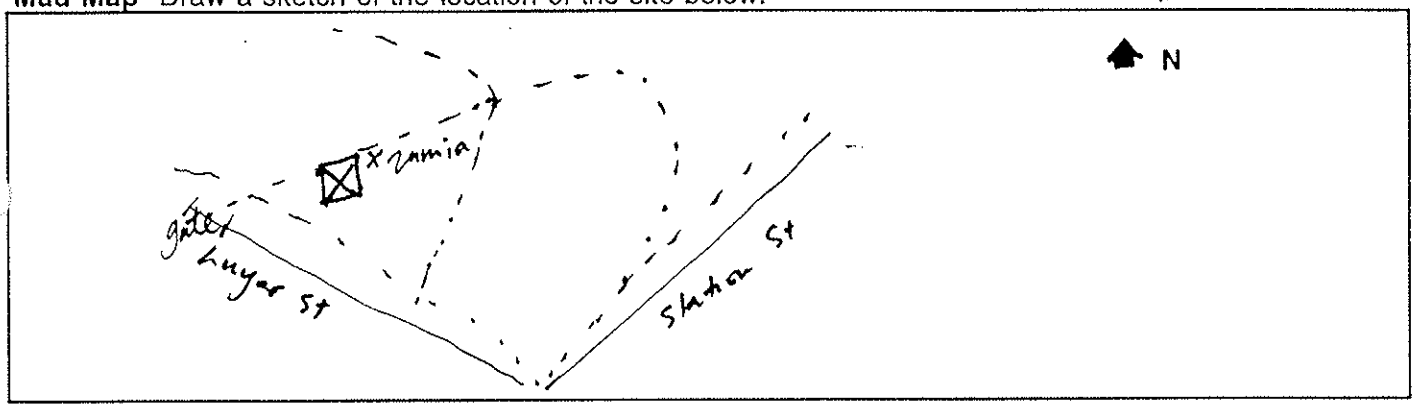
DATE TRIP _____ RECORDERS _____

BOTANIST C.T.

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

1. LOCATION of the QUADRAT

Mud Map Draw a sketch of the location of the site below.



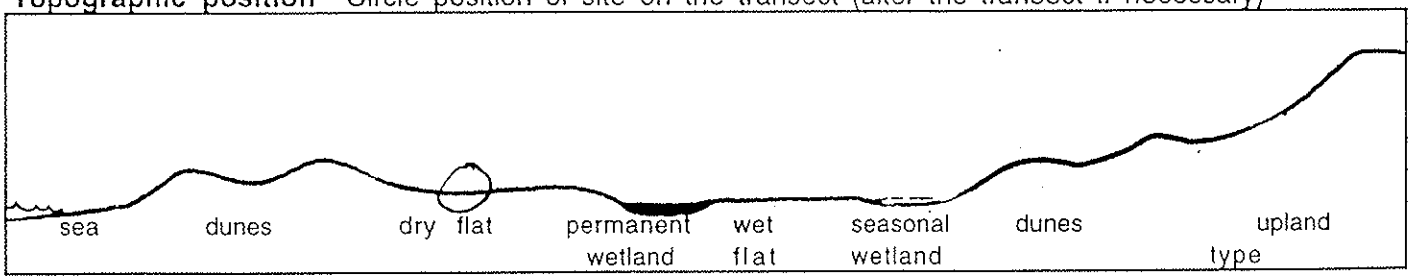
Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name Photo No

Topographic position Circle position of site on the transect (alter the transect if necessary)



2. SITE DATA Circle the correct response.

Slope (flat) gentle steep *Aspect* N NE E SE S SW W NW

Surface Soil sand *Colour* grey

Exposed rock *type* % surface

Sub-surface Soil sand *Colour* grey

Rock *type* depth to rock

Drainage (well) mod poor depth water cm *Wet* all year winter/spring

Litter 70 % cover

Depth 5 cm

Bare Ground 0 %cover

Q.P.S.

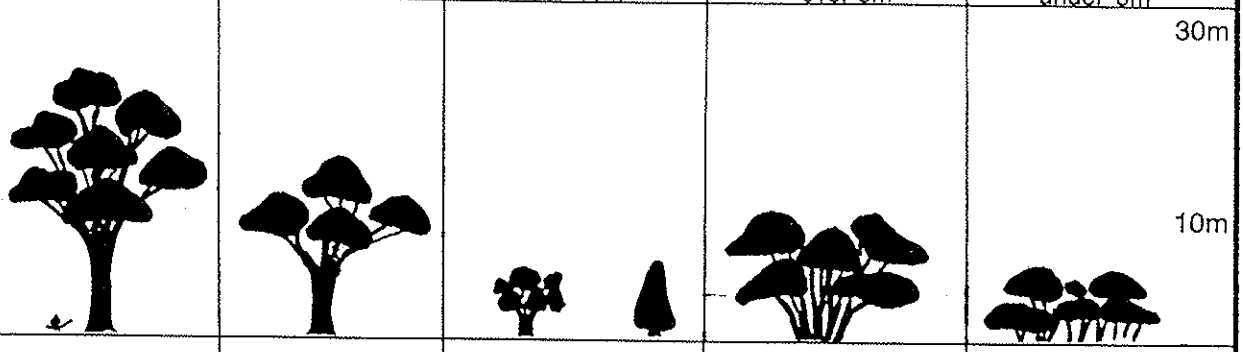
BUSHLAND PLANT SURVEY RECORDING SHEET-2 - use pencil only

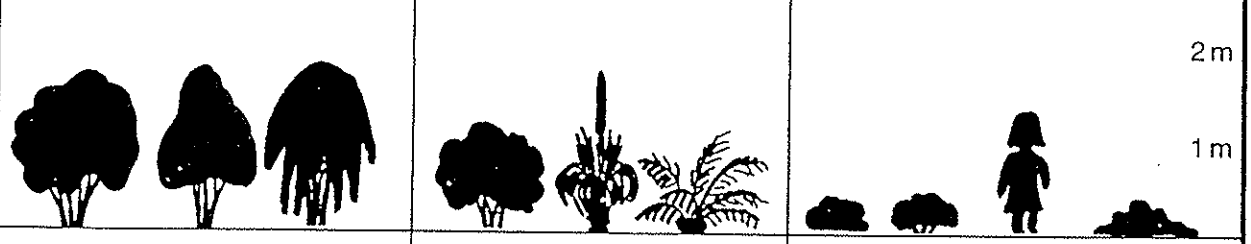
From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

3. VEGETATION STRUCTURE AND COVER

For each layer **record** - appropriate **life form**, **cover class** (see below).and **dominant species** in each layer.

Cover Class - 2-10% 10-30% 30 - 70% over 70%

	TREES			MALLEES	
	over 30m	10 - 30m	under 10m	over 8m	under 8m
LIFE FORM					
COVER CLASS (%)	-	-	30-70%	-	-
DOMINANT SPECIES			B. attenuata		

	SHRUBS		SHRUBS
	over 2m	2m - 1m	under 1m
LIFE FORM			
COVER CLASS (%)	-	-	30-70%
DOMINANT SPECIES			Eremaea pauciflora Melaleuca scabra

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				
COVER CLASS (%)	2 - 10%	10 - 30%	10 - 30%	
DOMINANT SPECIES	* Ehrharta calycina	Pat. occidentalis Stylidium repens	A. nitens L. barbata	

4. VEGETATION CONDITION

1 'PRISTINE'	
2 EXCELLENT	
3 VERY GOOD	✓
4 GOOD	
5 DEGRADED	

COMMENTS

Only a small area here is this V. good condition - edge effects threat.

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

SITE No QD5

Date 10/10/96

Label each plant with plants number, site code, date and plant's name or working name if required

Record on Sheet

- Column 1 plant name
- Column 2 plant number
- Column 3 flowering time- TICK if species flowering
- Column 4 identification check

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

TREES	No	Fl	ID
B. attenuata	1		✓
B. menziesii	2		✓
B. ilicifolia	3		✓
MALLEES			
SHRUBS			
Eremaea pauciflora	4	✓	✓
Melaleuca seriata	5	✓	✓
Scholtzia involucrata	6		✓
Bossiaea eriocarpa	7		✓
Calytrix fasci	8		✓
Gibbaria hypericoides	9		✓
Petrophile linearis	10		✓
Calytrix flavescens	11		✓
Conostephium pendulum	12		✓
Acacia pulchella	13		✓
Laxmannia ramosa	14		✓
Boronia ramosa ssp anceth.	19		✓
Hovea trisperma	21		✓
Dasypogon bromeliifolius	32	✓	✓
→ Macarthuria sp. Keigheryi	33	✓	✓
PRIORITY 1)			

SHRUBS (cont.)	No	Fl	ID
GRASSES			
* Ehrharta calycina	15		✓
* Briza maxima	29		✓
HERBS			
Patersonia occidentalis	16		✓
Byrchordia congesta	17		✓
Tricoryne ?elatior	18		✓
Thysanotus sp.? arbuscula	22	✓	✓
Stylidium repens	24	✓	✓
* Watsonia sp	26	✓	
* Ursinia anthemoides	27		✓
Lomandra preissii	28		✓
Paranthera microphylla	30	✓	✓
Podolepis gracilis	31		✓
Conostylis juncea	34		✓

HERBS (cont.)	No	Fl	ID
SEDGES			
Hypolaena bortonia	20		✓
Hypolaena exsulca	23		✓
Desmocladus flexuosus	25		✓
ADJ. 15/11/96			
Micrantis media ?ssp media			

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA Q.P.E.A. SITE NUMBER QP6

DATE TRIP 15-11-'96 RECORDERS S.M.

DATE TRIP _____ RECORDERS _____

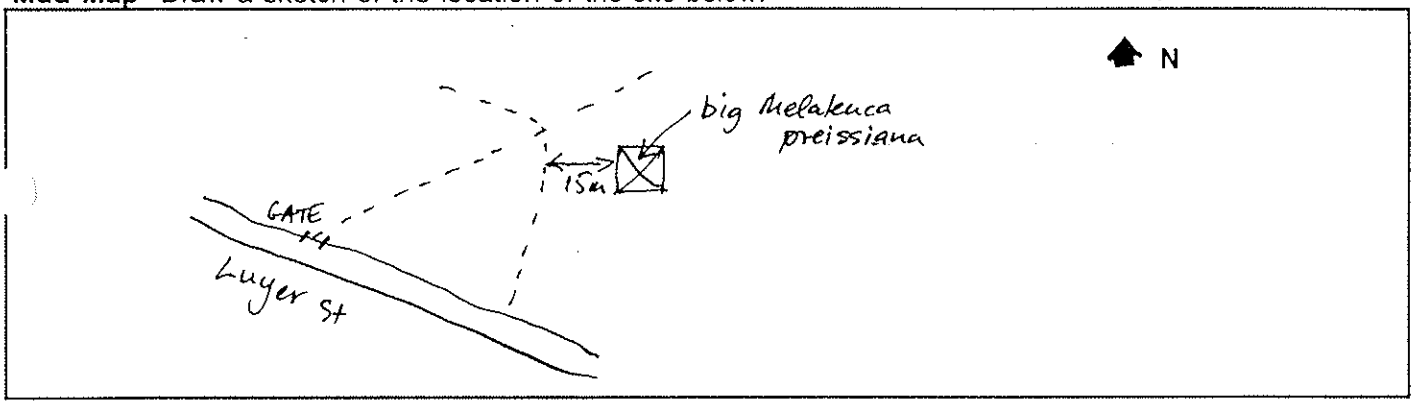
DATE TRIP _____ RECORDERS _____

BOTANIST C.T.

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

1. LOCATION of the QUADRAT

Mud Map Draw a sketch of the location of the site below.



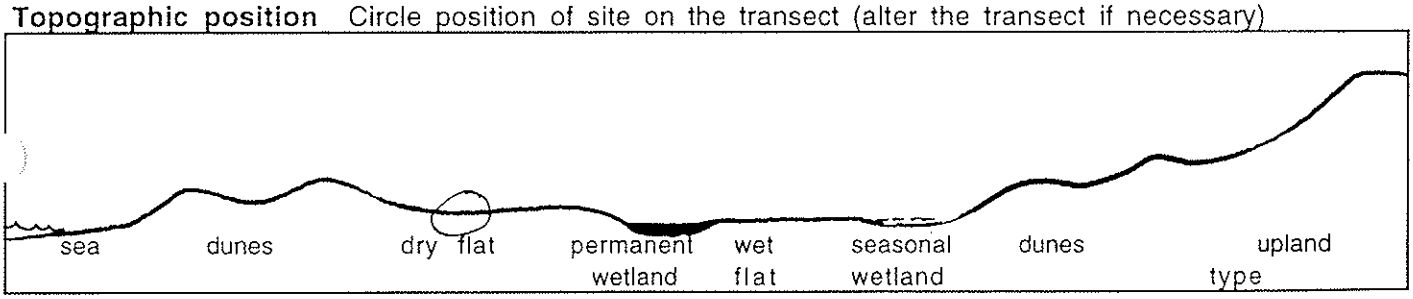
Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name Photo No

Topographic position Circle position of site on the transect (alter the transect if necessary)



2. SITE DATA Circle the correct response.

Slope (flat) gentle steep *Aspect* N NE E SE S SW W NW

Surface Soil sand *Colour* grey

Exposed rock *type* — % surface —

Sub-surface Soil sand *Colour* grey

Rock — *type* depth to rock —

Drainage (well) mod poor depth water cm *Wet* all year winter/spring

Litter > 70 % cover

Depth 5 cm

Bare Ground 0 %cover

QP6

BUSHLAND PLANT SURVEY RECORDING SHEET 2 - use pencil only

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

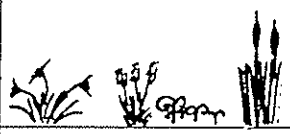
3. VEGETATION STRUCTURE AND COVER

For each layer **record** - appropriate **life form**, **cover class** (see below).and **dominant species** in each layer.

Cover Class - **2-10%** **10-30%** **30 - 70%** **over 70%**

	TREES			MALLEES	
	over 30m	10 - 30m	under 10m	over 8m	under 8m
LIFE FORM					30m 10m
COVER CLASS (%)	-	-	30 - 70%	-	-
DOMINANT SPECIES			Mel. preissiana Banksia menziesii Marri Banksia attenuata		

	SHRUBS over 2m	SHRUBS 2m - 1m	SHRUBS under 1m
LIFE FORM			2m 1m
COVER CLASS (%)	-	2 - 10%	10 - 30%
DOMINANT SPECIES		Allocasuarina fraseriana	Jacksonia furcellata Hibbertia hypericoides Eriostemon spicatus

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM			 1m	
COVER CLASS (%)	< 2%	10 - 30%	30 - 70%	
DOMINANT SPECIES	* Briza maxima	Patersonia occidentalis Phlebocarya ciliata	Meeboldina (Mesomelaena) tetragona	

4. VEGETATION CONDITION

'PRISTINE'	
2 EXCELLENT	✓
VERY GOOD	
GOOD	
DEGRADED	

COMMENTS

Frequent fire in past - charred trunk of Mel. preiss., re-seeding young Banksias + Hobelia tenuior

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

SITE No QP6

Date 15-11-96

Label each plant with plants number, site code, date and plant's name or working name if required

Record on Sheet

- Column 1 plant name-
- Column 2 plant number
- Column 3 flowering time- TICK if species flowering
- Column 4 identification check

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

TREES	No	Fl	ID
Banksia menziesii	1		✓
Banksia attenuata	2		✓
Marri	3		✓
Melaleuca preissiana	4		✓
Allocasuarina fraseriana	5		✓
* Schinus terebinthifolius	39		✓
MALLEES (seedling removed)			
SHRUBS			
Eriostemon spicatus	6	✓	✓
Jacksonia furcellata	7	✓	✓
Dampiera linearis	8	✓	✓
Hibbertia racemosa	9		✓
Acacia pulchella	10		✓
Hypocalymma angustifolia	11		✓
Hibbertia hypericoides	12		✓
Corynotheca micrantha	13	✓	✓
Gompholobium tomentosum	17		✓
Bossiaea eriocarpa	20		✓
Hovea trisperma	23		✓
Xanthosia huegelii	27	✓	✓
Stylidium repens	35	✓	✓
Desmypogon brometifolius	41		✓

SHRUBS (cont.)	No	Fl	ID
GRASSES			
* Briza maxima	16	✓	✓
* Ehrharta calycina	25	✓	✓
* Ursinia anthemoides	28		✓
HERBS			
Lobelia tenuior	14	✓	✓
Drosera stolonifera	15		✓
Patersonia occidentalis	18	✓	✓
Phlebocarya ciliata	19	✓	✓
Podolepis gracilis	24	✓	✓
Conostylis juncea	26	✓	✓
Burchardia congesta	29	✓	✓
Lomandra sp.	40		
* Gladiolus caryophyllaceous	30		✓
Lomandra preissii	31		✓
Diuris sp.	32		
Sowerbaea laxiflora	33		✓
Caesia micrantha	34		✓

HERBS (cont.)	No	Fl	ID
Stylidium brunonianum	35	✓	✓
* Hypochaeris glabra	44		✓
Tribonyne clatior	36	✓	✓
Chamaescilla corymbosa	37		✓
* Asparagus asparagoides	38		✓
* Watsonia sp	42		
Drosera menziesii	43		✓
SEDGES			
Loxocarya fasciculata	21		✓
Alexgeorgea nitens	22		✓
ADJACENT :			
Daviesia physodes			✓
Acacia huegelii			✓
Hypinia barbata			✓

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA QPEA SITE NUMBER QP7

DATE TRIP 15/11/96 RECORDERS T.N. C.T.

DATE TRIP _____ RECORDERS _____

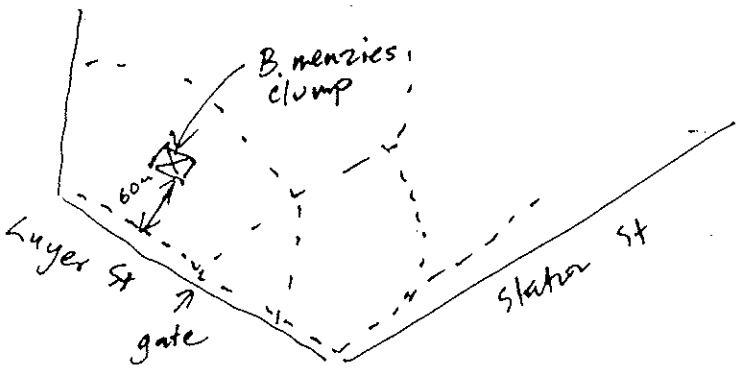
DATE TRIP _____ RECORDERS _____

BOTANIST CT

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

1. LOCATION of the QUADRAT

Mud Map Draw a sketch of the location of the site below.



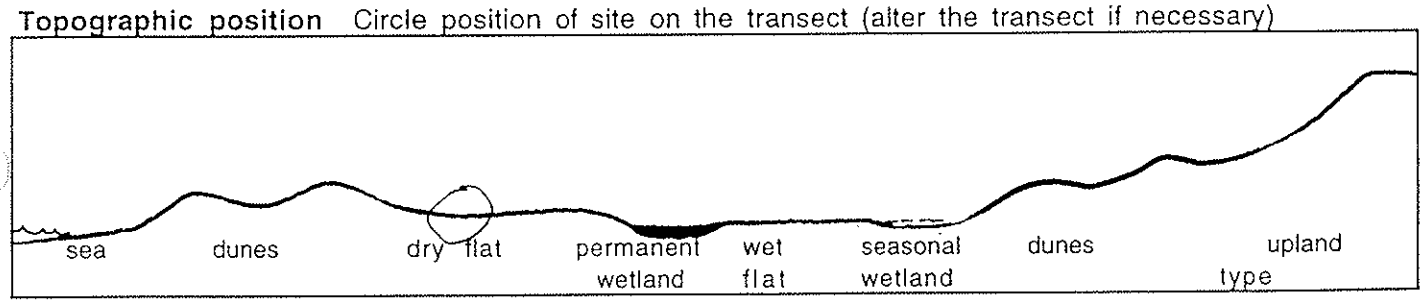
Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name Photo No

Topographic position Circle position of site on the transect (alter the transect if necessary)



2. SITE DATA Circle the correct response.

Slope (flat) (gentle) steep *Aspect* N NE E (SE) S SW W NW

Surface Soil sand *Colour* grey

Exposed rock *type* % surface

Sub-surface Soil sand *Colour* grey

Rock *type* depth to rock

Drainage (well) mod poor depth water cm *Wet* all year winter/spring

Litter 30 - 70 % cover Depth < 5 cm

Bare Ground < 2 %cover

QP7.

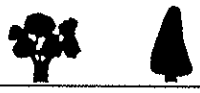
BUSHLAND PLANT SURVEY RECORDING SHEET 2 - use pencil only

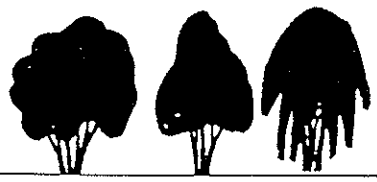
From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

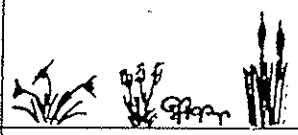
3. VEGETATION STRUCTURE AND COVER

For each layer **record** - appropriate **life form**, **cover class** (see below).and **dominant species** in each layer.

Cover Class	2-10%	10-30%	30 - 70%	over 70%

	TREES			MALLEES	
	over 30m	10 - 30m	under 10m	over 8m	under 8m
LIFE FORM					30m 10m
COVER CLASS (%)			50-70%		
DOMINANT SPECIES			B. menziesii B. attenuata		

	SHRUBS		SHRUBS
	over 2m	2m - 1m	under 1m
LIFE FORM			2m 1m
COVER CLASS (%)		10-30%	10-30%
DOMINANT SPECIES		Allocas. humilis Acacia pulchella	Hibbertia hypericoides Stirlingia Leucopogon conostephioides

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM			 1m	
COVER CLASS (%)	10-30%	2-10%	10-30%	
DOMINANT SPECIES	Amphipogon t. * Briza sp.	* Romulea rosea	Lepidosperma sp. Mesomelaena pseudostygia	

4. VEGETATION CONDITION

1 'PRISTINE'	
2 EXCELLENT	
3 VERY GOOD	✓
4 GOOD	
5 DEGRADED	

COMMENTS

Invaded by weeds - guildford grass * Briza to small extent.
but otherwise v. good

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

SITE No QP7

Date 15/11/96

Label each plant with plants number, site code, date and plant's name or working name if required

Record on Sheet

- Column 1 plant name-
- Column 2 plant number
- Column 3 flowering time- TICK if species flowering
- Column 4 identification check

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

TREES	No	Fl	ID
Banksia menziesii	1		✓
B. attenuata	2		✓
MALLEES			
SHRUBS			
Allocasuarina humilis	3		✓
Hibbertia hypericoides	4		✓
Leucopogon conostephioides	5		✓
Jacksonia densiflora	6		✓
Stirlingia latifolia	7		✓
Petrophile linearis	8		✓
Hovea trisperma	9		✓
Bossiaea eriocarpa	10		✓
Stylidium repens	14		✓
Nemcia capitata	21		✓
Oparcularia vaginata	23		✓
Conostephium preissii	31		✓
Gompholobium tomentosum	32		✓
Chamaenaxia squarrosa	36		✓
Macrozamia australis	41		✓
Xanthosia huegelii	46		✓
Acacia pulchella	46		✓

SHRUBS (cont.)	No	Fl	ID
GRASSES			
* Briza maxima	17		✓
* Briza minor	18		✓
* Avena barbata	19		✓
HERBS			
Stylidium divaricatum	15	✓	✓
Hybanthus floribundus	16	✓	✓
* Romulea rosea	20		✓
* Gladiolus caryophyllaceus	22		✓
Podolepis gracilis	24	✓	✓
* Hypochaeris glabra	25		✓
Thysanotus manglesianus	26		✓
Burchardia congesta	28		✓
Tricoryne elatior	27		✓
Trachymene pilosa	29	✓	✓
Conostylis setigera	30	✓	✓
Lomandra preissii	33		✓
Dressa stolonifera	34		✓

HERBS (cont.)	No	Fl	ID
leaf only - ?Conostylis ?aniogrant	35		
Stylidium brunonianum	37		✓
Caladenia sp. ? flava	38		✓
Lomandra sp.	43		
* Ursinia anthemoides	44		✓
Dipus sp. (dry)	45		
Thysanotus manglesianus	47		✓
SEDGES			
Desmocladus flexuosus	11		✓
Mesomelaena pseudostygia	12		✓
Lepidosperma sp.	13		.
Ehrharta barbata	39		✓
Hexgeorgea nitens	40		✓
Lepidosperma sp.	41		
Boronia coryo ~~fabrosa~~ fascicularis	42		✓
ADJACENT:			
X. brunonis			✓
Adenanthos cygnorum			✓

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA Q.P.E.A. SITE NUMBER Q.P.8

DATE TRIP 15/11/96 RECORDERS T.N.

DATE TRIP _____ RECORDERS _____

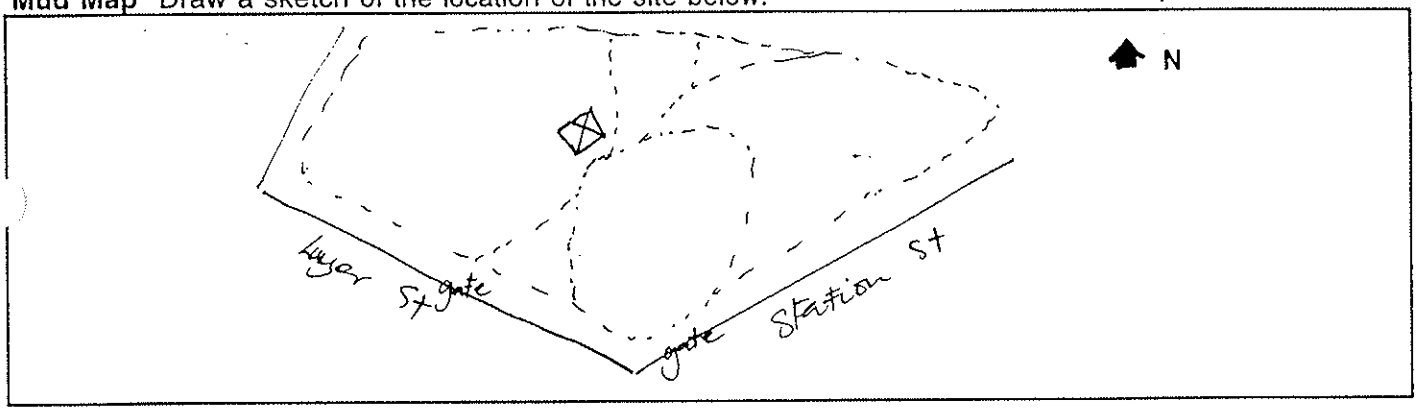
DATE TRIP _____ RECORDERS _____

BOTANIST C.T.

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

1. LOCATION of the QUADRAT

Mud Map Draw a sketch of the location of the site below.



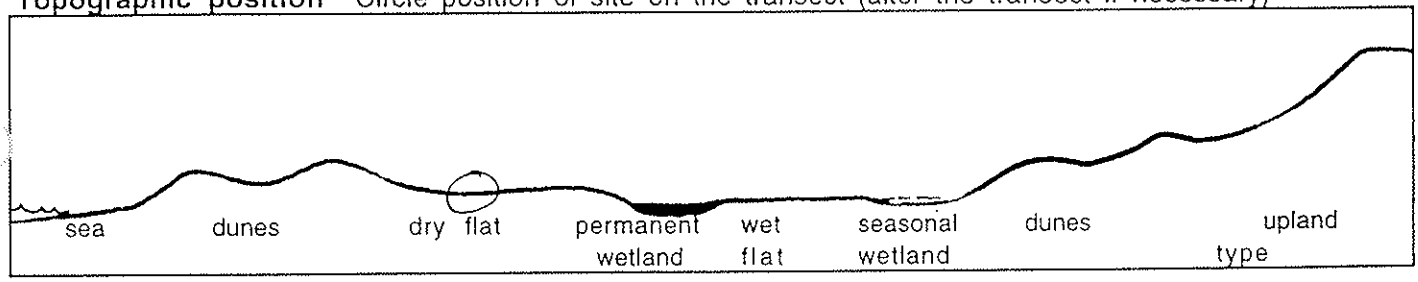
Road Location

Geographic Location Latitude S Longitude E **Altitude**

Reference Map

Photograph Photographer's Name Photo No

Topographic position Circle position of site on the transect (alter the transect if necessary)



2. SITE DATA Circle the correct response.

Slope ~~flat~~ (gentle) steep ***Aspect*** N NE (E) SE S SW W NW

Surface Soil Sand ***Colour*** grey

Exposed rock ***type*** % surface

Sub-surface Soil Sand ***Colour*** grey

Rock ***type*** depth to rock

Drainage (well) mod poor depth water cm ***Wet*** all year winter/spring

Litter	> 70 % cover	***Bare Ground***	0 %cover
Depth	< 5 cm		

Q.P.8.

BUSHLAND PLANT SURVEY RECORDING SHEET-2 - use pencil only

3. VEGETATION STRUCTURE AND COVER

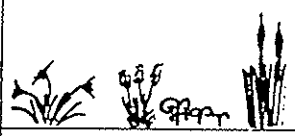
From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

For each layer **record** - appropriate **life form, cover class** (see below).and **dominant species** in each layer.

Cover Class - **2-10%** **10-30%** **30 - 70%** **over 70%**

	TREES			MALLEES	
	over 30m	10 - 30m	under 10m	over 8m	under 8m
LIFE FORM					30m 10m
COVER CLASS (%)			30-70%		
DOMINANT SPECIES			*B. attenuata* *Allocas. fras.* *B. menziesii*		

	SHRUBS		SHRUBS
	over 2m	2m - 1m	under 1m
LIFE FORM			2m 1m
COVER CLASS (%)			30-70%
DOMINANT SPECIES			*Hib. hypericoides* *Bossiaea eriocarpa* *Stylidium repens*

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM			 1m	
COVER CLASS (%)	< 2%	10-30%	10-30%	
DOMINANT SPECIES	*Ehrharta calycina*	*Pat. occidat.* *Romulea rosea*	*Alexgeorgea nitens*	

4. VEGETATION CONDITION

1 'PRISTINE'	
2 EXCELLENT	
3 VERY GOOD	✓
4 GOOD	
5 DEGRADED	

COMMENTS

frequent fire - *Romulea invaded.

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

SITE No Q.P.8

Date 15/11/96

Label each plant with plants number, site code, date and plant's name or working name if required

Record on Sheet

- Column 1 plant name-
- Column 2 plant number
- Column 3 flowering time- TICK if species flowering
- Column 4 identification check

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

TREES	No	Fl	ID
Banksia attenuata	1		✓
Banksia menziesii	2		✓
Allocasuarina fraseriana	3		✓
MALLEES			
SHRUBS			
Hibbertia hypericoides	4		✓
Bossiaea eriocarpa	5		✓
Jacksonia densiflora	6		✓
Acacia pulchella	7		✓
Gompholobium tomentosum	8		✓
Melaleuca capitata	9		✓
Stylidium repens	10		✓
Stirlingia latifolia	19		✓
Eriostemon spicatus	24		✓
Operculoria vaginata	25		✓
Daviesia linophylla	28		✓
Leucopogon propinquus	33		✓
Acacia huegelii	36		✓
Persoonia saccata	40		

SHRUBS (cont.)	No	Fl	ID
GRASSES			
Austrostipa semibarbata	17		✓
* Briza maxima	22		✓
* Ehrharta calycina	23		✓
* Ursinia anthemoides	37		✓
HERBS			
Patersonia occidentalis	11		✓
Podolepis gracilis	14		✓
* Gladiolus caryophyllaceus	15		✓
* Romulea rosea	16		✓
Burchardia congesta	18		✓
Phlebocarya ciliata	25		✓
* Hypochaeris glabra	26		✓
Petrorhagia nanteuilii	27		✓
Conostylis juncea	30		✓
Lomandra sp	32		✓
Stylidium brunonianum	34		✓
Drosera stolonifera	35		✓
Podotheca gnaphalioides	38		✓

HERBS (cont.)	No	Fl	ID
Leucochrysum stipitatum	39		✓
SEDGES			
Hypolaena fastigiata	12		✓
Meeboldina canescens	13		✓
Loxocarya flexuosa	20		✓
Desmocladus flexuosus	21		✓
Lepidosperma sp	29		
ADJACENT:			
Macarthuria australis			✓
Lobelia tenuior			✓
Conospermum micranthum			✓

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA Q.P.E.A. SITE NUMBER Q.P.9.

DATE TRIP 15/11/96. RECORDERS T.N.

DATE TRIP _____ RECORDERS _____

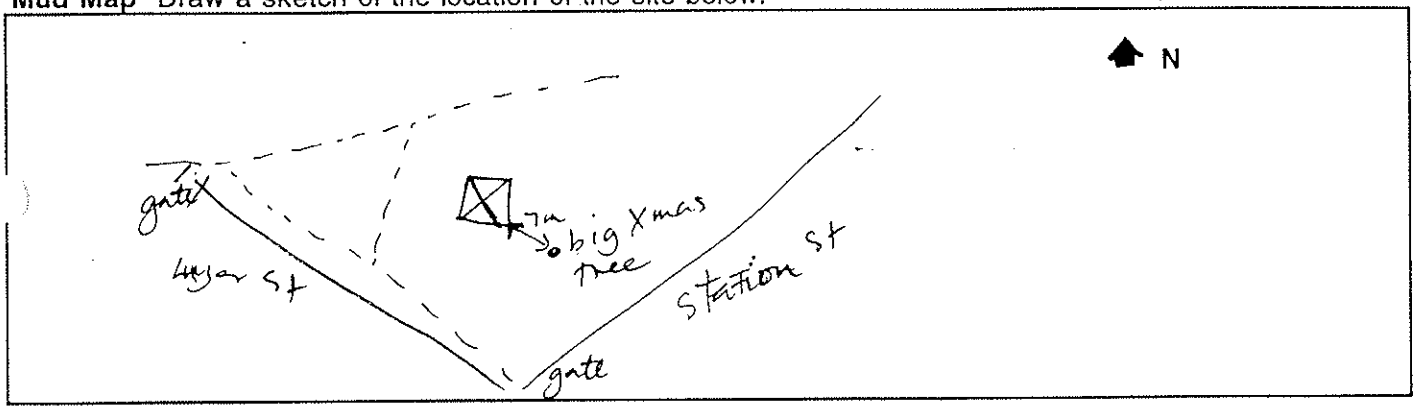
DATE TRIP _____ RECORDERS _____

BOTANIST C.T.

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

1. LOCATION of the QUADRAT

Mud Map Draw a sketch of the location of the site below.



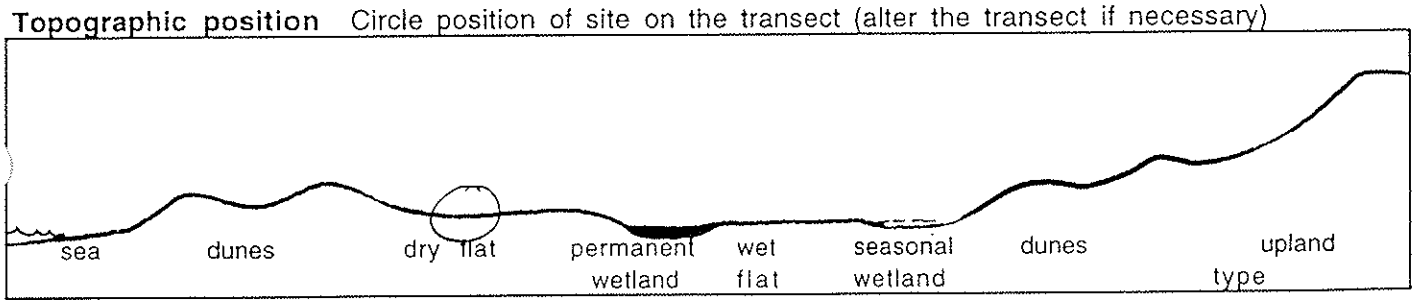
Road Location

Geographic Location **Latitude** **S Longitude** **E Altitude**

Reference Map

Photograph Photographer's Name Photo No

Topographic position Circle position of site on the transect (alter the transect if necessary)



2. SITE DATA Circle the correct response.

Slope (flat) gentle steep ***Aspect*** N NE E SE S SW W NW

Surface Soil Sand ***Colour*** grey

Exposed rock – ***type*** % surface –

Sub-surface Soil Sand ***Colour*** grey

Rock – ***type*** depth to rock –

Drainage (well) mod poor depth water cm ***Wet*** all year winter/spring

Litter	> 70 % cover	***Bare Ground***	0 %cover
Depth	5 cm		

Q.P. 9.

BUSHLAND PLANT SURVEY RECORDING SHEET-2 - use pencil only

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

3. VEGETATION STRUCTURE AND COVER

For each layer **record** - appropriate **life form**, **cover class** (see below).and **dominant species** in each layer.

Cover Class - **2-10%** **10-30%** **30 - 70%** **over 70%**

	TREES			MALLEES	
	over 30m	10 - 30m	under 10m	over 8m	under 8m
LIFE FORM					30m 10m
COVER CLASS (%)	—	—	30-70%	—	—
DOMINANT SPECIES			Marri Xanth. preiss. B. menziesii		

	SHRUBS		SHRUBS
	over 2m	2m - 1m	under 1m
LIFE FORM			2m 1m
COVER CLASS (%)	—	—	30-70%
DOMINANT SPECIES			Jacksonia floricallata Conospermum micranthum Xanthorrhoea ? brunonis.

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM			1m	
COVER CLASS (%)	< 2%	< 2%	30-70%	
DOMINANT SPECIES	Microlaena Stipoides	Lomandra spp. Thysanotus multiflorus	Meeboldina cana Loxocarya fasciculata	

4. VEGETATION CONDITION

1	'PRISTINE'	
2	EXCELLENT	
3	VERY GOOD	✓
4	GOOD	
5	DEGRADED	

COMMENTS

Fire affected but regenerating and resilient to weeds attack.

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

SITE No QP9

Date 15/11/96

Label each plant with plants number, site code, date and plant's name or working name if required

Record on Sheet

- Column 1 plant name-
- Column 2 plant number
- Column 3 flowering time- TICK if species flowering
- Column 4 identification check

From '*Bushland Plant Survey*' written by B. Keighery (1994) and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

TREES	No	Fl	ID
Melaleuca preissiana	1		✓
Marri	2		✓
Allocasuarina fraseriana	3		✓
Banksia menziesii	49		✓
MALLEES			
SHRUBS			
Jacksonia furcellata	4	✓	✓
Acacia pulchella	5		✓
Xanthorrhoea ? brunonis	6		✓
Hibbertia racemosa	7		✓
Dampiera linearis	14		✓
Corynotheca micrantha	16		✓
Dasypogon bromeliifolius	17		✓
Nuytsia floribunda	18		✓
Hypocalymma angustifolia	24		✓
Hovea trisperma	27		✓
Eriostemon spicatus	29		✓
Scholtzia involucrata	35		✓
Acacia huegelii	36		✓
Gompholobium tomentosum	40		✓
Conostephium preissii	47		✓

SHRUBS (cont.)	No	Fl	ID
GRASSES			
Microlaena stipoides	23		✓
* Ehrharta calycina	33		✓
* Briza maxima	43		✓
HERBS			
Lobelia tenuior	8		✓
* Gladiolus caryophyllaceous	11		✓
* Watsonia sp.	12		✓
Sowerbaea laxiflora	13		✓
Podolepis gracilis	15		✓
Thysanotus multiflorus	19		✓
Patersonia occidentalis	20		✓
Burbardia congesta	21		✓
Caesia micrantha	22		✓
Lomandra preissii	25		✓
Conostylis juncea	26		✓
Tricoryne elatior	39		✓
Borantha microphylla	34		✓

HERBS (cont.)	No	Fl	ID
* Hypochaeris glabra	31		✓
* Ursinia anthemoides	32		✓
Haemodorum spicatum	38		✓
Phlebocarya ciliata	41		✓
Lomandra hermaphrodita	42		✓
Drosera glanduligera	45		✓
Lomandra (Tryllow blue)	48		
SEDGES			
Loxocarya fasciculata	9		✓
Mesomelaena tetragona	10		✓
Tripogon loliiformis	28		✓
Hypolaena exsulca	37		✓
Anthrocaryon laxum	44		✓
Leptocarpus canus	46		✓
Lepidosperma sp.	50		

A VEGETATION

AND FLORA SURVEY

OF PART OF QUEENS PARK BUSHLAND

prepared for

BROWN AND ROOT

by

Malcolm Trudgen
Consultant Botanist

assisted by

Martin Henson
Environmental Scientist

September 2000

M.E. Trudgen and Associates

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1.0 INTRODUCTION

This report describes and discusses the remnants of native vegetation in part of Perth's Bushplan Site No. 283 which is in the suburb of Queens Park. The overall Perth's Bushplan (DEP 1998) Site No 283 is known as the Queens Park Bushland (see DEP 1998 vol. 2 part B page 73 for descriptions and Map 63 in DEP 1998 vol 2 part C).

The aim of this report is to assess the conservation value of the remnants in the current study area in relation to a proposed land swap. To facilitate this, the vegetation communities present in the remnants potentially involved are described, their condition is assessed, the flora in them listed and their conservation value discussed in regional and local contexts.

The remnants surveyed are located in an area adjacent to Welshpool Road (between Wharf and Gibbs Streets) zoned Parks and Recreation and Urban under the Metropolitan Region Scheme. However the present study area also includes an area of parkland cleared vegetation adjacent to Welshpool Road on the south side of Gibbs Street.

The vegetation and flora of the part of the Perth's Bushplan Site No. 283 outside of the current study area has been described by Tauss (1997).

2.0 GEOMORPHOLOGY AND SOIL

Perth's Bushplan Site No. 283 lies in an area mapped by Churchward and McArthur (1980) as their Southern River geomorphological/soil unit, which they describe on their map key as "Sandplain with low dunes and many intervening swamps; iron and humus podzols, peats, and clays".

This geomorphological/soil unit generally has a relatively thin layer of the aeolian Bassendean Sand over the alluvial soils of the eastern side of the Swan Coastal Plain. The clays occur where there is no cover of the Bassendean Sand. Thus, the Southern River geomorphological/soil unit is an area of transition between the aeolian soils of the centre and west of the Swan Coastal Plain and the alluvial soils of the eastern part of the Swan Coastal Plain.

The surface soils recorded during the survey were grey sands, except in the wetter areas where they are humus rich. Where the drain through the study area is deeper, a soil cross section is exposed, this shows that below the surface the soil is a pale yellow sand, with some ferruginous material in places.

3.0 REGIONAL BOTANICAL CONTEXT

There are several regional studies of the vegetation of the Swan Coastal Plain, each approaching the vegetation from a different perspective. The two most widely used for assessment of conservation value on the plain are the vegetation complex mapping of Heddle *et al* (1980) and the floristic community types defined by Gibson *et al* (1994). Therefore, these studies will be used in this report, supplemented where appropriate by more detailed information.

3.1 Perth's Bushplan Site 283 lies in the Southern River Vegetation Complex

The remnants of native vegetation in Perth's Bushplan Site 283 lie within an area of the Southern River Vegetation Complex of Heddle *et al* (1980). The original extent of this vegetation complex was defined by Heddle *et al* on the basis of the extent of the Southern River geomorphological/soil unit of Churchward and McArthur (1980). Although no formal definition of vegetation complex as a unit is given by Heddle *et al* (1980), their use of the unit on the Swan Coastal Plain is of roughly equivalent rank to vegetation formation, although based on a different concept (see Trudgen 1999 for discussion of the differences). The descriptions given by Heddle *et al* of the vegetation found within the complexes they define are synoptic and are not intended to describe the entire range of vegetation within a complex.

The Southern River Vegetation Complex contains a wide range of plant communities due to the interaction of the heterogenous assemblage of soils within the Southern River geomorphological/soil unit with variation in water availability due to the gently undulating topography. In fact, the Southern River Vegetation Complex has very diverse vegetation (see, for example Trudgen and Keighery 1995) and easily encompasses the variation present in the remnant on Perth's Bushplan Site No. 283.

3.2 Floristic community types present in Perth's Bushplan site 283

Gibson *et al* (1994) have defined a series of "floristic community types" for the Swan Coastal Plain. These are units defined on the floristic make up of the vegetation sites sampled, without taking into account the vegetation's structure. Gibson *et al* (1994) have grouped their floristic community types into four supergroups.

As with "vegetation complex", there is no formal definition of "floristic community types" that places them in a hierarchical arrangement similar to the traditional classification of vegetation into plant communities, vegetation associations and vegetation formations and they can be defined at any level depending on the particular study. As used by Gibson *et al* (1994) on the Swan Coastal Plain, the floristic community types defined are of a similar level to vegetation formation, and also to vegetation complex as used by Heddle *et al* (1980). See Trudgen (1999) for a discussion of these issues.

In Perth's Bushplan (DEP 1998, volume 2 part B, p. 74), the Queens Park Bushland is considered to have areas representing the following floristic community types:

Supergroup 1: Foothills/Pinjarra Plain
Floristic Community Type 3a: *Corymbia calophylla - Kingia australis* woodlands on heavy soils

Supergroup 2: Seasonal wetlands
Floristic Community Type 4: *Melaleuca preissiana* damplands

Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau
Floristic Community Type 23a: Central *Banksia attenuata - Banksia menziesii* woodlands AND/OR
Floristic Community Type 20a: *Banksia attenuata* woodlands over species-rich dense shrublands

It should be noted that the presence of these types has been inferred by the authors of Perth's Bushplan rather than site data having been run through the PATTN computer package as was done by Gibson *et al* (1994). However, as the work has been done by one of the authors of Gibson *et al* (1994) the assignment to floristic community types is likely to be correct.

4.0 METHODOLOGY OF THE VEGETATION AND FLORA SURVEY

A combination of releve sites and two 10 by 10 metre plots were recorded, none of which were permanently pegged. At each of the sites and plots recorded the vegetation structure was described, species lists recorded and habitat, soil type and vegetation condition noted. The two 10 by 10 m plots were sited in unburnt Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*) - *Banksia* vegetation, most of the remainder of the vegetation had been burnt in the last two years.

The two 10 by 10 metre plots were searched intensively for flora species to obtain data to compare to Gibson *et al* (1994), to attempt to confirm the floristic community types of the stands they were located in are amongst those inferred as present in the study area in Perth's Bushplan. The vegetation stands the releve sites were recorded in were more degraded and more recently burnt and it was considered that recording 10 by 10 metre plots in these stands would not give data of sufficient quality to compare to Gibson *et al* (1994).

In the stands were releve sites were recorded, flora lists were recorded over larger areas to give better lists for the stands and to record as many flora species as possible.

Additional flora searches were made through areas of the remnants surveyed when walking between the sites recorded and checking vegetation boundaries. An overall species list is provided in Appendix 2.

The separate remnants of vegetation are lettered A to D (see Map 1) to make reference to them easier in discussion of their values.

Condition assessments are made using the scale in Appendix 1.

Photographs were taken of the sites recorded using a digital camera.

5.0 LIMITATIONS OF THE VEGETATION AND FLORA SURVEY

The floristic data for the 10 by 10 metre plots is incomplete as they were only sampled once in early spring and it is necessary to sample such plots at different times of the year to obtain complete lists. Consequently, some early flowering cryptophytes may have been missed and some later flowering annuals may have been missed. Possibly as importantly, when sites are only visited once inconspicuous species not in flower are more likely to be missed. However, several orchid species were recorded at site 4 (the Marri 10 by 10 metre site sampled), so at this site the first limitation may not be very great.

A complete flora inventory of the remnants was not attempted, especially of the weed flora, although as many native species as possible were recorded.

The larger area of Jarrah - *Banksia* vegetation is mapped as one unit, but it is likely that the lower part of the slope could be distinguished as a separate unit (possibly the same as the smaller area of Jarrah -*Banksia*) when the area has recovered further from the last fire. It was noted that *Macrozamia fraseri* (the Zamia Palm) was present on the lower slope but not near the crest where the site was recorded and this species is often present in plant communities that occur on the lower slopes of dunes of the Bassendean Sands.

The accuracy of the vegetation mapping and vegetation condition boundaries may have been affected in some places by the recent fires blurring boundaries, as well as by the disturbance and variable weed invasion of the remnants.

6.0 FLORA OF THE STUDY AREA

Ninety-three native species were recorded in the remnants of native vegetation in the study area, but this is probably only about 70% of the total native flora of the remnants. The native flora recorded seems somewhat lower than would be expected for the size of the remnants and the number of plant communities in the study area. This can be partly explained by the fact that the survey was limited to one season but other factors are also relevant.

Some of the plant communities recorded, such as the dampland/wetland types, do not generally have high floristic diversity of native flora and this has been reduced by weed invasion and physical disturbance. Some of the plant communities (such as the two Marri plant communities) are closely related floristically and so do not add much diversity floristically, although they are different structurally. Finally, the repeated burning and subsequent weed invasion of the remnants has probably reduced diversity somewhat.

No declared rare or priority flora species were recorded during the survey, although Tauss (1997) has recorded the Priority 1 species *Macarthuria keigheryi* in the remnant in Perth's Busplan area 283 that adjoins the study area for this report. This species was searched for but not recorded during the current survey.

While the flora recorded is not large, due to the extent of clearing on the Swan Coastal Plain the flora populations in the remnants are of significant conservation value. Keighery (1999) has shown that many species native to the Swan Coastal Plain are poorly represented in conservation reserves on the plain. The degree of loss of flora populaions on the plain due to clearing is so significant that even relatively small remnants such as remnant C (the largest remnant in the survey area) are of importance for maintaining representation of species on the plain and probably also for maintaining the genetic diversity of species native to the Swan Coastal Plain.

In addition to the native flora species recorded, the remnants have many weed species. This reflects the urban setting of the remnants as well as the moist nature of some of the habitat types.

7.0 VEGETATION OF THE STUDY AREA

The vegetation is described under sections for the significant remnants of native vegetation remaining in the study area, except for areas mapped as parkland cleared Marri, for which no specific description is required. These latter areas have a variable amount of Marri (*Corymbia calophylla*) over understories of weeds.

7.1 Vegetation of remnant A

This remnant is located next to Gibbs Street on its north-west side, two sites were recorded in it.

Site 1.
Location: In a small patch of trees next to Gibbs Street that is separated from the rest of the remnant (in which site 2 is located) by a track.
Habitat: Upper edge of a dampland.
Soil: Grey sand (of the Bassendean Sands).
Vegetation: *Eucalyptus rudis* (one individual), *Melaleuca preissiana* (one individual), *Acacia saligna* (three individuals) over **Watsonia* sp., **Ehrharta calycina*, **Lolium* sp.
Associated species: **Solanum nigrum*, **Cynodon dactylon*, **Digitaria sanguinalis* (Crabgrass), *Xanthorrhoea brunonis* (one individual).
Condition: Very Poor to Completely Degraded.

Site 2.
Location: Larger patch of vegetation in the same remnant as Site 1, separated from it by a track.
Habitat: Dampland/Wetland.
Soil: Bassendean sand, humus-rich in surface layer.
Vegetation: *Eucalyptus rudis* Woodland to Low Open Forest over *Melaleuca preissiana* Low Woodland over **Chamaecytisus palmensis* (Tagasaste) Scattered Tall Shrubs over patches of **Watsonia* sp. (near Gibbs Road), **Pennisetum clandestinum* (Kikuyu Grass), **Ehrharta calycina* (Perennial Veldt Grass) **Ehrharta longiflora* (an annual Veldt Grass) and **Cynodon dactylon* (Couch Grass)
Associated species: *Acacia saligna*, **Cortaderia selloana* (Pampas grass), **Lupinus cosentinii.* (Blue Lupin), *Juncus pallidus*, **Myrsiphyllum asparagoides* (Bridal Creeper), **Oxalis pes-caprae*, **Acacia longifolia* (not a local native), *Aotus gracilima*, **Fumaria* sp., *Juncus pallidus*, **Melia azaderach* (Cape Lilac), **Dipogon lignosus*, *Vicia sp.
Condition: Very poor to completely degraded.
Notes: There were also some small patches of *Melaleuca preissiana*. The understorey may have been fairly open originally, but there would have been an open shrub layer and a herb/sedge layer and these have been completely lost. This means that the conservation value for flora is restricted to the dominants. However, the remnant retains significant value for birds, invertebrates (especially those associated with the dominants) and landscape.

7.2 Vegetation of remnant B

The 'improved' wetland.

Site 3.
Location: A short distance in (north-west) from Gibbs Street.

Habitat: A wetland that has been altered by the deepening of an elliptic section to intersect the water table (with the spoil placed in the centre to make a raised island).
Vegetation: **Azolla filiculoides* covers a large part of the water surface. The artificial central island has a grassland of introduced species with a few individuals of *Acacia saligna* scattered on it.
Condition: Completely Degraded.
Notes. **Rumex acetosella* was common along parts of the banks, which otherwise were mown grassland of introduced species. Although not native vegetation, this area has been treated as a 'vegetation patch' because it retains some value for native fauna, especially birds (both as a water source and possibly in summer as a refuge for waterbirds that have left seasonal wetlands that have dried out) and frogs.

7.3 Vegetation of remnant C
The large area of native vegetation in the north-west section of the part of the study area between Wharf and Gibbs Streets.

Site 4.
Location: In the south-eastern part of the remnant, at AMG 50H 04 01 320 (15) UTM 64 58 890 (83) {Probably due to the tree cover, the AMG given by the GPS fluctuated to the numbers in brackets.}
Habitat: Gentle slope.
Soil: Grey sand.
Vegetation: *Corymbia calophylla* (Marri) Woodland to Open Forest over *Allocasuarina fraseriana, Banksia attenuata* Scattered Low Trees over *Acacia pulchella, Jacksonia furcellata* Scattered Shrubs over *Xanthorrhoea brunonis* Scattered Low Shrubs over *Phlebocarya ciliata, Dasypogon bromeliifolius, Alexgeorgia nitens* Herbland/Sedgeland.
Associated species: *Hibbertia subvaginata, Acacia huegelii, Laxmannia ramosa* ssp. *ramosa, Pterostylis vittata* var. *vittata, Hibbertia hypericoides, *Myrsiphyllum asparagoides, *Briza maxima, Patersonia occidentalis, Caladenia latifolia, Caladenia patersonii* var *longicauda* ? (a white spider orchid), *Caladenia flava, Eucalyptus marginata* (Jarrah), *Gompholobium tomentosum, Dampiera linearis, *Hypochaeris glabra, Kennedia prostrata, *Ursinia anthemoides, Burchardia umbellata, Petrophile linearis, *Ehrharta longiflora, *Sonchus oleraceus, *Romulea rosea, Philotheca spicata, *Gladiolus caryophyllaceus, Melaleuca* species B, *Conostylis juncea, Acacia aplanata, Tricoryne elatior, Bossiaea eriocarpa, Jacksonia densiflora, Lomandra purpurea, Lomandra suaveolens, Hypolaena exsulea, Lyginia barbata, Lepidosperma squamatum* (narrow form), *Drosera stolonifera* ssp. *stolonifera*. **Trifolium* sp.
Condition: Good.
Fire Age: < 5 years.
Notes: Nearby; **Watsonia* sp, *Daviesia pectinata, Thysanotus patersoni, Nuytsia floribunda, Banksia ilicifolia, Lomandra preissii, Acacia huegellii, Leschenaultia floribunda, Stylidium brunonianum, Hibbertia hypericoides, Stylidium ?striata.*

Site 5.
Location: In the southern part of the remnant, at AMG 50H 04 01 257 UTM 64 58 811
Habitat: Gentle slope towards wetland.
Soil: Grey Sand, some humus giving a brownish tinge in the surface layer.
Vegetation: *Eucalyptus marginata, Corymbia calophylla* Scattered Low Trees to Trees over *Banksia attenuata, Banksia menziesii* Low Woodland over *Jacksonia densiflora, Acacia pulchella* Scattered Shrubs over *Stirlingia latifolia* Low Shrubland over *Phlebocarya ciliata,*

Dasypogon bromeliifolius, Lyginia barbata, Alexgeorgia nitens, Patersonia occidentalis Mixed Open Herbland/Sedgeland.
Associated species: *Stylidium brunonianum, Conostylis juncea, Chamaescilla corymbosa* var. *corymbosa, Amphipogon turbinatus, Burchardia umbellata, Burchardia bairdiae, *Ursinia anthemoides, Acacia stenoptera, Gompholobium tomentosum, Thysanotus patersonii, Petrophile linearis, Isotropis cuneifolia* ssp. *cuneifolia, Hypolaena exsulca, Tricoryne elatior, Conostylis teretifolia* spp. *planescens, Lepidosperma squamatum* (narrow form), **Hypochaeris glabra, *Ehrharta calycina, Boronia ramosa Drosera stolonifera* ssp. *stolonifera, Dampiera linearis, Laxmannia ramosa* ssp. *ramosa, Xanthosia huegelii, Lomandra suaveolens, Lomandra caespitosa, *Romulea rosea, Hibbertia hypericoides, *Gladiolus caryophyllaceus, *Briza maxima, Anigosanthos humilis, Philotheca spicata, Haemodorum spicatum, Jacksonia furcellata, Acacia aplanata, *Watsonia* sp., *Bossiaea eriocarpa, Xanthorrhoea brunonis, Leschenaultia floribunda, Kennedia prostrata, Diuris* cf *longifolia, *Homeria flaccida, Crassula colorata, Desmocladus fasciculatus, *Silene gallica.*
Condition: Good; weed invasion moderate, mostly **Ursinia anthemoides, *Hypochaeris glabra, *Briza maxima* and **Ehrharta calycina*. There has possibly been some physical disturbance or grazing at some time in the past, which has opened up the herb/sedge layer.
Fire age: 5-10 years. However, most of the area of this vegetation unit in the study area has been burnt in the last two years.

Site 6.
Habitat: Gentle slope.
Soil: Grey sand.
Vegetation: *Corymbia calophylla, Eucalyptus marginata* Woodland over *Banksia menziesii, Nuytsia floribunda, Allocasuarina fraseriana* Scattered Low Trees over *Stirlingia latifolia* Low Open Shrubland/Shrubland over *Dasypogon bromeliifolius, Patersonia occidentalis, Phlebocarya ciliata, Conostylis juncea, Alexgeorgia nitens, Lomandra suaveolens* Open Herbland.
Associated species: *Cyathochaeta avenacea, Hibbertia subvaginata, Tetraria octandra, Dampiera linearis, *Romulea rosea, Chamaescilla corymbosa* var. *corymbosa, *Watsonia, Tricoryne elatior, Caladenia flava, Desmocladus fasciculatus, Bossiaea eriocarpa, Jacksonia densiflora, Acacia pulchella, *Hypochaeris glabra, Drosera stolonifera* ssp. *stolonifera, *Ursinia anthemoides, Diuris* cf. *longifolia, Sollya heterophylla, Acacia aplanata, Trachymene pilosa, Xanthosia huegellii, Haemodorum spicatum, *Arctotheca calendula, *Briza maxima.*
Notes: Appears to be transitional between Site 4 and Site 5 but the recent fire makes this difficult to judge.
Condition: Good.
Fire age: Burnt within the last 18-24 months.

Site 7.
Habitat: Wetland.
Vegetation: *Melaleuca preissiana* Low Woodland over patches of *Astartea* aff. *fascicularis* and *Juncus pallidus*.
Associated species: *Burchardia bairdiae* (at edge only).
Notes: There was shallow water in the south-east part of the stand, while the north-west part had a weed understorey and no water.
Condition: The part with water was in Poor to Good condition and would be Good except for the high level of weed invasion. The remainder was poor to very poor.

Site 8.
Habitat: Would have been an upper part of a dampland before clearing.
Vegetation: Scattered *Melaleuca preissiana* Low Trees over weeds.
Associated species: Some *Eucalyptus marginata* and *Corymbia calophylla* at edges of adjoining units.
Condition: Poor to parkland cleared, part being a track.
Notes. Only a small area.

Site 9.
Habitat: Gentle slope at edge of wetland.
Soil: Grey sand (wet at 11/9/2000).
Vegetation: *Banksia menziesii, Banksia ilicifolia* Scattered Low Trees over *Jacksonia furcellata, Xanthorrhoea brunonis* Low Shrubland to Low Open Heath over *Dasypogon bromeliifolius* Open Herbland.
Associated species: *Prasophyllum fimbriata, *Hypochaeris glabra, *Ursinia anthemoides, *Watsonia, *Ehrharta calycina, *Briza maxima, *Romulea rosea, Crassula colorata, Kennedia prostrata, Hypocalymma angustifolia, Caladenia flava, Tricoryne elatior, Haemodorum spicatum, Thysanotus patersonii, Chamaescilla corymbosa, Crassula decumbens* var. *decumbens, Isolepis marginata, Cyathochaeta avenacea, Conostylis juncea, Drosera macrantha.*
Condition: Poor - Good. There has probably been some clearing of the tree layer. The stand has been burnt recently and has moderate weed invasion in patches. The westernmost part of the stand is in Poor to Very Poor condition.
Fire age: Burnt within the last 18-24 months.
Notes: Western part of site has been partially cleared.

Site 10.
Habitat: Upper slopes of low sand drift, and to crest.
Soil: Grey sand.
Vegetation: *Eucalyptus marginata* Scattered Trees to Open Woodland over *Banksia menziesii, Banksia attenuata, Allocasuarina fraseriana* Low Woodland to Low Open Forest over *Stirlingia latifolia* Shrubland over *Dasypogon bromeliifolius, Phlebocarya ciliata, Alexgeorgia nitens, Patersonia occidentalis, Conostylis juncea* Herbland/ Sedgeland.
Associated species: *Mesomelaena stygia, Conostylis aurea, Daviesia nudiflora, Arnocrinum preissii, Acacia sessilis, Jacksonia densiflora, Tricoryne elatior, Dampiera linearis, *Ehrharta calycina, *Gladiolus caryophyllaceus, Patersonia occidentalis, Burchardia umbellata, *Romulea rosea, *Arctotheca calendula, Kennedia prostrata, Adenanthos cygnorum, Caladenia gemmata, Caladenia patersonii* var. *longicauda, Conostylis teretifolia* ssp. *planescens , Acacia aplanata, Thysanotus patersonii, *Hypochaeris glabra, Petrophile linearis, Hibbertia hypericoides, 'Desmocladus fasciculatus, Conostephium pendulum, Lomandra suaveolens, Lyginia barbata, *Fumaria* sp., *Calandrinia corrigioloides, Banksia grandis, Macrozamia fraseri, Diuris* cf. *longifolia, *Dischisma arenarium.*
Condition: Poor to Good (patchy), some loss of structure, probably due to grazing at some time in the past. Weed invasion moderate to high.
Fire age: 18-24 months.
Notes: Some species were only observed on the crest of the low dune (*Mesomalaena stygia, Conostephium pendulum,* the two *Daviesias, Desmocladus flexuosus*). Similar vegetation continues towards the denser area to the north where the fire age appears to be greater - it doesn't contain *Stirlingia latifolia.*

Site 11.

Habitat: Slope of a low dune
Soil: Grey sand.
Vegetation: *Eucalyptus marginata* Open Woodland over *Banksia menziesii, Banksia attenuata, Allocasuarina fraseriana* Low Open Forest/Woodland over *Dasypogon bromeliifolius, Phlebocarya ciliata, Alexgeorgia nitens, Lomandra suaveolens, Lepidosperma squamatum* Herbland/Sedgeland.
Associated species: *Petrophile linearis, Hibbertia hypericoides, *Fumaria* sp., *Euphorbia, *Watsonia, *Ehrharta calycina, Conostylis juncea, Hakea prostrata, Burchardia umbellata, Romulea rosea, Desmocladus fasciculatus, Dianella revoluta, Lagenifera huegellii.*
Condition: Poor to Good.
Notes: This area is in poor condition (some in good condition). **Leptospermum laevigatum* has a large, patchy population here, **Brachychiton* is present as a weed (one individual) and **Euphorbia* cf. *peplus* is becoming a problem weed. There is also some *Bridal Creeper. There were two old *Jacksonia sternbergiana* in the adjacent area of parkland cleared *Corymbia calophylla* and one small clump of *Dryandra nivea* ssp. *nivea*. An area of *Corymbia calophylla* (Marri) Tall Woodland over **Leptospermum laevigatum* High Open Shrubland to High Shrubland over weeds downslope from site 11 is shown on the map as unit 14.

7.4 Vegetation of remnant D
The small area of native vegetation in the south-east section of the part of the study area between adjacent to Gibbs Streets near the intersection of Luyer Road with Gibbs Street.

Site 12.
Habitat: Low, flat area.
Soil: Dark grey sand.
Vegetation: *Corymbia calophylla* (Marri) Tall Open Woodland to Tall Woodland over *Eucalyptus marginata* (Jarrah) Scattered Low Trees over *Daviesia pectinata, Acacia pulchella* Scattered Shrubs over *Dasypogon bromeliifolius, Alexgeorgia nitens* Herbland/Sedgeland.
Associated species: **Gladiolus caryophyllaceus, Gompholobium tomentosum, Xanthorrhoea preissii, Xanthorrhoea brunonis, Hibbertia hypericoides, *Briza maxima, *Ehrharta calycina, Phlebocarya ciliata, Jacksonia furcellata, Thysanotus patersonii, Pterostylis vittata* var. *vittata, Xanthosia huegelii, Acacia huegelii, Kennedia prostrata, *Hypochaeris glabra, Caladenia flava, *Ehrharta longiflora, *Trifolium* sp., *Romulea rosea, Patersonia occidentalis, Conostylis juncea, Conospermum stoechadis, Adenanthos cygnorum* ssp. *cygnorum.*
Condition. The part of the remnant site 12 was in was in good condition, as was another part dominated by Marri, the third part dominated by Marri was in poor condition.
Notes. The remnant also includes a very small area of *Melaleuca preissiana* seasonal wetland (a small part may be semi-permanent, as it had *Typha*) but this was in very poor condition. Another small part of the remnant was parkland cleared Banksia *menziesii*. In the stand but away from the site recorded *Dampiera linearis, Bossiaea eriocarpa, Caladenia patersoniii* var. *longicauda, Banksia menzesii, Jacksonia densiflora, *Watsonia* sp., *Lomandra suaveolens, Hovea trisperma, Hypolaena exsulca* and *Tricoryne elatior* were recorded.

8.0 ASSESSMENT OF THE VEGETATION AND FLORA CONSERVATION VALUE OF REMNANTS A - D

8.1 Criteria used to assess the value of the remnants

The level of the conservation value of an area for vegetation is assessed on a number of parameters. These are:

- the conservation and reservation status of the vegetation in the area. For the Swan Coastal Plain this can be based on the vegetation complexes of Heddle *et al* (1980), the floristic community types of Gibson *et al* (1994), or the mapping of Beard (1979), taking into account the plant communities present on the land being assessed and how they indicate the vegetation of the land being assessed relates to the variation of the broad scale units available;

- the diversity of vegetation types on the area. On the Swan Coastal Plain this can be assessed at different levels. These are the vegetation complexes of Heddle *et al* (1980), the floristic community types of Gibson *et al* (1994), the mapping of Beard (1979) and the plant community level;

- whether or not the particular assemblage of vegetation present is common or uncommon. That is, is the particular mix of vegetation present unusual, for example (on the Swan Coastal Plain), an unusual combination of the floristic community types of Gibson *et al* (1994) or the presence of rare or threatened vegetation types;

- where the area being assessed falls in the geographic range of the type or types of vegetation present on it. Again, this can be assessed at the different levels of vegetation description available. Outlying areas, or areas at the ends of the range of a vegetation type will generally be considered of higher value than areas near the centre, if the latter are well reserved;

- the condition of the vegetation on the area. The better the condition of the vegetation of an area, the higher its conservation value will be rated. However, vegetation of a type that has become scarce will still be of high value if it has been degraded as long as there is potential to protect significant parts of its original vegetation structure.

"Thus, vegetation that is rare will be considered to have more value than vegetation that is common, an area with a diverse range of vegetation types or floristic community types will be considered to be of more value that one that has few types, an area of vegetation that represents that type in a region where it is less common than in other areas will be

considered to have more value than a similar stand in an area that has several such stands." (Trudgen and Keighery 1995).

Criteria such as those listed above can then be used in conjunction with a table such as Table 1 (see below) to assess individual areas or remnants of vegetation.

While it is not a basic determinant of conservation value, the shape of an area has an impact on the practicalities of managing an area to maintain its conservation value. Areas with long boundaries being considered more difficult to manage than areas with short boundaries, because there are more places where pressures (eg. weed invasion, physical impacts) are present that can reduce conservation value if the boundary to area ratio is high. So if two areas of otherwise similar values for vegetation have different shapes, then the one having a better shape for maintaining those values might be considered of higher value for retention of those values. {This section adapted from Trudgen (1999).}

Table 1. The range of possible values, extremely high to extremely low, for ranking the conservation value of an area for vegetation and flora defined in terms of a simplification of the range of possible richness of flora species and plant communities of an area. Reproduced with modifications from Trudgen (1999, Table 4, section 10.4), including the bottom four rows being added. The table has to be used as a guide, the value of a remnant also being affected by other factors such as the area of the remnant (which will be reflected to some degree in both the number of plant communities and the number of species), the condition of the remnant, the presence of rare or priority flora, the presence of rare vegetation types and the degree of clearing in the region.

Flora and vegetation diversity as range of numbers of native flora species and native plant communities	**Value Global scale**	**Value National scale**	**Value State scale**	**Value Regional scale**	**Value Local scale**	**Examples**
Thousands of flora species. Several hundred or more plant communities	Extremely high					Amazon rainforests
About 1000 - 2,000+ flora species. A few hundred plant communities.	Very high	Extremely high				*Banksia* Mediterranean woodlands of the Swan Coastal Plain IBRA region. The Jarrah forests of south-western Western Australia. Fitzgerald River National Park and Biosphere Reserve.
About 1,000 flora species. 100-200 plant communities	High	Very High	Extremely high			Lane Poole Nature Reserve in the northern Jarrah forest.
Less than 1,000 flora species (usually ± 700-900? but sometimes less) Less than 100 plant communities	Medium	High	Very High	Extremely high		Yalgorup National Park (largest national park on the Swan Coastal Plain south of Perth).
Less than 500 flora species ± 50 plant communities	Low	Medium	High	Very high	Extremely high	Yanchep National Park.
Less than 300 flora species ± 25 plant communities	Very low	Low	Medium	High	Very high	Survey area of Trudgen (1999) at Ellenbrook (near top of this level)
Less than 150 flora species Less than 10 plant communities	Extremely low	Very low	Low	Medium	High	

8.2 Assessment of conservation value for flora

The level of the conservation value of an area for flora is assessed on a number of parameters. These are:

- the diversity of the flora present. That is, how many species are present;

- whether or not any rare species (particularly Declared Rare Flora or priority taxa), poorly known species, poorly protected species, or geographically restricted species are present;

- whether or not there are species present that are at the ends of their known range.

- whether or not the flora present includes populations of species that are poorly represented in conservation reserves

An area with a diverse flora will generally be considered to have more value for flora than an area with few species and an area with rare species or species at the ends of their range will be considered to be more valuable than areas without such species. {This section reproduced from Trudgen (1999.}

8.3 Vegetation and flora conservation values of remnants A to D

8.3.1 Vegetation and flora conservation value of remnant A

Remnant A is mostly dominated by *Eucalyptus rudis* over *Melaleuca preissiana* with a smaller area dominated by *Melaleuca preissiana*. The understorey has been almost completely removed, with a total of six native species remaining in the remnant, including the dominants. The condition of both sites recorded in this remnant was assessed as very poor to completely degraded (see Appendix 1 for the condition scale used).

The low number of plant communities, the small number of flora species, the very condition and small size of this remnant together mean that it must be assessed as having extremely low conservation value for vegetation and flora at the local level of assessment. However, the remnant retains some value for the dominant flora species, has some value for fauna (particularly birds, but also invertebrates and probably for frogs) and has value in the local landscape.

8.3.2 Vegetation and flora conservation value of remnant B

Remnant B is completely cleared, retaining no conservation value for vegetation and almost none for flora, only having a few individuals of one native flora species (*Acacia*

saligna). It has been included in this assessment as it has value for native fauna, particularly waterfowl and frogs but also probably invertebrates. This value probably supplements the value of the wetland in Remnant C, where waterfowl were also observed as the water is deeper and therefore more likely to be permanent (it has been artificially deepened).

8.3.3 Vegetation and flora conservation value of remnant C

Remnant C is the most significant of the remnants of native vegetation remaining in the current study area. It has stands of at least seven (7) plant communities, which is a significant number for the size of the remnant, although not highly unusual for similar sized areas of the Southern River Complex, which is inherently variable due to its geomorphology. However, some of the stands are in poor condition (see vegetation site descriptions above). Of particular note is the presence of vegetation dominated by Marri (*Corymbia calophylla*) that has been inferred as belonging to Floristic Community Type 3a of Gibson *et al* (1994) in Perth's Bushplan. This is a Critically Endangered "Ecological Community" (English and Blyth 1997). The remnant also has at least eighty-one native flora species, although this is not based on searches at different times of the year, or exhaustive searches at the time of survey and is likely to significantly underestimate the number of species present.

The number of plant communities in the remnant and the number of flora species recorded would suggest the remnant has "medium" value at the regional level of assessment and "high" value at the local level of assessment (see Table 1 above). The fact that some of the stands are in poor or very poor condition would reduce the level of value somewhat. However, the presence of areas of Floristic Community Type 3a of Gibson *et al* (1994) is arguably more important and elevates the value. Thus the remnant should be considered to be of high to very high value at the local level and medium to high level at the regional level. This assessment is supported by the small amount of native vegetation remaining in the surrounding region.

The assignment in Perth's Bushplan (DEP 1998, vol. 2 part B) of the Marri vegetation in Bushplan site 283 to Floristic Community Type 3a is based on inferring that if sites were properly recorded in the vegetation and the appropriate computing analyses carried out that the sites would fall into this floristic community type. This (inferring allocation to a florisitc community type) is done by recording site data and comparing it to Table 12 ("Sorted two way table showing species frequency by (sic floristic) community type") of Gibson *et al* (1994). Comparing the site data recorded during this survey (especially the data from Site 4) suggests that the referral to Floristic Community Type 3a is probably correct, although not absolutely certain. It is possible that the Marri stands (or part of them) should be referred to Floristic Community Type 3b, which is a "vulnerable" rather

than "critically endangered" threatened ecological community (see English and Blyth 1997) and the sandy surface soil of the site and the presence of Jarrah (*Eucalyptus marginata*) would fit with this.

Possibly of more importance is that the exercise makes obvious the very diverse nature of Floristic Community Types 3a, 3b and 3c. Trudgen (1999) has discussed the appropriate ranking of the floristic community types of Gibson *et al* (1994), what is relevant here is that Floristic Community Types 3a, 3b and 3c are obviously very variable, each containing a number of plant communities. The implication of this is that individual stands of Floristic Community Type 3a, 3b and 3c are all of high conservation value as the amount of replication within these floristic community types at the plant community level is very low. The fact that there are two Marri plant communities within the Floristic Community Type 3a in remnant C adds significantly to the conservation value for this floristic community type in the remnant.

Perth's Busplan (DEP 1998, vol 2 part B p. 74) also infers the presence of the "possibly endangered" Floristic Community Type 20a in the Qeens Park Bushland. If this occurs in the study area, it would be unit 10, on the higher part of the dune. If this is correctly inferred (and it seems fairly likely), then this adds significantly to the conservation value of the remnant.

As the largest remant with the most species, remnant C has the highest conservation value for flora of the remants in the study area, as well as the highest conservation value for vegetation.

8.3.4 Vegetation and flora conservation value of remnant D

Remnant D has stands of two plant communities (Marri dominated and *Melaleuca preissiana* dominated), but is mostly one Marri community and has less than fifty (50) native species. This would suggest that it should be rated as extremely low on the regional level and very low on the local level (see Table 1) and its small size and condition would support this. However, the Marri vegetation that makes up most of remnant D belongs to Floristic Community Types 3a which is a "critically endangered" threatened ecological community (see discussion of remnant C above). Therefore remnant D should be assessed as being of significantly higher conservation value than it otherwise would be. As with the Marri in remnant C, it is possible that the Marri in remnant D should be asigned to Floristic Community Type 3b, rather than 3a. While this would reduce it's value slightly in a theoretical sense, it would still have sufficient value to deserve protection.

9.0 ACCEPTABILITY OF PROPOSED LAND SWAP

From the point of view of the conservation of vegetation and flora, the proposed land swap is acceptable if:

- the two significant remnants (remnants C, D) are protected with adequate buffers and improved management;

- areas of parkland cleared like vegetation are developed in the areas proposed to be cleared of housing to replace the landscape value of those that would be lost under the proposed land swap; and

- there is no net loss of wetland habitat.

Remnant A has some minor conservation value for flora and it would be desirable to keep it for it's landscape value. However, similar values could be obtained through planting of the same species in artificially created low points in the areas proposed to be cleared of housing.

The parkland cleared area south of Gibbs Street (between Gibbs Street and the fenced bushland outside the present survey area) has some low value for the trees and for a few scattered understorey species (some of which could be salvaged for rehabilitation in remnant D or C) and landscape value for the trees. Again, similar values could be could be obtained through planting of the same species in the areas proposed to be cleared of housing. However, the aspect of the landscape value of the trees in this area that relates to their being visible from Welshpool Road would be lost.

For the land swap to be successfully implemented from the point of view of conservation of the vegetation and flora, a management plan would need to be developed that included:

- "hard" edges such as roads to the areas of remnant bushland to reduce impacts on them;

- fences or other structures (eg high kerbs) of a type that prevent unauthorised vehicle access;

- adequate buffers around the bushland remnants, these would need to at least fifty (50) metres wide but 75 metres would be desirable;

- systematic rehabilitation of the areas of the remnants that are in poorer condition using plants grown from seed or cuttings sourced from the remnants and planted into the correct habitat type at appropriate densities;

- control of weeds through appropriate means;

- a local education campaign focussing on the values of the remnants for flora, vegetation and their contribution to amenity and landscape value and to discourage frequent burning;

- local involvement in management and rehabilitation of the remnants (this would be encouraged through the public education campaign);

- no net loss of wetland areas;

- no net loss of parkland cleared areas.

8.0 REFERENCES

Churchward, H.M. and W.M. McArthur (1980). *Landforms and soils of the Darling System, Western Australia.* In: *Atlas of natural resources, Darling System, Western Australia.* Maps and explanatory text. Department of Conservation and Environment, Western Australia.

English, V., and Blyth, J. (1997). *Identifying and conserving threatened ecological communities (TECs) in the South West Botanical Province.* ANCA National Reserves System Cooperative Program: Project Number N702, Australian National Conservation Agency, Canberra.

DEP (1998). Perth's Bushplan. Volumes 1 and 2 (Parts A, B, C). Prepared by the Environmental Protection Authority, the Western Australian Planning Commission. the National Parks and Nature Conservation Authority and the Waters and Rivers Commission. Published by the Department of Environmental Protection, Western Australia.

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

Heddle, E.M., Loneragan, O.W. & Havel. J.J. (1980). *Vegetation complexes of the Darling System, Western Australia.* In; *Atlas of Natural Resources, Darling System Western Australia.* Maps and explanatory text. Department of Conservation and Environment, Western Australia.

Keighery, G.J. (1999) *Conservation Status of Vascular Flora of the Southern Swan Coastal Plain.* Unpublished report for the ANCA National Reserves System Cooperative Program: Project N710, prepared by the Department of Conservation and Land Management, Woodvale.

Tauss, C. (1997). *Flora of the Queens Park ecological area.* Unpublished report prepared by Bushranger Landcare for the City of Canning.

Trudgen, M.E. (1988). *A Report on the Flora and Vegetation of the Port Kennedy Area.* Unpublished report prepared for Bowman Bishaw and Associates, West Perth.

Trudgen, M.E. (1999). *A flora and vegetation survey of Lots 46 and 47 Maralla Road and Lexia Avenue, Ellenbrook.* Unpublished report prepared for the Crown Solicitors Office. M.E. Trudgen and Associates, Perth. December 1999.

Trudgen, M.E. and B.J. Kieghery (1995). *A survey of remnant vegetation in the City of Gosnells west of the Darling Scarp.* Unpublished report prepared for the City of Gosnells

APPENDIX 1: Vegetation condition scale

This is a general purpose condition scale for assessment of native vegetation, a slightly modified version has been used in Perth's Bushplan. It is reproduced from Trudgen (1988).

E = Excellent. Pristine or nearly so, no obvious signs of damage caused by the activities of European man.

VG = Very good. Some relatively slight signs of damage caused by the activities of European man. E.g. some signs of damage to tree trunks caused by repeated fire and the presence of some relatively non-aggressive weeds such as Ursinia anthemoides or Briza spp., or occasional vehicle tracks.

G = Good. More obvious signs of damage caused by the activities of European man, including some obvious impact on the vegetation structure such as caused by low levels of grazing or by selective logging. Weeds as above, possibly plus some more aggressive ones.

P = Poor. Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of activities of European man such as grazing or partial clearing (chaining) or very frequent fires. Weeds as above, probably plus some more aggressive ones such as *Ehrharta* spp.

VP = Very poor. Severely impacted by grazing, fire, clearing or a combination of these activities. Scope for some regeneration but, not to a state approaching good condition without intensive management. Usually with a number of weed species including aggressive species.

D = Completely degraded. Areas that are completely or almost completely without native species in the structure of their vegetation. I.e. areas that are cleared or "parkland cleared" with their flora comprising weed or crop species with isolated native trees or shrubs.

APPENDIX 2. Vegetation structural table of Specht as modified by Aplin (1979)

Life form and height of tallest stratum	Projective foliage cover of tallest stratum as %	Description
Trees over 30 metres	70 -100	High closed forest
	30 -70	High open forest
	10 - 30	high woodland
	2 -10	high open woodland
	under 2	Scattered tall trees
Trees 10 - 30 metres	70 -100	Closed forest
	30 -70	Open forest
	10 - 30	Woodland
	2 -10	Open woodland
	under 2	Scattered trees
Trees under 10 metres	70 -100	Low closed forest
	30 - 70	Low open forest
	10 - 30	Low woodland
	2 -10	Low open woodland
	under 2	Scattered low trees
Shrubs over 2 metres	70 - 100	Closed scrub
	30 - 70	Open scrub
	10 - 30	High shrubland
	2 -10	High open shrubland
	under 2	Scattered tall shrubs
Shrubs 1 - 2 metres	70 - 100	Closed heath
	30 - 70	Open heath
	10 - 30	Shrubland
	2 -10	Open shrubland
	under 2	Scattered shrubs
Shrubs under 1 metre	70 - 100	low closed heath
	30 - 70	low open heath
	10 - 30	low shrubland
	2 -10	Low open shrubland
	under 2	Low scattered shrubs
Herbs/Sedges/Grasses	70 - 100	Closed herb, sedge, grassland
	30 - 70	Herb, sedge, grassland
	10 - 30	Open herb, sedge, grassland
	2 -10	Very open herb, sedge, g'land under 2
	Scattered herbs sedges, grasses	

Grasslands then divided into:
Tussock grasslands (perennial tussock species, e.g. Eragrostis species);
Hummock grasslands (Triodia and Plectrachne species that form hummocks)
Curly spinifex grassland (Plectrachne pungens, which does not form hummocks)
Annual tussock grassland (e.g. annual Sorghum species).
The "curly spinifex grassland " division follows J.S. Beard.

APPENDIX 3: Flora recorded for the survey area

Notes: The family order used and application of names follows the Western Australian Herbarium (some names of weeds may not be up to date). The list is based on the recording of a limited number of vegetation recording sites, and observations made while compiling a map of the vegetation and is not exhaustive as it only includes records made in September 2000.

PTERIDOPHYTA

15. AZOLLACEAE
*Azolla filiculoides

GYMNOPHYTA

16A. ZAMIACEAE
Macrozamia fraseri

ANGIOPHYTA

20. TYPHACEAE
Typha sp. (sterile)

31. POACEAE
Amphipogon turbinatus
**Briza maxima*
**Cortaderia selloiana*
**Cynodon dactylon*
**Digitaria sanguinalis*
**Ehrharta longiflora*
**Ehrharta calycina*
**Eragrostis curvula*
**Lolium sp*
**Pennisetum clandestinum.*

32. CYPERACEAE
Cyathochaeta avenacea
Isolepis marginata
Lepidosperma squamatum (narrow form)
Mesomalaena stygia

39. RESTIONACEAE
Alexgeorgia nitens
Desmocladus (Loxocarya) *fasciculata*
Desmocladus flexuosus
Hypolaena exsulca
39a. LYGINIACEAE
Lyginia barbata

52. JUNCACEAE
Juncus pallidus

54C. DASYPOGONACEAE
Dasypogon bromeliifolius

Lomandra caespitosa
Lomandra preissii
Lomandra suaveolens

54D. XANTHORRHOEACEAE
Xanthorrhoea brunonis
Xanthorrhoea preissii

54E. PHORMIACEAE
Dianella revoluta

54F. ANTHERICACEAE
Arnocrinum preissii
Chamaescilla corymbosa var corymbosa
Laxmannia ramosa ssp. *ramosa*
Thysanotus patersoni
Tricoryne elatior

54J. COLCHICACEAE
Burchardia bairdiae
Burchardia umbellata

55. HAEMODORACEAE
Anigozanthus humilis ssp. *humilis*
Conostylis aurea
Conostylis juncea
Conostylis teretifolia ssp. *planescens*
Haemodorum spicatum
Phlebocarya ciliata

60. IRIDACEAE
**Gladiolus caryophyllaceus*
**Homeria flaccida*
Patersonia occidentalis
**Romulea rosea*
**Watsonia* sp.

66. ORCHIDACEAE
Caladenia flava ssp. *flava*
Caladenia gemmata
Caladenia latifolia
Caladenia patersonii var. *longicauda*
Diuris cf. *longifolia*
Prasophyllum fimbriata
Pterostylis vittata var. *vittata*

70. CASUARINACEAE
Allocasuarina fraseriana

90. PROTEACEAE

Adenanthos cygnorum ssp. *cygnorum*
Banksia attenuata
Banksia grandis
Banksia ilicifolia
Banksia menziesii
Conospermum stoechadis
Dryandra nivea ssp. *nivea*
Hakea prostrata
Petrophile linearis
Stirlingia latifolia

97. LORANTHACEAE
Nuytsia floribunda

103. POLYGONACEAE
**Rumex acetosella*
**Rumex* sp.

113. CARYOPHYLLACEAE
**Silene gallica*

136. FUMARIACEAE
* *Fumaria* sp.

143. DROSERACEAE
Drosera macrantha ssp. *macrantha*
Drosera stolonifera ssp. *stolonifera*

149. CRASSULACEAE
Crassula colorata var. *colorata*
Crassula decumbens var. *decumbens*

152. PITTOSPORACEAE
Sollya heterophylla

163. MIMOSACEAE
Acacia huegelli
**Acacia longifolia*
Acacia aplanata
Acacia pulchella var. *pulchella*
Acacia saligna
Acacia sessilis
Acacia stenoptera
**Acacia sp.*

165. PAPILIONACEAE
Aotus gracillima
Bossiaea eriocarpa
Daviesia pectinata
Daviesia nudiflora

**Cytissus prolifera* (Tagasaste or Tree Lucerne)
**Dipogon lignosus*
Gompholobium tomentosum
Isotropis cuneifolia ssp. *cuneifolia*
Jacksonia densiflora
Jacksonia furcellata
Jacksonia sternbergiana
Kennedia prostrata
**Lotus* sp.
**Trifolium* sp.

175. RUTACEAE
Boronia ramosa
Philotheca spicata (syn. *Eriostemon spicatus*)

185. EUPHORBIACEAE
Euphorbia cf. *peplus*

226. DILLENIACEAE
Hibbertia stellaris
Hibbertia huegelii
Hibbertia hypericoides
Hibbertia subvaginata

273. MYRTACEAE
Astartea aff. *fascicularis*
Corymbia calophylla (Marri)
Eucalyptus marginata (Jarrah)
Hypocalymma angustifolium
Kunzea ericifolia
**Leptospermumm laevigatum*
Melaleuca preissiana
Melaleuca sp. B of Perth Flora

281. APIACEAE
Xanthosia huegelii

288. EPACRIDACEAE
Conostephium pendulum

315. SOLANACEAE
**Solanum nigrum*

316. SCROPHULARIACEAE
**Dichisma arenarium*

341. GOODENIACEAE
Dampiera linearis
Lechenaultia floribunda

Photograph 1. Vegetation unit 4: *Corymbia calophylla* (Marri) Woodland to Open Forest over *Allocasuarina fraseriana, Banksia attenuata* Scattered Low Trees over *Acacia pulchella, Jacksonia furcellata* Scattered Shrubs over *Xanthorrhoea brunonis* Scattered Low Shrubs over *Phlebocarya ciliata, Dasypogon bromeliifolius, Alexgeorgia nitens* Herbland/Sedgeland. This vegetation belongs to Floristic Community Type 3a, a critically endangered ecological community.

Photograph 2. Parkland cleared*Corymbia calophylla* (Marri) Woodland to Open Forest. Prior to clearing of the understorey, this stand would have been similar to the vegetation in photograph 1.

Photograph 3. *Corymbia calophylla* (Marri) Woodland to Open Forest over *Allocasuarina fraseriana, Banksia attenuata* Scattered Low Trees over *Acacia pulchella, Jacksonia furcellata* Scattered Shrubs over *Xanthorrhoea brunonis* Scattered Low Shrubs over *Phlebocarya ciliata, Dasypogon bromeliifolius, Alexgeorgia nitens* Herbland/Sedgeland.

Photograph 4. *Eucalyptus marginata* Scattered Trees to Open Woodland over *Banksia menziesii, Banksia attenuata, Allocasuarina fraseriana* Low Woodland to Low Open Forest over *Stirlingia latifolia* Shrubland over *Dasypogon bromeliifolius, Phlebocarya ciliata, Alexgeorgia nitens, Patersonia occidentalis, Conostylis juncea* Herbland/ Sedgeland. This stand appears to belong to Floristic Community Type 20a, which is a 'possibly endangered' threatened ecological community.

BUSH FOREVER SITE 283
QUEENS PARK

CONSERVATION CATEGORY WETLAND ASSESSMENT

Prepared for:

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Sheet 1 of 1

Project title Queens Park

Client Landstart

Document title Bush Forever Site 283 Queens Park - Conservation Category Wetland Assessment

Document type Report

Document code PN0040-GC-002 **First issue date** 7 May 2001

This sheet records the issue and revisions of the document. If only a few revisions are made, only the new or revised pages are issued. For convenience, the nature of the revision is briefly noted under 'Remarks', but these remarks are not part of the document.

Revision code	Date revised	Chapter/section/page revised, plus any remarks	Signatures		
			Originator	Checked	Approved
A	7/5/01	Issued for Client Review	PH	WNH	WNH
0	5/6/01	Final Report issued to Client			

1 INTRODUCTION

The Ministry for Housing is planning an urban revitalisation project within the Maniana Precinct at Queens Park. The project entails a proposed exchange of the Ministry's land holdings within the precinct for part of the adjacent Parks and Recreation Reserve that is within Bush Forever Site 283.

The Maniana Precinct project commenced during the Perth's Bushplan initiative (ie prior to the release of the Bush Forever reports), and investigation of the implications of the proposed land exchange for Bushplan Site 283 were included in the environmental studies undertaken during the project planning phase. Necessarily, the environmental investigations addressed issues relating to the remnant native vegetation within the site, although wetland related issues were also addressed.

In this regard, Map Sheet No. 49 in Volume 1 of the Bush Forever report, Policies, Principles and Processes published by the Western Australian Planning Commission (WAPC) (WAPC, 2000) now shows a Conservation category wetland extending across the northern portion of the Maniana Precinct study area east of Gibbs Street. As mapped, this wetland feature generally encompasses the remnant native vegetation within this part of the study area. The Conservation category wetland as mapped in the Bush Forever document also extends beyond the Maniana Precinct study area into the adjoining portion of the Parks and Recreation Reserve.

However, the equivalent mapping in Volume 2 Part C of the Perth's Bushplan report published by the Environmental Protection Authority (EPA), WAPC, National Parks and Nature Conservation Authority and Water and Rivers Commission (WRC) did not identify the area involved as a Conservation category wetland (EPA *et al*, 1998). Additionally, the area is not identified as any category of wetland in Volume 2B of the Wetlands of the Swan Coastal Plain series, Wetland Mapping, Classification and Evaluation - Wetland Atlas (Hill *et al*, 1996). Furthermore, in undertaking the project related environmental investigations, digital wetland data for the study area were obtained from the Water and Rivers Commission. These data were originally obtained from the Commission in May 2000 for a project Brown & Root was undertaking for Main Roads Western Australia, and were re-licensed by the Commission for use during the Ministry's Queens Park project on 06 October 2000. These data did not identify any portion of the study area east of Gibbs Road as a wetland and field inspections undertaken during the study confirmed that this area did not constitute a wetland.

Inquiries through the WRC in response to identification of this area as a Conservation category wetland in WAPC (2000) indicated that:

- its designation as such arose from advice from the Department of Environmental Protection; and

- an assessment of the area, in accordance with the procedures in EPA Bulletin 686 (EPA, 1993), would be required to justify any proposal to delete the wetland's conservation management categorisation.

This assessment has been undertaken, and the results are documented here. The premise underlying the need for the assessment is, however, of concern as it is based on an assumption that the area involved constitutes a wetland, a proposition that is not supported by field observations and available information.

2 ASSESSMENT

The extent of the Conservation category wetland as indicated by digital data provided by the WRC on 10 April 2001 has been superimposed on aerial photography of the site (refer to Figure 1). In terms of positional accuracy, the metadata file accompanying WRC's digital wetland data indicates the following:

- lakes and sumplands have been mapped to an accuracy of ± 10 metres; and
- damplands, palusplains, paluslopes, palusmonts and most flood plains have been mapped to a lesser accuracy of ± 50 metres (because of their less well defined boundaries).

Advice accompanying the digital data indicates that the wetland is a basin dampland presumably, therefore, indicating a potential error factor of ±50 metres in its position. The position of the wetland is also indicated as diagrammatic only on a hard copy plan of the wetland provided by the Commission to the Ministry for Housing on 13 March 2001. Accordingly, it is considered appropriate to regard the position of the wetland as mapped in the Bush Forever report as indicative only and potentially, therefore, as not necessarily impinging upon the Maniana Precinct study area.

Nevertheless, as can be seen from Figure 1, the wetland as mapped encompasses about 60% of the remnant native vegetation within that portion of the Maniana Precinct study area east of Gibbs Street and impinges upon the Scout Hall adjacent to the junction of Gibbs Street and Welshpool Road.

Trudgen's report only covered veg inside the proposals boundary + not the whole wetland as mapped.

The assessment of native vegetation undertaken as part of the project environmental investigations (Trudgen, 2000) identified the vegetation within the area encompassed by the Conservation category wetland as parkland cleared *Corymbia calophylla* (Marri), in respect of which the following was indicated:

- the area has some landscape value, and some value for the trees and the few scattered understorey species it contains (some of which could be salvaged for use in rehabilitation programs) and some landscape value; and
- the values represented within the area could be satisfactorily recreated through planting programs within those parts of the study area proposed for development.

The attached photographic plates (refer to Attachment 1) indicate conditions within that portion of the Conservation category wetland extending into the study area. Isolated Swamp paperbarks, *Melaleuca rhaphiophylla*, (refer to photographic plates 02, 03, 04 and 12) are the only typically wetland species occurring. However, this species also typically occurs within areas of elevated watertable and as indicated by the Perth Groundwater Atlas (WRC, 1997), much of the Maniana Precinct study area can be characterised as such.

As indicated above, the Conservation category wetland as mapped in the Bush Forever report extends beyond the Maniana Precinct study area into the adjoining portion of the Parks and Recreation Reserve. Vegetation within this adjoining area was mapped and assessed by Tauss (1997). As can be seen from the attached figure from Tauss (1997), refer to Attachment 2, the following vegetation units occur within the northern and western portions of the adjoining portion of the Parks and Recreation Reserve affected by the Conservation category wetland as mapped in the Bush Forever report. These units are listed in order of descending extent.

- Banksia (low open forest to low forest);
- Marri (low woodland to low forest);
- weed dominated;
- Marri/*Melaleuca preissiana* (low woodland to low forest); and
- *Eucalyptus rudis* (low woodland with weedy understorey).

Vegetation condition mapping from Tauss (1997) is also attached (Attachment 2), and this indicates the following:

- most vegetation within the northern and western extremity of the Parks and Recreation Reserve affected by the Conservation category wetland is in Poor or Very Poor condition, although areas to the south are in better condition (including areas rated as Fair to Good, and Very Good to Excellent); and
- those areas of the Marri and Banksia units immediately adjoining the Maniana Precinct study area are identified as in Very Poor condition.

However, as can be seen from the photographic plates, this vegetation is in substantially better condition than is the remnant native vegetation within the adjacent portion of the study area that is affected by the Conservation category wetland as mapped.

As indicated above, advice accompanying the digital data set for the wetland identifies it as a basin wetland, while field inspection of the area clearly indicates that the area in question does not constitute a permanent or seasonal wetland with well defined boundaries. Accordingly, the assessment questionnaire from EPA (1993) relating to seasonal and episodic wetlands with poorly defined boundaries has been applied to the area.

The completed questionnaire is included as Attachment 3 and as can be seen, its application results in natural and human use attribute scores of 3.5 and 9 respectively. Plotting these scores onto Graph 2 from EPA Bulletin 686, indicates that the area falls within the Multiple Use wetland management category (refer also to Attachment 3)

and accordingly, the questionnaire results indicate that designation of the area as a Conservation management category wetland is not justified.

However, as previously indicated, the requirement to apply the questionnaire is of concern because of the underlying assumption that the area constitutes a wetland. As demonstrated by the photographic plates included in Attachment 1, site conditions are not consistent with this assumption. Additionally, as discussed below, specific responses to several of the questions in the questionnaire would distort the intrinsic value of the area and therefore, its significance.

- ***Natural Attribute Question iii - Habitat Diversity - Is the composition and structure of the vegetation significantly different to that found at nearby wetlands?***

  Vegetation within that portion of the area mapped in the Bush Forever report as a Conservation management category wetland and which extends into the Maniana Precinct study area does differ from vegetation occurring within nearby wetlands. However, this is a consequence of the prevailing dryland terrestrial conditions within the area rather than any apparent uniqueness of wetland habitat as implied by the question. The yes and no response options do not, therefore, properly reflect the prevailing circumstances and on this basis, and in accordance with advice from WRC (Joshua Smith, WRC, pers.comm., May 2001), the question has been treated as "not applicable" with a consequent zero score.

- ***Natural Attribute Question v - Drainage - Are there drains directing water into or out of the wetland?***

  There is no drainage discharge into or out of that portion of the area mapped in the Bush Forever report as a Conservation management category wetland and which extends into the Maniana Precinct study area. Again, however, because of the prevailing dryland terrestrial conditions within the area, the relevance of this question and the yes/no response options is lacking. On this basis, and in accordance with advice from WRC (Joshua Smith, WRC, pers.comm., May 2001), the question has again been treated as "not applicable" with a consequent zero score.

- ***Human Use Question iii - Security of wetlands - What is the current vesting of the land containing the wetland?***

  At present, that portion of the area mapped in the Bush Forever report as a Conservation management category wetland and which extends into the Maniana Precinct study area is reserved for Parks and Recreation under the Metropolitan Region Scheme. Based on the response options provided, this results in a score of five (5). However, Map Sheet 49 in Volume 1 of the Bush Forever report (Policies, Principles and Processes) identifies the area as "SUBJECT TO POSSIBLE FUTURE LAND SWAP" (WAPC, 2000). This is a reflection of the Ministry for Housing's redevelopment proposal for the Maniana Precinct and suggests that a lower score could be justified. The available response options do not, however, enable this possibility to be countenanced.

This is wrong ~~[illegible]~~ just told him that justification must be provi if for some rea he thinks a q is inappropria never said anything about score

29/06

- ***Human Use Question v - Is the wetland used for any of the following active recreational activities?***

  That portion of the area mapped in the Bush Forever report as a Conservation management category wetland and which extends into the Maniana Precinct study area is used for active recreation, although none of the activities occurring depend on a wetland setting as is the inference of the question. Additionally, as can be seen from the photographic plates, the area is heavily disturbed and field inspection demonstrates that the recreational activities occurring therein are contributing to this disturbance. Accordingly, the recreational activities occurring cannot be regarded as intrinsically desirable (because of their impact on the area) or as intrinsically linked to any wetland habitat. However, the way the question is structured does not enable such factors to be reflected in the response.

While the zero score response adequately addresses concerns stemming from the two natural attribute questions, it is recognised that a similar approach in responding to the two human use questions would probably be regarded as inappropriate. Scores from the direct response to these questions have, therefore, been incorporated into the assessment, although it is considered that some "discounting" of these scores for the reasons outlined above should be accepted.

3 CONCLUSION

Within the Maniana Precinct study area and the adjoining portion of the Parks and Recreation Reserve, the major vegetation units occurring within the area affected by the Conservation category wetland as mapped in the Bush Forever report cannot be regarded as typically wetland vegetation. Further, the condition of the considerable majority of the vegetation within the areas affected by the wetland as mapped has been assessed as Poor or lower. Clearly, the combination of these circumstances raises doubts as to the appropriateness of Conservation management categorisation.

This is confirmed by the scores derived from application of the assessment questionnaire from EPA Bulletin 686 relating to seasonal and episodic wetlands with poorly defined boundaries.

The assessment undertaken demonstrates that the Conservation management categorisation is inappropriate and should therefore be removed. Additionally, however, this assessment combined with inspection of the clearly calls into question the appropriateness of actually designating the area as any form of wetland.

However, even if the above proposition is not accepted, it is relevant to note that much of the development proposed under the preferred redevelopment strategy in the area east of Gibbs Street is confined to the already fully cleared and grassed open space area (refer to Figure 2). As can be seen, this open space exhibits no residual wetland or native vegetation related natural attributes. In view of the potentially significant error factor in mapping the wetland, any proposition that development in the area east of Gibbs Street as proposed under the redevelopment strategy for the Maniana Precinct was inappropriate because of such attributes would be difficult to sustain.

It should also be noted that the extension of Gerrard Street to Welshpool Road is not specifically part of the Manaina Precinct redevelopment project. The proposed extension is the City of Canning's preferred option for linking Gerrard Street to the broader regional road network and has, therefore, been incorporated into the redevelopment strategy. The proposal for Gerrard Street will, however, be the subject of a separate approvals process.

4 REFERENCES

EPA (1993) *A Guide to Wetland Management in the Perth Metropolitan and Near Perth Swan Coastal Plain Area. An update to EPA Bulletin 374.* Environmental Protection Authority Bulletin 686, Perth WA, July 1993.

EPA *et al* (1998) *Perth's Bushplan Volume 2 Part C*. Environmental Protection Authority, WA Planning Commission, National Parks and Nature Conservation Authority, and Water and Rivers Commission, Perth WA, December 1998.

HILL *et al* (1996) *Wetlands of the Swan Coastal Plain Volume 2B - Wetland Mapping, Classification and Evaluation*. Prepared by A. L. Hill, C. A. Semeniuk, V. Semeniuk and A. Del Marco. Water and Rivers Commission, and Department of Environmental Protection, Perth WA, 1996.

WAPC (2000) *Bush Forever Volume 1 Policies, Principles and Processes*. Western Australian Planning Commission, Albert Facey House, 469 Wellington Street, Perth WA, December 2000.

WRC (1997) *Perth Groundwater Atlas*. Water and Rivers Commission, Hyatt Centre, 3 Plain Street, East Perth, WA, October 1997.

Tauss (1997) *Flora of the Queen's Park Ecological Area*. Report to the City of South Perth, prepared by C. Tauss, Bushranger Landcare, 6 Spoonbill Grove, Kingsley WA, February 1997.

Trudgen (2000) *A Vegetation and Flora Survey of Part of Queens Park Bushland*. Unpublished report prepared for Brown & Root Services Asia Pacific Pty Ltd by M.E.Trudgen and Associates, Perth WA, September 2000.

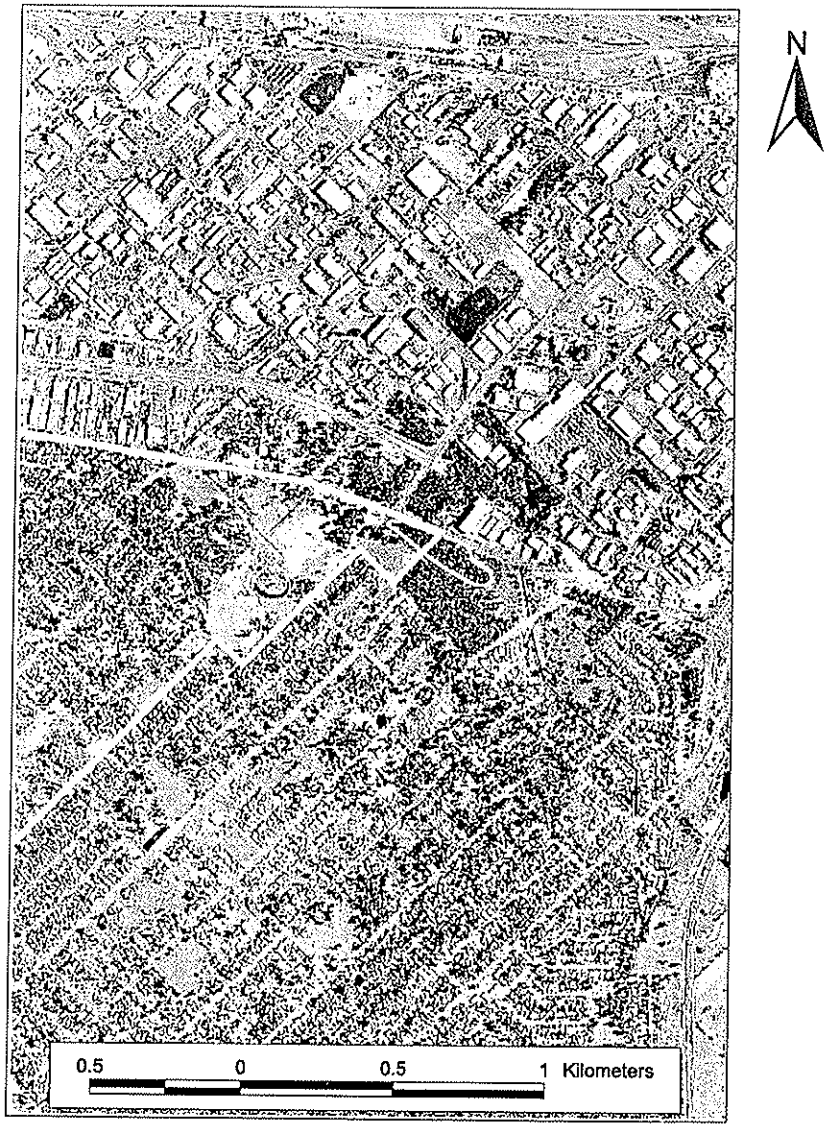


Figure 1: Conservation Category Wetlands as indicated on Map Sheet No. 49 in Volume 1 of the Bush Forever Report

Legend

Study Area

WRC Category C wetland

Notes:

Digital wetland data supplied by Water and Rivers Commission.
Digital aerial photography supplied by the Department of Land Administration.

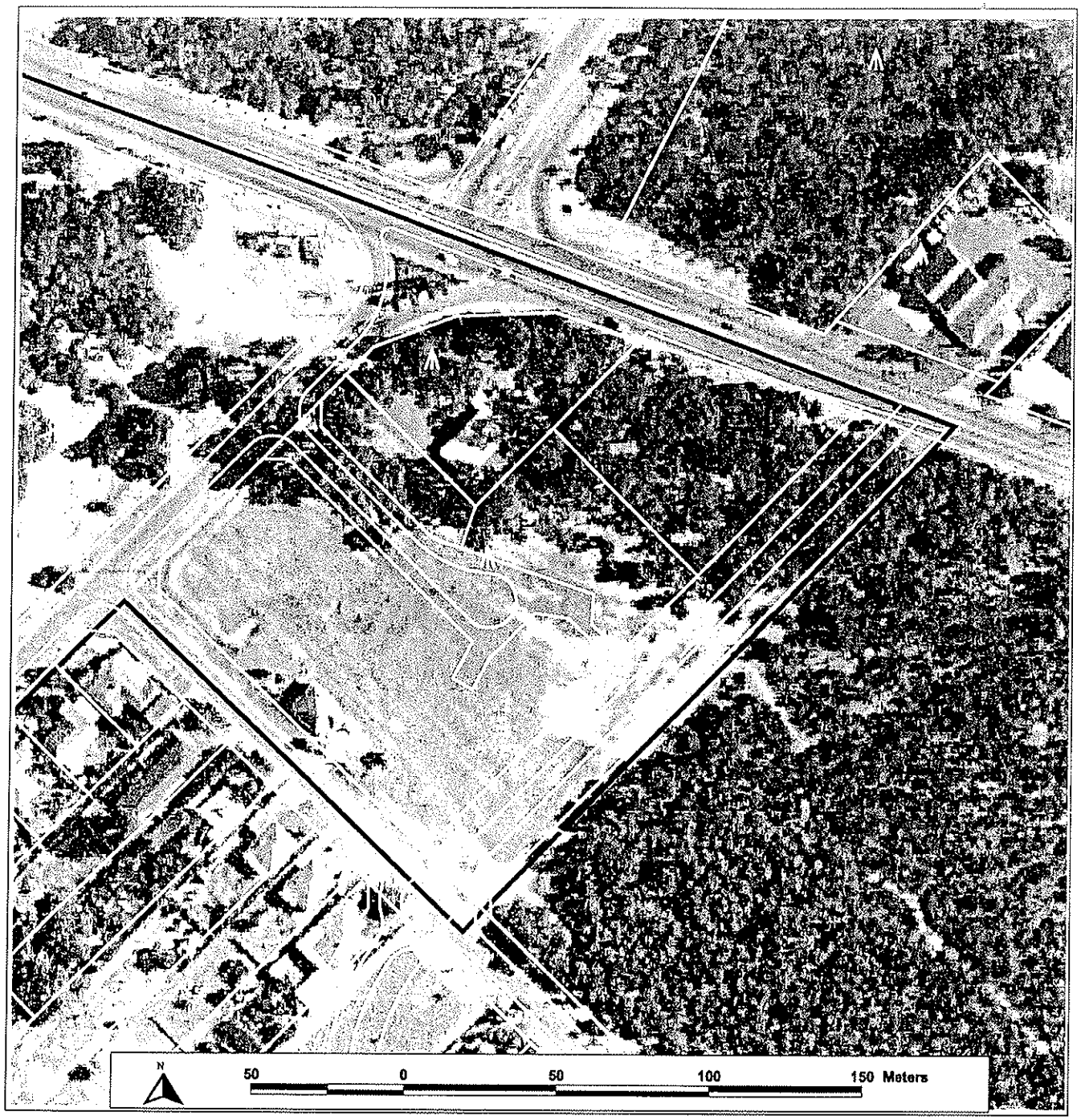


Figure 2: Redevelopment Strategy

Legend:

Proposed Development Outline

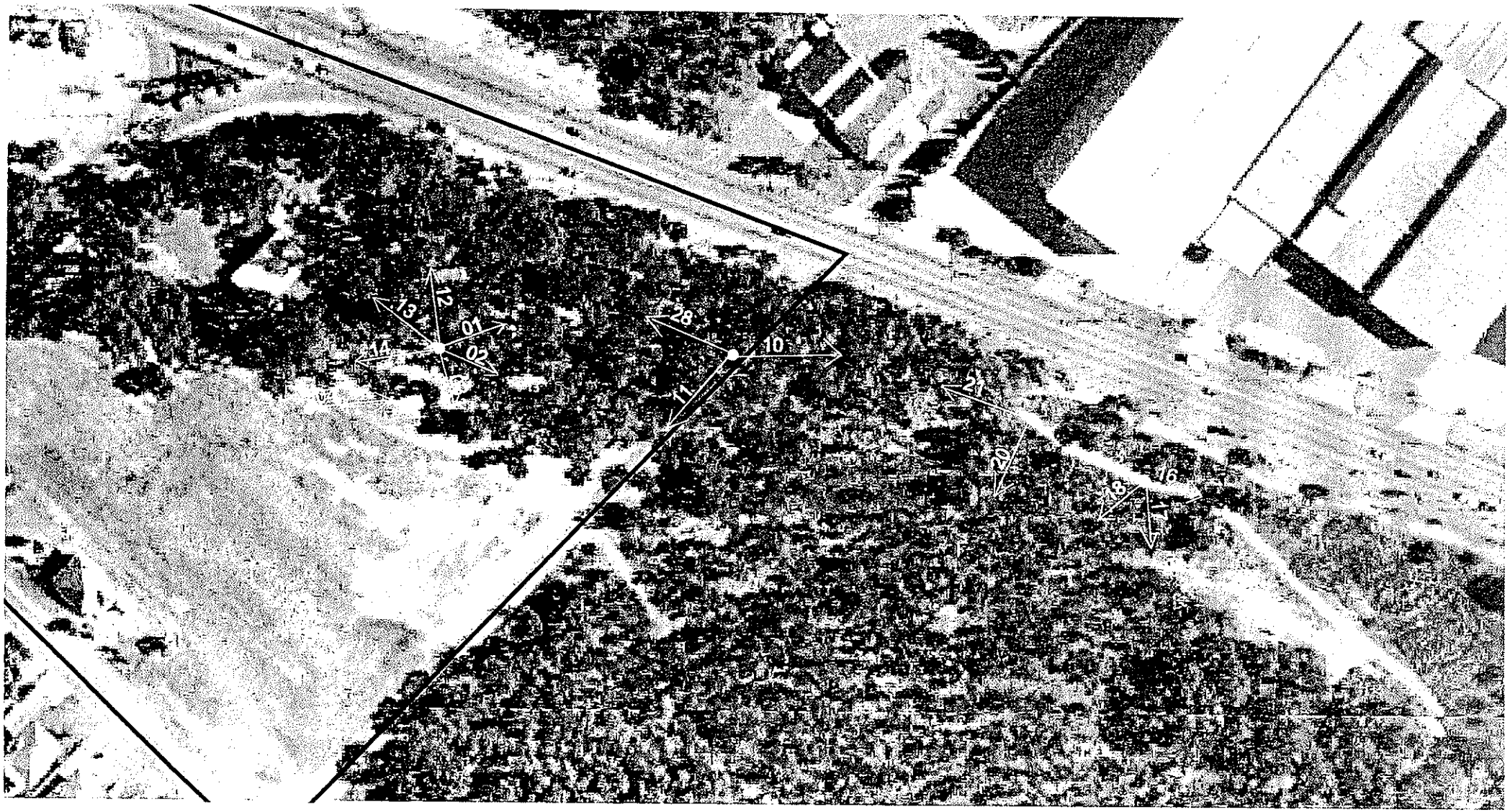
Study Area

Notes:

Digital aerial photograpy supplied by the Department of Land Administration. Digital redevelopment data supplied by Master Plan. Inaccuracies are present due to the photography rectification process.

Attachment 1

PHOTOGRAPHIC PLATES



Attachment 1: Photography Reference Points

Legend

Direction of Photos

Study Area

50 0 50 100 Meters

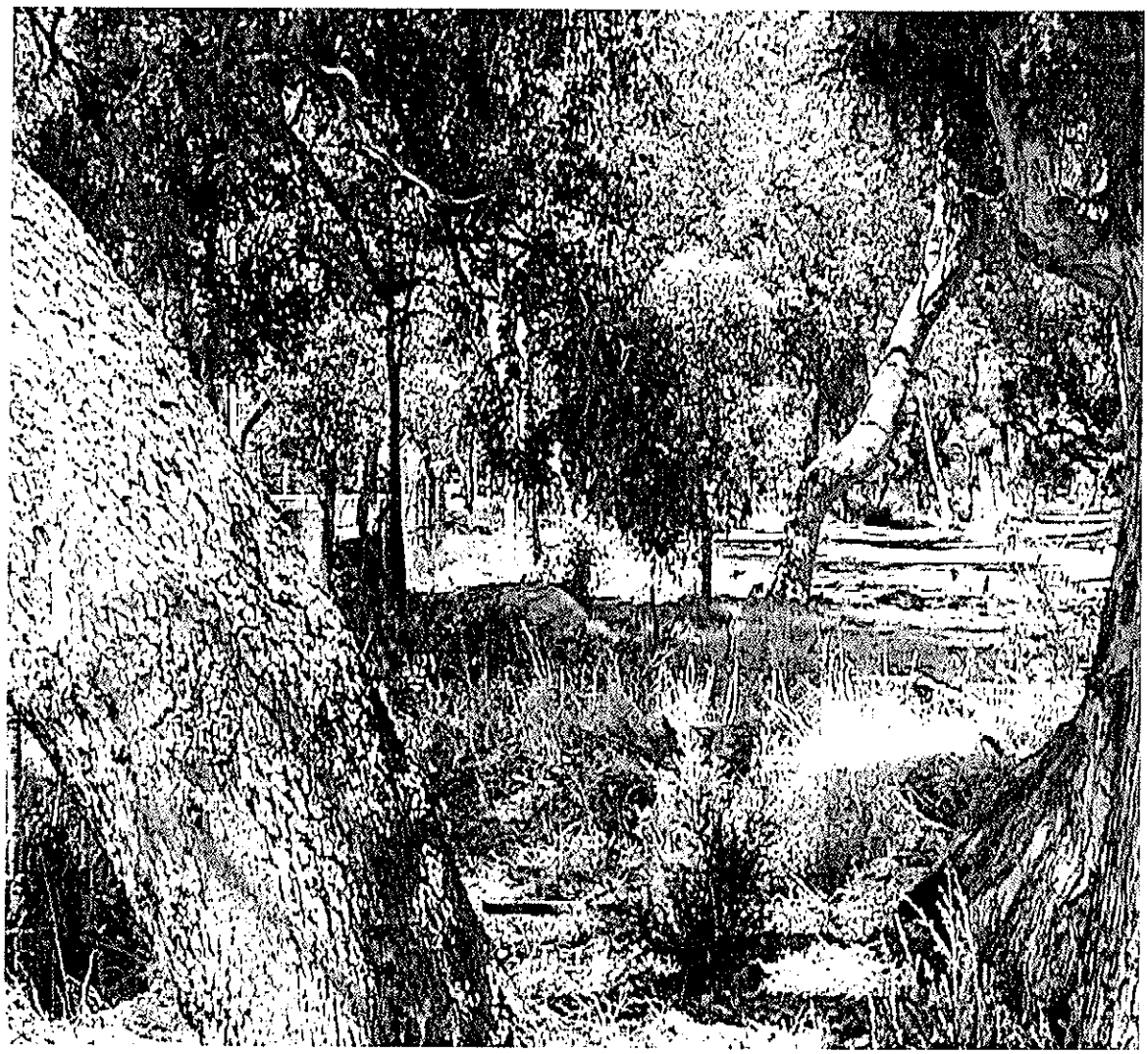


PHOTO 1

PHOTO 2

PHOTO 3

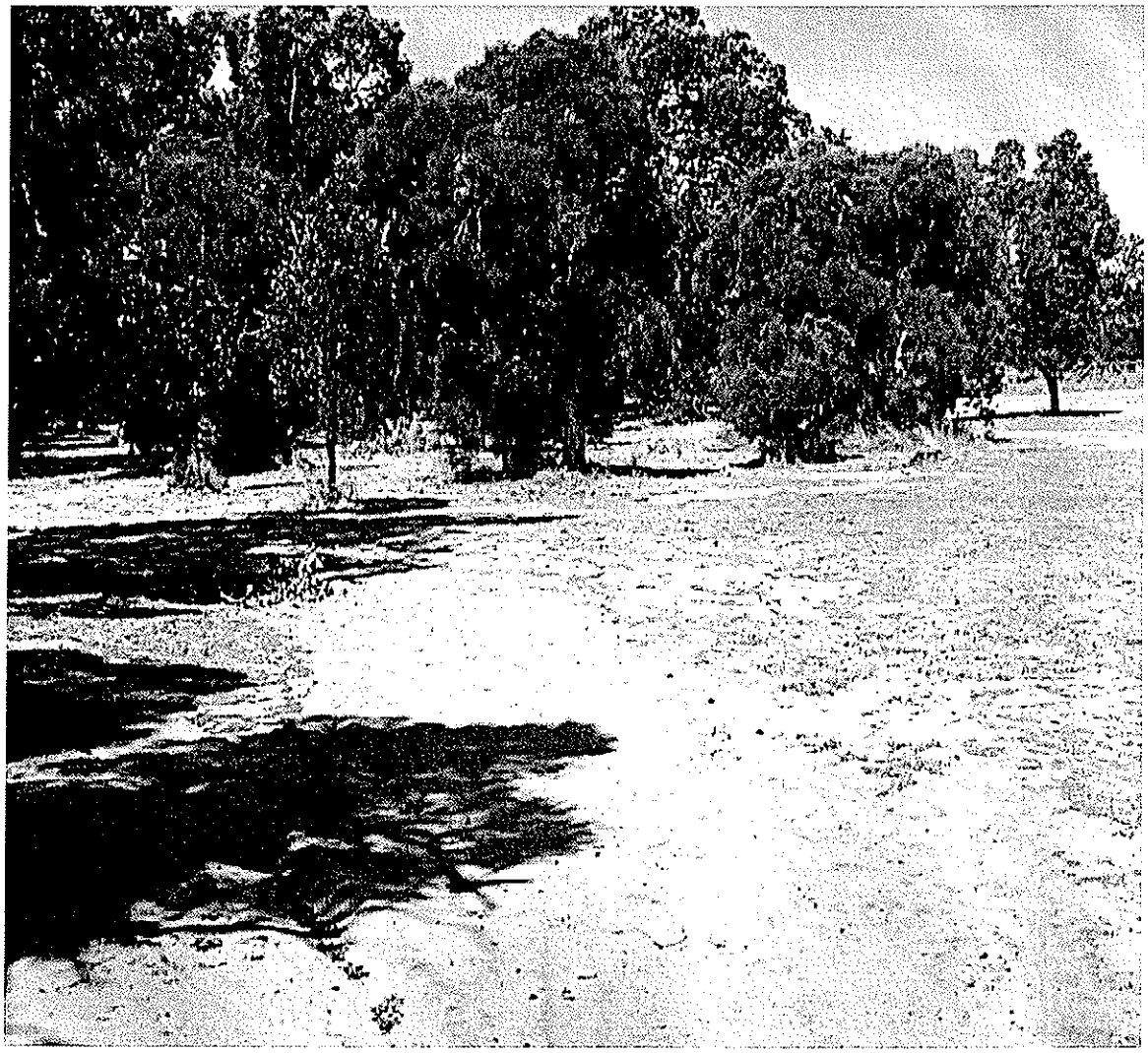


PHOTO 4

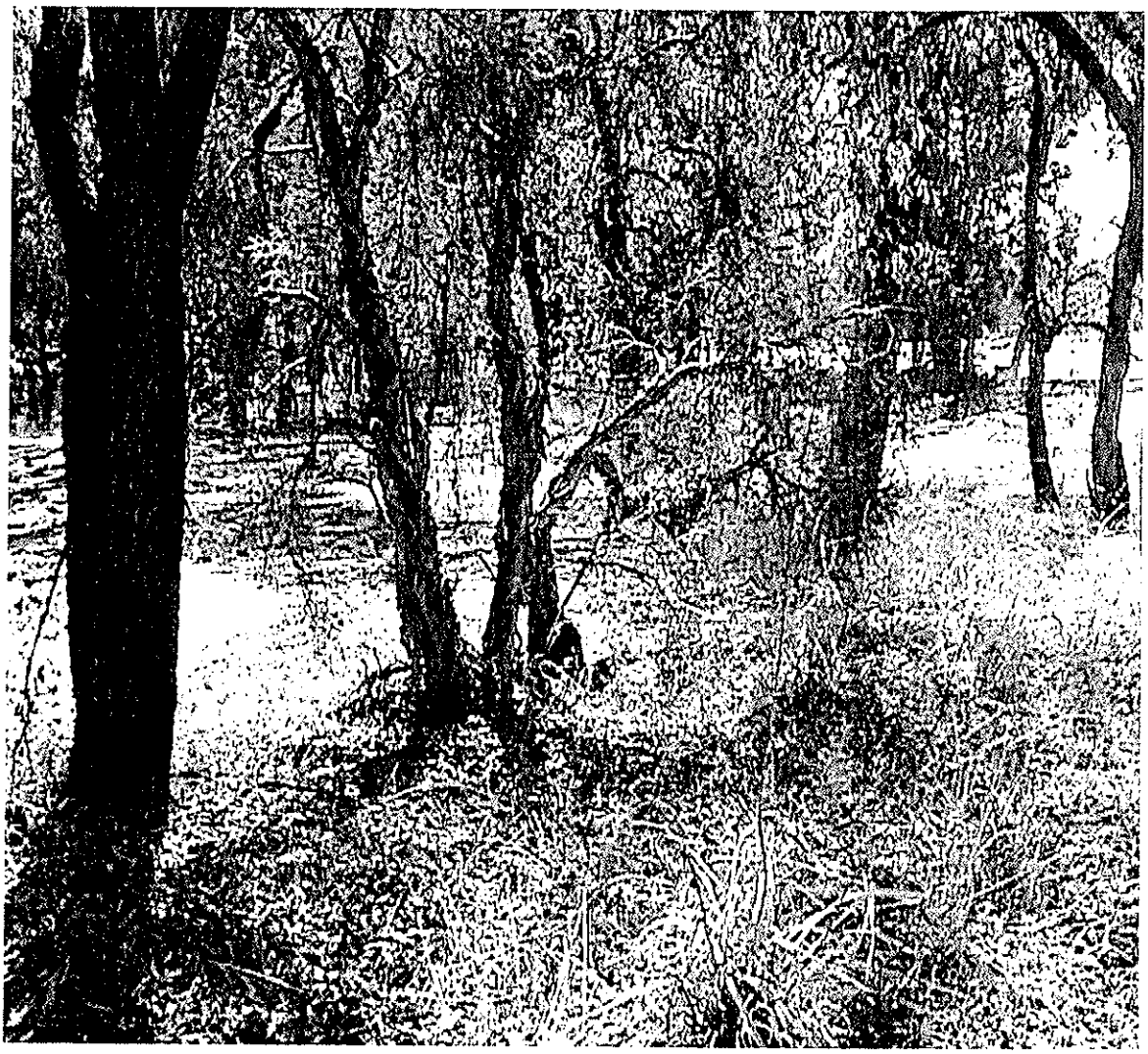


PHOTO 12

PHOTO 13

PHOTO 14

PHOTO 11

PHOTO 28

PHOTO 16

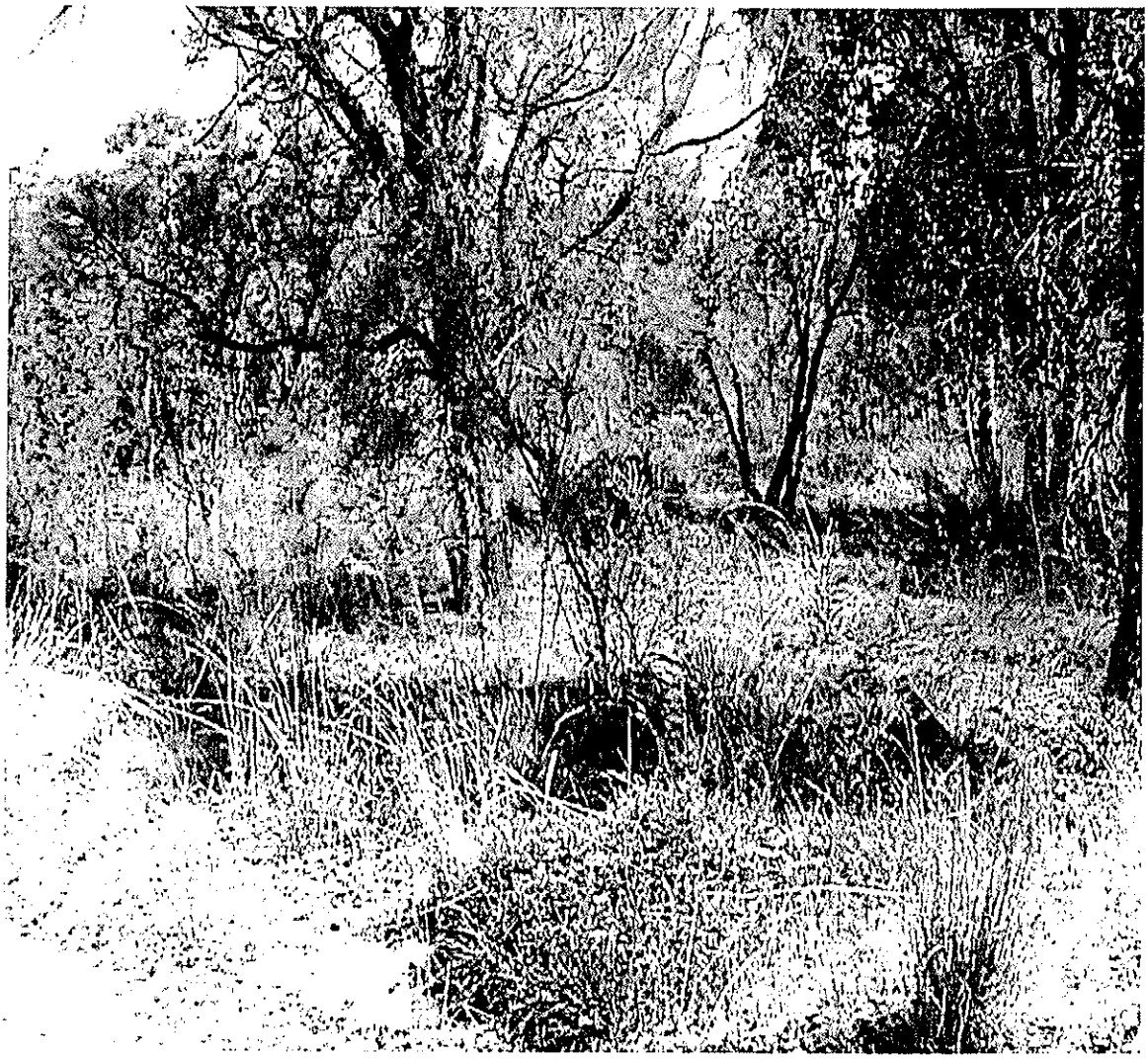


PHOTO 17

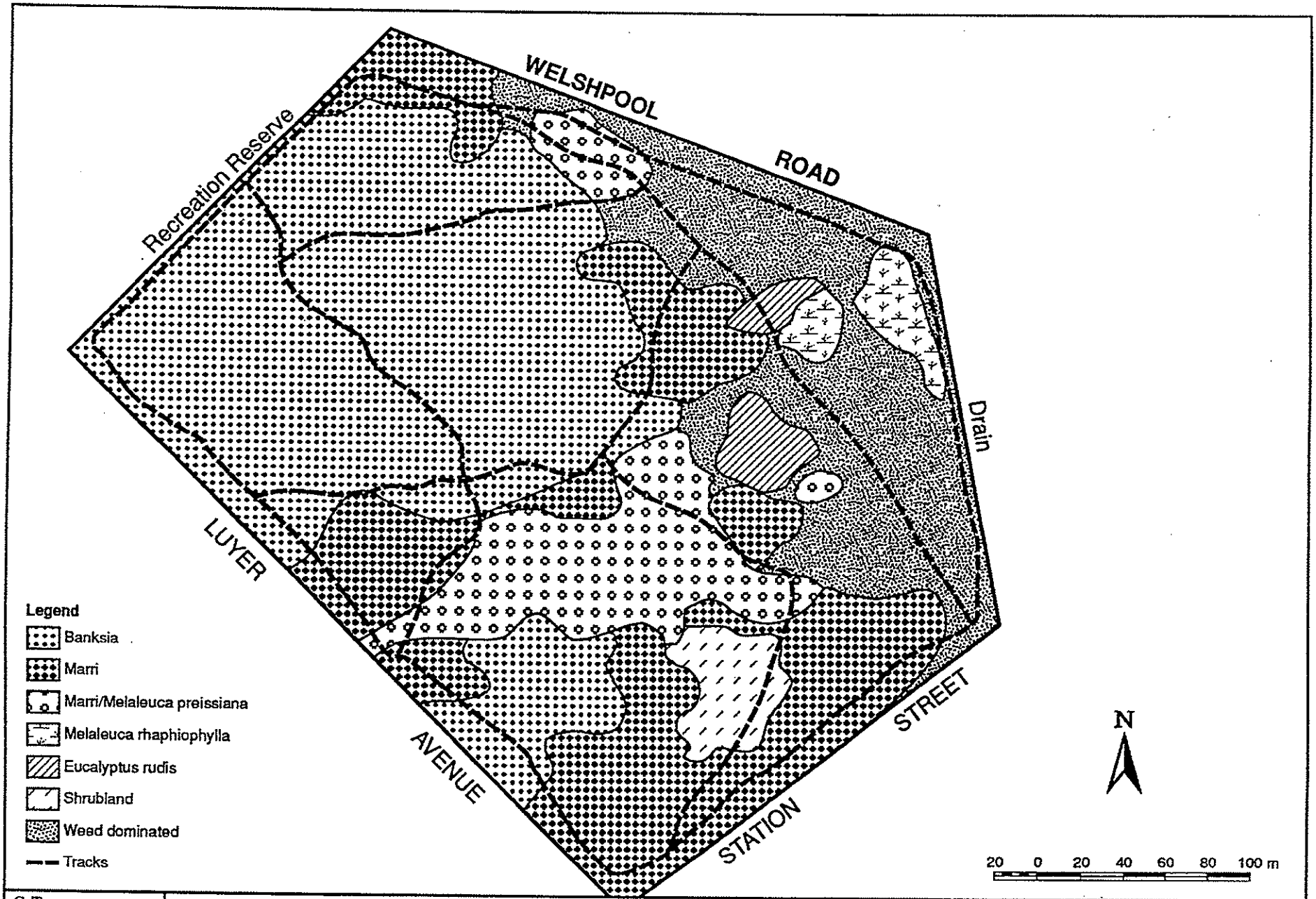
PHOTO 18

PHOTO 20

PHOTO 21

Attachment 2

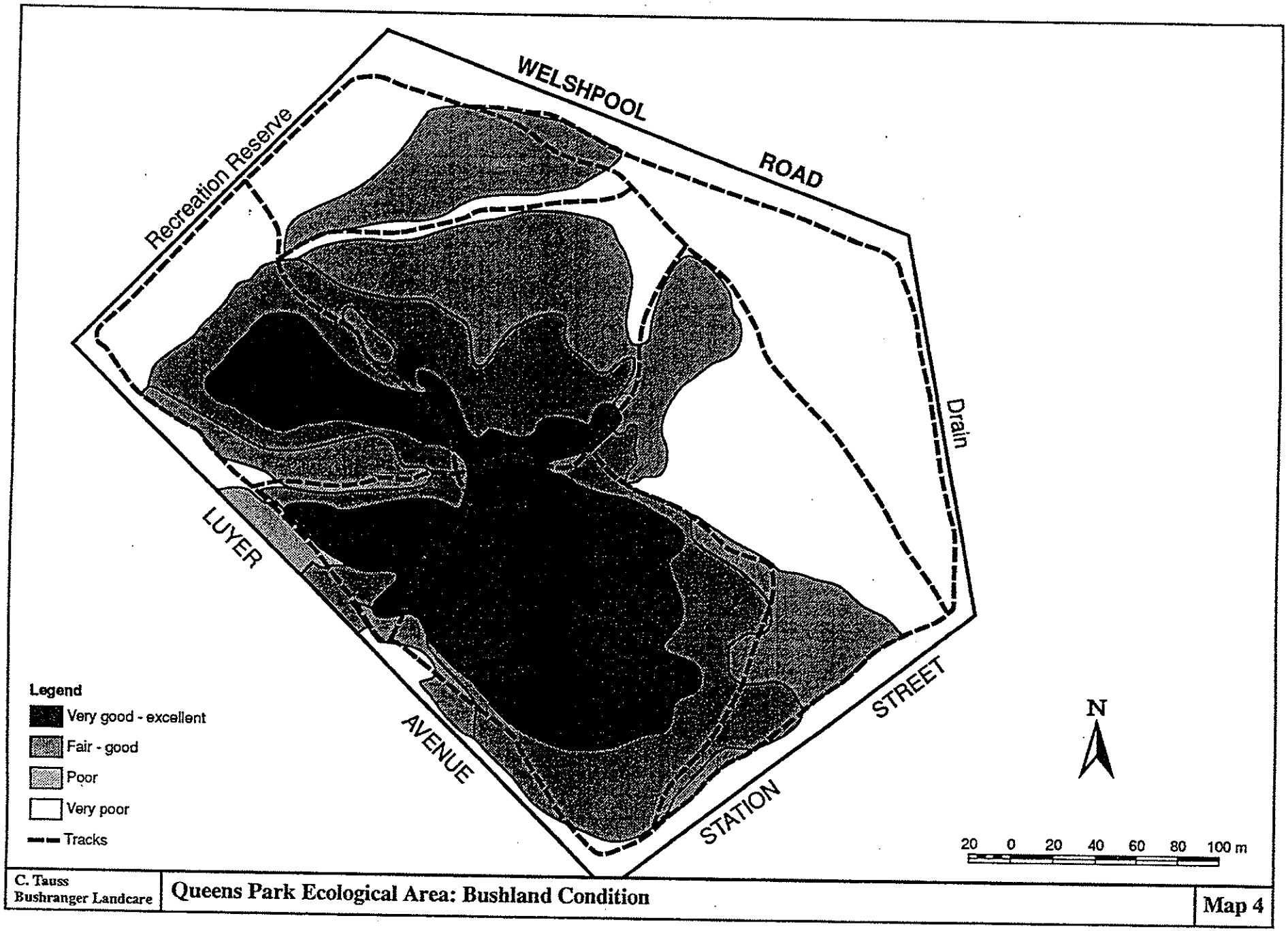
FIGURE FROM TAUSS (1997)



C. Tauss
Bushranger Landcare

Queens Park Ecological Area: Vegetation Units

Map 3



C. Tauss
Bushranger Landcare

Queens Park Ecological Area: Bushland Condition

Map 4

Attachment 3

EPA BULLETIN 686
WETLAND ASSESSMENTQUESTIONNAIRE
FOR
SEASONAL AND EPISODIC WETLANDS
WITH POORLY DEFINED BOUNDARIES

NATURAL ATTRIBUTE QUESTIONS

INTRODUCTION – "ZONING" THE WETLANDS

i Environmental geology classification

Does the wetland occur on the Quindalup Dunes or on a geological unit confined to a river/estuary floodplain?

YES	Score	5		
NO	Score	1	**SCORE**	[1]

Ii Adjacent Wetlands

Are there wetlands within a 2km radius?

YES	✓	go to question iii		
NO	Score	3 go to question (iv)	**SCORE**	[0]

iii Habitat diversity

Is the composition and structure of the vegetation significantly different to that found at nearby wetlands?

YES	Score	3		
NO	Score	1	**SCORE**	[0]

N/A as the area contains only dryland terrestrial vegetation (refer to Section 2 of the accompanying assessment report for additional discussion).

iv Habitat type

Using the list below score one for each habitat type represented (maximum score 10.)

a) Vegetation over 0.1 hectare (1000m2) in area.

- large paperbarks (>2.5m tall) in dense clumps [0]
- low thickets (ie <2.5m tall). These are often *Melaleuca, Astartea* or *Kunzea* spp [0]
- paperbark fringe [0]
- fringing rushes and sedges (often *Baumea, Juncea* spp) [0]
- fringing *Typha* (bullrush) [0]
- samphire or saltmarsh [0]
- extensive inlake beds of *Typha* or other rushes [0]
- scattered dense clumps of rushes or sedges [0]

b) Other habitats

- flooded grassland in winter/spring [0]
- mud flats or seasonally dry open water [0]
- islands — natural or human made [0]
- fringing woodland or heath (eg eucalyptus nodes or non-wetland species) [0]
- permanent shallow open water <50cm deep [0]
- permanent deep open water >50 cm deep [0]

Score ½ point for

- scattered paperbarks [0.5]
- scattered rushes [0]

SCORE [0.5]

v Drainage

Are there drains directing water into or out of the wetland?

YES	Score	0	
NO	Score	5	**SCORE** [0]

N/A as the area is a dryland terrestrial environment, the issue of drainage discharge to or from it therefore does not arise (refer to Section 2 of the accompanying assessment report for additional discussion).

vi Area of wetland modified

What proportion of the wetland has been modified by clearing of vegetation (including undergrowth) landfill, paving, cultivated gardens/playing fields, irrigated agriculture, grazing, weed invasion, mining etc?

Percentage modified	Score
0 – 10 %	5
11 – 20 %	4
21 – 30 %	3
31 – 40 %	2
>40 %	1

SCORE [1]

vii Wetland size

Estimate wetland size and score as follows:

Area	Score
>100ha	5
50 – 100ha	4
25 – 50ha	3
10 – 25ha	2
<10ha	1

SCORE [1]

TOTAL SCORE [3.5]

HUMAN – USE QUESTIONS

i Aesthetics

Does the wetland possess any of the following attributes?
(score appropriately and add score at the end)

Little, if any, artificial noise	Score	2	[0]
Understorey mostly intact	Score	2	[0]
Few, or no, roads or buildings obvious from wetland	Score	2	[0]
Steep ridge visible as part of the scenery	Score	1	[0]
Ridge accessible giving view of wetland	Score	1	[0]
Wetland is a lake and open water easy to view	Score	1	[0]
A section of wetland exists where few people visit	Score	1	[0]

SCORE [0]

ii Historical and archaeological features

Does the wetland have any of the following historical or archaeological features?

- Registered Aboriginal relics or sacred sites[3]
- Pioneer relics/operations
- National Estate/Trust listings

Score according to the following table:

Number of historical archaeological features	Score
2 or more	5
One	3
0	0

SCORE [0]

iii Security of wetlands

What is the current vesting of the land containing the wetland? Score according to the following table.

Vesting/ownership of wetland	Score
A Class Reserve for conservation and recreation or Metropolitan Region Scheme reserve for Parks and Recreation owned by the Department of Planning and Urban Development or local government authority.	5
Other class of reserve — vested System Six recommendation unvested or on private property	3
Other class or reserve — unvested	2
Other (eg private or vacant Crown land)	1

Presently MRS Parks and Recreation Reserve, but acknowledged as being subject to possible land swap in Bush Forever report Volume 1 (refer to Section 2 of accompanying Assessment Report for further discussion).

SCORE [5]

iv Security of wetlands

Does the wetland have active community protection groups?

One or more	Score	5		
No Groups	Score	0	**SCORE**	[**0**]

Only the adjoining portion of the Parks and Recreation Reserve to the south east of the Maniana Precinct project area is subject to involvement of a community based "friends" group.

v Passive recreation

Is the wetland used for any of the following passive recreation activities?

If yes, score 1 for each

▪ nature study/bird watching	[**0**]
▪ education (school or other educational interest within 500m)	[**0**]
▪ picnic and/or barbecue facilities	[**0**]
▪ conservation of flora (refer to maps)	[**0**]
▪ conservation of fauna (refer to maps)	[**0**]
▪ protection and preservation of other attributes	[**0**]
▪ recognised research site	[**0**]
– biological	[**0**]
– archaeological	[**0**]
– other	[**0**]
▪ recognised tourist venue	[**0**]
SCORE	[**0**]

vi Active recreation

Is the wetland used for any of the following active recreational activities? If yes, score 1 for each.

▪ walking/jogging or cycling	[**1**]
▪ horse riding	[**1**]
▪ trail bike riding	[**1**]
▪ playground	[**0**]
▪ sports ground	[**0**]
▪ model boats	[**0**]
▪ golf course	[**0**]
▪ canoeing/rowing	[**0**]
▪ power boating/skiing	[**0**]
▪ swimming	[**0**]

All these activities occur within a dryland terrestrial setting (refer to Section 2 of the accompanying Assessment Report for further discussion). **SCORE** [**3**]

vii Other human - uses

Is the wetland used for any of the following purposes? Score 1 for each)

- agricultural activities (grazing, horticulture etc) [0]
- mining (check for mining leases) [0]
- existing/proposed service corridors (SECWA, roads, etc) [0]
- water supply [0]
- proposed urban/housing use [1]
- private purposes other than described above [0]

SCORE [1]

TOTAL SCORE [9]

SUPPLEMENTARY QUESTIONS

i Species rarity

Are rare (and not gazetted) species of animals or plants present or are there communities represented which have a limited distribution?

YES
NO ✓

ii Effect on land values

Does the wetland significantly enhance real estate values and land rates around it? ie, does the wetland add more than 10% to the value of nearby houses?

YES
NO ✓

iii Human use

Do more than 100 people visit the wetland each week?

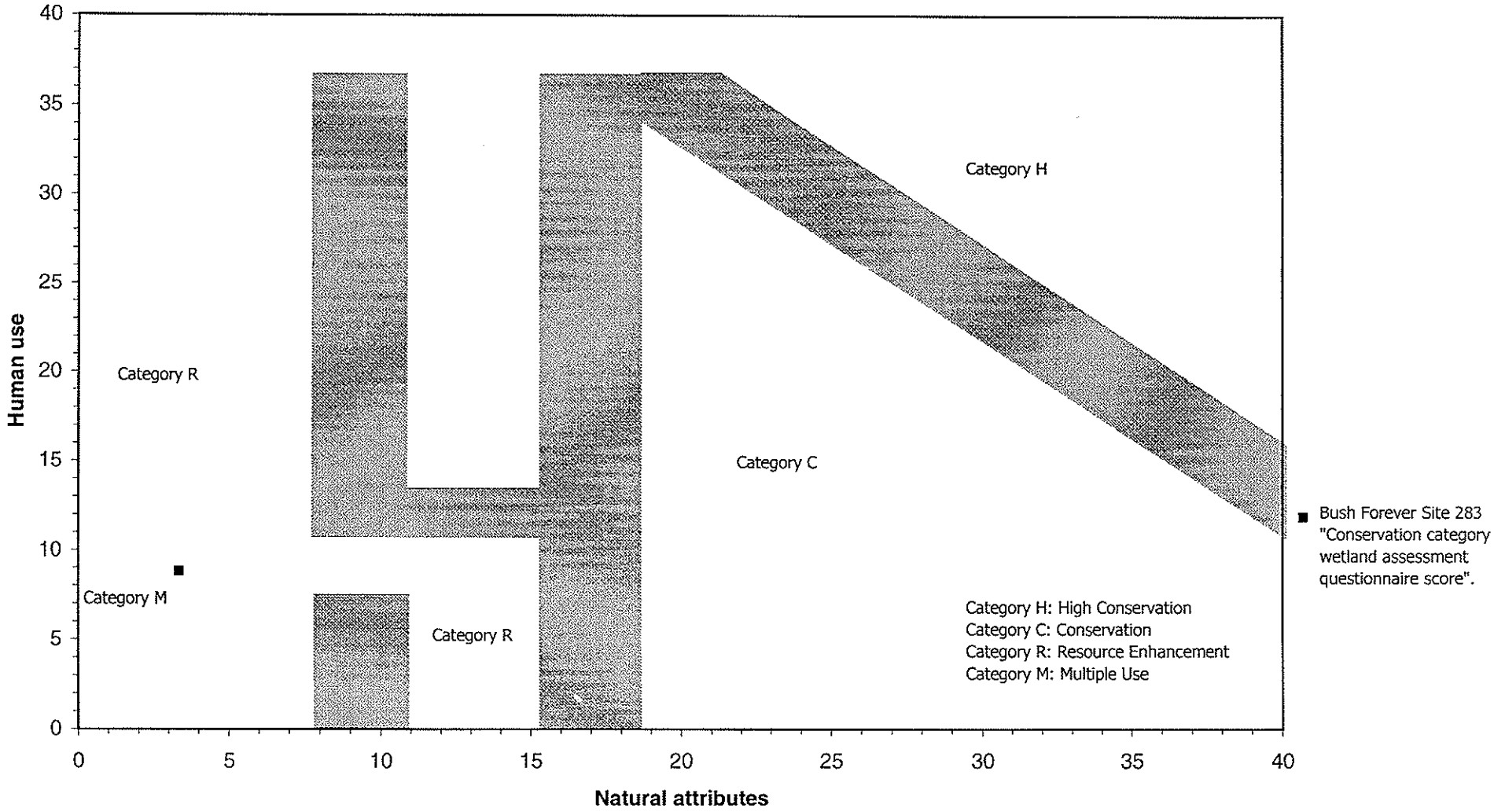
YES
NO ✓

iv Private human – use value

Where there is evidence of private use of the wetland (stock grazing, views of wetland from house or private recreation) ask owner how important the wetland is as a private resource. Does the owner rate it highly?

YES
NO ✓

Management categories for seasonal and episodic wetlands with poorly defined boundaries



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Second Copy with Notes

Flora of the QUEEN'S PARK ECOLOGICAL AREA

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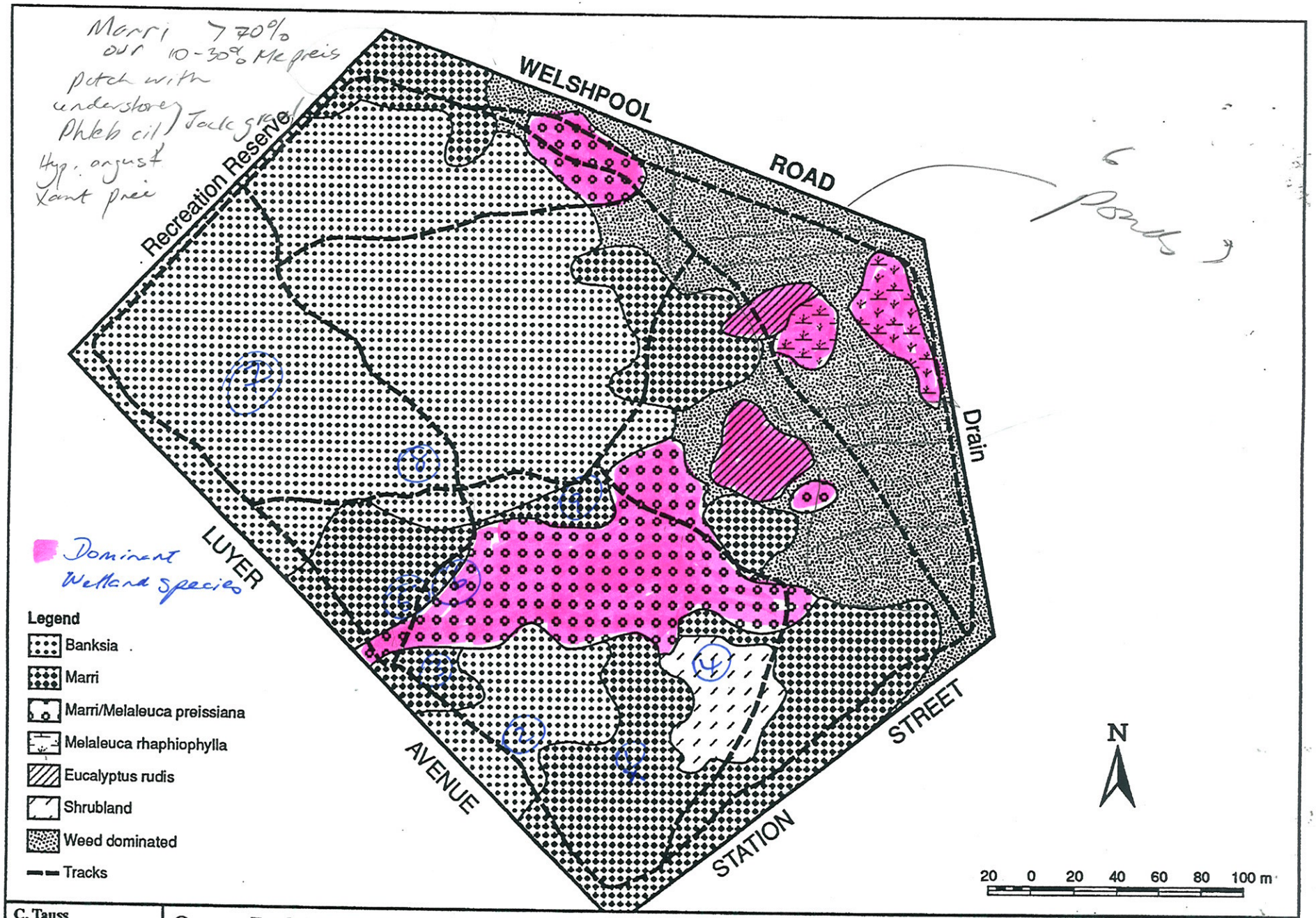
6 Spoonbill Grove Kingsley WA 6026

For:

CITY OF CANNING

February 1997


Marri 7 70%
our 10-30% Mepreis
patch with
understorey
Phleb cil
Hyp. angust
Xant prei
WELSHPOOL
ROAD
Recreation Reserve
Drain
LUYER
AVENUE
STATION
STREET
Dominant
Wetland species
Legend
Banksia
Marri
Marri/Melaleuca preissiana
Melaleuca rhaphiophylla
Eucalyptus rudis
Shrubland
Weed dominated
Tracks
N
20 0 20 40 60 80 100 m
C. Tauss
Bushranger Landcare
Queens Park Ecological Area: Vegetation Units
Map 3

5108 WA 3169(C) METRO REGIONAL AREA & EXT. RUN 13 (5082-5157) 1:20000 15-DEC-92 920676