LEDA AND ADJACENT BUSHLAND, LEDA

Boundary Definition: protected area/bushland (part taken to cadastre and zoning) boundary (Areas of bushland within the boundaries of the Site are not accurately mapped; Boundary adjusted after vegetation survey and negotiations with the land owner(s) in response to submissions to draft *Perth's Bushplan.*)

SECTION 1: LOCATION INFORMATION

Bush Forever Site no. 349
Area (ha): bushland 959.8 (Site also includes open water.)
Map no. 64, 70, 71
Map sheet series ref. no. 2033–I SW, 2033–II NW
Other Names: Submission Area 224
Local Authorities (Suburb): Town of Kwinana (Baldivis, Kwinana Beach, Postans, Medina, Calista, Leda, Wellard, East Rockingham), City of Rockingham (Baldivis, East Rockingham)
Includes CALM Managed Land: Nature Reserve 33581 (Conservation of Flora and Fauna)
System 6 (1983): M104 area of bushland goes beyond System area boundaries, all bushland described

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS
Bassendean Dunes
Bassendean Sands (Qpb: S8)
Spearwood Dunes
Sands derived from Tamala Limestone (Qts: S7)
Tamala Limestone (Qtl: LS1)
Quindalup Dunes (Holocene dunes)
Safety Bay Sands (Qhs: S13)
Wetlands (within the Spearwood and Bassendean Dunes)
Holocene Swamp Deposits (Qhw: Cps)

VEGETATION AND FLORA
Vegetation Complexes
Pinjarra Plain
Serpentine River Complex
Bassendean Dunes
Bassendean Complex — Central and South
Spearwood Dunes
Karrakatta Complex — Central and South
Cottesloe Complex — Central and South
Quindalup Dunes
Quindalup Complex
Floristic Community Types: *not sampled, type inferred
Supergroup 2: Seasonal Wetlands
*19b Woodlands over sedgelands in Holocene dune swales (DEP 1996, equivalent to 19 in Gibson *et al.* 1994)
17 *Melaleuca rhaphiophylla — Gahnia trifida* seasonal wetlands
Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau
21a Central *Banksia attenuata — Eucalyptus marginata* woodlands
Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes
25 Southern *Eucalyptus gomphocephala — Agonis flexuosa* woodlands
28 Spearwood *Banksia attenuata* or *B. attenuata — Eucalyptus* woodlands (most southern occurrence sampled)

WETLANDS
Wetland Types: sumpland, artificial channel
Natural Wetland Groups
Pinjarra Plain
Keysbrook (P.1)
Bassendean—Pinjarra transition OR Bassendean with fluvial features
Muchea (B/P.3)
Bassendean Dunes
Jandakot (B.3)
Spearwood—Bassendean interface
Bibra (S/B.1)
Spearwood Dunes
Stakehill (S.4)
Quindalup

Becher (Qu.2)

Wetland Management Objectives: Conservation (109.9ha), Multiple Use

Swan Coastal Plain Lakes EPP: 11.7ha + 4.4ha + 6.4ha + 0.5ha + 3.3ha + 3.6ha = 29.9ha (total)

THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Critically Endangered (floristic community type 19 as defined by Gibson *et al.* 1994)

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: open water, vegetated wetland, vegetated uplands, dune crest

Vegetation and Flora: limited survey (DEP 1996 (Leda 01–04), DEP 1999, DEP 2000, EPA and WAWA 1990, Gibson *et al.* 1994 (Well 01–02), Weston 1993)

Structural Units: mapping (EPA and WAWA 1990)

Uplands: *Eucalyptus marginata*, *E. gomphocephala* and *Allocasuarina fraseriana* Woodland; *Banksia menziesii*, *Eucalyptus marginata* and *Allocasuarina fraseriana* Low Woodland; *Banksia attenuata* and *B. grandis* Low Woodland; *Banksia attenuata* and *B. menziesii* Low Woodland with scattered emergent *Eucalyptus gomphocephala; Eucalyptus gomphocephala* Open Forest; *Acacia saligna* Low Open Forest; *Eucalyptus calophylla* Open Forest

Wetlands: *Eucalyptus rudis* Low Open Forest to Low Forest; *Melaleuca rhaphiophylla* Low Open Forest to Low Closed Forest; Mixed Closed Sedgeland

Scattered Native Plants: *Eucalyptus gomphocephala* Open Woodland

Vegetation Condition: >70% Excellent to Very Good, <20% Good, 10% Degraded, with areas of severe localised disturbance (Weston 1993)

Total Flora: 129 native species and 31 weed taxa (estimated >60% expected flora) (plot-generated list compiled from DEP 1996 (Leda 01–04), Gibson *et al.* 1994 (Well 01–02))

Significant Flora: *Glischrocaryon aureum* (uncommon in the PMR)

Fauna: limited survey for birds (60 species) (AHC 2000 D). Significant mammal species: Western Brush Wallaby (Halpern Glick Maunsell Pty Ltd and Tingay, Alan & Associates 1991), Quenda (Friend 1996 D)

Linkage: adjacent bushland to the north, south (Site 356, across road), east and west; part of Greenways 85, 86, 87 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed, Indicative place (AHC 2000 D), subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

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

Recommendation: Part A: Site with Some Existing Protection; the existing purpose, care, control and management of Reserve 33581 is endorsed. Part B: Other Government Land Mechanism. Part C: Urban Negotiated Planning Solution (see Table 3, Volume 1).

WETLANDS

Wetland Types: sumpland, artificial channel

Natural Wetland Groups

Pinjarra Plain

Keysbrook (P.1)

Bassendean—Pinjarra transition OR Bassendean with fluvial features

Muchea (B/P.3)

Bassendean Dunes

Jandakot (B.3)

Spearwood—Bassendean interface

Bibra (S/B.1)

Spearwood Dunes

Stakehill (S.4)

Quindalup

Becher (Qu.2)

Wetland Management Objectives: Conservation (109.9ha), Multiple Use

Swan Coastal Plain Lakes EPP: 11.7ha + 4.4ha + 6.4ha + 0.5ha + 3.3ha + 3.6ha = 29.9ha (total)

THREATENED ECOLOGICAL COMMUNITIES

Not assessed

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: open water, vegetated wetland, vegetated uplands, dune crest

Vegetation and Flora: limited survey (DEP 1996 (Leda 01–04), EPA and WAWA 1990, Gibson *et al.* 1994 (Well 01–02), Weston 1993)

Structural Units: mapping (EPA and WAWA 1990)

Uplands: *Eucalyptus marginata, E. gomphocephala* and *Allocasuarina fraseriana* Woodland; *Banksia menziesii, Eucalyptus marginata* and *Allocasuarina fraseriana* Low Woodland; *Banksia attenuata* and *B. grandis* Low Woodland; *Banksia attenuata* and *B. menziesii* Low Woodland with scattered emergent *Eucalyptus gomphocephala; Eucalyptus gomphocephala* Open Forest; *Acacia saligna* Low Open Forest

Wetlands: *Eucalyptus rudis* Low Open Forest to Low Forest; *Melaleuca rhaphiophylla* Low Open Forest to Low Closed Forest; Mixed Closed Sedgeland

Scattered Native Plants: *Eucalyptus gomphocephala* Open Woodland

Vegetation Condition: >70% Excellent to Very Good, <20% Good, 10% Degraded, with areas of severe localised disturbance (Weston 1993)

Total Flora: 129 native species and 31 weeds (estimated >60% expected flora) (DEP 1996 (Leda 01–04), Gibson *et al.* 1994 (Well 01–02))

Significant Flora: *Glischrocaryon aureum* (uncommon in the PMR)

Fauna: no systematic survey. Western Brush Wallaby known to occur (Halpern Glick Maunsell Pty Ltd and Tingay, Alan & Associates 1991). Significant mammal species: Quenda (Friend 1996 D)

Linkage: adjacent bushland to the north, south (BS356, across road), east and west; part of proposed Greenways 100, 110, 99, 93 (Tingay, Alan & Associates 1997a); part of a regionally significant contiguous bushland/wetland linkage (Volume 2A, Map 8)

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed, Indicative Place on Register of the National Estate

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/part Bushplan Site subject to Swan Coastal Plain Lakes EPP, Peel - Harvey Estuary EPP/SPP; location of conservation category wetlands; under MRS Parks and Recreation Reservation, TPS Landscape Zoning, Park Recreation and Drainage Zoning, Crown Reserve

Constraints: private land; under MRS Urban Zoning, MRD regional road requirements, Priority and General Mineral Resource Area (limestone, sand and clay), mining tenement 28/966 (ILDA leased to WA Limestone) for limestone sand and M70/556 (CSR Readymix)

Recommendation: The existing purpose, care, control and management of Reserve (33581) is endorsed. The most appropriate mechanism for the protection of the remainder of this Bushplan Site be considered through the public comment period in consultation with the land owner(s).

WETLANDS

Wetland Types: sumpland, artificial channel

Natural Wetland Groups

Pinjarra Plain
Keysbrook (P.1)

Bassendean—Pinjarra transition OR Bassendean with fluvial features
Muchea (B/P.3)

Bassendean Dunes
Jandakot (B.3)

Spearwood—Bassendean interface
Bibra (S/B.1)

Spearwood Dunes
Stakehill (S.4)

Quindalup
Becher (Qu.2)

Wetland Management Objectives: Conservation (109.9ha), Multiple Use

Swan Coastal Plain Lakes EPP: 11.7ha + 4.4ha + 6.4ha + 0.5ha + 3.3ha + 3.6ha = 29.9ha (total)

THREATENED ECOLOGICAL COMMUNITIES

Not assessed

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: open water, vegetated wetland, vegetated uplands, dune crest

Vegetation and Flora: limited survey (DEP 1996 (Leda 01–04), EPA and WAWA 1990, Gibson *et al.* 1994 (Well 01–02), Weston 1993)

Structural Units: mapping (EPA and WAWA 1990)
Uplands: *Eucalyptus marginata, E. gomphocephala* and *Allocasuarina fraseriana* Woodland; *Banksia menziesii, Eucalyptus marginata* and *Allocasuarina fraseriana* Low Woodland; *Banksia attenuata* and *B. grandis* Low Woodland; *Banksia attenuata* and *B. menziesii* Low Woodland with scattered emergent *Eucalyptus gomphocephala; Eucalyptus gomphocephala* Open Forest; *Acacia saligna* Low Open Forest
Wetlands: *Eucalyptus rudis* Low Open Forest to Low Forest; *Melaleuca rhaphiophylla* Low Open Forest to Low Closed Forest; Mixed Closed Sedgeland

Scattered Native Plants: *Eucalyptus gomphocephala* Open Woodland

Vegetation Condition: >70% Excellent to Very Good, <20% Good, 10% Degraded, with areas of severe localised disturbance (Weston 1993)

Total Flora: 129 native species and 31 weeds (estimated >60% expected flora) (DEP 1996 (Leda 01–04), Gibson *et al.* 1994 (Well 01–02))

Significant Flora: *Glischrocaryon aureum* (uncommon in the PMR)

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Linkage: adjacent bushland to the north, south (BS356, across road), east and west; part of proposed Greenways 100, 110, 99, 93 (Tingay, Alan & Associates 1997a); part of a regionally significant contiguous bushland/wetland linkage (Volume 2A, Map 8)

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed, Indicative Place on Register of the National Estate

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/part Bushplan Site subject to Swan Coastal Plain Lakes EPP, Peel - Harvey Estuary EPP/SPP; location of conservation category wetlands; under MRS Parks and Recreation Reservation, TPS Landscape Zoning, Park Recreation and Drainage Zoning, Crown Reserve

Constraints: private land; under MRS Urban Zoning, MRD regional road requirements, Priority and General Mineral Resource Area (limestone, sand and clay), mining tenement 28/966 (ILDA leased to WA Limestone) for limestone sand and M70/556 (CSR Readymix)

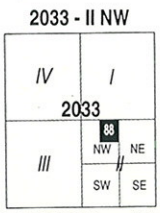
Recommendation: The existing purpose, care, control and management of Reserve (33581) is endorsed. The most appropriate mechanism for the protection of the remainder of this Bushplan Site be considered through the public comment period in consultation with the land owner(s).

Bushplan Site Map

LEGEND

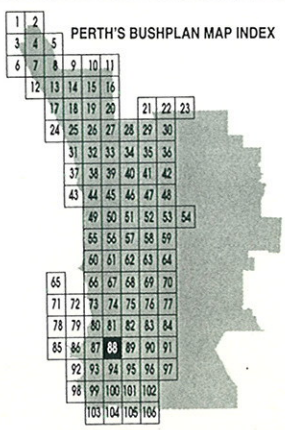
- 472 — Bushplan Sites With Regionally Significant Bushland
- Other Native Vegetation
- Conservation Category Wetlands
- Bushplan Sites With Some Existing Protection
- 696 — Lot Number, Location Number
- Channel Wetlands
- Local Government Boundary

2033 - II NW



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

PERTH'S BUSHPLAN MAP INDEX



N

SCALE

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Metres

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

ntw-map9//environ/bushplan//bushv2_88.dgn

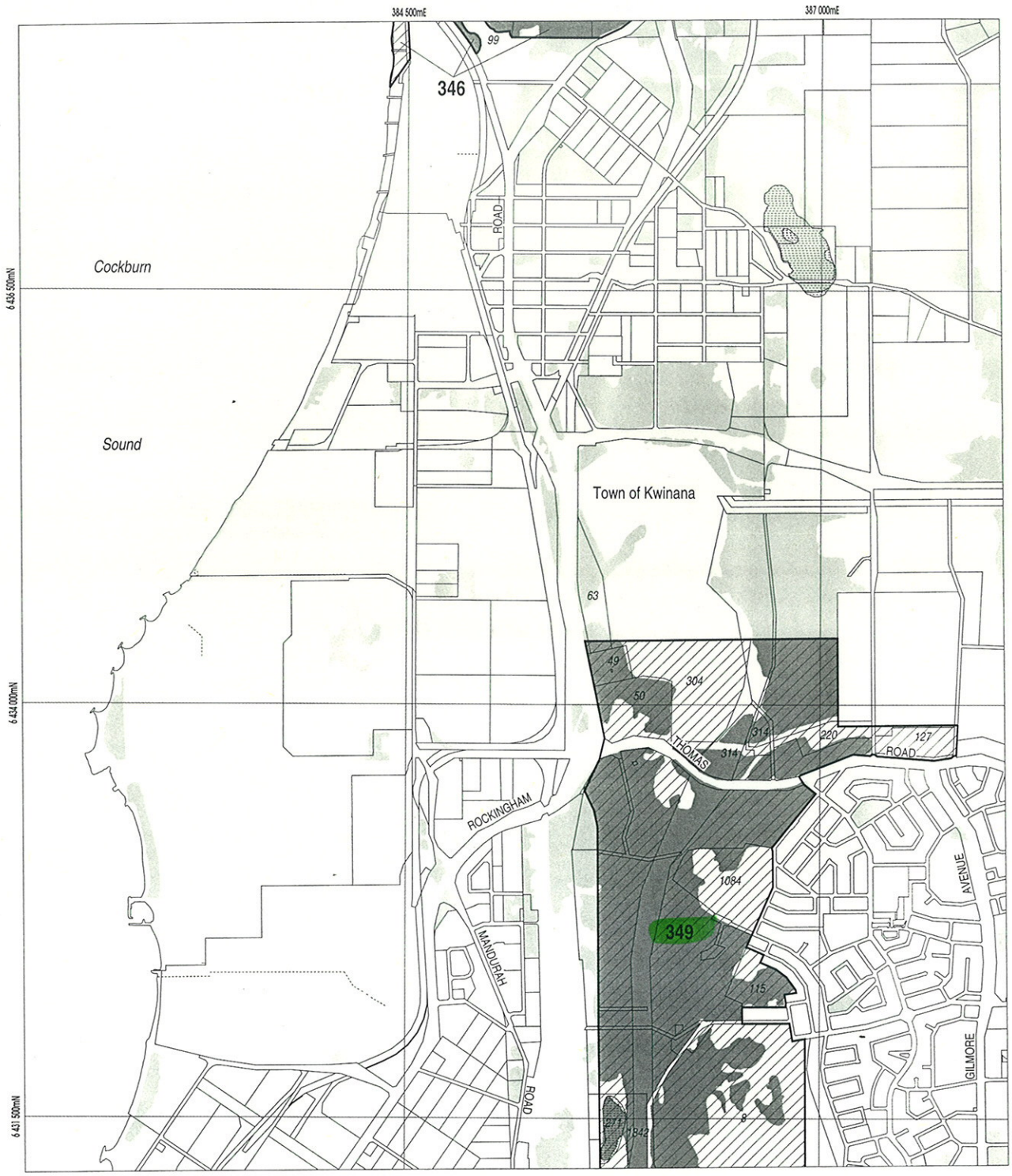
Cadastral Data supplied by Department of Land Administration, W.A.

Wetlands Data supplied by Water and Rivers Commission

Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

Bushplan Site Map

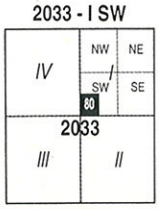
Map 88



LEGEND

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

2033 - I SW



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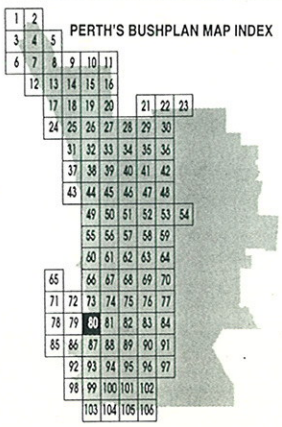
PERTH'S BUSHPLAN MAP INDEX



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Metres

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

ntw-map9//environ/bushplan//bushv2_80.dgn

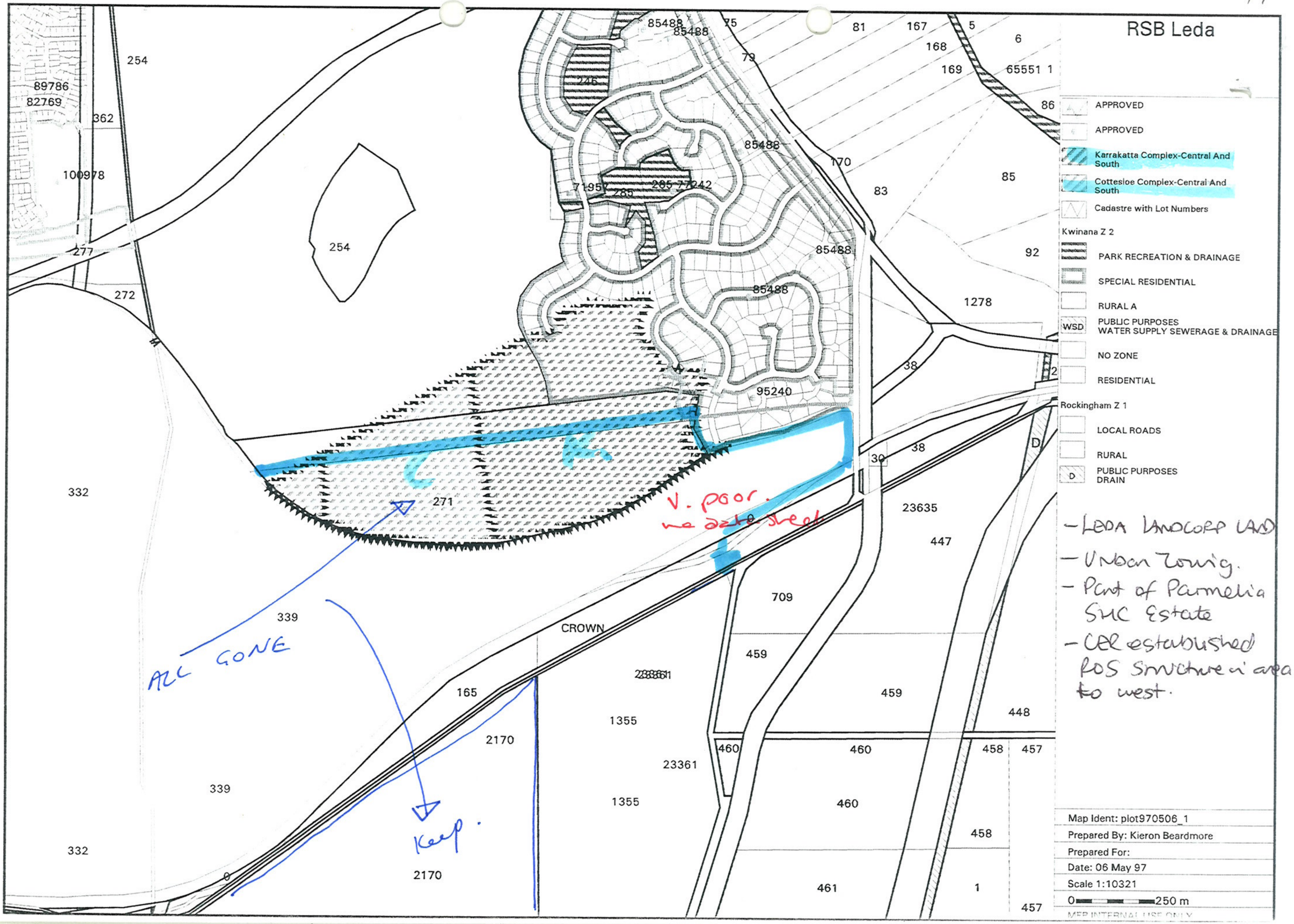
Cadastral Data supplied by Department of Land Administration, W.A.

Wetlands Data supplied by Water and Rivers Commission

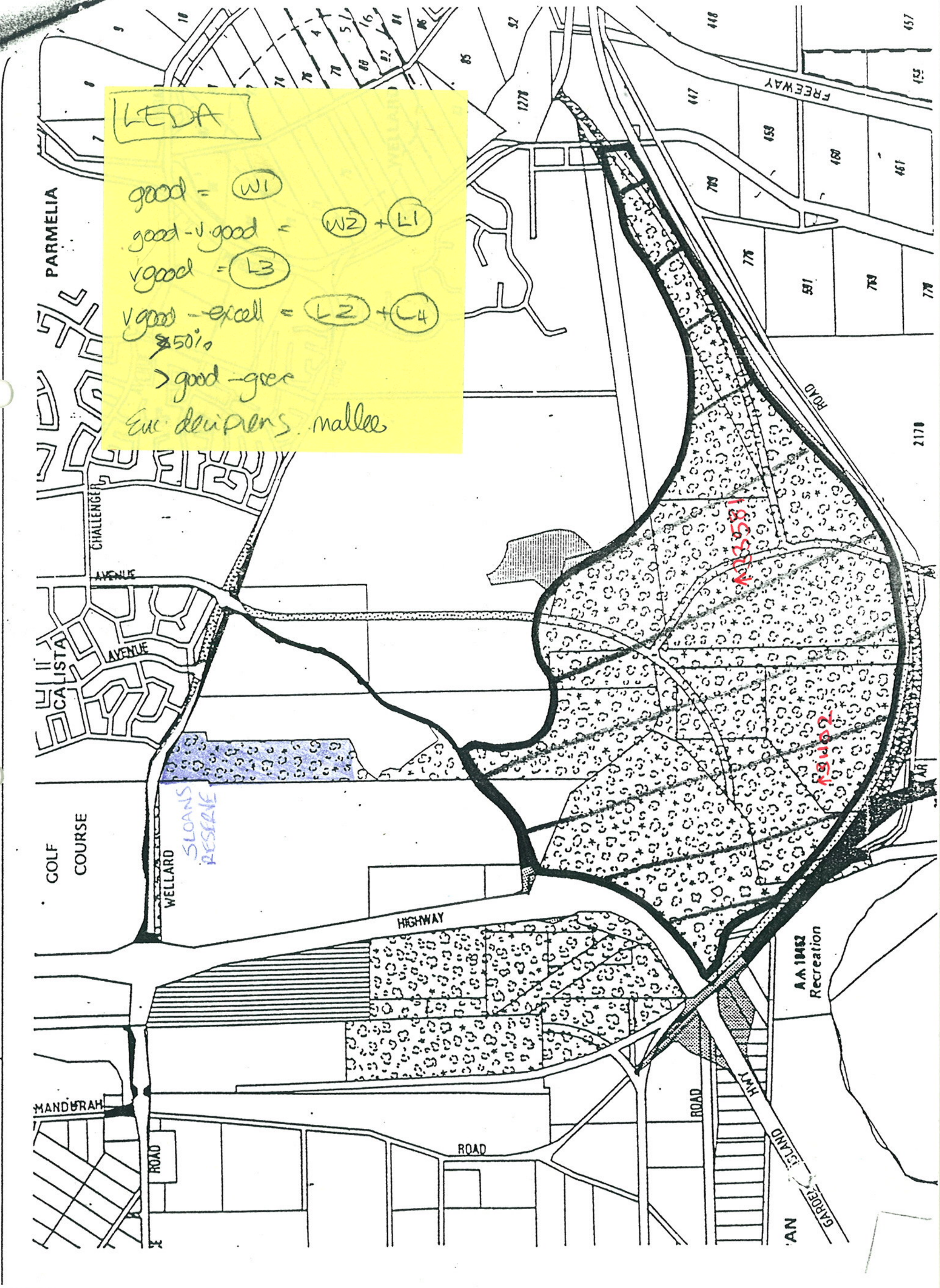
Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

Bushplan Site Map

Map 80

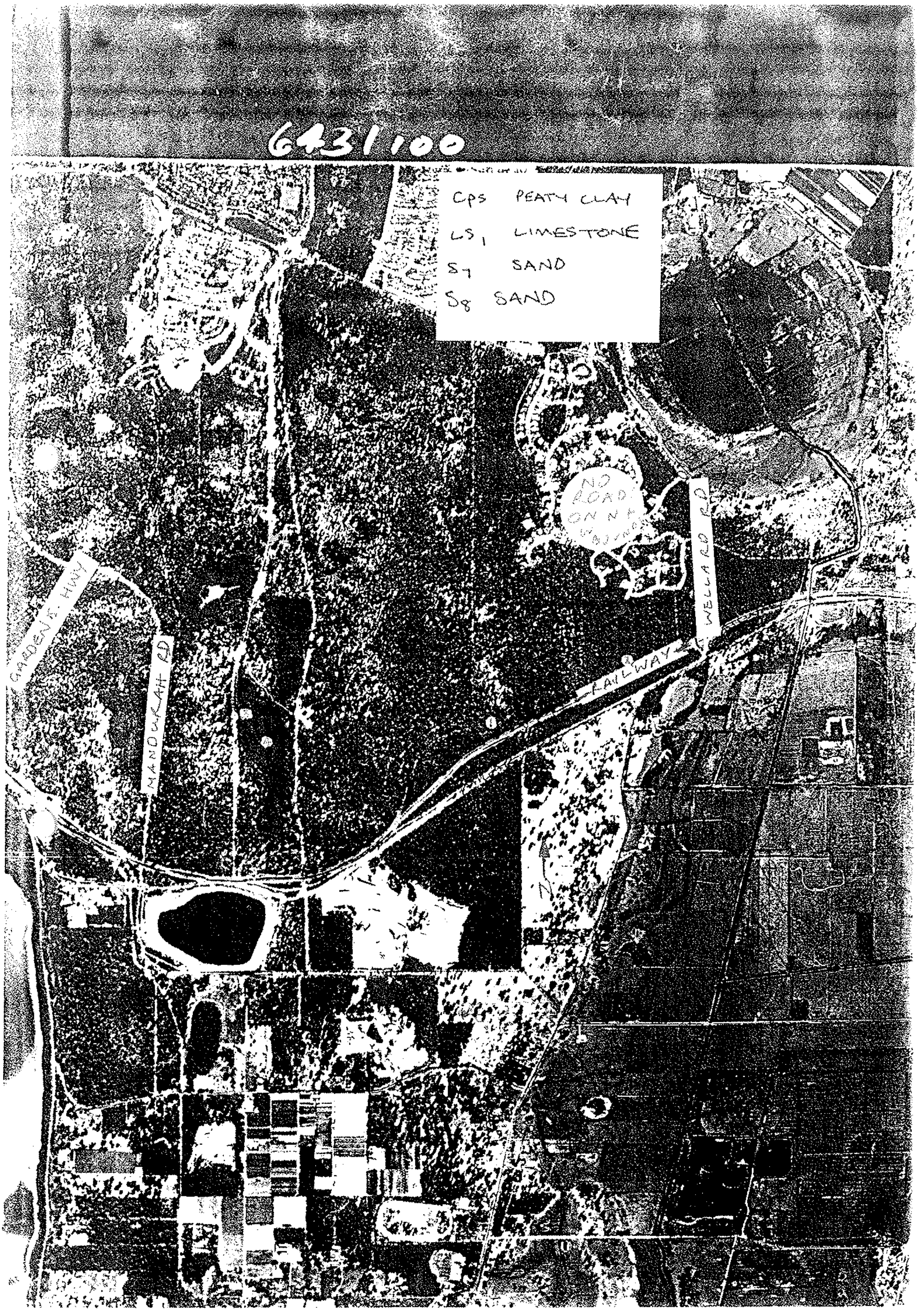


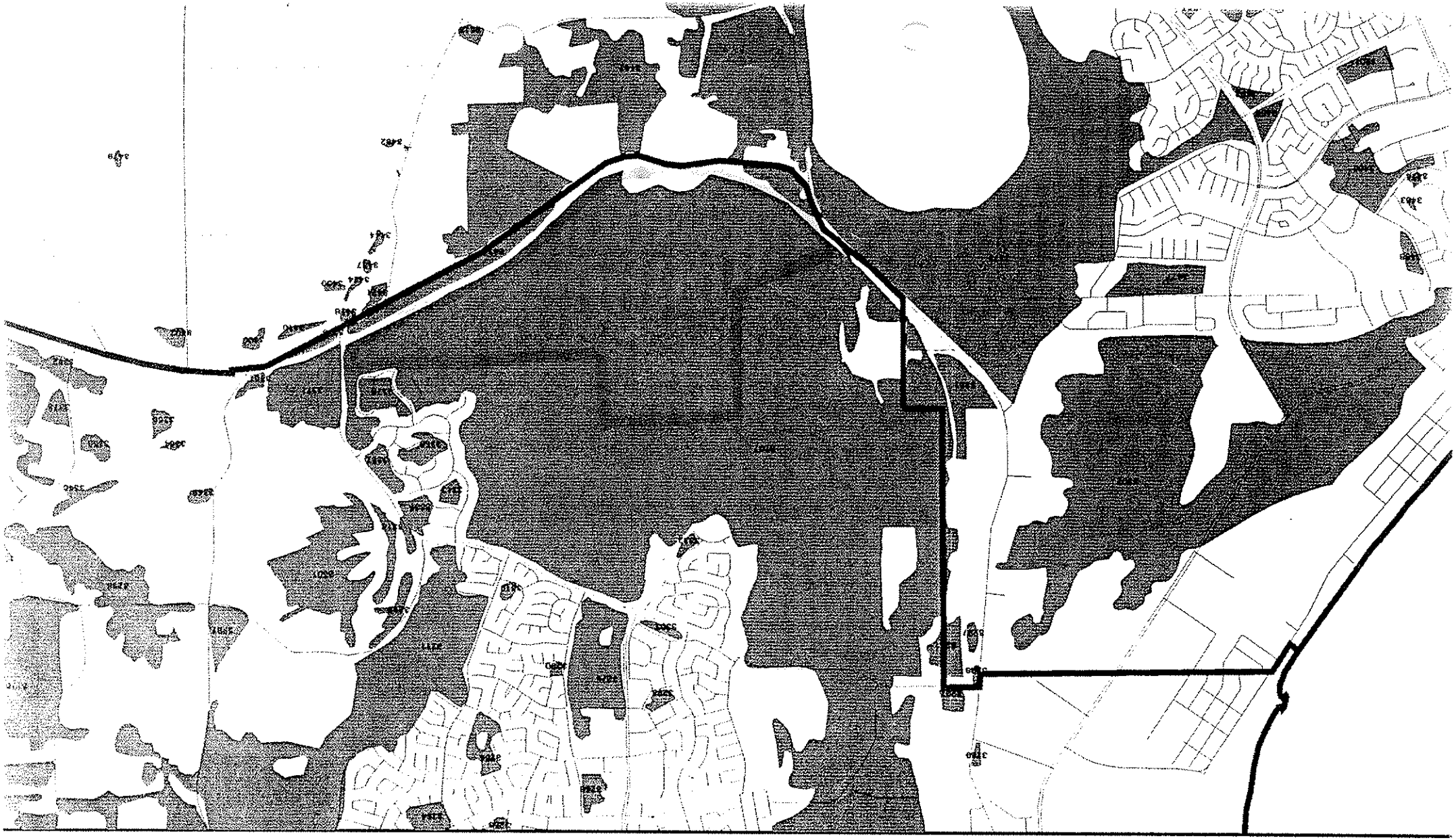
RSB Leda
APPROVED
APPROVED
Karrakatta Complex-Central And South
Cottesloe Complex-Central And South
Cadastre with Lot Numbers
Kwinana Z 2
PARK RECREATION & DRAINAGE
SPECIAL RESIDENTIAL
RURAL A
WSD
PUBLIC PURPOSES WATER SUPPLY SEWERAGE & DRAINAGE
NO ZONE
RESIDENTIAL
Rockingham Z 1
LOCAL ROADS
RURAL
D
PUBLIC PURPOSES DRAIN
CROWN
254
89786
82769
362
100978
277
272
332
339
271
85488
95240
1278
23635
447
709
459
165
2170
1355
23361
460
458
457
461
448
- LEDA LANDCORP LAND
- Urban Zoning.
- Part of Parmelia SHC Estate
- CER established POS structure in area to west.
V. poor. no data sheet
ALL GONE
Keep.
Map Ident: plot970506_1
Prepared By: Kieron Beardmore
Prepared For:
Date: 06 May 97
Scale 1:10321
0 250 m

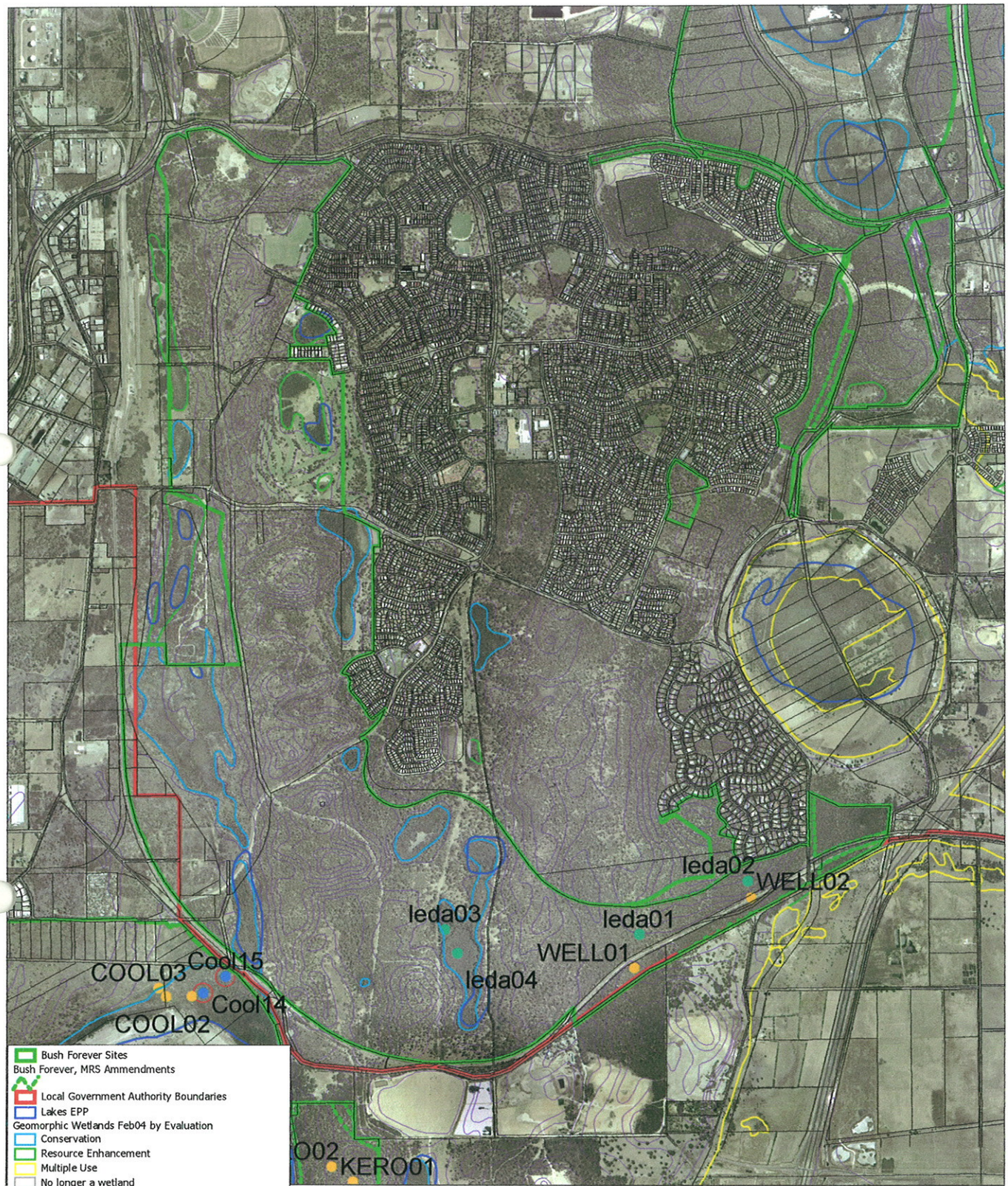


LEDA

good = W1
good - v.good = W2 + L1
vgood = L3
vgood - excell = L2 + L4
≥50%
>good - grer
Euc decipiens mallee


6431100
Cps PEATY CLAY
LS1 LIMESTONE
S7 SAND
S8 SAND
NO ROAD
MANDURAH RD
RAILWAY
WELLARD RD

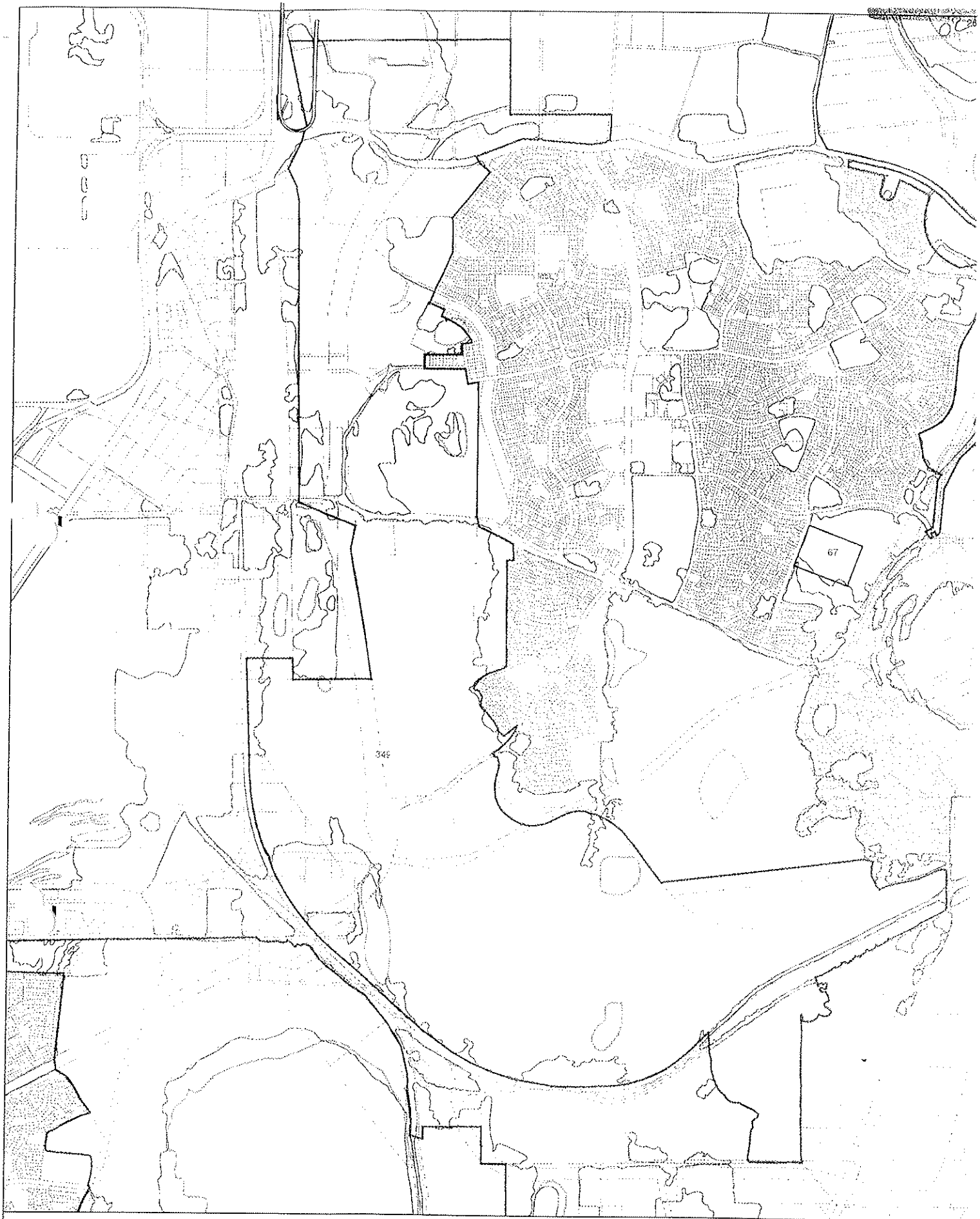




Bush Forever Site 349: Leda and Adjacent Bushland, Leda

Department of Environment

Data Sources:
Cadastre DLI
Aerial Phototography : Skyview DLI



BUSHPLAN SITES CORRECTED

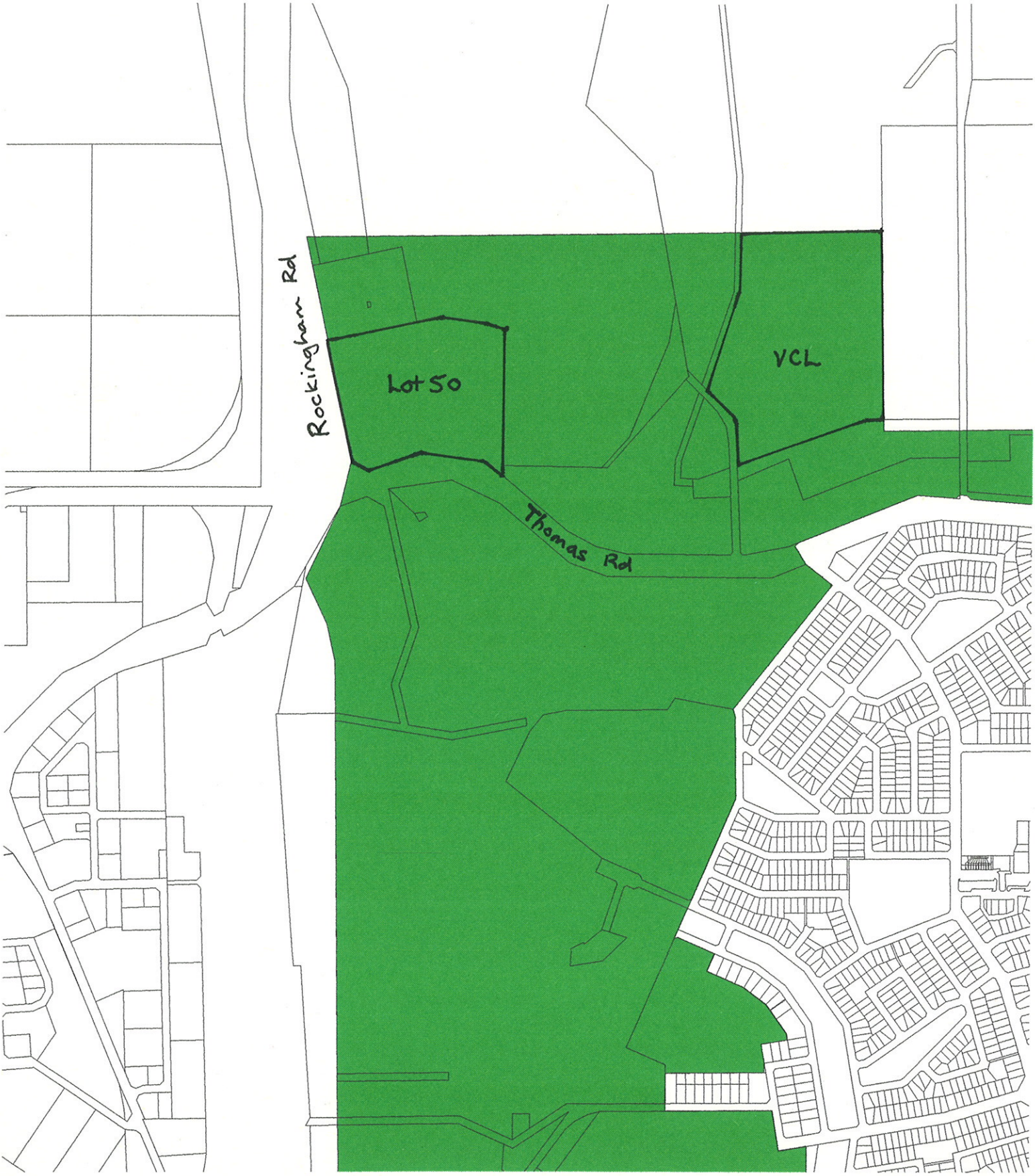
THE GOVERNMENT OF WESTERN AUSTRALIA

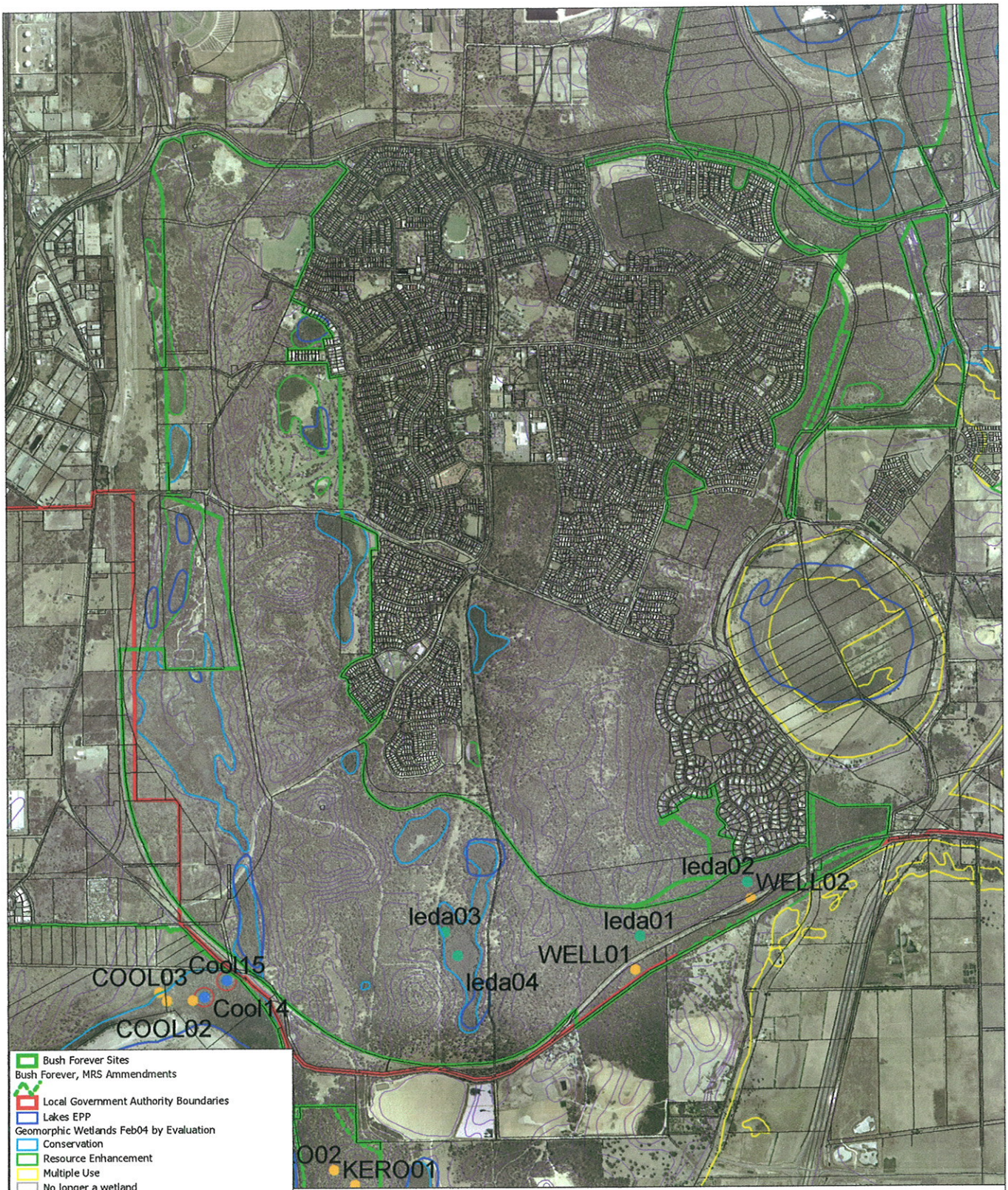
WESTERN AUSTRALIAN PLANNING COMMISSION

CUSTOMER FOCUS WESTERN AUSTRALIA

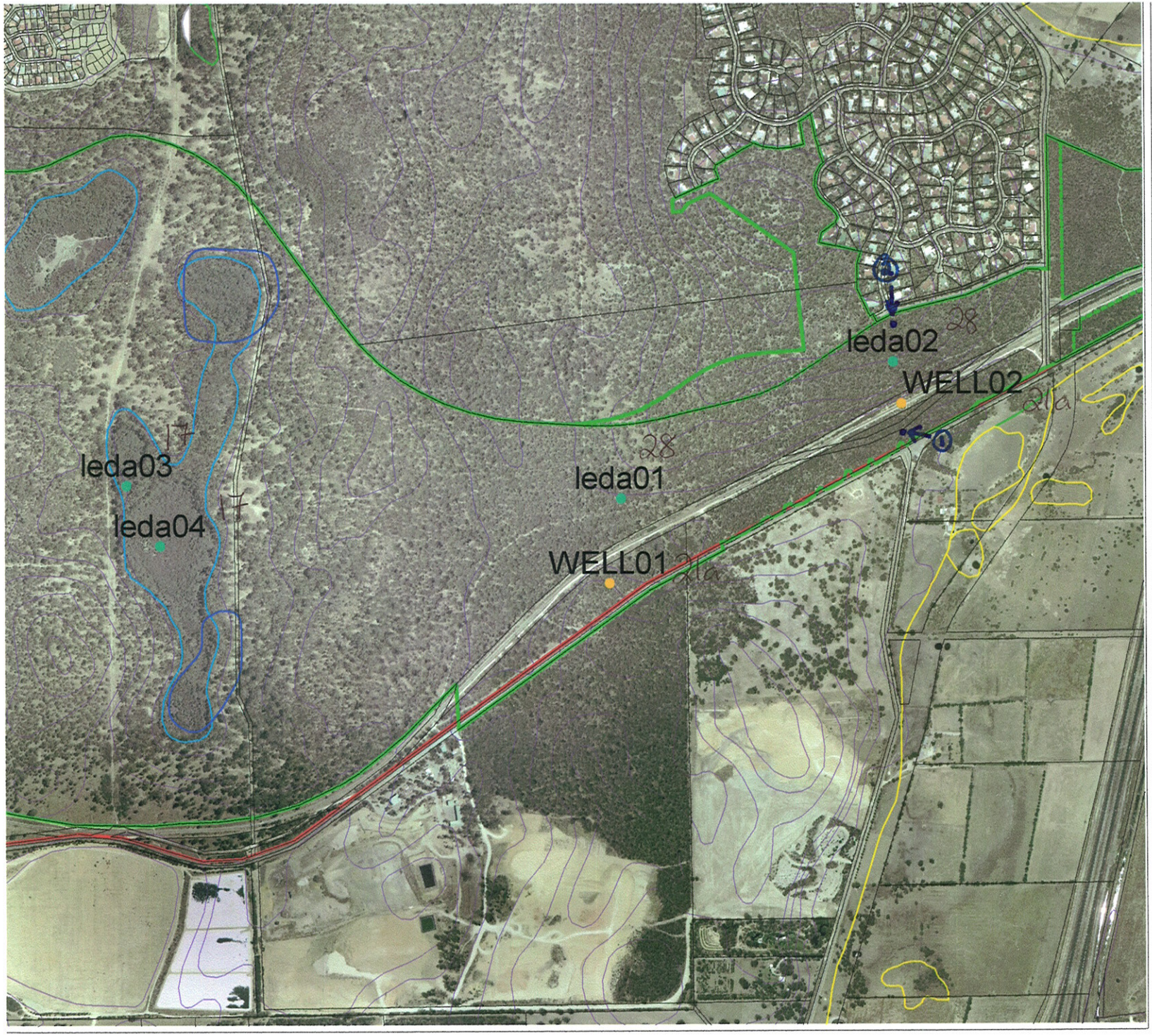
B T6/10/98

N


Rockingham Rd
Lot 50
VCL
Thomas Rd



Bush Forever Site 349: Leda and Adjacent Bushland, Leda



Bush Forever Site 349: Leda and Adjacent Bushland, Leda

Bush Forever Sites
Bush Forever, MRS Ammendments
Local Government Authority Boundaries
Lakes EPP
Geomorphic Wetlands Feb04 by Evaluation
Conservation
Resource Enhancement
Multiple Use
No longer a wetland
Not Assessed
Floristic Survey Sites of the Southern Swan Coastal Plain
GJKENV (Keighery 1996)
GRIFFIN (Griffen 1994)
SCP (Gibson et al 1994)
SYS6ENV (DEP 1996 and Trudgen & Keighery 1995)
SYS6ENV2 (DEP 1996 and Trudgen & Keighery 1995)
CALM Threatened Ecological Communities 2002
Roads - Perth Metropolitan

N

1:15000

100 0 100 Meters

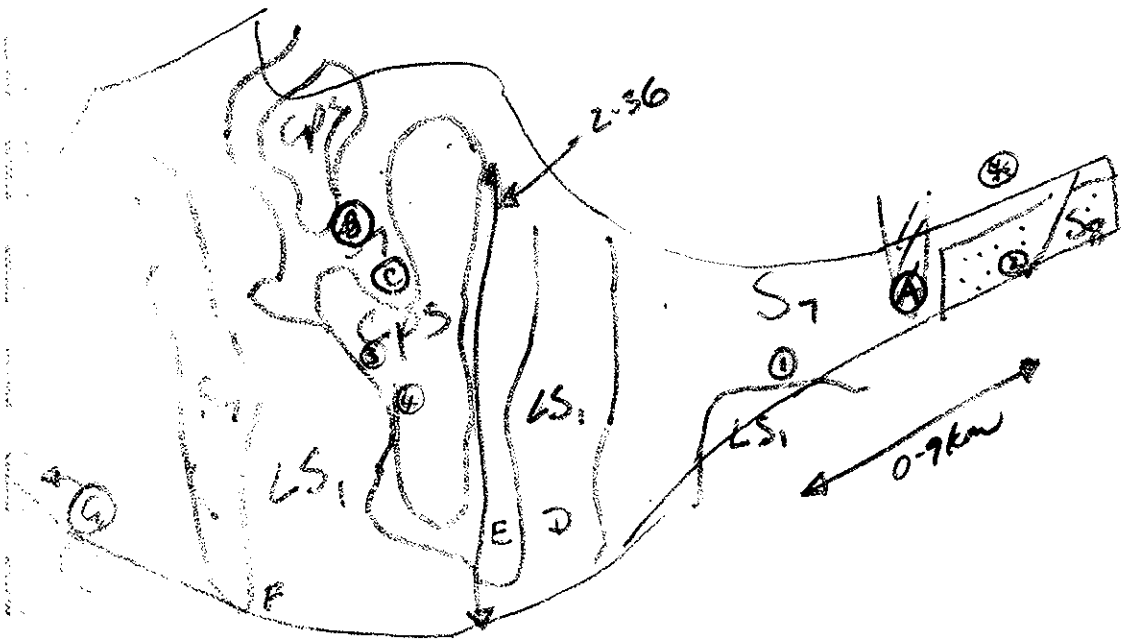
Datum: GDA - Projection: MGA Zone 50

Department of Environment

Data Sources:
Cadastre DLI
Aerial Phototography : Skyview DLI

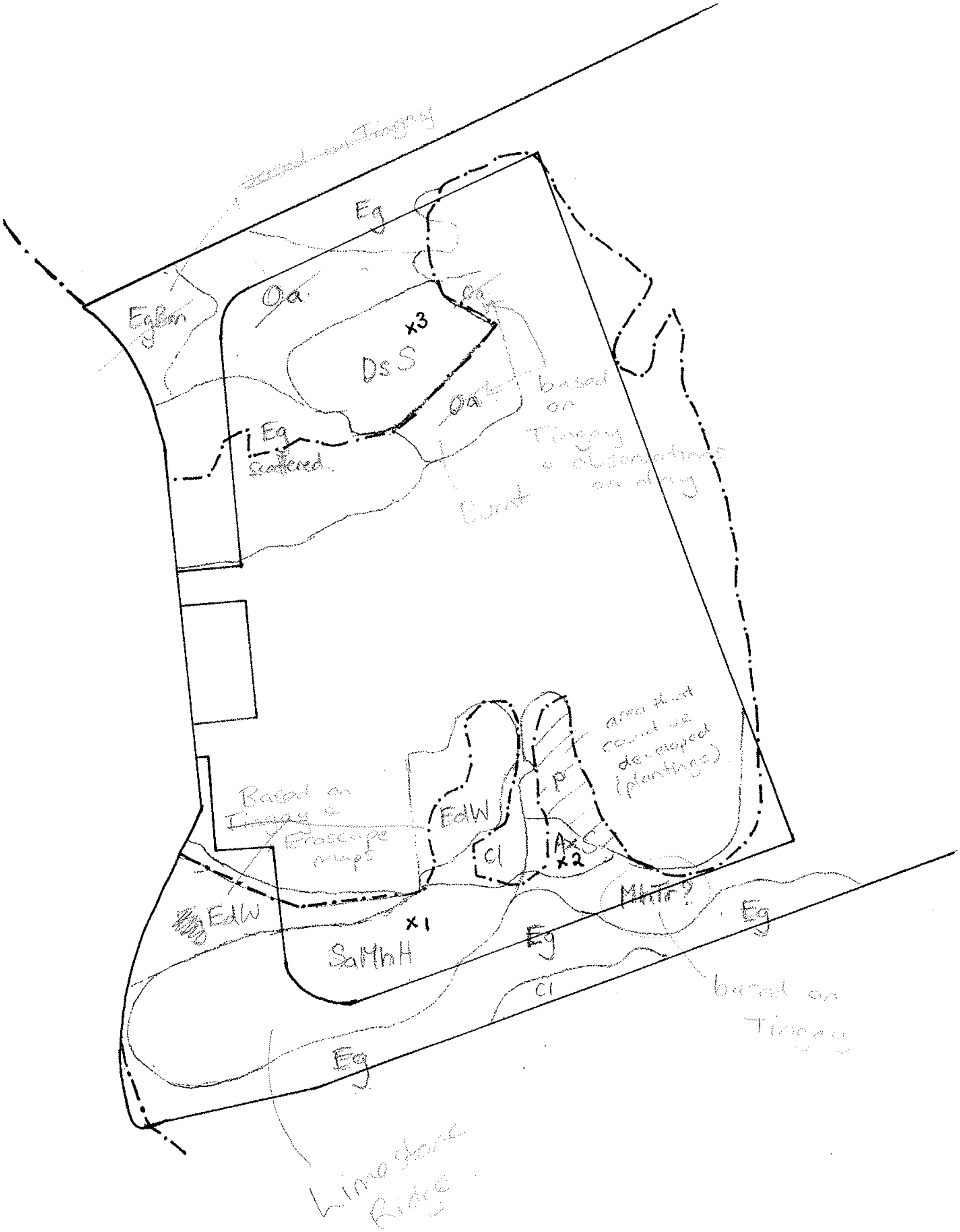
LEDA 02

M.104



Cps	PEATY CLAY
LS_1	LIMESTONE
S_7	SAND
S_8	SAND

Map 5



Eg
Oa
x3
based on Tingay & observations on day
Burnt
Eg scattered
EdW
P
area that cannot be developed (plantings)
Based on Tingay & Eroscape maps
Cl
x2
x1
Eg
Cl
Eg
based on Tingay
Limestone Ridge

BPS 349

nth of Thomas Rd

Cadastre

Contours - 5m (DOLA)

← 652

1043 – Crown Reserve (class)
6B vacant Crown Land

MRS zoning – P&R

Cottesloe Complex – C & S
(19% proposed for protection)

Not part of System 6.

* Access for core conservation (veg).

NB: No veg surveys have been done by CSR

Map Ident: plot000228_2

Prepared By: Catherine Thomson

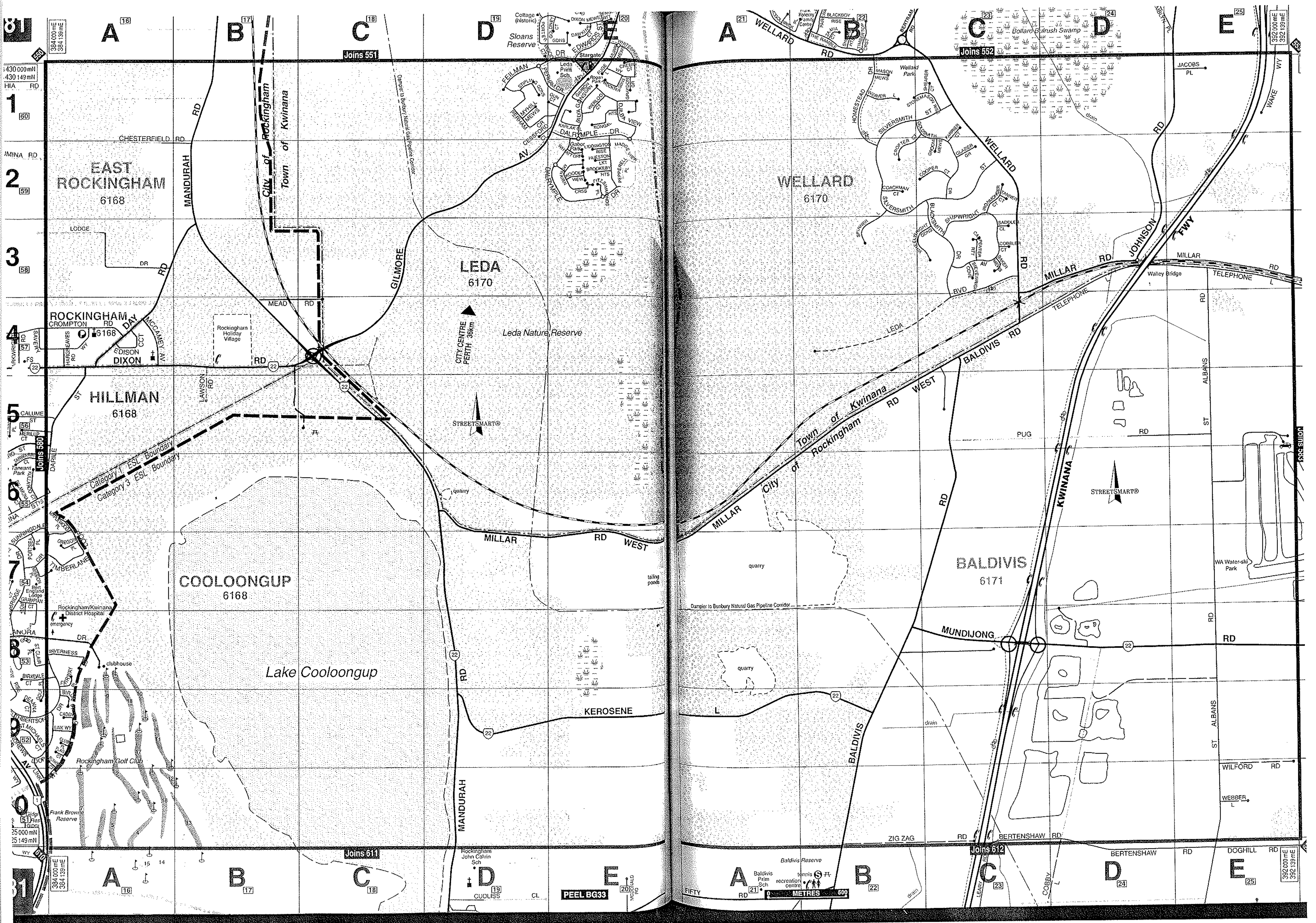
Prepared For: CT

Date: 28 Feb 2000

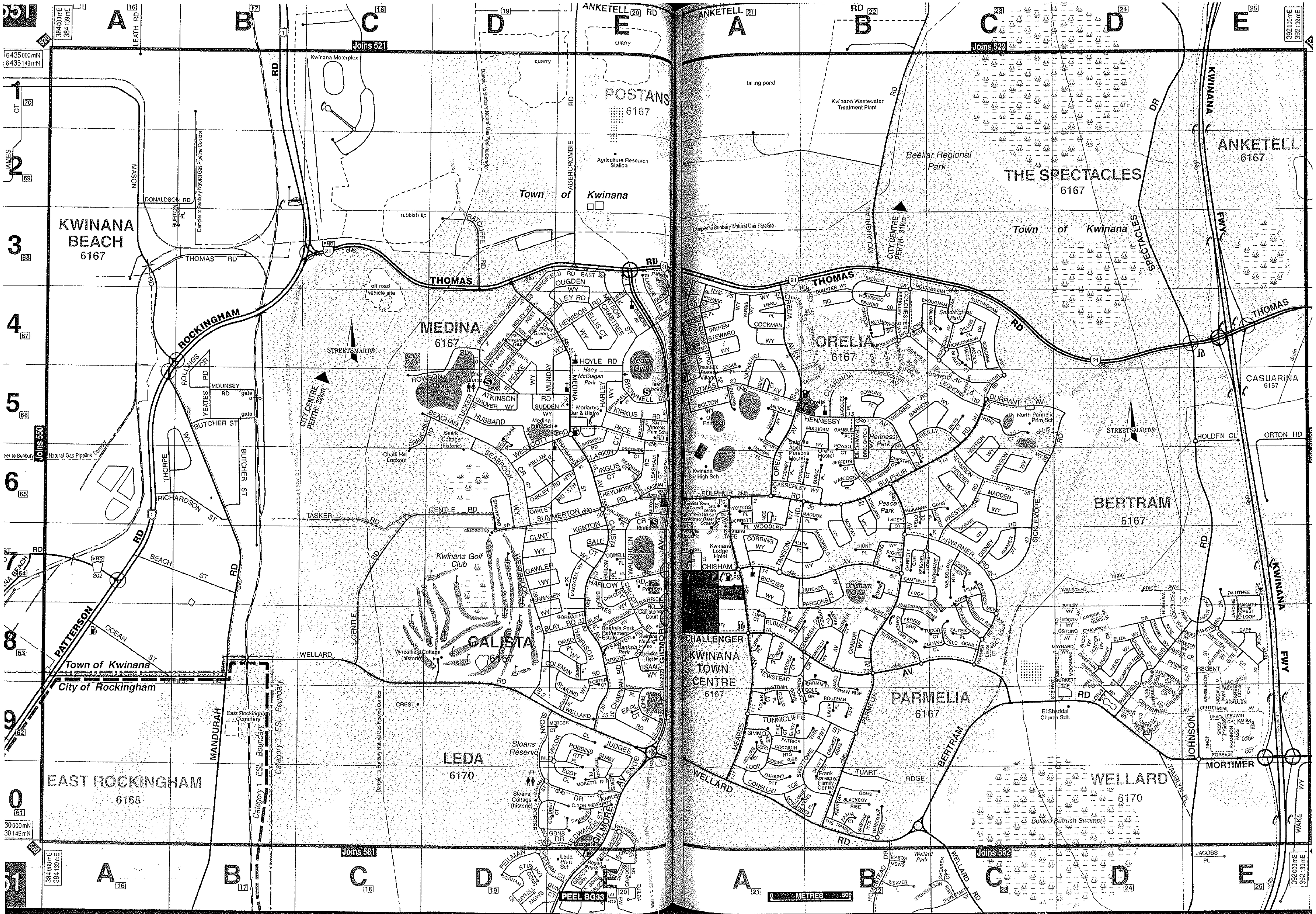
Scale 1:4864

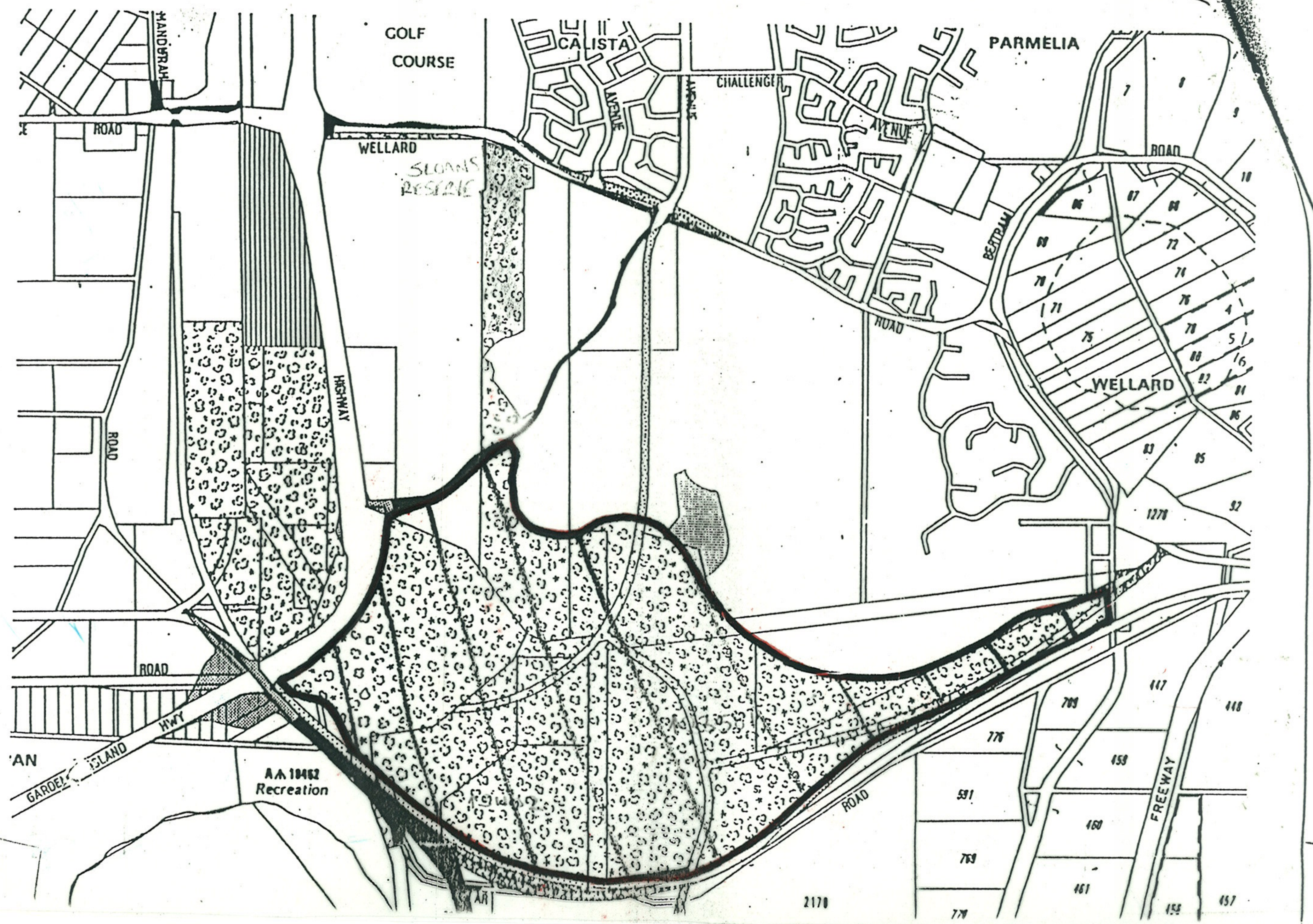
0 125 m

MFP INTERNAL USE ONLY

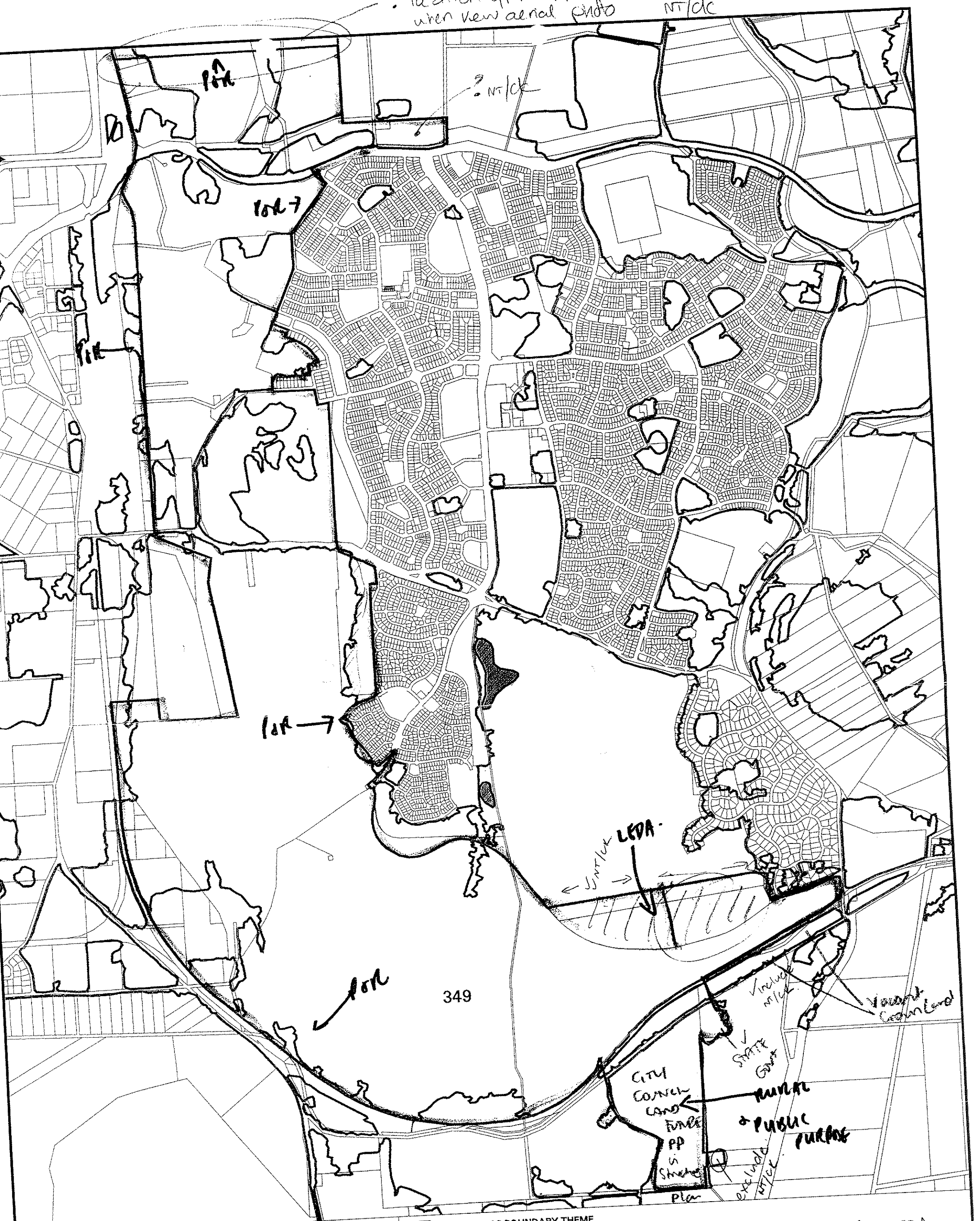


Joins 551
Joins 552
Joins 611
Joins 612
Joins 580
PEEL BG33
EAST ROCKINGHAM 6168
ROCKINGHAM 6168
HILLMAN 6168
COOLOONGUP 6168
LEDA 6170
WELLARD 6170
BALDIVIS 6171
Lake Cooloongup
Leda Nature Reserve
Rockingham Holiday Village
Rockingham Golf Club
clubhouse
Frank Browne Reserve
Rockingham/Kwinana District Hospital
emergency
Bert England Lodge
Sloans Reserve
Leda Prim Sch
Stargate
Wellard Park
Bollard Bulrush Swamp
Walley Bridge
WA Water-ski Park
Baldivis Reserve
Baldivis Prim Sch
recreation centre
tennis
Rockingham John Calvin Sch
CITY CENTRE PERTH 36km
City of Rockingham
Town of Kwinana
Category 1 ESL Boundary
Category 3 ESL Boundary
Dampier to Bunbury Natural Gas Pipeline Corridor
quarry
tailing ponds
drain
STREETSMART®
MANDURAH RD
CHESTERFIELD RD
LODGE DR
MEAD RD
DIXON RD
CROMPTON RD
DAY
MCCAMEY AV
EDISON CCT
LAWSON RD
GILMORE AV
DALRYMPLE DR
MILLAR RD WEST
MILLAR RD
KEROSENE L
BALDIVIS RD
WELLARD RD
JOHNSON RD
KWINANA FWY
TELEPHONE L
MUNDIJONG RD
PUG RD
ST ALBANS RD
WILFORD RD
WEBBER L
ZIG ZAG RD
BERTENSHAW RD
DOGHILL RD
JACOBS PL
WAKE WY
SILVERSMITH ST
SAVERSMITH DR
SHIPWRIGHT AV
HOMESTEAD DR
FIFTY RD
CUDLISS CL
COBBY L
LEARY
METRES 0 500
384 000mE
384 139mE
392 000mE
392 139mE
6430 000mN
6430 149mN
6425 000mN
6425 149mN


551
Joins 521
Joins 522
Joins 550
Joins 581
Joins 582
PEEL BG33
POSTANS 6167
KWINANA BEACH 6167
Town of Kwinana
MEDINA 6167
ORELIA 6167
THE SPECTACLES 6167
ANKETELL 6167
CASUARINA 6167
BERTRAM 6167
CALISTA 6167
KWINANA TOWN CENTRE 6167
PARMELIA 6167
WELLARD 6170
LEDA 6170
EAST ROCKINGHAM 6168
City of Rockingham
Beeliar Regional Park
Kwinana Golf Club
Kwinana Wastewater Treatment Plant
Kwinana Motorplex
Agriculture Research Station
Bollard Bulrush Swamp
Sloans Reserve
East Rockingham Cemetery
THOMAS RD
ROCKINGHAM RD
PATTERSON RD
MANDURAH RD
KWINANA FWY
GILMORE AV
ANKETELL RD
WELLARD RD
BERTRAM RD
SICKLEMORE RD
MORTIMER RD
JOHNSON RD
SPECTACLES DR
GENTLE RD
ABERCROMBIE RD
CITY CENTRE PERTH 32km
CITY CENTRE PERTH 31km
METRES 500



MANDURAH
GOLF
COURSE
CALISTA
PARMELIA
CHALLENGER
AVENUE
ROAD
WELLARD
SLOANS
RESERVE
HIGHWAY
ROAD
BERTRAM
ROAD
WELLARD
ROAD
GARDEN ISLAND HWY
A 10462
Recreation
ROAD
FREEWAY



(1) ?? NTH END of LEDA
.. some blocks included appear to be quite 'scrappy'

(2) ?? on PtK & NTH
... appear to not be reflected on ground

(3) include VCL

CSR Land Swap -
want to exchange NW & NE corner of BS 349 for part of existing BS 395.

NB: Motorplex to go in western part of NW corner BS 349 & hill in NW corner wanted by CSR for fill.
May mine NE corner of BS 349 later depending on negotiations with BS 395

BPS 349
nth of Thomas Rd

Cadastre

Contours - 5m (DOLA)

For Brouwer to keep

Map Ident: plot000228_2
Prepared By: Catherine Thomson
Prepared For: CT
Date: 28 Feb 2000
Scale 1:4864
0 125 m
MFP INTERNAL USE ONLY

REQUIREMENT FOR
ERN RAILCAR DEPOT

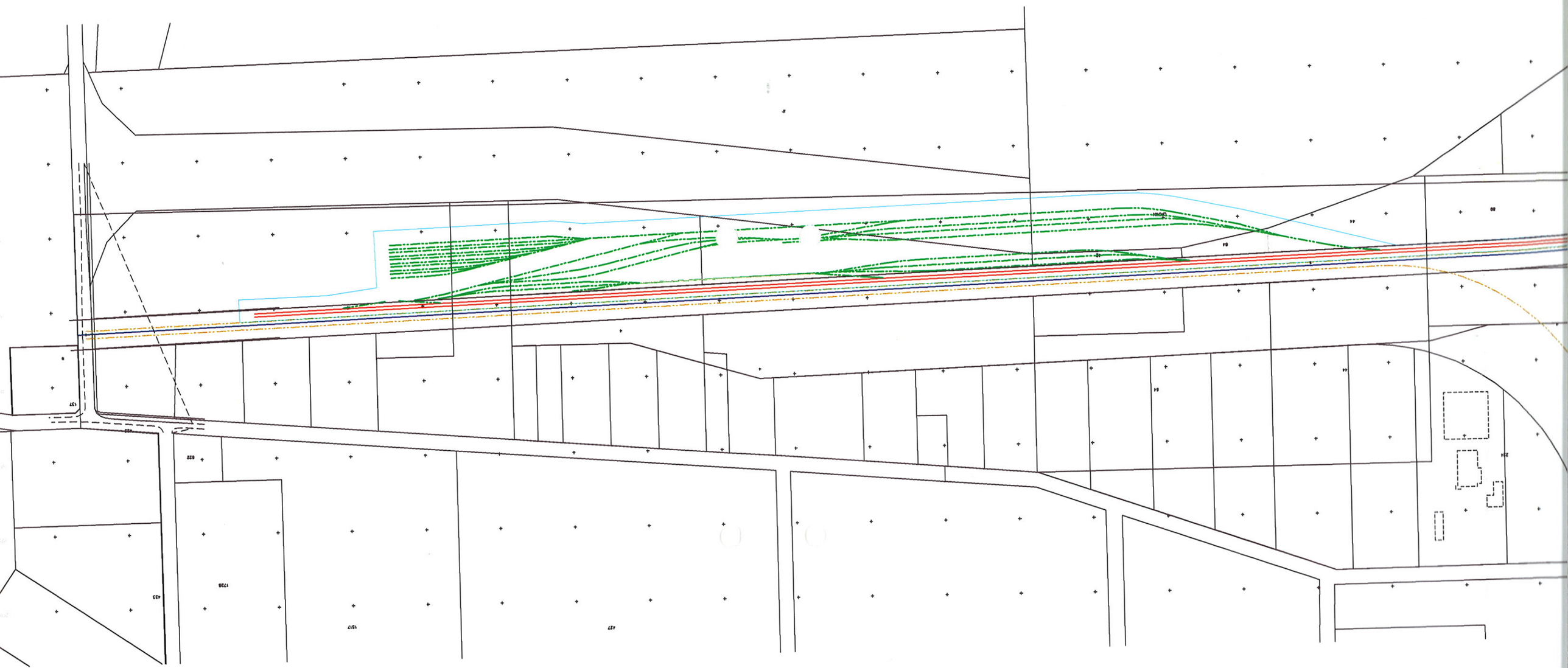
LAND REQUIREMENT

LAND REQUIREMENT
JOINS TO EXISTING MRS RESERVE

LAND REQUIREMENT
ADDITIONAL TO EXISTING MRS RESERVE

ATTACHMENT A

Scale 1:2500



BPS 349
nth of Thomas Rd

for CSR proposal.

Cadastre

Contours - 5m (DOLA)

Lot 50
Thomas Rd
1043

Rubbish tip

P29 Limestone ridge leading over Banksia Woodland towards gas pipeline easement

Condition: Good - V. good with severe localised disturbance.

P26 27 & 28.
V. Weedy
Fountain Grass
Eragrostis

P30 P31 P32

4x P35 Acacia heath (old)

Tuart/Banksia Woodland

P7

x3 P33 P34 Acacia heath

Tuart/Banksia Woodland
Good - Degraded

Off road vehicle site

← 656

← Crown - no lot #

1043 - Crown Reserve (Class)
656 - Vacant Crown Land

MRS Zoning - P&R.

Cottesloe Complex - C & S
(19% proposed for protection)

Not part of System 6.

* Assess for core conservation areas.

NB: No veg. surveys have been done by CSR.

Map Ident: plot000228_2
Prepared By: Catherine Thomson
Prepared For: CT
Date: 28 Feb 2000
Scale 1:4864
0 125 m

BPS 349

Map 87

ATTACHMENT A

LAND REQ

LAND REQUIREMENT
ADDITIONAL TO EXISTING MRS RESERVE

NOTE

DETAILS OF DEPOT LAYOUT SUPPLIED BY DEPARTMENT OF TRANSPORT

Rochelle Greenwell.

SCALE

0 20 40 60 80 100 120 140 160 180 200 metres

1:2000

SOUTH WEST METROPOLITAN RAILWAY - MASTER PLAN

ALTERNATIVE PROPOSED LOCATION FOR THE EAST ROCKINGHAM RAILCAR STORAGE AND DEPOT FACILITY

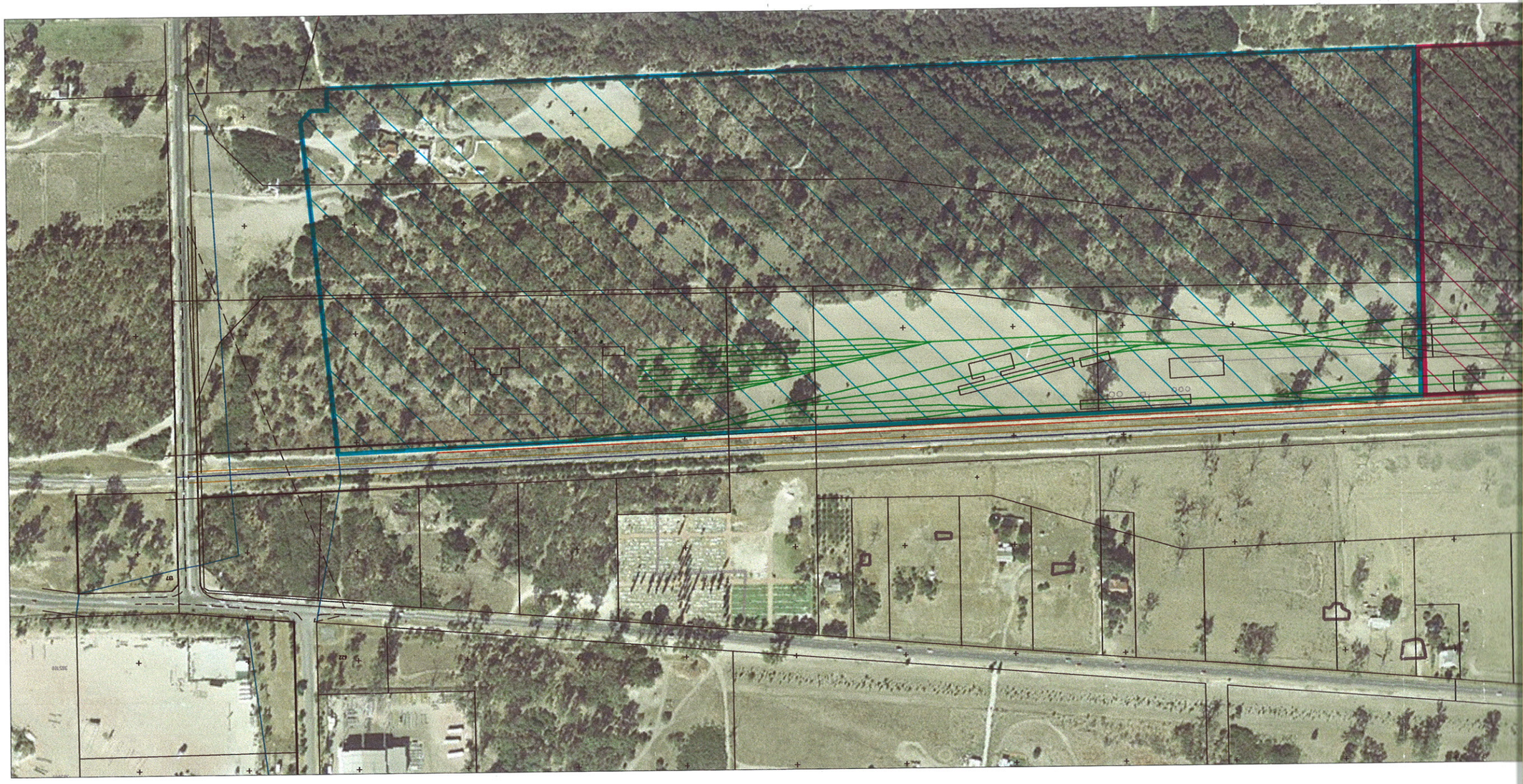
BAR CODE

DRAWN PS JAN 2000
DESIGNED
REVISED
AUTHORISED JS JAN 2000
EXAMINED JS JAN 2000
APPROVED
DATE

NORTH

SCALE 1:2000

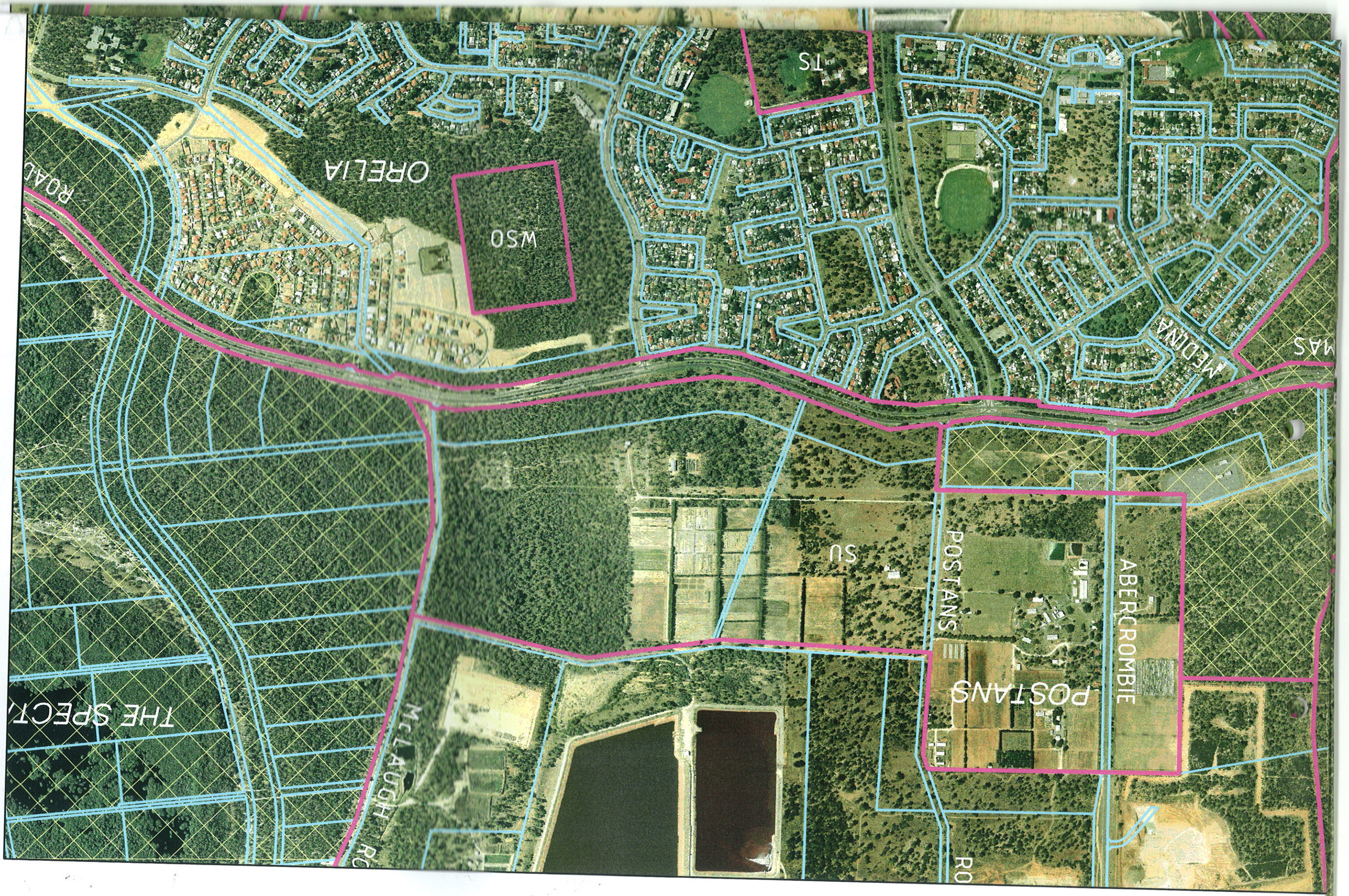
FILE REF 835 / 2 / 28 /7
PLAN REF
PLAN No. REVISION
SHEET No.

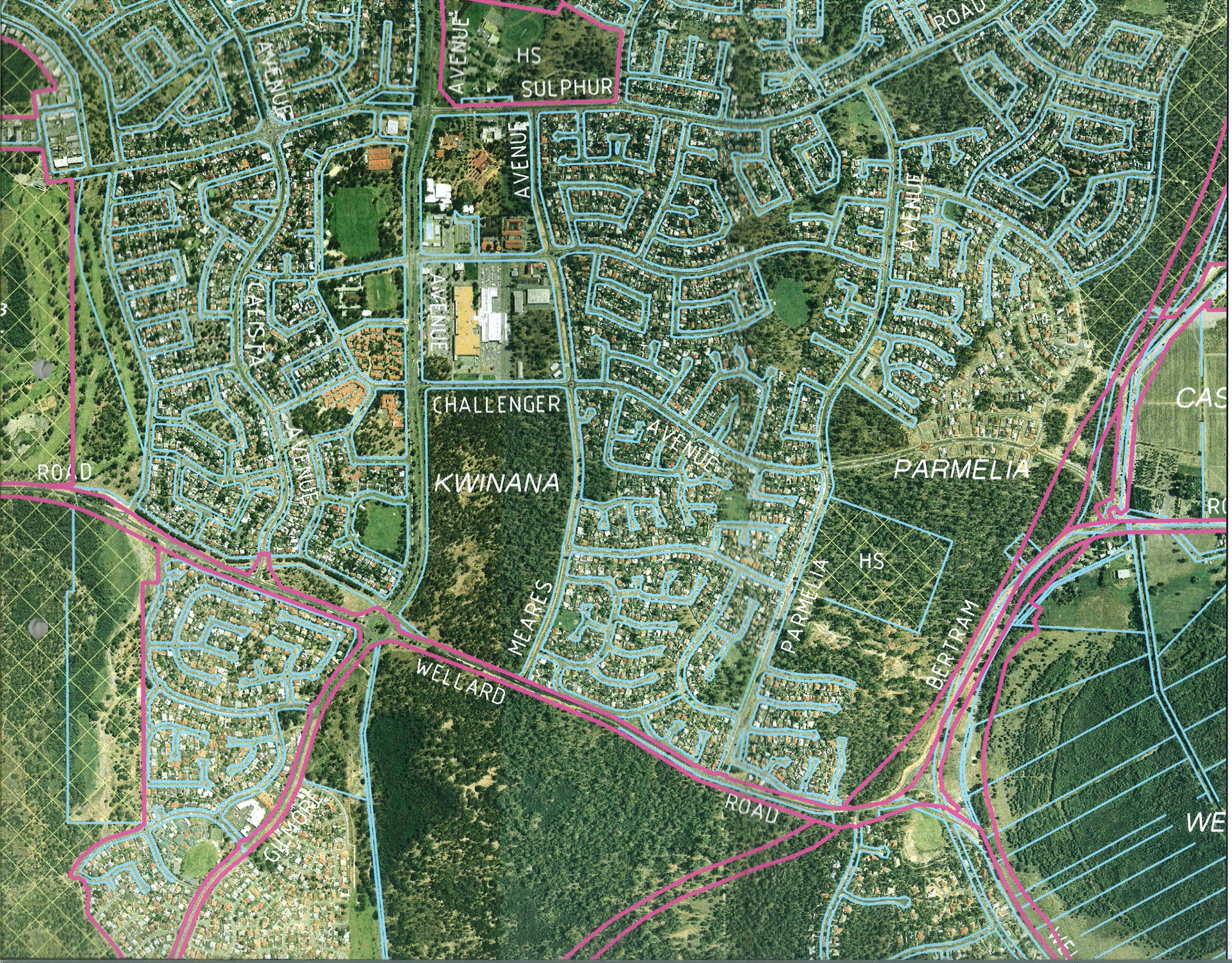


RAILWAYS RESERVATION IN THE MRS

PARKS AND RECREATION RESERVATION IN THE MRS

PLANNING
WESTERN AUSTRALIA
Ministry for Planning


TS
WSO
ORELIA
ROAD
MEDINA
MAS
SU
POSTANS
POSTANS
ABERCROMBIE
THE SPECTR
MCLAUGH
RO


AVENUE
HS
SULPHUR
AVENUE
AVENUE
AVENUE
CALISTA
AVENUE
CHALLENGER
AVENUE
KWINANA
ROAD
PARMELIA
HS
MEARES
PARMELIA
BERTRAM
WELLARD
ROAD
GILMORE

LEDA

ROAD

BALDIVIS

ROAD

PUG

SU

ROAD

FREEWAY

MILLAR

N

SCALE 1:10000

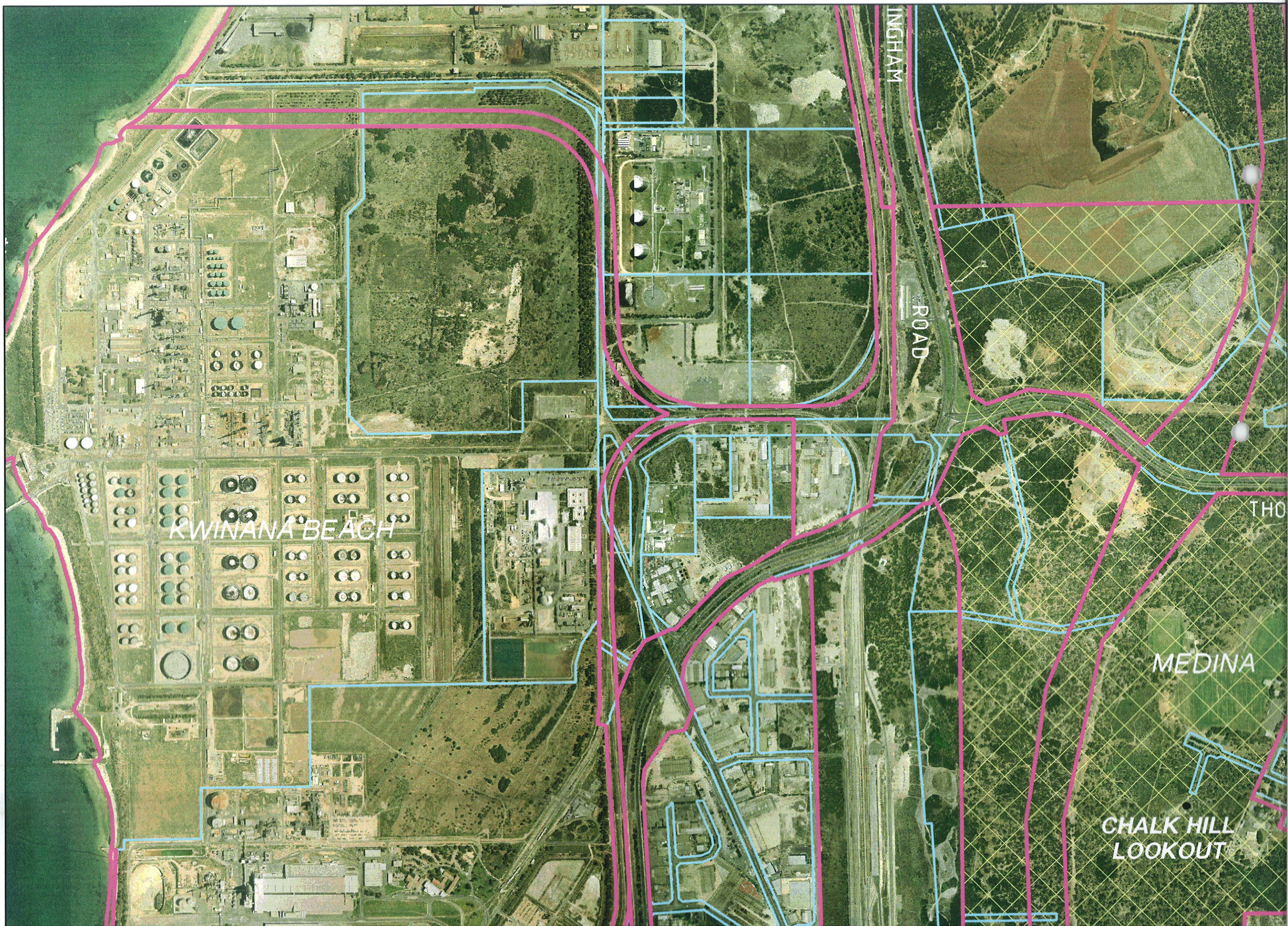
400m 0 400m

EAST ROCKINGHAM MARSHALLING YARDS

AERIAL PHOTOGRAPHY - ORTHO-RECTIFIED

ORIGINAL PHOTOGRAPHY - DEPARTMENT OF LAND ADMINISTRATION
FLOWN: JANUARY 2000 SCALE: 1:20000

POSITIONAL ACCURACY + or - 10 metres


INGHAM
ROAD
KWINANA BEACH
MEDINA
CHALK HILL
LOOKOUT
THO

CHALK HILL/
LOOKOUT

ROAD

ROAD

BEACH

ROAD

GENTLE

KWINANA CLU
GOLF COURS

CALISTA

KWINANA

ROAD

WELLARD

CHARLES

OFFICE

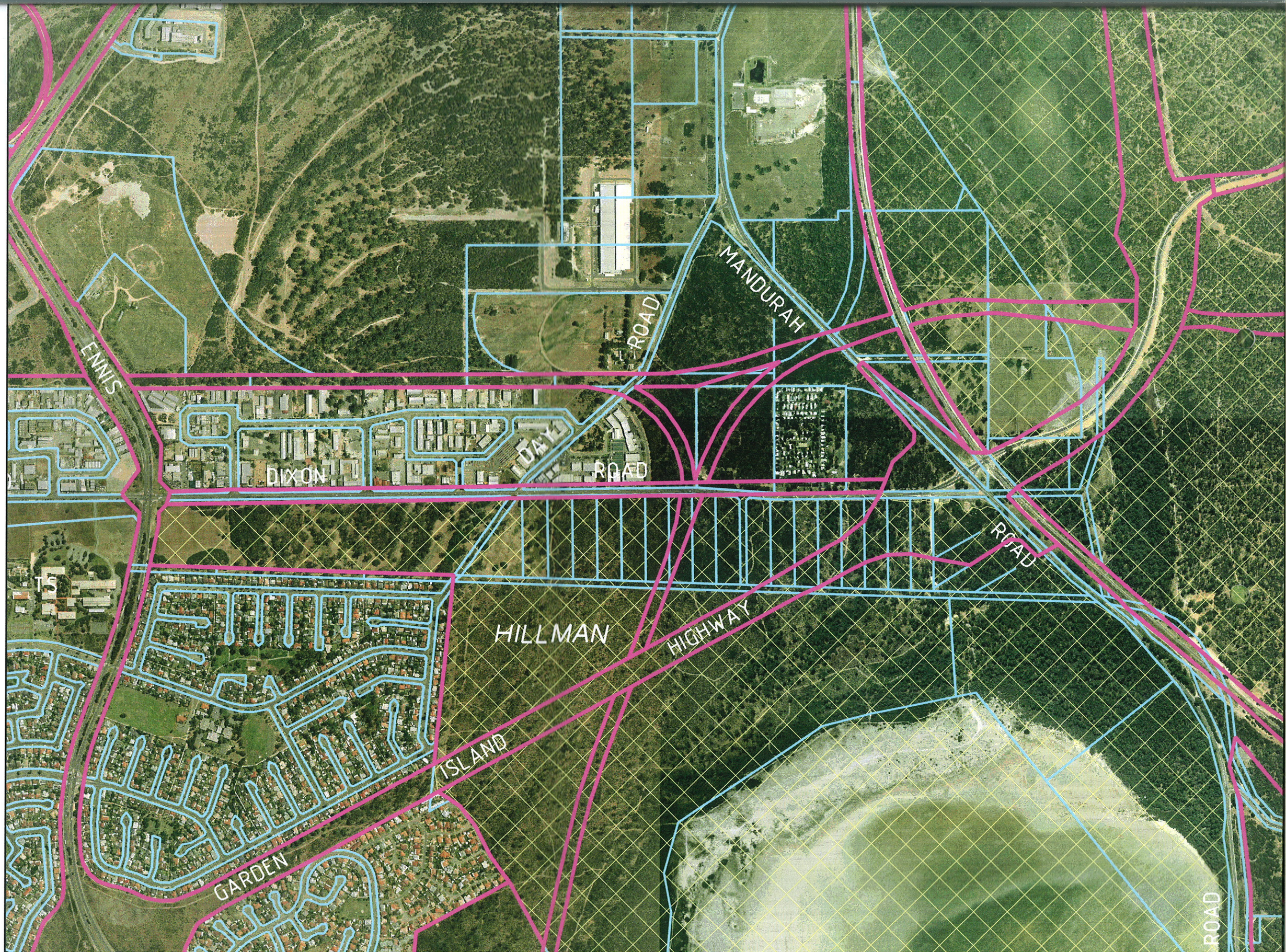
ROAD

STREET

MANDURAH

PATTERSON

EAST ROCKINGHAM


ENNIS
DIXON
DAY
ROAD
MANDURAH
ROAD
ROAD
HILLMAN
HIGHWAY
ISLAND
GARDEN
TS
ROAD

THE GOVERNMENT OF WESTERN AUSTRALIA

PLANNING
WESTERN AUSTRALIA
MINISTRY FOR PLANNING

CUSTOMER FOCUS
WESTERN AUSTRALIA

PRODUCED BY STATUTORY MAPPING SECTION, GEOGRAPHIC AND PLANNING INFORMATION BRANCH

LEGEND

- CADASTRE
- BUSHPLAN SITES - PUBLIC COMMENT NOV 1998
- METROPOLITAN REGIONA L SCHEME BOUNDARY

MIOH RESERVES C31102 & C33581, LEDA

Note Gas pipeline Rd

0.6km railway to 1.7km Bank Woodland (sim Ø1) in good to very good cond.
End at limestone knoll.

N Rd exit
4.6 km

M104 Reserves C31102 and C33581, Leda

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
Murdoch Branch Wildflower Society

M104 Reserves C31102 and C33581, Leda		
M104.1 Reserve C33581 be vested in Shire of Kwinana.	Implementation Progressing	CALM and Local Authority agree CALM could manage the reserve. Structure plan outlining conservation proposals for the area has been prepared. DPUD progressing Metropolitan Region Scheme amendments. The reservations are being progressed by DOLA.
M104.2 Vacant Crown land be declared Class " C" Reserve for Parkland, vested for limited period of ten years in Town of Kwinana. and managed under a published management plan.	Implementation Progressing	CALM and Local Authority agree CALM could manage the reserve. Structure plan outlining conservation proposals for the area has been prepared. DPUD progressing Metropolitan Region Scheme amendments. The reservations are being progressed by DOLA.
M104.3 Ways and means of protecting conservation value of Kwinana lot 533 be sought through planning procedures.	Implementation Progressing	CALM and local authority agree CALM could manage the reserve. Structure plan outlining conservation proposals for the area has been prepared. DPUD progressing Metropolitan Region Scheme amendments. The reservations are being progressed by DOLA. Wetlands Conservation Society has an interest in this area.

- CALM manage vested NPNCA

SHEET 1: System 6 - REPORT Information Search Date _____

Please circle the appropriate response or respond in the space provided.

Area M/04 Name Leda

Title An Environmental Assessment of Structure Plans for Leda

Published/(Unpublished) Date April 1991

Author/s Halpern, Glick & Maunsell & Alan Tingay and Assocs

Location of Publication ? DPUD

Purpose (why was the report prepared?) planning - development

Government LANDCORP

Corporate

Community Group

Management Plan

Soils

Units mapped 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

Trees Shrubs Herbs Sedges Weeds Significant Taxa DRF CALM Priority Other

? **Fauna**

Timing %completion

Mammals Birds Significant Taxa Sched1 Sched2 Other

Reptiles Invertebrates

Vegatation Condition

Site based Mapped Units

Disturbance Factors

Phytophthora observed Other incidental

tested itemised

Notes

System 6 Update - Floristic Community Type Mapping Information **DRAFT ONLY**

AREA INFORMATION

System 6 Area (C or M) or Update Area (Update) M104

Conservation Area	
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 S6 :	Bound	Area (ha)	Area(ha)
adjacent	G : WELL			
21a	Ø1 (3) Ø2 (2.5)			

Boundaries determined by use of

aerial photograph	Metro Street Directory run 8 5049,51 run 9 5138
orthophoto	2033 II NW
vegetation map	
soil map	

Department of Environmental Protection System 6 Update: Site Based Flora List M104 Reserves C31102 and C33581, Leda
(~~121~~ taxa, Leda Sites 1-4, B.J. Keighery, 31/3/95)

DEP

Amaranthaceae
Ptilotus drummondii

Anthericaceae
Caesia micrantha
Chamaescilla corymbosa
Sowerbaea laxiflora
Thysanotus patersonii
Tricoryne tenella
Laxmania squarrosa

Apiaceae
Centella cordifolia
Eryngium pinnatifidum subsp. pinnatifidum scps
Homalosciadium homalocarpum
Hydrocotyle pilifera var. pilifera
Trachymene pilosa

ARACEAE
*Zantedeschia aethiopica

Asteraceae
Asteridea pulverulenta
Gnaphalium sphaericum
* Hypochaeris glabra
Ixiolaena viscosa
Lagenifera huegelii
Millotia tenuifolia
Podolepis gracilis
Podotheca chrysantha
* Sonchus oleraceus
Siloxerus humifusus

*Ursinia anthemoides

Campanulaceae
Wahlenbergia preissii

Caryophyllaceae
* Cerastium glomeratum
* Petrorhagia velutina
* Silene gallica
* Stellaria media

Casuarinaceae
Allocasuarina fraseriana

Centrolepidaceae
Centrolepis drummondiana

Colchicaceae
Burchardia umbellata

Crassulaceae
Crassula colorata

Cyperaceae
Baumea arthrophylla
Baumea juncea
Gahnia trifida
* Isolepis marginata

Lepidosperma angustatum
Mesomelaena pseudostygia
Schoenus clandestinus
Schoenus grandiflorus
Tetraria octandra

Dasypogonaceae
Lomandra caespitosa
Lomandra sericea
Dasypogon bromeliifolius Lomandra nigricans
Lomandra preissii
Dennstaedtiaceae
Pteridium esculentum

Dilleniaceae
Hibbertia hypericoides
Hibbertia racemosa

Droseraceae
Drosera erythrorhiza
Drosera sp. scps
Drosera stolonifera subsp. stolonifera

Epacridaceae
Astroloma pallidum
Conostephium pendulum

Euphorbiaceae
Adriana quadripartita
Monotaxis grandiflora
Phyllanthus calycinus
Poranthera microphylla

Gentianaceae
* Centaurium erythraea

Geraniaceae
Geranium solanderi

Goodeniaceae
Dampiera linearis
Scaevola anchusifolia
Scaevola canescens

Haemodoraceae
Anigozanthos manglesii
Conostylis aculeata
Conostylis juncea
Haloragaceae
Glischrocaryon aureum

Iridaceae
* Romulea rosea
Patersonia occidentalis
Juncaceae
* Juncus bufonius
Luzula meridionalis

Juncaginaceae
Triglochin procerum

Lauraceae
Cassytha racemosa

Laniaceae
Hemiandra pungens

Lobeliaceae
Lobelia alata
Lobelia tenuior
Isotoma hypocrateriformis

Loganiaceae
Logania vaginalis
Mitrasacme paradoxa

Mimosaceae
Acacia pulchella
Acacia saligna
Acacia willdenowiana

Myrtaceae
Eucalyptus calophylla
Eucalyptus gomphocephala
Eucalyptus marginata
Melaleuca rhaphiophylla
Kunzea ericifolia

Orchidaceae
Caladenia flava
Caladenia latifolia

Orobanchaceae
* Orobanche minor

Papilionaceae
Bossiaea eriocarpa
Daviesia triflora
Gompholobium tomentosum
Hardenbergia comptoniana
Hovea trisperma var. trisperma
Jacksonia sternbergiana
* Trifolium dubium
Kennedia prostrata

Phormiaceae
Dianella revoluta var. divaricata

Poaceae
* Aira caryophyllea
* Briza maxima
* Briza minor
* Bromus diandrus
* Ehrharta calycina
* Lagurus ovatus
* Lolium rigidum
Microlaena stipoides
* Polypogon monspeliensis
Stipa compressa
Stipa flavescens
* Vulpia sp. scps
Danthonia occidentalis

Portulacaceae
Calandrinia liniflora

Primulaceae
* Anagallis arvensis var. arvensis FPR

Proteaceae
Banksia attenuata
Banksia grandis
Banksia menziesii
Dryandra nivea
Grevillea vestita
Persoonia saccata
Petrophile linearis
Stirlingia latifolia
Xylomelum occidentale
Synaphea spinulosa
Ranunculaceae
Clematis linearifolia

Restionaceae
Loxocarya flexuosa

Rubiaceae
Opercularia hispidula

Scrophulariaceae
* Dischisma capitatum
* Parentucellia viscosa

Solanaceae
Anthocercis ilicifolia
Solanum symonii
*Solanum nigrum
Stylidiaceae
Stylidium schoenoides
Levenhookia stipitata
Stylidium brunonianum
Violaceae
Hybanthus calycinus

Zamiaceae
Macrozamia riedlei
Xanthorrhoeaceae
Xanthorrhoea preissi

BS 349 Spearwood Sand

CONTACT DR N. GIBSON CALM WOODVALE for further information.
Flora list for M104 Reserves C31102 and C33581, Leda (extracted from Swan Coastal Plain database, Well 1-2, and B.J. Keighery sites Leda 1-4, 9/5/1995).

Department of Environmental Protection System 6 Update: Site Based Flora List M104 Reserves C31102 and C33581, Leda
(extracted from the CALM Swan Coastal Plain database sites Well 1-2 and B.J. Keighery sites Leda 1-4, ~~160~~ taxa combined, 9/5/95)

= 129 Native spp.
= 31 weeds

Amaranthaceae
Ptilotus drummondii

Anthericaceae
Caesia micrantha
Chamaescilla corymbosa
Laxmannia squarrosa
Sowerbaea laxiflora
Thysanotus arenarius
Thysanotus patersonii
Thysanotus sp. manglesianus/patersonii scps
Tricoryne tenella

Apiaceae
Centella cordifolia
Eryngium pinnatifidum subsp. pinnatifidum scps
Homalosciadium homalocarpum
Hydrocotyle pilifera var. pilifera
Trachymene pilosa
Xanthosia huegelii

Araceae
* Zantedeschia aethiopica

Asteraceae
Asteridea pulverulenta
Gnaphalium sphaericum
* Hypochaeris glabra
Ixiolaena viscosa
Lagenifera huegelii
Millotia tenuifolia
Podolepis gracilis
Podotheca chrysantha
Siloxerus humifusus
* Sonchus oleraceus
* Ursinia anthemoides

Brassicaceae
* Heliophila pusilla

Campanulaceae
Wahlenbergia preissii

Caryophyllaceae
* Cerastium glomeratum
* Petrorhagia velutina
* Silene gallica
* Stellaria media

Casuarinaceae
Allocasuarina fraseriana

29 = native
9 = weeds

CONTACT DR N. GIBSON CALM WOODVALE for further information.
Flora list for M104 Reserves C31102 and C33581, Leda (extracted from Swan Coastal Plain database, Well 1-2, and B.J. Keighery sites Leda 1-4, 9/5/1995).

Centrolepidaceae
Centrolepis drummondiana

Colchicaceae
Burchardia umbellata

Crassulaceae
Crassula colorata

Cyperaceae
Baumea arthrophylla
Baumea juncea
Gahnia trifida
Isolepis cernua
* Isolepis marginata
Isolepis sp. scps
Lepidosperma angustatum
Mesomelaena pseudostygia
Schoenus clandestinus
Schoenus grandiflorus
Tetraria octandra

Dasypogonaceae
Dasypogon bromeliifolius
Lomandra caespitosa
Lomandra micrantha
Lomandra nigricans
Lomandra preissii
Lomandra sericea
Lomandra suaveolens

Dennstaedtiaceae
Pteridium esculentum

Dilleniaceae
Hibbertia hypericoides
Hibbertia racemosa

Droseraceae
Drosera erythrorhiza
Drosera menziesii subsp. penicillaris
Drosera sp. scps
Drosera stolonifera
Drosera stolonifera subsp. stolonifera

Epacridaceae
Astroloma pallidum
Conostephium pendulum

Euphorbiaceae
Adriana quadripartita
Monotaxis grandiflora
Monotaxis occidentalis
Phyllanthus calycinus
Poranthera microphylla

60 = (N)

CONTACT DR N. GIBSON CALM WOODVALE for further information.

Flora list for M104 Reserves C31102 and C33581, Leda (extracted from Swan Coastal Plain database, Well 1-2, and B.J. Keighery sites Leda 1-4, 9/5/1995).

Gentianaceae
* Centaurium erythraea

Geraniaceae
Geranium solanderi

Goodeniaceae
Dampiera linearis
Scaevola anchusifolia
Scaevola canescens

Haemodoraceae
Anigozanthos manglesii
Conostylis aculeata
Conostylis juncea
Phlebocarya ciliata

Haloragaceae
Glischrocaryon aureum

Iridaceae
Patersonia occidentalis
* Romulea rosea

Juncaceae
* Juncus bufonius
Luzula meridionalis

Juncaginaceae
Triglochin procerum

Lamiaceae
Hemiandra pungens

Lauraceae
Cassytha racemosa

Lobeliaceae
Isotoma hypocrateriformis
Lobelia alata
Lobelia tenuior

Loganiaceae
Logania vaginalis
Mitrasacme paradoxa

Mimosaceae
Acacia pulchella
Acacia saligna
Acacia stenoptera
Acacia willdenowiana

Myrtaceae
Eucalyptus calophylla
Eucalyptus gomphocephala

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Flora list for M104 Reserves C31102 and C33581, Leda (extracted from Swan Coastal Plain database, Well 1-2, and B.J. Keighery sites Leda 1-4, 9/5/1995).

Eucalyptus marginata
Kunzea ericifolia
Melaleuca rhaphiophylla

Orchidaceae
Caladenia flava
Caladenia latifolia

Orobanchaceae
* Orobanche minor

Papilionaceae
Bossiaea eriocarpa
Daviesia triflora
Gompholobium tomentosum
Hardenbergia comptoniana
Hovea trisperma var. trisperma
Isotropis cuneifolia
Jacksonia sternbergiana
Kennedia prostrata
* Trifolium campestre
* Trifolium dubium

Phormiaceae
Dianella revoluta var. divaricata

Poaceae
* Aira caryophyllea
* Briza maxima
* Briza minor
* Bromus diandrus
Danthonia occidentalis
* Ehrharta calycina
* Lagurus ovatus
* Lolium rigidum
Microlaena stipoides
* Polypogon monspeliensis
Stipa compressa
Stipa flavescens
* Vulpia myuros
* Vulpia sp. scps

Portulacaceae
Calandrinia granulifera
Calandrinia liniflora

Primulaceae
* Anagallis arvensis
* Anagallis arvensis var. arvensis FPR

Proteaceae
Banksia attenuata
Banksia grandis
Banksia menziesii
Dryandra nivea
Grevillea vestita

110 = (N)
28 = (W)

CONTACT DR N. GIBSON CALM WOODVALE for further information.

Flora list for M104 Reserves C31102 and C33581, Leda (extracted from Swan Coastal Plain database, Well 1-2, and B.J. Keighery sites Leda 1-4, 9/5/1995).

Persoonia saccata
Petrophile linearis
Stirlingia latifolia
Synaphea polymorpha
Synaphea spinulosa
Xylomelum occidentale

Ranunculaceae
Clematis linearifolia

Restionaceae
Loxocarya flexuosa
Lyginia barbata

Rubiaceae
Opercularia hispidula

Scrophulariaceae
* Dischisma capitatum
* Parentucellia viscosa

Solanaceae
Anthocercis ilicifolia
* Solanum nigrum
Solanum symonii

Stylidiaceae
Levenhookia stipitata
Stylidium brunonianum
Stylidium piliferum
Stylidium schoenoides

Violaceae
Hybanthus calycinus

Xanthorrhoeaceae
Xanthorrhoea preissii

Zamiaceae
Macrozamia riedlei

129 = N
31 = W

BUSHPLAN SITE CASE STUDIES/ISSUES - BACKGROUND ON SITE SELECTION AND ASSOCIATED ISSUES from Meeting of 2/3/99

PART LOT 271/?254/?339 BUSHPLAN SITE 349 - LEDA AND ADJACENT BUSHLAND, LEDA

Issues relevant in the selection of the area of BS 349, additional to the area of P&R Reservation (see area indicated on Map 1, Map 88 from Volume 2, Part C Perth's Bushplan)

Issues 1 - Specific issues related to the selection criteria: Representation of ecological communities

Vegetation Complexes

Bassendean Dunes (Bassendean Complex — Central and South) and Spearwood Dunes (Karrakatta Complex — Central and South) and the interface of these are represented in the area. Less than 10% of the Karrakatta Complex — Central and South is proposed to be protected in Perth's Bushplan.

Floristic Community Types

The area is typical of and contains good examples of the regional floristic groupings typical of the vegetation complexes mapped, containing both floristic community type 21a, Central *Banksia attenuata — Eucalyptus marginata* woodlands, from Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau; and floristic community type 25, Southern *Eucalyptus gomphocephala — Agonis flexuosa* woodlands and 28, Spearwood *Banksia attenuata* or *B. attenuata — Eucalyptus* woodlands (most southerly occurrence sampled), both from Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes).

Vegetation and Flora: limited survey (DEP 1996 (Leda 01–04), EPA and WAWA 1990, Gibson *et al.* 1994 (Well 01–02), Weston 1993)

Structural Units

Uplands: *Eucalyptus marginata, E. gomphocephala* and *Allocasuarina fraseriana* Woodland; *Banksia menziesii, Eucalyptus marginata* and *Allocasuarina fraseriana* Low Woodland; *Banksia attenuata* and *B. grandis* Low Woodland; *Banksia attenuata* and *B. menziesii* Low Woodland with scattered emergent *Eucalyptus gomphocephala; Eucalyptus gomphocephala* Open Forest

Vegetation Condition: >70% Excellent to Very Good, <20% Good, 10% Degraded, with areas of severe localised disturbance (Weston 1993)

Total Flora: 129 native species and 31 weeds (estimated >60% expected flora) (DEP 1996 (Leda 01–04), Gibson *et al.* 1994 (Well 01–02))

Significant Flora: *Glischrocaryon aureum* (uncommon in the PMR)

Issue 2 - System 6 (1983)

Some of the eastern section of M104 was not included in P&R Reservation (see Map 2) even though the eastern portion is the area in best condition and is at the interface of the Bassendean and Spearwood Dune systems. Additional land was included to the north west and west of the System area but the vegetation in this area is in variable condition, generally poorer. The delineation of the boundaries of the P&R were not subject to environmental assessment.

Additional Comments in Relation to Proposed Negotiated Planning Solution Presentation

- The present P&R area is relatively narrow proposed protected area consolidates this with an additional bushland area in good to very good condition, proposal adds area but does not consolidate the narrow corridor to the east to improve long term management prospects.

• Road reserve seen as a constraint is not indicated on Map 2 Volume 1 Perth's Bushplan as a MRS reserved road under the MRS therefore it appears that there is tho opportunity to adjust the alignment of this road to achieve consolidation of the area.

Bushplan Map 74 - South East Quadrant:-

Currently there is no bushland recommended for this portion which is on the lower eastern edge of the map between Gaebler Road. Once again its retention under Bushplan may help the long term ambition of preserving the Jandakot groundwater mound. The bush is typical Banksia Woodland.

Bushplan Map 74 - South East Quadrant:-

The more southerly part of the map adjoining the Kwinana Freeway on its eastern side includes some wetlands which are not recommended as a Bushplan site. These extend on to map 81, the bush has some intense thickets of Malalueca and Eucalyptus Rudis. ***I recommend its retention.***

Bushplan Map 74 - Site [redacted]:-

This is situated in the north west quadrant of the map and abuts Fraser and Armadale Roads.

I are away that some very rare species of orchids are on this site including ***Caladenia Huegelii*** which has been documented by CALM's herbarium. The balance of the land has a great abundance of quite different plants which is often seen in other parts of Jandakot. ***I strongly suggest it be properly surveyed by a botanist during spring to determine its importance.***

Site 390 is subject to a sand mining license and a logical outcome maybe to provide the licensee with another less ecologically important site for sand mining, or by compensation for loss of the site. It is understand that the owner of the land is Homeswest. The sandmining has been in progress and here is an example indicating the need for a moratorium on such activity on Bushplan sites to be implemented as a matter of urgency.

Map 88 - Bushplan Site [redacted]:

I recommend that this site be extended further to the east to include the bushland just north of Millar Road and south east of the Leda Subdivision. The land is good quality Banksia Woodland.

Bushplan Site [redacted]:

I recommend that Cardup Nature Reserve be extended to include Lot 701, 703 to 708 inclusive.

Bushplan Site [redacted]

The good quality Tuart Woodland on Lot 1387 Kerosene Lane should be included in the site.

Leda 6/12/94

Photos Tuart regen in bushland to SW site Ø1

Slope to NW of site Ø1 looking to NE.

Photo to W of site Ø2 where Tuart begins, note change in condition

P29

Photo 30 & 31

0.5km from track site Ø1 to W along track // to Railway.

Photo 32 & 33

Tuart to NW of Lake - Limestone outcrop.

See notes on photo sheet

18/3/9?

[illegible]

[illegible] in [illegible]

[illegible]

[illegible] 58 [illegible] 57 [illegible]

eastern boundary [illegible]

[illegible] 57) [illegible]

- [illegible] in 57 [illegible]

- [illegible]

[illegible] to varying [illegible]

≈ 1km Stretch along old Mandurah Rd / [illegible] pipeline

Inspection began at [illegible] [illegible] along tracks N/S/N and NE [illegible] full length railway [illegible] along sites yet to [illegible] gaspipeline Road

Further notes on sheets and remnant veg x aerial map photocopy.

COND Good – grazing/cleaning new rabbits.

Species

Bank att ADJ. Scott Euc. gomph.
Xanth press
Acac. ?rost * Briza max
Cono. hypl. * Bromus diand.
Mel. acros. * Petro. velut.
Hibb hyp * Carp. edulis weed
Phyl. caly * Aira cary
Hovd comp * Vulp. myuros
Dry nivea * Hyp glab.
Danth ?occid * Sol. nig.
Stipa compressa
Lom. marsham.
Lyg bar.
Burch umbell.
Stipa flav.
Schoenus grandi
Scaev. Canescens.

Photo 36 from SW

Lat 32° 16.30' ± 188 m
Long 115° 48.06'
2 pegs paced out orientat. NW–SE

Gas pipeline Rd.

Sites Ø3 & Ø4 just to South.

Approx location of site Ø5

Site Ø5

Brown sand over limestone on NE slope ridge outcropping limestone.

Bank att (5-15m, 2-10% up to 10-30%) over Ac ?rost (>2m 10-30%) over Mel ac (1-0.5m 30-70%) over ? his (10-30%)

Locate site in valley to South

Gaspipeline Rd / Mandurah rd
Site 05 at end (toward S) of veg in Vgood cond
Banksia Woodland Swales with over stony Tuart (mostly) to Tuart on ridges.

Welland Rd 1km to entrance to 'Gas pipeline Rd'

FCT	Plot Name	TaxonID	*	Genus	Species	Infrasp	InfraspName	Informal	Consv
17	leda04	3527		Acacia	saligna				
17	leda04	740		Baumea	arthrophylla				
17	leda04	740		Baumea	arthrophylla				
17	leda04	743		Baumea	juncea				
17	leda04	2957		Cassytha	racemosa				
17	leda04	907		Gahnia	trifida				
17	leda04	8092		Ixiolaena	viscosa				
17	leda04	7400		Lobelia	alata				
17	leda04	5959		Melaleuca	rhaphiophylla				
17	leda04	7037		Solanum	symonii				
17	leda04	15820		Triglochin	linearis				
17	leda04	-976	*	Anagallis	arvensis var. arvensis FPR				
17	leda04	6539	*	Centaurium	erythraea				
17	leda04	1178	*	Juncus	bufonius				
17	leda04	582	*	Polypogon	monspeliensis				
17	leda04	8231	*	Sonchus	oleraceus				

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA LEOA SITE NUMBER LEOA 04

DATE TRIP 18/10/94 RECORDERS BJK

DATE TRIP 6-12-94 RECORDERS BJK

DATE TRIP _____ RECORDERS _____

BOTANIST _____

1. LOCATION of the QUADRAT

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

N

See LEOA 03

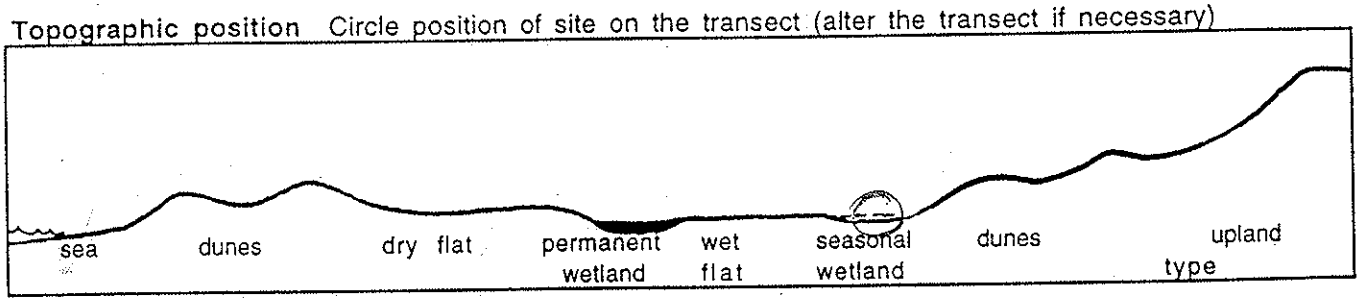
Road Location

Geographic Location Latitude 32° 16.75' S Longitude 115° 48.55' N Altitude ~10m

Reference Map Env. geol

Photograph Photographer's Name JA 6/12/94 Photo No 35

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



2. SITE DATA Circle the correct response.

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

Surface Soil ~~clay~~ clay Colour dark brown

Exposed rock type — % surface

Sub-surface Soil clay Colour dark brown

Rock type depth to rock

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

Litter	80 % cover	Bare Ground	/ %cover
Depth	0.5 cm		

sumpland

Env. geol : GPS

S4

BUSHLAND PLANT SURVEY RECORDING SHEET 2 (Muir)- use pencil only

3. VEGETATION STRUCTURE AND COVER

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

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

	TREES			MALLEES	
	over 30m	15 - 30m	5 - 15m ✓ / under 5m ✓	over 8m	under 8m
LIFE FORM			[Adj edge to 5m] — suckers make cover > 	Low Forest B. 	30m 10m 
COVER CLASS (%)			10-30% = (30-70	small trees.	
DOMINANT SPECIES			Mel rhaph. include suckers)		

	SHRUBS				SHRUBS
	over 2m	2m - 1.5m	1.5 - 1m	1 -0.5m	under 0.5m
LIFE FORM					2m 1m 
COVER CLASS (%)					
DOMINANT SPECIES					

	GRASSES	HERBS	SEDGES over 0.5m	under 0.5m
LIFE FORM			Open Tall Sedges 	Low Sedges 1m 
COVER CLASS (%)			10-30%	30-70
DOMINANT SPECIES			Gahnia trif	Baumea juncea

4. VEGETATION CONDITION

		COMMENTS
1 'PRISTINE'		Rabbit & Kangaroo traffic & grazing & shelter significant trampling
2 EXCELLENT	)	
3 VERY GOOD		Salt seeds? when dry. or calcium deposit.
4 GOOD		
5 DEGRADED		

0/4/95

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

SITE No	LEDA Ø4
Date	18/10/94
	6/12/94

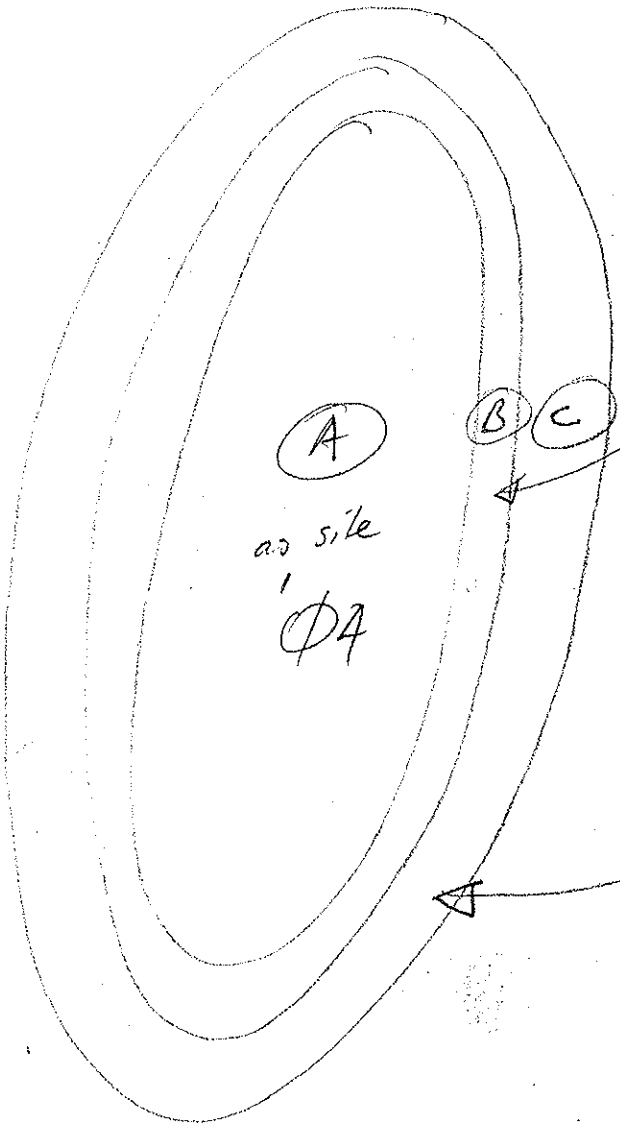
Label each plant with plants number, site code, date and plant's name or working name if required

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

TREES	No	Fl	ID	SHRUBS (cont.)	No	Fl	ID	HERBS (cont.)	No	Fl	ID
0 Mela. rhaphio				6/12/94							
0 Acacia saligna			0	*Centaurium eryth.							
				~~*Aster~~							
			0	Solanum (seedling = trust symonii)							
			0	*Anagalis arv.							
MALLEES			0	Cassytha racemosa							
				GRASSES							
				Grass (weed)							
			0	=*Polypogon monospel.							
SHRUBS											
								SEDGES			
							0	Gahnia trifida			
							0	Baumea juncea			
							0	Juncus bufonius			
				HERBS			0	Baumea ?arthro.	VSP		
			0	Triglochin procera				(no B. juncea seen on 6/12/94 but is			
			0	*Sonchus oleraceus				common towards			
			0	Lobelia alata	C	✓	✓	centre swamp so			
				(rosettes only)				may have been on 18/10/94,			
								area very dry)			
							✓	Edge swamp spec			
							0	Isolepis nodosa	VSP		

Do not keep, check.

PTO



Patches of
Baumea articulata
at edge also are
part (clumps) Lepid laev.

FCT	Plot Name	TaxonID	*	Genus	Species	Infrasp	InfraspName	Informal	Consv
17	leda03	3527		Acacia	saligna				
17	leda03	4582		Adriana	quadripartita				
17	leda03	6947		Anthocercis	ilicifolia				
17	leda03	1599		Caladenia	latifolia				
17	leda03	6214		Centella	asiatica				
17	leda03	10804		Clematis	linearifolia				
17	leda03	-20214		Eucalyptus	gomphocephala	var.	gomphocephala		
17	leda03	907		Gahnia	trifida				
17	leda03	3961		Hardenbergia	comptoniana				
17	leda03	6236		Hydrocotyle	pilifera				
17	leda03	6515		Logania	vaginalis				
17	leda03	5959		Melaleuca	rhaphiophylla				
17	leda03	7348		Opercularia	hispidula				
17	leda03	57		Pteridium	esculentum				
17	leda03	-976	*	Anagallis	arvensis var. arvensis FPR				
17	leda03	8231	*	Sonchus	oleraceus				

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA LEOA SITE NUMBER LEOA Ø3

DATE TRIP 18/10/94 RECORDERS BJK

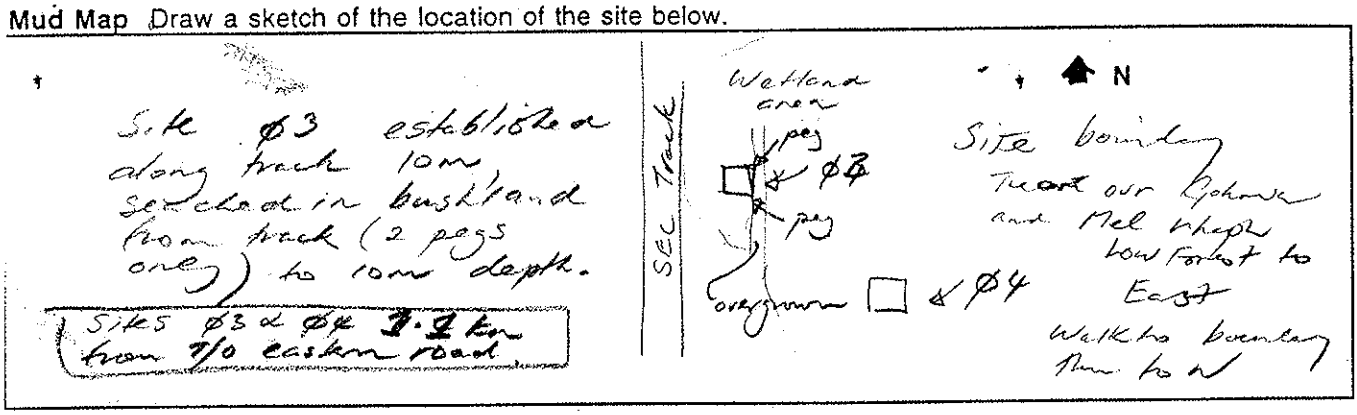
DATE TRIP 6-12-94 RECORDERS BJK

DATE TRIP _____ RECORDERS _____

BOTANIST _____

1. LOCATION of the QUADRAT

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



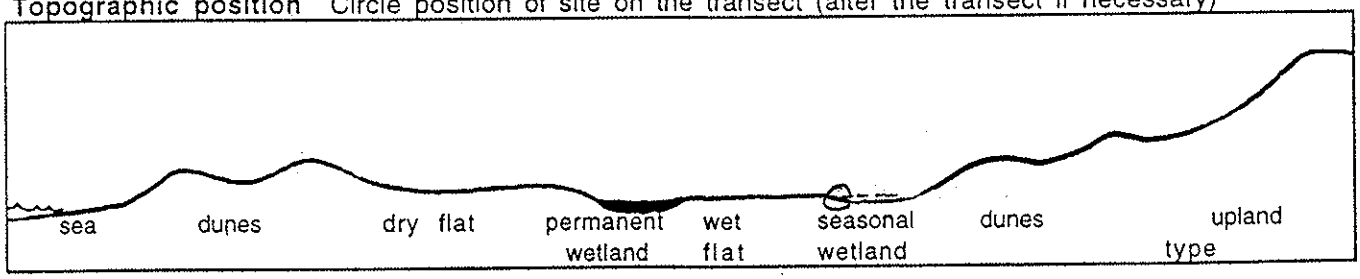
Road Location SEC Track LEOA

Geographic Location Latitude 32° 16·7' S Longitude 115° 48 6' N Altitude ≈ 10m

Reference Map Env. geol

Photograph Photographer's Name JA 6/12/94 Photo No 34

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



2. SITE DATA Circle the correct response.

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

Surface Soil humus rich sand Colour brown

Exposed rock type % surface

Sub-surface Soil ? clay Colour grey

Rock type depth to rock

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

Litter	100	% cover	Bare Ground	0	%cover
Depth	0·5	cm			

Env. geol : CPS

uplands, zone of C1

S4

BUSHLAND PLANT SURVEY RECORDING SHEET 2 (Muir)- use pencil only

3. VEGETATION STRUCTURE AND COVER

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

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

	TREES over 30m	TREES 15 - 30m	TREES 5 - 15m / under 5m ✓	MALLEES over 8m	MALLEES under 8m
LIFE FORM		Forest	Low forest B.		30m / 10m
COVER CLASS (%)		30-70%	30-70%		
DOMINANT SPECIES		Tuart	Acacia salig ✓		
		Euc. gomph.			

	SHRUBS over 2m	2m - 1.5m	1.5 - 1m	1 -0.5m	SHRUBS under 0.5m
LIFE FORM					2m / 1m
COVER CLASS (%)					
DOMINANT SPECIES					

	GRASSES	HERBS	SEDGES over 0.5m	under 0.5m
LIFE FORM		Dense Herbs		1m
COVER CLASS (%)		>70%		
DOMINANT SPECIES		Bracken	scattered Gahnia	trifida
		Pterid esc.		

4. VEGETATION CONDITION

		COMMENTS
1 'PRISTINE'		All tuarts & A saligna young (≈ 40 years for Tuarts A saligna 5)
2 EXCELLENT		
3 VERY GOOD	✓	
4 GOOD		
5 DEGRADED		

Towards the Road(W) becomes Tuart over Lepid long.

6/2/95.

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

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

SITE No	LFDA 03
Date	18/10/94
	6-12-94

Record on Sheet

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

	TREES	No	Fl	ID
0	Euc gomp			
0	Accacia saligna			0
	MALLEES			
	SHRUBS			
0	Hakea comp.			
0	Antho. ilicifs (long pan)	C		
0	Logania vaginalia	C		
0	Clematis microphylla			
0	Adriana quadripartita			

	SHRUBS (cont.)	No	Fl	ID
	6/12/94			
	/ Mel rhaphio			
	GRASSES			
	HERBS			
0	*Anagalis arvensis			
0	Caladenia ? latifolia (white)			
0	(Bracken) Pterid esculent.			
0	* Sonchus oleraceus			
0	Centella cordifolia	✓		✓
0	Opercularia hispidula			✓

	HERBS (cont.)	No	Fl	ID
	SEDGES			
0	Gahnia trifida			
	ADJ			
0	Hydrocotyle pilifera			

FCT	Plot Name	TaxonID	*	Genus	Species	Infrasp	InfraspName	Informal	Consv
28	leda02	3602		Acacia	willdenowiana				
28	leda02	1728		Allocasuarina	fraseriana				
28	leda02	11261		Anigozanthos	manglesii	subsp.	manglesii		
28	leda02	6334		Astroloma	pallidum				
28	leda02	17234		Austrostipa	compressa				
28	leda02	1834		Banksia	menziesii				
28	leda02	3710		Bossiaea	eriocarpa				
28	leda02	12770		Burchardia	congesta				
28	leda02	1276		Caesia	micrantha				
28	leda02	1125		Centrolepis	drummondiana				
28	leda02	11299		Chamaescilla	corymbosa	var.	corymbosa		
28	leda02	6348		Conostephium	pendulum				
28	leda02	1418		Conostylis	aculeata				
28	leda02	7454		Dampiera	linearis				
28	leda02	3845		Daviesia	triflora				
28	leda02	17691		Desmocladus	fasciculatus				
28	leda02	11569		Drosera	stolonifera	subsp.	stolonifera		
28	leda02	16672		Dryandra	lindleyana				
28	leda02	15446		Eryngium	pinnatifidum	subsp.	pinnatifidum	MS	
28	leda02	5578		Eucalyptus	calophylla				
28	leda02	13547		Eucalyptus	marginata	subsp.	marginata		
28	leda02	3957		Gompholobium	tomentosum				
28	leda02	3961		Hardenbergia	comptoniana				
28	leda02	5135		Hibbertia	hypericoides				
28	leda02	5162		Hibbertia	racemosa				
28	leda02	6222		Homalosciadium	homalocarpum				
28	leda02	12859		Hovea	trisperma	var.	trisperma		
28	leda02	5216		Hybanthus	calycinus				
28	leda02	4029		Jacksonia	sternbergiana				
28	leda02	18585		Lagenophora	huegelii				
28	leda02	945		Lepidosperma	squamatum				
28	leda02	1223		Lomandra	caespitosa				
28	leda02	1243		Lomandra	sericea				
28	leda02	85		Macrozamia	riedlei				
28	leda02	955		Mesomelaena	pseudostygia				
28	leda02	485		Microlaena	stipoides				
28	leda02	4662		Monotaxis	grandiflora				
28	leda02	2273		Persoonia	saccata				
28	leda02	2299		Petrophile	linearis				
28	leda02	16177		Phyllangium	paradoxum				
28	leda02	4675		Phyllanthus	calycinus				
28	leda02	8175		Podolepis	gracilis				
28	leda02	8183		Podotheca	chrysantha				
28	leda02	7595		Scaevola	anchusifolia				
28	leda02	7603		Scaevola	canescens				
28	leda02	982		Schoenus	clandestinus				
28	leda02	1312		Sowerbaea	laxiflora				
28	leda02	2316		Stirlingia	latifolia				
28	leda02	7798		Stylidium	schoenoides				
28	leda02	1036		Tetraria	octandra				
28	leda02	1343		Thysanotus	patersonii				
28	leda02	6280		Trachymene	pilosa				
28	leda02	1363		Tricoryne	tenella				
28	leda02	7389		Wahlenbergia	preissii				
28	leda02	2331		Xylomelum	occidentale				
28	leda02	184	*	Aira	caryophyllea				
28	leda02	244	*	Briza	maxima				
28	leda02	8086	*	Hypochaeris	glabra				
28	leda02	19825	*	Petrorhagia	dubia				
28	leda02	-1528	*	Vulpia	sp. scps				

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA LEDA SITE NUMBER LEDA Ø2

DATE TRIP 18.10.94. RECORDERS BJK, NCT, JJA

DATE TRIP 6-12-94 RECORDERS BJK

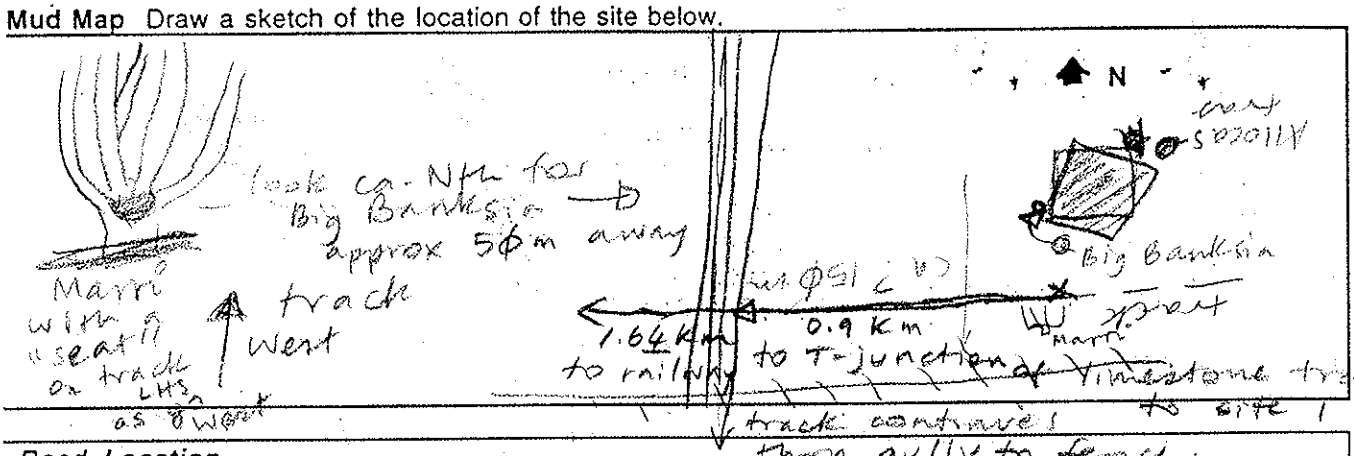
DATE TRIP _____ RECORDERS _____

BOTANIST BJK

4.0
↑
2.36 km
↓
1.64

1. LOCATION of the QUADRAT

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



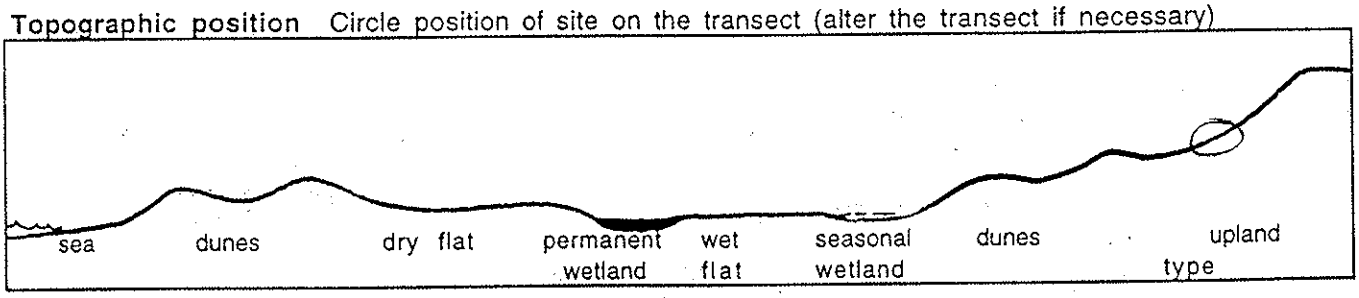
Road Location

Geographic Location Latitude 32° 16.5 S Longitude 115° 49.8 N Altitude ~43 metres ≈20m Env. geol

Reference Map

Photograph Photographer's Name JA 6/12/94 Photo No 28 NW corner.

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



2. SITE DATA Circle the correct response.

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

Surface Soil Sand *Colour* grey/brown

Exposed rock *type* % surface

Sub-surface Soil Sand. *Colour* ? br. yellow

Rock *type* depth to rock

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

Litter 30-70 % cover Depth 2-6 cm

Bare Ground 2-10 %cover rabbit disturbance

Env. geol: S8

upland B3

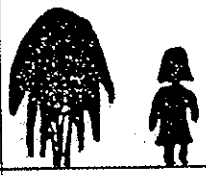
BUSHLAND PLANT SURVEY RECORDING SHEET 2 (Muir)- use pencil only

3. VEGETATION STRUCTURE AND COVER

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

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

	TREES			MALLEES	
	over 30m	15 - 30m	5 - 15m under 5m	over 8m	under 8m
LIFE FORM			Note Marri to 5 Low Woodland A 		30m 10m 
COVER CLASS (%)			1ϕ - 3ϕ		
DOMINANT SPECIES			B. menziesii E. marginata Allocas. fras.		

	SHRUBS over 2m	SHRUBS 2m - 1.5m	1.5 - 1m	SHRUBS 1 -0.5m	SHRUBS under 0.5m
LIFE FORM		(Open Low Scrub A) 		Dwarf Scrub C. 	(Open Dwarf Scrub O) 2m 1m 
COVER CLASS (%)		2-10%		1ϕ - 3ϕ	2 - 1ϕ
DOMINANT SPECIES		Jacksonia stem		Phyll calycin Bossia brio.	Dryandra nivea Scaevola. ~~ere~~ cun

	GRASSES	HERBS	SEDGES over 0.5m	under 0.5m
LIFE FORM	(Very open Low grass) 	Open Herbs 		Open Low Sedges 1m 
COVER CLASS (%)	~~2 - 10~~ ~~10 - 30~~	1ϕ - 3ϕ %	1ϕ - 3ϕ % →	→
DOMINANT SPECIES	Microlaena stip Briza max	N Podolepis grac Lomandra caesp.	Lepidos. ~~pseudo~~ → ang. Meeum pseudo. → Tetraria octand →	→

4. VEGETATION CONDITION

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

COMMENTS Someone has driven through our site! Virtually no weeds though. Larger trees surround site (granak) Rabbit diggings + dung

6/1/95 – 9/4/95

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

SITE No LEDA Ø2
Date 18/10/94

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

TREES	No	Fl	ID
Bank. menz			0
Allocas fras			
Euc. marg			
MALLEES			
SHRUBS			
Stirlingia latifolia			
Phyllanthus calycinus			
Scaevola canescens			
Bossiaea eriocarpa			
Macrozamia riedlii			
Jacksonia stern.			
Dryandra nivea			
Hibbertia hyperi			
Hybanthus calycinus			
Hovea trisperma			
Hardenb. comp			
Daviesia triflora			
Astroloma pallidum (sterile)			
Petrophile linearis			
Hibbert racemosa			
Scaevola anchusifolia	0		
Gomph tomentosum			
Persoonia (= bold PK) saccata			

SHRUBS (cont.)	No	Fl	ID
0 Conostephium pendulum.			
6/12/94			
0 Dampiera linearis			
0 Monotaxis grandif			
0 Wchlanb. priessii			
0 Acacia willd (thick)			
GRASSES			
0 Microlaena stipoides			
0 * Briza maxima			
0 Stipa compressa			
0 Grass = *Vulpia myuros	C		✓
0 *Aira cary			
HERBS			
0 Chaemascilla corym			
0 Monotaxis grandi.			
0 Lomandra caespitosa 'fine'			
0 Drosera stolonifera			
0 Caesia micrantha			
0 Burchardia umbellata			
0 Sowerbaea laxiflora			
0 Dampiera linearis			
0 Trachymene pilosa			
0 Tricoryne tenella			
0 Podolepis gracilis			
0 Lagenifera hueg			
0 *Hypochaeris glabra			

HERBS (cont.)	No	Fl	ID
0 Lomandra sericea			
0 Conostylis aculeata			
0 Homal. homo			
0 Thysanotus (climb) pat/man			
0 Anigozanthos mang			
0 Mitrasacme paradoxa			
0 Stylidium schoenoides			
0 Eryngium pinnat ssp pin ✓			
0 Podotheca chrysantha			
0 *Petrorhagia velutina			
SEDGES			
0 Mesomelaena pseudo			
0 Lepid. angustatum			
0 Loxocarya flex			
0 Schoenus clandestinus			
0 Centrolepis drummondii			
0 Tetraria octandra			
AOJ			
0 Marri (Euc. cal.)			
0 Xylo. occid.			

~~Edge~~ NOTE  (blue) note extend to N boundary.

Area of best condition
See also WELR #2

General condition of area other than area of site 2 is #1 or worse, Wild oats / Veldt Grass / Briza major weeds plus a #1 and spot occurrence of Arum Lily

FCT	Plot Name	TaxonID	*	Genus	Species	Infrasp	InfraspName	Informal	Consv
25	leda01	3502		Acacia	pulchella				
25	leda01	1728		Allocasuarina	fraseriana				
25	leda01	7851		Asteridea	pulverulenta				
25	leda01	17240		Austrostipa	flavescens				
25	leda01	1800		Banksia	attenuata				
25	leda01	1819		Banksia	grandis				
25	leda01	12770		Burchardia	congesta				
25	leda01	15348		Caladenia	flava	subsp.	flava		
25	leda01	2856		Calandrinia	liniflora				
25	leda01	1125		Centrolepis	drummondiana				
25	leda01	1418		Conostylis	aculeata				
25	leda01	11563		Crassula	colorata	var.	colorata		
25	leda01	17691		Desmocladus	fasciculatus				
25	leda01	11636		Dianella	revoluta	var.	divaricata		
25	leda01	13217		Drosera	erythrorhiza	subsp.	erythrorhiza		
25	leda01	15446		Eryngium	pinnatifidum	subsp.	pinnatifidum	MS	
25	leda01	-20214		Eucalyptus	gomphocephala	var.	gomphocephala		
25	leda01	13547		Eucalyptus	marginata	subsp.	marginata		
25	leda01	15137		Euchiton	sphaericus				
25	leda01	4341		Geranium	solanderi				
25	leda01	6143		Glischrocaryon	aureum				
25	leda01	3957		Gompholobium	tomentosum				
25	leda01	12824		Grevillea	vestita	subsp.	vestita		
25	leda01	3961		Hardenbergia	comptoniana				
25	leda01	5162		Hibbertia	racemosa				
25	leda01	6222		Homalosciadium	homalocarpum				
25	leda01	5216		Hybanthus	calycinus				
25	leda01	18585		Lagenophora	huegelii				
25	leda01	945		Lepidosperma	squamatum				
25	leda01	7408		Lobelia	tenuior				
25	leda01	1223		Lomandra	caespitosa				
25	leda01	1198		Luzula	meridionalis				
25	leda01	955		Mesomelaena	pseudostygia				
25	leda01	485		Microlaena	stipoides				
25	leda01	14344		Millotia	tenuifolia	var.	tenuifolia		
25	leda01	4675		Phyllanthus	calycinus				
25	leda01	8175		Podolepis	gracilis				
25	leda01	4691		Poranthera	microphylla				
25	leda01	11260		Ptilotus	drummondii	var.	drummondii		
25	leda01	7595		Scaevola	anchusifolia				
25	leda01	992		Schoenus	grandiflorus				
25	leda01	1312		Sowerbaea	laxiflora				
25	leda01	7389		Wahlenbergia	preissii				

FCT	Plot Name	TaxonID	*	Genus	Species	Infrasp	InfraspName	Informal	Consv
25	leda01	184	*	Aira	caryophyllea				
25	leda01	-976	*	Anagallis	arvensis var. arvensis FPR				
25	leda01	244	*	Briza	maxima				
25	leda01	245	*	Briza	minor				
25	leda01	249	*	Bromus	diandrus				
25	leda01	2889	*	Cerastium	glomeratum				
25	leda01	7055	*	Dischisma	capitatum				
25	leda01	347	*	Ehrharta	calycina				
25	leda01	8086	*	Hypochaeris	glabra				
25	leda01	917	*	Isolepis	marginata				
25	leda01	467	*	Lagurus	ovatus				
25	leda01	478	*	Lolium	rigidum				
25	leda01	7122	*	Orobanche	minor				
25	leda01	7090	*	Parentucellia	viscosa				
25	leda01	19825	*	Petrorhagia	dubia				
25	leda01	2909	*	Silene	gallica				
25	leda01	8231	*	Sonchus	oleraceus				
25	leda01	2918	*	Stellaria	media				
25	leda01	4295	*	Trifolium	dubium				
25	leda01	-1528	*	Vulpia	sp. scps				

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA LEDA SITE NUMBER LEDA P1

DATE TRIP 18/10/94 RECORDERS BJK, N.T, JA

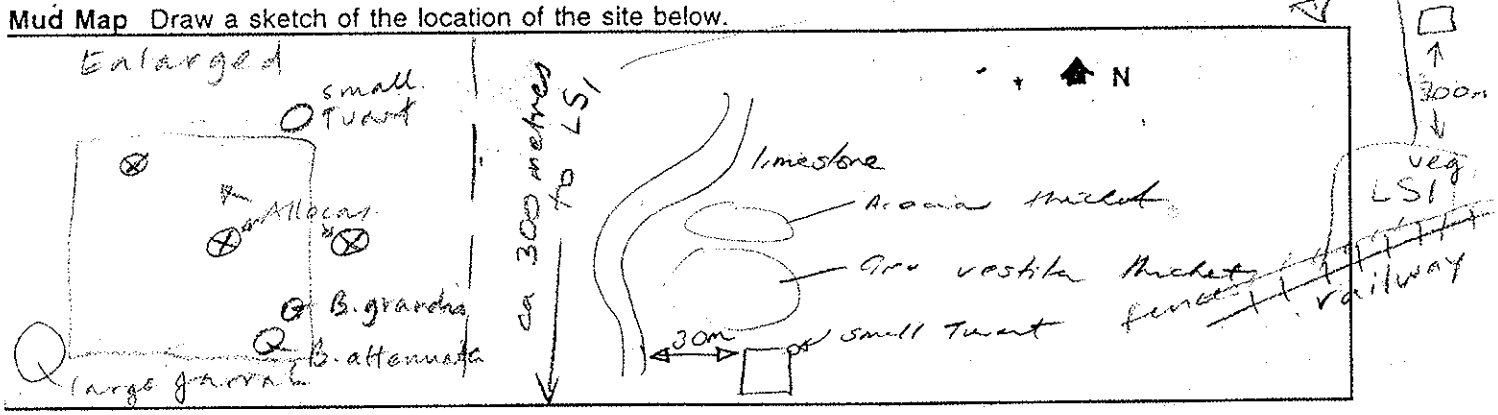
DATE TRIP 6-12-94 RECORDERS BJK.

DATE TRIP _____ RECORDERS _____

BOTANIST _____

1. LOCATION of the QUADRAT

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



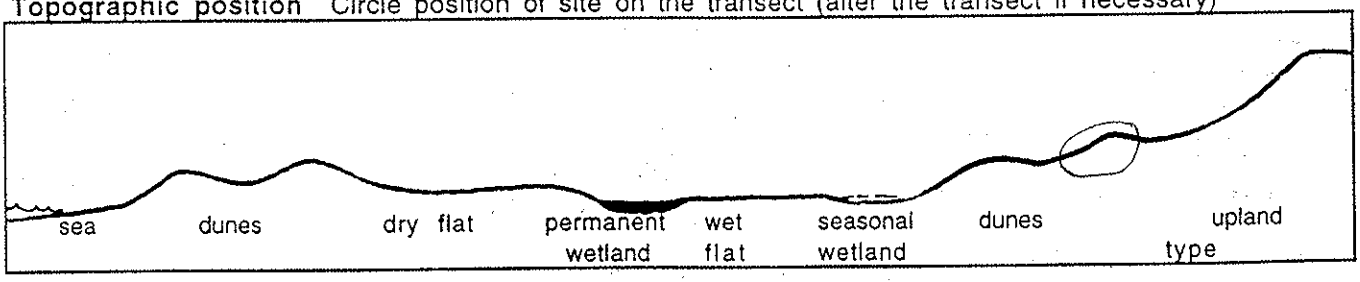
Road Location

Geographic Location Latitude 32°16.5 S Longitude 115°49.3 N Altitude ~14 mt ≈ 20 m Env geol.

Reference Map

Photograph Photographer's Name BJK 6/12/94 Photo No

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



2. SITE DATA Circle the correct response.

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

Surface Soil SAND *Colour* BROWN

Exposed rock *type* % surface

Sub-surface Soil Sand *Colour*

Rock *type* depth to rock

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

Litter 10 - 30 % cover Depth 2 - 6 cm

Bare Ground __ %cover

↓ B. grandis

upland

S.4

Env. geol : S7

BUSHLAND PLANT SURVEY RECORDING SHEET 2 (Muir)- use pencil only

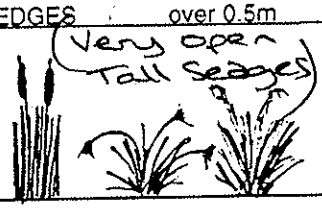
3. VEGETATION STRUCTURE AND COVER

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

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

	TREES			MALLEES	
	over 30m	15 - 30m	5 - 15m	over 8m	under 8m
LIFE FORM		Woodland. 	under 5m Low Woodland B. 		30m 10m 
COVER CLASS (%)		1ϕ → 3ϕ%	1ϕ - 30 %		
DOMINANT SPECIES		E. gomphoc.	B. grandis		
		E. margin.	B. attenuata		
		Alloc. fras			

	SHRUBS				SHRUBS
	over 2m	2m - 1.5m	1.5 - 1m	1 -0.5m	under 0.5m
LIFE FORM					2m 1m 
COVER CLASS (%)					< 2%
DOMINANT SPECIES					Phyllanthus calycina

	GRASSES	HERBS	SEDGES over 0.5m	under 0.5m
LIFE FORM	Low Grass 	Herbs 	Very open Tall Sedges 	1m 
COVER CLASS (%)	3ϕ - 7ϕ%	3ϕ → 7ϕ	2 %	
DOMINANT SPECIES	Ehrharta calycina	Conostylis aculeata	Schoenus grandiflorus	
	Aira cary	Hybanthus calycinus		
	Briza maxima	Hypochaeris glabra		
		Sowerbaea laxiflora		

4. VEGETATION CONDITION

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

COMMENTS Rabbits present - diggings
Many Banksia + jarrah seedlings emerging surrounding woodland taller trees

6/1/95 – 6/2/95

BUSHLAND PLANT SURVEY RECORDING SHEET 3 - use pencil only

5. SPECIES PRESCENCE

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

SITE No	LEOA Ø1
Date	18/10/94
	6-12-94

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

	TREES	No	Fl	ID	SHRUBS (cont.)	No	Fl	ID	HERBS (cont.)	No	Fl	ID
0	(Jarrah) Euc. marg.				HERBS			0	*Geranium (molle) solander	C		✓
0	Euc. gomph.			0	Lomandra caespitosa			0	Sowerbaea laxiflora			
0	Bank. attenuata			0	Drosera erythro			0	Poranthera microphylla			
0	Allocas. fras			0	Drosera climb/glab.			0	*Sonchus oleraceus			
0	Bank. grand.			0	Crassula colorata			0	*Trifolium dubium	✓		✓
				0	Wahlenbergia preissii			0	Levenhookia preissii			
	MALLEES			0	Calandrinia linifolia			0	*Gnaphalium sphae	C		✓
				0	* Anagalis arvensis			0	*Silene gallica			
					GRASSES			0	*Parentucellia viscosa			✓
				0	* Briza minor			0	*Orobanche minor			
				0	* Briza maxima			0	Dianella divaricata			
	SHRUBS			0	* Lagurus ovatus			0	*Romulea rosea			
0	Phyllanthus calycinus			0	Microlaena stipoides			0	Caladenia (pt only) ?Hada			
0	Hardenbergia comp.			0	* Aira cary				SEDGES			
0	Hibbertia racemosa			0	*Lolium rigidum			0	Schoenus grandiflorus			
0	Scaevola anchusifolia			0	* Bromus diandrus			0	Lepidosperma angust			
0	Acacia pulchella (seedling)			0	* Ehrharta calycina			0	Isolepis marginata			
0	Ptilotus drummondii	C		✓	Stipa 'fung' flavescens	VSP		0	Loxocarya flex			
					HERBS			0	Luzula meridonalis			✓
				0	Conostylis acculeata	C	VSP	0	Centrolepis drummond			
				0	Burchardia umbellata							
	HERBS			0	Glischocaryon flavescens	VSP						
0	Podolepis gracilis			0	Eryngium pinnat. ssp pin			0	ADJ Grevillea vestita			
				0	* Petrorhagia velutina							
				0	* Dichisma capitata	VSP		✓				
				0	Hybanthus calycinus				6/12/94			
				0	* Hypochaeris glabra				0 Millotia tenuifol.			
				0	*Cerastium glomeratum	✓		✓	0 * Vulpia ?myuros			
				0	* Stellaria media	✓		✓	0. Mesomelaena pseudostyg			
				0	Lobelia (seedling) tenuior			✓	Gomph. tom.			
				0	Asteridia pulveru.							
				0	Homal. homal.							

FCT	Plot Name	TaxonID	*	Genus	Species	Infrasp	InfraspName	Informal	Consv
21a	WELL-1	1728		Allocasuarina	fraseriana				
21a	WELL-1	1800		Banksia	attenuata				
21a	WELL-1	1819		Banksia	grandis				
21a	WELL-1	12770		Burchardia	congesta				
21a	WELL-1	1276		Caesia	micrantha				
21a	WELL-1	2854		Calandrinia	granulifera				
21a	WELL-1	1125		Centrolepis	drummondiana				
21a	WELL-1	11299		Chamaescilla	corymbosa	var.	corymbosa		
21a	WELL-1	1418		Conostylis	aculeata				
21a	WELL-1	11563		Crassula	colorata	var.	colorata		
21a	WELL-1	17691		Desmocladus	fasciculatus				
21a	WELL-1	13217		Drosera	erythrorhiza	subsp.	erythrorhiza		
21a	WELL-1	13222		Drosera	stolonifera	subsp.	porrecta		
21a	WELL-1	16672		Dryandra	lindleyana				
21a	WELL-1	15446		Eryngium	pinnatifidum	subsp.	pinnatifidum	MS	
21a	WELL-1	-20214		Eucalyptus	gomphocephala	var.	gomphocephala		
21a	WELL-1	5135		Hibbertia	hypericoides				
21a	WELL-1	6222		Homalosciadium	homalocarpum				
21a	WELL-1	12859		Hovea	trisperma	var.	trisperma		
21a	WELL-1	910		Isolepis	cernua				
21a	WELL-1	4044		Kennedia	prostrata				
21a	WELL-1	18585		Lagenophora	huegelii				
21a	WELL-1	945		Lepidosperma	squamatum				
21a	WELL-1	1223		Lomandra	caespitosa				
21a	WELL-1	1097		Lyginia	barbata				
21a	WELL-1	85		Macrozamia	riedlei				
21a	WELL-1	955		Mesomelaena	pseudostygia				
21a	WELL-1	485		Microlaena	stipoides				
21a	WELL-1	2299		Petrophile	linearis				
21a	WELL-1	1478		Phlebocarya	ciliata				
21a	WELL-1	8175		Podolepis	gracilis				
21a	WELL-1	982		Schoenus	clandestinus				
21a	WELL-1	1312		Sowerbaea	laxiflora				
21a	WELL-1	-20184		Thysanotus	manglesianus/patersonii				
21a	WELL-1	6280		Trachymene	pilosa				
21a	WELL-1	184	*	Aira	caryophyllea				
21a	WELL-1	6480	*	Anagallis	arvensis				
21a	WELL-1	244	*	Briza	maxima				
21a	WELL-1	245	*	Briza	minor				
21a	WELL-1	2889	*	Cerastium	glomeratum				
21a	WELL-1	347	*	Ehrharta	calycina				
21a	WELL-1	3016	*	Heliophila	pusilla				
21a	WELL-1	8086	*	Hypochaeris	glabra				
21a	WELL-1	19825	*	Petrorhagia	dubia				
21a	WELL-1	7022	*	Solanum	nigrum				
21a	WELL-1	8231	*	Sonchus	oleraceus				
21a	WELL-1	17763	*	Trifolium	campestre	var.	campestre		
21a	WELL-1	724	*	Vulpia	myuros				
21a	WELL-1	1049	*	Zantedeschia	aethiopica				

(N) ✓

SURVEY RECORDING SHEET — Please use pencil

QUADRAT No. WELL 1 VEGETATION TYPE Banksia woodland.
DATE FIRST TRIP 7/10/92 VOLUNTEERS
DATE SECOND TRIP 4/11/92 VOLUNTEERS BJK NG
BOTANIST NG/MC/SC

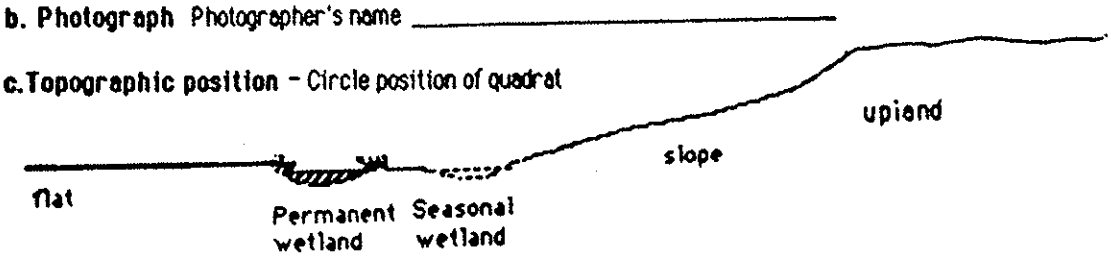
WELL

1. LOCATION of the QUADRAT

a. Mud Map Draw a sketch of the location of the quadrat the back of this sheet →

b. Photograph Photographer's name _____

c. Topographic position – Circle position of quadrat



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

2. SITE DATA – Circle the correct response

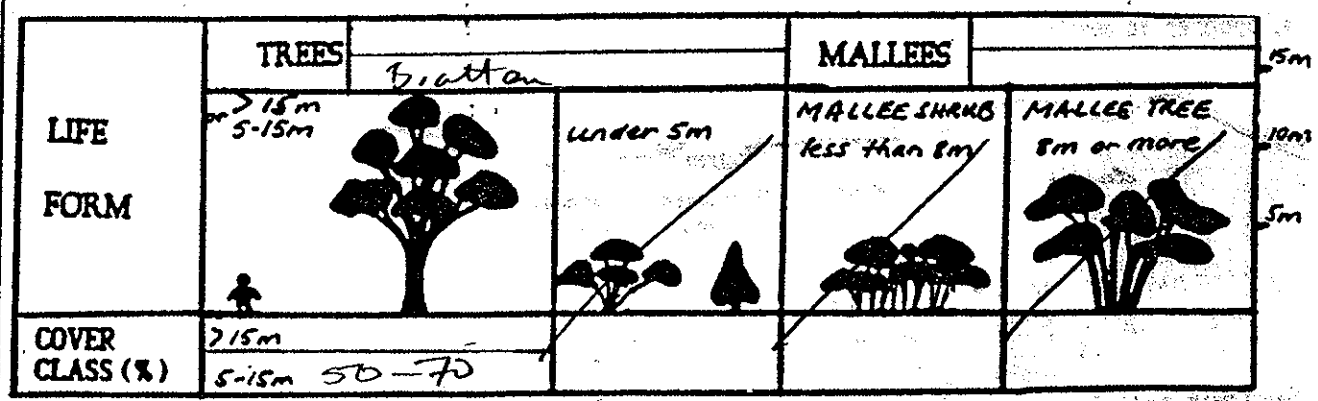
Slope flat gentle steep **Aspect** N NE E SE S SW W NW

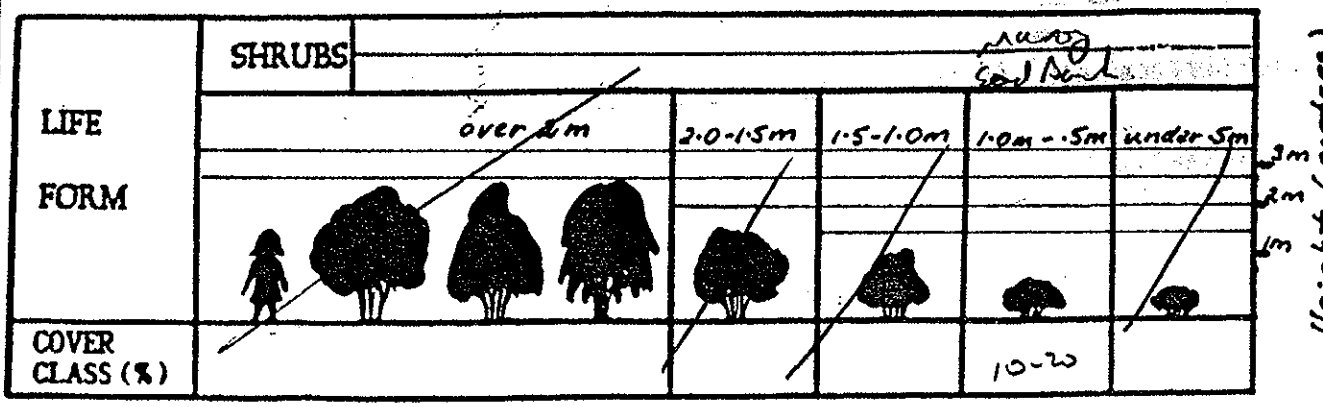
% Bare ground____ **Drainage** well mod poor **Wet** All year winter/spring

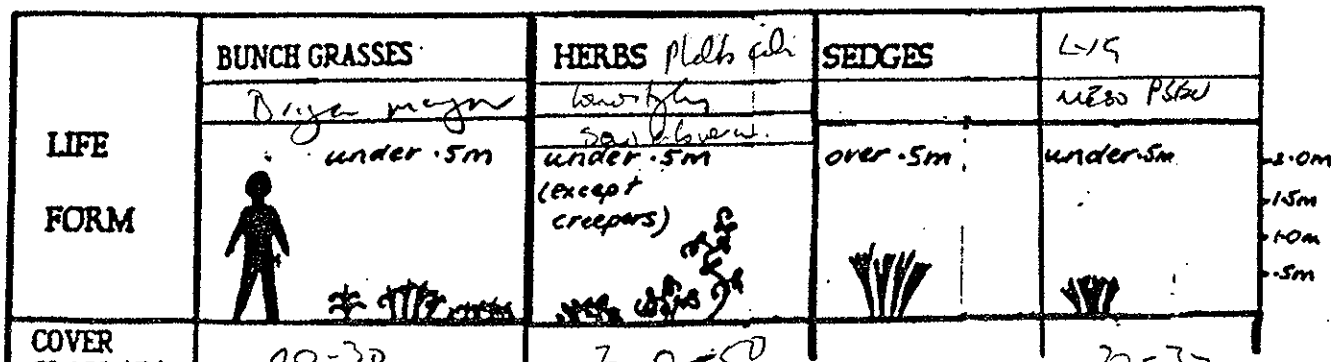
Litter (% cover)____ **Surface soil**_____ **Sub-surface soil** _____

3. VEGETATION STRUCTURE AND COVER Record appropriate cover class

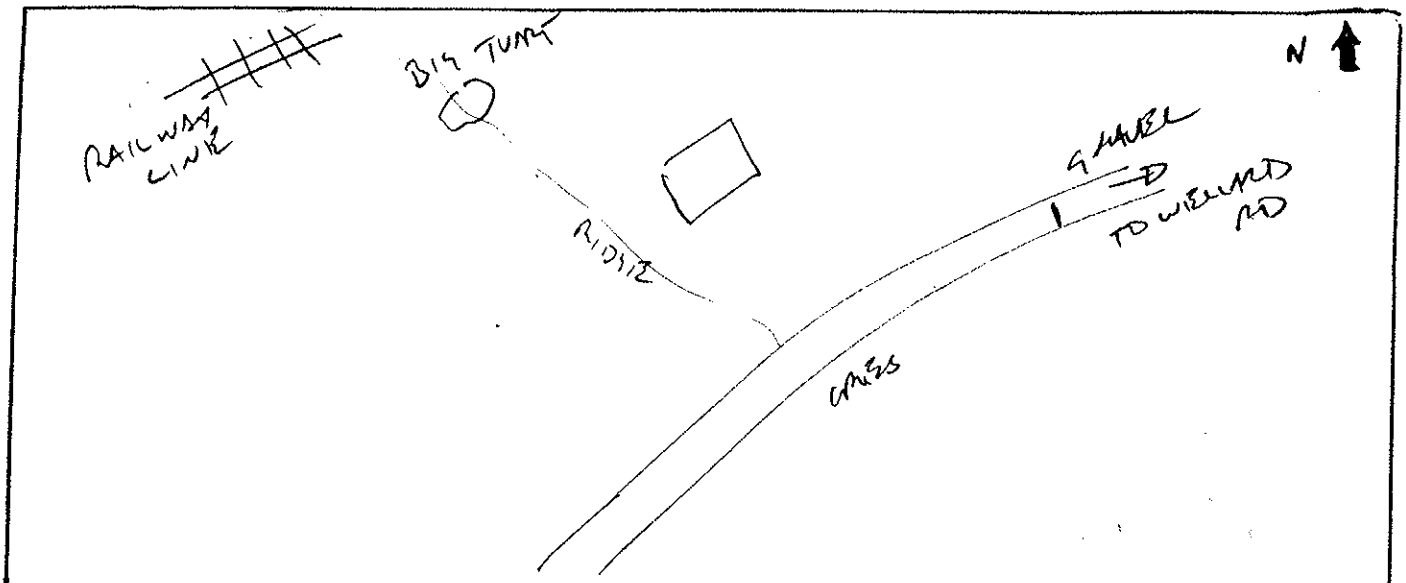
Cover Class – percentage classes: 0% | under2% | 2-10% | 10-20% | 20-30% | 30-50% | 50-70% | over70%







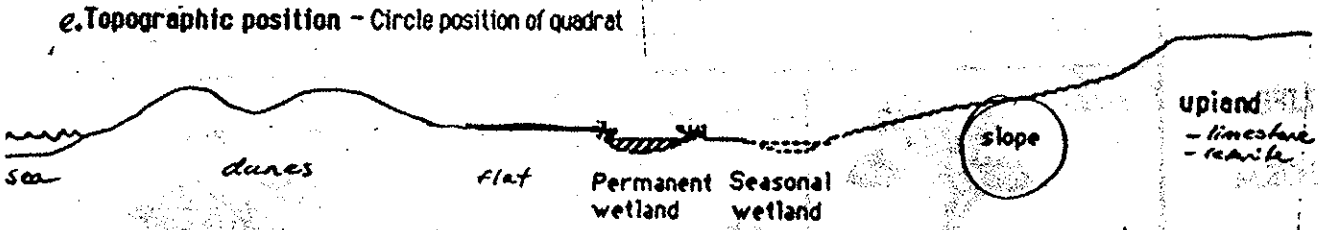
a. **Mud Map** Draw a sketch of the location of the quadrat



b Road Location	c. Latitude	Longitude
	32 16 54.4	115 49 17.1
		Altitude 20m ± 100m

d. **Photograph** Photographer's name NS 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 DrSAND

Sub-surface soil DANCIE SAND

Drainage (well) mod poor

Wet All year winter/spring

Litter (% cover) 70

% Bare ground 10

4. VEGETATION CONDITION

		Comments
EXCELLANT		Generally good, rabbit warren + firewood cutters.
VERY GOOD		
GOOD	✓	
POOR		
VERY POOR		

SPECIES PRESENCE

21 vi 99

QUADRAT No.
WELL 01

- 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

- Bank ATT •
- BANK SAND (seed) •
- ALLO FRAS •

Mallees

SHRUBS

- MICRO REL
- HIBB HYP •
- PET LIN •
- DRY NIV •
- TUNNEL NTVR

SHRUBS | No | ID

4/11/12

- Microlaena stipoides •
- Hovea trisperma •
- Lomandra caespitosa •
- ⊙ *Trifolium campestre ~~WEED~~ ✓

Bunch Grasses | No | ID

- *BRIZ MAX • ✓
- *ARIA ~~SP~~ CARY • ✓
- *BRIZ MIN • ✓
- *PER VELT GRASS •
- *⊙ VULPIA SP. myuros ? (RH) ✗

Herbs

- LOXO ACUL •
- SOW CAX •
- BURCH UMB •
- *HYPO GLAB •
- *ANAL ARV •
- TRACH PILO •
- · HOMA HOMA ✓
- · THYS (LONG STEM) P/M ?
- DROS STOL. ✓
- CALESIA ~~[illegible]~~ MICR •
- · LAS INVIL
- · CHAM CORY
- *SONC OLRA •? ~~[illegible]~~ ✓
- DROS ERYTH •
- POD GRAC •
- KENN PROS (N) ✓
- · *URSIL PUL
- · *PETRO VOLU

Herbs | No | ID

- ~~*STELL MED~~ = CERAST GLOM •
- CRASS COLO
- CALANDRINIA GRANDIFLORA •
- · ERING PINIF
- *(? AQUIL LILY (DIETES) (N) ✓ N AET ✓
- *SOL NIS (seed) (N)
- CENTROL DRUM ✓

Sedges

- · DHEL CILI
- ~~PSEUDO~~ ~~CILI~~ MESO PSEUDO •
- · LYS SPB ? Lyginia barbata
- LEPIDO ANG •
- LOXO FLEX •
- (SM) SCHOENUS CLANDES. (RH) ✗
- ISOLEPIS CERN •
- ADJ TUART associated weed patch

• = recorded by Gibson + Keighery '95 (N) = not recorded by Gibson + Keighery 95 ∴ added to flora list

FCT	Plot Name	TaxonID	*	Genus	Species	Infrasp	InfraspName	Informal	Consv
21a	WELL-2	3557		Acacia	stenoptera				
21a	WELL-2	1728		Allocasuarina	fraseriana				
21a	WELL-2	17949		Austrodanthonia	occidentalis				
21a	WELL-2	1800		Banksia	attenuata				
21a	WELL-2	1834		Banksia	menziesii				
21a	WELL-2	3710		Bossiaea	eriocarpa				
21a	WELL-2	12770		Burchardia	congesta				
21a	WELL-2	11299		Chamaescilla	corymbosa	var.	corymbosa		
21a	WELL-2	6348		Conostephium	pendulum				
21a	WELL-2	1418		Conostylis	aculeata				
21a	WELL-2	1436		Conostylis	juncea				
21a	WELL-2	7454		Dampiera	linearis				
21a	WELL-2	1218		Dasypogon	bromeliifolius				
21a	WELL-2	17691		Desmocladus	fasciculatus				
21a	WELL-2	13217		Drosera	erythrorhiza	subsp.	erythrorhiza		
21a	WELL-2	13216		Drosera	menziesii	subsp.	penicillaris		
21a	WELL-2	15446		Eryngium	pinnatifidum	subsp.	pinnatifidum	MS	
21a	WELL-2	5578		Eucalyptus	calophylla				
21a	WELL-2	13547		Eucalyptus	marginata	subsp.	marginata		
21a	WELL-2	3957		Gompholobium	tomentosum				
21a	WELL-2	3961		Hardenbergia	comptoniana				
21a	WELL-2	6839		Hemiandra	pungens				
21a	WELL-2	5135		Hibbertia	hypericoides				
21a	WELL-2	5162		Hibbertia	racemosa				
21a	WELL-2	7396		Isotoma	hypocrateriformis				
21a	WELL-2	19700		Isotropis	cuneifolia	subsp.	cuneifolia		
21a	WELL-2	4044		Kennedia	prostrata				
21a	WELL-2	15498		Kunzea	glabrescens				
21a	WELL-2	1309		Laxmannia	squarrosa				
21a	WELL-2	945		Lepidosperma	squamatum				
21a	WELL-2	7677		Levenhookia	stipitata				
21a	WELL-2	7408		Lobelia	tenuior				
21a	WELL-2	1223		Lomandra	caespitosa				
21a	WELL-2	14542		Lomandra	micrantha	subsp.	micrantha		
21a	WELL-2	1234		Lomandra	nigricans				
21a	WELL-2	1239		Lomandra	preissii				
21a	WELL-2	1243		Lomandra	sericea				
21a	WELL-2	1246		Lomandra	suaveolens				
21a	WELL-2	85		Macrozamia	riedlei				
21a	WELL-2	955		Mesomelaena	pseudostygia				
21a	WELL-2	4662		Monotaxis	grandiflora				
21a	WELL-2	4666		Monotaxis	occidentalis				
21a	WELL-2	1550		Patersonia	occidentalis				
21a	WELL-2	2273		Persoonia	saccata				
21a	WELL-2	2299		Petrophile	linearis				
21a	WELL-2	8175		Podolepis	gracilis				
21a	WELL-2	4691		Poranthera	microphylla				
21a	WELL-2	7603		Scaevola	canescens				
21a	WELL-2	8225		Siloxerus	humifusus				
21a	WELL-2	1312		Sowerbaea	laxiflora				
21a	WELL-2	2316		Stirlingia	latifolia				
21a	WELL-2	11983		Stylidium	brunonianum	subsp.	brunonianum		
21a	WELL-2	11974		Stylidium	piliferum	subsp.	piliferum		
21a	WELL-2	15532		Synaphea	spinulosa	subsp.	spinulosa		
21a	WELL-2	15532		Synaphea	spinulosa	subsp.	spinulosa		
21a	WELL-2	1319		Thysanotus	arenarius				
21a	WELL-2	-20184		Thysanotus	manglesianus/patersonii				
21a	WELL-2	6280		Trachymene	pilosa				
21a	WELL-2	1256		Xanthorrhoea	preissii				
21a	WELL-2	15968		Xanthosia	huegelii	subsp.	huegelii	MS	
21a	WELL-2	2331		Xylomelum	occidentale				

(N) ✓

SURVEY RECORDING SHEET — Please use pencil

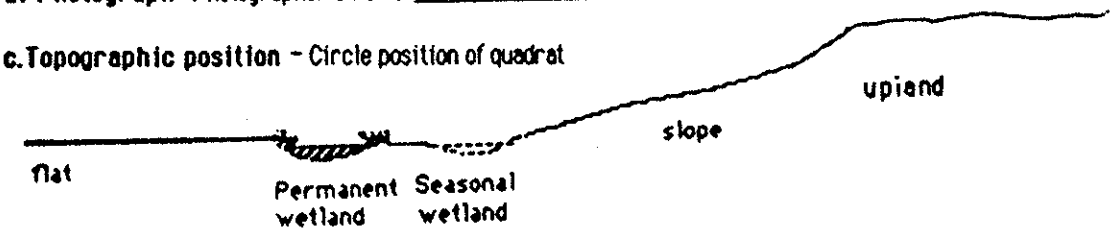
QUADRAT No. WELL02 **VEGETATION TYPE** JARAH · BANK
DATE FIRST TRIP 7/10/92 **VOLUNTEERS**
DATE SECOND TRIP 4/11/92 **VOLUNTEERS** BJK NG
BOTANIST NS/ML/DL

1. LOCATION of the QUADRAT

a. Mud Map Draw a sketch of the location of the quadrat the back of this sheet →

b. Photograph Photographer's name _____

c. Topographic position – Circle position of quadrat



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

2. SITE DATA – Circle the correct response

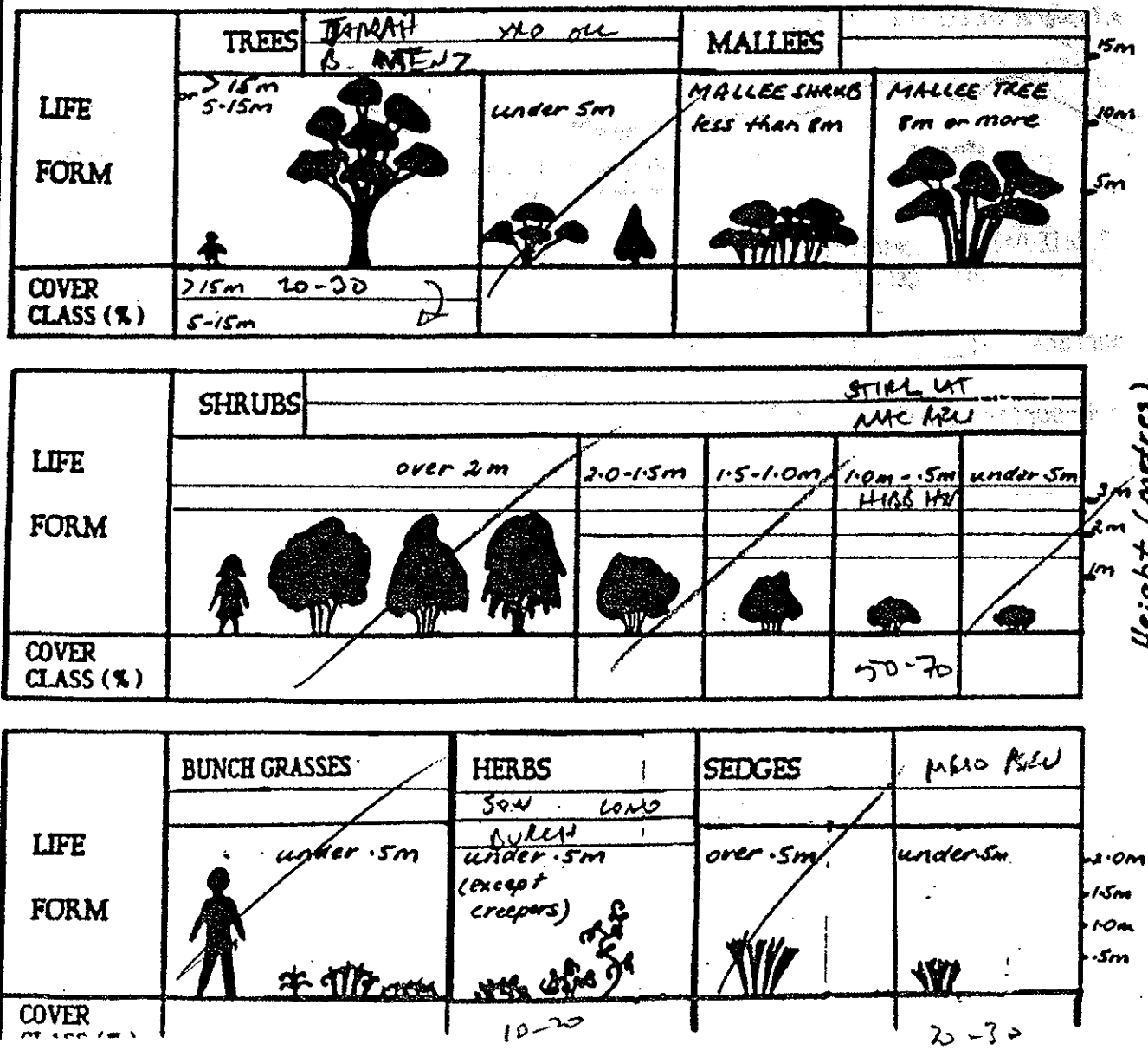
Slope flat gentle steep Aspect N NE E SE S SW W NW

% Bare ground____ Drainage well mod poor Wet All year winter/spring

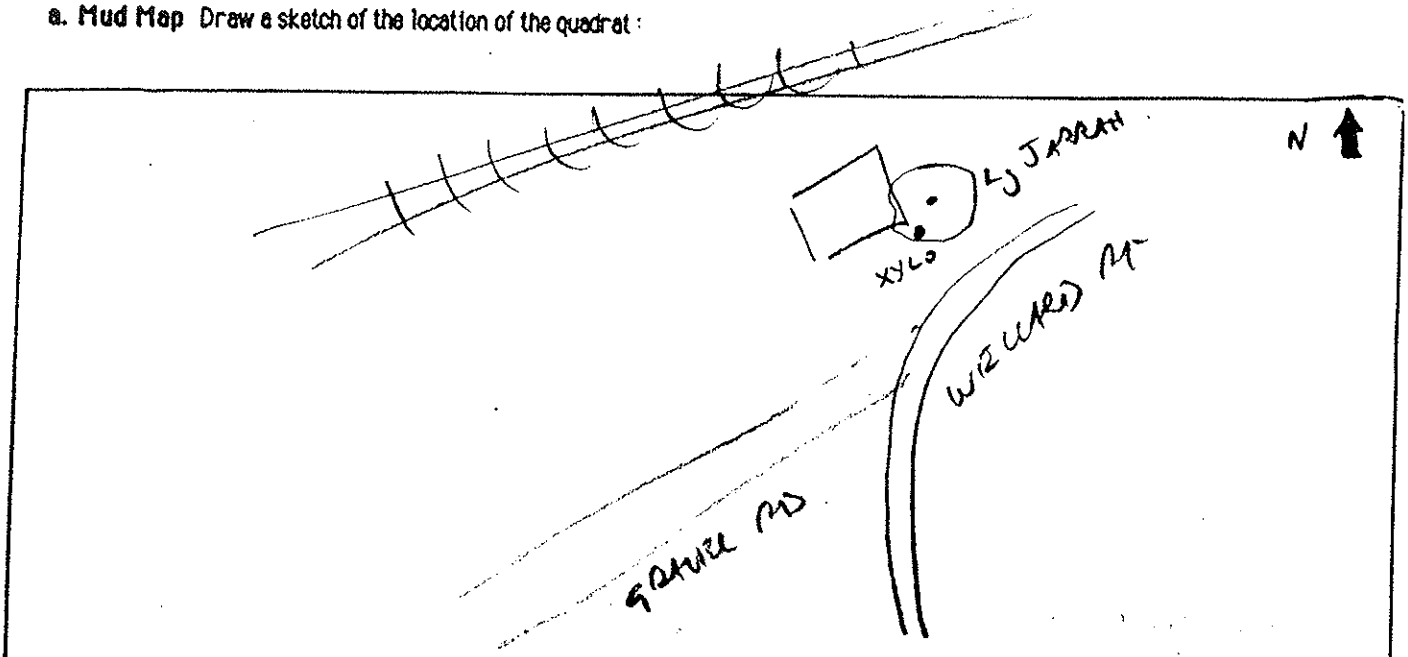
Litter (% cover)____ Surface soil_____ Sub-surface soil _____

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%



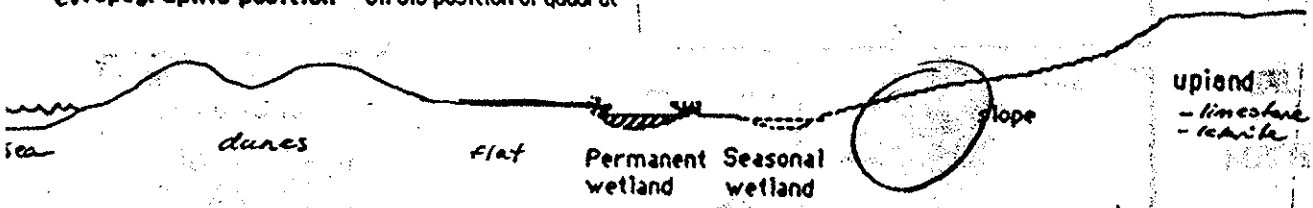
a. **Mud Map** Draw a sketch of the location of the quadrat :



b Road Location	c. Latitude	Longitude
	32 16 38.3	115 49 48.9

d. **Photograph** Photographer's name _____ Photograph No _____ Altitude 20 m ± 10m

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 Dk Grey Sand

Sub-surface soil Clay

Drainage (well) mod poor

Wet All year winter/spring

Litter (% cover) 50

% Bare ground 0

4. VEGETATION CONDITION

EXCELLENT		Comments
VERY GOOD	22/8/94	Some wood cutting
GOOD		
POOR		
VERY POOR		

SPECIES PRESENCE

7/10/92

QUADRAT No. WELL 02

- work systematically through the vegetation, start with the tallest stratum, not 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)

- JARRAH •
- B. MENZ •
- XYLO OCC
- B. ATT •
- MAORI (seed) •

Mallees

SHRUBS (No, ID)

- ALLO FRAS •
- STIRL LAT •
- MACRO FEND •
- HYB HYP •
- BOSS ERIO •
- HIBB RACE — RH ✓
- stenophera? AC STENO •
- COMPH TOM •
- XANTH PREISSI (N)
- KUNZ ERIC (N)

7/10/92

- • XANT HUEG ✓
- PORANTHERA MICROPHYLLA • ✓

SHRUBS (No, ID)

4/11/92

- G Stylid brun (N)
- X Lobelia tenuior •
- G Eryngium pinnat •
- Laxmannia squamosa (N)
- Levenhookia stip (N)
- * Petrorhagia velut •
- Synaphaea spinulosa (N) ✓
- ⊙ Lomandra sericea ✓ (RH)
- * Aira caryophyllea • X
- ⊙ * Vulpia myuros ? X (RH)
- ⊙ Isolepis drum
- G Silov? hum (N)
- * ~~Cerastium glom~~ Silene gallica ✓

Bunch Grasses

- * BRIZ MAX •
- * • ERHART ?
- * BRIZ MIN •

Herbs

- LOND AWL •
- LOND JUNC (N)
- STYL CURN (N)
- BURCH UMB •
- CON LAT •
- PAT OCC •
- POD GRACIL •
- TRACH PIL •
- DAMP LIN •
- HEM PUNG (N)
- SCAV ~~?~~ = CANESCENS •
- • STYL PIL ? Stylidium piliferum (N)
- DROS ERYTH •
- * AIRA ~~SP~~ CARY • ✓
- HENRIC PW •
- DASY BROM (N)
- ⊙ LOM SP micrantha (N)
- * URSIN ANTHIN (N)

Herbs (No, ID)

- KENN SP PROSTRATA (N) ✓
- ANAC ANISD •
- SYNAPH ? POLY
- * HYPO GLAB •
- SILOX HUM (N)
- • * HELI PIL
- • THYS ?? (FRUIT) P/M
- HARD COMP •
- • PAT LIN
- • MONO OCC ?
- • CHAM CORY

4/11/92

- Drosera menz ssp pen
- Isotropis cuneifolia (N)
- Lomandra preissii (N)
- Isotoma hypocrat (N)
- Dampiera occid (N) ✓ ✓
- ~~Hyper...~~ ✓
- G Dasypogon brom ~~repeat~~

Sedges

- MESO PSEUDO •
- LOXO FLEX •
- LEPID ANSO • ✓

4/11/92

- Persoonia saccata • ✓
- Lomandra nigricans (N) (RH) ✓
- Mesomelaena grandiflora
- Conostylis juncea (N)
- Conostephium pend •
- G Kunzea ericif (N)
- LOMANDRA ? CAESPITOSA • X RH
- LOMANDRA SERICEA •

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA BS 349 CSR Pop. (NW corner of SO) SITE NUMBER 1

DATE TRIP 7/4/00 RECORDERS TK Clarke

DATE TRIP _____ RECORDERS _____

DATE TRIP _____ RECORDERS _____

BOTANIST _____

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

1. LOCATION of the QUADRAT

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

N

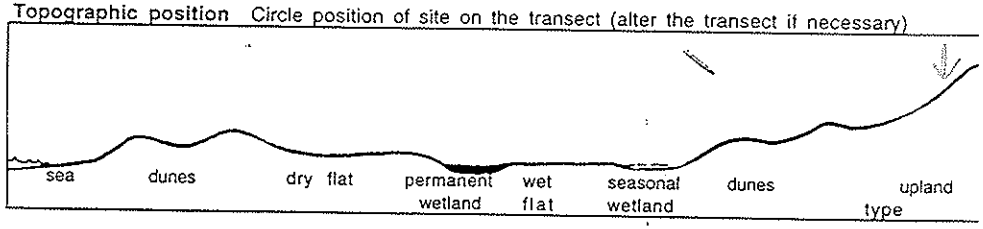
Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name K. Clarke Photo No 30

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



2. SITE DATA Circle the correct response.

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

Surface Soil *Colour*

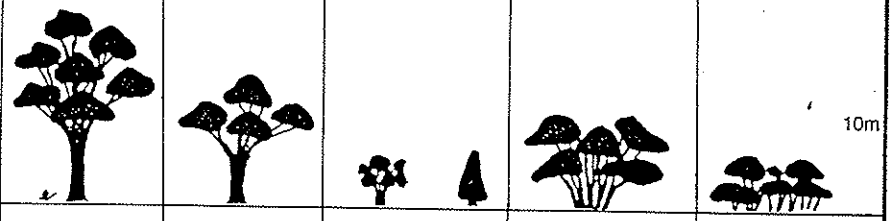
Exposed rock *type* % surface

Sub-surface Soil *Colour*

Rock *type* depth to rock

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

Litter	% cover	*Bare Ground*	%cover
Depth	cm		

	TREES over 30m	TREES 10 - 30m	TREES under 10m	MALLEES over 8m	MALLEES under 8m
LIFE FORM					
COVER CLASS (%)			10 - 30%		
DOMINANT SPECIES			Banott Banmen?		

	SHRUBS over 2m	SHRUBS 2m - 1m	SHRUBS under 1m
LIFE FORM			
COVER CLASS (%)		2 - 10%	2 - 10%
DOMINANT SPECIES		Xanthorr.	Dryland

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				
COVER CLASS (%)	10 - 30%			
DOMINANT SPECIES	Erical			

4. VEGETATION CONDITION

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

COMMENTS

Most of shrub & herb & sedge layer gone
Lots of rabbit activity, dune plants dying
V. weedy understorey, Lots of litter & tracks

* Caredu, Hibhyp, Macred, Conacu, Lepido sp, Carpend.

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA BS 349- CSR Proposal (Lot 50) SITE NUMBER 2

DATE TRIP ______ RECORDERS ______

DATE TRIP ______ RECORDERS ______

DATE TRIP ______ RECORDERS ______

BOTANIST ______

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

1. LOCATION of the QUADRAT

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

N

Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name Photo No 31

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

2. SITE DATA Circle the correct response.

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

Surface Soil *Colour*

Exposed rock *type* % surface

Sub-surface Soil *Colour*

Rock , *type* depth to rock

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

Litter % cover *Bare Ground* %cover

Depth cm

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

	SHRUBS over 2m	2m - 1m	SHRUBS under 1m
LIFE FORM			
COVER CLASS (%)		30 - 70%	10 - 30%
DOMINANT SPECIES		Aca ~~[illegible]~~ rost Dry sess Mal aspera	Hibb hyp

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				
COVER CLASS (%)	<2	<2	<2	
DOMINANT SPECIES	(dead at present otherwise >2%)			

4. VEGETATION CONDITION

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

COMMENTS

Basic structure intact, lots of rabbit diggings, grassy weed understorey (dead at present)

Xan prei, *Ehrcal, *Brizmax, Dryhad, Petlin

& some Euc mar

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA BS 349 - CSR Proposal (VCL) SITE NUMBER 3

DATE TRIP ______ RECORDERS ______

DATE TRIP ______ RECORDERS ______

DATE TRIP ______ RECORDERS ______

BOTANIST ______

1. LOCATION of the QUADRAT

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

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

N

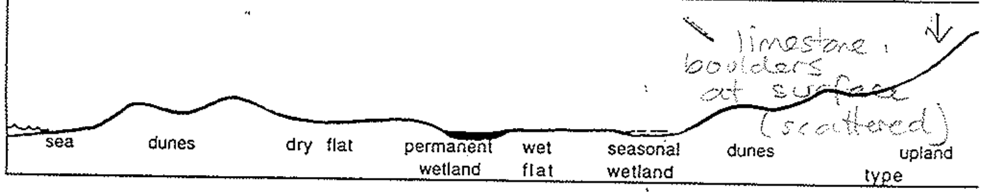
Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name Photo No 33

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



2. SITE DATA Circle the correct response.

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

Surface Soil *Colour*

Exposed rock *type* % surface

Sub-surface Soil *Colour*

Rock *type* depth to rock

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

Litter % cover *Bare Ground* %cover

Depth cm

	TREES over 30m	TREES 10 - 30m	TREES under 10m	MALLEES over 8m	MALLEES under 8m
LIFE FORM (30m, 10m)					
COVER CLASS (%)		occassional			
DOMINANT SPECIES		emergent Euc gom & Ban att			

	SHRUBS over 2m	SHRUBS 2m - 1m	SHRUBS under 1m
LIFE FORM (2m, 1m)			
COVER CLASS (%)		70 - 100%	
DOMINANT SPECIES		Aca sp (site 2)	

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM (1m)				
COVER CLASS (%)	<2	2 - 10%	<2	
DOMINANT SPECIES		Conacu		

4. VEGETATION CONDITION

		COMMENTS
1 'PRISTINE'		Basic structure intact but weedy grasses in understorey not dominant due to dense canopy. Lots of rabbit diggings & droppings
2 EXCELLENT		
3 VERY GOOD	✓	
4 GOOD		
5 DEGRADED		

Macpred, Hibhyp, Lom sp, Dryllind, Acapul, Desm flex, Xanpreli (v. large), * Ehrcal, Lagus obov., Brizmax,

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA BS 349 - CSR proposal (VCL) SITE NUMBER 4

DATE TRIP ______ RECORDERS ______

DATE TRIP ______ RECORDERS ______

DATE TRIP ______ RECORDERS ______

BOTANIST ______

1. LOCATION of the QUADRAT

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

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

N

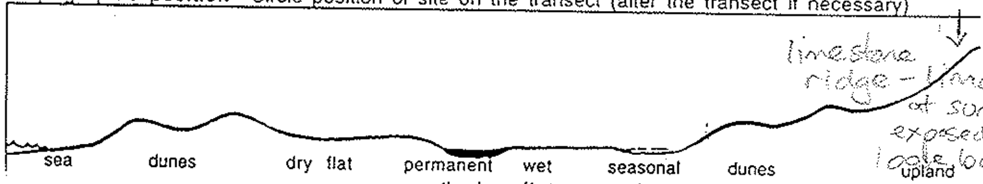
Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name Photo No 35

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



2. SITE DATA Circle the correct response.

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

Surface Soil *Colour*

Exposed rock *type* % surface

Sub-surface Soil *Colour*

Rock *type* depth to rock

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

Litter % cover *Bare Ground* %cover

Depth cm

	TREES over 30m	TREES 10 - 30m	TREES under 10m	MALLEES over 8m	MALLEES under 8m
LIFE FORM (30m, 10m)					
COVER CLASS (%)					
DOMINANT SPECIES					

	SHRUBS over 2m	SHRUBS 2m - 1m	SHRUBS under 1m
LIFE FORM (2m, 1m)			
COVER CLASS (%)	30 - 70%		
DOMINANT SPECIES	Acasp (old specimens & many with dead branches)		

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM (1m)				Climbers
COVER CLASS (%)				2-10%
DOMINANT SPECIES				Clem micr (all over Acasp)

4. VEGETATION CONDITION

1 'PRISTINE'		COMMENTS
2 EXCELLENT		Lots of dead emergent Tuart.
3 VERY GOOD		Weedy grass understorey (dead at present) - *Ehrcaly, ~~*Lagurus ov~~, *Brizmax
4 GOOD	I	
5 DEGRADED	I	

Macred, Clemmicr, Xanprei, Acasp, Ptilpoly

Orange-brown soils.

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA BS 349 SITE NUMBER 5

DATE TRIP 7/4/06 RECORDERS K Clarke.

DATE TRIP RECORDERS

DATE TRIP RECORDERS

BOTANIST

1. LOCATION of the QUADRAT

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

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

N

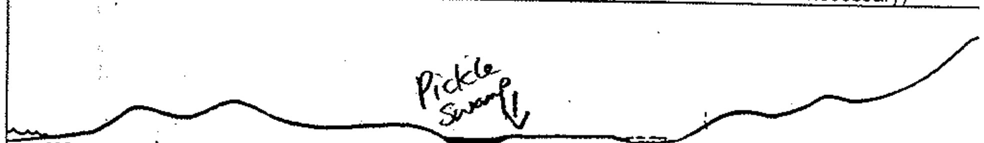
Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name K. Clarke. Photo No ~~38~~ 91

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



2. SITE DATA Circle the correct response.

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

Surface Soil Black humic find sandy-clay *Colour*

Exposed rock type % surface

Sub-surface Soil *Colour*

Rock type depth to rock

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

Litter % cover *Bare Ground* %cover

Depth cm

	TREES over 30m	TREES 10 - 30m	TREES under 10m	MALLEES over 8m	MALLEES under 8m
LIFE FORM					
COVER CLASS (%)		30-70%	~~30-70%~~		
DOMINANT SPECIES		Melrhaph	~~Melrhaph~~		

	SHRUBS over 2m	SHRUBS 2m - 1m	SHRUBS under 1m
LIFE FORM			
COVER CLASS (%)	← 2-10%		
DOMINANT SPECIES	Spyr glob Mel. tedet		

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				Climbers
COVER CLASS (%)	<2	<2	70-100%	
DOMINANT SPECIES			~~Baumea juncea~~ ~~Lepid sp~~ Gahn trifid	Native Yam

4. VEGETATION CONDITION

1 'PRISTINE'		COMMENTS ~~Good~~ Excellent except for some aggressive weeds which bring the cond. rating down
2 EXCELLENT	I	
3 VERY GOOD		
4 GOOD		
5 DEGRADED		

* Conyza * Euphor terracina ?asper ?hydr

* Solnig L., * Pampas grass, * Sonch. (Large thistle) sp

Lob alatd, Aca cyclops * * Fig tree

Bandicoot runnels evident

Sol symon., Cass racem, Myopor sp, Clem micro,

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA BS 319 SITE NUMBER 6

DATE TRIP 7/4/00 RECORDERS K Clarke

DATE TRIP ______ RECORDERS ______

DATE TRIP ______ RECORDERS ______

BOTANIST ______

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

1. LOCATION of the QUADRAT

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

N

History to Land Use – ask Myles Mulvay, CALM Wanneroo Office. Report on history of Mead Cottage

Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

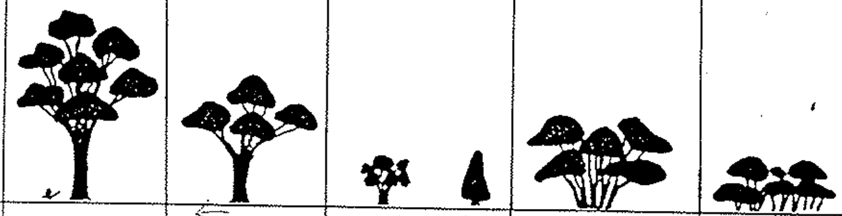
Photograph Photographer's Name Photo No

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

2. SITE DATA Circle the correct response.

Slope flat gentle steep	***Aspect*** N NE E SE S SW W NW
Surface Soil type Dark grey sand	***Colour***
Exposed rock % surface	
Sub-surface Soil	***Colour***
Rock type	depth to rock
Drainage well mod poor depth water cm	***Wet*** all year winter/spring
Litter % cover, Depth cm	***Bare Ground*** %cover

	TREES over 30m	TREES 10 - 30m	TREES under 10m	MALLEES over 8m	MALLEES under 8m
LIFE FORM (30m, 10m)					
COVER CLASS (%)	←	10-30%	(scattered		
DOMINANT SPECIES		Euc gomph	Banlitt)		



	SHRUBS over 2m	SHRUBS 2m - 1m	SHRUBS under 1m
LIFE FORM (2m, 1m)			
COVER CLASS (%)	10-30%	2-10%	
DOMINANT SPECIES	Acacia cyclops	Xan pres	

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM (1m)				
COVER CLASS (%)	<2	<2	2-10%	
DOMINANT SPECIES			Gah trif	

4. VEGETATION CONDITION

Hasn't been burnt for many yrs >15yrs?

1 'PRISTINE'		COMMENTS Good - V. good - Small shrub/herb/sedge layer/more rare. Lots of rabbit diggings. Grazed historically & grazed by kangas now.
2 EXCELLENT		
3 VERY GOOD	↓	
4 GOOD		
5 DEGRADED		

Lots of moss crusting over the surface (dormant at present). Fountain grass all along railway need to control during construction (seed shed). Romi ros (other weeds dead) no critical obvious. Temp retus. Stipa flav, Phyl calyc, Lepid squa, Con acu, Lepid squa, Native grass Desm sp (flex?), Banlitt (some v old), Kenn pros, Lep lon, Lepid sp 5)

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA BS 349 SITE NUMBER 5

DATE TRIP 7/4/06 RECORDERS K Clarke

DATE TRIP / / RECORDERS

DATE TRIP RECORDERS

BOTANIST

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

1. LOCATION of the QUADRAT

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

N

Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name K. Clarke Photo No 38

Topographic position Circle position of site on the transect (alter the transect if necessary) 9 1

2. SITE DATA Circle the correct response.

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

Surface Soil Black humic fine / sandy-clay *Colour*

Exposed rock *type* % surface

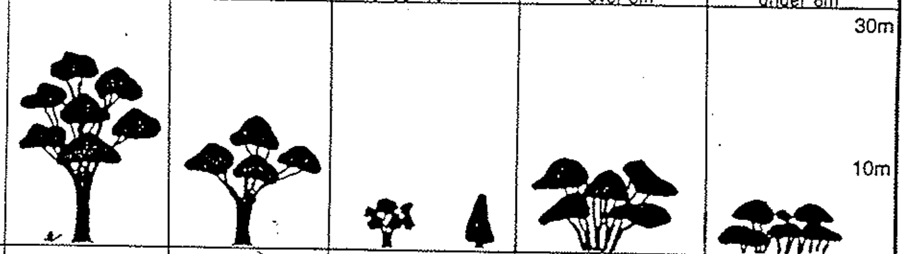
Sub-surface Soil *Colour*

Rock *type* depth to rock

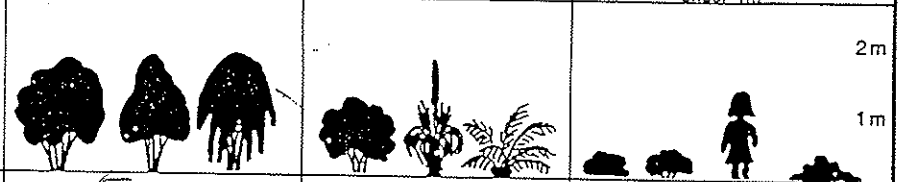
Drainage well mod poor depth water cm *Wet* all year winter/spring

Litter % cover *Bare Ground* %cover

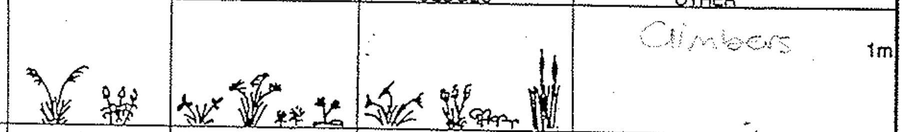
Depth cm

	TREES over 30m	TREES 10 - 30m	TREES under 10m	MALLEES over 8m	MALLEES under 8m
LIFE FORM					
COVER CLASS (%)		30-70%	~~30-70%~~		
DOMINANT SPECIES		Mel rhaph	~~Mel rhaph~~		

Scale: 30m, 10m

	SHRUBS over 2m	2m - 1m	SHRUBS under 1m
LIFE FORM			
COVER CLASS (%)	2-10%		
DOMINANT SPECIES	Spyr glob; Mel teret		

Scale: 2m, 1m

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				Climbers
COVER CLASS (%)	<2	<2	70-100%	< 2%
DOMINANT SPECIES			~~Baumea juncea~~ Gahn trifid	Native Yam?

Scale: 1m

4. VEGETATION CONDITION

1 'PRISTINE'		COMMENTS Excellent except for some aggressive weeds which bring the cond. rating down
2 EXCELLENT	I	
3 VERY GOOD		
4 GOOD		
5 DEGRADED		

* Conyza * Euphor terracina. ?aspar ?hydro
* Sol nigh, * Pampas grass, * Sonch. (Large thistle) sp
Lob alata, Aca cyclops * * Fig tree

Bandicoot runnels evident

Sol symon, Cass racem, Myopor sp, Clem micro, Myo capillaris, Muel 6.

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA BS 349 (SF proposal (VC)) SITE NUMBER 7

DATE TRIP 7/4/00 RECORDERS K. Clarke

DATE TRIP ____ RECORDERS ____

DATE TRIP ____ RECORDERS ____

BOTANIST ____

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

1. LOCATION of the QUADRAT

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

N

Road Location

Geographic Location Latitude S Longitude E Altitude

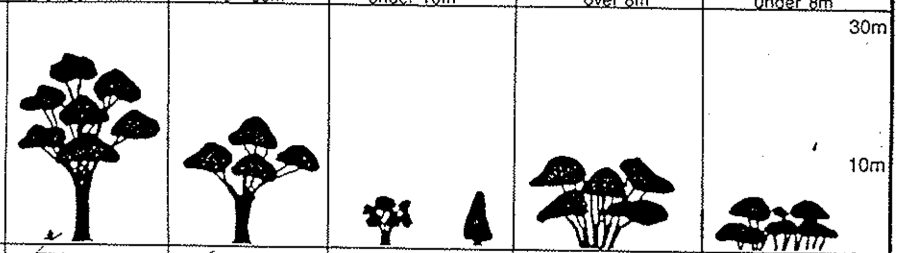
Reference Map

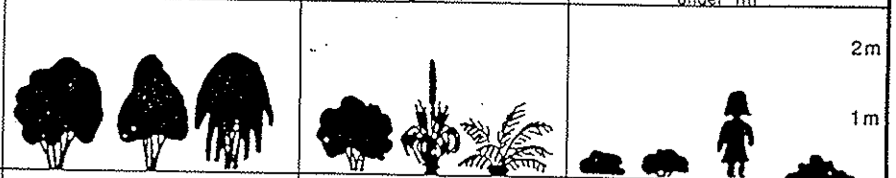
Photograph Photographer's Name K. Clarke Photo No 7

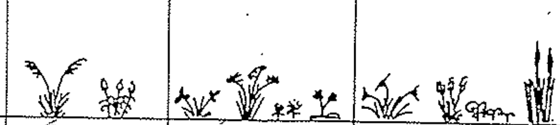
Topographic position Circle position of site on the transect (alter the transect if necessary)

2. SITE DATA Circle the correct response.

Slope flat gentle steep	***Aspect*** N NE E SE S SW W NW
Surface Soil Yellow - orange sand	***Colour***
Exposed rock type	% surface
Sub-surface Soil Orange sand	***Colour***
Rock type	depth to rock
Drainage well mod poor depth water cm	***Wet*** all year winter/spring
Litter % cover Depth cm	***Bare Ground*** %cover

	TREES over 30m	TREES 10 - 30m	TREES under 10m	MALLEES over 8m	MALLEES under 8m
LIFE FORM					
COVER CLASS (%)	2-10%	10-30%			
DOMINANT SPECIES	Eucgomph	Banatt			
		Allocfras			

	SHRUBS over 2m	SHRUBS 2m - 1m	SHRUBS under 1m
LIFE FORM			
COVER CLASS (%)		2-10%	2-10%
DOMINANT SPECIES		Xanpreis	Drylind

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				
COVER CLASS (%)	70-100%	2-10%	<2	
DOMINANT SPECIES	Brizmax	Conacu		
	Ehrcal			

4. VEGETATION CONDITION

		COMMENTS
1 'PRISTINE'		Dominant shrub layer mostly gone, herbs & sedges & native grass layer gone. Lots of rabbit diggings / droppings
2 EXCELLENT		
3 VERY GOOD		
4 GOOD	I	
5 DEGRADED	I	

*Euphterrac, Brizmax, Ehrcal.

Macr reid, Leuco propingu (KF), Hibbhyp, Acapul, Lepid squa

Kenprost

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA _____ SITE NUMBER _____

DATE TRIP _____ RECORDERS _____

DATE TRIP _____ RECORDERS _____

DATE TRIP _____ RECORDERS _____

BOTANIST _____

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

1. LOCATION of the QUADRAT

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

N

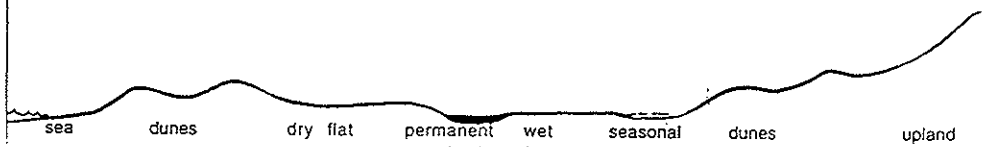
Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name Photo No

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



2. SITE DATA Circle the correct response.

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

Surface Soil *Colour*

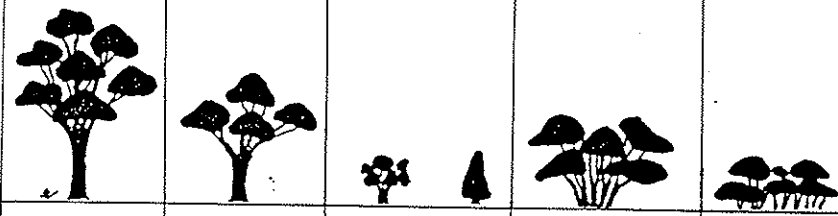
Exposed rock *type* % surface

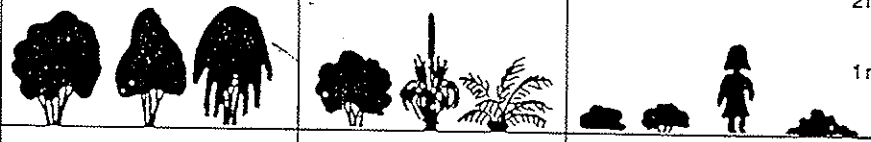
Sub-surface Soil *Colour*

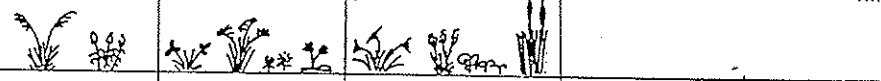
Rock *type* depth to rock

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

Litter	% cover	*Bare Ground*	%cover
Depth	cm		

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

	SHRUBS		SHRUBS
	over 2m	2m - 1m	under 1m
LIFE FORM			
COVER CLASS (%)			
DOMINANT SPECIES			

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				
COVER CLASS (%)				
DOMINANT SPECIES				

4. VEGETATION CONDITION

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

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA BS 319 SITE NUMBER 6

DATE TRIP 7/4/00 RECORDERS K Clarke

DATE TRIP RECORDERS

DATE TRIP RECORDERS

BOTANIST

1. LOCATION of the QUADRAT

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

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

N

✱ History to Land Use – ask Myles Mulvay, CALM Wanneroo Office

Report on history of Mead Cottage

Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name Photo No

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

2. SITE DATA Circle the correct response.

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

Surface Soil type Dark grey sand . Colour

Exposed rock % surface

Sub-surface Soil . Colour

Rock type depth to rock

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

Litter % cover Depth cm | *Bare Ground* %cover

	TREES over 30m	TREES 10 - 30m	TREES under 10m	MALLEES over 8m	MALLEES under 8m
LIFE FORM					
COVER CLASS (%)		10 - 30%	(scattered		
DOMINANT SPECIES		Euc gomph	Banlitt)		

	SHRUBS over 2m	2m - 1m	SHRUBS under 1m
LIFE FORM			
COVER CLASS (%)	10 - 30%	2 - 10%	
DOMINANT SPECIES	Aca sp	Xan pres	

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				
COVER CLASS (%)	< 2	< 2	2 - 10%	
DOMINANT SPECIES			Gah trif	

4. VEGETATION CONDITION

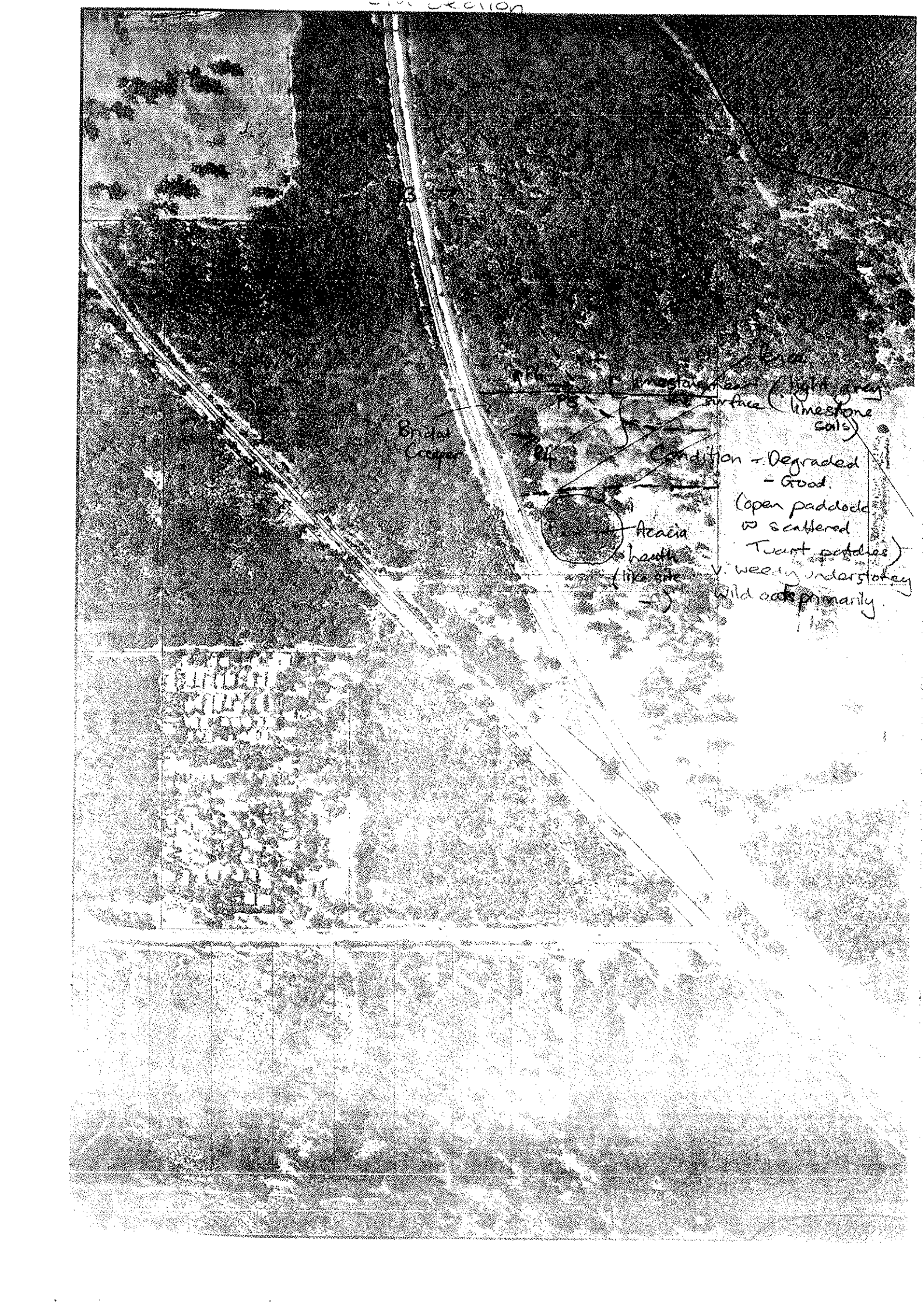
Hasn't been burnt for many yrs >15 yrs?

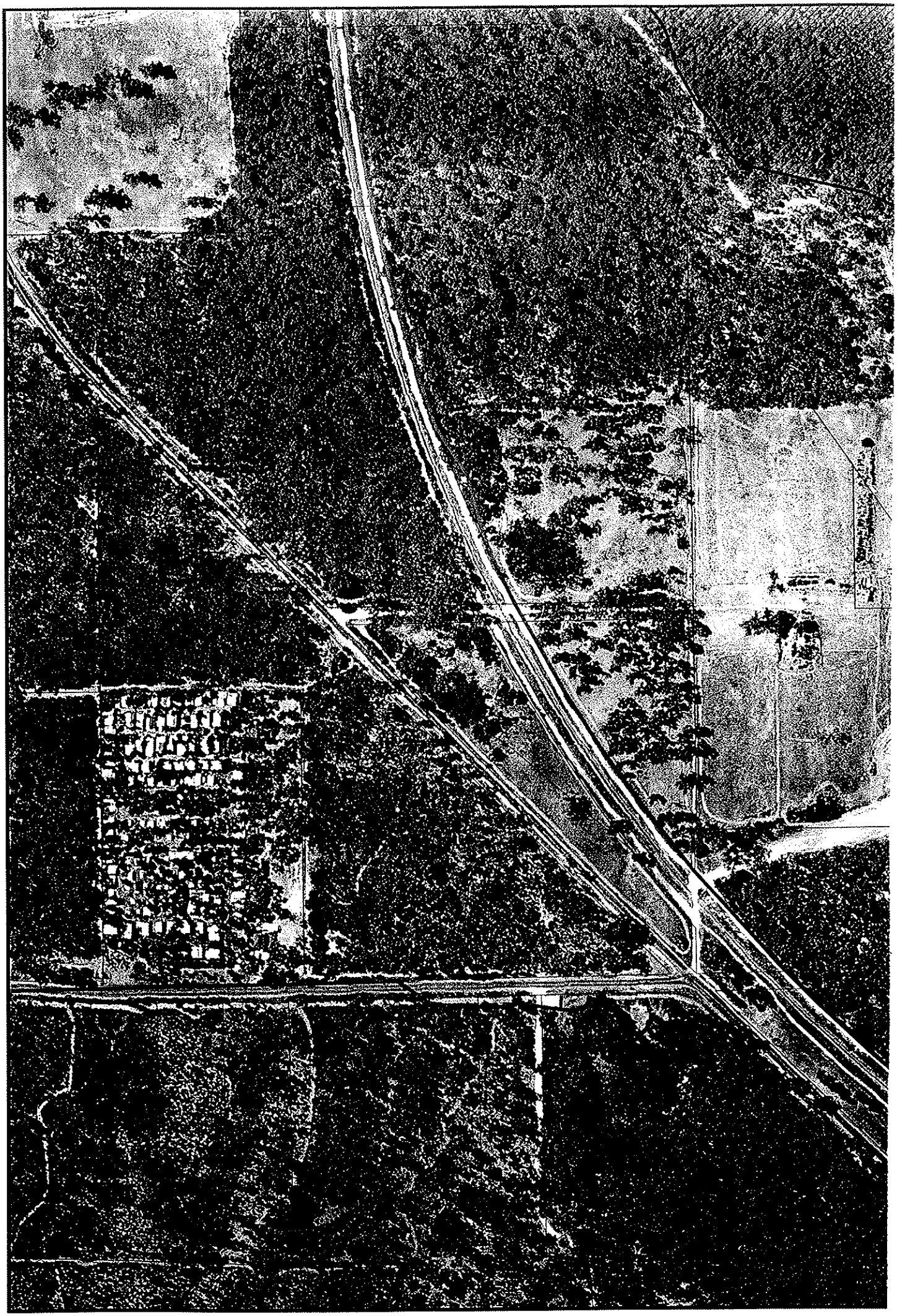
		COMMENTS
1 'PRISTINE'		Good - V. good – Small shrub/herb layer / sedge / mostly gone
2 EXCELLENT		lots of rabbit diggings, Grazed
3 VERY GOOD	I	historically ✱ & grazed by kangas
4 GOOD		now
5 DEGRADED		

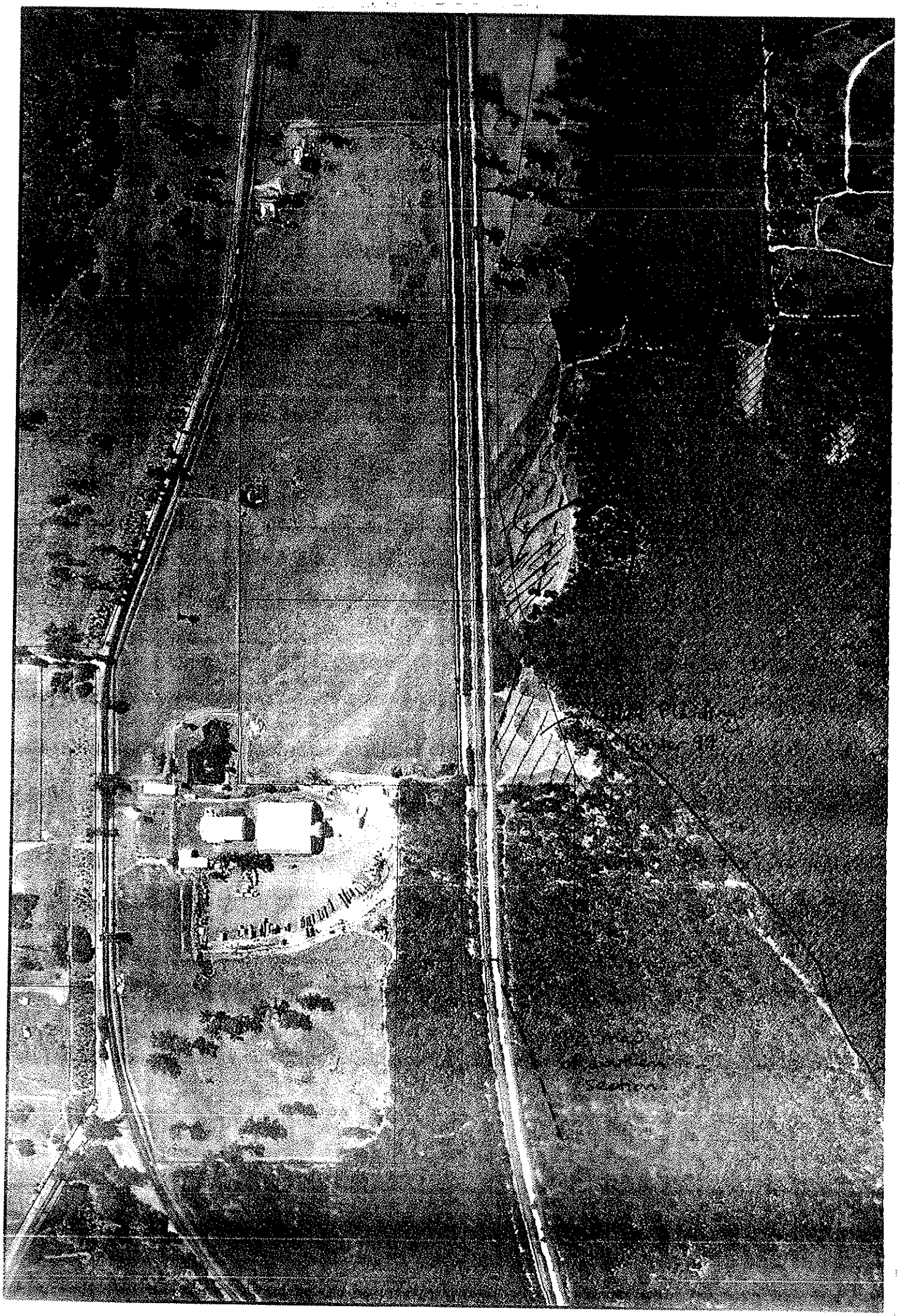
Lots of moss crusting over the surface (dormant at present). Fountain grass all along railway need to control during construction (seed ~~set~~ shed)

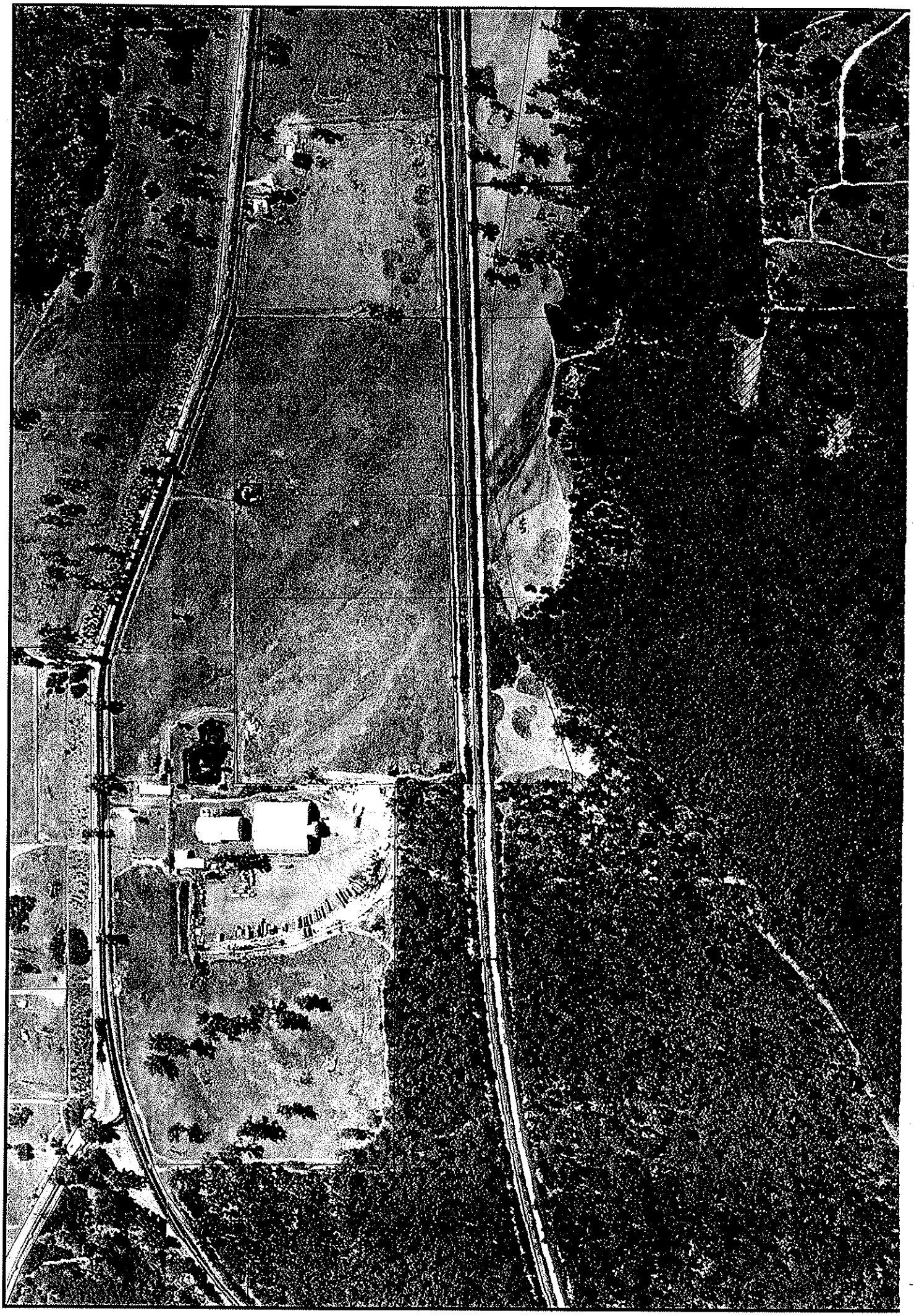
✱ Rom ros (other weeds dead) no Ehrhcal obvious. Temp retus, Stipa flav, Phyl caly, Lepid squa, & Con acu, Lepid squa?, Native grass Desm sp (flex?) (site 5)

Banlitt (some old) ~~[illegible]~~ Kunzeas Leplon Leesp


Limestone surface
(light grey limestone soils)
Bridal Creeper
Condition - Degraded
- Good.
(open paddocks
w scattered
Tuart patches)
Acacia
heath
(like site
-5)
weedy understorey
Wild oats primarily







6/4/00 Meeting w Raymond Marks (Consultant) BS349
re Railcar Storage Facility

Indep. Consultant to assess the Railcar Storage Facility. 2 options — western side (private)
vs eastern side (mostly govt. owned)

IP14 Heavy industry

Heavy freight triangle required for IP14

Cabinet minute to put area in Regional Park. CACM have been given/funds to regenerate area

Conservation for loss if rail on E side. needs to be recognised (rear in area of Regional Pk)

Send advice/report to MFP & they should give to Raymond Marks.

Marked on map ~55m land requirement. Raymond Marks indicated they need 90m.

LEDA M104

REFS: • Halpern Glick Maunsell
• Gibson et al

- Heritage Commission
- ~~library~~ NO RECORDS
- No. of sites.
- Environmental Audits – MfP.

- ~~Brouwer: "all gone" comment on maps?~~
- ~~Brouwer: M104 = Leda~~ (? well)

- FLORA LIST

~~GIBSON/KEIGHERY SITE~~ GIBSON/KEIGHERY

? Vulpia sp. myuros = Vulpia sp. scps ?
? Thysanotus blindstem = Thysanotus patersonii
? Trifolium campestre = Trifolium dubium
? Isolepis diurnandra = I. marginata
? Lomandra sp. micrantha = ?
Thysanotus climb.
? Lomandra suaveola = ? L. sericea

- ~~References seem to be confused:~~

~~(DEP 1995) + (DEP 1994-96) = 1996~~

~~same site info~~

Vegetation and Flora: detailed survey (Burbidge *et al.* in prep.); limited survey (Smith 1989; part site: Gibson *et al.* 1994 Yan01-03, Weston and Gibson 1997, CHECK Y. . .; Arnold 1990; McComb and McComb 1967; Ecologia 1997; Griffin 1994, zYan 2, 4-6; Keighery pers. comm., Pip01)
Structural units: mapping (Smith 1989; Arnold 1990; McComb and McComb 1967; Ecologia 1997)
Spearwood sands: *Eucalyptus gomphocephala* open Forest to Woodland; *Eucalyptus marginata* Open Forest to Woodland - both generally over or mixed with *Banksia* Low Open Forest and Low Woodland and often with *Eucalyptus calophylla* or *Allocasuarina fraseriana*; *Banksia attenuata* and *B. menziesii* Low Open Forest to Low Woodland, often with *Allocasuarina fraseriana, Eucalyptus marginata, Eucalyptus todtiana, Banksia grandis* or *Nuytsia floribunda*
Tamala limestone: *Dryandra sessilis* subsp. *cordata, Hakea trifurcata* and *Calothamnus quadrifidus* Closed Tall Scrub to Open Heath; *Melaleuca acerosa* Closed to Open Heath; *Melaleuca* aff. *acerosa, Melaleuca huegelii* and *Dodonaea aptera* Closed Tall to Open Heath
Wetlands:*Eucalyptus rudis* Open Forest to Low Woodland; *Banksia littoralis* Low Open Forest to Low Woodland; *Melaleuca rhaphiophylla* Closed Forest to Low Woodland; *Typha orientalis* Closed Sedgeland; mixed Low Shrubland; Closed to Open Sedgeland which is mixed or is dominated by *Schoenoplectus validus, Baumea articulata, Lepidosperma drummondii, Lepidosperma gladiatum, Baumea laxa* or *Baumea juncea*; mixed Open Low Heath

Remnant Vegetation (canopy only): Not determined
Vegetation Condition: >90% Very Good to Excellent, <10% Good to Degraded, with areas of severe localised disturbance
Total Flora: 577+ species (estimated >85% expected flora - Burbidge *et al.* undated; McComb and McComb 1967)
DRF/Priority and significant flora: *Melaleuca* sp. Yanchep (G.J.Keighery 11242) (2), *Stylidium maritima ms* (3), *Conostylis pauciflora* subsp. *euryrhipis* (3), *Hibbertia spicata* subsp. *leptotheca* (3)*Lepidium pseudotasmanicum* (4), *Eucalyptus foecunda, Eucalyptus petrensis, Pteris vittata, Melaleuca cardiophylla, Melaleuca huegelii, Alyogyne huegelii* var. *glabrata, Pimelea calcicola, Trachymene coerulea, Astroloma macrocalyx, Astroloma microcalyx, Ricinocarpos glaucus, Lechenaultia linarioides, Acacia alata, Grevillea preissii, Trymalium ledifolium* subsp. *ledifolium, Diplopeltis huegelii, Veronica* aff. *calycina*

Fauna
Site surveyed by structured surveys by WA. Museum and CALM for mammals (15), reptiles (47). Birds surveyed by WA Museum and RAOU 8 visits (134). Significant populations of Splendid Fairy-wren, Southern Emu-wren Broad-tailed, Western and Yellow-rumped Thornbills, Weebill, White-browed Scrubwren, Scarlet Robin, Golden Whistler, Grey Shrike-thrush and several honeyeater species. Significant bird species: category 1 (1), cat 3 (13), cat 4 (8).
Linkage: adjacent bushland to north (east and west links Wilbinga/M3), east (M4), west (Ningana) recognised, fragmented linkage to Subm 290 and 291 to the south recognised
Special Attributes:
• recommended for protection in the study of City of Wanneroo bushland (Trudgen 1996)
• contains XX regional floristic groups, one group (floristic community type 26a) has been recommended as a "critically threatened community " (Weston and Gibson 1997); "

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE
Wetlands of International Significane, ANCA Directory of Important Wetlands in Australia, Register of the National Estate

SECTION 5: INCLUSION CRITERIA AND RECOMMENDATIONS
Criteria met for inclusion: Representation of ecological communities, Diversity, Rarity, Maintaining ecological systems or natural processes, 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 &/or Constraints: Private land, MRS Urban zoning, General and Priority Mineral Resource Area (limestone), Mineral Lease
Recommendation:

LANDCORP

AN ENVIRONMENTAL ASSESSMENT OF

STRUCTURE PLANS FOR LEDA

HALPERN GLICK MAUNSELL PTY LTD

&

ALAN TINGAY & ASSOCIATES

APRIL 1991

DECLARED RARE & PRIORITY FLORA & TARGETED FAUNA SURVEY

PROPOSED EAST ROCKINGHAM RAILCAR DEPOT SITE

·ECOSCAPE·

Declared Rare and Priority Flora and Targeted Fauna Survey, Proposed East Rockingham Railcar Depot Site

Department of Transport

Prepared by:

Ecoscape (Australia) Pty Ltd
21a Pakenham Street, Fremantle WA 6160
Telephone: (08) 9430 8955 Facsimile: (08) 9430 8977
email: ecoscape@wantree.com.au
website: http://www.ecoscape.com.au

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LIST OF PLATES

Acknowledgements

The preparation of this report has been greatly assisted by the following people:

Lawell Cassidy, Department of Transport
Daniel Grover, Department of Transport
Neil Hammer, Hammer Scientific Services
Raimond Orifici, Consulting Botanist
Jennifer Wilcox, Consulting Ornithologist

Their contributions are gratefully acknowledged.

Summary

Declared Rare and Priority Flora and Targeted Fauna Survey

One of the four potential sites for the East Rockingham Railcar Depot site was surveyed for the presence of Declared Rare and Priority Flora and Threatened Fauna. The site surveyed was the south-east alignment, between Wellard and Mead Roads on the eastern side of the existing railway. The majority of this site has been significantly degraded through past land-use practises, but retains small areas of relatively intact bushland. The southern part of the proposed railcar depot is located within Bushplan Site 349 (Leda and Adjacent Bushland) The majority of the study area is zoned Railways in the Metropolitan Region Scheme (MRS), with a small southern portion zoned as Parks and Recreation.

A flora survey was conducted to determine the presence or absence of the following species of Declared Rare and Priority Flora:

- *Diuris micrantha* (Dwarf Bee Orchid) — Declared Rare
- *Hemigenia microphylla* — Priority 3
- *Dodonaea hackettiana* (Hackett's Hopbush) — Priority 4
- *Verticordia multiflora* subspecies *multiflora* — Priority 4

A search was conducted to detect the presence of the following species of Threatened Fauna:

- *Calyptorhynchus latirostris* (Carnaby's Cockatoo) — Schedule 1
- *Falco peregrinus* (Peregrine Falcon) — Schedule 4
- *Macropus irma* (Kwoora or Western Brush Wallaby) — Priority 4
- *Isoodon obesulus fusciventer* (Quenda) — Priority 4

No evidence was found of any of the listed flora species, despite a detailed search of the area.

Diggings and a scat likely to belong to the Quenda were found within the study site, concentrated in areas of degraded *Acacia* shrubland. Local residents reported that Carnaby's Cockatoo has been seen within the study site. No evidence was found of the other two fauna species, although the habitats present in the site indicate that these species could potentially occur, but only in very low numbers, and individuals would not be entirely dependent upon the study site.

The majority of the study site was very degraded, with few native species and an abundance of weeds. Some rehabilitation has been attempted within the site, but much of this was overgrown with weeds. Overall, the conservation significance of bushland within the site was low, and it is considered unlikely that the construction of the proposed Railcar Depot would result in any significant loss of environmental values.

1.0 Introduction

Declared Rare and Priority Flora and Targeted Fauna Survey

Four potential sites for the Rockingham Railcar Depot site have been identified in the City of Rockingham, as part of the development of the Southern Urban Rail Network. The south-east alignment, between Wellard and Mead Roads on the eastern side of the existing railway, is the subject of the current study (Figures 1 and 2). The majority of this site has been significantly degraded through past land-use practises, but retains some stands of relatively intact bushland. As such, it may contain specially protected flora or fauna.

The southern part of the proposed railcar depot is located within Bushplan Site 349 (Leda and Adjacent Bushland) (see Figure 2). A small part of this Bushplan site within the proposed depot is designated as regionally significant bushland (Government of Western Australia, 1998). The site also borders a conservation category wetland (described as a sumpland in Hill *et al.*, 1996). However, it should be noted that the majority of the study area is zoned Railways in the Metropolitan Region Scheme (MRS), with a small southern portion zoned as Parks and Recreation (Figure 2).

This report presents the findings of searches for Declared Rare and Priority Flora and Threatened Fauna within the study area. The study area consists of three discreet parcels of land, which will be referred to as Parcel A, B and C, as indicated on Figure 2.

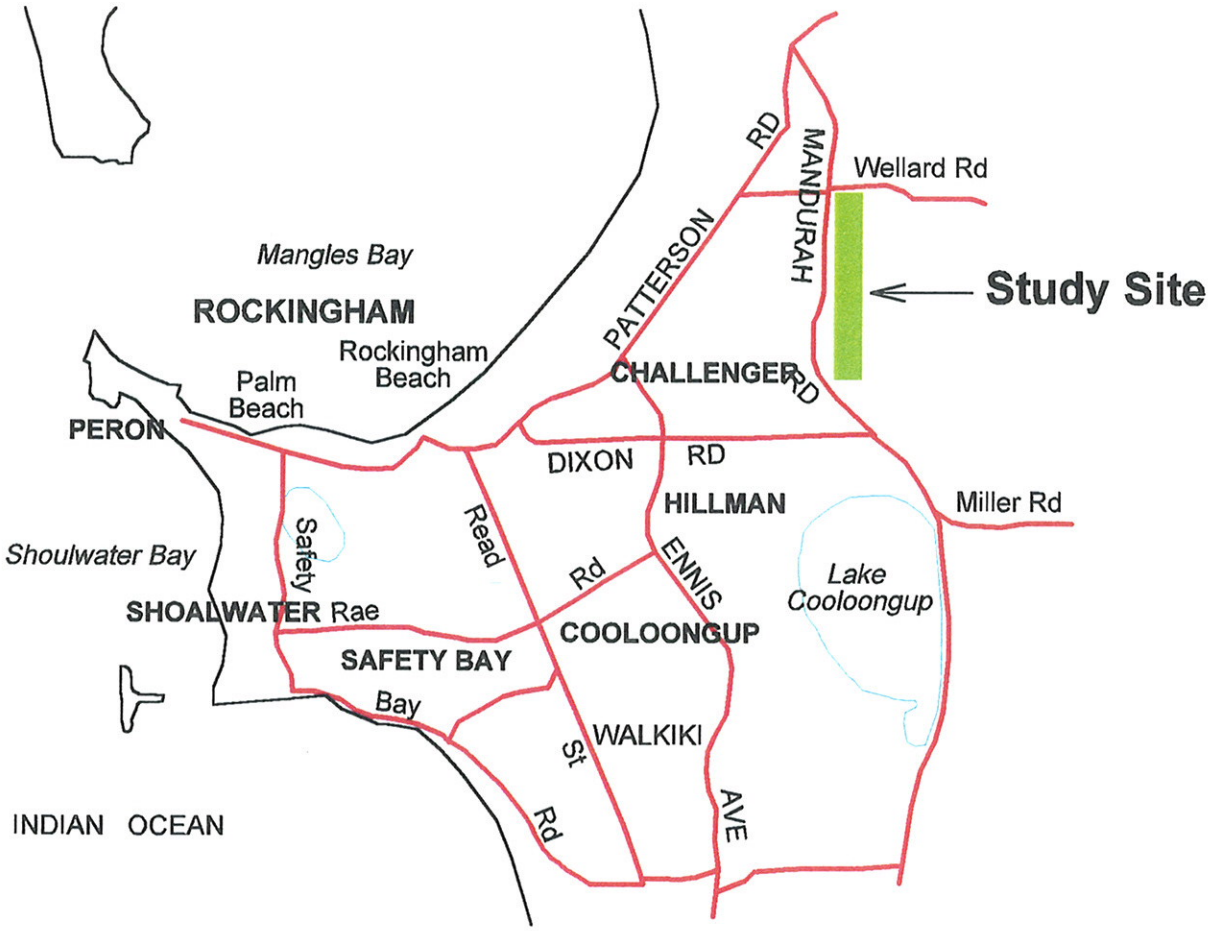

FIGURE 1:
LOCATION PLAN

Source: DOLA Street Express 1997 | Date: 16/10/00 | File: loc_788_1.dgn

SCALE: NOT TO SCALE

• E C O S C A P E •
ECOSCAPE (AUSTRALIA) PTY LTD ACN 070 128 675
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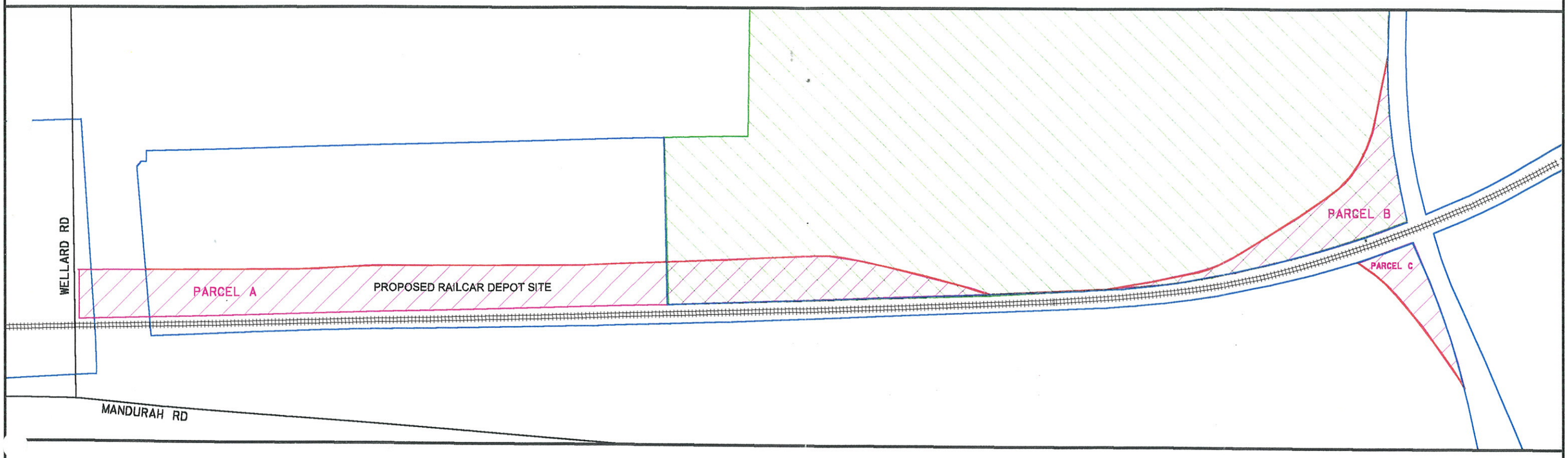

KEY

- Study areas
- Parks and recreation reserve (Bushplan Site 349, Leda and Adjacent Bushland)
- Existing railways reservation boundaries
- Proposed railways reservation boundaries
- Existing railway line

REV	DATE	REVISION

TITLE:
STUDY AREA LAYOUT

CLIENT:
DEPARTMENT OF TRANSPORT

PROJECT:
DECLARED RARE & PRIORITY FLORA & TARGETED FAUNA SURVEY, PROPOSED EAST ROCKINGHAM RAILCAR DEPOT

• E C O S C A P E •
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SCALE: 1:7500

DATE: 16/10/00

DRAWING No:
DEPOT_788_3.DGN

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1.1 Declared Rare and Priority Flora

A search of CALM's *Threatened (Declared Rare) Flora* and *WA Herbarium Specimens* databases indicated that there is the potential for the following species of Declared Rare and Priority Flora to occur within the study area:

- *Diuris micrantha* (Dwarf Bee Orchid) — Declared Rare
- *Hemigenia microphylla* — Priority 3
- *Dodonaea hackettiana* (Hackett's Hopbush) — Priority 4
- *Verticordia multiflora* subspecies *multiflora* — Priority 4

The results of the database search are given in Appendix One, and definitions of the priority categories are given in Table 1.

Table 1: Definition of Priority Categories for Flora.

Category	Definition*
Declared Rare	Taxa that are extant and considered likely to become extinct or rare and therefore in need of special protection (Schedule 1) or taxa that are presumed to be extinct in the wild and therefore in need of special protection (Schedule 2).
Priority 1	Taxa which are known from one or a few (<5) populations which are under threat.
Priority 2	Taxa which are known from one or a few (<5) populations, at least some of which are not believed to be under immediate threat.
Priority 3	Taxa which are known from several populations, at least some of which are not believed to be under threat.
Priority 4	Taxa which are considered to have been adequately surveyed and which whilst being rare, are not currently threatened by any identifiable factors.

* From CALM Priority Flora List, December 1999, and *Wildlife Conservation Act 1950*

1.1.1 *Diuris micrantha* (Dwarf Bee Orchid)

Dwarf Bee Orchid flowers from September to early October, producing 1 to 6 yellow and brown flowers. The species is confined to swampy flats between Perth and Boyup Brook, growing in shallow water amongst dense native sedges. Associated orchids include *Caladenia paludosa* (Swamp Spider Orchid), *Prasophyllum drummondii* (Swamp Leek Orchid) and *Diuris laxiflora* (Bee Orchid) (Hoffman and Brown, 1992).

1.1.2 *Hemigenia microphylla*

Hemigenia microphylla is an erect shrub to around one metre in height. The species has opposite leaves of 1 cm in length, with distinctive whorls of leaves at branch nodes, and green and pink/red flowers. The species grows in seasonally wet, poorly drained flats with clay soils, and is associated with species such as *Viminaria juncea* (Swishbush), *Astartea* aff. *fascicularis*, *Melaleuca leptoclada* and *Olearia paucidentata* (Autumn Scrub Daisy).

1.1.3 *Verticordia multiflora* subsp. *multiflora*

This species occurs on white sandy flats, in association with *Verticordia plumosa*, *Verticordia pennigera*, and Wandoo (*Eucalyptus wandoo*) in the Hillman area. The species has yellow flowers in opposite inflorescences, triangular shaped leaves with prominent oil glands, and alternate leaves in whorls on the branches. The species reaches about 35 cm in height and 30 cm in width. The species is found in widely dispersed locations across the southwest, including the Porongorups, Newdegate, Dragon Rocks and Kojonup.

1.1.4 *Dodonaea hackettiana* (Hackett's Hopbush)

Hackett's Hopbush is a shrub to 3 m high with distinct male and female plants. The leaves are up to 6 cm long. The prominent yellow to red fruits have three prominent "wings". The species is relatively common on the upper limestone escarpment, growing on sand over limestone (Bennett, 1998). Associated species are Tuart (*Eucalyptus gomphocephala*), Flooded Gum (*E. rudis*), Jarrah (*E. marginata*), *Allocasuarina* sp., *Banksia* spp. and introduced grasses.

1.2 Threatened Fauna

A search of CALM's *Threatened Fauna* database indicated that there is the potential for the following species of Threatened and Priority Fauna to occur within the study area:

- *Calyptorhynchus latirostris* (Carnaby's Cockatoo) Schedule 1
- *Falco peregrinus* (Peregrine Falcon) Schedule 4
- *Macropus irma* (Kwoora or Western Brush Wallaby) Priority 4
- *Isoodon obesulus fusciventer* (Quenda or Southern Brown Bandicoot) Priority 4

The results of the database search are given in Appendix Two, and definitions of the priority categories are given in Table 2.

Table 2: Definition of Priority Categories for Fauna.

Category	Definition*
Schedule 1	Fauna which is rare or likely to become extinct
Schedule 4	Fauna in special need of protection
Priority 1	Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority 2	Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority 3	Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority 4	Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.

* From CALM Priority Fauna List, May 2000.

1.2.1 *Macropus irma* (Kwoora or Western Brush Wallaby)

The Kwoora resembles larger kangaroos in its habits, and is a grazer rather than a browser. Optimum habitat consists of open forest or woodland, particularly favouring open, seasonal wet flats with low grasses and open scrubby thickets (Strahan, 1991). The Kwoora is most active at dawn and dusk, resting during the day under scrub. According to the CALM Threatened Fauna database, this species still occurs in the larger patches of native shrubland in the Leda area and adjacent landscape, but in very low numbers. The Kwoora has a distinct white stripe across the face, black and white ears, black hands and feet, and a long tail with a crest of black hair towards the extremity. The species moves fast with the head low and tail extended.

1.2.2 *Isoodon obesulus fusciventer* (Quenda or Southern Brown Bandicoot)

The Quenda prefers scrubby habitats or areas with low ground cover (Strahan, 1991). For a particular area to support a stable population, parts of it must be burned regularly, creating a mosaic of suitable habitats. The Quenda is a nocturnal animal that prefers to stay close to cover. According to the CALM Threatened Fauna database, the Quenda may persist in the study area in low dense heath vegetation

and around wetlands in the dune swales, grazing at the edge of grasslands near denser vegetation. Like other bandicoots, the Quenda leaves distinctive conical-shaped or pointed diggings when searching for food, as opposed to the more rounded diggings of the European Rabbit (*Oryctolagus cuniculus*). The scats of Quendas are cylindrical and friable, compared to the spherical scats of European Rabbits.

1.2.3 *Falco peregrinus* (Peregrine Falcon)

The Peregrine falcon is widespread and sparsely distributed throughout Australia. It feeds on a variety of birds including pigeons and parrots (Johnstone and Storr 1998). Favoured breeding sites for this bird are ledges in cliffs, quarries and granite outcrops, but when these are unavailable it will nest in tree hollows and the old nests of other species such as the Raven *Corvus coronoides* (Johnstone and Storr 1998). The Peregrine Falcon may nest in the open Tuart (*Eucalyptus gomphocephala*) woodlands of the study site. However, as the birds range over large tracts of land, the site would represent only a small part of the range of one pair of birds.

The wings of Peregrine Falcons are held stiffly outstretched when soaring, and the trailing edge is usually straight. The head and cheeks are black, the upperparts are blue-grey, and the underparts are cream with dark barring on the belly (Simpson and Day, 1996).

1.2.4 *Calyptorhynchus latirostris* (Carnaby's or Short-billed Black Cockatoo)

Carnaby's Cockatoo breeds in the wheatbelt of south-west Western Australia, and is a seasonal summer/autumn migrant to the coastal plain. It favours areas of heathland (e.g. *Dryandra sessilis*, *Hakea* spp.), woodland (e.g. *Banksia* spp.) and forest (e.g. *Eucalytpus* spp., *Pinus* spp.) Although Carnaby's Cockatoo would not breed on the site, Tuarts represent potential feeding habitat.

Carnaby's Cockatoo is black, with white tail panels and cheek panels. The male has a pink eye-ring, with a small cheek patch, and the female has a grey eye-ring with a larger cheek patch. The species is distinguished from *Calptorhynchus baudinii* (Baudin's or Long-billed Black Cockatoo) by a shorter bill (Simpson and Day, 1996).

2.0 Methods

Declared Rare and Priority Flora and Targeted Fauna Survey

2.1 DRF and Priority Flora Search

Specimens of the listed Declared Rare and Priority Flora were inspected at the Western Australian Herbarium, Como. Notes were made on their appearance, distinguishing characteristics, growth form, flowering period, habitat and associated species, and this information was taken into the field.

The study area was surveyed for the presence of the listed Declared Rare and Priority Flora on the 6th of October, 2000, by two field staff. The AMG coordinates of the survey area were programmed into a GPS, creating a GPS map of the position of field staff in relation to the boundaries of the study area. This ensured that the study area was adequately surveyed. The survey area for Parcel A was extended to Wellard Road, and also by approximately 20 m to the east of the study site, to coincide with a track that ran most of the length of this parcel (see Figure 3). The area between Wellard Road and Parcel A was surveyed as this land will be used to accommodate construction machinery and vehicle access to the site. Additional vegetation was surveyed outside of the boundaries of Parcels B and C to ensure adequate coverage.

The area of intact bushland in Parcel A was surveyed by traversing the width of the parcel in successive, adjoining 10 m by 100 m transects. The cleared area of Parcel A was not surveyed in transects, due to the wide field of view and high abundance of low-growing weeds, which would not have obscured the presence of *Dodonaea hackettiana*, *Hemigenia microphylla* and *Verticordia multiflora* subsp. *multiflora*. *Diuris micrantha* was considered extremely unlikely to have occurred within the cleared habitat, as it has previously been found only in wetland areas growing amongst native sedges. The more irregularly shaped Parcels B and C were surveyed in successive 10 m transects.

2.2 Targeted Fauna Search

A search for the presence of the Quenda and the Kwoora was carried out on 6th October, 2000, at the same time as the rare flora search. This ensured that the entire study site was searched for the presence of the animals and their diggings, scats and tracks. Information on the tracks, scats and other traces of these animals, as well as identification of the animals themselves, was gathered from Triggs (1996) and Strahan (1991) and taken into the field.

A bird survey was conducted with the objectives of identifying the habitat types present to ascertain the species of birds that may be supported on the site, and recording the bird species identified. Particular emphasis was placed on determining the ability of the site to support two threatened species, the Peregrine Falcon (*Falco peregrinus*) and Carnaby's Cockatoo (*Calyptorhynchus latirostris*).

The site was visited twice on 8th October 2000. One survey was done in the morning and one in the afternoon, and each took about 2 hours to complete. The railway line was traversed from north to south, and then from south to north. All birds species seen in the site were recorded. Birds were identified by both sight and call.

3.0 Results

Declared Rare and Priority Flora and Targeted Fauna Survey

3.1 Description of Study Area

3.1.1. Parcel A

Parcel A can be divided into three distinct vegetation types (Figure 3). The northernmost section of Parcel A consisted of open woodland of Tuart (*Eucalyptus gomphocephala*) and *Acacia rostellifera* (Summer-scented Wattle) over a dense understorey of weeds, with major species *Avena fatua* (Wild Oat), *Bromus* sp. (Brome), *Euphorbia terracina* (Geraldton Carnation Weed) and *Ehrhata longiflora* (Annual Veldt Grass). The typical condition of vegetation in this area is shown in Plate 1. Other weed species present were *Sonchus oleraceus* (Common Sow Thistle), *Oxalis pes-caprae* (Soursob), *Asparagus asparagoides* (Bridal Creeper), *Zantedeschia aethiopica* (Arum Lily), *Rumex* spp. (Dock), *Hypochaeris* sp. (Flat Weed), *Anagallis arvensis* (Scarlet Pimpernel), *Solanum nigrum* (Blackberry Nightshade), *Lolium* sp. (Rye Grass), *Briza maxima* (Blowfly Grass), *Eragrostis curvula* (African Lovegrass) and *Fumaria capreolata* (Ramping Fumitory). The only other native plants in this area (aside from those planted during rehabilitation) were *Clematis microphylla* (Old Man's Beard) and *Spyridium globulosum* (Basket Bush). Much of this part of the study area contained young plants (between about 1 and 3 years of age) that had been planted during rehabilitation, at a separation distance of 3-5 m. However, many of these plants had been overgrown with weeds. There does not appear to be any active management of weeds within this area, aside from a band about 1 m in width near the access track to the immediate east of the study site, where the effects of herbicide application were apparent.

The central section of the Parcel A was largely cleared, with several mature, large Tuart trees, and a low-growing understorey of weeds. In this section, no rehabilitation was apparent, with all plantings occurring east of the study site, on the eastern side of the track, as shown in Plate 2.

The southern section of Parcel A consisted of a sumpland area, with the overstorey dominated by *Melaleuca rhaphiophylla* (Swamp Paperbark) with some *Acacia rostellifera*, over *Gahnia trifida* (Coast Saw-Sedge) and a variety of weed species. A dense thicket of *Acacia rostellifera* at the southern extremity of Parcel A bordered a water-filled depression. This section also contained a very small area (less than 20 m by 20 m) of more intensive rehabilitation than that seen elsewhere within Parcel A, with plants spaced at 1 m intervals (see Plate 3). This area of rehabilitation was not overgrown with weeds, but few native species were present other than those planted during rehabilitation.

Plate 1: Open shrubland of *Acacia rostellifera* with scattered Tuarts over weeds.

This photo, taken from the northern portion of Parcel A, demonstrates the typical, degraded condition of vegetation in this area, showing thickets of *Acacia rostellifera* in the middle ground, a Tuart (*Eucalyptus gomphocephala*) at the extreme left, and dense understorey of *Euphorbia terracina* and other weeds in the foreground.

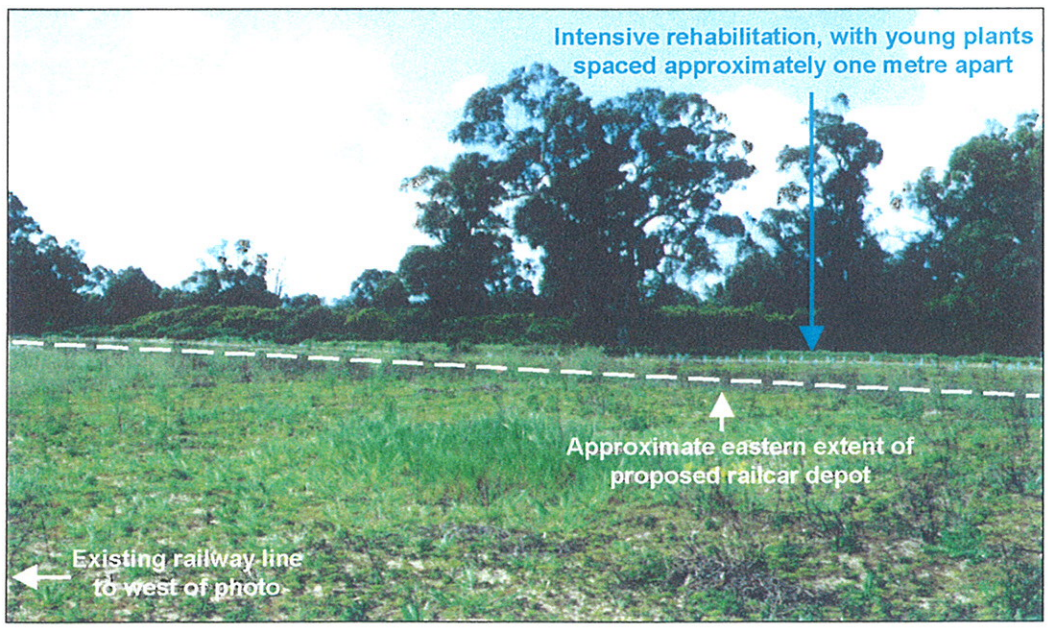


Plate 2: Cleared land within Parcel A, showing location of rehabilitation.

This photo was taken facing northeast, within the cleared area of Parcel A. The understorey is entirely composed of weeds, and scattered Tuarts (not shown in this photo) occur within the site. An area of rehabilitation is indicated in the photo, appearing as small blue rectangles just below the Tuarts in the background. This rehabilitation is outside of the boundaries of the proposed railcar depot, indicated by a dashed line marking the approximate easternmost extent of the proposed depot.

Plate 3: Open woodland of *Melaleuca rhaphiophylla*, Parcel A.

This photo was taken facing northwest, from the southernmost end of Parcel A. Woodland of *Melaleuca rhaphiophylla* can be seen over an understorey of weed species. The photo also depicts an area of intensive rehabilitation within the boundaries of the study area, with young plants (1-2 years of age) spaced at approximately one metre intervals.

3.1.2. Parcel B

Of the three sections surveyed, the bushland in Parcel B was in the best condition. A fenceline ran almost perpendicular to the railway line, beginning near the northernmost of the two proposed railway bridges. This fenceline divided Parcel B into two similar sized areas. To the north of the fence, the vegetation consisted of woodland of Tuart and scattered *Banksia littoralis* (Swamp Banksia) over *Acacia rostellifera*, *Xanthorrhoea preissii* (Grasstree), *Hardenbergia comptoniana* (Native Wisteria), weeds and occasional *Thomasia* sp. The species diversity in this parcel of bushland was low, with less than ten native species noted. Several fallen, dead specimens of *Xanthorrhoea preissii* were noted, many of which would have been more than two metres in height. A few live individuals of this height were also present. The vegetation south of the fenceline was similar in species composition, but was much more degraded, with a high abundance of weeds similar to those noted in Parcel A.

3.1.3. Parcel C

The vegetation of Parcel C consisted of Tuart woodland over *Acacia rostellifera* with a dense understorey of weeds, dominated by *Asparagus asparagoides* and *Euphorbia terracina*. A small water-filled depression surrounded by *Melaleuca rhaphiophylla* was also evident in this parcel.

3.2. DRF and Priority Flora Search

No Declared Rare or Priority Flora were found as a result of this search.

3.3. Targeted Fauna Search

3.3.1. Habitat Types

Habitat types observed within the study site, in decreasing order of areal extent were:

- Isolated mature Tuarts over weeds, surrounded by cleared land;
- Open shrubland of *Acacia rostellifera* with scattered Tuart over dense weeds;
- Woodland of Tuart, Swamp Banksia and *Acacia rostellifera*; and
- Woodland of *Melaleuca rhaphiophylla* in seasonally inundated areas.

3.3.2 Mammals

No evidence was found of the Kwoora during field surveys. Several conical-shaped diggings, typical of those left by bandicoots, were found during the field survey (see Figure 3). These diggings were concentrated in the northernmost area of Parcel A, in areas of Tuart and *Acacia rostellifera* over grassy weeds. It is likely that Quendas frequent this part of the study area when searching for food. A scat, which appeared to be bandicoot-like due to its cylindrical shape and friable nature, was found in relatively intact bushland in Parcel B.

3.3.3. Birds

No threatened birds were observed at the site, however, a chance meeting with local residents confirmed the occasional presence of Carnaby's Cockatoo.

The bird species observed on each survey were similar, so they have been included as one table (Table 3). A total of 29 species were observed. The species observed on a single day of surveying tend to be the common species, and it is less likely to pick up rare or threatened species simply because there are usually less of them. Other species such as owls and frogmouths are also missed as they are nocturnal, and more honeyeaters will move into the area when the Tuart flower.

Of the species observed, the Australian Magpie, Australian Ringneck and Black-shouldered Kite were both noticed to be breeding at the site, the Kite with two fledged young. Hollows in the large Tuarts on the site may be utilised by Tree Martins, pardalotes, parrots and owls.

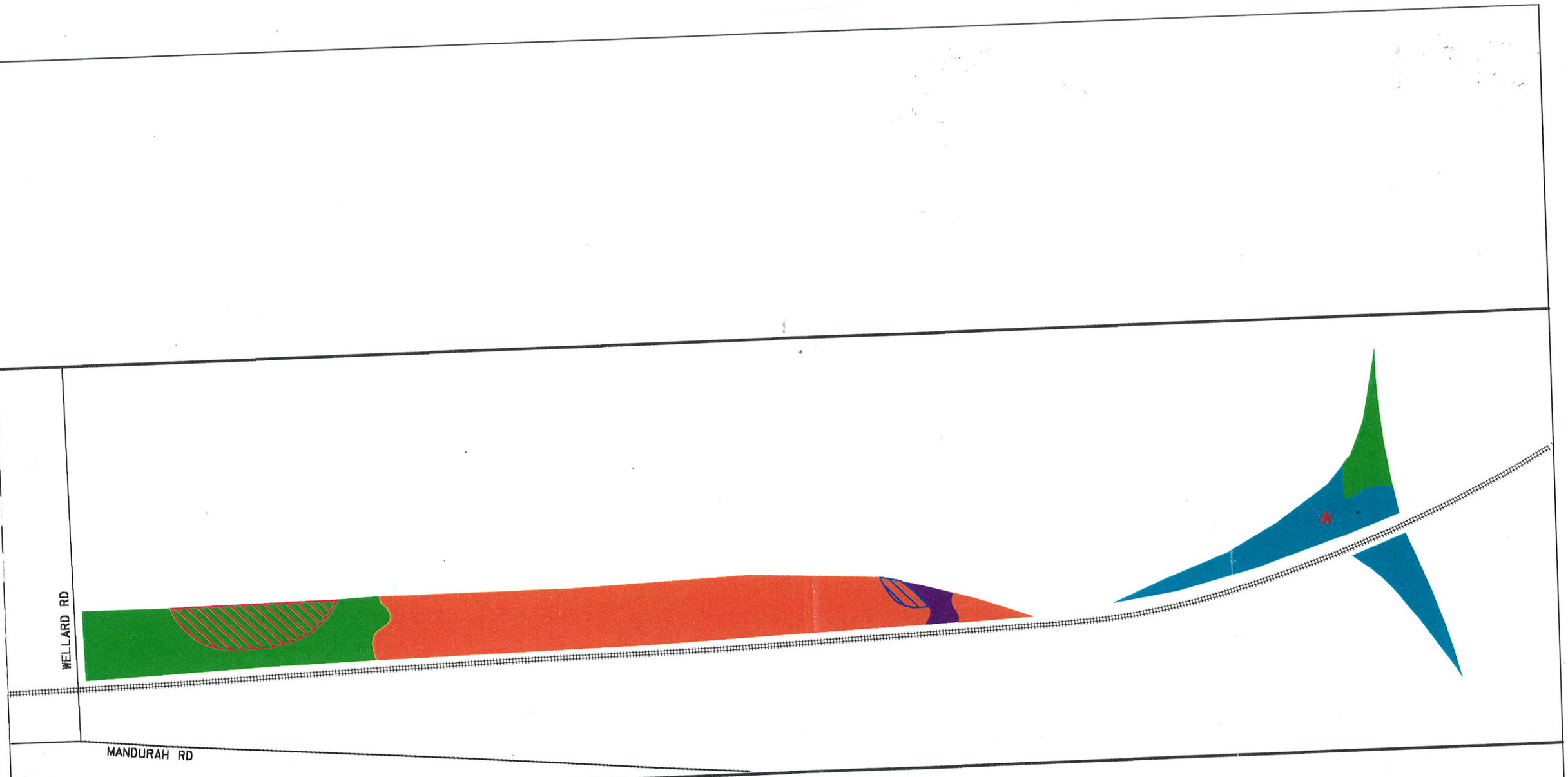
Some of the species observed, such as the Splendid Fairy-wren and White-browed scrubwren, are small, insectivorous and favour the thick *Acacia* heath. These species will not persist on the site if the heath is removed, but will utilise the extensive areas of similar habitat surrounding the proposed depot. Other species such as Weebills and pardalotes favour eucalypts, also well represented in bushland surrounding the proposed depot site. The open, cleared land favours some birds of prey such as the Black-shouldered Kite and Nankeen Kestrel.

Table 3: Birds observed at the proposed East Rockingham railcar depot site.
Where species have particular habitat preferences, these have been added as 'heath', 'Tuart' and 'open pasture'.

Species		Habitat
Accipitridae (kites, hawks and eagles)		
Black-shouldered Kite	*Elanus notatus*	open pasture
Falconidae (falcons)		
Nankeen Kestrel	*Falco cenchroides*	open pasture
Columbidae (pigeons and doves)		
Laughing Turtle-dove	*Streptopelia senegalensis*	open pasture
Spotted Turtle-dove	*Streptopelia chinensis*	open pasture
Cacatuidae (cockatoos)		
Corella sp.	*Cacatua* sp.	
Galah	*Cacatua roseicapilla*	open pasture
Psittacidae (lorikeets and parrots)		
Red-capped Parrot	*Purpureicephalus spurius*	Tuart
Australian Ringneck	*Barnardius zonarius*	

Table 3 cont'd

Cuculidae (cuckoos)		
Horsfields Bronze-cuckoo	*Chrysococcyx basalis*	
Shining Bronze-cuckoo	*Chrysococcyx lucidus*	
Halcyonidae (forest kingfishers)		
Laughing Kookaburra	*Dacelo novaeguinae*	
Meropidae (bee-eaters)		
Rainbow Bee-eater	*Merops ornatus*	
Maluridae (fairy-wrens)		
Splendid Fairy-wren	*Malurus splendens*	Heath
Pardilotidae (pardalotes and thornbills)		
Striated Pardalote	*Pardalotus striatus*	
White-browed Scrub-wren	*Sericornis frontalis*	Heath
Western Gerygone	*Gerygone fusca*	Tuart
Weebill	*Smicrornis brevirostris*	Tuart
Meliphagidae (honeyeaters)		
Red Wattlebird	*Anthochaera carunculata*	
Pachycephalidae (whistlers)		
Golden Whistler	*Pachycephala pectoralis*	Tuart
Rufous Whistler	*Pachycephala rufiventris*	Tuart
Grey Shrike Thrush	*Colluricincla harmonica*	Tuart, heath
Dicruridae (flycatchers)		
Grey fantail	*Rhipidura fuliginosa*	
Campephagidae (cuckoo-shrikes)		
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	
Artamidae (woodswallows)		
Grey Butcherbird	*Cracticus torquatus*	
Australian Magpie	*Gymnorhina tibicen*	
Corvidae (ravens and crows)		
Australian Raven	*Corvus coronoides*	
Hirundinidae (swallows)		
Welcome Swallow	*Hirundo neoxena*	
Tree Martin	*Hirundo nigricans*	
Zosteropidae (white-eyes)		
Silvereye	*Zosterops lateralis*	Tuart, Heath



KEY

- Open shrubland of Acacia rostellifera with scattered Eucalyptus gomphocephala over dense weeds, with low to medium density rehabilitation (plants 3-5m apart)
- Cleared land with isolated mature Eucalyptus gomphocephala
- Woodland of Melaleuca rhaphiophylla over Gahnia trifida and weeds, with fringing thickets of Acacia rostellifera
- Woodland of Eucalyptus gomphocephala over Banksia littoralis, Acacia rostellifera and Xanthorrhoea preissii (In poor condition west of the railway line, and fair to good condition east of the railway line)
- * Quenda scat found
- Scattered Quenda diggings (~10) observed in this area)
- Intensive Rehabilitation within boundaries of study site
- Existing railway line

REV	DATE	REVISION

TITLE:
HABITAT AND FAUNA LOCATIONS

CLIENT:
DEPARTMENT OF TRANSPORT

PROJECT:
DECLARED RARE & PRIORITY FLORA & TARGETED FAUNA

• E C O S C A P E •
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SCALE: 1:7500

DATE: 16/10/00

DRAWING No:
DEPOTVEG_788_1.DGN

N

4.0 Discussion

4.1. Declared Rare and Priority Flora

Given the abundance of non-native species, the relatively open nature of much of the study area, the low native species diversity, and the detailed survey technique used, there is a very high probability that *Dodonaea hackettiana*, *Hemigenia microphylla* and *Verticordia multiflora* subsp *multiflora* would have been detected, had they been present in the study area.

The rare orchid *Diuris micrantha* would have been more difficult to find than the other targeted species in areas where weed cover was high. However, it is unlikely that *D. micrantha* would persist in these areas. The two small areas of *D. micrantha*'s preferred wetland habitat within the study area in Parcels B and C were carefully searched, but no specimens were found.

The conservation status of the four species surveyed will not be affected by the proposed railcar depot.

4.2. Threatened and Priority Fauna

Of the four targeted species, the Quenda and Carnaby's Cockatoo may possibly be present within the study area. Of the habitat types within the study area, Quendas appear to favour areas of open *Acacia rostellifera* shrubland for foraging. Both of these habitat types are well represented in the adjacent bushland that forms part of Bushplan Site 349 (Leda and Adjacent Bushland), and the loss of small areas of these habitat types is unlikely to significantly affect these species.

No evidence was found of the presence of Kwoora or Peregrine Falcons in the study area. If these species did utilise the study area, they would be present in very low numbers, and would be reliant on adjacent, larger tracts of intact bushland to meet their foraging and breeding requirements.

4.3. Conclusions

The conservation significance of the bushland areas surveyed is low, due to the history of disturbance in the area, the high abundance of invasive weeds such as *Asparagus asparagoides*, *Euphorbia terracina* and *Bromus* sp., and the low native species diversity. Although Tuart woodland is becoming increasingly rare on the Swan Coastal Plain and several isolated mature Tuarts remain on the site, the condition of Tuart woodland is degraded and consequently of low conservation significance. In addition, the area of relatively intact Tuart woodland that would be removed from Parcel B is small, at around 2.5 ha.

Discussion

Most of the rehabilitation works that have been implemented on the site do not appear to have been maintained, and no substantial follow-up weed control programs appear to have been implemented. More substantial rehabilitation of the degraded areas of the site, particularly in Parcel A, would be a major undertaking, requiring complete reestablishment of understorey plants and eradication of the numerous and abundant weed species. Such rehabilitation would be better aimed at areas of bushland in better condition than those present within the study area.

The construction and operation of the proposed East Rockingham Railcar Depot is unlikely to affect the conservation status of any of the flora or fauna species targeted during this survey, as no evidence was found of any threatened flora and the threatened fauna that may be present are likely to utilise similar habitat in adjacent bushland.

References

Declared Rare and Priority Flora and Targeted Fauna Survey

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Hoffman, N and Brown, A (1992) *Orchids of South-West Australia.* University of Western Australia Press, Perth, Western Australia.

Johnstone, R and Storr, G (1998) *Handbook of Western Australian Birds, Volume 1: Non-Passerines (Emu to Dollarbird).* Museum of Western Australia.

Simpson, K and Day, N (1996) *Field Guide to the Birds of Australia.* 5th Edition. Penguin Books Australia, Victoria.

Strahan, R (1991) *The Australian Museum Complete Book of Australian Mammals.* Cornstalk Publishing, New South Wales.

Appendix One

Declared Rare and Priority Flora and Targeted Fauna Survey

Declared Rare and Priority Flora Search Results

HEAD OFFICE
Dick Perry Drive
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6009
Ph (08) 9334 0333
Fax (08) 9386 1578

STATE OPERATIONS
HEADQUARTERS
17 Dick Perry Avenue
Western Precinct
Technology Park
KENSINGTON WA
6151
Ph (08) 9334 0333
Fax (08) 9334 0466
Teletype (08) 9334 0515

Postal Address:
Locked Bag 104
Bentley Delivery Centre
BENTLEY WA 6983

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

Your Ref:
Our Ref: 045094F2000
Enquiries: John Riley
Phone: (08) 9334 0123

RECEIVED
28 SEP 2000

Ecoscape Pty Ltd
21A Pakenham Street
FREMANTLE WA 6160

Attention: Sandy Griffin

Dear Ms Griffin

REQUEST FOR RARE FLORA INFORMATION

I refer to your request of 26 September 2000 for information on rare flora in the Rockingham area. The search co-ordinates used were 32^0 12' - 32^0 18' & 115^0 44' - 115^0 49'.

A search was undertaken for this area of (1) the Department's *Threatened (Declared Rare) Flora* database (for results, if any, see "Summary of Threatened Flora Data"), (2) the Department's *Priority Species List* [this list contains species that are declared rare (Conservation Code R and/or T, or X for those presumed to be extinct), poorly known (Conservation Codes 1, 2 or 3), or require monitoring (Conservation Code 4) – for results, if any, see "Declared Rare and Priority Flora List"] and (3), the *Western Australian Herbarium Specimen* database for priority species opportunistically collected in the area of interest (for results, if any, see "WAHERB Specimen Database General Enquiry").

Attached also are the conditions under which this information has been supplied. Your attention is specifically drawn to the seventh point which refers to the requirement to undertake field investigations for the accurate determination of rare flora occurrence at a site. *The information supplied should be regarded as an indication only of the rare flora that may be present and maybe used as a target list in any surveys undertaken.*

An invoice for $200 (plus GST), being the standard fee for the supply of this information, will be forwarded.

It would be appreciated if any populations of rare flora encountered by you in the area could be reported to this Department to ensure their ongoing management.

If you require any further details, or wish to discuss rare flora management, please contact my Principal Botanist, Dr Ken Atkins, on (08) 93340425.

Yours faithfully

J. Riley

.....
for Dr Wally Cox
EXECUTIVE DIRECTOR
26 September, 2000
Attached

ATTACHMENT

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

RARE FLORA INFORMATION

CONDITIONS IN RESPECT OF SUPPLY OF INFORMATION

1. All requests for data to be made in writing to the Executive Director, Department of Conservation and Land Management, Attention: Administrative Officer Flora, Wildlife Branch.

2. The data supplied may not be supplied to other organisations, nor be used for any purpose other than for the project for which they have been provided, without the prior written consent of the Executive Director, Department of Conservation and Land Management.

3. Specific locality information for Declared Rare Flora is regarded as confidential, and should be treated as such by receiving organisations. Specific locality information for DRF may not be used in reports without the written permission of the Executive Director, Department of Conservation and Land Management. Reports may only show generalised locations or, where necessary, show specific locations without identifying species. The Administrative Officer Flora is to be contacted for guidance on the presentation of rare flora information.

4. Note that the Department of Conservation and Land Management respects the privacy of private landowners who may have rare flora on their property. Rare flora locations identified in the data as being on private property should be treated in confidence, and contact with property owners made through the Department of Conservation and Land Management.

5. Receiving organisations should note that while every effort has been made to prevent errors and omissions in the data provided, they may be present. The Department of Conservation and Land Management accepts no responsibility for this.

6. Receiving organisations must also recognise that the database is subject to continual updating and amendment, and such considerations should be taken into account by the user.

7. It should be noted that the supplied data do not necessarily represent a comprehensive listing of the rare flora of the area in question. Its comprehensiveness is dependant on the amount of survey carried out within the specified area. The receiving organisation should employ a botanist, if required, to undertake a survey of the area under consideration.

8. Acknowledgment of the Department of Conservation and Land Management as source of the data is to be made in any published material. Copies of all such publications are to be forwarded to the Department of Conservation and Land Management, Attention: Principal Botanist, Wildlife Branch.

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
DECLARED RARE AND PRIORITY FLORA LIST
20 December 1999

SPECIES / TAXON	CONS CODE	CALM REGION	DISTRIBUTION	FLOWER PERIOD
Verticordia multiflora subsp. multiflora	4	SC,WB, SW	Porongorups, Newdegate, Darkin Swamp, Borden, Dragon Rocks, Kojonup, Woodanilling, Hillman	

WAHERB SPECIMEN DATABASE
GENERAL ENQUIRY

Diuris micrantha
D.L.Jones (Orchidaceae)
CONSERVATION STATUS: R
Coll.: S.D. Hopper s.n. Date: 24 09 1984 (PERTH 04981588)
LOCALITY Medina WA
Lat.: 32^ 13' 35" S Long.: 115^ 48' 18" E
Previous det.: Diuris laxiflora aff.

Diuris micrantha
D.L.Jones (Orchidaceae)
CONSERVATION STATUS: R
Coll.: A.P. Brown s.n. Date: 10 09 1984 (PERTH 266701)
LOCALITY Johnson road just S of Thomas road [Ca 3 km S of Kwinana]. WA
Lat.: 32^ 14' 0 " S Long.: 115^ 48' 0 " E
Erect tuberous herb ca 60 cm high. Flowers yellow bloched with brown (late flowe
rs). In winter wet swamp.
Low sedges. Common in clumps.
Previous det.: Diuris sp.(Kwinana)A.P.Brown 10/9/84

Dodonaea hackettiana
W.Fitzg. (Sapindaceae)
CONSERVATION STATUS: P4
Coll.: A.H. Burbidge 3980 Date: 22 04 1986 (PERTH 01157647)
LOCALITY The Spectacles, near Medina WA
Lat.: 32^ 14' 0 " S Long.: 115^ 48' 0 " E
Erect shrub, ca 1.5 m high. Level, but disturbed sand.
Abundance: rare.

Hemigenia microphylla
Benth. (Lamiaceae)
CONSERVATION STATUS: P3
Coll.: B.J. Keighery & N. Gibson 401 Date: 02 09 1993 (PERTH 04383257)
LOCALITY Reserve 23172 (C58) adjacent to Harvey River 15 km WSW of Waroona
(plot
c58-2). WA
Lat.: 32^ 15' 48" S Long.: 115^ 45' 45" E
Erect shrub 1m. Soil: Clay. Topography/drainage: Seasonally wet poorly
drained flat.
Geomorphology: Guildford formation (pinjarra plain).
Vegetation: Viminaria juncea, Astartea aff. fascicularis Low Scrub B
over Melalueca leptoclada, Olearia paucidentata Dwarf Scrub C over Leptocarpus c
anus, Chorizandra enodis Low Sedges.

Appendix Two

Declared Rare and Priority Flora and Targeted Fauna Survey

Threatened Fauna Search Results

HEAD OFFICE
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Teletype (08) 9334 0546

Postal Address:
Locked Bag 104
Bentley Delivery Centre
BENTLEY WA 6983

044766F2000
Dr. Peter Mawson
08 93340421

Ms Sandra Griffin
Ecoscape
21A Packenham Street
FREMANTLE WA 6160

Dear Ms Griffin

REQUEST FOR THREATENED FAUNA INFORMATION

I refer to your request of 26 September for information on threatened fauna occuring in the Leda / IP14 area.

A search was undertaken for this area of the Department's Threatened Fauna database, which includes species which are declared as '*Rare or likely to become extinct* (Schedule 1)', '*Birds protected under an international agreement* (Schedule 3)', and '*Other specially protected fauna* (Schedule 4)'. Attached are print outs from these databases where records were found.

Attached also are the conditions under which this information has been supplied. Your attention is specifically drawn to the sixth point that refers to the requirement to undertake field investigations for the accurate determination of threatened fauna occurrence at a site. The information supplied should be regarded as an indication only of the threatened fauna that may be present.

An invoice for $110.00 ($100.00 + $10.00 GST), being the set charge for the supply of this information, will be forwarded.

It would be appreciated if any populations of threatened fauna encountered by you in the area could be reported to this Department to ensure their ongoing management.

If you require any further details, or wish to discuss threatened fauna management, please contact my Senior Zoologist, Dr Peter Mawson on 08 93340421.

Yours faithfully

.....
for Dr Wally Cox
EXECUTIVE DIRECTOR

4 October, 2000.

Attachment

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

THREATENED FAUNA INFORMATION

Conditions In Respect Of Supply Of Information

* All requests for data to be made in writing to the Executive Director, Department of Conservation and Land Management, Attention: Senior Zoologist, Wildlife Branch.

* The data supplied may not be supplied to other organisations, nor be used for any purpose other than for the project for which they have been provided without the prior consent of the Executive Director, Department of Conservation and Land Management.

* Specific locality information for Threatened Fauna is regarded as confidential, and should be treated as such by receiving organisations. Specific locality information for Threatened Fauna may not be used in reports without the written permission of the Executive Director, Department of Conservation and Land Management. Reports may only show generalised locations or, where necessary, show specific locations without identifying species. The Senior Zoologist is to be contacted for guidance on the presentation of Threatened Fauna information.

* Receiving organisations should note that while every effort has been made to prevent errors and omissions in the data, they may be present. The Department of Conservation and land Management accepts no responsibility for this.

* Receiving organisations must also recognise that the database is subject to continual updating and amendment, and such considerations should be taken into account by the user.

* It should be noted that the supplied data do not necessarily represent a comprehensive listing of the Threatened Fauna of the area in question. Its comprehensiveness is dependent of the amount of survey carried out within a specified area. The receiving organisation should employ a biologist/zoologist, if required, to undertake a survey of the area under consideration.

* Acknowledgment of the Department of Conservation and Land Management as the source of data is to be made in any published material. Copies of all such publications are to be forwarded to the Department of Conservation and Land Management, Attention; Senior Zoologist, Wildlife Branch.

The search of the database indicated that the following threatened and priority fauna occur in the area in question.

Schedule 1 (Fauna which is Rare or likely to become Extinct)

Carnaby's cockatoo (*Calyptorhynchus latirostris*) This species is a seasonal visitor (summer-autumn) in the area in question. It feeds extensively on the proteaceous shrublands where they have been retained.

Schedule 4 (Fauna which is Otherwise Specially Protected)

Peregrine Falcon (*Falco peregrinus*) This species may occur as a vagrant in the area in question in open tuart woodlands.

Priority Taxa

Quenda (*Isoodon obesulus fusciventer*) P4 This species may still persist in the area in question in locations with low dense heath vegetation and around the wetalnds in the dune swales.

Western Brush Wallaby (*Macropus irma*) P4 This species still occurs in the larger patches of native shrubland in the Leda area and adjacent landscape, but in very low numbers.

JENNY ARNOLD'S
PERTH WETLANDS RESOURCE BOOK

CHAPTERS 9 - 11

EAST BEELIAR WETLANDS

WETLANDS OF THE SOUTH WEST CORRIDOR
AND OF THE ROCKINGHAM PLAIN

RONMENTAL PROTECTION AUTHORITY
ATER AUTHORITY OF WESTERN AUSTRALIA

BULLETIN 266 DECEMBER 1990

5111 WA 3165 (C) METRO REGIONAL AREA & EXT. RUN 8 (5079-5160) 1:20000 11-DEC-92 920676

5112 WA 3165 (C) METRO REGIONAL AREA & EXT. RUN 8 (5079-5160) 1:20000 11-DEC-92 920676

5194 WA 3165 (C) METRO REGIONAL AREA & EXT. RUN 9 (5161-5244) 1:20000 11-DEC-92 920676

5195 WA 3165 (C) METRO REGIONAL AREA & EXT. RUN 9 (5161-5244) 1:20000 11-DEC-92 920676