PEPPERMINT GROVE FORESHORE

Boundary Definition: protected area/bushland (part taken to zoning) boundary

SECTION 1: LOCATION INFORMATION

Bush Forever Site no. 403
Area (ha): bushland 1.7
Map no. 45
Map sheet series ref. no. 2033–I NW, 2034–II SW
Other Names: Part Submission Area 190
Local Authorities (Suburb): Shire of Peppermint Grove (Peppermint Grove)
System 6 (1983): M54 part System area bushland and part scattered native plants (canopy), all vegetation described

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS
Pinjarra Plain
Guildford Formation (Qha: S14)
Spearwood Dunes
Tamala Limestone (Qtl: LS1)
VEGETATION AND FLORA
Vegetation Complexes
Spearwood Dunes
Cottesloe Complex — Central and South
Floristic Community Types
Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes
30a2 Woodlands and shrublands on Holocene Dunes (DEP 1996, re-allocated from 30a, equivalent to 30a in Gibson *et al.* 1994, English and Blyth 1997)
WETLANDS
Wetland Types: estuary (waterbody)
Natural Wetland Groups
Estuaries
Swan River (E.2)
Wetland Management Objectives: Conservation (0.3ha)
Swan Coastal Plain Lakes EPP: none identified
THREATENED ECOLOGICAL COMMUNITIES
Endangered (floristic community type 30a as defined by Gibson *et al.* 1994)

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: estuary — limestone cliff, vegetated wetland, vegetated uplands

Vegetation and Flora: limited survey (Gibson *et al.* 1994 (Pepgrv 01–02)); detailed survey (Keighery, GJ and Keighery 1998)

Structural Units
Uplands — Tamala Limestone: *Eucalyptus gomphocephala* Woodland over *Callitris preissii* Low Woodland; *Callitris preissii* Low Woodland
Scattered Native Plants: *Eucalyptus gomphocephala* and *Banksia* species Low Open Woodland
Vegetation Condition: >40% Very Good to Good, <60% Degraded, with areas of severe localised disturbance
Total Flora: 59 native taxa (Keighery, GJ, and Keighery 1998, Gibson *et al.* 1994) (estimated >75% expected flora)
Significant Flora: *Dodonaea hackettiana* (4); Keighery, GJ, and Keighery 1998 (taxa of restricted distribution on the Swan Coastal Plain associated with Swan/Canning estuarine bushland remnants) — *Callitris preissii*, *Acacia xanthina*, *Alyxia buxifolia*, *Pittosporum phylliraeoides* var. *phylliraeoides*

Fauna: not known

Linkage: adjacent bushland to the north; part of Greenway 24 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

Other Special Attributes: National Trust of Australia (WA) Classification; Peppermint Grove Limestone, a Middle Pleistocene emergent shell bed deposited during the Mindel-Riss interglacial period, is the most informative and well preserved natural outcrop in and around the Swan River District (Lemmon *et al.* 1979); one of a very limited number of bushland areas on the Swan Estuary, naturally vegetated areas on the Swan Estuary having particular conservation value in providing habitat for fauna and linkage between areas of bushland; open space of regional significance (DCE 1983)

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

Criteria: Representation of ecological communities, Rarity, Scientific or evolutionary importance, 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. Long-term security and support for conservation management of the 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 (see Table 3, Volume 1).

PEPPERMINT GROVE FORESHORE

Boundary Definition: protected area/bushland (part taken to zoning) boundary

SECTION 1: CADASTRAL INFORMATION

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

Bushplan Site no. 403 **Map no.** 55, 60 **Map sheet series ref. no.** 2033–I NW, 2034–II SW

System 6 (1983): M54 part System area bushland and part scattered native plants (canopy), all vegetation described

Other Names
Part Submission Area 190

Local Authorities (Suburb)
Shire of Peppermint Grove (Peppermint Grove)

Ownership Categories
State Government

Area (ha): total 3.1; bushland 1.7

Zoning
MRS: Parks and Recreation, Urban, Waterways
TPS: Landscape

Lot/Location/Reserve numbers (Purpose), Street name
2539 The Esplanade
Crown Reserve

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS

Pinjarra Plain
Guildford Formation (Qha: S14)

Spearwood Dunes
Tamala Limestone (Qtl: LS1)

VEGETATION AND FLORA

Vegetation Complexes

Spearwood Dunes
Cottesloe Complex - Central and South

Floristic Community Types

Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes
30a2 Woodlands and shrublands on Holocene Dunes (DEP 1996, re-allocated from 30a, equivalent to 30a in Gibson *et al.* 1994, English and Blyth 1997)

WETLANDS

Wetland Types: estuary (waterbody)

Natural Wetland Groups

Estuaries
Swan River (E.2)

Wetland Management Objectives: Conservation (0.3ha)

Swan Coastal Plain Lakes EPP: none identified

THREATENED ECOLOGICAL COMMUNITIES

Endangered (floristic community type 30a as defined by Gibson *et al.* 1994)

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: estuary — limestone cliff, vegetated wetland, vegetated uplands

Vegetation and Flora: limited survey (Gibson *et al.* 1994 (Pepgrv 01–02)); detailed survey (Keighery, GJ, and Keighery 1998)

Structural Units
Tamala Limestone: *Callitris preissii* and *Eucalyptus gomphocephala* Woodland; *Callitris preissii* Woodland

Scattered Native Plants: *Eucalyptus gomphocephala* and *Banksia* species Open Woodland

Vegetation Condition: >40% Very Good to Good, <60% Degraded, with areas of severe localised disturbance

Total Flora: 59 native taxa (Keighery, GJ, and Keighery 1998, Gibson *et al.* 1994) (estimated >75% expected flora)

Significant Flora: *Dodonaea hackettiana* (4); Keighery, GJ, and Keighery 1998 (taxa of restricted distribution on the Swan Coastal Plain associated with Swan/Canning estuarine bushland remnants) — *Callitris preissii, Acacia xanthina, Alyxia buxifolia, Pittosporum phylliraeoides* var. *phylliraeoides*

Fauna: no known information

Linkage: adjacent bushland to the north; part of proposed Greenway 24 (Tingay, Alan & Associates 1997a); part of a regionally significant contiguous bushland/wetland linkage (Volume 2A, Map 8)

Other Special Attributes: National Trust of Australia (WA) Classification; Peppermint Grove Limestone, a Middle Pleistocene emergent shell bed deposited during the Mindel-Riss interglacial period, is the most informative and well preserved natural outcrop in and around the Swan River District (Lemmon *et al.* 1979); is one of a very

limited number of bushland areas on the Swan Estuary, naturally vegetated areas on the Swan Estuary having particular conservation value in providing habitat for fauna and linkage between areas of bushland; open space of regional significance (DCE 1983)

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

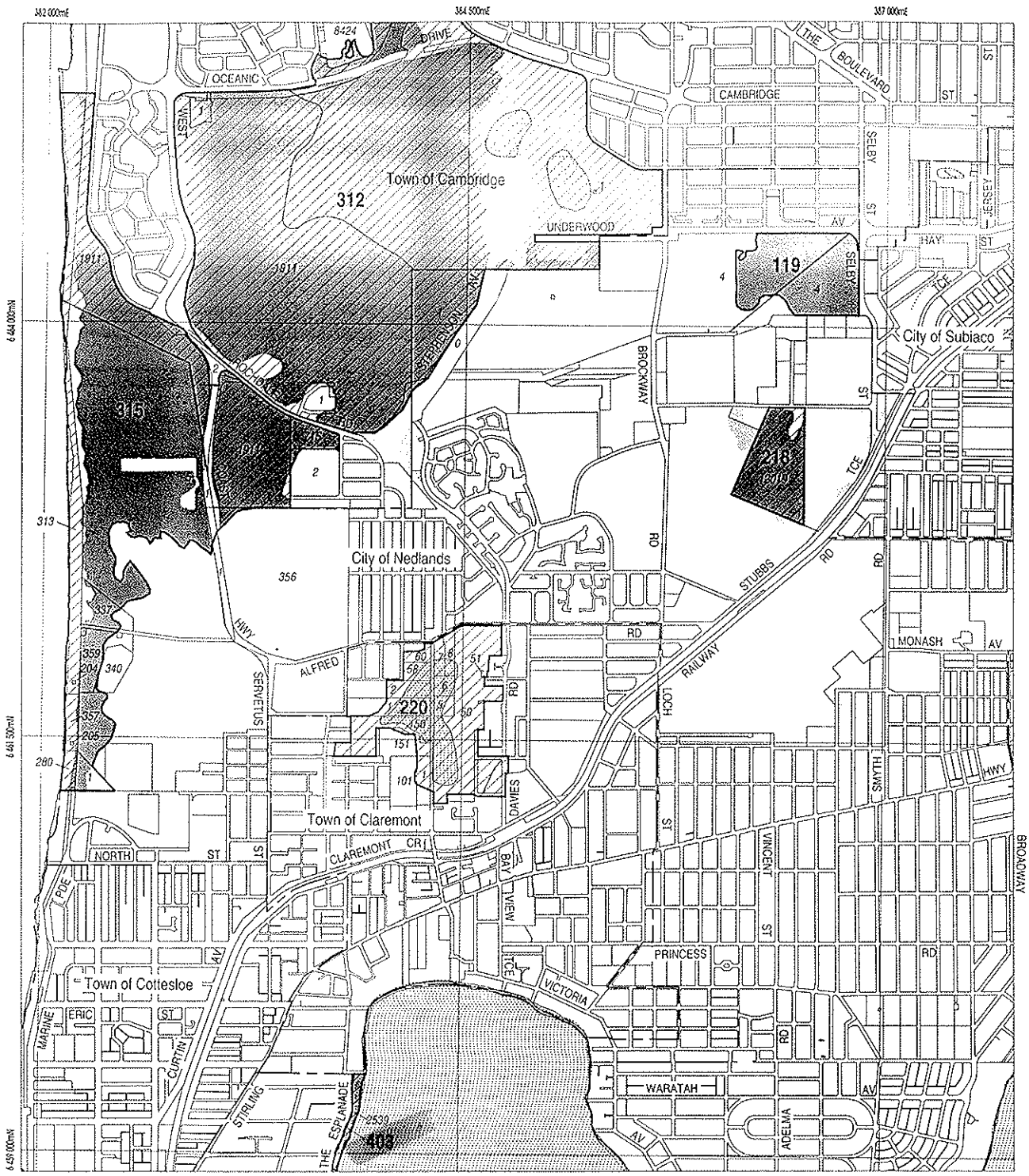
Criteria: Representation of ecological communities, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of conservation value, but which may be applied when evaluating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

Opportunities and/or Constraints

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

Constraints: under MRS Urban Zoning

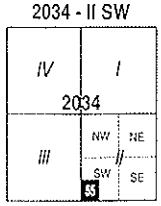
Recommendation: The existing care, control and management intent of the reserve is endorsed. Long-term security and support for conservation management of the Bushplan Site to be enhanced by: amending the purpose of the reserve to include conservation; and applying appropriate mechanisms in consultation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



LEGEND

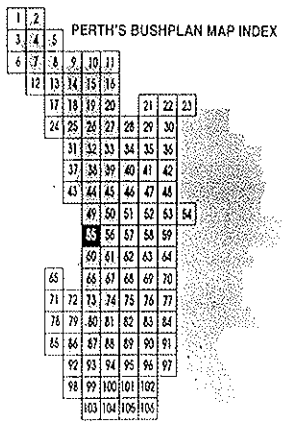
- 472 — Bushplan Sites With Regionally Significant Bushland
- Other Native Vegetation
- Conservation Category Wetlands
- Bushplan Sites With Some Existing Protection
- 696 — Lot Number, Location Number
- Channel Wetlands
- Local Government Boundary

2034 - II SW



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

PERTH'S BUSHPLAN MAP INDEX



N

SCALE

0 500 1000

Metres

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

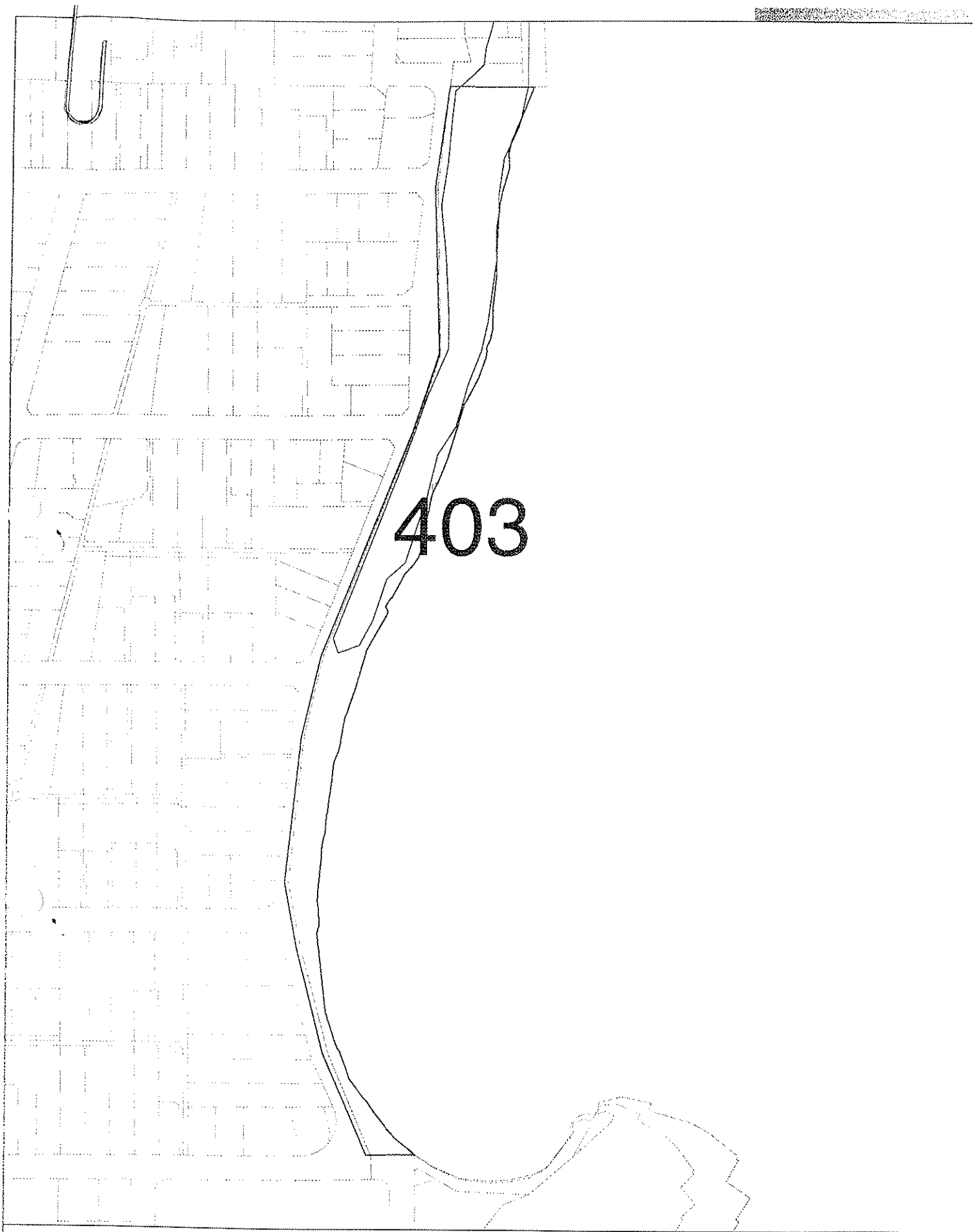
ntw-map18//environ/bushplan//bushv2_55.dgn

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



BUSHPLAN SITES CORRECTED

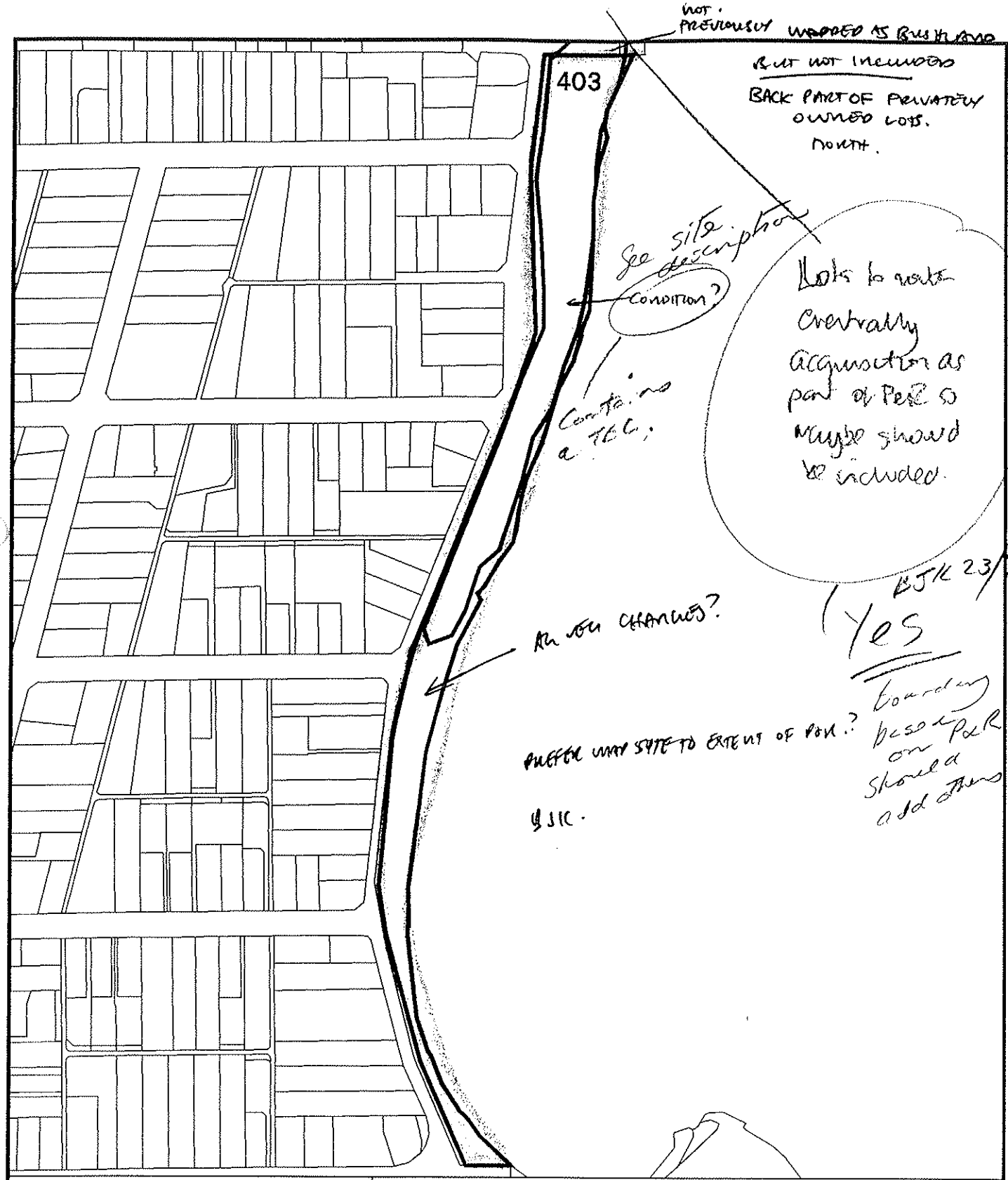
THE GOVERNMENT OF WESTERN AUSTRALIA

WESTERN AUSTRALIAN PLANNING COMMISSION

CUSTOMER FOCUS WESTERN AUSTRALIA

B TL 28/10/98

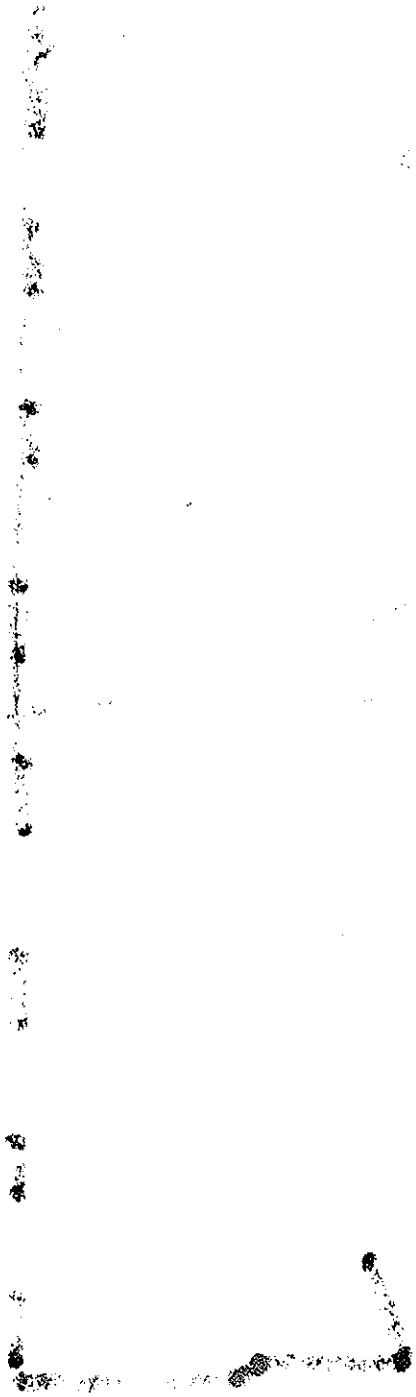
N



bp site 403

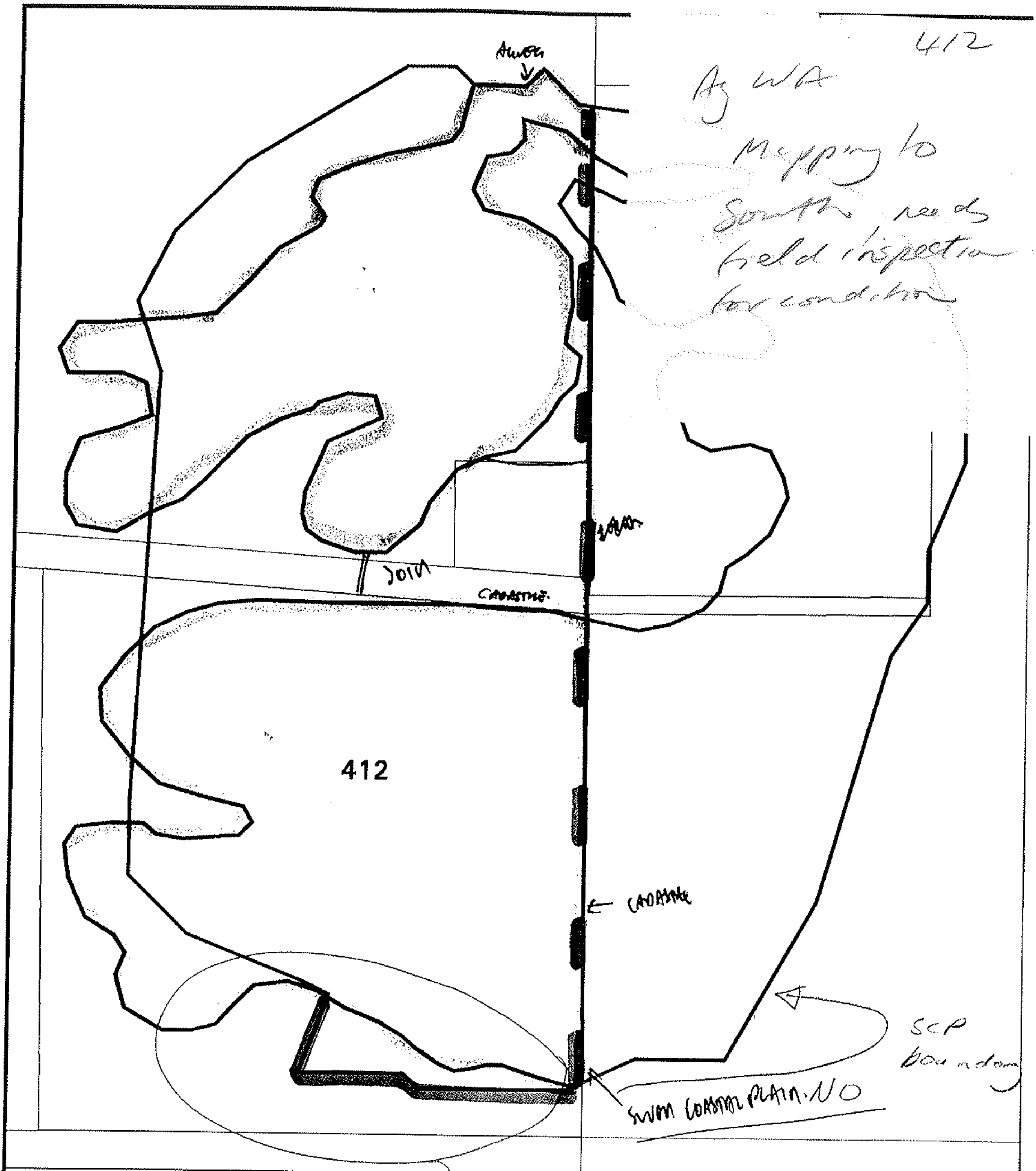
- Cadastre
- Bushplan sites refno 1-500 SCP BOUNDARY THEME
- AG VEG 1998 BOUNDARY THEME

MFP INTERNAL USE ONLY
Prepared By: Andrea Zappacosta
Prepared For:
Map Ident: plot980608_1
Date: 08 Jun 98
Scale 1:4224



Needs note on description to indicate adjacent SCP in Walgunya not described as a Site /

Note: presence of gravel pit (inspected from fence line 6/5/76)



bp site 412

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

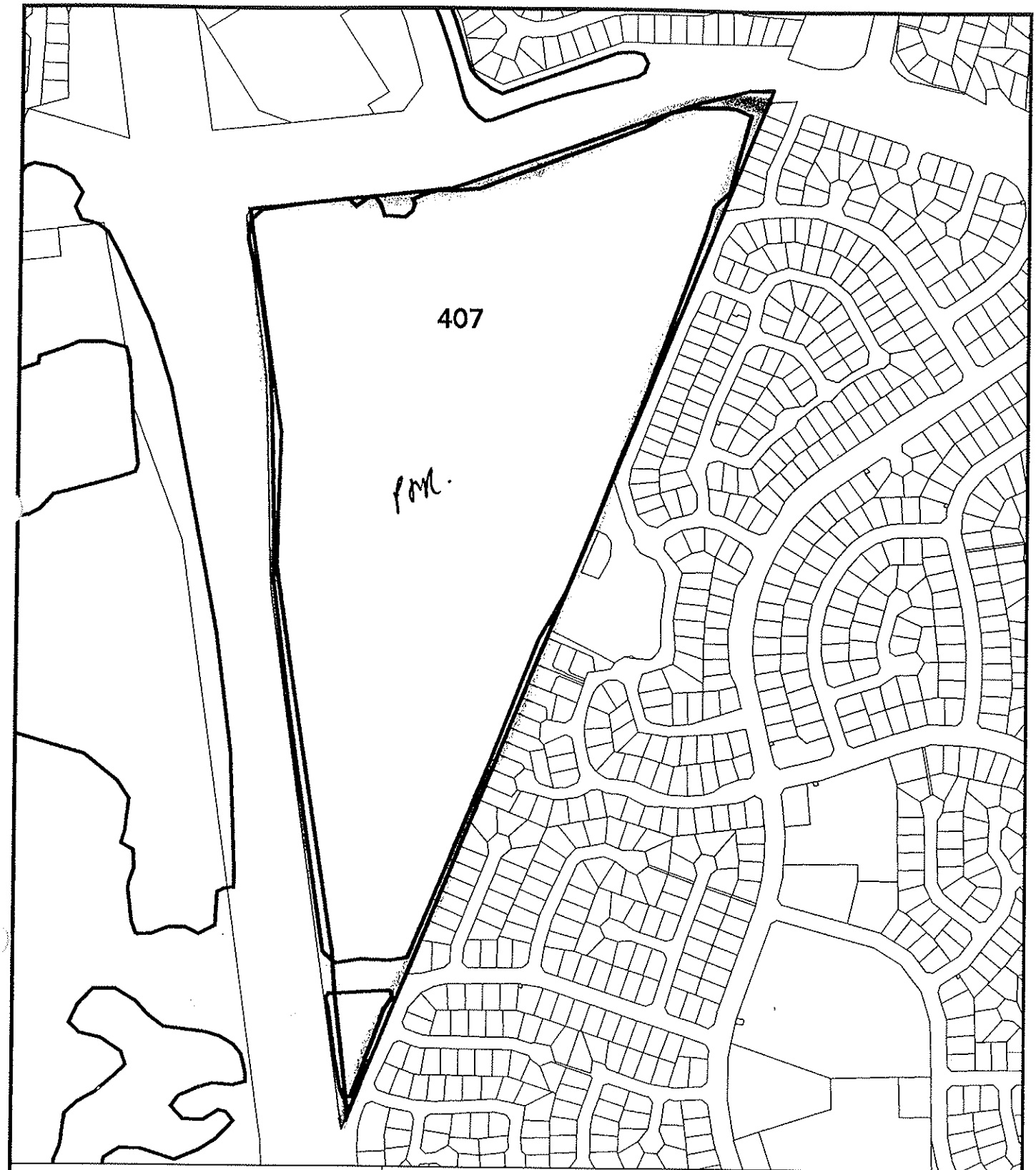
MFP INTERNAL USE ONLY
Prepared By: Andrea Zappacosta
Prepared For:
Map Ident: plot980608_1
Date: 08 Jun 98
Scale 1:6377

BJK 23/9

Veg mapping not correct north / trees changes original boundary should be used which reflects boundary of the Swan Coastal Plain. Dashed boundary is to Walyunga Nat. Pk

OK

PTO

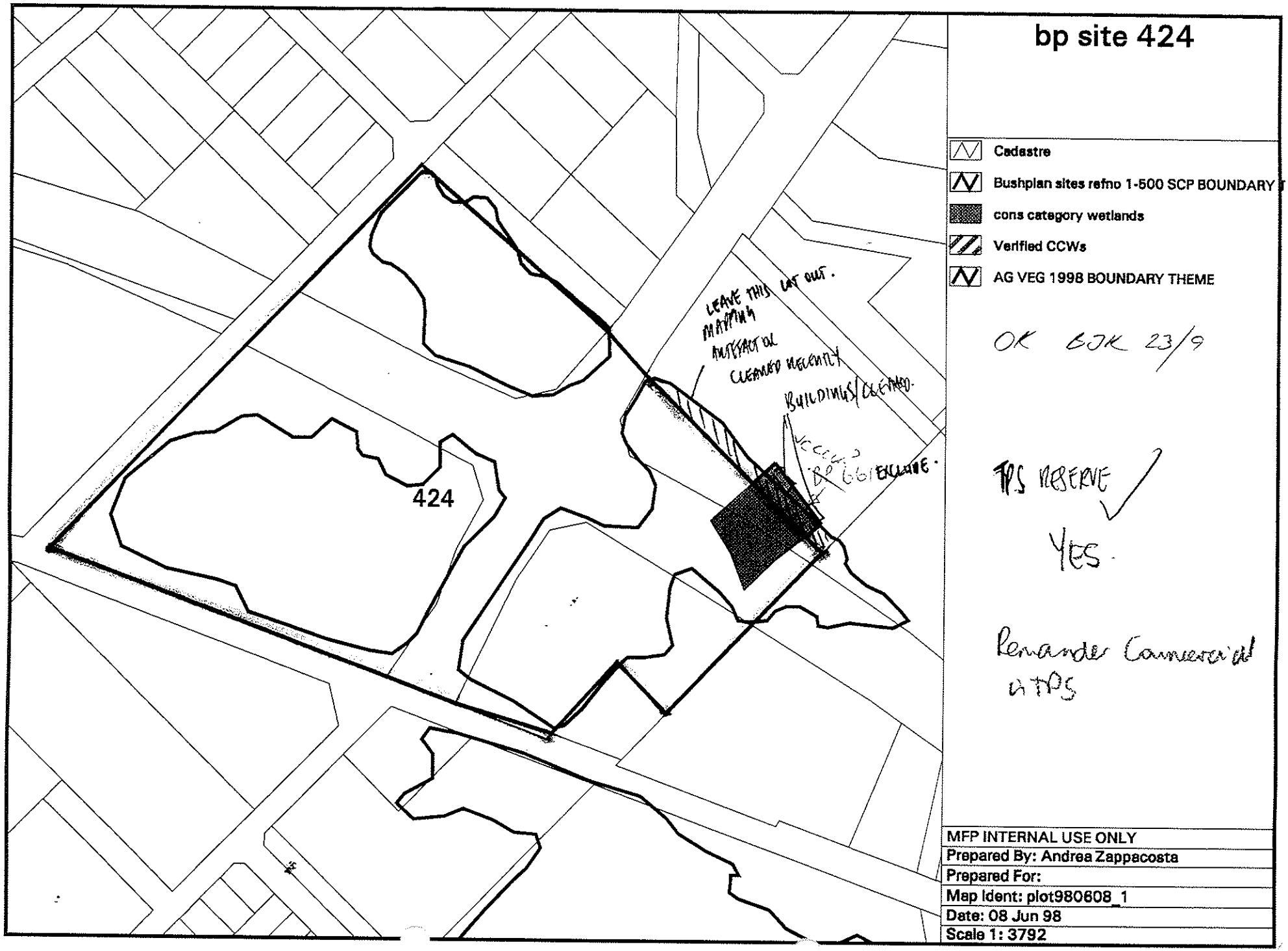


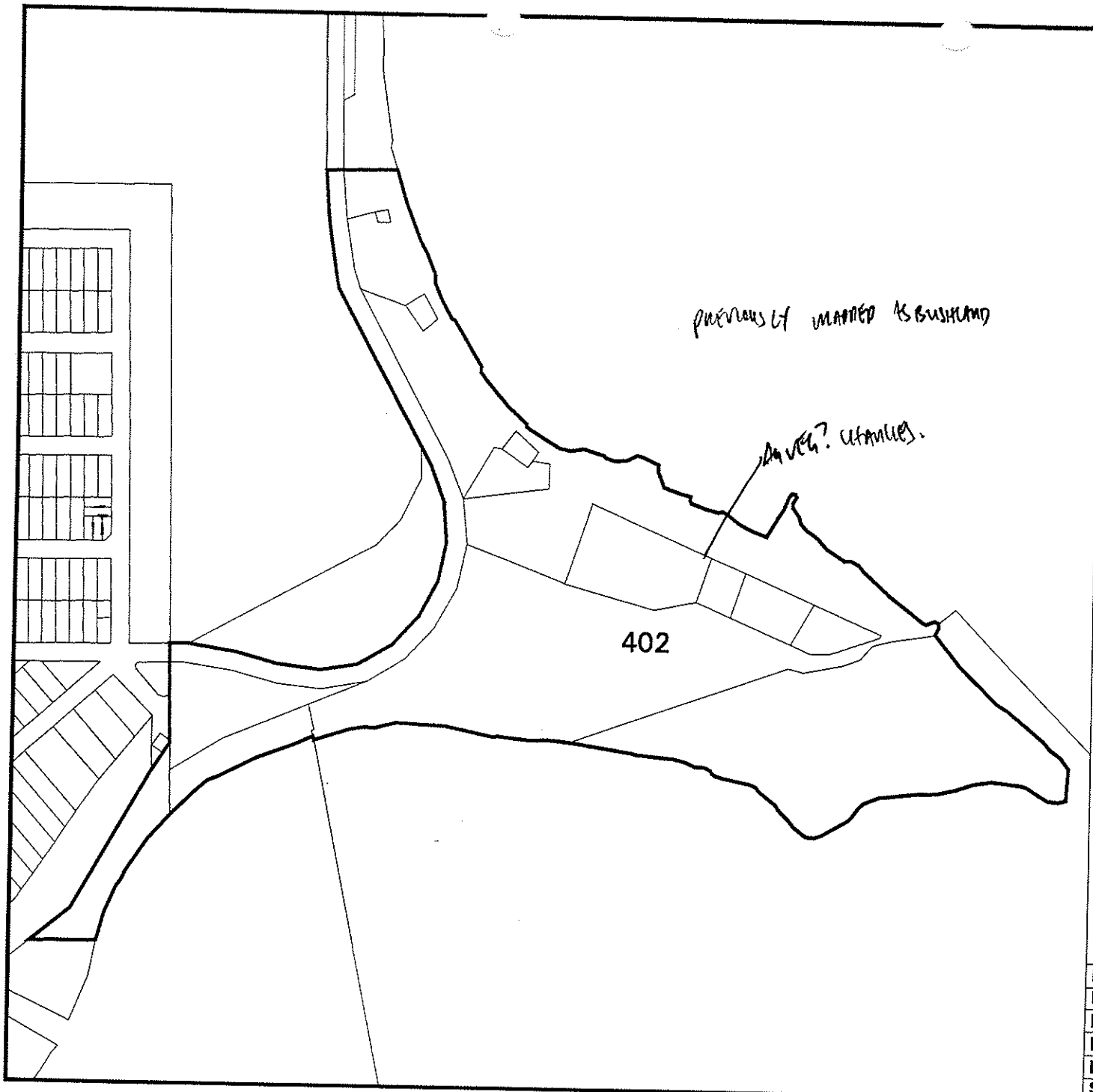
bp site 407

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

MFP INTERNAL USE ONLY
Prepared By: Andrea Zappacosta
Prepared For:
Map Ident: plot980608_1
Date: 08 Jun 98
Scale 1:6678

BJK OK, PdR boundary
Ag Veg needs correcting
(Also Freeway verge to SE
of Freeway)


bp site 424
Cadastre
Bushplan sites refno 1-500 SCP BOUNDARY
cons category wetlands
Verified CCWs
AG VEG 1998 BOUNDARY THEME
OK BJK 23/9
TPS RESERVE
YES.
Remainder Commercial
in TPS
424
LEAVE THIS LOT OUT.
MAPPING
INTERFACE OF
CLEARED RECENTLY
BUILDINGS/CLEARED.
EXCLUDE.
MFP INTERNAL USE ONLY
Prepared By: Andrea Zappacosta
Prepared For:
Map Ident: plot980608_1
Date: 08 Jun 98
Scale 1: 3792



bp site 402

Cadastre

Bushplan sites refno 1-500 SCP BOUNDARY

23/9 BJK

Must have note in description to indicate that this area has vegetation

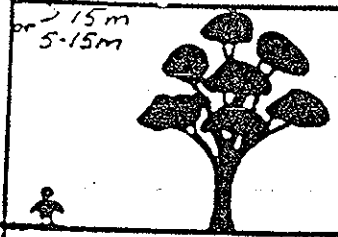
Needs AgWA changes

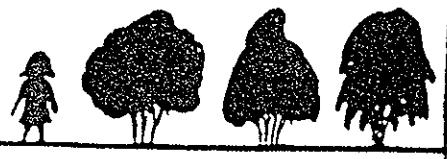
MFP INTERNAL USE ONLY
Prepared By: Andrea Zappacosta
Prepared For:
Map Ident: plot980608_1
Date: 08 Jun 98
Scale 1: 6138

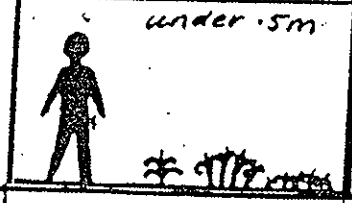
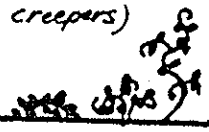
3. VEGETATION STRUCTURE AND COVER Record appropriate cover class

Cover Class – percentage classes

0%	under 2%	2-10%	10-20%	20-30%	30-50%	50-70%	over 70%

LIFE FORM	TREES		MALLEES		
	>15m or 5-15m 	under 5m 	MALLEE SHRUB less than 8m 	MALLEE TREE 8m or more 	15m 10m 5m
COVER CLASS (%)	>15m 5-15m 10/20				
Dominant Species	Callitris preissii				

LIFE FORM	SHRUBS over 2m	2.0-1.5m	1.5-1.0m	1.0m-.5m	under .5m	SHRUBS use the height classes indicated
						3m 2m 1m Height (metres)
COVER CLASS (%)	30/50					
Dominant Species	Mel. huegelii Alyxia buxifolia Dodonaea					

LIFE FORM	BUNCH GRASSES under .5m	HERBS under .5m (except creepers)	SEDGES over .5m	SEDGES under .5m	2.0m 1.5m 1.0m .5m
					
COVER CLASS (%)		20/30			
Dominant Species		Oxalis pes-C			

4. VEGETATION CONDITION

EXCELLENT	
VERY GOOD	
GOOD	
POOR	
VERY POOR	

Comments

weeds in leaf layer

Swan Coastal Plain Survey - SURVEY RECORDING SHEET Please use pencil

BUSHLAND AREA: = PEPGRV-1

QUADRAT No: [illegible] VEGETATION TYPE Callitris preissii woodland

DATE TRIP 9-7-1993 BOTANIST G.JK

VOLUNTEERS

DATE TRIP BOTANIST

VOLUNTEERS

Keighery and Keighery, 1990
Adapted from Griffin and Keighery, 19[illegible]
MOORE RIVER to JURIEN SANDPLAIN SURVEY. WILDFLOWER SOCIETY of WA

PEPGRV

1. LOCATION of the QUADRAT

NO PEGS

a. Mud Map Draw a sketch of the location of the quadrat

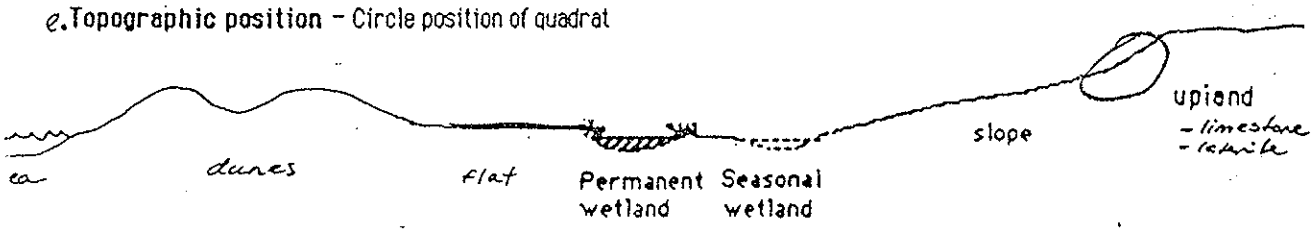
LOCAL GOV - PEPPERMINT GROVE

SYST6 M54

N

b Road Location	c. Latitude	Longitude
Esplanade Peppermint Grove A 1713		
d. Photograph Photographer's name GK Photo No		Altitude 6 m

e. Topographic position - Circle position of quadrat



2. SITE DATA - Circle the correct response

Slope flat gentle (steep)

Aspect N NE (E) SE S SW W NW

Surface soil red brown loam

Sub-surface soil limestone Environ geol LS1

Drainage (well) mod poor

Wet All year winter/spring

Litter (% cover)

% Bare ground

P.T.O.

SPECIES PRESENCE

PERGRU I

QUADRAT No. [illegible] I

- work systematically through the vegetation; start with the tallest stratum, i.e. trees
- within each stratum try to record the most common species first and the most uncommon last
- as each species is collected **label** it with a numbered tag and use this number on your recording sheet
- indicate if the species is in **flower**

Keighery and Keighery, 1990
Adapted from Griffin and Keighery, 1989
MOORE RIVER to JURIEN SANDPLAIN SURVEY. WILDFLOWER SOCIETY of WA

Trees	No	ID
/ Callitris preissii		

Mallees	No	ID

SHRUBS	No	ID
/ Melaleuca huegelii ✓		
/ Alyxia buxifolia ✓		
/ Templetonia retusa ✓		
/ ~~Dodonaea ?~~ pers. com G. Keighery 27/?/97		
/ Comesperma integerrimum		
/ Grevillea thelemanniana ssp. preissii (?N)		
/ Argyranthemum frutescens		
/ Spyridium globulosum ✓		
/ Rhamnus alaternus		
/ Thomasia cognata		
/ Rhagodia baccata ✓		

SHRUBS	No	ID

Bunch Grasses	No	ID
/ Stipa flavescens		

Herbs	No	ID
/ *Oxalis pes caprae		
~~Ehr~~		
/ *Myrsiphyllum asparagoides		
/ *Fumaria capreolata		
/ *Romulea rosea		
/ *Ehrharta longiflora		
/ *Catapodium rigidum		
/ *Euphorbia peplus		
/ *Trifolium dubium		
/ *Tricoryne elatior		
/ Thysanotus patersonii ✓		
/ Dianella revoluta ✓		
/ *Crassula colorata		
/ Apium annuum ✓		

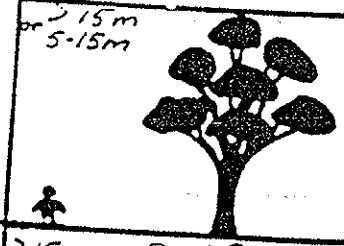
Herbs	No	ID

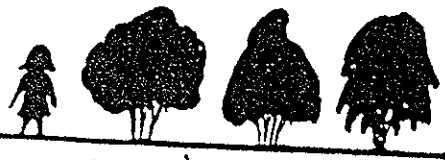
Sedges	No	ID
/ Lepidosperma angustatum (N)		

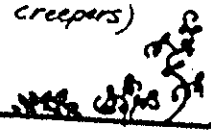
3. VEGETATION STRUCTURE AND COVER. Record appropriate cover class

Cover Class – percentage classes

0%	under 2%	2–10%	10–20%	20–30%	30–50%	50–70%	over 70%

LIFE FORM	TREES		MALLEES	
	>15m or 5–15m 	under 5m 	MALLEE SHRUB less than 8m 	MALLEE TREE 8m or more 
COVER CLASS (%)	>15m 2–10 5–15m 10–20	<2%		
Dominant Species	Euc. gomphoceph Callitris preissii	Pittosporum philyr		

LIFE FORM	SHRUBS (use the height classes indicated)				SHRUBS
	over 2m 	2.0–1.5m 	1.5–1.0m 	1.0m – .5m 	under .5m 
COVER CLASS (%)	50–>70	<2	<2		
Dominant Species	Alyxia buxifolia Spyridium globb Dryandra sessilis	Templ. ret, Rhag. baca			

LIFE FORM	BUNCH GRASSES	HERBS	SEDGES	
	under .5m 	under .5m (except creepers) 	over .5m 	under .5m 
COVER CLASS (%)	2–10	10–30		
Dominant Species	Stipa flav	Freesia		

4. VEGETATION CONDITION

EXCELLENT	
VERY GOOD	
GOOD	
POOR	
VERY POOR	

Comments

Swan Coastal Plain Survey - SURVEY RECORDING SHEET Please use pencil

BUSHLAND AREA: = PEPGRV-2

QUADRAT No. CLAREMONT 2 VEGETATION TYPE Tuart/ Rottnest Island Pine

DATE TRIP 9-7-1993 BOTANIST GK

VOLUNTEERS

DATE TRIP BOTANIST

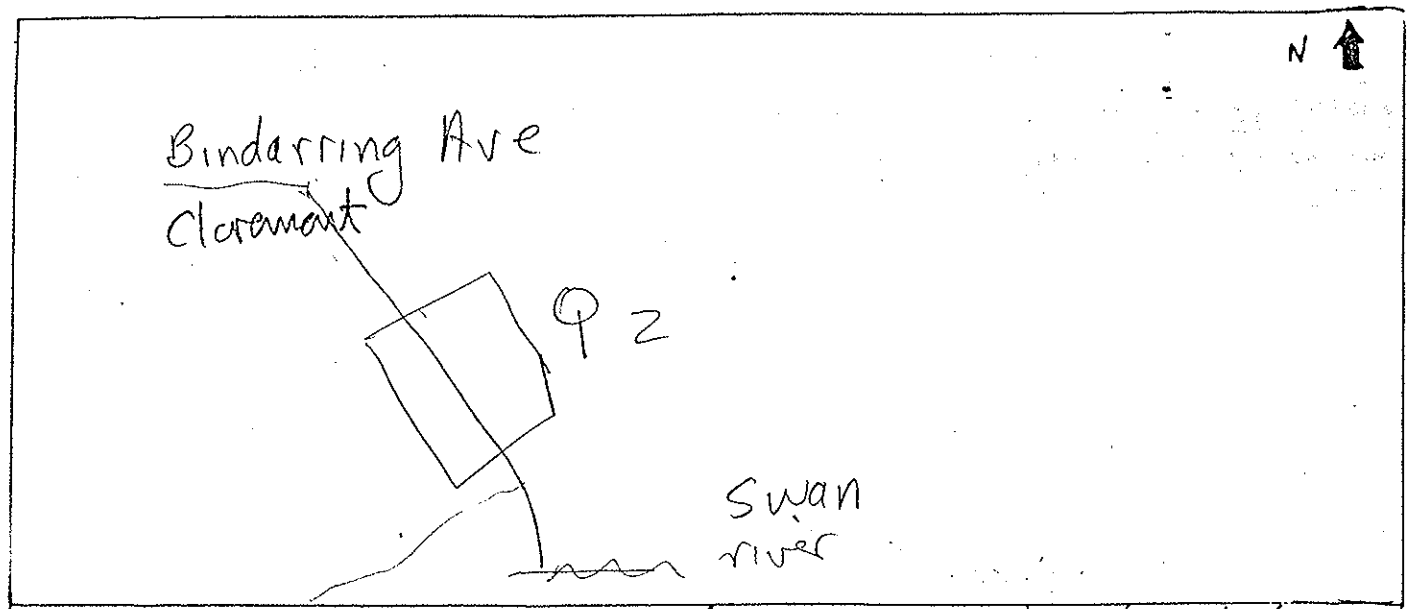
VOLUNTEERS

Keighery and Keighery, 1990
Adapted from Griffin and Keighery, 198
MOORE RIVER to JURIEN SANDPLAIN
SURVEY. WILDFLOWER SOCIETY of WA

1. LOCATION of the QUADRAT

NO PEGS

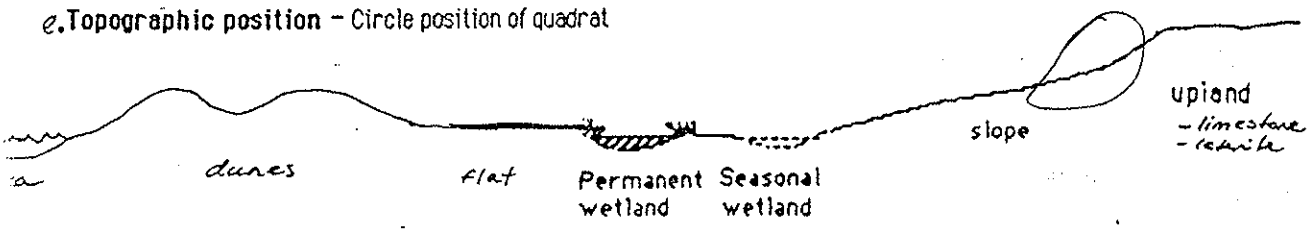
a. Mud Map Draw a sketch of the location of the quadrat



b Road Location	c. Latitude	Longitude
The Esplanade Peppermint Grove		
		Altitude

d. Photograph Photographer's name Photo No

e. Topographic position - Circle position of quadrat



2. SITE DATA - Circle the correct response

Slope flat gentle steep

Aspect N NE E SE S SW W NW

Surface soil brown sandy loam

Sub-surface soil limestone Environ Geol LS1

Drainage well mod poor

Wet All year winter/spring

Litter (% cover) 20/50

% Bare ground MOSSY

P.T.O.

SPECIES PRESENCE

PEPARUTT

- work systematically through the vegetation; start with the tallest stratum, i.e. trees
- within each stratum try to record the most common species first and the most uncommon last.
- as each species is collected label it with a numbered tag and use this number on your recording sheet
- indicate if the species is in flower

QUADRAT No.
CLAREMONT 2

Keighery and Keighery, 1990
Adapted from Griffin and Keighery, 1989
MOORE RIVER to JURIEN SANDPLAIN SURVEY. WILDFLOWER SOCIETY of WA

Trees	No	ID
Euc gomphocephala ✓		
Callitris preissii ✓		
Pittosporum philyraeoides ✓		
Mallees		
SHRUBS		
Alyxia buxifolia ✓	70% flower	
Spyridium ~~buxifolia~~ globulosum ✓		
Templetonia retusa ✓		
Trymalium albicans (N)		
Dryandra sessilis ✓		
Eremophila glabra ✓		
Scaevola crassifolia (N)		
Rhagodia baccata ✓		
Hardenbergia comptoniana ✓		
Logania vaginalis ✓		
Adelia oxanthina ✓		
* Argyranthemum frutescens		

SHRUBS	No	ID
Bunch Grasses		
Stipa elegantissima ✓		
Stipa flavescens ✓		
Herbs		
* Freesia leichtlinii		
* Fumaria capreolata		
* Myrsiphyllum asparagoides		
* Romulea rosea		
Tricoryne elatior ✓		
Acanthocarpus preissii ✓		
Thysanotus patersonii ✓		
Dianella revoluta (N)		

Herbs	No	ID
Sedges		

M54 Foreshore Reserve, Peppermint Grove

Friends Advocate Management

Other Names:

(Specific Study/studies) Miscellaneous studies

Flora

Vegetation Map	1	2	3	
Flora list	(1)	2	3	4
Significant Taxa		(done / suitable)	/ doubtful	

Fauna

Mammals	1	2	
Birds	1	2	RAOU
Reptiles and Amphibia	1	2	
Invertebrates	1	2	

Vegetation Condition Map (Sites) Comment

Disturbance Factors (Comment) Management

(Swan Coastal Plain Floristic Survey)

AHC: National Estate- Listed / Interim / Nominated / Notified NT (WA): Heritage Classification

Notes

M54 Foreshore Reserve, Peppermint Grove		
M54.1 Regional park recommendations be applied to this area.	Unresolved Issues	The Regional Parks Task Force Report proposes that the Swan Estuary be considered analogous to a regional park managed under Swan River Trust legislation. The Swan River Management Strategy (1988) recommends that all the foreshore reserves and waterways of the Swan Canning Rivers be treated as a single entity for the purposes of planning and management. However, areas of high conservation value may be added to CALM's existing Swan Estuary Marine Park estate.
M54.2 Geological Sites Committee in consultation with Peppermint Grove Shire Council prepare management plan to protect vegetation and the shell deposits.	Unresolved Issues	The Geological Sites Committee no longer exists. The Swan River Trust should be consulted. To date the local authorities involved have not allocated resources for preparing a management plan.

System 6 - VERBAL Information Search Date 5/94

Area M54 Name PEPPERMINT GROVE (M54)							
Source Swan Coastal Plain Floristic Survey (see general)							
Purpose (why was the study done?)							
Government							
Corporate							
Community Group							
Management Plan							
Publication Planned	Yes	No	Date				
Planned Location							

Soils							
Units	described	referenced					

Landscape							
Features	described	referenced					

Flora							
Vegetation Map							
Units				Site based (no) 2			
Mapped							
Veg Units	Comparable Heddle *et al*			Compared Heddle *et al.*		Unit not mapped by Heddle *et al.*	
Flora list							
Timing	%completion					Significant Taxa	
	Trees	Shrubs	Herbs	Sedges	Weeds	DRF	CALM Prority	Other

Fauna				
Timing	%completion			Significant Taxa
	Mammals	Birds		Sched1 Sched2 Other
	Reptiles	Invertebrates		

Vegetation Condition				
Site based	Mapped	Units		
Disturbance Factors				
Phytophthora	observed		Other	incidental
	tested			itemised

Notes

PEPPERMINT GROVE

NO RECORDS IN LIBRARY

Hewgill, F.R., Kendrick, G.W, Webb, R.J. and Wyrwoll, K.-H. (1983). Routine ESR dating of emergent Pleistocene marine units in Western Australia. *Search* 14: 215-217.

Kendrick, G.W. (1960). The fossil Mollusca of the Peppermint Grove Limestone, Swan River district of Western Australia. *The Western Australian Naturalist* 7: 53-66.

Kendrick, G.W., Wyrwoll, K.-H. and Szabo, B.J. (1991). Pliocene-Pleistocene coastal events and history along the western margin of Australia. *Quaternary Science Reviews* 10: 419-439.

Murray-Wallace, C.V. and Kimber, R.W.L. (1989). Quaternary marine aminostratigraphy - Perth Basin, Western Australia. *Australian Journal of Earth Science* 36: 553-568.

Murray-Wallace, C.V., Kimber, R.W.L., Belperio, A.P. and Gostin, V.A. (1988). Aminostratigraphy of the Last Interglacial in southern Australia. *Search* 19: 33-36.

190 3. **Peppermint Grove and The Coombe, Mosman Park.** The Tamala Limestone cliffs near the Scotch College boatshed at Peppermint Grove and at The Coombe, Mosman Park each present in their lower parts two water-laid calcarenites separated by a fossil soil or palaeosol, the latter either a yellow-brown quartz sand or a massive, hard calcrete. The upper unit at both sites is a shelly calcarenite, which differs significantly from that at Minim Cove in its stratigraphy, preservation state and palaeontology. The available evidence, summarised by Kendrick *et al.* (1991: 424-426) indicates that the upper shelf beds at these two sites were formed at the transgressive peak of the Penultimate Interglacial, Middle Pleistocene, corresponding to Stage 7 of the deep sea isotopic chronology. In absolute terms, this would be about 230,000 yr BP. Faunal studies suggest that at the time, the marine outlet of the palaeo-estuary was located close to Peppermint Grove; the open coast shoreline was then situated near the present Cottesloe shopping centre, between Stirling Highway and the railway.

Water laid calcarenites **underlying** the conspicuous palaeosols at Peppermint Grove and The Coombe probably represent a Middle Pleistocene transgressive peak older than Stage 7. This unit at Peppermint Grove appears to be non-fossiliferous; its equivalent at The Coombe features a poorly preserved shell bed of sheltered-water facies. The age and developmental history of the Swanbourne-North Fremantle barrier-peninsula are linked with the fossil deposits, such as these, contained within it. Much remains to be clarified about these deposits and their significance to the evolution of landscape in the Perth metropolitan area and I submit that these sites warrant being managed and conserved in ways appropriate to their scientific and cultural importance, which equals those of the Minim Cove deposit, discussed above.

References concerning the above-mentioned deposits are:

Fairbridge, R.W. (1954). Quaternary eustatic data for Western Australia and adjacent states. *Proceedings of the Pan Indian Ocean Science Congress, Perth, Western Australia*, p. 64-84.

Hewgill, F.R., Kendrick, G.W., Webb, R.J. and Wyrwoll, K.-H. (1983). Routine ESR dating of emergent Pleistocene marine units in Western Australia. *Search* 14: 215-217.

Kendrick, G.W. (1960). The fossil Mollusca of the Peppermint Grove Limestone, Swan River district of Western Australia. *The Western Australian Naturalist* 7: 53-66.

Kendrick, G.W., Wyrwoll, K.-H. and Szabo, B.J. (1991). Pliocene-Pleistocene coastal events and history along the western margin of Australia. *Quaternary Science Reviews* 10: 419-439.

Murray-Wallace, C.V. and Kimber, R.W.L. (1989). Quaternary marine aminostratigraphy - Perth Basin, Western Australia. *Australian Journal of Earth Sciences* 36: 553-568.

REMNANT LANDFORMS ON DARLING PLATEAU

In connection with the System Six Update, I wish finally to draw your attention to a unique and very interesting concentration of swamps, valleys and surrounds located in the eastern Darling Range on and adjacent to a major drainage divide at the headwaters of the Darkin River (a tributary of the Helena R.). The area is located along the eastern boundary of System Six. Named features in this group include Brown's Swamp, Darkin Swamp, Little Darkin Swamp and Goonaping Swamp, all of which are connected by valleys of distinctive morphology. This area has been designated as type area of the Goonaping Type Valley by Bettenay and Mulcahy (1972: 364) and mapped as the Goonaping Valley Unit by Mulcahy *et al.* (1982, figs 2,3).

For all that they are swamps and valleys, these features are situated on a major interfluve between the westward-draining Helena-Darkin System and the eastward-draining Dale-Avon System. They are believed to represent remnants of an ancient drainage system now dismembered and largely obliterated following uplift (epeirogenic) of the Yilgarn Block (Darling Plateau) and consequent stream rejuvenation. At one location in the West Dale district, they are associated with perched stream deposits of Early Tertiary age containing a unique, diverse fossil leaf flora consistent with a temperate, humid forest and including such genera as *Nothofagus, Agathis* and *Gymnostoma* (Hill and Merrifield, 1993).

There are numerous other, scattered remnants of the Goonaping Valley Unit throughout southwestern Australia but the aggregation of features that I have referred to is by far the most intact and best preserved. It retains discernible features of a once-integrated river system and with its associated areas of higher relief represents without much alteration an Early Tertiary or older land surface. To the best of my knowledge, the swamp-valley system in this area has yet to be examined biologically and I suggest that this may be worth consideration. The area, being part of the Mundaring Reservoir catchment, is subject to management appropriate to that circumstance. I suggest that this need not preclude recognition of the special geomorphological features of the area, whether or not these may be supplemented by biological features.

I suggest that some consideration be given to the suitability of including the ancient "wetlands" at the head of the Darkin River within the scope of the System Six Update.

References.

Bettenay, E. and Mulcahy, M.J. (1972). Soil and landscape studies in Western Australia. (2). Valley form and surface features of the south-west drainage division. *Journal of the Geological Society of Australia* 18: 359-369.

Hill, R.S. and Merrifield, H.E. (1993). An Early Tertiary macroflora from West Dale, southwestern Australia. *Alcheringa* 17: 285-326.

Mulcahy, M.J., Churchward, H.M. and Dimmock, G.M. (1972). Landforms and soils on an uplifted peneplain in the Darling Range, Western Australia. *Australian Journal of Soil Research* 10: 1-14.

Yours sincerely

George W. Kendrick.

G.W. KENDRICK
Research Associate
Department of Earth & Planetary Science

AREA INFORMATION

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

Conservation Area	
Nature Reserve	
Reserve No	
National Park	
Reserve No	
Local Government	MSH FOREHORE RESERVES PEPPERMINT GROVE
Reserve No	A17113 Shire of Peppermint Grove
Other	
Proposed Conservation Areas	
Local Government	
Reserve No	
Other	

Conservation Area

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

TOTAL AREA

Bushland Area	3.25	hectares
Completely Degraded	1.042 ha - lawn	
weeds in herb layer		

AREA MAPPED FLORISTIC UNITS

Units	Site (Condition) Code G.: PEPGRV	Bound	Area (ha)
30a	01 (2), 02 (2)	B	2.208

Boundaries determined by use of

aerial photograph	Metro Street Directory run 7 5137 5/1/91
orthophoto	2033 1 NW Aug 1991
~~vegetation map~~	
~~soil map~~	

CALM MAP metro 5

CONTACT DR N. GIBSON CALM WOODVALE for further information.
Flora list for M54 Foreshore Reserve, Peppermint Grove (extracted from Swan Coastal Plain database, Pepgrv sites 1 - 2 2/1995).

Department of Environmental Protection System 6 Update: Site Based Flora List M54 Foreshore Reserve, Peppermint Grove
(extracted from the CALM Swan Coastal Plain database, Pepgrv sites 1-2, 2/95)

Anthericaceae
Thysanotus patersonii
Tricoryne elatior

Apiaceae
Apium annuum

Apocynaceae
Alyxia buxifolia

Asparagaceae
* Myrsiphyllum asparagoides

Asteraceae
* Argyranthemum frutescens

Chenopodiaceae
Rhagodia baccata subsp. baccata

Crassulaceae
Crassula colorata

Cupressaceae
Callitris preissii

Cyperaceae
Lepidosperma angustatum

Dasypogonaceae
Acanthocarpus preissii

Euphorbiaceae
* Euphorbia peplus

Fumariaceae
* Fumaria capreolata

Goodeniaceae
Scaevola crassifolia

Iridaceae
* Freesia aff. leichtlinii FPR
* Romulea rosea

Loganiaceae
Logania vaginalis

Mimosaceae
Acacia xanthina

Myoporaceae
Eremophila glabra

CONTACT DR N. GIBSON CALM WOODVALE for further information.

Flora list for M54 Foreshore Reserve, Peppermint Grove (extracted from Swan Coastal Plain database, Pepgrv sites 1 - 2 2/1995).

Myrtaceae
- Eucalyptus gomphocephala
- Melaleuca huegelii

Oxalidaceae
- * Oxalis pes-caprae

Papilionaceae
- Hardenbergia comptoniana
- Templetonia retusa
- * Trifolium dubium

Phormiaceae
- Dianella revoluta

Pittosporaceae
- Pittosporum phylliraeoides

Poaceae
- * Ehrharta longiflora
- Stipa elegantissima
- Stipa flavescens

Polygalaceae
- Comesperma integerrimum

Proteaceae
- Dryandra sessilis
- Grevillea thelemanniana subsp. preissii

Rhamnaceae
- * Rhamnus alaternus
- Spyridium globulosum
- Trymalium albicans

Sapindaceae
- ~~Dodonaea hackettiana~~ pers com G Keighery 23/7/97

Sterculiaceae
- Thomasia cognata

orthophoto 2033 1 NW Aug 1991

IMPORTANT GEOLOGICAL SITES IN THE PERTH AND SOUTHWESTERN AREA OF WESTERN AUSTRALIA

A Report on their Scientific Significance and Future Protection.

by *T. C. Lemmon*

R. D. Gee

W. R. Morgan

C. R. Elkington

Geological Society of Australia Incorporated
Western Australia Division

October, 1979

See Fig 146

bf 403
PB202

Please quote source as being from an unpublished report titled 'Floristics of System Six Reserves and Bushland XVI: Point Heathcote Foreshore (M65), Minim Cove (M 57), Mosman Park (M56), Peppermint Grove Foreshore (M 54) and Point Resolution (M59).' by G.J.Keighery[1] and B.J. Keighery[2] in 1998.

1. Department of Conservation and Land Management
2. Department of Environmental Protection

Appendix 1: Flora

TAXON

KEY
Areas

PH	Point Heathcote Reserve
PR	Point Resolution Reserve
PG	Peppermint Grove
CP	Chidley Point Reserve
MC	Minim Cove

Site Location of Plants

C	Cliff Top
F	Cliff Face
B	Beach
M	Marsh
W	woodland of Banksia or Tuart

	PH	PR	PG	CP	MC	Site
FERNS						
Annogramma leptophylla				*		
*Adiantium capillus-veneris			*			
PTERIDIACEAE						
Pteridium esculentum			*			F
GYMNOSPERMS						
ZAMIACEAE						
Macrozamia riedleii	*	*	*	*	*	W,H
CUPRESSACEAE						
Callitris preissii			*	*		C
MONOCOTYLEDONS						
AGAVACEAE						
*Agave americana		*	*		*	C,B
ALLIACEAE						
*Allium triquetrum		*				B
AMARYLLIDACEAE						
*Narcissus tazetta		*	*	*		C

ANTHERICAEAE						
Arthropodium capillipes			*			W
Caesia micrantha				*		W
Corynotheca micrantha	*			*	*	H
Thysanotus arenarius			*			W
Thysanotus dichotomus		*				W
Thysanotus patersonii		*	*		C	
*Trachyandra divaricata	*	*	*	*	*	B
Tricoryne elatior		*	*	*	*	C,H
AREACEAE						
*Phoenix dactylifera	*	*				C
ASPARAGACEAE						
*Myrsiphyllum asparagoides	*	*	*	*	*	C
ASPHODELACEAE						
*Asphodelus fistulosus			*			C
CENTROLEPIDACEAE						
Centrolepis drummondiana				*		W
COLCHICACEAE						
Burchardia umbellata				*		W
CYPERACEAE						
Baumea juncea				*	M	
Isolepis nodosa	*	*	*	*	*	B
Lepidosperma angustatum		*		*	*	H,W
Lepidosperma gladiatum	*	*	*	*	*	C,B
Lepidosperma tuberculatum	*			*		H,W
Mesomelaena pseudostygia	*	*	*	*	*	H,W
DASYPOGONACEAE						
Acanthocarpus preissii*	*	*	*	*		C
Lomandra caespitosa			*	*		W
L. maritima	*			*	*	C,W
HAEMODORACEAE						
Conostylis aculeata ssp. aculeata				*		W
C. candicans	*	*	*	*	*	H,W
C. setigera	*					W
HYACINTHACEAE						
*Lachenalia reflexa	*		*	*	*	W,C
*Ornithogalium umbellatum				*		H
IRIDACEAE						
*Chasmanthe floribunda	*	*	*	*		C
*Ferraria crispa	*			*		H
*Freesia leichtlinii	*	*	*	*	*	C
*Gladiolus undulatus	*		*	*	*	B
*Homeria flaccida					*	C
*Romulea rosea	*	*	*	*	*	C,W
*Watsonia bulbillifera			*		B	
JUNCACEAE						
Juncus kraussii	*	*	*	*	*	B, M

JUNCAGINACEAE						
Triglochin calcitrapa					*	C
ORCHIDACEAE						
Microtis media		*			B	
PHORMIACEAE						
Dianella divaricata	*	*	*	*	*	C,W
POACEAE						
*Aira cupiana		*	*	*	*	C,H,W
*Arundo donax	*	*	*	*	*	B
*Avena barbata	*	*	*	*	*	C
*Briza maxima *	*	*	*	*	C	
*Briza minor		*			*	C
*Bromus diandrus		*	*	*	*	C,W
*Bromus unioloides					*	C
*Catapodium rigidum			*		*	C
*Cynodon dactylon	*	*	*	*	*	C,B,W
*Ehrharta calycina	*	*	*	*	*	W,B
*Ehrharta longiflora	*	*	*	*	*	C,W.
*Eragrostis curvula		*				W
*Hordeum leporinum			*	*		W
*Lagurus ovatus	*	*	*	*	*	C,W
*Lolium perenne					*	B, W
*Lolium rigidum		*	*		*	C,W
*Paralophis incurva					*	B
Paspalum vaginatum		*	*	*	*	B
*Pennisetum clandestinum	*	*	*			W
*Pennisetum purpureum	*		*	*	*	W
*Pennisetum setaceum		*			C	
*Pentaschistis airoides	*				S	
*Phalaris minor			*			C
*Pipteranthemum milliaceum			*			C
*Poa annua			*	*	*	C
Poa porphroclados			*	*	*	C
Sporobolus virginicus *	*	*	*	*	B	
*Stenotraphum secundatum	*	*	*	*	*	C,B
Stipa elegantissima		*	*	*	*	C
Stipa.flavescens			*	*	*	C
*Vulpia myorus		*	*			W
RESTIONACEAE						
Loxocarya flexuosa	*			*	*	C
XANTHORRHOEACEAE						
Xanthorrhoea preissii		*	*	*	*	H,W
DICOTYLEDONS						
AIZOACEAE						
*Carpobrotus edulis	*		*		*	B,C
*Galena secunda			*			B
*Tetragonia decumbens	*	*		*	*	B
Tetragonia tetragonioides		*			*	B

AMARANTACEAE						
Ptilotus polystachyus					*	W
ANACARDIACEAE						
*Schinus terebinthifolius	*	*	*	*	*	C
APIACEAE						
Apium annuum					*	M
Apium prostratum					*	B
Centella cordifolia		*				S
*Foeniculum vulgare				*		C
APOCYNACEAE						
Alyxia buxifolia			*		*	C
*Nerium oleander			*			C,R
*Vinca major			*			C
ASTERACEAE						
*Argyranthemum frutescens		*	*	*	*	C
*Arctotheca calendula		*		*		C,B,W
*Artemisia arborescens			*			C
*Aster subulatus		*				S
*Conyza albida		*	*		*	C,B
*Dittrichia graveolens				*		B
*Hypochaeris glabra	*	*	*	*	*	C,W
*Lactuca serriola		*	*		*	C
Olearia axillaris		*	*		*	C
*Osteospermum ecklonis			*		*	B
*Pseudognaphalium luteo-album					*	D,C
Senecio lautus ssp. maritimus				*	H	
*Sonchus oleraceus	*	*	*	*	*	C,H
*Ursinia anthemoides	*	*	*	*		C,W
*Urospermum picroides		*	*	*	*	C
*Vellerophyton dealbatum					*	B,W
BRASSICACEAE						
*Brassica tournefortii		*	*	*	*	C,B,W
*Cakile maritima		*		*	*	B
*Heliophila pusilla		*	*	*	*	C,W
*Lobularia maritima		*				C,H
*Rhaphanus raphanistrum	*	*	*	*	*	B,W
CAMPANULACEAE						
*Wahlenbergia capensis				*		W
CASUARINACEAE						
Allocasuarina fraseriana	*		*			W
A.humilis	*	*	*		*	W
Casuarina obesa	*	*	*	*	*	B
CARYOPHYLLACEAE						
*Cerastium glomeratum		*	*	*	*	C
*Petrohagia velutina		*	*	*	*	C,W
*Polycarpon tetraphyllum		*			*	C
*Silene gallica		*	*	*	C,W	
*S.nocturna		*		*	*	C
*Stellaria media					*	C

CHENOPODIACEAE						
Atriplex hypoleuca					*	B,S
*A. prostrata			*		*	B,S
Enchylaena tomentosa			*		*	C
Rhagodia baccata	*	*	*		*	C
Suaeda australis					*	C,B
Threlkeldia diffusa		*		*	*	C,B
CONVOLVULACEAE						
*Ipomaea indica		*				T
CRASSULACEAE						
Crassula exserta				*	*	C
*C. colorata		*	*			F
CUSCUTACEAEC						
*Cuscuta epithymum					*	C
DILLENIACEAE						
Hibbertia hypericoides		*	*	*		B/T
DROSERACEAE						
Drosera glanduligera				*		B/T
EPACRIDACEAE						
Leucopogon parviflorus	*	*		*	*	C
EUPHORBIACEAE						
*Euphorbia peplus	*	*	*	*	*	C
*E.terracina			*	*	*	C,H
Phyllanthus calycinus	*	*				C
Poranthera microphylla			*			T
*Riccinus communis		*			*	C
FABACEAE (PAPILIONACEAE)						
Daviesia divaricata			*	*		H,W
Gompholobium tomentosum	*			*		H,W
Hardenbergia comptoniana	*	*	*	*	*	C
Isotropis cuneifolia				*		H,W
Jacksonia furcellata	*	*	*	*		B/T
J.sericea		*		*		C
J sternbergiana	*			*		B/T
Kennedia prostrata				*		B/T
*Lathrys tingtianus		*				S,B
*Lotus angustissimus	*	*			*	C
*Lupinus consentinii	*	*		*	*	C
*Medicago polymorpha		*	*		*	C,B,W
*Meliotis indica			*		*	C,B
Templetonia retusa	*	*	*	*	*	C
*Trifolium angustifolium		*				B/T
*Trifolium campestre		*	*	*	*	C
*Trifolium cernuum		*				
*Trifolium dubium				*	*	C
*Vicia sativa ssp. nigra	*			*		C
FRANKENIACEAE						
Frankenia pauciflora					*	B

FUMARIACEAE						
*Fumaria capreolata		*	*	*	*	C,B
*F. muralis			*	*	*	C,B
GENTIANACEAE						
*Centaurium erythraea				*		C
GERANIACEAE						
*Pelargonium capitatum		*	*	*	*	C,B
*P.x domesticum		*		*		B
*P. x asperum		*				B
GOODENIACEAE						
Lechenaultia floribunda	*					W
L. linearoides				*		C,H
Scavola canescens	*			*		W
S.globulifera		*				C
S.nitida	*	*	*	*	*	C
LAMIACEAE						
*Leonotis leonurus		*				S
LOBELIACEAE						
Lobelia alata					*	B
LOGANIACEAE						
Logania vaginalis			*	*		C
LORANTHACEAE						
Amyema linophyllum	*	*	*		*	B
MALVACEAE						
*Lagunaria patersonii					*	C
MIMOSACEAE						
Acacia cyclops	*		*	*	*	C,T
Acacia lasiocarpha					*	H
Acacia pulchella		*		*		H,W
Acacia rostellifera	*	*	*	*	*	C,H
Acacia saligna		*		*		W
*Acacia sophorae		*				B
Acacia truncata				*	*	C
Acacia xanthina			*	*	*	C
MORACEAE						
*Ficus carica		*	*	*	*	C,W
MYOPORACEAE						
Eremophila glabra			*		*	C
Myoporum insulare		*	*		*	C
MYRTACEAE						
Agonis flexuosa		*	*	*	*	C
Calothamnus quadrifidus					*	H
*Chamelaucium uncinatum	*					W
Eucalyptus gomphocephala	*	*	*	*	*	C
Hypocalymma angustifolium	*					W

*Leptospermum laevigatum	*		*			C
Melaleuca acerosa	*				*	H
Melaleuca huegelii			*	*	*	C
OLEACEAE						
Olea europea		*			*	C
OROBANCHACEAE						
*Orobanche minor			*	*	*	W
OXALIDACEAE						
*Oxalis pes-caprae	*	*	*	*	*	C
PITTOSPORACEAE						
*Pittosporum undulatum			*			C
Pittosporum phillyraeoides			*			C
Sollya heterophylla					*	C,H
PLUMBAGINACEAE						
*Limominm campyonis		*				B
*Plumbago zeylanica			*			C
POLYGALACEAE						
Comesperma integerrimum			*		*	C,T
*Polygala myrtifolia			*			C
POLYGONACEAE						
*Rumex crispus	*		*	*	*	B,M
PORTULACACEAE						
C. corrigioiloides				*		B/T
PRIMULACEAE						
*Anagallis arvensis var arvensis			*			C
*Anagallis arvensis var caerulea		*	*	*	*	C,B
PROTEACEAE						
Adenanthos cygnorum	*					W
Banksia attenuata	*	*		*	*	W
B. menziesii	*	*		*		W
B. prionotes				*		W
Conospermum triplinervum	*					W
Dryandra nivea	*	*		*	*	H
D. sessilis	*	*	*	*	*	C
Grevillea crithmifolia	*		*			C
G.thelemanniana		*	*		*	C,H
Hakea prostrata	*		*	*	*	W,H,C
Petrophile macrostachya	*					W
P. serruriae					*	H
RANNUNCULACEAE						
Clematis pubescens					*	C
C.microphylla			*			C
RHAMNACEAE						
*Rhamnus alaternus			*			C

Syridium globulosum	*	*	*	*	C
Trymalium ledifolium		*	*		C
RUBIACEAE					
*Galium murale	*				C
Opercularia vaginata			*	*	C,H
RUTACEAE					
Boronia alata				*	C
*Coleonema album		*			C
SANTALACEAE					
Exocarpus sparteus				*	C
SAPINDACEAE					
Dodonaea ceratocarpa		*			C
SCROPHULARIACEAE					
*Cymbalaria muralis		*			C
*Dischisma arenaria			*		C
*Missopates orontorium	*	*			C
SIMAROUBICEAE					
*Ailanthus altissima		*			C
SOLANACEAE					
*Solanum nigrum	*	*		*	C,W
TROPAEOLEACEAE					
*Tropaeoleum majus		*			C
URTICACEAE					
Parietaria debilis				*	C
*P. judaica				*	C
VALERIANACEAE					
*Centranthus macrosiphon		*	*		C,W
VERBENACEAE					
*Phyla nodiflora				*	B