SWANBOURNE BUSHLAND, SWANBOURNE/CITY BEACH

Boundary Definition: protected area/bushland boundary

SECTION 1: LOCATION INFORMATION

Bush Forever Site no. 315
Area (ha): bushland 174.9
Map no. 45
Map sheet series ref. no. 2034–II SW
Other Names: not known
Local Authorities (Suburb): City of Nedlands (Swanbourne, Mt Claremont), Town of Cambridge (City Beach, Mt Claremont)
System 6 (1983): M46 area of bushland goes beyond System area boundaries, all bushland described

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS
Spearwood Dunes
Tamala Limestone (Qtl: LS1)
Quindalup Dunes (Holocene dunes)
Safety Bay Sands (Qhs: S1, S2)

VEGETATION AND FLORA
Vegetation Complexes
Spearwood Dunes
Karrakatta Complex — Central and South
Cottesloe Complex — Central and South
Quindalup Dunes
Quindalup Complex

Floristic Community Types
Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes
29b *Acacia* shrublands on taller dunes
S11 Northern *Acacia rostellifera — Melaleuca systena* shrublands
S13 Northern *Olearia axillaris — Scaevola crassifolia* shrublands
S14 *Spinifex longifolius* grassland and low shrubland

WETLANDS
No wetlands mapped

THREATENED ECOLOGICAL COMMUNITIES
Not assessed, Not determined

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: coastal dunes
Vegetation and Flora: detailed survey (part Site — Keighery, GJ, and Keighery 1993; Mitchell McCotter and Ecoscape 1993); limited survey (DEP 1999, Dames and Moore 1986, Griffin and Trudgen 1994 (SW 01–11), Keighery, GJ, 1996 D (M46 01–02))
Structural Units: mapping (part Site — Mitchell McCotter and Ecoscape 1993)
Spearwood Dunes
Uplands — Sands derived from Tamala Limestone and Tamala Limestone: limited in area and vegetation; reflects Quindalup Dunes floristic influence
Quindalup Dunes
Uplands — Oldest dunes and plains (limited area): *Eucalyptus gomphocephala* Woodland; *Callitris preissii* Low Closed Forest to Low Woodland; *Agonis flexuosa* Low Woodland; Open Low Heaths dominated by *Melaleuca systena, Acacia rostellifera, A. lasiocarpa, Calothamnus quadrifidus* over Herblands dominated by *Lomandra maritima*; *Allocasuarina lehmanniana* subsp. *lehmanniana* Closed Tall Scrub; *Acacia rostellifera* Closed Tall Scrub
Uplands — Youngest dunes: Open Low Heaths to Closed Tall Scrub dominated by *Myoporum insulare, Scaevola crassifolia, Acacia rostellifera, Olearia axillaris*
Uplands — Strand: *Spinifex hirsutus* Grassland
Vegetation Condition: >75% Very Good to Good, <25% Good to Degraded
Total Flora: 117 native taxa, 58 weed taxa (Keighery, GJ, and Keighery, 1993c) (estimated >75% expected flora)
Significant Flora: *Lechenaultia linarioides, Allocasuarina lehmanniana* (most southern significant population), *Chamelaucium uncinatum* (with Bold Park most southern population), *Callitris preissii, Agonis flexuosa* (with Bold Park most northern population)

Fauna: structured survey for birds (57 species), native mammals (1 species) and reptiles (19 species) (How *et al.* 1996). Significant populations of insectivorous passerine birds including Splendid, Variegated and White-winged Fairy-wrens and White-browed Scrubwren. Significant bird species: category 1 (1), category 3 (8) and category 4 (5). Significant reptile species: Bardick (*Echiopsis curtus*)

Linkage: adjacent bushland to the north (Site 312, across road); part of Greenways 1, 18, 20 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

Other Special Attributes

Meets all six specific coastal reserve criteria —

(i) Quindalup Dune types: 'moderate to tall, moderate aged dunes perched on gently undulating Spearwood (Tamala) Limestone surface, with little plain between them; moderate sized coastal Q4 (youngest) dunes' (Griffin and Trudgen 1994)
(ii) Continuing natural processes: 220.3ha (174.8ha bushland) of Quindalup Dunes extending to 1.6km inland
(iii) Shoreline: soft (sandy)
(iv) Linkage: adjacent to area containing Quindalup/Spearwood Dunes interface; part of semi-contiguous North—South vegetated coastal strip
(v) Vegetation: four regional floristic groups, diversity of structural groups
(vi) Habitats: see Fauna section above

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

Criteria: Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

Recommendation: Part A: 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. Part B: Local Reserve Mechanism. Part C: Other Government Land Mechanism (see Table 3, Volume 1).

SWANBOURNE BUSHLAND, SWANBOURNE/CITY BEACH

Boundary Definition: protected area/bushland boundary

SECTION 1: CADASTRAL INFORMATION

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

Bushplan Site no. 315 **Map no.** 55 **Map sheet series ref. no.** 2034–II SW

System 6 (1983): M46 area of bushland goes beyond System area boundaries, all bushland described

Other Names: not known

Local Authorities (Suburb)

City of Nedlands (Swanbourne, Mt Claremont), Town of Cambridge (City Beach, Mt Claremont)

Ownership Categories

Commonwealth Government, State Government, Local Government, Private (commercial organisation)

Area (ha): total 221.6; bushland 174.9

Zoning

MRS: Urban, Parks and Recreation, Parks and Recreation Restricted, Public Purposes-Commonwealth, Other Major Highways, Important Regional Roads, Public Purposes-Water Authority of WA

TPS: Landscape, Recreation, Parks and Recreation

Lot/Location/Reserve numbers (Purpose), Street name

2, 715, 1911 Rochdale Rd; 2 McClemans Rd; 0, 1, 5, 314, 337, 340, 359 Wood St; 1, 356 Alfred Rd; 1, 204, 205, 280, 328, 357, 361 Marine Pde; 0 street not identified

Crown Reserve

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS

Spearwood Dunes

Tamala Limestone (Qtl: LS1)

Quindalup Dunes (Holocene dunes)

Safety Bay Sands (Qhs: S1, S2)

VEGETATION AND FLORA

Vegetation Complexes

Spearwood Dunes

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

Quindalup Dunes

Quindalup Complex

Floristic Community Types

Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

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S13 Northern *Olearia axillaris — Scaevola crassifolia* shrublands

S14 *Spinifex longifolius* grassland and low shrubland

WETLANDS

No wetlands mapped

THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: coastal dunes

Vegetation and Flora: detailed survey (part Bushplan Site — Keighery, GJ, and Keighery 1993c, Mitchell McCotter and Ecoscape 1993); limited survey (Dames and Moore 1986, Griffin 1994 (SW 01–11), Keighery, GJ, 1996 D (M46 01–02))

Structural Units: mapping (part Bushplan Site — Mitchell McCotter and Ecoscape 1993)

Spearwood Dunes

Uplands - Sands derived from Tamala Limestone and Tamala Limestone: limited in area and vegetation; reflects Quindalup Dunes floristic influence

Quindalup Dunes

Oldest dunes and plains (limited area): *Eucalyptus gomphocephala* Woodland; *Callitris preissii* Low Closed Forest (R. Powell pers. comm.); Open Low Heaths dominated by *Melaleuca acerosa, Acacia rostellifera, A. lasiocarpa, Calothamnus quadrifidus* over Herblands dominated by *Lomandra maritima*; *Allocasuarina lehmanniana* subsp. *lehmanniana* Closed Tall Scrub; *Acacia rostellifera* Closed Tall Scrub

Youngest dunes: Open Low Heaths to Closed Tall Scrub dominated by *Myoporum insulare, Scaevola crassifolia, Acacia rostellifera, Olearia axillaris*

Strand: *Spinifex hirsutus* Grassland

Vegetation Condition: >75% Very Good to Excellent, <25% Good to Degraded
Total Flora: 117 native taxa, 58 weeds (Keighery, GJ, and Keighery 1993c) (estimated >75% expected flora)
Significant Flora: *Lechenaultia linarioides, Allocasuarina lehmanniana* (most southern significant population), *Chamelaucium uncinatum* (with Bold Park most southern population), *Callitris preissii* (R. Powell pers. comm.)

Fauna: multiple and structured surveys by Western Australian Museum of Natural Science for birds (57), native mammals (1) and reptiles (19) (How *et al.* 1996). Significant populations of insectivorous passerine birds including Splendid, Variegated and White-winged fairy-wrens and White-browed Scrubwren. Significant bird species: category 1 (1), category 3 (8) and category 4 (5). Significant reptile species: Bardick (*Echiopsis curtus*)

Linkage: adjacent bushland to the north (BS312); part of proposed Greenways 1, 19 (Tingay, Alan & Associates 1997a); part of a regionally significant fragmented bushland/wetland linkage (Volume 2A, Map 8)

Other Special Attributes

Meets all six specific coastal reserve criteria —

(i) Quindalup Dune types: 'moderate to tall, moderate aged dunes perched on gently undulating Spearwood (Tamala) Limestone surface, with little plain between them; moderate sized coastal Q4 (youngest) dunes' (Griffin and Trudgen 1994)
(ii) Continuing natural processes: 220.3ha (174.8ha bushland) of Quindalup Dunes extending to 1.6km inland
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(v) Vegetation: four regional floristic groups, diversity of structural groups
(vi) Habitats: see Fauna section above

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

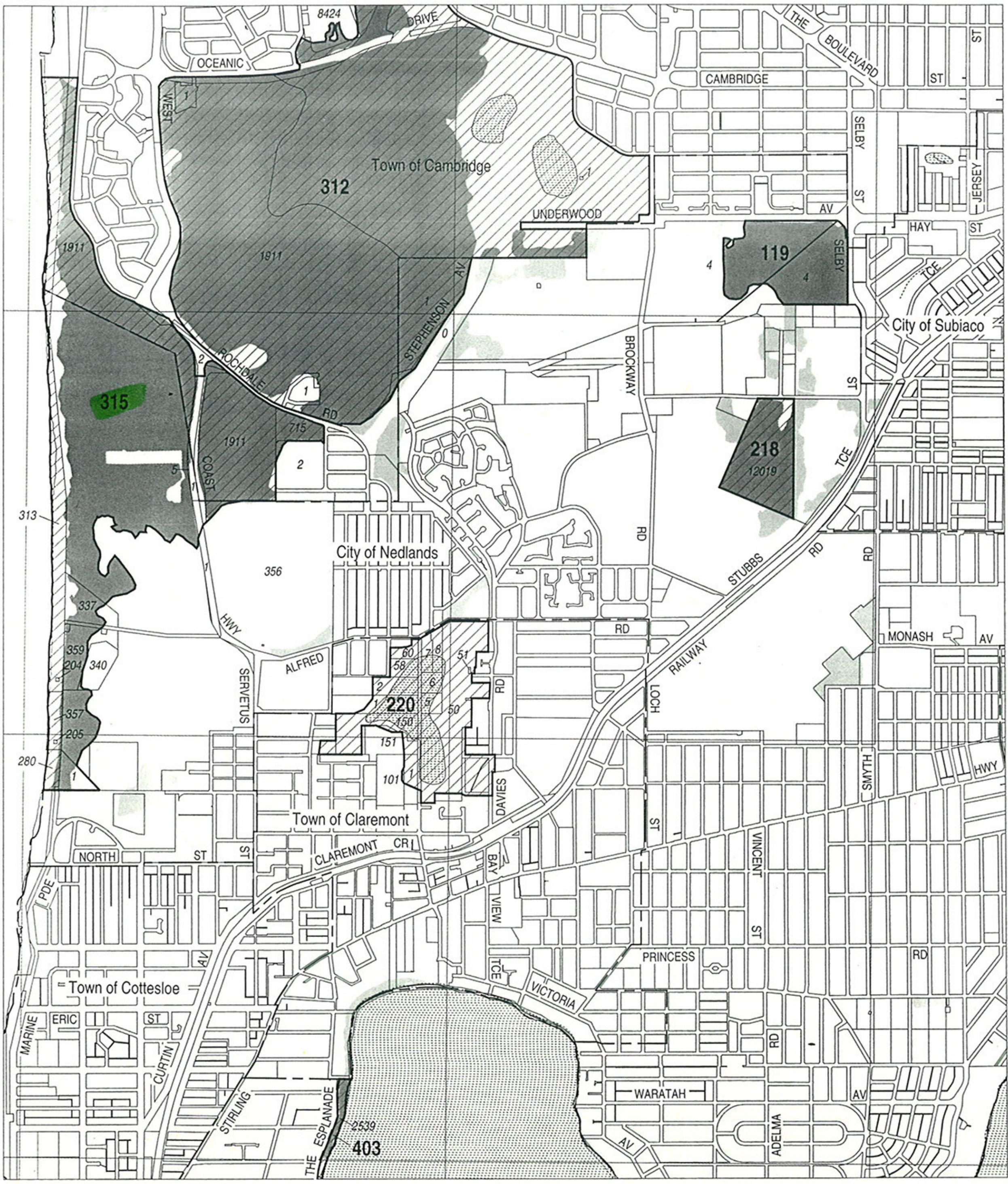
Criteria: Representation of ecological communities, Rarity, Maintaining ecological processes or natural systems, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

Opportunities and/or Constraints

Opportunities: Bushplan Site/part Bushplan Site location of Scheduled Fauna; under MRS Parks and Recreation Reservation, Parks and Recreation Restricted Zoning, TPS Parks and Recreation Zoning, Landscape Zoning and Recreation Zoning, Crown Reserve

Constraints: under MRS Urban Zoning, MRD regional road requirements

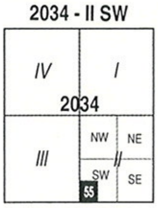
Recommendation: The existing care, control and management intent of the reserved area (MRS Parks and Recreation) is endorsed. Long-term security and support for conservation management of the Bushplan Site be enhanced by: amending the purpose of the reserve to include conservation; and applying appropriate mechanisms in consultation with the reserve management body. For the remaining land managed by the Defence Department: The most appropriate mechanism for the protection of this Bushplan Site to be considered through the public comment period in consultation with the land owner(s).



LEGEND

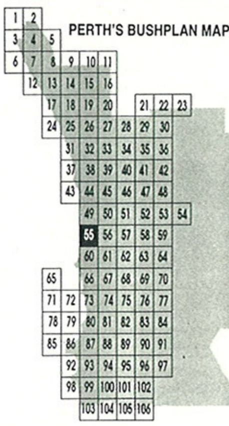
472	Bushplan Sites With Regionally Significant Bushland
	Other Native Vegetation
	Conservation Category Wetlands
	Bushplan Sites With Some Existing Protection
696	Lot Number, Location Number
....	Channel Wetlands
— ——	Local Government Boundary

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

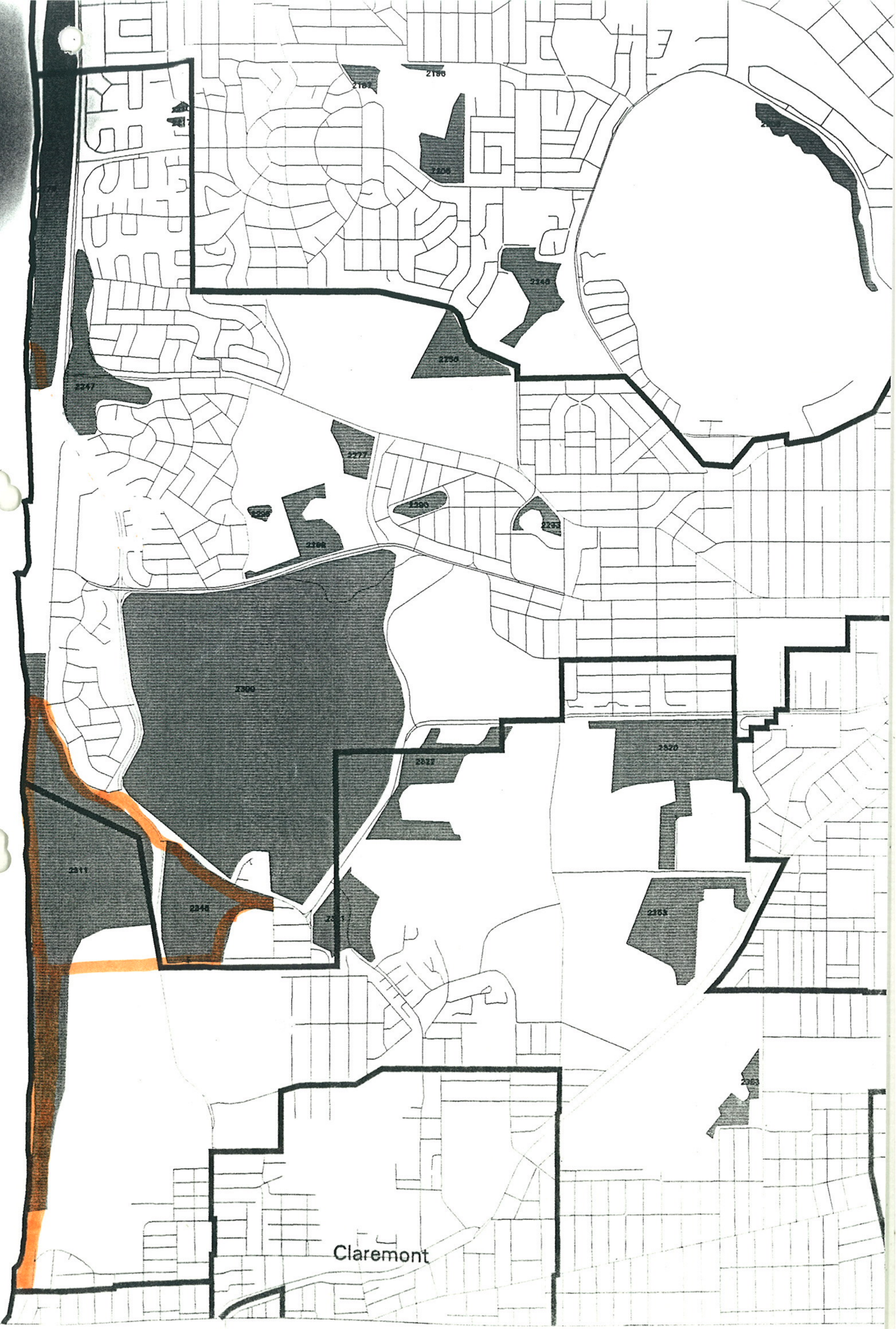
ntw-map18//environ/bushplan//bushv2_55.dgn

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

Wetlands Data supplied by Water and Rivers Commission

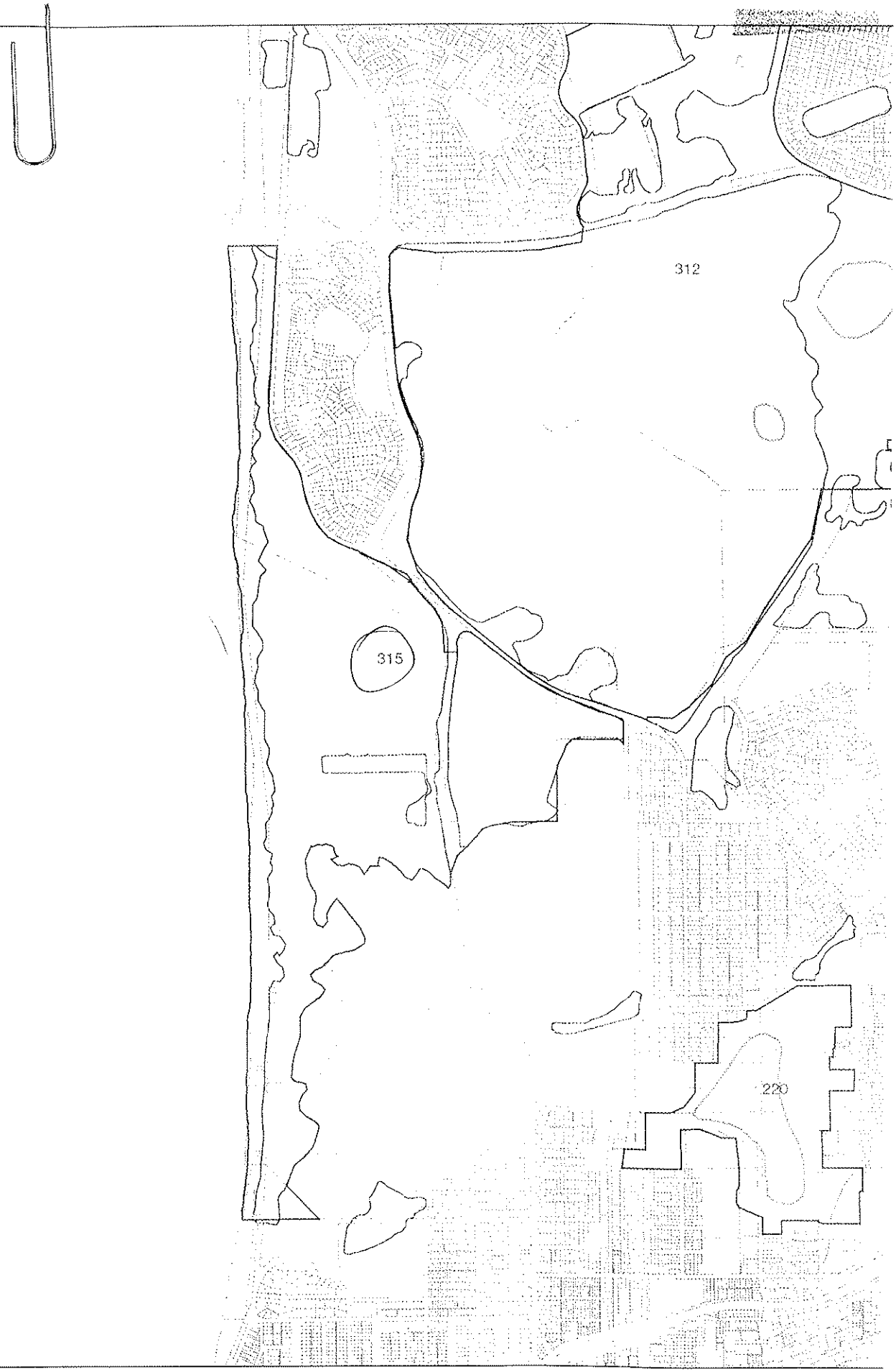
Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

Bushplan Site Map



2320
2311
Claremont


N
WEST COAST HIGHWAY
ROCKDALE RD
COTTESLOE GOLF COURSE
RIFLE RANGE



BUSHPLAN SITES CORRECTED

WESTERN AUSTRALIAN PLANNING COMMISSION

CUSTOMER FOCUS

B ex Rt 2 · 10/98

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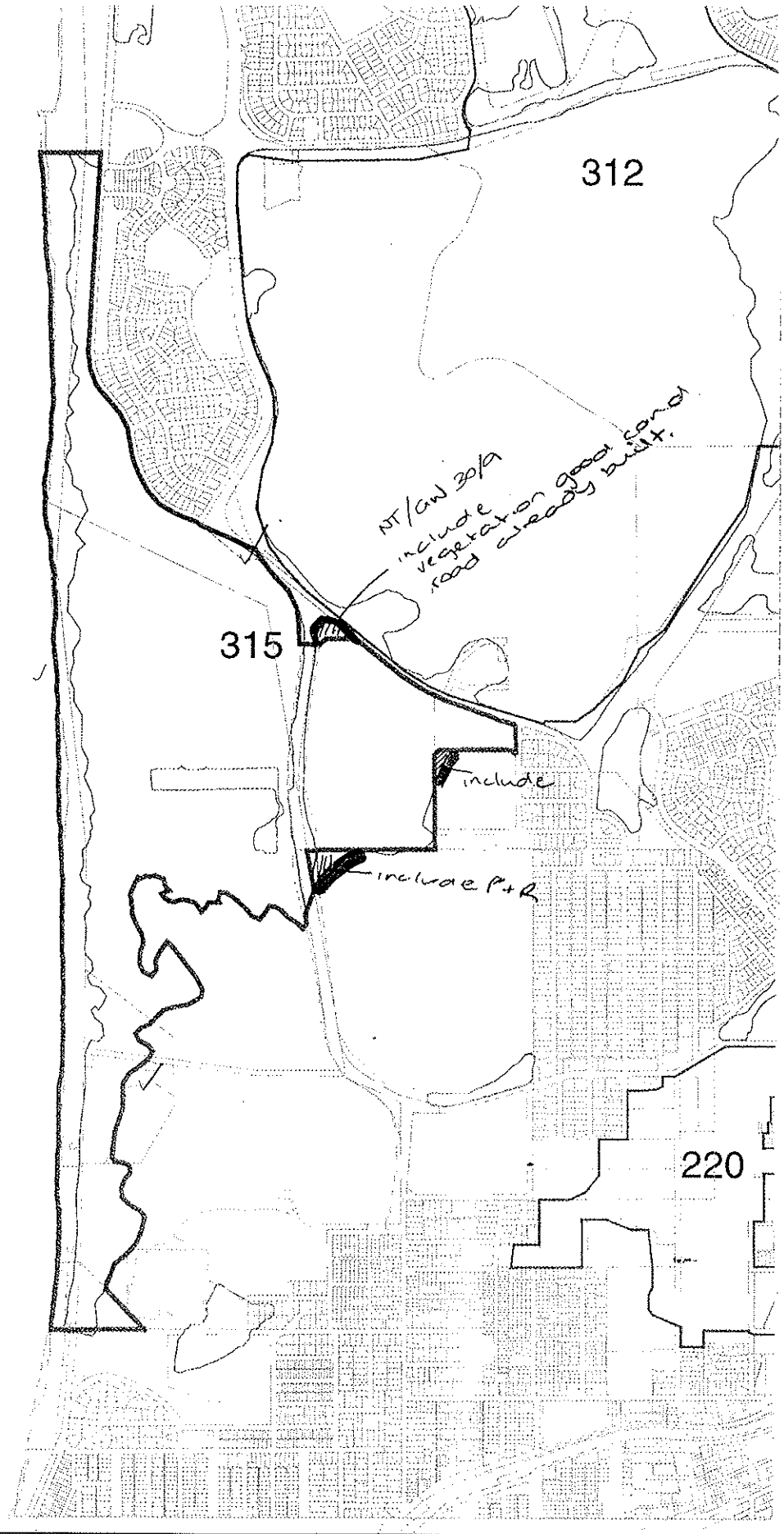

BUSHPLAN SITES CORRECTED

THE GOVERNMENT OF WESTERN AUSTRALIA

WESTERN AUSTRALIAN PLANNING COMMISSION

CUSTOMER FOCUS WESTERN AUSTRALIA

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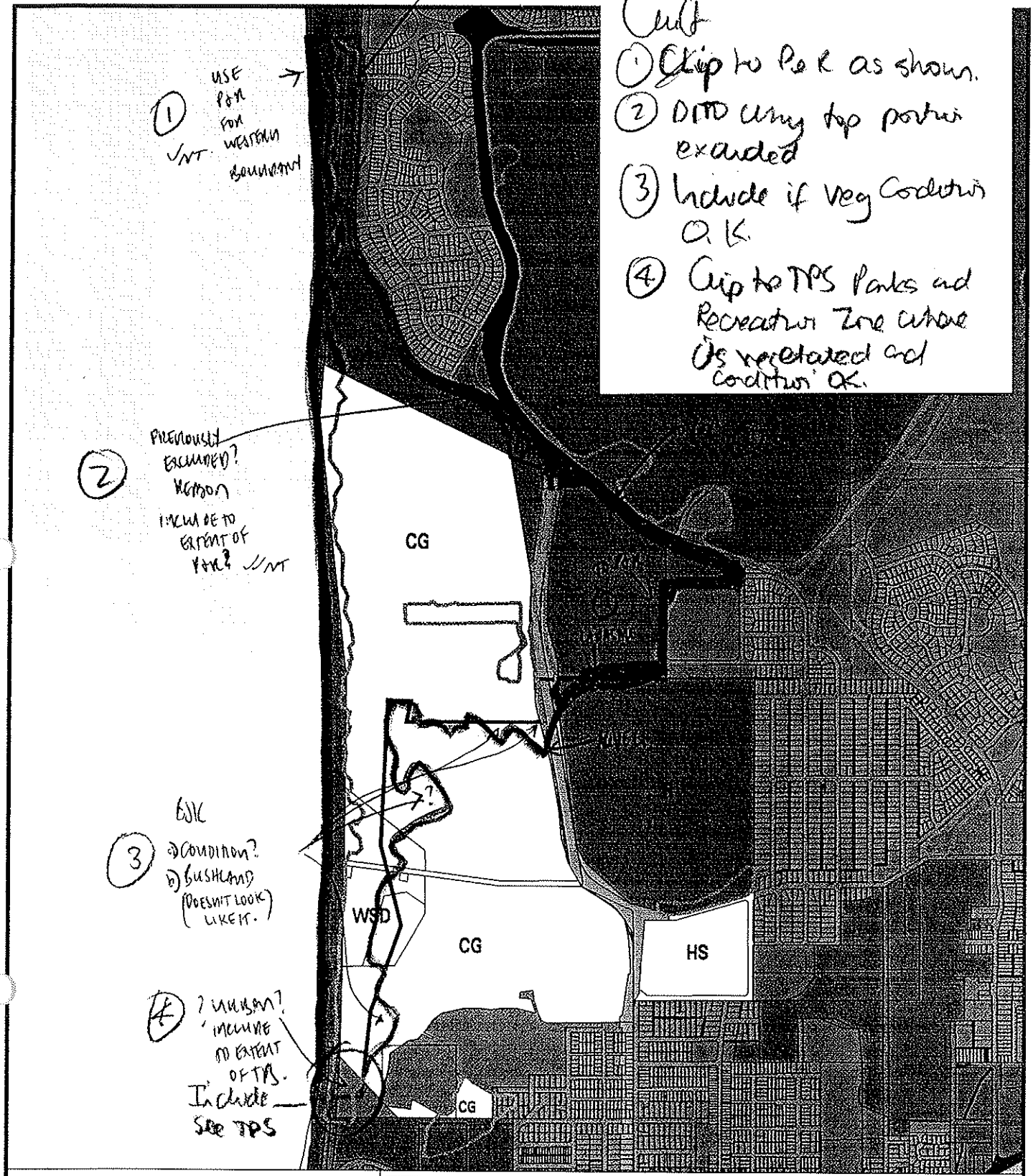


Cut
(1) Clip to Park as shown.
(2) DITO any top portion excluded
(3) Include if Veg Condition OK.
(4) Clip to TPS Parks and Recreation Zone where Os vegetated and condition OK.

(1) USE PARK FOR WESTERN BOUNDARY

(2) PREVIOUSLY EXCLUDED? REASON INCLUDE TO EXTENT OF PARK?

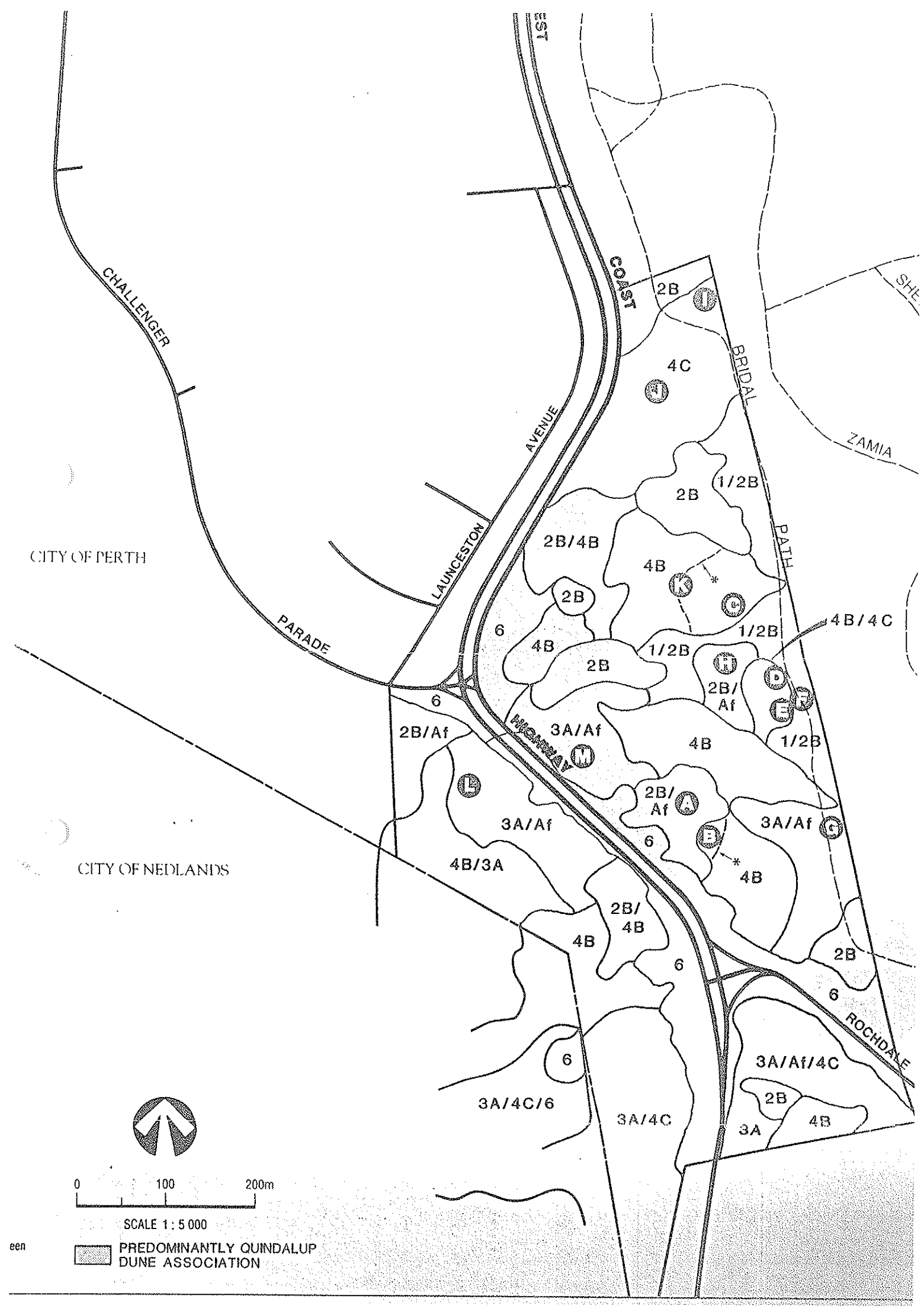
(3) a) CONDITION? b) BUSHLAND (DOESN'T LOOK LIKE IT.

(4) ? URBAN? INCLUDE TO EXTENT OF TPS. Include See TPS

bp site 315

MFP INTERNAL USE ONLY	
Prepared By: Andrea Zappacosta	
Prepared For:	
Map Ident: plot980908_1	
Date: 08 Sep 98	
Scale 1:21090	

- Bushplan sites refno 1-500 SCP BOUNDARY THEME
- Cadastre
- AG VEG 1998 - BOUNDARIES SCP
- URBAN
- WATERWAYS
- PARKS & RECREATION
- RAILWAYS
- OTHER MAJOR HIGH
- IMPORTANT REGION
- PP - HIGH SCHOOL


CHALLENGER
PARADE
LAUNCESTON
AVENUE
COAST
BRIDAL
PATH
ZAMIA
ROCHDALE
HIGHWAY
CITY OF PERTH
CITY OF NEDLANDS
2B
4C
2B
1/2B
2B/4B
4B
2B
6
4B
1/2B
2B
4B/4C
1/2B
2B/
Af
2B/Af
3A/Af
4B
1/2B
2B/
Af
3A/Af
3A/Af
6
4B
4B/3A
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4B
4B
6
2B
6
6
3A/Af/4C
2B
3A
4B
3A/4C/6
3A/4C
0
100
200m
SCALE 1 : 5 000
PREDOMINANTLY QUINDALUP
DUNE ASSOCIATION

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

SITE No M46 81

Date

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
0 Euc. gomphocephala			
MALLEES			
SHRUBS			
0 Acacia rostellifera			
0 Rhagodia baccata			
0 Olearia axillaris			
0 Clematis microphylla			
0 Myrsiphyllum asparagoides			
0 Acanthocarpus preissii			

SHRUBS (cont.)	No	Fl	ID
GRASSES			
0 Stipa flavescens			
0 *Briza maxima			
0 *Ehrharta longiflora			
HERBS			
0 *Pelargonium capitatum			
0 *Euphorbia terracina			
0 *Lagurus ovatus			
0 *Fumaria capreolata			
0 Geranium molle			
0 *Vicia sativa			
0 Geranium retrosum			

HERBS (cont.)	No	Fl	ID
SEDGES			
0 Lepidosperma gladiatum			
0 Loxocarya flexuosa			

GJK

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

SITE No M46 02

Date

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
0 Euc. gamphocephala			
MALLEES			
SHRUBS			
0 Allocasuarina lehmanii			
0 Exocarpus sparteus			
0 Acacia pulchella			
0 Olearia axillaris			
0 Calothamnus quadrifidus			
0 Acacia rostellifera			
0 Hardenbergia comptoniana			
0 Pelargonium capitatum			
0 Rhagodia baccata			
0 Lechenaultia linarioides			
0 Acanthocarpus preissii			

SHRUBS (cont.)	No	Fl	ID
GRASSES			
0 Stipa flavescans			
0 Avena barbata			
0 Ehrharta calycina			
0 Briza maxima			
HERBS			
0 Pianella revoluta			
0 Zaguria ovatus			
0 Carpobrotus rossii			
0 Vicia sativa			
0 Thysanotus arenarius			

HERBS (cont.)	No	Fl	ID
SEDGES			
0 Schoenus grandiflora			
0 Lepidosperma gladiatum			

Amg_e: 382,155.50 Amg-n: 6,464,497.91 Zone: 50
Study: QUI Site: SW01 Fe: F Ty: 2 Abt: 3
Date: 5.12.91 Observers: EA Griffin
Bare: 30 Litter: 2 Weeds: 0 Condition: E
Slope: 10 Aspect: 180 Wet: 1 Drainage: 1 Fire:O
Spec1: POASPIHIR Spec2: AIZTETDEC Spec3: BRACAKMAR
M45
Surface soil type: cap Colour: p g Texture: S
Sub-soil type: Colour: Texture:
Geol. rock type: Geo1: Geo2:
Landform: DFI Topography: WB Q: V
Location1: on coast
Location2: N of Swanbourne
Reserve: 0
Latitude: 315657S Longitude: 1154511E
Treesa: Tb: T1: T2: Malleet: Ms:
Shrubs: Sa: Sb: Sc: Sd:
Mat plants: Bunch grass: Herbs: SedgesT: SedgesL: 2
S_gc: S_gp: D_gp: B_gc: B_gp: Q_gc: 4 Q_gp: 4
N_gp20: N_gp50: N_gp100: N_gp200: N_gp500:

Amg_e: 383,324.59 Amg-n: 6,462,982.69 Zone: 50
Study: QUI Site: SW11 Fe: F Ty: 2 Abt: 3
Date: 5.12.91 Observers: EA Griffin
Bare: 15 Litter: 30 Weeds: 15 Condition: G
Slope: 10 Aspect: 60 Wet: 1 Drainage: 1 Fire:M
Spec1: MYRMELACE Spec2: ASTOLEAXI Spec3: RUBOPEVAG
Surface soil type: cap Colour: g Texture: S
M46
Sub-soil type: cap Colour: p g Texture: S
Geol. rock type: Geo1: Geo2:
Landform: DUS Topography: DSL Q: M
Location1: near coast
Location2: N of Swanbourne
Reserve: 0
Latitude: 315747S Longitude: 1154555E
Treesa: Tb: T1: T2: Malleet: Ms:
Shrubs: Sa: Sb: Sc: 3 Sd: 2
Mat plants: Bunch grass: Herbs: 3 SedgesT: SedgesL: 3
S_gc: S_gp: D_gp: B_gc: B_gp: Q_gc: 44h3 Q_gp: 93
N_gp20: N_gp50: N_gp100: N_gp200: N_gp500:

Amg_e: 382,179.50 Amg-n: 6,464,430.00 Zone: 50
Study: QUI Site: SW02 Fe: F Ty: 2 Abt: 3
Date: 5.12.91 Observers: EA Griffin
Bare: 10 Litter: 5 Weeds: 10 Condition: G
Slope: 10 Aspect: 180 Wet: 1 Drainage: 1 Fire:O
Spec1: GOOSCACRA Spec2: MYOMYOINS Spec3: ASTOLEAXI
Surface soil type: cap Colour: p g Texture: S
M96 Sub-soil type: Colour: Texture:
Geol. rock type: Geo1: Geo2:
Landform: DUS Topography: DSW Q: Y
Location1: on coast
Location2: N of Swanbourne
Reserve: 0
Latitude: 315700S Longitude: 1154512E
Treesa: Tb: T1: T2: Malleet: Ms:
Shrubs: Sa: Sb: Sc: 3 Sd: 2
Mat plants: Bunch grass: Herbs: 4 SedgesT: SedgesL:
S_gc: S_gp: D_gp: B_gc: B_gp: Q_gc: 23c2 Q_gp: 20
N_gp20: N_gp50: N_gp100: N_gp200: N_gp500:

Amg_e: 382,201.75 Amg-n: 6,464,437.34 Zone: 50
Study: QUI Site: SW03 Fe: F Ty: 2 Abt: 3
Date: 5.12.91 Observers: EA Griffin
Bare: 20 Litter: 10 Weeds: 8 Condition: G
Slope: 25 Aspect: 30 Wet: 1 Drainage: 1 Fire:O
Spec1: GOOSCACRA Spec2: MYOMYOINS Spec3: DASACAPRE
M91 Surface soil type: cap Colour: p g Texture: S
Sub-soil type: Colour: Texture:
Geol. rock type: Geo1: Geo2:
Landform: DUS Topography: DSL Q: Y
Location1: on coast
Location2: N of Swanbourne
Reserve: 0
Latitude: 315659S Longitude: 1154513E
Treesa: Tb: T1: T2: Malleet: Ms:
Shrubs: Sa: Sb: Sc: Sd: 1
Mat plants: Bunch grass: Herbs: 4 SedgesT: SedgesL: 4
S_gc: S_gp: D_gp: B_gc: B_gp: Q_gc: 23a2 Q_gp: 20
N_gp20: N_gp50: N_gp100: N_gp200: N_gp500:

Amg_e: 382,250.69 Amg-n: 6,464,210.38 Zone: 50
Study: QUI Site: SW04 Fe: F Ty: 2 Abt: 3
Date: 5.12.91 Observers: EA Griffin
Bare: 5 Litter: 30 Weeds: 0 Condition: G
Slope: 40 Aspect: 180 Wet: 1 Drainage: 1 Fire:O
Spec1: MYOMYOINS Spec2: CYPLEPGLA Spec3: RHASPYGLO
Surface soil type: cap Colour: p g Texture: S
M46 Sub-soil type: Colour: Texture:
Geol. rock type: Geo1: Geo2:
Landform: DUS Topography: DSW Q: Y
Location1: on coast
Location2: N of Swanbourne
Reserve: 0
Latitude: 315707S Longitude: 1154515E
Treesa: Tb: T1: T2: Malleet: Ms:
Shrubs: Sa: Sb: 3 Sc: 2 Sd:
Mat plants: Bunch grass: Herbs: 2 SedgesT: 4 SedgesL:
S_gc: S_gp: D_gp: B_gc: B_gp: Q_gc: 21c Q_gp: 21
N_gp20: N_gp50: N_gp100: N_gp200: N_gp500:

Amg_e: 382,431.66 Amg-n: 6,464,110.25 Zone: 50
Study: QUI Site: SW05 Fe: F Ty: 2 Abt: 3
Date: 5.12.91 Observers: EA Griffin
Bare: 10 Litter: 20 Weeds: 20 Condition: G
Slope: 17 Aspect: 0 Wet: 1 Drainage: 1 Fire:O
M46
Spec1: MYRCALQUA Spec2: MYRMELACE Spec3: DASACAPRE
Surface soil type: cap Colour: g Texture: S
Sub-soil type: cap Colour: p g Texture: S
Geol. rock type: Geo1: Geo2:
Landform: DUS Topography: DSL Q: Y
Location1: near coast
Location2: N of Swanbourne
Reserve: 0
Latitude: 315710S Longitude: 1154522E
Treesa: Tb: T1: T2: Malleet: Ms:
Shrubs: Sa: Sb: Sc: 3 Sd: 2
Mat plants: Bunch grass: Herbs: 3 SedgesT: SedgesL: 4
S_gc: S_gp: D_gp: B_gc: B_gp: Q_gc: 42c2 Q_gp: 93
N_gp20: N_gp50: N_gp100: N_gp200: N_gp500:

Amg_e: 382,400.81 Amg-n: 6,464,097.47 Zone: 50
Study: QUI Site: SW06 Fe: F Ty: 2 Abt: 3
Date: 5.12.91 Observers: EA Griffin
Bare: 15 Litter: 20 Weeds: 20 Condition: G
Slope: 18 Aspect: 190 Wet: 1 Drainage: 1 Fire:O
Spec1: LAMHEMPUN Spec2: MYRMELACE Spec3: PAPNEMRET
Surface soil type: cap Colour: g Texture: S
Sub-soil type: cap Colour: p g Texture: S
Geol. rock type: Geo1: Geo2:
Landform: DUS Topography: DSW Q: Y
Location1: near coast
Location2: N of Swanbourne
Reserve: 0
Latitude: 315710S Longitude: 1154520E
Treesa: Tb: T1: T2: Malleet: Ms:
Shrubs: 5 Sa: Sb: 4 Sc: Sd: 2
Mat plants: Bunch grass: Herbs: 2 SedgesT: SedgesL: 4
S_gc: S_gp: D_gp: B_gc: B_gp: Q_gc: 40c Q_gp: 93
N_gp20: N_gp50: N_gp100: N_gp200: N_gp500:

Amg_e: 382,460.47 Amg-n: 6,464,002.53 Zone: 50
Study: QUI Site: SW07 Fe: F Ty: 2 Abt: 3
Date: 5.12.91 Observers: EA Griffin
Bare: 2 Litter: 70 Weeds: 20 Condition: F
Slope: 8 Aspect: 110 Wet: 1 Drainage: 1 Fire:O
Spec1: MIMACAROS Spec2: MIMACALASL Spec3: MYRMELACE
Surface soil type: cap Colour: g Texture: S
Sub-soil type: cap Colour: p g Texture: S
Geol. rock type: Geo1: Geo2:
Landform: DUT Topography: DT Q: Y
Location1: near coast
Location2: N of Swanbourne
Reserve: 0
Latitude: 315714S Longitude: 1154523E
Treesa: Tb: T1: T2: Malleet: Ms:
Shrubs: Sa: 2 Sb: Sc: 4 Sd: 2
Mat plants: Bunch grass: Herbs: 3 SedgesT: SedgesL: 3
S_gc: S_gp: D_gp: B_gc: B_gp: Q_gc: 29b1 Q_gp: 93
N_gp20: N_gp50: N_gp100: N_gp200: N_gp500:

Amg_e: 383,388.97 Amg-n: 6,463,421.91 Zone: 50
Study: QUI Site: SW08 Fe: F Ty: 2 Abt: 3
Date: 5.12.91 Observers: EA Griffin
Bare: 20 Litter: 80 Weeds: 10 Condition: G
Slope: 40 Aspect: 0 Wet: 1 Drainage: 1 Fire:O
Spec1: CASALLLEHL Spec2: MYRMELACE Spec3: DASACAPRE
Surface soil type: cap Colour: p g Texture: S
Sub-soil type: Colour: Texture:
Geol. rock type: Geo1: Geo2:
M46 Landform: DUS Topography: DSL Q: Y
Location1: near coast
Location2: N of Swanbourne
Reserve: 0
Latitude: 315733S Longitude: 1154558E
Treesa: Tb: T1: T2: Malleet: Ms:
Shrubs: 2 Sa: Sb: Sc: 3 Sd: 4
Mat plants: Bunch grass: Herbs: 4 SedgesT: SedgesL: 3
S_gc: S_gp: D_gp: B_gc: B_gp: Q_gc: 30g2 Q_gp: 93
N_gp20: N_gp50: N_gp100: N_gp200: N_gp500:

Amg_e: 383,448.47 Amg-n: 6,463,369.62 Zone: 50
Study: QUI Site: SW09 Fe: F Ty: 2 Abt: 3
Date: 5.12.91 Observers: EA Griffin
Bare: 7 Litter: 20 Weeds: 5 Condition: E
Slope: 7 Aspect: 30 Wet: 1 Drainage: 1 Fire:O
Spec1: MYRMELACE Spec2: DASACAPRE Spec3: CASALLLEHL
Surface soil type: cap Colour: g Texture: S
Sub-soil type: cap Colour: p g Texture: S
M46 Geol. rock type: Geo1: Geo2:
Landform: DUS Topography: DSL Q: M
Location1: near coast
Location2: N of Swanbourne
Reserve: 0
Latitude: 315734S Longitude: 1154600E
Treesa: Tb: T1: T2: Malleet: Ms:
Shrubs: Sa: Sb: 4 Sc: 2 Sd: 3
Mat plants: Bunch grass: Herbs: 4 SedgesT: SedgesL: 3
S_gc: S_gp: D_gp: B_gc: B_gp: Q_gc: 44j2 Q_gp: 93
N_gp20: N_gp50: N_gp100: N_gp200: N_gp500:

Amg_e: 383,442.28 Amg-n: 6,463,316.47 Zone: 50
Study: QUI Site: SW10 Fe: F Ty: 2 Abt: 3
Date: 5.12.91 Observers: EA Griffin
Bare: 5 Litter: 80 Weeds: 30 Condition: G
Slope: 5 Aspect: 300 Wet: 1 Drainage: 1 Fire:M
Spec1: MIMACAROS Spec2: CYPLEPANG Spec3: MYRMELACE
Surface soil type: cap Colour: g Texture: S
Sub-soil type: cap Colour: p g Texture: S
Geol. rock type: Geo1: Geo2:
Landform: DUS Topography: DSW Q: M
M46 Location1: near coast
Location2: N of Swanbourne
Reserve: 0
Latitude: 315736S Longitude: 1154600E
Treesa: Tb: T1: T2: Malleet: Ms:
Shrubs: 1 Sa: Sb: 4 Sc: Sd:
Mat plants: Bunch grass: Herbs: 1 SedgesT: SedgesL: 3
S_gc: S_gp: D_gp: B_gc: B_gp: Q_gc: 29b2 Q_gp: 92
N_gp20: N_gp50: N_gp100: N_gp200: N_gp500:

FCT	Plot Name	*	Genus	Species	Infrasp Rank	InfraspName	Informal	Consv Code
s11	m4601		Acacia	rostellifera				
s11	m4601		Acanthocarpus	preissii				
s11	m4601		Austrostipa	flavescens				
s11	m4601		Clematis	linearifolia				
s11	m4601		Desmocladus	fasciculatus				
s11	m4601		Eucalyptus	gomphocephala	var.	gomphocephala		
s11	m4601		Geranium	retrorsum				
s11	m4601		Lepidosperma	gladiatum				
s11	m4601		Olearia	axillaris				
s11	m4601		Rhagodia	baccata	subsp.	dioica		
s11	m4601	*	Asparagus	asparagoides				
s11	m4601	*	Briza	maxima				
s11	m4601	*	Ehrharta	longiflora				
s11	m4601	*	Euphorbia	terracina				
s11	m4601	*	Fumaria	capreolata				
s11	m4601	*	Geranium	molle				
s11	m4601	*	Lagurus	ovatus				
s11	m4601	*	Pelargonium	capitatum				
s11	m4601	*	Vicia	sativa				

FCT	Plot Name	*	Genus	Species	Infrasp Rank	InfraspName	Informal	Consv Code
s11	m4602		Acacia	pulchella				
s11	m4602		Acacia	rostellifera				
s11	m4602		Acanthocarpus	preissii				
s11	m4602		Allocasuarina	lehmanniana	subsp.	lehmanniana		
s11	m4602		Austrostipa	flavescens				
s11	m4602		Calothamnus	quadrifidus				
s11	m4602		Dianella	revoluta	var.	divaricata		
s11	m4602		Eucalyptus	gomphocephala	var.	gomphocephala		
s11	m4602		Exocarpos	sparteus				
s11	m4602		Hardenbergia	comptoniana				
s11	m4602		Lechenaultia	linarioides				
s11	m4602		Lepidosperma	gladiatum				
s11	m4602		Olearia	axillaris				
s11	m4602		Rhagodia	baccata	subsp.	dioica		
s11	m4602		Schoenus	grandiflorus				
s11	m4602		Thysanotus	arenarius				
s11	m4602	*	Avena	barbata				
s11	m4602	*	Briza	maxima				
s11	m4602	*	Carpobrotus	edulis				
s11	m4602	*	Ehrharta	calycina				
s11	m4602	*	Lagurus	ovatus				
s11	m4602	*	Pelargonium	capitatum				
s11	m4602	*	Vicia	sativa				

FCT	Plot Name	*	Genus	Species	Infrasp Rank	InfraspName	Informal	Consv Code
s14	SW01		Carpobrotus	virescens				
s14	SW01		Spinifex	hirsutus				
s14	SW01	*	Cakile	maritima				
s14	SW01	*	Tetragonia	decumbens				

FCT	Plot Name	*	Genus	Species	Infrasp Rank	InfraspName	Informal	Consv Code
s13	SW02		Acanthocarpus	preissii				
s13	SW02		Carpobrotus	virescens				
s13	SW02		Cassytha	aurea				
s13	SW02		Conostylis	candicans	subsp.	candicans		
s13	SW02		Enchylaena	tomentosa	var.	tomentosa		
s13	SW02		Ficinia	nodosa				
s13	SW02		Hardenbergia	comptoniana				
s13	SW02		Lepidosperma	gladiatum				
s13	SW02		Leucopogon	parviflorus				
s13	SW02		Myoporum	insulare				
s13	SW02		Olearia	axillaris				
s13	SW02		Ozothamnus	cordatus				
s13	SW02		Rhagodia	baccata	subsp.	baccata		
s13	SW02		Scaevola	crassifolia				
s13	SW02		Spyridium	globulosum				
s13	SW02		Templetonia	retusa				
s13	SW02	*	Bromus	diandrus				
s13	SW02	*	Lagurus	ovatus				
s13	SW02	*	Pelargonium	capitatum				
s13	SW02	*	Raphanus	raphanistrum				
s13	SW02	*	Romulea	rosea	var.	australis		
s13	SW02	*	Sonchus	oleraceus				
s13	SW02	*	Tetragonia	decumbens				
s13	SW02	*	Trachyandra	divaricata				
s13	SW02	*	Vulpia	myuros				
s13	SW03		Acanthocarpus	preissii				
s13	SW03		Austrostipa	flavescens				
s13	SW03		Cassytha	aurea				
s13	SW03		Conostylis	candicans	subsp.	candicans		
s13	SW03		Ficinia	nodosa				
s13	SW03		Hardenbergia	comptoniana				
s13	SW03		Lepidosperma	gladiatum				
s13	SW03		Myoporum	insulare				
s13	SW03		Ozothamnus	cordatus				
s13	SW03		Rhagodia	baccata	subsp.	baccata		
s13	SW03		Scaevola	crassifolia				
s13	SW03		Templetonia	retusa				
s13	SW03	*	Bromus	diandrus				
s13	SW03	*	Ehrharta	brevifolia	var.	cuspidata		
s13	SW03	*	Lagurus	ovatus				
s13	SW03	*	Pelargonium	capitatum				
s13	SW03	*	Raphanus	raphanistrum				
s13	SW03	*	Sonchus	oleraceus				
s13	SW03	*	Tetragonia	decumbens				
s13	SW03	*	Trachyandra	divaricata				

FCT	Plot Name	*	Genus	Species	Infrasp Rank	InfraspName	Informal	Consv Code
s13	SW04		Acacia	cyclops				
s13	SW04		Acanthocarpus	preissii				
s13	SW04		Carpobrotus	virescens				
s13	SW04		Cassytha	aurea				
s13	SW04		Cassytha	racemosa				
s13	SW04		Daucus	glochidiatus				
s13	SW04		Hardenbergia	comptoniana				
s13	SW04		Lepidosperma	gladiatum				
s13	SW04		Melaleuca	systena				
s13	SW04		Myoporum	insulare				
s13	SW04		Olearia	axillaris				
s13	SW04		Rhagodia	baccata	subsp.	baccata		
s13	SW04		Spyridium	globulosum				
s13	SW04	*	Bromus	diandrus				
s13	SW04	*	Crassula	glomerata				
s13	SW04	*	Isolepis	marginata				
s13	SW04	*	Sonchus	oleraceus				
s13	SW04	*	Tetragonia	decumbens				
s13	SW04	*	Trachyandra	divaricata				
s13	SW04	*	Vulpia	myuros				

FCT	Plot Name	*	Genus	Species	Infrasp Rank	InfraspName	Informal	Consv Code
s11	SW05		Acacia	lasiocarpa	var.	lasiocarpa		
s11	SW05		Acanthocarpus	preissii				
s11	SW05		Austrostipa	flavescens				
s11	SW05		Calothamnus	quadrifidus				
s11	SW05		Cassytha	flava				
s11	SW05		Conostylis	candicans	subsp.	candicans		
s11	SW05		Desmocladus	fasciculatus				
s11	SW05		Eremophila	glabra	subsp.	albicans		
s11	SW05		Gompholobium	tomentosum				
s11	SW05		Grevillea	crithmifolia				
s11	SW05		Hemiandra	pungens				
s11	SW05		Hibbertia	racemosa				
s11	SW05		Lepidosperma	squamatum				
s11	SW05		Lomandra	maritima				
s11	SW05		Melaleuca	systena				
s11	SW05		Olearia	axillaris				
s11	SW05		Parietaria	debilis				
s11	SW05		Rhagodia	baccata	subsp.	baccata		
s11	SW05		Schoenus	grandiflorus				
s11	SW05		Tersonia	cyathiflora				
s11	SW05	*	Anagallis	arvensis	var.	caerulea		
s11	SW05	*	Avena	barbata				
s11	SW05	*	Boerhavia	coccinea				
s11	SW05	*	Cerastium	glomeratum				
s11	SW05	*	Heliophila	pusilla				
s11	SW05	*	Lagurus	ovatus				
s11	SW05	*	Lolium	rigidum				
s11	SW05	*	Pelargonium	capitatum				
s11	SW05	*	Petrorhagia	dubia				

FCT	Plot Name	*	Genus	Species	Infrasp Rank	InfraspName	Informal	Consv Code
29b	SW06		Acacia	lasiocarpa	var.	lasiocarpa		
29b	SW06		Acanthocarpus	preissii				
29b	SW06		Agonis	flexuosa				
29b	SW06		Austrostipa	flavescens				
29b	SW06		Calothamnus	quadrifidus				
29b	SW06		Cassytha	racemosa				
29b	SW06		Conostylis	candicans	subsp.	candicans		
29b	SW06		Daucus	glochidiatus				
29b	SW06		Dianella	revoluta	var.	divaricata		
29b	SW06		Eremophila	glabra	subsp.	albicans		
29b	SW06		Gompholobium	tomentosum				
29b	SW06		Hardenbergia	comptoniana				
29b	SW06		Hemiandra	pungens				
29b	SW06		Hibbertia	racemosa				
29b	SW06		Lepidosperma	gladiatum				
29b	SW06		Lepidosperma	squamatum				
29b	SW06		Leucopogon	parviflorus				
29b	SW06		Lomandra	maritima				
29b	SW06		Melaleuca	systena				
29b	SW06		Nemcia	reticulata				
29b	SW06		Olearia	axillaris				
29b	SW06		Opercularia	vaginata				
29b	SW06		Parietaria	debilis				
29b	SW06		Templetonia	retusa				
29b	SW06		Thomasia	cognata				
29b	SW06		Triglochin	muelleri	subsp.	recurvum		
29b	SW06	*	Anagallis	arvensis	var.	caerulea		
29b	SW06	*	Boerhavia	coccinea				
29b	SW06	*	Bromus	diandrus				
29b	SW06	*	Heliophila	pusilla				
29b	SW06	*	Isolepis	marginata				
29b	SW06	*	Lagurus	ovatus				
29b	SW06	*	Lolium	rigidum				
29b	SW06	*	Pelargonium	capitatum				
29b	SW06	*	Petrorhagia	dubia				
29b	SW06	*	Vulpia	myuros				
29b	SW06	*	Zaluzianskya	divaricata				

FCT	Plot Name	*	Genus	Species	Infrasp Rank	InfraspName	Informal	Consv Code
29b	SW07		Acacia	lasiocarpa	var.	lasiocarpa		
29b	SW07		Acacia	rostellifera				
29b	SW07		Acanthocarpus	preissii				
29b	SW07		Agonis	flexuosa				
29b	SW07		Austrostipa	flavescens				
29b	SW07		Cassytha	racemosa				
29b	SW07		Clematis	linearifolia				
29b	SW07		Conostylis	candicans	subsp.	candicans		
29b	SW07		Daucus	glochidiatus				
29b	SW07		Desmocladus	fasciculatus				
29b	SW07		Hardenbergia	comptoniana				
29b	SW07		Hemiandra	pungens				
29b	SW07		Hibbertia	racemosa				
29b	SW07		Lepidosperma	squamatum				
29b	SW07		Leucopogon	parviflorus				
29b	SW07		Lomandra	maritima				
29b	SW07		Melaleuca	systena				
29b	SW07		Olearia	axillaris				
29b	SW07		Parietaria	debilis				
29b	SW07		Thysanotus	arenarius				
29b	SW07	*	Anagallis	arvensis	var.	caerulea		
29b	SW07	*	Boerhavia	coccinea				
29b	SW07	*	Centaurium	erythraea				
29b	SW07	*	Ehrharta	brevifolia	var.	cuspidata		
29b	SW07	*	Lagurus	ovatus				
29b	SW07	*	Lolium	rigidum				
29b	SW07	*	Pelargonium	capitatum				
29b	SW07	*	Petrorhagia	dubia				
29b	SW07	*	Sonchus	oleraceus				

FCT	Plot Name	*	Genus	Species	Infrasp Rank	InfraspName	Informal	Consv Code
s11	SW08		Acacia	lasiocarpa	var.	lasiocarpa		
s11	SW08		Acanthocarpus	preissii				
s11	SW08		Allocasuarina	lehmanniana	subsp.	lehmanniana		
s11	SW08		Austrostipa	flavescens				
s11	SW08		Calandrinia	corrigioloides				
s11	SW08		Conostylis	candicans	subsp.	candicans		
s11	SW08		Desmocladus	fasciculatus				
s11	SW08		Dianella	revoluta	var.	divaricata		
s11	SW08		Gompholobium	tomentosum				
s11	SW08		Hemiandra	pungens				
s11	SW08		Hibbertia	racemosa				
s11	SW08		Lechenaultia	linarioides				
s11	SW08		Melaleuca	systena				
s11	SW08		Olearia	axillaris				
s11	SW08		Schoenus	grandiflorus				
s11	SW08		Templetonia	retusa				
s11	SW08		Thysanotus	arenarius				
s11	SW08	*	Anagallis	arvensis	var.	caerulea		
s11	SW08	*	Briza	maxima				
s11	SW08	*	Bromus	diandrus				
s11	SW08	*	Dischisma	arenarium				
s11	SW08	*	Ehrharta	brevifolia	var.	cuspidata		
s11	SW08	*	Lagurus	ovatus				
s11	SW08	*	Lolium	rigidum				
s11	SW08	*	Pelargonium	capitatum				
s11	SW08	*	Petrorhagia	dubia				
s11	SW08	*	Raphanus	raphanistrum				
s11	SW08	*	Sonchus	oleraceus				

FCT	Plot Name	*	Genus	Species	Infrasp Rank	InfraspName	Informal	Consv Code
s11	SW09		Acacia	lasiocarpa	var.	lasiocarpa		
s11	SW09		Acacia	rostellifera				
s11	SW09		Acanthocarpus	preissii				
s11	SW09		Allocasuarina	lehmanniana	subsp.	lehmanniana		
s11	SW09		Austrostipa	flavescens				
s11	SW09		Calandrinia	corrigioloides				
s11	SW09		Cassytha	racemosa				
s11	SW09		Conostylis	candicans	subsp.	candicans		
s11	SW09		Desmocladus	fasciculatus				
s11	SW09		Diplopeltis	huegelii	subsp.	huegelii		
s11	SW09		Gompholobium	tomentosum				
s11	SW09		Hemiandra	pungens				
s11	SW09		Hibbertia	racemosa				
s11	SW09		Lechenaultia	linarioides				
s11	SW09		Lepidosperma	squamatum				
s11	SW09		Melaleuca	systena				
s11	SW09		Olearia	axillaris				
s11	SW09		Opercularia	vaginata				
s11	SW09		Schoenus	grandiflorus				
s11	SW09		Templetonia	retusa				
s11	SW09		Trachymene	pilosa				
s11	SW09		Triglochin	muelleri	subsp.	recurvum		
s11	SW09	*	Anagallis	arvensis	var.	caerulea		
s11	SW09	*	Boerhavia	coccinea				
s11	SW09	*	Briza	maxima				
s11	SW09	*	Desmazeria	rigida				
s11	SW09	*	Heliophila	pusilla				
s11	SW09	*	Isolepis	marginata				
s11	SW09	*	Lagurus	ovatus				
s11	SW09	*	Petrorhagia	dubia				
s11	SW09	*	Raphanus	raphanistrum				
s11	SW09	*	Sonchus	oleraceus				

FCT	Plot Name	*	Genus	Species	Infrasp Rank	InfraspName	Informal	Consv Code
s11	SW10		Acacia	rostellifera				
s11	SW10		Acanthocarpus	preissii				
s11	SW10		Austrostipa	elegantissima				
s11	SW10		Austrostipa	flavescens				
s11	SW10		Calothamnus	quadrifidus				
s11	SW10		Daucus	glochidiatus				
s11	SW10		Desmocladus	fasciculatus				
s11	SW10		Dianella	revoluta	var.	divaricata		
s11	SW10		Hibbertia	racemosa				
s11	SW10		Lepidosperma	squamatum				
s11	SW10		Leucopogon	parviflorus				
s11	SW10		Melaleuca	systena				
s11	SW10	*	Anagallis	arvensis	var.	caerulea		
s11	SW10	*	Boerhavia	coccinea				
s11	SW10	*	Desmazeria	rigida				
s11	SW10	*	Ehrharta	brevifolia	var.	cuspidata		
s11	SW10	*	Euphorbia	peplus				
s11	SW10	*	Lagurus	ovatus				
s11	SW10	*	Sonchus	oleraceus				

FCT	Plot Name	*	Genus	Species	Infrasp Rank	InfraspName	Informal	Consv Code
29b	SW11		Acacia	lasiocarpa	var.	lasiocarpa		
29b	SW11		Acanthocarpus	preissii				
29b	SW11		Austrostipa	flavescens				
29b	SW11		Calandrinia	corrigioloides				
29b	SW11		Cassytha	racemosa				
29b	SW11		Conostylis	candicans	subsp.	candicans		
29b	SW11		Desmocladus	fasciculatus				
29b	SW11		Gompholobium	tomentosum				
29b	SW11		Hemiandra	pungens				
29b	SW11		Lepidosperma	squamatum				
29b	SW11		Melaleuca	systena				
29b	SW11		Olearia	axillaris				
29b	SW11		Opercularia	vaginata				
29b	SW11		Schoenus	grandiflorus				
29b	SW11	*	Anagallis	arvensis	var.	caerulea		
29b	SW11	*	Boerhavia	coccinea				
29b	SW11	*	Bromus	diandrus				
29b	SW11	*	Dischisma	arenarium				
29b	SW11	*	Ehrharta	brevifolia	var.	cuspidata		
29b	SW11	*	Heliophila	pusilla				
29b	SW11	*	Lagurus	ovatus				
29b	SW11	*	Lolium	rigidum				
29b	SW11	*	Pelargonium	capitatum				
29b	SW11	*	Petrorhagia	dubia				

System 6 Update - Floristic Community Type Mapping Information DRAFT ONLY

AREA INFORMATION

System 6 Area (C or M) or Update Area (Update) M46

Conservation Area	Swanbourne Beach and Rifle Range
Nature Reserve	
Reserve No	
National Park	
Reserve No	
Local Government	
Reserve No	
Other	
Proposed Conservation Areas	
Local Government	
Reserve No	
Other	

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

AREA

Total Area	hectares
Completely Degraded	hectares
comments:	

AREA MAPPED FLORISTIC UNITS

Boundaries: System6 CALM

Units	Site (Condition) Code	Bound	Area (ha)	Area(ha)

Boundaries determined by use of

	aerial photograph
	orthophoto
	vegetation map
	soil map

M46 Swanbourne Beach and Rifle Range

Bulletin 655 (West Coast Hwy)

Friends (Advocate) Management

Other Names:

(Specific Study/studies) Miscellaneous studies

Flora

Vegetation Map 1 (2) 3 (part)

Flora list (1) 2 3 4 (part)

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) Computable sites (Griffin, Keighery)

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

Notes
Friends Bold Park
Bird Banding Group

M46 Swanbourne Beach and Rifle Range Bulletin 655 (West Coast Hwy)		
M46.1 Regional park recommendations be applied to this area.	Unresolved Issues	At this stage there is no regional park proposal for this area.
M46.2 Vacant Crown land be declared a Class "C" Reserve for Recreation vested in City of Nedlands.	Unresolved Issues	The local authority has not approved implementation of the recommendation.
M46.3 Nedlands City Council in consultation with EPA prepare a management plan for Reserves A23729 and A27250 and the vacant Crown land.	Unresolved Issues	Council will consider resource allocations for the preparation of a management plan early in 1993.
M46.4 Perth City Council in consultation with CALM prepare management plan for Location 1911, with particular attention to foreshore.	Unresolved Issues	City of Perth is preparing a Public Environmental Review addressing planning and management of the M46 and M47 areas. Therefore the recommendation is progressing for the M46 area within the City of Perth.
M46.5 Commonwealth retain as much uncleared land within Lease 37/449 as possible.	Unresolved Issues	EPA is liaising with DASETT to develop a mechanism for achieving the intent of the recommendation.

SHEET 2: System 6 - VERBAL Information Search Date 13/5/94 BJK

Area M ~~46~~ Name Swanbourne			
Source G.J. Keighery (note books) and B.J. Keighery			
Purpose (why was the study done?) Flora Survey - Regional Study			
Government CALM - personal			
Corporate			
Community Group			
Management Plan			
Publication Planned	Yes (No)	Date	
Planned Location			

Soils		
Units	described	referenced

Landscape		
Features	described	referenced

Flora					
Vegetation ~~Map~~					
Units Muir			Site based (no) 10x10m (relevee) (6)		
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 Priority 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

- site data maybe incorporated in a regional study at some stage.
- all sites can be relocated by GJK

System 6 - VERBAL Information Search Date 29/4/94

Area M 46 Name	Dr Boyd Wykes			
Source				
Purpose (why was the study done?)				
Government				
Corporate				
Community Group - Perth Wildlife Watch then Bird Banding Group				
Management Plan				
Publication Planned	(Part) Yes	No	Date	See Mitchell-McCotter/Ecoscape (PER - M46/M47)
Planned Location				

Soils		
Units	described	referenced

Landscape		
Features	described	referenced

Flora						
Vegetation Map						
Units				Site based (no)		
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 Much of this work presented in Mitchell-McCotter and Ecoscape PER on M46 & M47 but ongoing work on: lists, colour banding (allows sight recording) and recovery.

Subm 1968 BS315 Attachment N: 1 of 2

PERTH'S BUSHPLAN

PB130 185

Submission from the City of Nedlands

Bold Park **Bushplan Site [redacted]2**

The City of Nedlands has a small portion in the south eastern corner of Bold Park. This land is currently reserved for Parks and Recreation within the Metropolitan Region Scheme. The area has regional significance as a flora and fauna reserve. The City of Nedlands supports the inclusion of this area as a Bushplan site, and endorses the recommendations in Volume 2 Part B page 294 of Perth's Bushplan.

Shenton Bushland **Bushplan Site [redacted]8**

This area is currently zoned for light industrial use, however there is a proposal to amend the zoning to Parks and Recreational use. The City of Nedlands has actively encouraged a support group "The Friends of Shenton Bushland" in their efforts to ensure the conservation of this area. The City supports the inclusion of this area as a Bushplan site, and endorses the recommendations in Volume 2 Part B page 296 of Perth's Bushplan.

The City also supports the inclusion of bushland remnants adjoining the proposed Bushplan site. These comprise a strip of bushland down the eastern side of Shenton Bushland, part of the Lemnos hospital and Stubbs Terrace hospital grounds, and remnant bushland on the southern side, part of Irwin Barracks. Inclusion of these areas should be with the co-operation of the landowners.

Underwood Avenue Bushland **Bushplan Site [redacted]19**

This area is owned by UWA and is currently used for agricultural research. There are some pockets of localised severe degradation within this site, however the area has high conservation value due to the proximity of Shenton Bushland Site 218, and its potential as part of Greenway 20 a green corridor linking Bold Park, Lake Claremont and Allen Park bushland. The City is aware that the UWA have plans to develop this site, and endorses the recommendations on Volume 2 Part B page 294 of Perth's Bushplan that "the most appropriate mechanism for this Bushplan Site be considered through the public comment period in consultation with the land owner(s)".

Swanbourne Bushland **Bushplan Site [redacted]15**

This area within the City of Nedlands comes mainly within the jurisdiction of the Commonwealth Government and the Water Corporation, but also includes the majority of a small triangle of land (area 1, Map 55), owned in fee simple by the City and currently a Local Scheme Reserve. This is an important coastal section of Quindalup Dune and its conservation should be a high priority. In principle the City of Nedlands supports the inclusion of this area as a Bushplan site and endorses the recommendations in Volume 2 Part B page 346, although with some reservations (refer to general comments section below).

The City also supports the inclusion of bushland contained in Allen Park an area adjacent to this Bushland site. Its inclusion is warranted on the grounds that it is currently listed by the National Trust of Australia, contains a high level of bio-diversity and its potential as part of Greenway 20 linkage to the Lake Claremont wetland area.

BS 315 Subm 1945 42 PB130

Area [redacted] – Bold Park and Adjacent Bushland

It is pertinent to mention that the creation of Bold Regional Park was made possible by the Town of Cambridge gifting approximately 470 ha of freehold land. Bold Park is now secured as one of the most significant regional bushland areas in metropolitan Perth and, as such, the Town would expect it to be included in a Regional Bush Plan. The inclusion of Perry Lakes Stadium and the cleared area on the southern side of Underwood Avenue, known as AK Reserve, however, is queried. Again, these properties are owned freehold by the Town of Cambridge and in this case, have both been fully cleared.

The future of athletics at Perry Lakes Stadium is under question and should they be relocated, the land is viewed by the Town as having development potential. Similarly, AK Reserve, which is mostly used for overflow parking for major events at Perry Lakes Stadium at present, and lies between University development, CSIRO offices and the Superdrome, is seen being most suitable for future development.

It is submitted that these areas taken out of Area 312.

[redacted] – Swanbourne Bushland

This area, insofar as it is in the Town of Cambridge, is included in Bold Park and as with the remainder of the Park, is under the control and management of the Kings Park Board. The Town has no objection to its inclusion in the Bush Plan.

Other Native Vegetation

With regard to the areas identified as Other Native Vegetation, the Town would appreciate the opportunity to further discuss the implications of Perth Bush Plan on these areas.

Conclusion

In summary, the Town is fully supportive of the principle of a Metropolitan Region Bush Plan. As mentioned above, the Town has made a quite extraordinary contribution to the preservation of natural bushland through provision of the land for the creation of Bold Regional Park.

There are some aspects of the Plan, however, which are of some considerable concern to the Town concerning our freehold land holdings. In relation to these, we would seek the opportunity to make further submissions before the finalisation of the Bush Plan.

I would welcome the opportunity to further discuss the Town's position in regard to its freehold land assets prior to any final decision being made. The Town looks forward to your response on these matters.

Yours sincerely

GRAHAM D PARTRIDGE
CHIEF EXECUTIVE OFFICER

SWANBOURNE
BS315

BOLD PK
BS312

PROPOSED REALIGNMENT OF THE WEST COAST HIGHWAY, CITY BEACH

PUBLIC ENVIRONMENTAL REVIEW

for

City of Perth

Dames & Moore Job No. 15345-003-071

January 1992

TABLE OF CONTENTS

TABLE 2

SIGNIFICANT FLORA OF BOLD PARK (M47) AND MOUNT CLAREMONT BUSH (M46)

Species	*Family*	*Significance*[1]	*Habitat in Project Area*	*Nearest Locality*[1]
Acacia xanthina	MIMOS	At or near southern limit of distribution	No	Limestone above quarry amphitheatre, Bold Park
Agonis flexuosa	MYRT	At or near northern limit of distribution	Yes	Valleys and slopes in project area, M46 and M47
Allocasuarina lehmanniana	CASU	At or near southern limit of distribution	Possible	Stable dunes and limestone bordering Rochdale Road and southern end of project area, M46
Banksia menziesii yellow flowered form	PROT	Uncommon form	Possible	Centre and eastern side of Bold Park
Beyeria cygnorum	EUPH	Priority 1 species; possible a limestone variant of *Beyeria cinerea*	No	Limestone in *Acacia xanthina* area, M47
Callitris preissii	CUPR	Rare in metropolitan area	Possible	Rifle Range and stable dune, M46, near project area
Cartonema philydroides	COMM	Priority 3 species	Possible	Rare in Bold Park *Banksia* woodland
Chamelaucium uncinatum	MYRT	At or near southern limit of distribution; although *C. uncinatory* (Geraldton Wax) is reasonably common in near-coastal areas between Perth and Kalbarri and is in existing and proposed national parks the Perth form is poorly conserved (Keighery pers. comm.)	Yes	Stable dunes in project area
Eucalyptus decipiens	MYRT	Especially sporadic on the Swan Coastal Plain and locally	Possible	South east of pine plantation, M47
Eucalyptus foecunda	MYRT	Priority 5 species; quite uncommon in the metropolitan area	Possible	Eastern side of Bold Park
Eucalyptus "petrensis"	MYRTA	Priority 3 species; undescribed eucalypt referred to by Brooker and Kleinig (1990) as *E.* "petrensis", an unpublished name; an uncommon recently recognised species, occurring on limestone between Yalgorup National Park and Lancelin. The buds, flowers, nuts, leaves and stems of the Bold Park plants are shown in Plate 1H. The habit of the Bold Park plants is, however, much straighter and the substrate much sandier than Powell describes for *Eucalyptus* "petrensis". The Bold Park plants have probably been planted (Keighery Pers. comm.)	Possible	At Site J and south of it a few metres east of the track there are a few small, smooth-trunked eucalypt trees with buds, flowers and nuts which match Western Australian Herbarium drawings and descriptions in Powell (1990) of *Eucalyptus* "petrensis". The nearest locality of a natural populations is in Sorrento.
Gyrostemon ramulosus	GYRO	At or near southern limit of distribution	Possible	Tuart and *Banksia* woodlands, south eastern corner of M47
Hakea ruscifolia	PROT	Uncommon in Metropolitan area	Possible	M47, east of project area
Jacksonia sericea	PAPI	Priority 3 species	Yes	Widespread in project area
Sonchus aff. *asper*	ASTE	A form which is possibly a native *Sonchus* species recorded from only one locality	No	Camel Lake, M47
Stylidium aff. *affine*	STYL	Rare and restricted species	No	Under *Acacia xanthina*, M47

1. Keighery *et al.* (1990), Dames & Moore (1986), Weston (1987), EPA (1988), CALM (pers. comm.), Keighery (pers. comm.).

TABLE 3

ENDANGERED FLORA (DRF) OF THE METROPOLITAN REGION
(LIST OF SPECIES BASED ON GOVERNMENT GAZETTE, WA, 1 JUNE 1990)

Species and Family	Localities and Distribution[1]	Habitat[1]	Flowering Times[1]
Aponogeton hexatepalus APONOGETONACEAE	>15: Kenwick-Darradup-Augusta	Shallow winter pools on clayey soils	(May-)Aug-Sep
Caladenia huegelii (=C. sp. (coastal plain)) ORCHIDACEAE	>15: Gnangara-Yallingup-Margaret River	Sandy soils in *Banksia* and eucalypt woodland, often with *Allocasuarina fraseriana* and usually low on the landscape	Aug-Oct(-Nov)
Diuris drummondii ORCHIDACEAE	3: Rocky Gully-Perth (near Jandakot)	Open swampy areas, particularly during the season following a summer fire	Nov-Dec
Diuris purdiei ORCHIDACEAE	9: southern Perth area-Harvey	Seasonal semi-swamp on sandy over clay soils, usually in *Regelia* and *Pericalymma* shrublands; flowers in habits which were burnt the previous dry season	*Sep-Oct(-Nov)*
Diuris sp. (Kwinana) aff. *laxiflora* A.P. Brown 10/9/84 ORCHIDACEAE	1(-2): Kwinana	Small shallow winter-wet swamps amongst short sedgeland, predominantly of *Lepidosperma longitudinale*, on sandy-clayey soils	Aug-Sep
Drakaea elastica (=*D. jeanensis*) ORCHIDACEAE	8: Gingin-Busselton	Sandy soils, often firm and very white, in *Kunzea ericifolia* tall shrubland and *Banksia* woodland, low on the landscape	(Sep-)Oct-Nov
Drakaea sp. (south west) ORCHIDACEAE	5: Canning Vale, Yarloop, Mowen, Bakers Junction	Sandy soils in scrub and woodlands, low in the landscape, often near swamps	Sep-Oct
Drosera occidentalis ssp. *occidentalis* DROSERACEAE	>15(?): Gingin-Pinjarra; Darling Range[2]	With short Centrolepidaceae sedges on peaty, sandy soils which are winter-inundated, usually shallowly, in swampy areas	(Oct-)Nov-Dec
Dryandra mimica (=*D.* sp. A in Flora of the Perth Region) PROTEACEAE	3(-4): Mogumber-Wattle Grove (-Whicher Range)	Flowers bright yellow; low sandy flat in heath or scrub in *Banksia* woodland or with *Kingia* and *Byblis*	(Sep-[Type: Dec 17])Jan-Feb
Hydrocotyle lemnoides APIACEAE	47: Kenwick-Upper Swan-Bolgart; Darling Range	Shallow winter pools on clayey soils	Sep-Oct

Notes:

1. The information in this table was compiled from Rye and Hopper (1981), Hoffman and Brown (1984), Sainsbury (1985), Marchant *et al.* (1987), Lowrie (1989), Hopper *et al.* (1990), information provided by L. Mutter and botanists of the Western Australian Herbarium and the WAWRC, and field work by A.S. Weston during 1989 and 1990. There may be a few more localities for some of the species than the number given in the table, but some of the species are no longer found in some of the localities where they were previously recorded.

2. *Drosera occidentalis* is now believed to be more abundant and widespread than Western Australian Herbarium collections indicate (Atkins and Moore, pers. comm.; Lowrie (1989)).

5.1.6 Fauna

5.1.6.1 General

Lack of faunal data prior to 1986 and proposed plans to develop parts of the M46 and M47 areas have prompted faunal surveys of the Mount Claremont Bush and Bold Park, of which the project area is a part (Wykes, 1990a; Wykes, 1990b; How & Dell, 1990).

The Western Australian Museum undertook a survey of ground vertebrate fauna within Bold Park from 1986 to 1989 through a programme of trapping and opportunistic observations (How & Dell, 1990). The objective of this programme was to determine the distribution, relative abundance and habitat preferences of native species in the Perth Metropolitan Area. One of the trap sites is located near to the project area.

Fauna of the Mount Claremont Bush has been documented through the bird banding programme of the Perth Wildlife Watch (Wykes, 1990b). Some opportunistic sightings of reptiles have also been recorded, although a need for a comprehensive survey is recognised (Wykes, 1990a; 1990b).

5.1.6.2 Mammals

Only one native mammal, the Brushtail Possum (*Trichosurus vulpecula*), was positively recorded during the Western Australian Museum's survey, although the possible presence of two species of bat fauna was suggested (How & Dell, 1990). Several introduced feral species have been recorded, including the introduced House Mouse (*Mus musculus*), European Rabbit (*Oryctolagus cuniculus*), Fox (*Vulpes vulpes*) and Cat (*Felis catus*). The mammal assemblage at Bold Park appears to have suffered great losses since the commencement of urbanisation of the area. This decline in mammal species at Bold Park reinforces the findings of other workers, e.g. Kitchener *et al.* (1980); How *et al.* (1987). How & Dell (1990) indicate that it is likely that many mammal species, in addition to the Brushtail Possum, previously existed in the area. How & Dell (1990) list an additional 14 native mammals and suggest that others were probably also present.

No mammal surveys have been undertaken in the Mount Claremont Bush. However, it is likely that the mammal assemblage in this area would be similarly impoverished.

5.1.6.3 Birds

Sixty-one species of birds were recorded during the Western Australian Museum's survey of Bold Park between 1986 and 1989 (How and Dell, 1990). Other species, especially nomads and migrants such as birds of prey and birds using Bold Park during transit, are likely to be recorded during additional surveys.

The most abundant birds in Bold Park are honeyeaters. These were noted as occurring in *Banksia* woodland (Singing Honeyeater, Brown Honeyeater), in *Dryandra sessilis* heath (Brown Honeyeater) and amongst *Calothamnus quadrifidus* shrubland (Singing Honeyeater, White-cheeked Honeyeater, New Holland Honeyeater, Tawny-crowned Honeyeater) (How & Dell, 1990).

The tuart woodlands provide nesting hollows for an array of species including the Striated Pardalote, the Tree Martin and various species of cockatoos and parrots. The Painted Button-quail is also noted as breeding in the tuart woodland. These are the only recent records of this species in near-coastal parts of the coastal plain.

The Perth Wildlife Watch's monthly banding programme has documented the avifauna of the Mount Claremont Bush. The site is noted as being a haven for numerous small insectivorous birds which are considered vulnerable to human impacts such as clearing, fire, introduced predators and barriers such as roads (Wykes, 1990a). Species recorded include the White-browed Scrub-wren, Splendid Fairy-wren, Variegated Fairy-wren, White-winged Fairy-wren, Inland Thornbill, Yellow-rumped Thornbill, Western Gerygone, Grey Fantail, Weebill, Black-capped Sittella and Rufous Whistler.

The site is also considered a major focus for suburban honeyeaters, the presence of which may be due to the extensive *Calothamnus quadrifidus* (Wykes, 1990a). Abundant species include White-cheeked Honeyeater, Brown Honeyeater, Singing Honeyeater and Silvereye. Birds of prey are also a significant feature of the avian community of the Mount Claremont Bush (Wykes (1990a). Species recorded are Hobby, Goshawk, Black-shouldered Kite, Kestrel, Whistling Kite, Little Eagle, Boobook Owl and Tawny Frogmouth.

The bird assemblage in Bold Park and Mount Claremont Bush contains several species that are now threatened with local extinction (How & Dell, 1990). The breeding populations of Painted Button-quail in Bold Park and the White-winged and Splendid Fairy-wrens in Bold Park and Mount Claremont Bush represent very important refuge populations of these species in urban areas (How & Dell, 1990). The principal value of the Bold Park and Mount Claremont Bush to avifauna is its extent and diversity of habitat types (How & Dell, 1990; Wykes, 1990a). Together these areas also provide a corridor which links the coastal dune system with Bold Park and may be important for avifaunal migration (Wykes, 1990a).

5.1.6.4 Herpetofauna

Three species of frogs and 29 species of reptiles were recorded in Bold Park between 1986 and 1989. Western Australian Museum records suggest that several additional species may yet be recorded there (How & Dell, 1990). The three species of frogs were captured only after rain or on nights with high humidity. Only the Banjo Frog (*Limnodynastes dorsalis*) was both widespread and abundant.

Lizards account for 22 of the 29 species of reptiles recorded in Bold Park, with representatives of all five families present. Arboreal, fossorial and epigeic forms are all present, suggesting that the assemblage has been little changed from its original composition. The skinks are the most numerous group of reptiles in Bold Park and vary markedly in their abundance and use of habitats. Both species of *Varanus* monitors are still present in the area, as are the Dugite and five species of burrowing snake (*Vermicella* spp.) (How & Dell, 1990).

The richness and diversity of the herpetofauna of Bold Park is the highest recorded for urban bushland in the Perth metropolitan area (29 reptile species as compared with 17 from Kings Park) and highlights the conservation value of this isolated urban area (How & Dell, 1990).

No specific reptile surveys were undertaken for the Mount Claremont Bush. However sightings, tracks and diggings suggest a varied community (Wykes, 1990b).

5.1.6.5 Invertebrates

Invertebrate fauna in Bold Park, as is characteristic of many areas, has not received the same level of attention as that of the vertebrate fauna. Studies of invertebrates have been carried out at Reabold Hill (Koch & Majer, 1980; Majer & Koch, 1982). Pitfall trapping was undertaken at Manjimup, Dwellingup and Reabold Hill to determine the seasonal activity and phenology of invertebrates in these areas. The assemblage of invertebrates at Reabold Hill compares favourably to those found in the Dwellingup and Manjimup trapping sites, both in terms of numbers of species and the total number of individuals trapped at the site (Koch & Majer, 1980).

No invertebrate surveys have been carried out in the Mount Claremont Bush and thus nothing is known of invertebrate numbers or diversity in this area (Boyd Wykes, pers. comm.).

5.1.6.6 Conclusions

The importance of Bold Park bushland as a conservation area for vertebrates lies in its relatively large area that provides habitats for resident and migratory bird species and a rich assemblage of reptiles.

The Mount Claremont Bush contains one of the best examples of the fauna of the Quindalup Dune System. The bird community in this area has proven to be rich and to contain species which are otherwise rare in the urban area.

5.1.7 Weeds and Diseases

Weed invasion in the project area is significant, especially in areas which are in close proximity to roads (West Coast Highway, Rochdale Road). The most conspicuous weeds are the herbaceous perennials *Ehrharta calycina* (Veldt Grass) and *Pelargonium capitatum*, both of which are particularly well established in the *Banksia* woodland and Tuart woodland. Heath vegetation is comparatively free of weed invasion.

Vegetation can be radically altered by dieback disease caused by the root-rot fungus *Phytophthora cinnamomi*. This is a soil-borne pathogen that can be carried on the underbodies, wheels and tracks of vehicles, and in mud or soil on the feet of animals and humans. Once introduced to a site, the fungus spreads slowly through the soil and among the root systems of susceptible species. It may also be washed downslope with the soil water flow during rainfall.

Recent research has demonstrated variations in disease impact over time. The degree of impact depends on landscape position (downslope sites are more vulnerable), vegetation type and host susceptibility (myrtaceous and proteaceous species, such as occur in the project area, more susceptible) and drainage characteristics (poorly drained sites in high rainfall areas are at greater risk).

Widespread visual evidence of *Phytophthora cinnamomi* dieback disease was noted in the Study Area during field surveys. It was particularly noted in the vicinity of the walk trails on the eastern boundary of the project area, south of the junction with the bridle path. This reinforces the importance of dieback disease hygiene management, as outlined in Section 7.1.5, in an effort to prevent its spread into uninfected areas.

5.1.8 Fire Management

The City of Perth prepared a set of "Draft Guidelines for Fire Protection Operations" in 1989. Advice was sought from the Environmental Protection Authority, who provided input and recommendations on the Council's plans. The programme, in essence, is as follows:

- the development of fire buffers and the reduction of fuel loading of broad buffers between existing fire breaks and walking trails is provided in order to establish a system of low-fuel mosaics. ;
- Parks and Gardens officers from the City of Perth are to undertake a rotational burn management programme to reduce the accumulation of fuel within the boundaries of Bold Park over a 6-10 year cycle;
- the development of a trained fire control response team for Bold Park; and
- controlled burning of the pine plantation in August/September in consultation with the Department of Conservation and Land Management;

BF 315
Karen Clarke

FLORISTICS of RESERVES and BUSHLAND AREAS of the PERTH REGION (SYSTEM 6)

Parts V - IX

G.J. Keighery and B.J. Keighery

The Wildflower Society of Western Australia has published these papers, parts of a continuing series, in the interest of the conservation of our unique flora. The Society considers it essential that decision makers and managers have available the necessary flora information before making irreversible land use decisions.

The Floristic Survey of the Swan Coastal Plain, of which the surveys of the flora of these areas was part, was carried out with the assistance of funds made available by the Commonwealth of Australia under the National Estate Grants Programme, and by the Australian Heritage Commission.

Wildflower Society of Western Australia (Inc.)
PO Box 64 Nedlands WA 6009

ISBN 0 9595443 8 0

CONTENTS

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GENERAL ACKNOWLEDGEMENTS

Parts of these studies were funded by the National Estates Grants Program of the Australian Heritage Commission under the GinGin to Busselton Bushland Survey and the Swan Coastal Plain Survey. The permanent sites for the GinGin to Busselton Bushland Survey were established with Neil Gibson. Neil Gibson and Allan Burbidge kindly commented on the manuscript for this publication.

PART IX: THE FLORA OF THREE COASTAL BUSHLAND AREAS (System 6 Areas M 46, M 91 and M106) IN THE PERTH METROPOLITAN AREA

INTRODUCTION

Six coastal bushland areas within the metropolitan section of the System 6 Report (Department of Conservation and Environment, 1983) were the subject of recommendations. Three of these areas are the subject of this study. From north to south these three areas are:
(i) M 46 - Swanborne Beach and Rifle Range, City of Nedlands and Perth, adjacent to M 47 (Bold Park)
(ii) M 91- Reserve 24309 Coogee, City of Cockburn, adjacent to M 92, the western chain of the Cockburn Wetlands
(iii) M106 - Becher Point, adjacent to Lake Cooloongup Regional Park.
All three areas are adjacent to inland bushland areas.

GEOMORPHOLOGY AND SOILS

The three bushland areas contain a variety of coastal land forms and soils.
(i) M 46 is located on a series of relatively steep mobile Quindalup Dunes of aeolian origin. Soils are mapped as calcareous sands (Safety Bay Sands; S1- foredunes, S2 - mobile dunes) which are underlain, at varying depths, by Tamala Limestone (Gozzard 1983a).
(ii) M 91 is located on exposed Tamala Limestone (LS 1). Along the coast the limestone outcrops as a series of cliffs. Shallow pockets of soil are found on the exposed limestone and deeper sands have collected between the limestone ridges (Gozzard, 1986).
(iii) M 106 is located entirely on Quindalup Dunes but unlike those in M 46 most are regular low dunes lying parallel to the coast (S13). A narrow band of mobile sands (S 1) occur on the coast and there is a pocket of similar sands (S 2) at Point Becher. In the interdunal depressions between the parallel dunes are peaty sands (Gozzard, 1983b). This area has been the subject of a detailed geomorphological study (Searle, Semeniuk and Woods, 1988).

VEGETATION

Over the period of 1990-93 the authors visited the bushland areas and compiled records on the flora. Foot transects supported by vehicle transects, when appropriate, were made in the three areas. Vouchers were collected if the plants were not known to the authors or were considered significant. In two of the areas, M 91 and M 106, permanent sites have been established for the GinGin to Busselton Bushland Survey.

A wide variety of coastal plant communities are encompassed by these three bushland areas. Other studies have described the communities of these areas (Trudgen, 1988 and Kaeshagen and Carr, 1993) and a general treatment is included in this study.

The plant communities are closely related to topography. The principal communities are:
(i) M 46 - The communities of the foredunes (S1) are a series of Herblands and Grasslands merging with *Olearia axillaris* Heaths. On the valleys of the mobile dunes (S2) are Tuart (*Eucalyptus gomphocephala*) Woodlands, *Agonis* Woodlands, *Banksia* Woodlands and *Acacia rostellifera* Shrublands and on the ridges are Low Heaths where *Calothmanus quadrifidus* or *Chamelaucium uncinatum* may be dominant. On the northern face of a dune along Rochdale Rd are *Allocasuarina lehmanniana* Shrublands.

Kaeshagen and Carr (1993) have compiled a vegetation map the area of M 46 in the City of Perth.

(ii) M 91 - On the coastal limestone cliffs are Low Closed Heaths (under 0.5m) dominated by *Atriplex cinerea* and *Frankenia pauciflora*. Low Closed Heaths (under 0.5m) are also found on the limestone ridges but these are dominated by a series of shrubs, such as *Dryandra sessilis*, *Petrophile serruriae*, *Melaleuca huegellii* and *Hibbertia spicata* ssp *leptotheca*. On the deeper sands between the limestone ridges are some small patches of *Banksia* Low Open Woodland but generally mixed Low Closed Heaths (greater 1m to 1.5 m) and Shrublands, dominated by *Acacia* species, *Hibbertia hypericoides* and *Petrophile serruriae*.

(iii) M 106 - The communities of the foredunes (S1) are a series of Herblands and Grasslands merging with *Olearia axillaris* Low Open Heaths. On the parallel dunes the predominant community is *Jacksonia furcellata* and *Acacia lasiocarpa* Low Heath. However the density of other species present in the community alters and some areas are dominated by other species. The most significant are the *Acacia rostellifera* Open Heaths to Open Scrub and *Stipa flavescens* Grasslands. A series of linear wetlands are found between many of the dunes. These wetlands are characterised as Sedgelands. The older interdunal wetlands are fringed by *Xanthorrhoea preissii* Shrubland and occasionally edged by *Melaleuca* woodlands. These wetlands are unique geomorphologically (Searle, Semeniuk and Woods, 1988). Two of these communities, the *Jacksonia furcellata* and *Acacia lasiocarpa* Low Heath (extending east to the western margins of the Lake Cooloongup Regional Park) and the Sedgelands of the ephemeral freshwater wetlands between the dunes were identified as being rare by Keighery and Keighery (1992).

Of particular interest are the localised occurrences of Tuart and in the foredunes adjacent to the southern boundary of the area patches of *Hibbertia cuneiformis* Low Open Heaths occurring adjacent to areas of exposed clay below the sands (these are best developed in the Anstey Swamp area to the south, Semeniuk et al. , 1989).

Trudgen (1988) has mapped the plant communities at M 106.

Vegetation Condition

In assessing the condition of a bushland areas the general characteristics of the areas vegetation needs to be noted. In coastal areas it is necessary to consider that these areas are subjected to high levels of natural disturbance and the predominant native species are, of necessity colonising species. Consequently the following features of the vegetation are of importance in the assessment of the condition of the vegetation of coastal areas:

- the abundance and density of native species in the herb layer in the communities.
- the presence of areas of bare sand, these areas occur naturally and are important habitat areas (How and Dell, 1989).
- the occurrence of extensive moss swards in sheltered locations in shrublands
- the abundance and density of native grasses.

These four features of the coastal communities must be assessed in spring when native and non-native annuals are evident.

Of the three areas the M 106 area is in the best condition, being in generally in excellent to very good condition as there are bare sand areas and moss swards, the herb layer is composed of predominantly native species, such as *Daucus glochidiatus* and *Hydrocotyle diantha* and the native grasses, *Stipa flavescens*, *Poa porphyroclados* and *Poa poiformis*. These grasses are widespread, forming a grass stratum in most communities and, at times, are the dominant species forming a grassland in their own right. There are disturbed patches which appear to be associated with past grazing, vehicle activity and burning regimes. However these areas are isolated and the activities of the Port Kennedy

Land Conservation group have reduced disturbance allowing the native species to re-establish. The weeds of greatest concern are **Homeria flaccida* and **Euphorbia terracina*. **Ehrharta calycina*, which can replace *Stipa flavescens* in disturbed sandy coastal areas was not observed in the M 106 area. The common coastal weed **Pelargonium capitatum* is also uncommon.

By comparison the Tuart Woodlands and the fringing *Banksia* Woodlands at M 46 are significantly invaded by the perennial grass, **Ehrharta calycina*. Invasion by **Ehrharta calycina* is not as significant in the other communities but the herb layer in all communities is predominantly weed species. The weeds of greatest concern are **Myrsiphyllum asparagoides* and **Euphorbia terracina*. Generally the area is in good to poor condition with much of the heath in very good condition. There has been significant disturbance in the area associated with road building, tracks, rubbish dumping and adjacent irrigated areas.

At M 91 substantial disturbance has occurred due to partial clearance, past grazing, uncontrolled access tracks, fires, substantial rabbit grazing and 'enrichment planting'. The impact of this disturbance is greatest in the sandy areas between the ridges where the herbs are replaced by weeds and the moss swards are absent. Where the limestones outcrops, the weeds are less abundant, but the grazing by rabbits is still evident in the cropped sedges. The weed of greatest concern is **Homeria flaccida* (not palatable) and **Myrsiphyllum asparagoides* present in the adjacent bushland. Generally the area is in good to poor condition with much of the heath in very good condition.

FLORA

The recorded flora of the three areas is given in Appendix 1, p76. A comparison of the flora between the three areas is shown in Table 1.

Table 1 A Comparison of the Floras of M 46, M 91 and M 106.

Bushland Area	Total taxa	Native taxa	Non - native taxa	Native taxa shared	Native taxa not shared
M 46	177	117	58 (33%)	49 (42%)	17 (15%)
M 91	142	86	56 (39%)	49 (57%)	25 (29%)
M 106	240	172	68 (28%)	49 (28%)	78 (45%)

As expected the largest area with the greatest diversity of habitat, M 106, has the greatest diversity of flora. This diversity is also reflected in the number of native taxa recorded only at M 106. The presence of freshwater wetlands at M 106 accounts for the presence of many of these taxa, such as *Pteridium esculentum*, *Baumea acuta*, *Baumea articulata*, *Baumea juncea*, *Bulboschoenus caldwellii*, *Lepidosperma effusa*, *Schoenus nitens*, *Loxocarya pubescens*, *Juncus kraussii*, *Triglochin procera*, *Typha domingensis*, *Centella cordifolia*, *Cotula coronopifolia*, *Sonchus hydrophilus*, *Lobelia alata*, *Melaleuca rhaphiophylla*, *Melaleuca teretifolia* and *Epilobium billardierianum*. Also, other taxa uncommon in coastal area are associated with the damp interdunal areas of M 106, for example the Orchidaceae and Haemodoraceae taxa. The diversity at M 106 is further enhanced by the presence of several taxa that are generally associated with outcropping Tamala limestone, such as *Acacia lasiocarpa*, *Trymalium albicans* and *Cryptandra mutila*.

A significant proportion of the taxa at M 91 are not shared by the other areas. Some of these taxa such as *Wilsonia backhousei* and *Lawrencia spicata* are normally associated with saline wetlands while *Lavatera pleibea* var *tomentosa* and *Wilsonia humilis*,

normally confined to offshore islands, are found here in small remnant populations in the cliff top heath. *Wilsonia humilis* is not mentioned in Marchant et al. (1981), although there are old records from Rottnest Island.

Significant Flora

A series of species identified by Keighery (1992) as being possibly endemic to the western side of the Swan Coastal Plain are found in the study areas. These are from:
- M46, M 91 & M106: *Rhagodia baccata* R.Br. ssp *dioica* (range, Lancelin to Leuwin Ridge) and *Nemcia reticulata* (coastal form, range, Yalgorup to Grey).
- M46 & M106, the dune form of *Hemiandra pungens* GK 12,794 (range, Becher Point to Seabird). This is a prostrate glabrous plant, with short ovate pungent leaves.
- M 91: *Grevillea thelemanniana* (range, Yalgorup to Cervantes), *Petrophile serruriae* ssp nov. (range, Cervantes to Bunbury - Hamelin Bay, apparently disjunct between Bunbury and Hamelin Bay), *Hibbertia spicata* ssp. *leptotheca* (range, Yalgorup to Lancelin), *Pimelea calcicola* (Yanchep, Neerabup and Yalgorup National Parks) and *Stylidium bulbiferum* (range, Yalgorup to Yanchep). *Petrophile serruriae* ssp nov. is a pink flowered variant of a normally yellow flowered species on the Darling Range. The type collection of *Stylidium bulbiferum* is from the Swan Coastal Plain, not the Darling Range, as assumed previously (A.H. Burbidge, pers. comm.).
- M106 *Trymalium albicans* (range, Yalgorup to Lancelin) and *Diplopeltis huegelii* var *huegelii* (range, Perth to Dongara).

Keighery (1992) also identified a series of taxa occurring at the ends of their ranges in the near coastal section of the Swan Coastal Plain. Nine of these taxa occur in the bushland areas . This study has identified some northern and southern extensions of some of these taxa.

Agonis flexuosa:	Range	N = Bold Park
Allocasuarina lehmanniana	Range	S = M 46/ Bold Park
Chamelaucium uncinatum	Range	S = M 46/Bold Park (M47)
Cryptandra mutila	Range	S = was Point Peron now M106
Diplolaena dampieri	Range	N = Garden Is/Rottnest, M 106 most northern on the mainland.
Hibbertia cuneiformis	Range	N = M 106
Lavatera plebeia var *tomentosa*	Range	Only mainland record at M 91; known from offshore islands - Rottnest, Green, Shag Rock.
Zygophyllum fruticulosum	Range	S = was Cottesloe, now M 106.

CONCLUSION

Although these three coastal areas are within 50 kilometres of each other they encompass a different suite of species expressed in a variety of plant communities. These communities reflect the different geomorphological units on which they are located. Although much of these coastal areas have been subject to considerable disturbance the heaths have remained in generally very good condition. The M 106 area is unusual in that the sandy soil communites, the most disturbed communities in the other areas, are in very good condition.

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Appendix 1: Flora of M 91, M 106 and M46

Records from opportunistic collecting, 1990-93. Families in alphabetical order and according to Marchant et al., (1987). An * indicates a non-native taxon.

TAXON	M 91	M 106	M46
FERNS			
DENNSTAEDIACEAE			
Pteridium esculentum		+	
GYMNOSPERMS			
ZAMIACEAE			
Macrozamia riedlei	+	+	+
CUPRESSACEAE			
Callitris preissii		+	
ANGIOSPERMSS			
AIZOACEAE			
*Carpobrotus edulis	+	+	+
C. edulis x virescens	+		
Carpobrotus virescens		+	+
*Tetragonia decumbens	+	+	+
Tetragonia implexicoma			+
Tetragonia tetragonioides		+	+
AMARANTHACEAE			
Ptilotus drummondii	+		
ANTHERICAEAE			
Arthropodium capillipes		+	
Caesia micrantha		+	
Corynotheca micrantha		+	
Sowerbaea laxiflora		+	
Thysanotus arenarius		+	+
Thysanotus manglesianus		+	
Thysanotus patersonii	+	+	
Thysanotus sparteus		+	
Tricoryne elatior	+	+	
APIACEAE			
Apium annuum	+	+	+
Apium prostratum		+	
Centella cordifolia		+	
Daucus glochidiatus	+	+	+
*Foeniculum vulgare	+		
Hydrocotyle diantha		+	
Hydrocotyle hispidula		+	
Trachymene coerulea			+
Trachymene pilosa		+	
APOCYNACEAE			
Alyxia buxifolia		+	

TAXON	M 91	M 106	M46
ASPHODELEACEAE			
*Asphodelus fistulosus	+	+	+
*Trachyandra divaricata	+	+	+
ASTERACEAE			
Angianthus cunninghamii		+	
Actites megalocarpa		+	
*Arctotheca calendula	+	+	+
*Arctotheca populifolia		+	+
*Arctotis stoechadifolia			+
*Aster subulatus		+	
Calocephalus brownii			+
*Carduus pycnocephalus		+	+
*Centaurium melitensis	+	+	
*Cirsium vulgare	+	+	+
*Conyza albida	+	+	+
*Conyza bonariensis	+		
Cotula australis		+	
Cotula cotuloides		+	
Cotula coronopiifolia		+	
*Dittrichia graveolens	+	+	
Helichrysum cordatum	+	+	+
Hyalospermum cotula	+		
*Hypochaeris glabra	+	+	+
Lagenifera huegelii		+	+
Leptorhynchos scabrus		+	
Millotia myosotidiifolia		+	
Olearia axillaris	+	+	+
Olearia rudis		+	
Podotheca angustifolia		+	
*Pseudognaphalium luteo-album		+	
Senecio lautus ssp. dissectifolius		+	
Senecio lautus ssp. maritimus	+	+	+
*Senecio tamoides			+
Siloxerus humifusus			+
*Sonchus asper	+		
Sonchus hydrophilus		+	
*Sonchus oleraceus	+	+	+
*Ursinia anthemoides		+	+
*Urospermum picroides	+		
*Vellerophyton dealbatum	+		
Waitzia aurea		+	
Waitzia suaveolens			+
BRASSICACEAE			
*Brassica tournefortii	+	+	+
*Cakile maritima		+	+
*Heliophila pusilla	+	+	+
Stenopetalum gracile		+	+
CAMPANULACEAE			
Wahlenbergia preissii		+	+

TAXON	M 91	M 106	M46
CARYOPHYLLACEAE			
*Cerastium glomeratum		+	
*Minuartia hybrida	+	+	+
*Petrorhagia velutina	+	+	+
*Sagina maritima	+	+	
*Silene gallica	+	+	+
*Spergula arvensis			+
*Stellaria media	+		
CASUARINACEAE			
Allocasuarina humilis	+		+
Allocasuarina lehmanniana			+
CHENOPODIACEAE			
Atriplex cinerea	+	+	+
Atriplex hypoleuca		+	
Atriplex isatidea			+
*Chenopodium murale	+	+	
Rhagodia baccata ssp baccata	+	+	+
Rhagodia baccata ssp dioica	+	+	+
Salsola kali		+	+
Sarcocornia quinqueflora	+		
Suaedea australis	+		
Threkeldia diffusa	+		+
COLCHICACEAE			
Wurmbaea monantha		+	
CONVOLVULACEAE			
Wilsonia backhousei	+		
Wilsonia humilis	+		
CRASSULACEAE			
Crassula colorata	+	+	+
Crassula exserta	+	+	+
*Crassula glomerata	+	+	+
*Crassula natans		+	
Crassula pedicellosa			+
CUSCUTACEAE			
*Cuscuta epithymum		+	
CYPERACEAE			
Baumea acuta		+	
Baumea articulata		+	
Baumea juncea		+	
Bulboschoenus caldwelli		+	
Carex preissii		+	+
Cyperus tenuiflorus		+	
Isolepis cernua	+	+	+
Isolepis nodosa	+	+	+
Lepidosperma angustatum	+	+	+
Lepidosperma effusum		+	
Lepidosperma gladiatum	+	+	+
Lepidosperma longitudinale	+	+	+

TAXON	M 91	M 106	M46
Lepidosperma scabrum			+
Lepidosperma ?tenue		+	
Mesomelaena pseudostygia		+	+
Schoenus clandestinus		+	
Schoenus grandiflora	+	+	+
Schoenus nitens		+	
Tetraria octandra		+	
DASYPOGONACEAE			
Acanthocarpus preissii	+	+	+
Lomandra hermaphrodita		+	
Lomandra maritima	+	+	+
DILLENIACEAE			
Hibbertia acerosa	+		
Hibbertia cuneiformis		+	
Hibbertia hypericoides	+		
Hibbertia racemosa	+		+
Hibbertia spicata ssp. leptotheca	+		
EPACRIDACEAE			
Acrotriche cordata	+	+	
Leucopogon australis	+		
Leucopogon parviflorus		+	+
EUPHORBIACEAE			
*Euphorbia peplus	+	+	+
*Euphorbia terracina	+	+	+
Phyllanthus calycinus	+	+	+
Poranthera microphylla		+	+
Ricinocarpus glaucus		+	
FABACEAE (PAPILIONACEAE)			
Daviesia decurrens			
Daviesia nudiflora			
Daviesia triflora			
Gompholobium tomentosum	+	+	+
Hardenbergia comptoniana	+	+	+
Jacksonia furcellata	+	+	
Kennedia coccinea	+		
Kennedia prostrata		+	+
*Lotus angustissimus		+	+
*Lupinus consentinii			+
*Medicago polymorpha		+	+
*Meliotis indica	+	+	+
Nemcia reticulata	+	+	+
*Trifolium angustifolium			+
*Trifolium campestre	+		+
*Trifolium cernuum	+	+	+
*Vicia sativa			+
FRANKENIACEAE			
Frankenia pauciflora	+		

TAXON	M 91	M 106	M46
FUMARIACEAE			
*Fumaria capreolata			+
*Fumaria muralis			+
GENTIANACEAE			
*Centaurium erythraea		+	+
*Cicendia filiformis		+	
GERANIACEAE			
*Erodium botrys		+	
*Erodium cicutarium	+	+	+
*Geranium molle			+
Geranium solanderi		+	+
*Pelargonium capitatum	+	+	+
Pelargonium littorale		+	+
GOODENIACEAE			
Lechenaultia linearoides			+
Scaevola canescens			+
Scaevola crassifolia	+	+	+
Scaevola holosericea		+	
Scaevola nitida		+	
Scaevola thesioides			+
GYROSTEMONACEAE			
Tersonia cyathifolia			+
HAEMODORACEAE			
Anigozanthos humilis		+	
Anigozanthos manglesii		+	+
Conostylis aculeata	+	+	+
Conostylis candicans		+	+
Haemodorum laxum			+
Haemodorum spicatum		+	+
Haemodorum paniculatum			+
Phlebocarya ciliata		+	
HYACINTHACEAE			
*Ornithogalum ?caudatum			+
IRIDACEAE			
*Freesia leichtlinii		+	
*Gladiolus caryophyllaceus	+		
*Homeria flaccida		+	
*Homeria ?flaccida 'yellow'	+		
Patersonia occidentalis		+	
*Romulea rosea	+	+	+
JUNCACEAE			
Juncus bufonius		+	
Juncus krausii		+	
Juncus pallidus		+	
JUNCAGINACEAE			
Triglochin calcitrapa	+	+	+

TAXON	M 91	M 106	M46
Triglochin procera		+	
Triglochin striata		+	
Triglochin trichophora		+	+
LAMIACEAE			
Hemiandra pungens		+	+
*Stachys arvensis		+	
Westringia dampieri		+	
LAURACEAE			
Cassytha flava	+	+	+
Cassytha pubescens	+	+	+
Cassytha racemosa	+	+	
LOBELIACEAE			
Lobelia alata		+	
Lobelia gibbosa			+
Lobelia tenuior		+	+
LOGANIACEAE			
Logania vaginalis		+	
MALVACEAE			
Lavatera pleibia var tomentosa	+		
Lawrencia spicata	+		
MIMOSACEAE			
Acacia cochlearis		+	+
Acacia cyclops	+	+	+
Acacia lasiocarpa	+	+	+
Acacia pulchella	+		+
Acacia rostellifera	+	+	+
Acacia saligna	+	+	+
Acacia truncata	+		+
MYOPORACEAE			
Eremophila glabra	+	+	+
Myoporum insulare	+	+	+
MYRTACEAE			
Astarea fasicularis		+	
Agonis flexuosa			+
Calothamnus quadrifidus	+	+	+
Chamelaucium uncinatum			+
Eucalyptus decipiens	+		
Eucalyptus gomphocephala		+	+
Melaleuca acerosa	+	+	+
Melaleuca huegelii	+	+	
Melaleuca rhaphiophylla		+	
Melaleuca teretifolia		+	
OLACACEAE			
Olax benthamiana		+	+

TAXON	M 91	M 106	M46
ONAGRACEAE			
Epilobium billardierianum		+	
Epilobium hirtigerum		+	
*Oenothera drummondii		+	+
ORCHIDACEAE			
Acianthus reniformis		+	+
Caladenia flava		+	
Caladenia latifolia	+	+	+
Caladenia longicauda		+	
Microtis media		+	
*Monadenia bracteata	+		
Prasophyllum calcicola			+
Prasophyllum fimbria		+	
Pterostylis nana		+	
Pterostylis vittata		+	
OROBANCHACEAE			
*Orobanche minor	+	+	+
OXALIDACEAE			
Oxalis perennans		+	+
PHORMIACEAE			
Dianella divaricata	+	+	+
PHYTOLACCACEAE			
*Phytolacca octandra	+		
PLANTAGINACEAE			
Plantago ?exilis	+		
POACEAE			
+Agropyron racemosus			+
Agrostis avenacea		+	
*Aira caryophyllea	+	+	+
Amphipogon turbinatus		+	
*Avellina michelii		+	
*Avena barbata	+	+	+
*Briza maxima	+	+	+
Bromus arenarius		+	+
*Bromus diandrus	+	+	+
*Bromus hordeaceus	+	+	
*Bromus madritensis		+	
*Catapodium rigidum	+	+	+
*Cynodon dactylon		+	+
Danthonia occidentalis	+	+	+
*Ehrharta calycina	+		+
*Ehrharta longiflora		+	
*Eragrostis curvula		+	
*Holcus lanatus		+	
*Lagurus ovatus	+	+	+
*Lolium multiflorum	+	+	+
*Phalaris minor	+		
*Poa annua	+		

TAXON	M 91	M 106	M46
Poa drummondiana	+	+	+
Poa poiformis		+	+
Poa porphyroclados	+	+	+
Sporobolus virginicus	+	+	
Spinifex hirsutus		+	+
Spinifex longifolius	+	+	+
*Stenotraphum secundatum			+
Stipa compressa		+	
Stipa elegantissima		+	+
Stipa flavescens	+	+	+
Stipa semibarbata		+	
*Vulpia myuros	+		+
POLYGALACEAE			
Comesperma integerrimum		+	+
Comesperma confertum	+	+	+
POLYGONACEAE			
Muehlenbeckia adpressa		+	
*Rumex crispus		+	
PORTULACACEAE			
Calandrinia corrigioloides	+	+	+
Calandrina granulifera		+	+
Calandrinia liniflora		+	
PRIMULACEAE			
*Anagallis arvensis	+	+	+
Samolus junceus	+	+	
Samolus repens	+		
PROTEACEAE			
Banksia attenuata	+		+
Banksia menziesii	+		+
Dryandra nivea	+		
Dryandra sessilis	+		+
Grevillea thelemanniana	+		
Grevillea vestita	+		+
Hakea lissocarpha	+		
Hakea prostrata	+		+
Petrophile brevifolia			
Petrophile serruriae	+		
RANUNCULACEAE			
Clematis microphylla			+
RESTIONACEAE			
Loxocarya cinerea		+	+
Loxocarya flexuosa	+	+	+
Loxocarya pubescens		+	
RHAMNACEAE			
Cryptandra mutila	+	+	
Spyridium globulosum	+	+	+
Trymalium albicans		+	

TAXON	M 91	M 106	M46
RUBIACEAE			
*Galium aparine	+		
*Galium murale		+	+
Opercularia vaginata		+	+
Opercularia aff. vaginata		+	
RUTACEAE			
Diplolaena dampieri		+	
SANTALACEAE			
Exocarpus sparteus		+	+
Santalum acuminatum	+	+	+
SAPINDACEAE			
Diplopeltis huegelii			+
SCROPHULARIACEAE			
*Bellardia trixago		+	
*Dischisma arenaria		+	+
*Parentucellia viscosa	+	+	
Verbascum virgatum	+		
SOLANACEAE			
Anthocercis ilicifolia			+
Anthocercis littorea		+	
*Lycium ferocissimum			+
*Nicotiana glauca	+		
*Solanum nigrum	+	+	+
*Solanum sodomaeum	+	+	
Solanum symonii	+	+	+
STACKHOUSIACEAE			
Stackhousia pubescens		+	
STERCULIACEAE			
Thomasia cognata	+	+	
THYMELAEACEAE			
Pimelea calcicola	+		
TYPHACEAE			
Typha domingensis		+	
*Typha orientalis		+	
STYLIDIACEAE			
Stylidium bulbiferum	+		
URTICACEAE			
Parietaria debilis	+	+	+
VALERIACEAE			
*Centranthus macrosiphon			+

TAXON	M 91	M 106	M46
VERBENACEAE			
*Phyla nodiflora		+	
VIOLACEAE			
Hybanthus calycinus	+		
XANTHORRHOEACEAE			
Xanthorrhoea preissii	+	+	
ZYGOPHYLLACEAE			
Zygophyllum fruticulosum	+	+	+

M47

Proposed realignment of West Coast Highway at south City Beach

Full document available on request

City of Perth

Report and recommendations
of the Environmental Protection Authority

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Environmental Protection Authority
Perth, Western Australia
Bulletin 655
October 1992

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