WILBINGA-CARABAN BUSHLAND

Boundary Definition: protected area/bushland taken to cadastre boundary

SECTION 1: CADASTRAL INFORMATION

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

Bushplan Site no. 406 **Map no.** 1, 2, 3, 4, 5, 6, 7, 8 **Map sheet series ref. no.** 2035–III SE, 2035–III SW

System 6 (1983): Part M1, C12 area of bushland goes beyond System area boundaries, all bushland described

Other Names
Submission Area 217

Local Authorities (Suburb)
Shire of Gingin (Two Rocks, Wilbinga, Caraban), Shire of Wanneroo (Yanchep)

Ownership Categories
State Government

CALM Managed Land

Area (ha): total 9683.3; bushland 9158.3

Zoning
MRS: Urban Deferred, Rural, Parks and Recreation
TPS: Landscape, Ocean, Parks and Recreation, Rural, Public Use, Roads

Lot/Location/Reserve numbers (Purpose), Street name
5611, 8185, 9755, 9756, 9757, 10651, 10652, 10692 street not identified
Crown Reserve
Reserve 39412 (Quarry (limestone), State Forest 65

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS

Spearwood Dunes
Sands derived from Tamala Limestone (Qts: S7)
Tamala Limestone (Qtl)
Quindalup Dunes (Holocene dunes)
Safety Bay Sands (Qhs: S1, S2, S13, LS4)

VEGETATION AND FLORA

Vegetation Complexes
Spearwood Dunes
Cottesloe Complex — North
Quindalup Dunes
Quindalup Complex

Floristic Community Types: *not sampled, type inferred

Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

26a	*Melaleuca huegelii — M. acerosa* shrublands of limestone ridges
26b	Woodlands and mallees on limestone
27	Species poor mallees and shrublands on limestone
28	Spearwood *Banksia attenuata* or *B. attenuata — Eucalyptus* woodlands
29a	Coastal shrublands on shallow sands
29b	*Acacia* shrublands on taller dunes
*S11	Northern *Acacia rostellifera — Melaleuca acerosa* shrublands
S13	Northern *Olearia axillaris — Scaevola crassifolia* shrublands
*S14	*Spinifex longifolius* grassland and low shrubland

WETLANDS

No wetlands mapped

THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: limestone sheets overlaid by Quindalup and Spearwood sands, limestone ridges, younger to older Quindalup Dunes, vegetated uplands

Vegetation and Flora: detailed survey (part Bushplan Site — Trudgen *et al.* 1990); limited survey (DEP 1996 (Wilb 01–10), Gibson *et al.* 1994 (She 01–06; Nwil 01, 03))

Structural Units: mapping (Trudgen *et al.* 1990)

Spearwood Dunes

Uplands - Sands derived from Tamala Limestone: *Eucalyptus gomphocephala* Open Forest to Woodland; *Eucalyptus todtiana, Banksia attenuata* and *B. menziesii* Low Open Forest; *Banksia attenuata* and *B. menziesii* Low Woodland; *Eucalyptus decipiens* Low Open Forest; *Banksia ilicifolia* Low Woodland

Uplands - Tamala Limestone: Closed Low Heaths, Closed to Open Heaths and Tall Scrub dominated by *Melaleuca cardiophylla, M. huegelii* and *Westringia dampieri* (uncommon near the coast), and by *Melaleuca acerosa, Baeckea robusta, Calothamnus quadrifidus* and *C. sanguineous* distant from the coast; *Dryandra sessilis* var. *cygnorum, Acacia truncata, A. lasiocarpa, Hibbertia hypericoides, Scaevola repens, Rhagodia baccata, Hardenbergia comptoniana* and combinations of these; occasional patches of *Eucalyptus foecunda* Closed Mallee Heath

Quindalup Dunes

Older dunes and plains: Open Low Heaths dominated by *Melaleuca acerosa, Acacia rostellifera, Hibbertia racemosa* over Herblands dominated by *Lomandra maritima, Conostylis candicans, Opercularia vaginata, Acanthocarpus preissii* and combinations of these; occasional *Eucalyptus gomphocephala* trees

Younger dunes: Open Low Heaths to Shrubland dominated by *Myoporum insulare, Scaevola crassifolia, Spyridium globulosum, Acacia rostellifera* and *Olearia axillaris*

Strand: *Spinifex longifolius* and *S. hirsutus* Grasslands

Scattered Native Plants: not assessed

Vegetation Condition: >70% Excellent to Pristine, <30% Very Good to Good, with areas of localised disturbance associated with previous grazing pressure (mapping, Trudgen *et al.* 1990)

Total Flora: 219 native taxa, 21 weeds (Trudgen *et al.* 1990), estimated >75% expected flora

Significant Flora: *Eucalyptus argutifolia* (R, also Submission no. 146), *Acacia benthamii* (2), *Hibbertia spicata* subsp. *leptotheca* (3), *Stylidium maritimum* (3); *Conostylis pauciflora* subsp *euryrhipis* (3, Trudgen *et al.* 1990); *Pimelea calcicola, Trachymene coerulea, Stylidium crossocephalum, Lechenaultia linarioides, Melaleuca cardiophylla, Conospermum triplinervium, Alyogyne huegelii* var. *glabrata, Alyogyne huegelii* var. *huegelii* ms (only known co-occurrence of these two taxa and of hybrids), *Allocasuarina lehmanniana, Hydrocotyle diantha* (most northerly population, Griffin and Trudgen 1994), *Leucopogon tenuis* (atypical form, possibly new taxon Submission no. 146); typical Tamala Limestone taxa - *Schoenus latitans, Acacia alata* var. *tetrantha, Grevillea preissii, Petrophile* aff. *brevifolia* (pink flowered form), *Petrophile serruriae* subsp. nov. (GJK 11421), *Trymalium ledifolium* subsp. *ledifolium, Astroloma microcalyx*

Fauna: limited survey for birds (45), native mammals (2) and reptiles (18) (Ninox Wildlife Consulting 1991 and Submission no. 146). Significant bird species: category 1 (1), category 3 (7) and category 4 (8). Good assemblage of insectivorous and nectarivorous birds. Significant mammal species: Western Brush Wallaby. Significant reptile species: Carpet Python (*Morelia spilota*) and Barking Gecko (*Underwoodisaurus millii*)

Linkage: adjacent bushland to the north and south (BS397, BS284, BS396); part of proposed Greenway 37 (Tingay, Alan & Associates 1997a); part of a regionally significant contiguous bushland/wetland linkage (Volume 2A, Map 8)

Other Special Attributes

Meets all six specific coastal reserve criteria —

(i) Quindalup Dune types: low, well separated dunes perched on gently undulating Spearwood (Tamala) Limestone surface, younger dunes on coast steeper with little plain between them; ages of dunes range from blowouts to Q1, most being Q2 or Q3 in age (Griffin and Trudgen 1994)

(ii) Continuing natural processes: Quindalup Dunes extending to 5.8kms inland

(iii) Shoreline: sandy shoreline

(iv) Linkage: contains Quindalup/Spearwood Dunes interface (and connects to area of Spearwood/Bassendean Dunes interface)

(v) Vegetation: contains nine regional floristic groups, one group (floristic community type 26a) having been recommended as a 'critically threatened community' (Weston and Gibson 1997); the 'most important feature of the Wilbinga site is its diversity of vegetation in good (that is, very good) condition' (Trudgen *et al.* 1990)

(vi) Habitats: see Fauna section above;

Contains at least nine regional floristic groups, one group (limestone floristic community type 26a) having been recommended as a 'critically threatened community' (Weston and Gibson 1997); part Bushplan Site proposed to become Conservation Park and 5g CALM Act Reserve in Forest Management Plan 1994-2003 (CALM 1994); 'Locations 9755, 9756 and 9767 should be reserved for the conservation of Flora and Fauna and added to the Caraban Management Priority Area' (Griffin and Trudgen 1994); part Bushplan Site included in Gnangara Park proposal (Bailey 1997)

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

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

Opportunities and/or Constraints

Opportunities: Bushplan Site/part Bushplan Site subject to Gnangara Mound Crown Land EPP; location of Declared Rare Flora and Scheduled Fauna; under MRS Parks and Recreation Reservation and TPS Landscape Zoning and Parks and Recreation Zoning, Crown Reserve

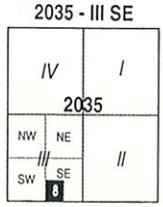
Constraints: private land; MRS Urban Deferred Zoning

Recommendations: The State Forest portion of the Bushplan Site be reserved for Conservation Park and Section 5g CALM Act Reserve (in accordance with Forest Management Plan 1994-2003, CALM 1994); The remaining portion of the site, including Wilbinga, to be added to the proposed Conservation Park.

LEGEND

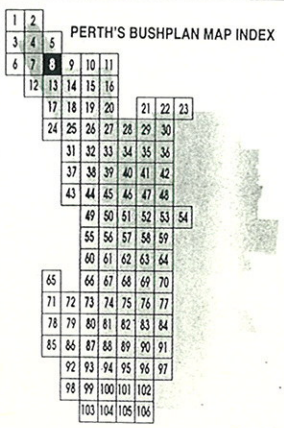
- 472 — Bushplan Sites With Regionally Significant Bushland
- Other Native Vegetation
- Conservation Category Wetlands
- Bushplan Sites With Some Existing Protection
- 696 — Lot Number, Location Number
- Channel Wetlands
- Local Government Boundary

2035 - III SE



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

PERTH'S BUSHPLAN MAP INDEX



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Metres

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

Wetlands Data supplied by Water and Rivers Commission

Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

Bushplan Site Map

LEGEND

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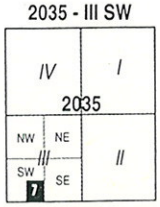
- Local Government Boundary

2035 - III SW



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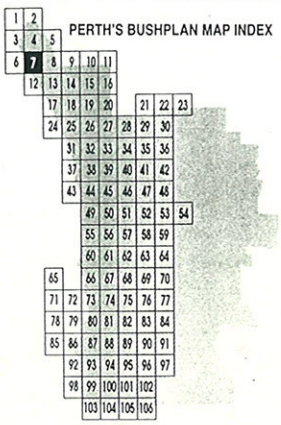
PERTH'S BUSHPLAN MAP INDEX



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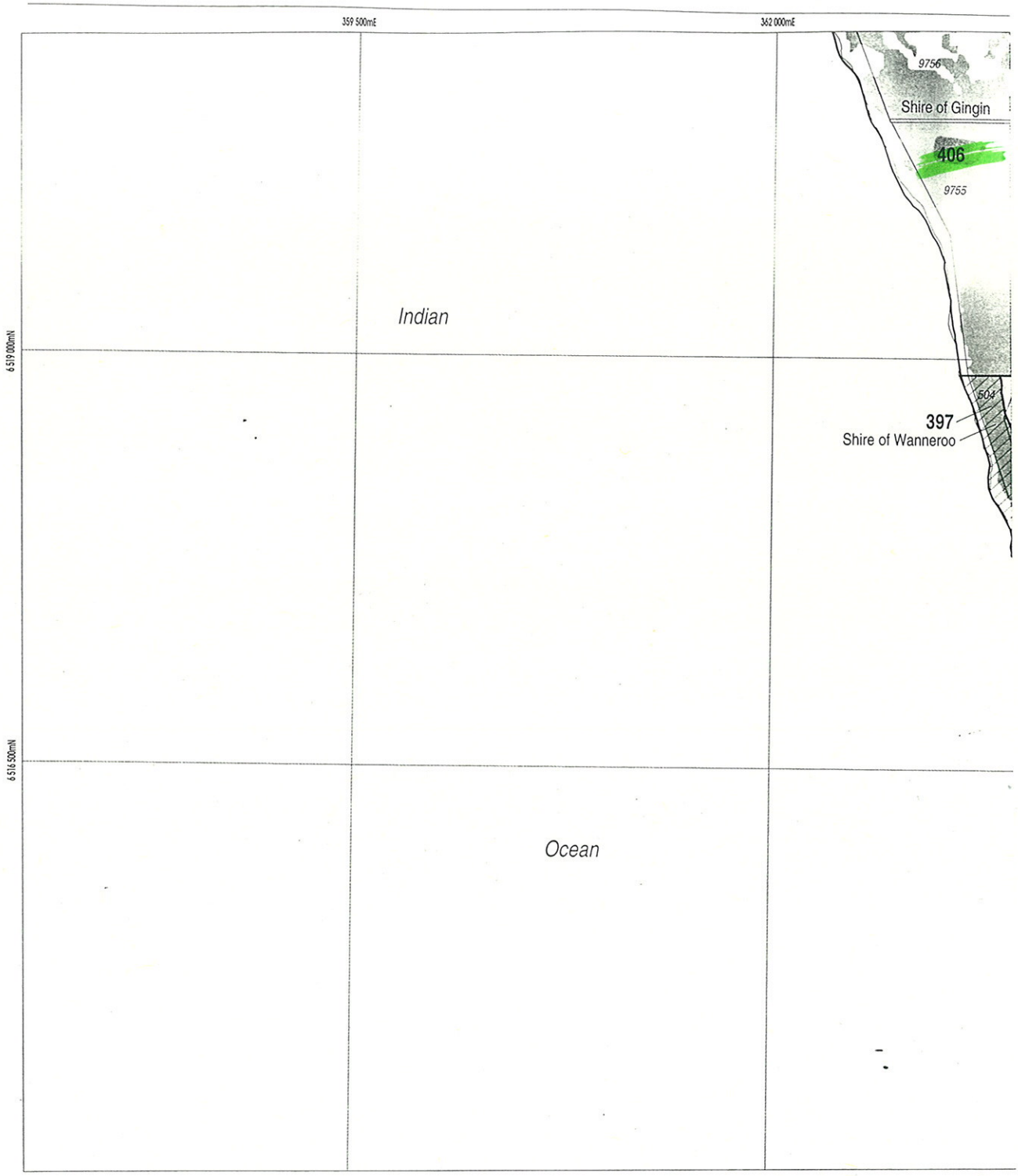
Wetlands Data supplied by Water and Rivers Commission

Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

Bushplan Site Map

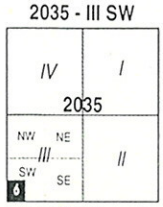
Map 7



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

2035 - III SW



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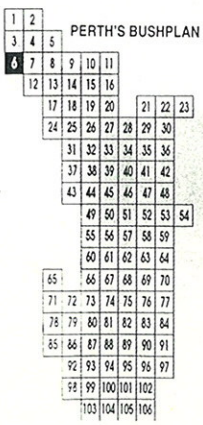
PERTH'S BUSHPLAN MAP INDEX



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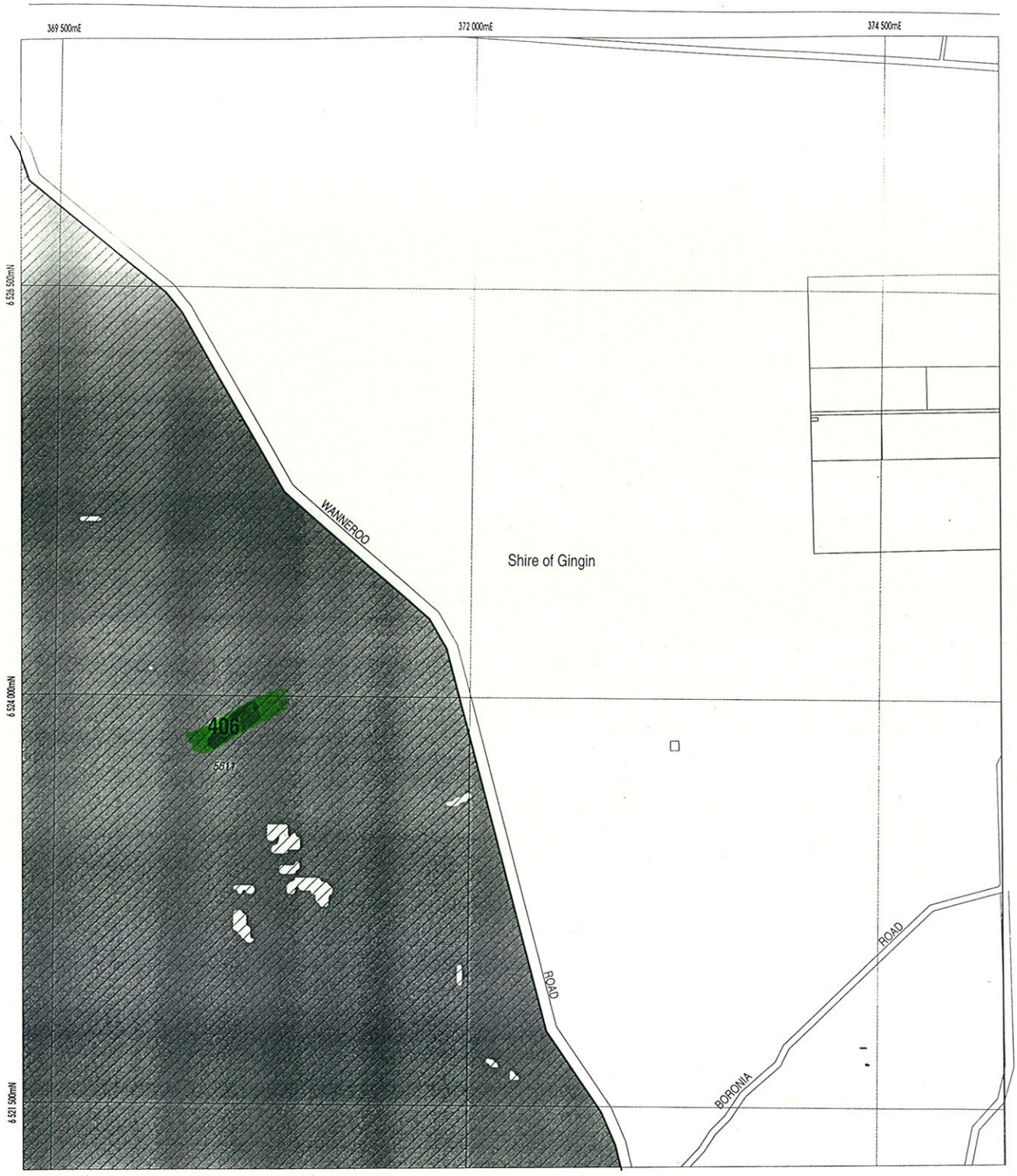
Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

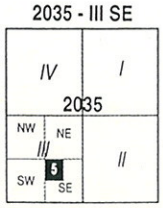
Bushplan Site Map



LEGEND

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

2035 - III SE



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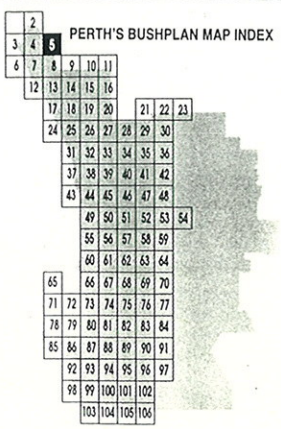

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Wetlands Data supplied by Water and Rivers Commission

Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

Bushplan Site Map

LEGEND

472 Bushplan Sites With Regionally Significant Bushland

Other Native Vegetation

Conservation Category Wetlands

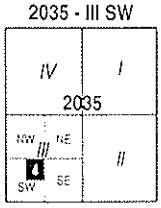
Bushplan Sites With Some Existing Protection

696 Lot Number, Location Number

Channel Wetlands

Local Government Boundary

2035 - III SW



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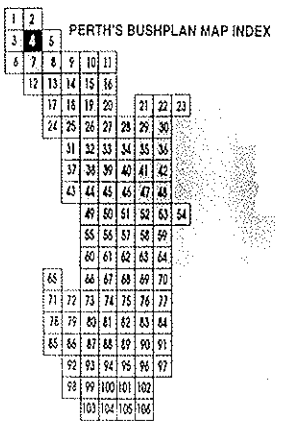
PERTH'S BUSHPLAN MAP INDEX



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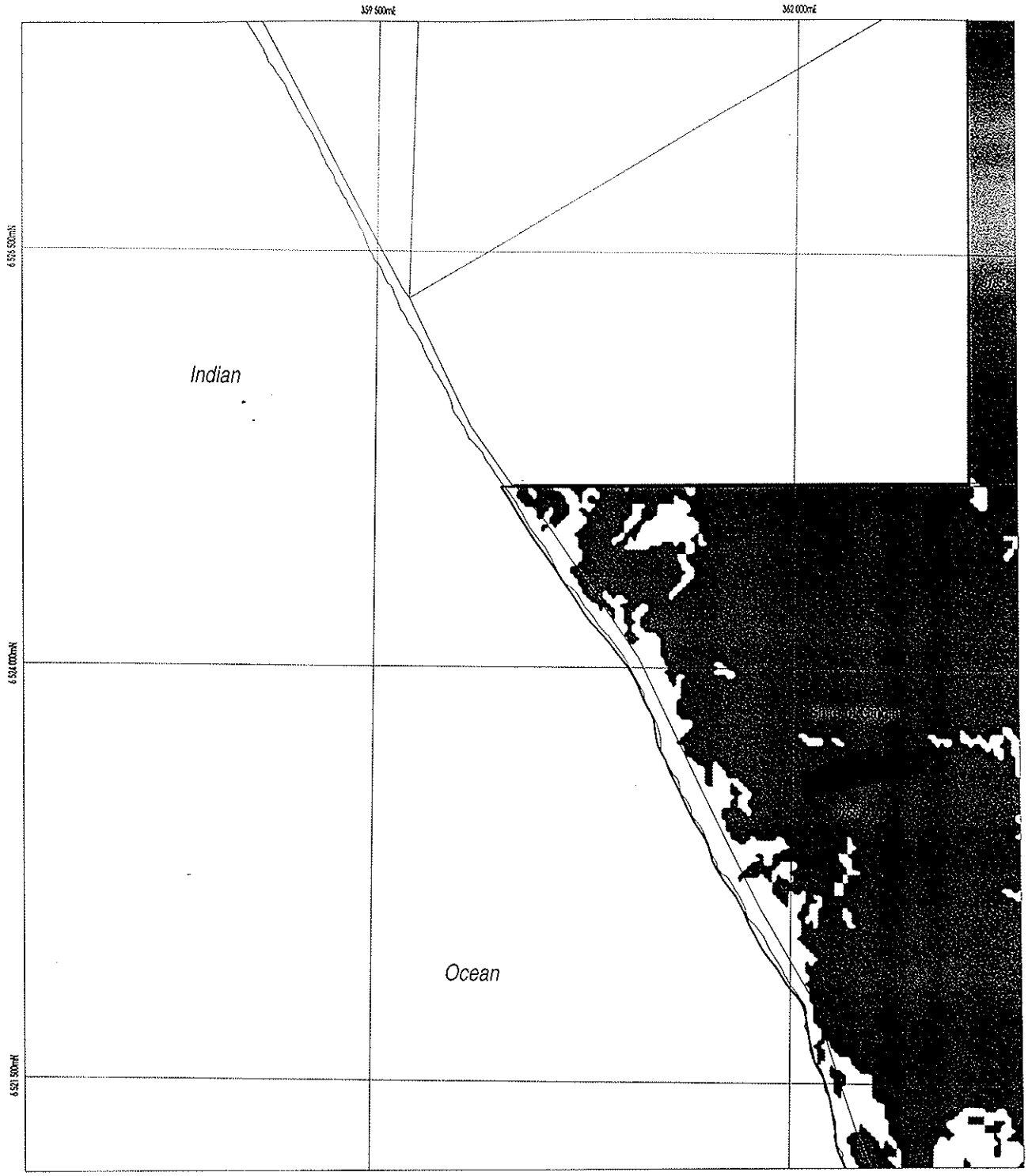
Wetlands Data supplied by Water and Rivers Commission

Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

Bushplan Site Map

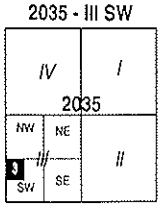
Map 4



LEGEND

- 72 — 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

2035 - III SW



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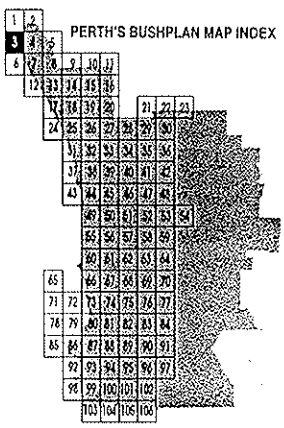
PERTH'S BUSHPLAN MAP INDEX



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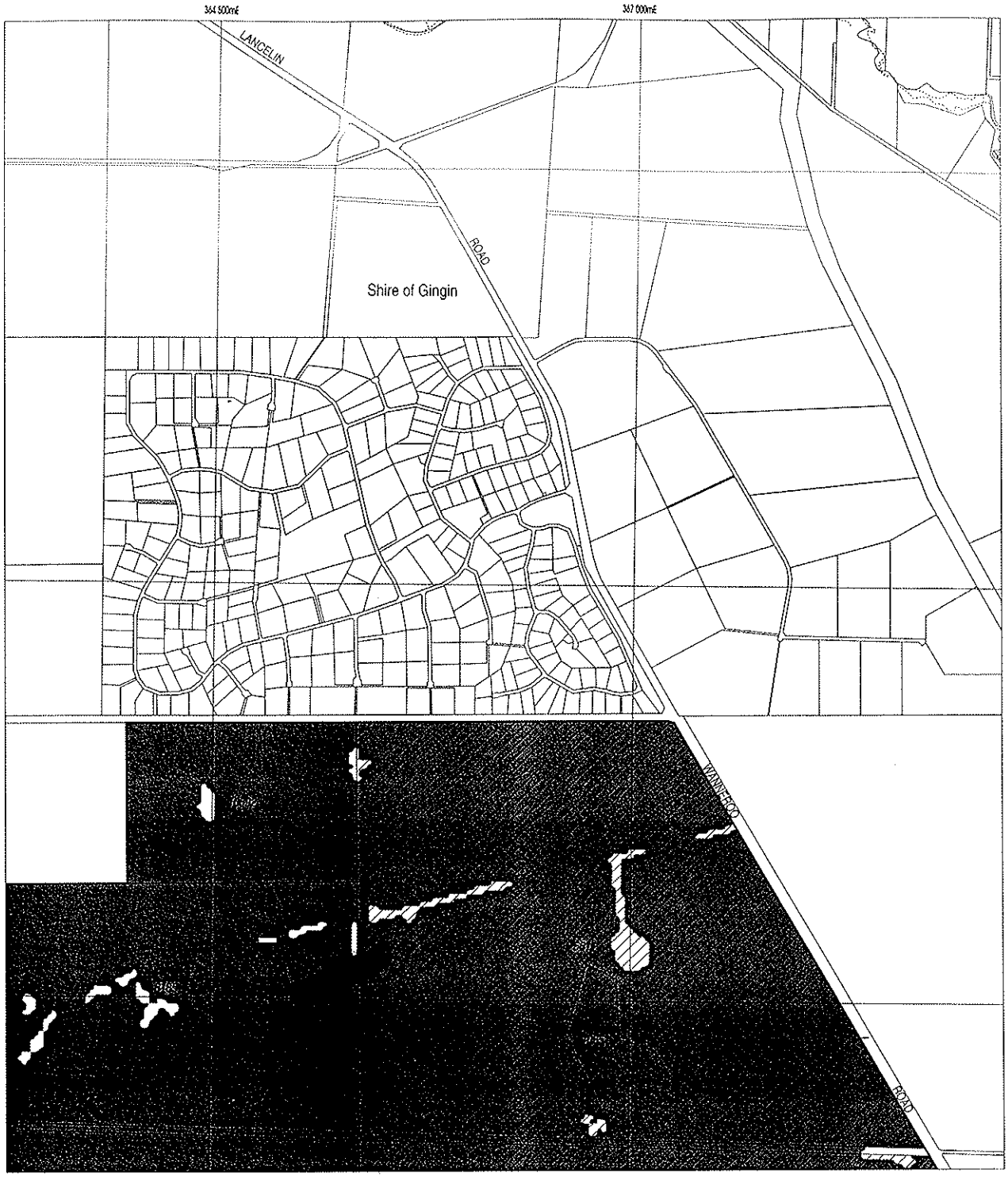
Wetlands Data supplied by Water and Rivers Commission

Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

Bushplan Site Map

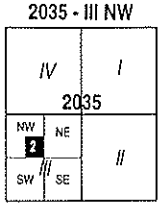
Map 3



LEGEND

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

2035 - III NW



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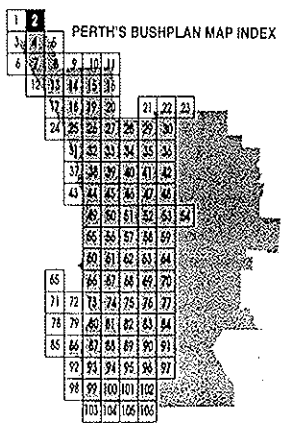

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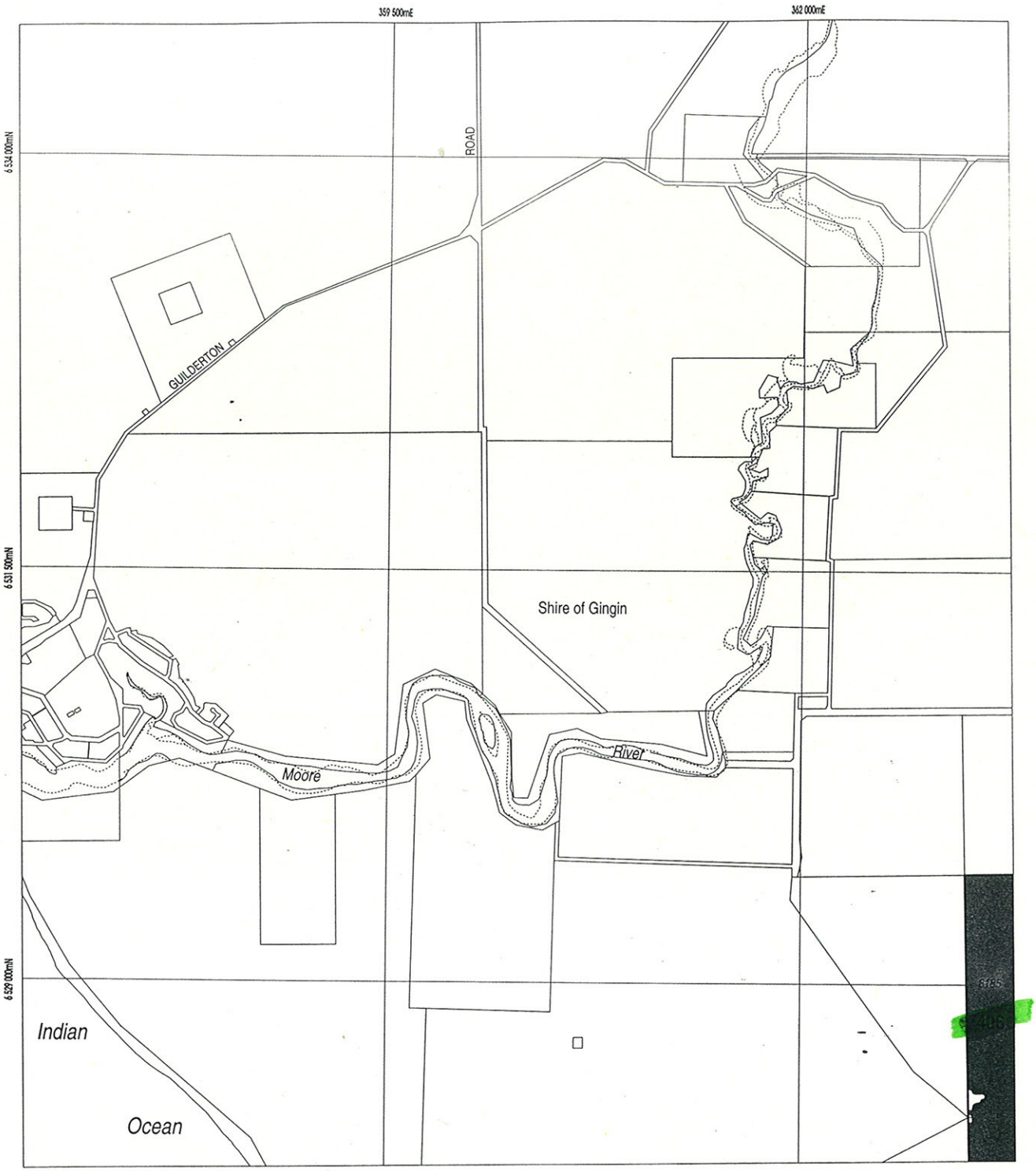
Wetlands Data supplied by Water and Rivers Commission

Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

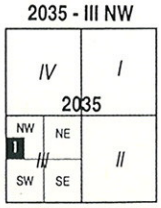
Bushplan Site Map



LEGEND

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

2035 - III NW



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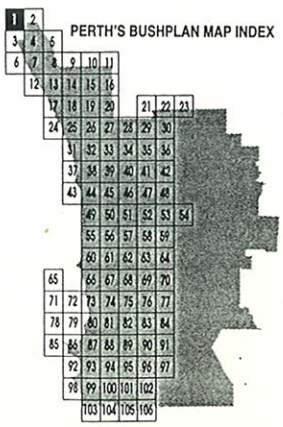

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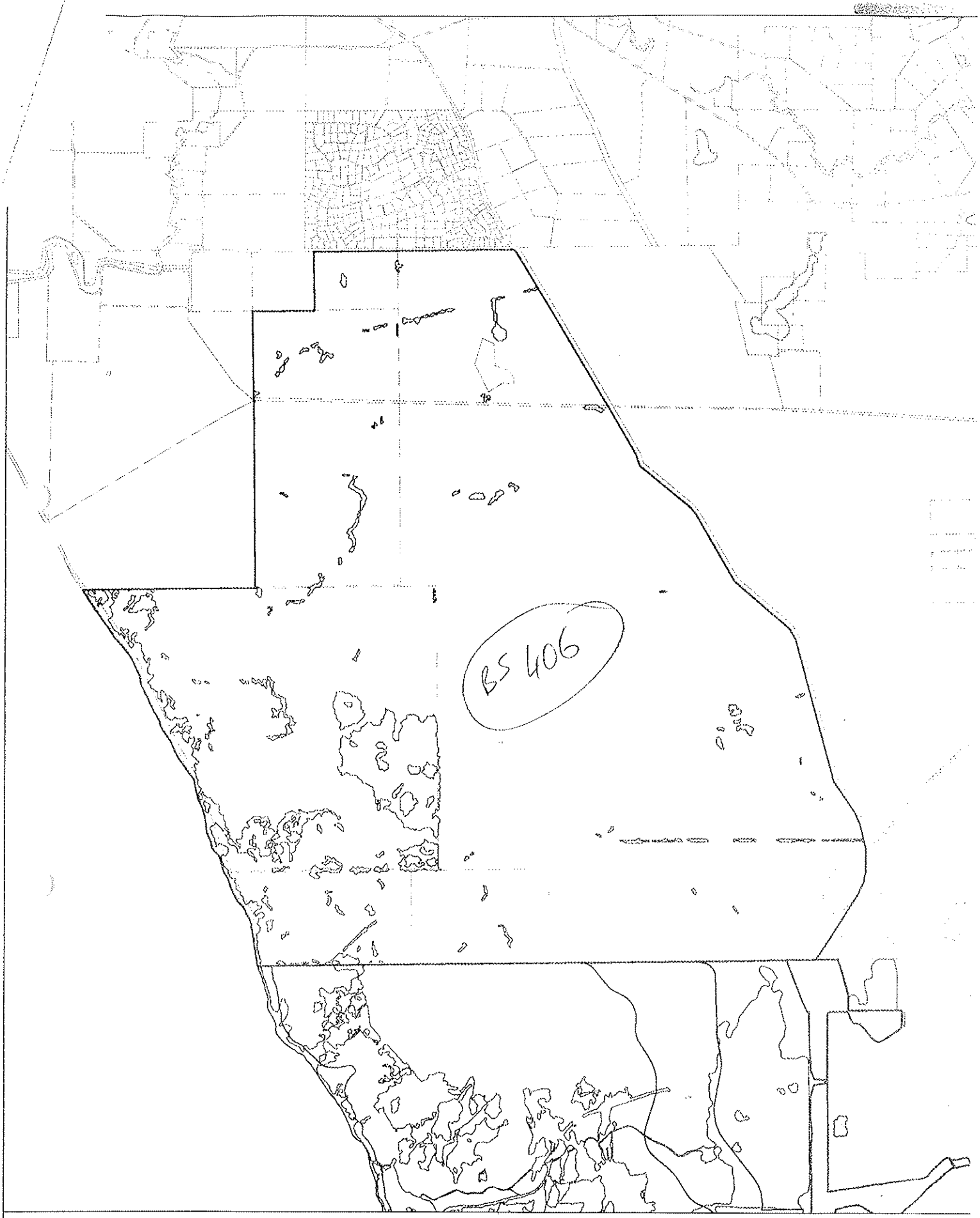
Wetlands Data supplied by Water and Rivers Commission

Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

Bushplan Site Map

Map 1



BUSHPLAN SITES CORRECTED

B Bk/16 22/10/98

THE GOVERNMENT OF WESTERN AUSTRALIA

WESTERN AUSTRALIAN PLANNING COMMISSION

CUSTOMER FOCUS WESTERN AUSTRALIA

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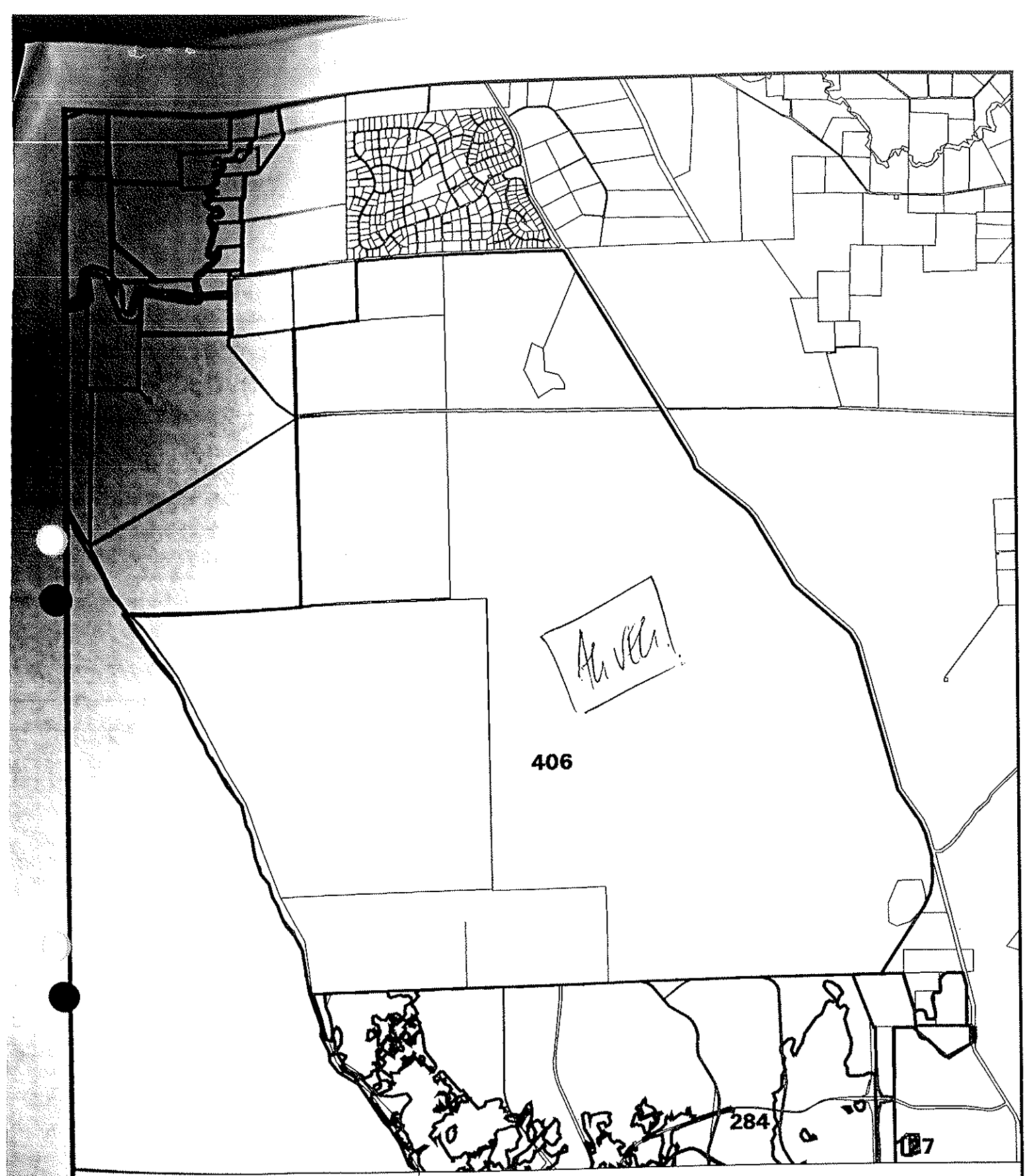


bp site 406

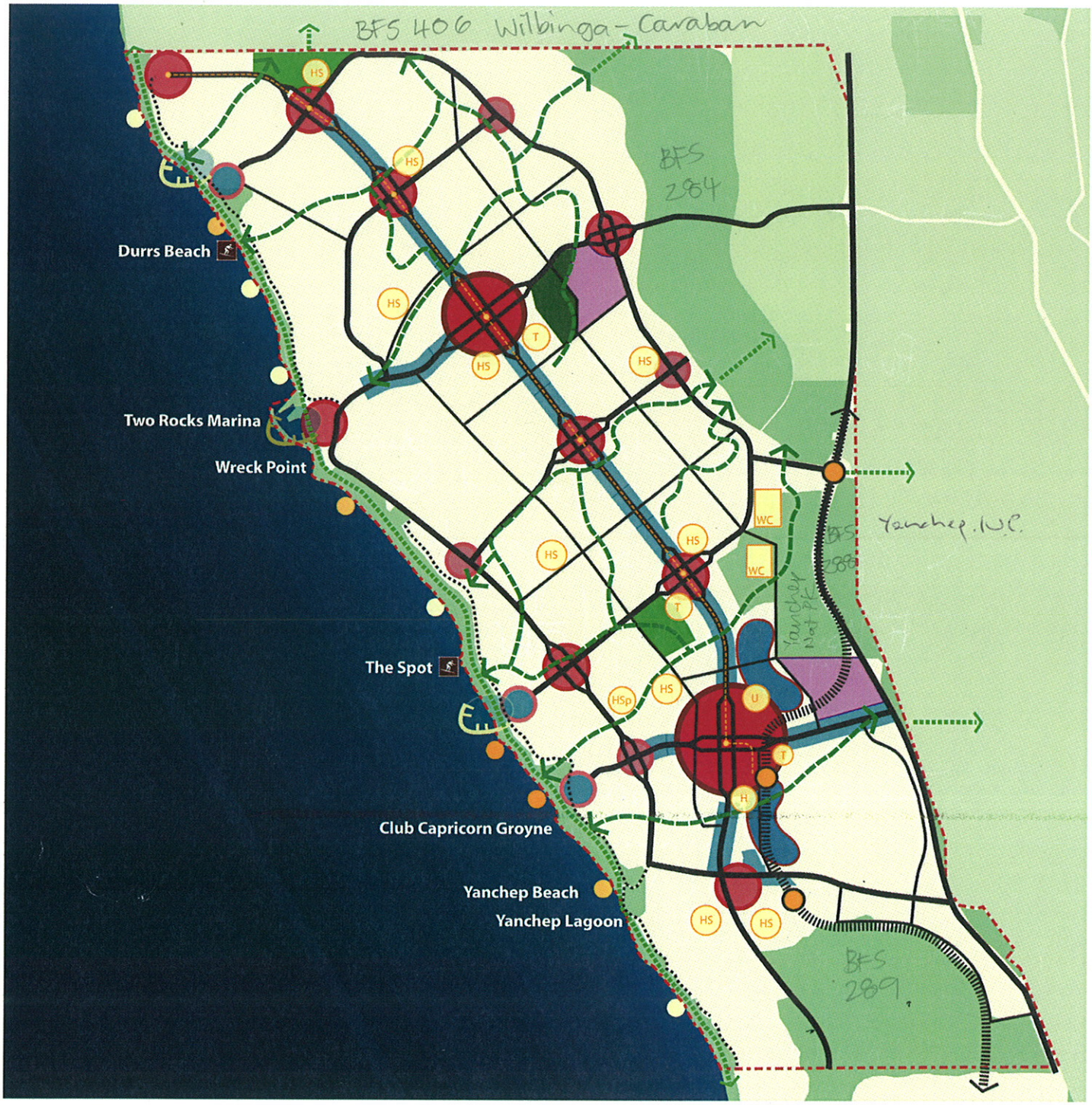
Cadastre

AG VEG 1998 BOUNDARY THEME

Bushplan Sites (Boundaries)

NPWS INTERNAL USE ONLY
Prepared By: Andrea Zappacosta
Prepared For:
Map Name: plot980609_1
Date: 09 Jun 98
Scale: 1:10,000

ST ANDREWS DISTRICT STRUCTURE PLAN



STRUCTURE PLAN BOUNDARY

USES

- RESIDENTIAL
- RURAL RESIDENTIAL
- MIXED USE
- MIXED USE/ EMPLOYMENT
- INDUSTRIAL
- OPEN SPACE (EXTERNAL TO SITE)
- RURAL (EXTERNAL TO SITE)
- REGIONAL OPEN SPACE
- DISTRICT OPEN SPACE
- PARKS AND RECREATION
- PUBLIC PURPOSE
  - U UNIVERSITY
  - T TERTIARY INSTITUTION
  - HS HIGH SCHOOL
  - HSp PRIVATE HIGH SCHOOL
  - H HOSPITAL
  - WC WATER CORP

DEVELOPMENT NODES

- NORTHERN TOWN CENTRE
- ST ANDREWS CITY CENTRE
- DISTRICT ACTIVITY CENTRE
- NEIGHBOURHOOD ACTIVITY CENTRE
- COASTAL ACTIVITY CENTRE
- POTENTIAL MARINA
- EXISTING MARINA

MOVEMENT NETWORKS

- RAIL (WITH TRANSIT STATION)
- LIGHT RAIL/BUS SYSTEM (WITH TRANSIT STATION)
- PRIMARY ROADS
- SECONDARY ROADS
- COASTAL ROADS
- GREEN LINKS
- PEDESTRIAN CONNECTIONS

- DISTRICT/POTENTIAL FUTURE REGIONAL BEACH
- DISTRICT BEACH
- LOCAL BEACH
- SURF BREAK

PROPOSED

METROPOLITAN REGION SCHEME (DECEMBER 1994)

LEGEND

Scheme Boundary

RESERVED LANDS

- Parks and Recreation
- Restricted Public Access
- Railways
- Port Installations
- State Forests
- Water Catchments
- Civic and Cultural
- Waterways

ROADS

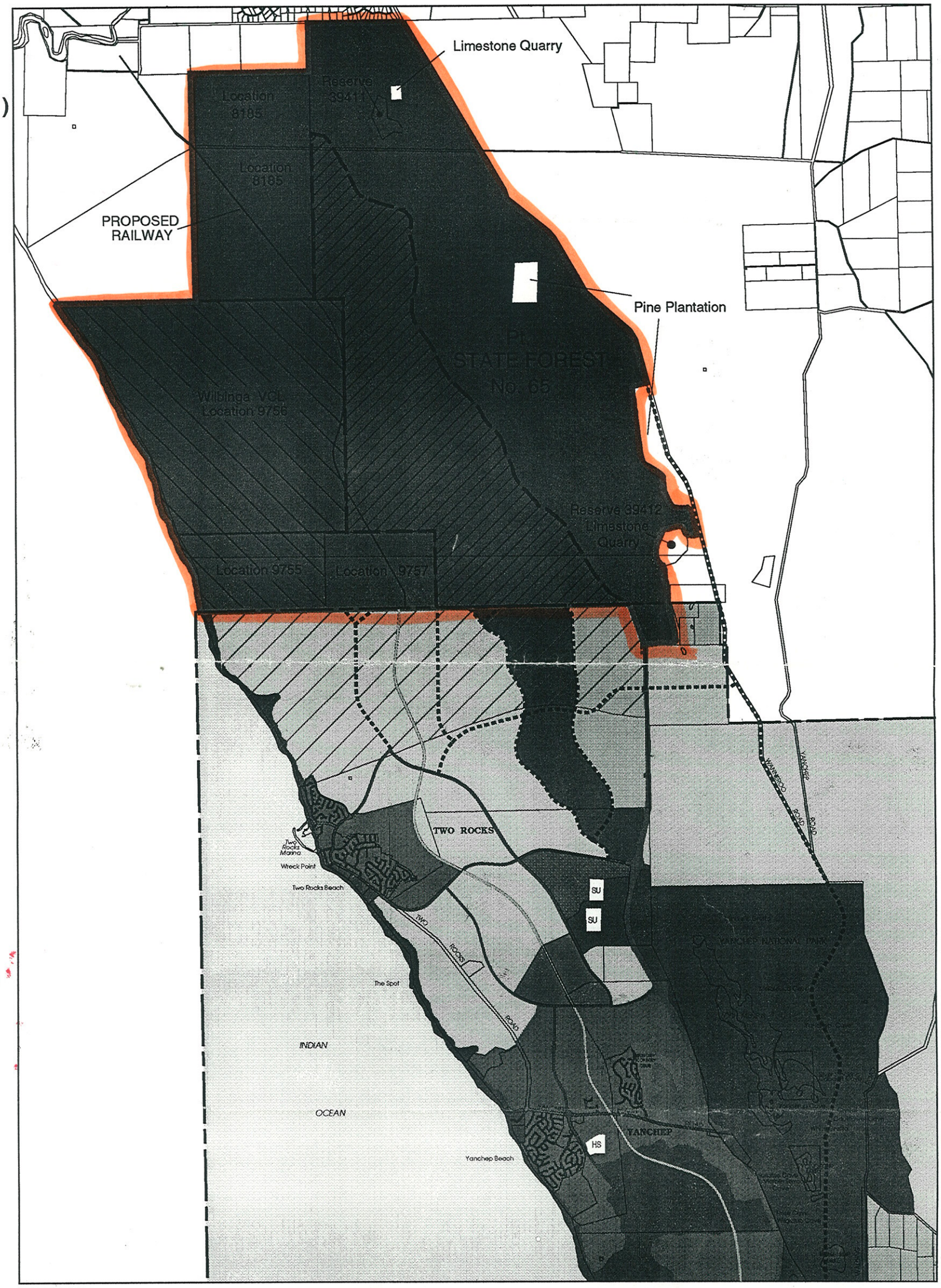
- Controlled Access Highways
- Other Major Highways
- Important Regional Roads
- Public Purposes

Denoted as Follows :

H	Hospital
HS	High School
TS	Technical School
CP	Car Park
U	University
CG	Commonwealth Government
SEC	State Energy Commission
SU	Special Uses
WSD	Water Authority of WA
P	Prison

ZONES

- Urban
- Urban Deferred
- Central City Area
- Industrial
- Special Industrial
- Rural
- Private Recreation



PROPOSED REGIONAL PARK BOUNDARY

WILBINGA VCL
(Defer decision to reserve pending completion of SHIP study)

SYSTEM 6 RECOMMENDATION M1
(Agreed to exchange for Wilbinga VCL)

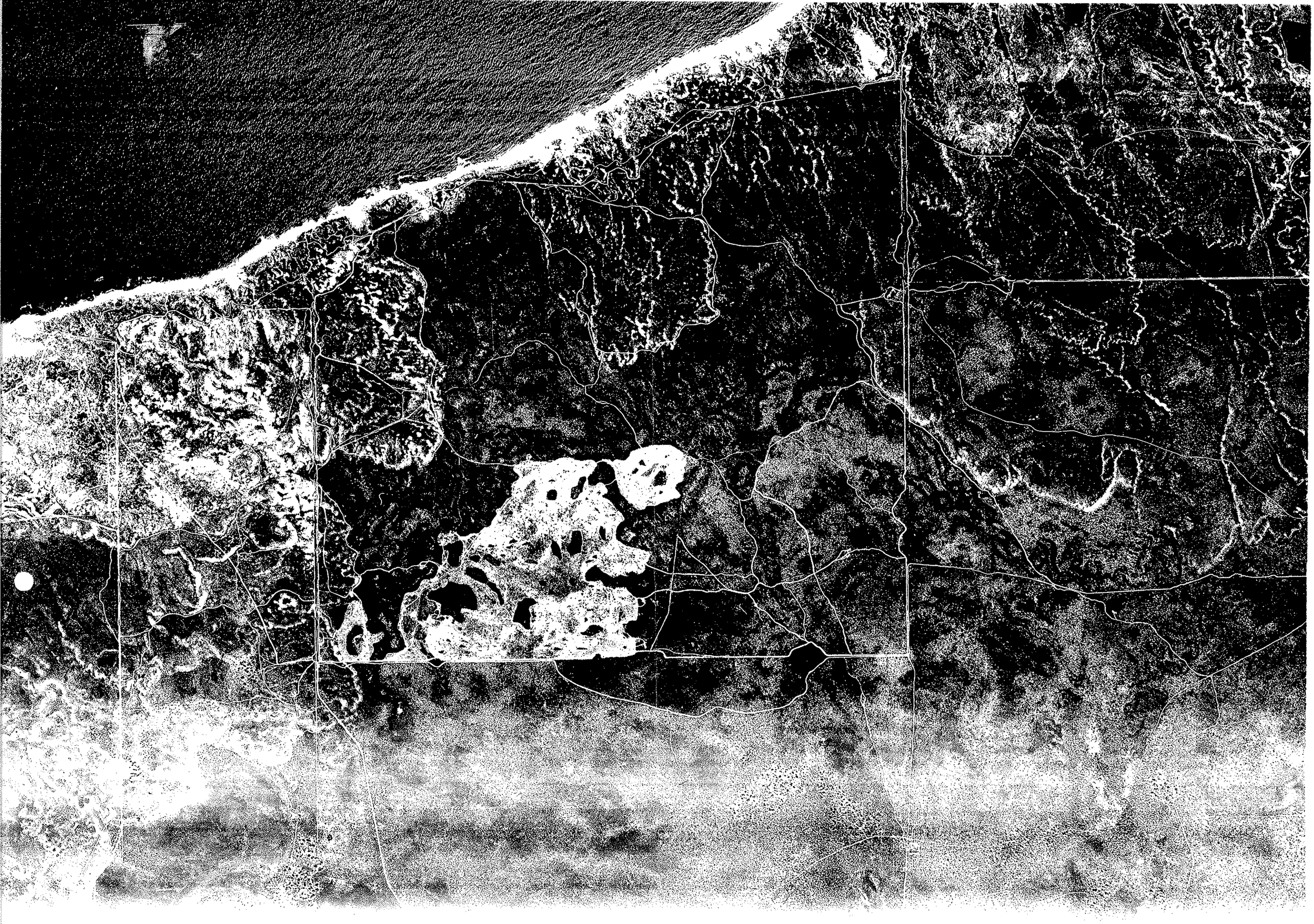
PROPOSED RESERVE FOR
FLORA AND FAUNA CONSERVATION,
GROUNDWATER PROTECTION AND STRATEGIC LIMESTONE
DEVELOPMENT AND MANAGEMENT

N

0 2

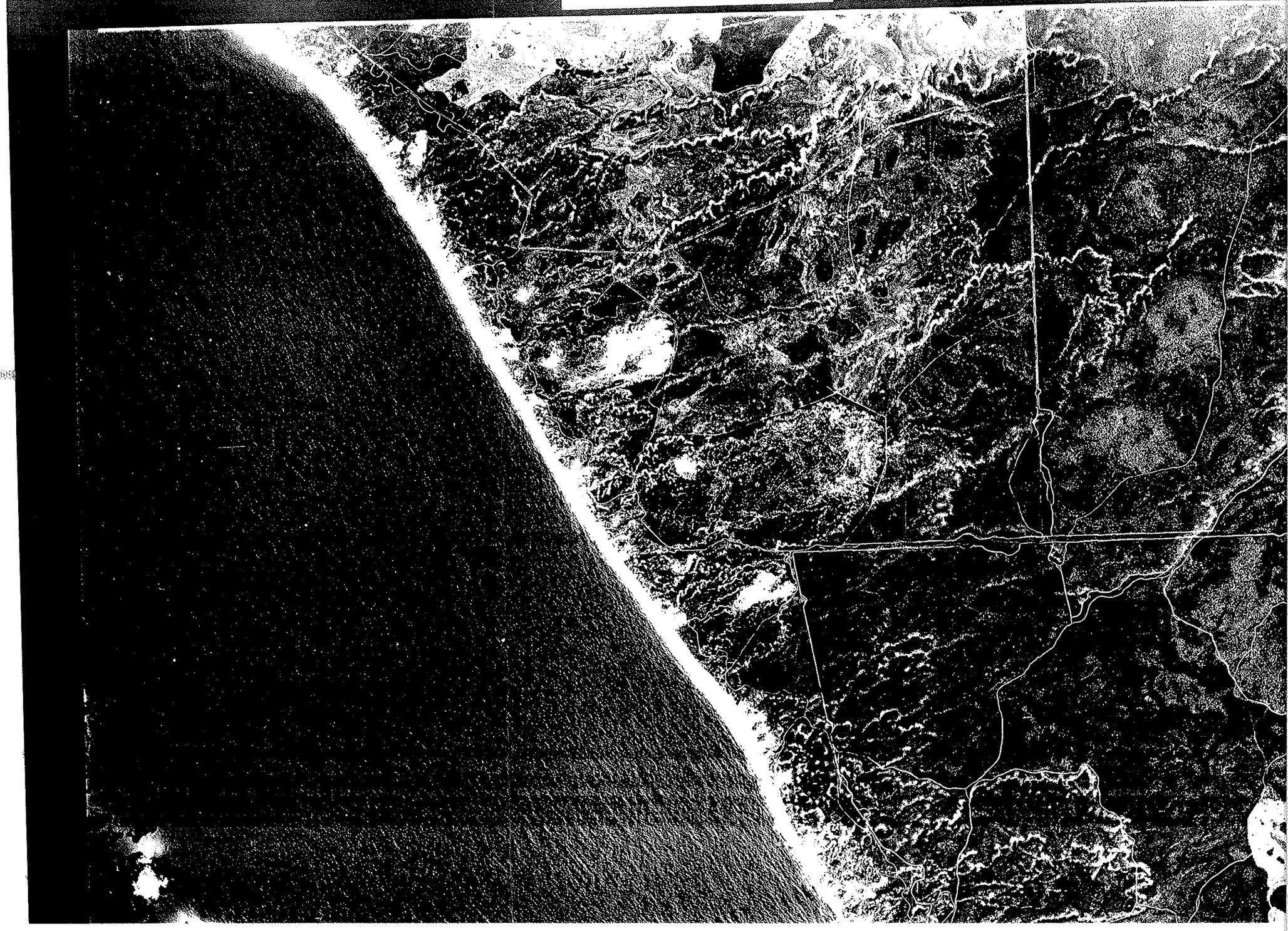
Kilometres

PRODUCED BY STATUTORY MAPPING SECTION ,
LAND INFORMATION BRANCH , DPUD



OCTOBER
1991

652860



PROPOSED

METROPOLITAN REGION SCHEME (DECEMBER 1994)

LEGEND

Scheme Boundary

RESERVED LANDS

- Parks and Recreation
- Restricted Public Access
- Railways
- Port Installations
- State Forests
- Water Catchments
- Civic and Cultural
- Waterways

ROADS

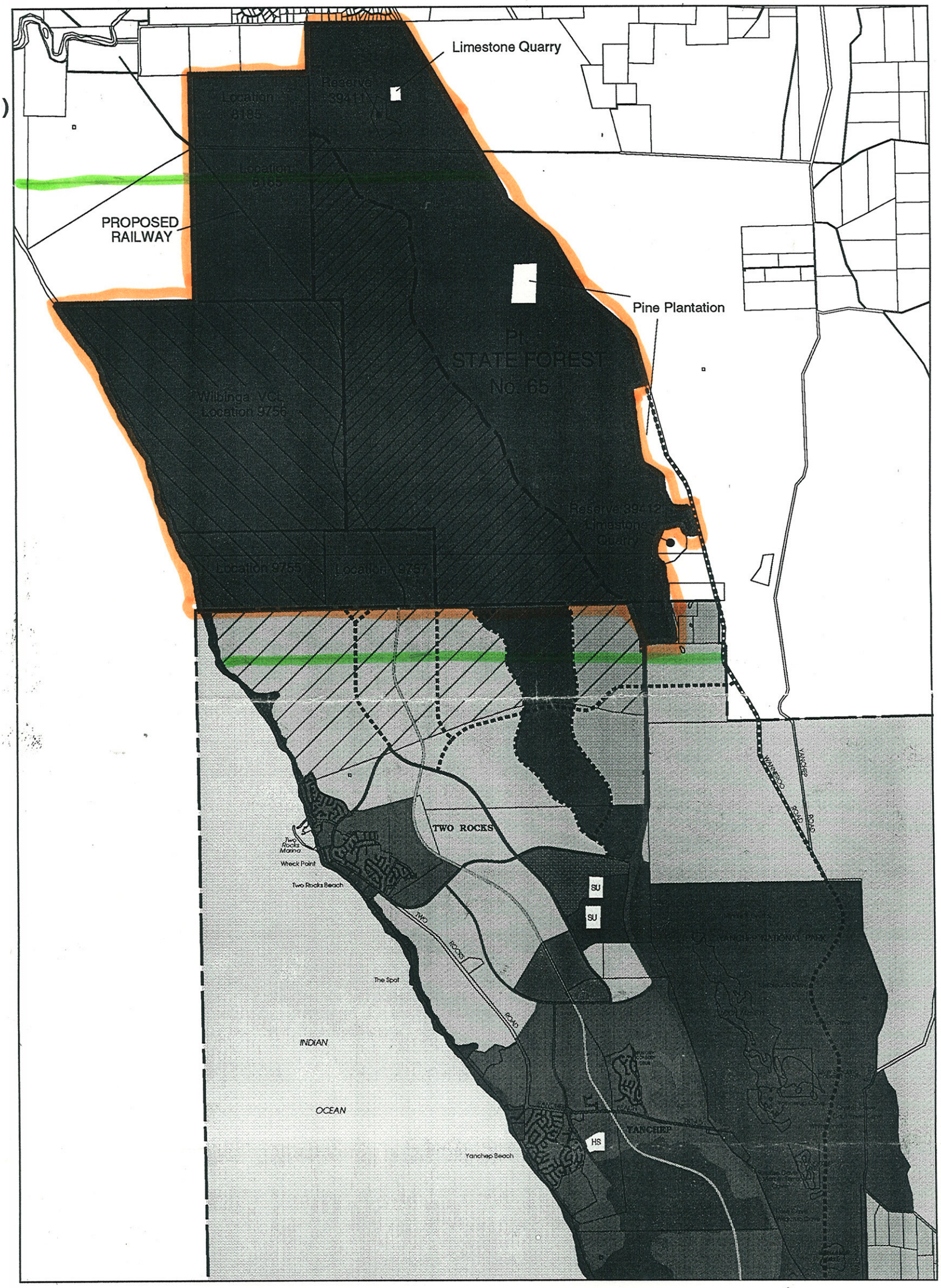
- Controlled Access Highways
- Other Major Highways
- Important Regional Roads
- Public Purposes

Denoted as Follows :

H	Hospital
HS	High School
TS	Technical School
CP	Car Park
U	University
CG	Commonwealth Government
SEC	State Energy Commission
SU	Special Uses
WSD	Water Authority of WA
P	Prison

ZONES

- Urban
- Urban Deferred
- Central City Area
- Industrial
- Special Industrial
- Rural
- Private Recreation



PROPOSED REGIONAL PARK BOUNDARY

SYSTEM 6 RECOMMENDATION M1
(Agreed to exchange for Wilbinga VCL)

WILBINGA VCL
(Defer decision to reserve pending completion of SHIP study)

PROPOSED RESERVE FOR
FLORA AND FAUNA CONSERVATION,
GROUNDWATER PROTECTION AND STRATEGIC LIMESTONE
DEVELOPMENT AND MANAGEMENT

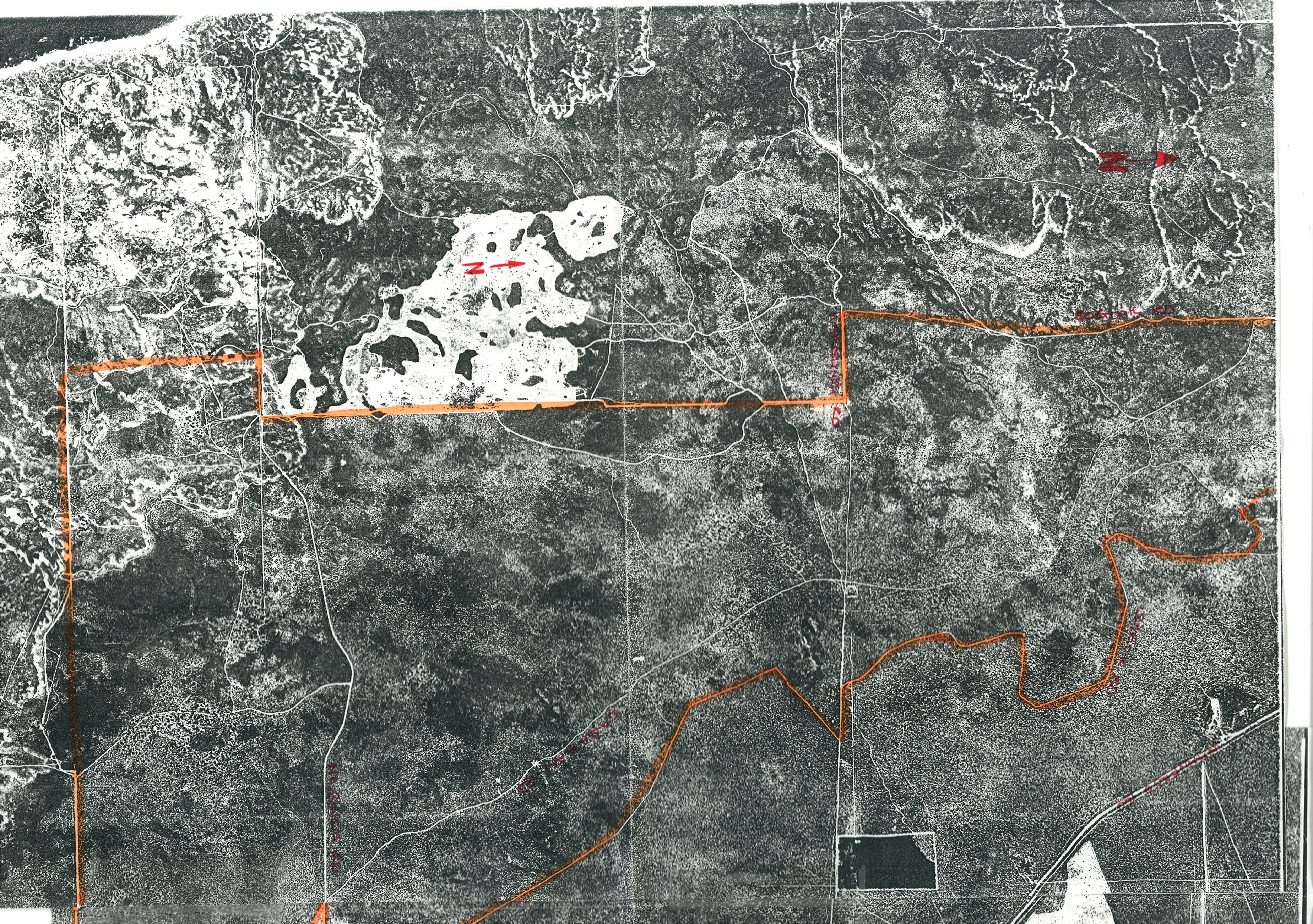
N/S Boundary Trudgen, Gritton and Keighery

N

0 2

Kilometres

PRODUCED BY STATUTORY MAPPING SECTION ,
LAND INFORMATION BRANCH , DPUD



TUNNEL #3

WANNEROO RD

WANNEROO RD

24

SYSTEM 6 BUSHLAND SUBMISSION FORM
FOR CONSIDERATION IN THE UPDATE PROGRAMME

If you wish to submit more than one area for consideration in the System 6 update, please use a separate form for each area.

Please fill in each section giving as much information as possible.

LOCATION, OWNERSHIP AND ZONING OF THE AREA

1. Location Willunga

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

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

a) Bordering Roads: .....

b) Nearest Corner: .....

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

d) Town/Suburb/Location: North of Two Rocks.

e) Local Council: Gingin

f) Site Name (if any): Proposed Willunga Open Space Reserve.

g) Approximate size of the area (ha): 2430 ha.

h) Please locate the area on a map and give us map references if possible:
See attached extract from DPUD's Yanchep Structure Plan

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

j) Map no.: .....

k) Grid Ref: .....

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

.....

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

.....

.....

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

Please fill out those questions that you can answer

2. Who owns the area? (If owned by the person/s making the nomination please indicate) ......Private......

3. If you own the area, and may be interested in participating in conservation on private land initiatives please indicate (and leave your name and address at the end of this submission form) ....

4 .What is the area zoned? (please indicate whether zoning is Town Planning Scheme or Metropolitan Region Scheme) ......Rural......

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

5. Why do you consider this area important? (Refer to Guiding Issues paper)
(1) D.P.U.D.(M.F.P.) Proposed Willinga as a greenbelt + a substitute for the loss of (M1) + part (M3) a break from continuous urban development (2) Important coastal vegetation not represented anywhere in any significant size secure reserve.

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

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

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

If yes, what are they? ......Coastal limestone outcrops.......

....

....

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

If yes, what kind of a wetlands is it?

a) lake

b) river

c) stream

d) swamp

e) estuary

f) seasonally wet

g) other

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

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

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

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

.....

12. Has any previous flora or fauna survey work been done on the area?
.....Yes - (MFD) CALM.

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

.....

.....

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

a) pristine
b) excellent
c) very good
d) good
e) degraded
f) completely degraded
g) don't know

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

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

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

n) Proliferation of tracks, fire breaks and walk trails

o) Off-road vehicle use

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

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

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

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

.....

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

Can you list those you know of? (birds, mammals, reptiles, amphibians etc)

.....

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

If yes, please name them and indicate source of information

.....

.....

CAN YOU TELL US A LITTLE ABOUT THE SURROUNDING AREA

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

.....

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

.....

.....

Are they already conservation reserves? .....

What is their approximate size? .....

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

.....

.....

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

(146)

SYSTEM 6 BUSHLAND SUBMISSION FORM
FOR CONSIDERATION IN THE UPDATE PROGRAMME

If you wish to submit more than one area for consideration in the System 6 update, please use a separate form for each area.

Please fill in each section giving as much information as possible.

LOCATION, OWNERSHIP AND ZONING OF THE AREA

PLEASE SEE DOCUMENT ATTACHED TO REAR OF THIS SUBMISSION FORM.

1. Location (Please also see "MAP①" & "MAP②" - ATTACHED TO THE REAR OF THIS SUBMISSION FORM.)

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

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

a) Bordering Roads: Part of BARRAGOON ROAD (Portion West of Wanneroo Road), WANNEROO ROAD, SMOKEBUSH ROAD, BINDIAR ROAD, LAROS ROAD, BAILEY ROAD.

b) Nearest Corner: WANNEROO ROAD & BAILEY ROAD.

c) Lot Number: N/A Street Number: N/A The nominated Area covers some 10,200 hectares.

d) Town/Suburb/Location: Between TWO ROCKS & GUILDERTON

e) Local Council: GINGIN and WANNEROO

f) Site Name (if any): "WILBINGA" - (includes "CARABAN", "WILBINGA GROVE" and "WILBINGA")

g) Approximate size of the area (ha): 10,200 hectares

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

CENTRE OF WILBINGA AREA IS AT LATITUDE: -31°24'30" South LONGITUDE: - 115°35'45" EAST.

i) Map: No. (7) Streetsmart / UBD / (Other:) TRAVELLERS' ATLAS OF WESTERN AUSTRALIA 2nd & 3rd Editions.

j) Map no.: ALSO SEE C.A.L.M 1:50,000 MAP - YANCHEP and see TOPOGRAPHICAL 1:25,000 SERIES, D.O.L.A. MOORE RIVER 2035-III SW, SE & NW

k) Grid Ref: MOORE RIVER 2035-III, SW, 50JLL, 66-24 → Kilometre grid square approximately in centre of the Area.

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

PLEASE REFER TO ATTACHED DOCUMENTS

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

YES: CALM Proposes Reservation of most of this area in two Parts. The central Part (shaded solid Green) on MAP② attached is proposed for reservation under section 5g of the CALM Act vested in NPNCA for Flora+Fauna conservation, Ground Water development AND Proposed LIMESTONE MINING DEVELOPMENT YIELDING ± 300 MILLION TONNES OF HIGH GRADE LIMESTONE. This Area

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

includes the CARABAN MANAGEMENT PRIORITY AREA - C12 as outlined on page 60 of Conservation Reserves for Western Australia - THE DARLING SYSTEM - SYSTEM 6, PART II: Recommendations for Specific Localities, Report 13, October 1983.

* See ALSO the attachment.

Please fill out those questions that you can answer

2. Who owns the area? (If owned by the person/s making the nomination please indicate) .....

GOVERNMENT OF WESTERN AUSTRALIA, managed by D.O.L.A. & C.A.L.M.

3. If you own the area, and may be interested in participating in conservation on private land initiatives please indicate (and leave your name and address at the end of this submission form) .....

4 .What is the area zoned? (please indicate whether zoning is Town Planning Scheme or Metropolitan Region Scheme) ..... CURRENTLY AS THE FOLLOWING: VACANT CROWN LAND and STATE FOREST

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

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

Approximately 10,200 hectares of Remnant Native vegetation = 98% of which is in Pristine-Excellent condition that contains many soil elements of Quindalup & Spearwood dune systems and many vegetation types providing habitat for a wide range of fauna. This area is connected by a bush corridor to Yanchep National Park to the south and [redacted] Runs to coast on the west. Part of the area is threatened by a large limestone mining proposal.

6. What is/are the soil type/s and colours ? SANDS, predominantly from Quindalup and SPEARWOOD dune systems.

Type: (Sand) / Clay / Gravel / Loam / Silt

Colour: (White) (Grey) (Brown) (Orange) / (Yellow) / Red / Black

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

If yes, what are they? LIMESTONE RIDGE OUTCROPPING WITH SHEER FACES AND CAVE SYSTEMS ARE ALSO PRESENT WITHIN THE AREA.

.....

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

If yes, what kind of a wetlands is it?

a) lake

b) river

c) stream

d) swamp

e) estuary

f) seasonally wet

(g) other Small Soak that has been mechanically altered possibly to water livestock in the past.

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

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

10. What percentage of the area is indigenous vegetation? ≃ 98%

11. If the area includes regions cleared of native bushland please indicate reasons for the inclusion. The cleared area ≃ 2% of the total Area and is surrounded by remnant native vegetation on all sides and lies well within the nominated area's boundaries. The surrounding vegetation ranges in condition from Pristine to very good.

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

If yes, please give details of the work → B.K. Keighery - D.E.A Coastal Plain survey - currently.
- Trudgen, M., Griffin, E.A., and Keighery, B.K. (1990) A report of the flora and vegetation areas at Wilbinga and Breton Bay prepared as alternatives for a future industrial site.

- Ninox Wildlife Consulting, (1991). The Wilbinga and Breton Bay Sites - A Comparative Appraisal of their Vertebrate Fauna. Both Prepared for Halpern Glick Maunsell Pty Ltd - Metropolitan Heavy Industry Site Study, Draft Report, Vol. II.

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

a) pristine
b) excellent ← MOSTLY PRISTINE – EXCELLENT
c) very good
d) good
e) degraded
f) completely degraded
g) don't know

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

a) Partial clearing ≃ [redacted] ≃ 0.05 %
b) fragmentation ≃ 0.25 % being Roads and tracks (~0.25% : Area that is Roads & Tracks)
c) Selective removal of species: timber cutting, wildflower picking, mowing [redacted] ≃ 0.5%
dieback and other plant diseases
d) Fire regime, including intensity, season and frequency Low - High, Spring Early - Late, Annually MAINLY IN CALM Managed State Forest [redacted] Reserves → 60% - 65% of Area.
e) 'Enrichment plantings' that is plantings of species not found in that community – Less than 1% → Less than 0.05 % (includes Pines & Cannabis)
f) Weed invasion ≃ 2 % mostly Pasture for Autumn, Winter - Spring Grazing.
g) Animal impact: horses, foxes, rabbits, cats, dogs, camels, goats etc ≃ 2% MAINLY CATTLE ~~Less than 0.05 %~~
h) Soil movement, both removal and dumping ≃ 0 %
i) Changes in water regimes; flooding, drainage and watering ≃ 0%
j) Salinity ≃ 0%
k) Fertiliser drift and along waterways nutrient influx ≃ 0%
l) Mining, including that for road works ≃ 0% - 0.01%

m) Grazing: stock, overgrazing by feral or native mammals ≃ 2% Applied to Weed invasion and Cattle impact.

n) Proliferation of tracks, fire breaks and walk trails ≃ 0·25% (See Fragmentation)

o) Off-road vehicle use ≃ 0·25% Some tracks (new) are formed mainly by Cannabis growers operating in the area.

p) Use as service corridors by the SEC, Main Roads, Water Authority. ≃ 0·08% Groundwater monitoring wells.

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

15. Does the area contain any plant species of special interest that you know of? (eg. declared rare flora, priority taxa, outlier populations) ① Eucalyptus arguti folia (DRF)

② Non typical form of Leucopogon tenuis may be a new subspecies.

Do you know what they are? ③ Occurrence of Leucopogon gracillimus. This may be an outlier

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

Can you list those you know of? (birds, mammals, reptiles, amphibians etc)

See Attached list.

17. Is the area used by any native animals of special interest? (eg. endangered species, large/important populations) Western Brushtail (Black-Grove) Wallaby, Stimson's Python, Carnabys Black-Cockatoo.

If yes, please name them and indicate source of information

SOURCE: All sighted by myself, Brushtail sightings also by two beekeepers and Stimson's python sighting confirmed after discussion with the W.A. Museum

CAN YOU TELL US A LITTLE ABOUT THE SURROUNDING AREA

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

If yes, how close are they ? 400–600m in adjacent Private land and 2,000m (approx) to the South lies Loch M^c^Ness in Yanchep National Park.

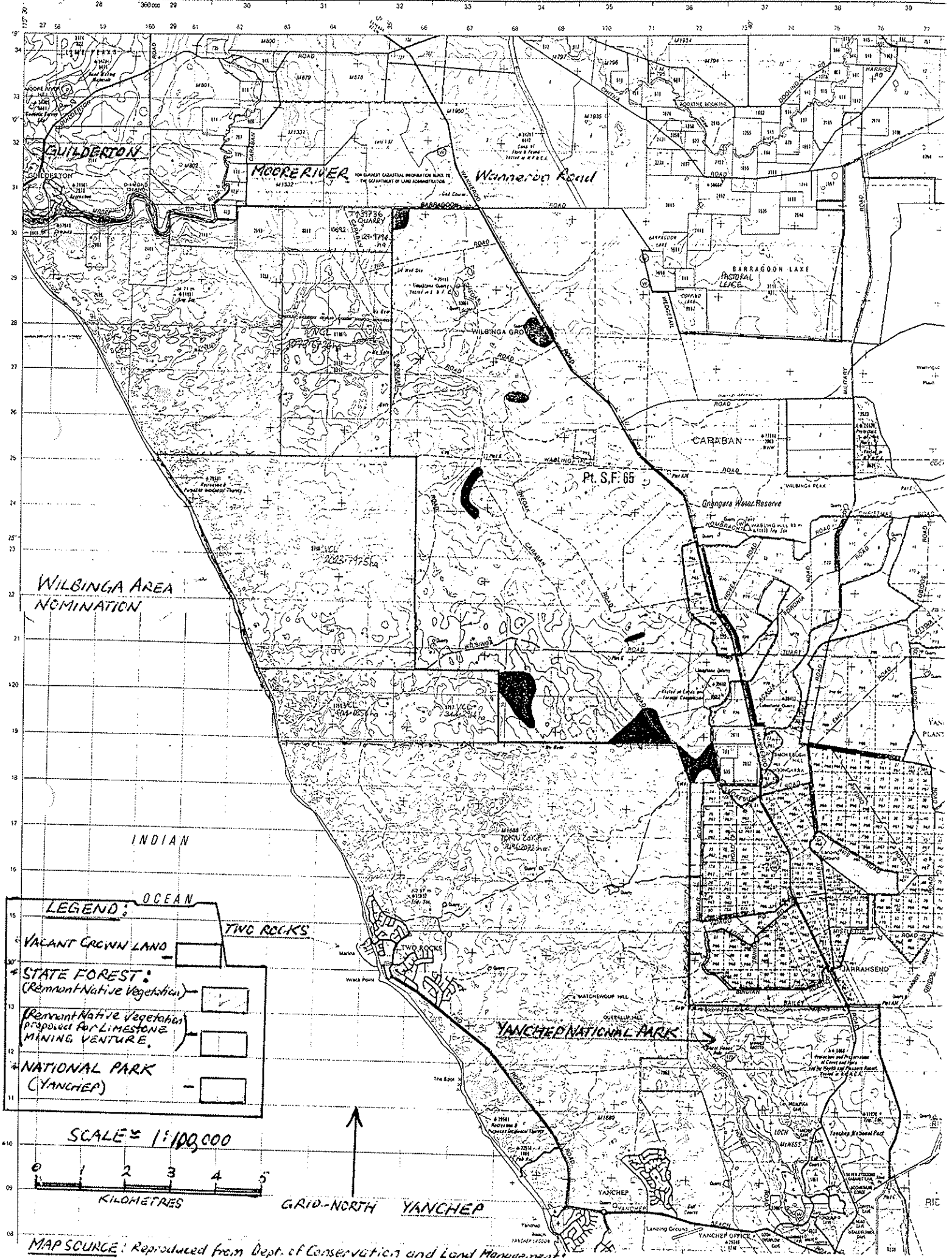
Are they already conservation reserves? Loch M^c^NESS - YANCHEP N.P.

What is their approximate size? Loch M^c^NESS ≃ 0·75 km² the others ≃ 2ha

19. Does the submitted area link other bushland areas? YES. The Wilbinga Area has ≃ 400m wide link of native bush with Yanchep National Park to the south.

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

MAP (2): ~~LOCAL~~ SETTING OF WILBINGA NOMINATION (Area shaded Light + Dark Green and Brown with Red Border)



MAP SOURCE: Reproduced from Dept. of Conservation and Land Management! Part of YANCHEP (1:50000) - EDITION 2 (1986). Colour information source from CALM and DOLA (Dept of Land Administration)

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WILBINGA AREA NOMINATION

CONFIDENTIAL

* WILBINGA is located between the coastal towns of Two Rocks and Guilderton. The centre of the area is situated approximately 65 kilometres north-northwest of the Perth C.B.D.

-LATITUDE - 31° 24' 30" South, LONGITUDE - 115° 35' 45" East.
- See maps ① & ②.

* The area occupies approximately 10,200 hectares (25,184 acres) or 102 square kilometres. Of this area:

- 0.6% is portion of an unvested Coastal Reserve,
- 37.6% consists of 4 lots of Vacant Crown Land; namely Swan Locations 8185, 9756, 9755 and 9757.
- 61.8% belongs to a portion of State Forest № 65 known by C.A.L.M as "CARABAN"

* MAP ① Shows where Wilbinga is situated in relation to Perth.
MAP ② Shows the Wilbinga area in greater detail (Scale ≈ 1:100,000).

* DEVELOPMENT PROPOSALS:
- SEE MAP ②:- Area shaded solid dark green is proposed as a section 5g (CALM Act) reserve for the purpose of Flora & Fauna Conservation, Ground water development and (Strategic Limestone development) LIMESTONE RESOURCE DEVELOPMENT, vested in NPNCA and managed by CALM. This proposal appears to be designed to secure the area for the express purpose of developing a High-grade Limestone deposit of some 300 million tonnes which under current mining production rates will last 30 years (approx). Two officers from your department were present at a meeting regarding this proposal on 23rd of July, 1993.
- I notice that this area includes the C12 - Caraban Management Priority Area as outlined on Page 60 of "Conservation Reserves for

Western Australia - THE DARLING SYSTEM - SYSTEM 6, PART II"

- It appears that Swan locations 9755, 9756 & 9757 may have been aquired by ILDA and dedicated under section 11 of the Industrial Development (Resumption of Land) Act (1945) and subsequently re-vested.
- Perhaps there are still plans to pursue industrial development in these areas.

*** NATIVE ANIMALS IN WILBINGA *** (List compiled from Personal Sightings)

- REPTILES:
  - Bearded Dragon
  - Tiger Snake
  - Dugite
  - Carpet Python
  - Stimson's Python
  - Blue tongue skink.
  - Bobtail Skink.

- MAMMALS:
  - Western Brush tail (Black Glove) Wallaby
  - Western Grey Kangaroo

- BIRDS:
  - Pink & Grey (Galah) Cockatoo
  - Carnaby's Black Cockatoo
  - ~~Red Capped Robin~~
  - Splendid Wren
  - Nankeen Kestrel
  - White-Cheeked Honeyeater
  - ~~Dusky Wood Swallow~~ BFWS
  - Rainbow Bee-eater
  - Wedge tailed Eagle
  - Common Bronzewing
  - Grey Fantail
  - Sacred Kingfisher
  - Brown Goshawk
  - Red Wattle Bird
  - Little Eagle
  - Emu
  - Grey backed Butcher bird
  - Black faced Wood Swallow
  - Silvereye
  - Australian Owlet-Nightjar
  - Western Spinebill
  - Brush Bronzewing

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	[illegible] 01
Date	3/11/94

Record on Sheet

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

From '*Bushland Plant Survey*' written by B. Keighery (19940 and published by the Wildflower Society of WA (Inc.), PO Box 64 Nedlands WA 6008.

	TREES	No	Fl	ID
0	Euc gomph			
0	Bank grand.			
0	Bank att.			
0	Nuyt. flor			
0	Allocas fras (overhangs)			
	MALLEES			
	SHRUBS			
0	[illegible] preissii			
0	[illegible]			
0	[illegible] hom			
0	Hard. comp			
0	Macrozamia riedlii			
0	[illegible] prostrata			

	SHRUBS (cont.)	No	Fl	ID
	GRASSES			
0	? [illegible] ? flaves 8/2/94	c		
0	[illegible]			
0	*Bromus [illegible]			
0	? [illegible] ?occidentalis	c		
0	*[illegible]			
[box]	[illegible]	c		
	HERBS			
0	Daucus [illegible]			
0	*Urospermum picroides			
0	[illegible]			
0	*[illegible]			
0	*Trifolium [illegible]			
0	[illegible]			
0	*Pelargonium [illegible]			
0	*[illegible]			
0	*Cerastium glom (Mouse Chick)	c		
0	Pelargonium littorale	c		
0	[illegible]			
0	[illegible]			

	HERBS (cont.)	No	Fl	ID
0	*[illegible]			
0	[illegible]			
0	[illegible]			
0	*[illegible]			
0	[illegible]			
0	Pterostylis nana			
0	Caladenia (leaf only)			
	8/2/94			
	SEDGES			
0	[illegible]			
0	[illegible] angust.			
0	[illegible]			
0	[illegible]			

NOTE
Specimens not located by 7oKyu 1-5 105 with [box] based on expectation

System 6 Update - Floristic Community Type Mapping Information DRAFT ONLY

AREA INFORMATION

System 6 Area (C or M) or Update Area (Update) C12

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	Bound	Area (ha)	Area(ha)

Boundaries determined by use of

aerial photograph
orthophoto 2035 TT SW SE
vegetation map
soil map

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

AREA INFORMATION

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

Conservation Area	
Nature Reserve	Nil
Reserve No	
National Park	
Reserve No	
Local Government	
Reserve No	
Other	
Proposed Conservation Areas	
Local Government	
Reserve No	
Other	

Conservation Area

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

AREA

Total Area	hectares
Completely Degraded	hectares
comments:	

AREA MAPPED FLORISTIC UNITS

Boundaries: System6 CALM

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

Boundaries determined by use of

aerial photograph	Metro Regional Area - R 2 5007 - 5008 4photos
orthophoto	Nil.
vegetation map	
soil map	

Department of Environmental Protection System 6 Update: Site Based Flora List M1 Two Rocks Open Space
(174 taxa, Tokyu Sites 1-7, B.J. Keighery, 31/3/95)

Aizoaceae
Carpobrotus sp. hepburn Heights scps (GJK 11518)

Anthericaceae
Corynotheca micrantha
Laxmannia sessiliflora subsp. australis
Thysanotus arenarius
Thysanotus patersonii

Apiaceae
Daucus glochidiatus
Homalosciadium homalocarpum
Trachymene pilosa
Xanthosia huegelii

Asteraceae
* Hypochaeris glabra
Lagenifera huegelii
Leptorhynchos scabrus
Millotia tenuifolia
Olearia axillaris
Olearia rudis
Podolepis gracilis
Podotheca angustifolia
Podotheca chrysantha
Senecio lautus subsp. maritimus
Siloxerus humifusus
* Sonchus oleraceus
* Urospermum picroides
* Ursinia anthemoides
Waitzia citrina
Waitzia suaveolens

Brassicaceae
* Heliophila pusilla

Campanulaceae
Wahlenbergia preissii

Caryophyllaceae
* Cerastium glomeratum
* Petrorhagia velutina

Casuarinaceae
Allocasuarina fraseriana
Allocasuarina humilis

Centrolepidaceae
Centrolepis drummondiana

Chenopodiaceae
Rhagodia baccata subsp. dioica
Threlkeldia diffusa

Colchicaceae
Burchardia umbellata
Wurmbea monantha

Crassulaceae
Crassula colorata
* Crassula glomerata

Cuscutaceae
* Cuscuta epithymum

Cyperaceae
* Isolepis marginata
Lepidosperma angustatum
Lepidosperma gladiatum
Mesomelaena pseudostygia
Schoenus lanatus

Dasypogonaceae
Acanthocarpus preissii
Lomandra hermaphrodita
Lomandra maritima

Dilleniaceae
Hibbertia hypericoides
Hibbertia racemosa
Hibbertia spicata subsp. leptotheca

Droseraceae
Drosera sp. scps

Epacridaceae
Conostephium preissii
Leucopogon parviflorus
Leucopogon propinquus
Leucopogon racemulosus
Leucopogon sp. scps

Euphorbiaceae
* Euphorbia terracina
Phyllanthus calycinus
Poranthera microphylla

Geraniaceae
Pelargonium littorale

Goodeniaceae
Scaevola sp. scps
Scaevola thesioides

Haemodoraceae
Anigozanthos humilis
Anigozanthus sp. scsp
Conostylis aculeata
Conostylis candicans
Conostylis setigera
Haemodorum laxum

Iridaceae
* Gladiolus caryophyllaceus
Patersonia occidentalis

Juncaginaceae
Triglochin centrocarpum

Lamiaceae
Hemiandra pungens

Lauraceae
Cassytha flava
Cassytha racemosa

Lobeliaceae
Isotoma hypocrateriformis
Lobelia tenuior

Loranthaceae
Nuytsia floribunda

Mimosaceae
Acacia cochlearis
Acacia cyclops
Acacia lasiocarpa
Acacia pulchella
Acacia saligna
Acacia truncata
Acacia xanthina

Myoporaceae
Eremophila glabra
Myoporum insulare

Myrtaceae
Baeckea robusta
Calothamnus quadrifidus
Calytrix strigosa
Eremaea asterocarpa subsp. asterocarpa
Eucalyptus gomphocephala
Eucalyptus todtiana
Leptospermum spinescens
Melaleuca acerosa
Melaleuca cardiophylla
Melaleuca huegelii
Melaleuca sp. scps
Scholtzia involucrata

Orchidaceae
Caladenia sp. scps
Pterostylis nana

Orobanchaceae
* Orobanche minor

Papilionaceae
Bossiaea eriocarpa
Daviesia divaricata

Gompholobium shuttleworthii
Gompholobium tomentosum
Hardenbergia comptoniana
Isotropis cuneifolia
Jacksonia stricta
Kennedia prostrata
* Medicago polymorpha
Nemcia reticulata
Sphaerolobium sp. scps
Templetonia retusa
* Trifolium campestre

Phormiaceae
Dianella revoluta var. divaricata

Poaceae
* Aira caryophyllea
* Bromus diandrus
Danthonia occidentalis
* Ehrharta longiflora
* Lolium rigidum
Microlaena stipoides
Poa poiformis
Stipa compressa
Stipa flavescens
* Vulpia sp. scps

Polygalaceae
Comesperma calymega
Comesperma confertum
Comesperma integerrimum

Portulacaceae
Calandrinia liniflora

Primulaceae
* Anagallis arvensis var. arvensis FPR

Proteaceae
Banksia attenuata
Banksia grandis
Banksia menziesii
Conospermum stoechadis
Dryandra nivea
Dryandra sessilis
Grevillea thelemanniana subsp. preissii
Hakea costata
Hakea lissocarpha
Hakea prostrata
Hakea ruscifolia
Hakea trifurcata
Persoonia comata
Petrophile linearis
Petrophile macrostachya
Petrophile serruriae
Stirlingia latifolia
Synaphea spinulosa

Ranunculaceae
Clematis linearifolia

Restionaceae
Hypolaena exsulca
Lepidobolus preissianus
Loxocarya flexuosa
Lyginia barbata

Rhamnaceae
Cryptandra mutila
Spyridium globulosum
Spyridium tridentatum

Rubiaceae
* Galium murale
Opercularia vaginata

Rutaceae
Eriostemon spicatus

Santalaceae
Leptomeria preissiana

Sapindaceae
Diplopeltis huegelii

Scrophulariaceae
* Dischisma arenarium
* Parentucellia viscosa

Stackhousiaceae
Stackhousia monogyna
Tripterococcus brunonis

Stylidiaceae
Levenhookia stipitata
Stylidium crossocephalum
Stylidium junceum
Stylidium repens

Thymelaeaceae
Pimelea ferruginea

Urticaceae
Parietaria debilis

Violaceae
Hybanthus calycinus

Xanthorrhoeaceae
Xanthorrhoea preissii

Zamiaceae
Macrozamia riedlei

Department of Environmental Protection System 6 Update: Site Based Flora List M1 Wilbinga
(210 taxa, Wilb Sites 1-13, B.J. Keighery, 31/3/95)

Aizoaceae
- Carpobrotus modestus
- Carpobrotus sp. scps
- Carpobrotus virescens
- * Tetragonia decumbens

Amaranthaceae
- Ptilotus drummondii

Anthericaceae
- Corynotheca micrantha
- Laxmannia sessiliflora subsp. australis
- Sowerbaea laxiflora
- Thysanotus arenarius
- Thysanotus patersonii
- Thysanotus triandrus
- Tricoryne elatior

Apiaceae
- Daucus glochidiatus
- Homalosciadium homalocarpum
- Hydrocotyle hispidula
- Trachymene coerulea
- Trachymene pilosa
- Xanthosia huegelii

Asteraceae
- Asteridea pulverulenta
- Brachyscome iberidifolia
- Gnaphalium sphaericum
- Helichrysum cordatum
- Helipterum corymbosum
- Hyalosperma cotula
- * Hypochaeris glabra
- Lagenifera huegelii
- Leptorhynchos scabrus
- Millotia tenuifolia
- Olearia axillaris
- Olearia rudis
- Podolepis gracilis
- Podotheca angustifolia
- Podotheca chrysantha
- Podotheca gnaphalioides
- Quinetia urvillei
- Senecio lautus subsp. maritimus
- Siloxerus humifusus
- * Sonchus oleraceus
- * Ursinia anthemoides
- Waitzia citrina
- Waitzia suaveolens

Brassicaceae
- * Heliophila pusilla
- Stenopetalum robustum

Campanulaceae
* Wahlenbergia capensis
Wahlenbergia preissii

Caryophyllaceae
* Cerastium glomeratum
* Silene gallica

Casuarinaceae
Allocasuarina humilis

Centrolepidaceae
Centrolepis drummondiana

Chenopodiaceae
Rhagodia baccata subsp. dioica
Threlkeldia diffusa

Colchicaceae
Burchardia umbellata
Wurmbea monantha

Crassulaceae
Crassula colorata
* Crassula glomerata

Cyperaceae
* Isolepis marginata
Isolepis nodosa
Lepidosperma angustatum
Lepidosperma gladiatum
Mesomelaena pseudostygia
Schoenus clandestinus
Schoenus grandiflorus
Schoenus lanatus
Schoenus latitans

Dasypogonaceae
Acanthocarpus preissii
Lomandra caespitosa
Lomandra hermaphrodita
Lomandra maritima
Lomandra suaveolens

Dilleniaceae
Hibbertia hypericoides
Hibbertia racemosa
Hibbertia spicata subsp. leptotheca

Droseraceae
Drosera macrantha subsp. macrantha
Drosera sp. scps

Epacridaceae
Astroloma microcalyx
Leucopogon parviflorus
Leucopogon propinquus

Leucopogon racemulosus
Lysinema ciliatum

Euphorbiaceae
Phyllanthus calycinus
Poranthera microphylla

Gentianaceae
* Centaurium erythraea

Geraniaceae
* Erodium moschatum
* Pelargonium capitatum
Pelargonium littorale

Goodeniaceae
Dampiera linearis
Lechenaultia linarioides
Scaevola canescens
Scaevola crassifolia
Scaevola nitida
Scaevola repens var. angustifolia
Scaevola repens var. repens

Gyrostemonaceae
Tersonia cyathiflora

Haemodoraceae
Conostylis candicans
Conostylis setigera
Haemodorum laxum
Haemodorum paniculatum
Haemodorum spicatum

Iridaceae
* Gladiolus caryophyllaceus
Orthrosanthus laxus
Patersonia occidentalis

Juncaginaceae
Triglochin centrocarpum

Lamiaceae
Hemiandra pungens
Westringia dampieri

Lauraceae
Cassytha flava
Cassytha glabella
Cassytha racemosa

Lobeliaceae
Isotoma hypocrateriformis
Lobelia tenuior

Loganiaceae
Mitrasacme paradoxa

Malvaceae
Alyogyne huegelii

Mimosaceae
Acacia aff. alata scps (alata var. tetrantha Ms)
Acacia benthamii
Acacia cochlearis
Acacia cyclops
Acacia lasiocarpa
Acacia preissiana
Acacia pulchella
Acacia rostellifera
Acacia truncata
Acacia xanthina

Myoporaceae
Eremophila glabra
Myoporum insulare

Myrtaceae
Calothamnus quadrifidus

Myrtaceae
Calothamnus sanguineus
Calytrix strigosa
Eucalyptus gomphocephala
Leptospermum spinescens
Melaleuca acerosa
Melaleuca cardiophylla
Melaleuca huegelii

Olacaceae
Olax benthamiana

Orchidaceae
Caladenia flava
Caladenia sp. scps

Orobanchaceae
* Orobanche minor

Papilionaceae
Bossiaea eriocarpa
Gompholobium tomentosum
Hardenbergia comptoniana
Isotropis cuneifolia
Jacksonia stricta
Kennedia prostrata
* Melilotus indicus
Nemcia capitata
Nemcia reticulata
Templetonia biloba
Templetonia retusa
* Trifolium arvense

Phormiaceae
Dianella revoluta var. divaricata

Poaceae
* Aira caryophyllea
* Bromus diandrus
* Bromus sp. scps
Danthonia occidentalis
* Ehrharta longiflora
* Lolium rigidum
Microlaena stipoides
Poa drummondiana
Poa poiformis
Spinifex longifolius
Stipa compressa
Stipa flavescens
* Vulpia bromoides
* Vulpia myuros
* Vulpia sp. scps

Polygalaceae
Comesperma confertum
Comesperma integerrimum

Portulacaceae
Calandrinia liniflora

Primulaceae
* Anagallis arvensis var. arvensis FPR

Proteaceae
Banksia attenuata
Banksia menziesii
Conospermum stoechadis
Dryandra nivea
Dryandra sessilis
Grevillea thelemanniana subsp. preissii
Hakea costata
Hakea lissocarpha
Hakea prostrata
Hakea trifurcata
Persoonia comata
Petrophile brevifolia
Petrophile macrostachya
Petrophile serruriae

Restionaceae
Lepidobolus preissianus
Loxocarya fasciculata
Loxocarya flexuosa

Rhamnaceae
Cryptandra mutila
Cryptandra pungens
Spyridium globulosum
Spyridium tridentatum
Trymalium albicans

Rubiaceae
* Galium murale
Opercularia spermacocea

Opercularia vaginata

Santalaceae
Leptomeria empetriformis
Leptomeria preissiana
Santalum acuminatum

Sapindaceae
Diplopeltis huegelii

Scrophulariaceae
* Dischisma arenarium
* Dischisma sp. scsp

Stylidiaceae
Levenhookia stipitata
Stylidium adpressum
Stylidium calcaratum
Stylidium crossocephalum
Stylidium maritima MS

Thymelaeaceae
Pimelea calcicola
Pimelea ferruginea
Pimelea rosea
Pimelea sulphurea

Violaceae
Hybanthus calycinus

Xanthorrhoeaceae
Xanthorrhoea preissii

Zamiaceae
Macrozamia riedlei

DEPARTMENT OF PLANNING AND URBAN DEVELOPMENT
PERTH ENVIRONMENT PROJECT : BIBLIOGRAPHY OF ENVIRONMENTAL TOPICS

PIC:
EPARED FOR: M 142 - Burns Beach

Date prepared:
04/14/94

COASTAL PLANNING STUDY : BURNS BEACH TO JINDALEE, SUMMARY REPORT [FOR DEPARTMENT OF PLANNING AND URBAN DEVELOPMENT AND THE CITY OF WANNEROO] / Hames Sharley Australia -- Subiaco, W.A. Hames Sharley, 1992.

1. COASTAL PLANNING. 2. BURNS BEACH. 3. JINDALEE.
PEP TOPIC: 1. GEOMORPHOLOGICAL UNIT. veg maps

ISBN: 0 7309 5297 5

Location(s) : EPA

COASTAL PLANNING STUDY : BURNS BEACH TO JINDALEE, TECHNICAL REPORT [FOR DEPARTMENT OF PLANNING AND URBAN DEVELOPMENT AND THE CITY OF WANNEROO] / Hames Sharley Australia -- [Subiaco, W.A. Hames Sharley]] 1992.

1. COASTAL PLANNING. 2. BURNS BEACH. 3. JINDALEE. veg maps.
PEP TOPIC: 1. GEOMORPHOLOGICAL UNIT.

ISBN: 0 7309 3292 3

Location(s) : EPA

CONSERVATION AREA : OCEAN REEF/BURN'S BEACH SOUTH. / Foulds, W. (William). English. 1983.

1. NATURAL AREAS. 2. BURNS BEACH. 3. OCEAN REEF. 4. COASTAL FLORA.
PEP TOPIC: 1. COASTLINE. 2. FLORA SPECIES.

Location(s) : WCX =JOONDALUP...Q333.7209941 FOU copies:1 <562884>
on order

FLORA OF BURNS BEACH COASTAL RESERVE / Keighery, G.J.: Keighery, B.J.

(Unpublished Report.) Get of G.J Keighery.

1. BURNS BEACH. 2. DARLING. 3. FLORA. 4. PERTH REGION. 5. SWAN.
6. VEGETATION. 7. COASTAL RESERVES.
PEP TOPIC: 1. COASTLINE. 2. FLORA SPECIES.

Location(s) : CALM

M1 Two Rocks Open Space
Other Names: Yanchep
Specific Study/studies Miscellaneous studies

Flora
Vegetation Map 1 2 3
Flora list 1 2 3
Rare Taxa done / suitable / doubtful

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

Vegetation Condition Map Comment

Disturbance Factors Comment Management

Swan Coastal Plain Floristic Survey

AHC: National Estate- Listed / Interim / Notified National Trust: Heritage Classification

M2 Coastal strip from Two Rocks to Burns Beach
Bulletins 200 (Mindarie Keys, alt boundaries), 500 (Eglington Beach Reseort, alt. boundaries), 485 (Burns Beach, alt boundaries)

Other Names:
Specific Study/studies Miscellaneous studies refer to areas (individual) within the greater area

Flora
Vegetation Map 1 2 3
Flora list 1 2 3
Rare 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 compatible sites also

AHC: National Estate- Listed / Interim / Notified National Trust: Heritage Classification

Note: M1&2 and the extension of M6 to the coast should be considered as a unit as these recommendations are continually being 'modified' and the original proposals may not be tenable with changed land use. Keighery 1990, Griffin 1993, Keighery and Keighery 1992, Trudgen and Keighery 1990, Alkimos, Eglington, Mindarrie, Ningana and SCPFS 1994 can be used to gain information on the area.
This general statement also applies to other coastal M areas M35, M46, M90, M91, M106 & M 107 and the miscellaneous studies can be used to gain information on the area.

M1 Two Rocks Open Space		
M1.1 Regional park recommendations be applied to this area.	Unresolved Issues	At this stage there is no regional park proposal for this area.
M1.2 Proposal under Metropolitan Region Scheme to reserve M1 is endorsed.	Implemented	Recommendation is an endorsement. DPUD are reconsidering the boundaries of the reserve area through the Yanchep-Sun City development. Quinns Rock Environmental Research Group has an interest in this area.
M2 Coastal strip from Two Rocks to Burns Beach Bulletins 200 (Mindarie Keys, alt boundaries), 500 (Eglington Beach Reseort, alt. boundaries), 485 (Burns Beach, alt boundaries)		
M2.1 Regional park recommendations be applied to this area.	Unresolved Issues	A regional park is not being considered for this area. DPUD is preparing management plan for southern portion of M2. Quinns Rock Environmental Research Group has an interest in this area.

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A report on the flora and vegetation of areas at Wilbinga and Breton Bay proposed as alternatives for a future industrial site

Prepared for Halpern Glick Maunsell

by Malcolm Trudgen, Consultant Botanist

assisted by

E.A. Griffin and B.K. Keighery

November 1990

CONTENTS

4.1.1 The Strand

The Strand vegetation is poorly developed in both the Wilbinga and Breton bay areas areas as the beaches are typically narrow as a result of erosion by the sea. Only small areas of strand are present and in some places this too has been truncated by the erosion. Several distinct vegetation types were recognised, appearing to represent different phases of the stabilising of the strand. Firstly (and nearest the beach) is an area of essentially only *Cakile maritima* (Cm) Herbland, further back from the beacl (and presumably older) a Grassland dominated by young *Spinifex longifolius.* Thi appears to be replaced by a Hummock Grassland dominated by *Spinifex longifoliu* (Sl). Species typical of the youngest stabilised Quindalup dunes (Q4) invade the areas and an overlap of species between the two develops. The soil of all strai vegetation types is loose, essentially sand sized, shell fragments and there is no si of soil profile development.

Cm *Cakile maritima* Herbland

The one site from which this was recognised was dominated (40% cover) by this species growing to only 0.3m in height. The only other species recognised were *Tetragona decumbens* (5% cover, 0.2m tall), **Arctotheca populifolia* (5%, 0.2m) and young *Spinifex longifolius* (1%, 0.4m).

Sl *Spinifex longifolius* Hummock Grassland

Two species of *Spinifex* (*S. longifolius* and *S. hirsutus*) occur along the coast on which the stud area is located. However, at both Wilbinga and Breton Bay *Spinifex longifolius* was dominant (40-70% cover, 0.4 & 1.5m tall). Other species present included *Tetragona decumbens* (5-20%, 0.3m), *Olearia axillaris* (1-10%, 0.6-1.0m) *Isolepis nodosus* (1%, 0.6m) plus the weed species *Carpobrotus* (2%, 0.2m) and *Trachyandra divaricata* (Onion Weed, 2%, 0.4m). *Helichrysum chordatum* is usually only sparingly present but, in areas stabilised for longer, it may exceed 2m in height.

This unit grades into the stabilising eroded primary dune vegetation (unit Sc, see below).

larger areas are required.

Table 1 shows that the Wilbinga site, especially the buffer, contains a greater diversity of vegetation than the Breton Bay site but that neither sites include the full range of vegetation units recognised during this study. Wilbinga does not have vegetation units E and Fp and only has small amounts of units CuMa and AMa. On the other hand Breton Bay has very little area of the deeper sands of the Spearwood Dunes and some vegetation types of these soils (e.g. units BEp and Bi) are totally absent. The most important points relating to the conservation value of the vegetation found on the two sites are summarised below.

Wilbinga

Probably the most important feature of the Wilbinga site is its diversity of vegetation in good condition in a more or less single block. Of the approximate 10,000 ha less than 2,000ha has been cleared. The size of the uncleared area means there is a high chance of long term viability for the vegetation types. This area contains most of the vegetation types represented on both the Quindalup and Spearwood dunes in this study. It is thus an extremely valuable resource, given that most reserved land in the metropolitan area contains only parts of only one of the major geomorphological units.

The proposed core contains good examples of vegetation growing on extensive areas of exposed limestone and shallow sand over limestone. These are poorly represented in the adjoining Caraban Management Priority Area (whose purpose is conservation). Within the core are stands of *Melaleuca cardiophylla* which is close to its southern limit of distribution and is poorly represented in conservation reserves in the area. Particularly valuable are the near coastal areas which again are not well conserved.

The coastal portions of the proposed buffer contain a wide range of Quindalup dunes, mostly of the older Q1 and Q2 groups. Transgression of the Quindalup dunes over the Spearwood dunes has created a wide range of soil types to which many species

appear to be responding in their distribution and abundance. The eastern portion of the buffer, essentially Caraban MPA, is valuable for its range of different woodlands growing on Spearwood dunes. These were once extensive on the Swan Coastal Plain but have been greatly reduced in area by clearing for various activities. Included in this is perhaps the northern most remnant of Tuart (*Eucalyptus gomphocephala*) woodland. Other stands of Tuart further north are generally quite small and their under-storey is more representative of surrounding vegetation than of Tuart woodlands. The occurrence within these *Banksia* and Tuart woodlands of limestone capped hills and rises adds to the diversity of this part of the proposed buffer. Caraban MPA represents a range of *Banksia* woodlands which are near the northern limit of their distribution.

Location 1688, the subject of the System Six redbook recommendation M1, borders the Caraban MPA. However, its potential to compliment Caraban has been diminished since its area of Quindalup Dunes, are either cleared or in a poor condition. It has, however, areas of shallow Spearwood dunes not well represented in Caraban and still retains considerable conservation value.

Given the range of vegetation types present at Wilbinga, the overall good condition of the study area, the size of the site and the strategic location of the site (see section 6) it must be rated as having very high to extremely high value for the conservation of vegetation types.

Breton Bay

The native vegetation in the Breton Bay site is also diverse but as mentioned above only includes the vegetation of the Quindalup dunes and of the shallower soils of the Spearwood dunes. Most of the vegetation types recognised in the study for these soil types were at the Breton Bay site. While uncleared vegetation growing on a wide range of Quindalup dunes units is represented at the Breton Bay site, the relative importance of younger and older type dunes appears to be different from that at Wilbinga. Of particular note is the sizable area of steeper (and presumably younger) dunes in the northern part of the Breton Bay buffer.

Given the number of vegetation types present at Breton Bay, and the size of the site it must have value for the conservation of vegetation types. However, given the fragmented nature of the vegetation due to clearing it can only be rated as high value, except possibly for the largest uncleared block which could be rated as very high. Clearly however, the Breton Bay study area has somewhat less overall value than the Wilbinga study area.

The occurrences of several vegetation units are of particular merit. The *Melaleuca cardiophylla* (Mc) heaths right on the coast is uncommon both at the Breton Bay site and elsewhere. This vegetation apparently does not occur so close to the coast in V)nagarren Nature Reserve or Nambung National Park. Breton Bay also has one of the few areas known where vegetation dominated by two rare mallee eucalypts (*Eucalyptus "argutifolia"* and *Eucalyptus "petrensis"*) are known to occur.

Unfortunately for the long term viability of the vegetation in the Breton Bay study area the uncleared areas are scattered through a matrix of cleared and partially cleared land. The largest uncleared patch is between 3,000 and 4,000 ha. This contains many, but not all, of the vegetation units found in the Breton Bay site.

It appears to have been a relatively long period since much of the vegetation at Breton Bay was last burnt. Such areas are particularly valuable for research as they are r( )tively uncommon. The fragmentation of the native vegetation at Breton Bay has probably been responsible for it not having been regularly burnt.

5.4 Conservation Value for Landforms

The study areas also have value for the conservation of landforms. These include beaches, several ages of Quindalup dunes and areas of the shallow sand/limestone and deep sand surfaces (including several of the units of McArthur and Bartle 1980) of the Spearwood dune system. In a similar fashion to the vegetation and flora of the Quindalup dunes these features are in conservation reserves towards the limits of their distribution but are not adequately reserved in the centre of their range.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

- the Wilbinga and Breton Bay study areas both have considerable conservation value for flora (including the presence of rare and restricted flora), vegetation and geomorphological types.

- the strategic position of the Wilbinga study area for the conservation of flora and vegetation coupled with its greater area of vegetation in a less disturbed state mean that it has significantly higher value for conservation than the Breton Bay study area.

- the value of Wilbinga and Breton Bay has not previously been recognised because of inadequate knowledge of the flora and vegetation of the Swan Coastal Plain, although in a general sense it has been well known (at least to biologists) that the coastal zone flora and vegetation is inadequately represented in conservation reserves.

- the protection, or realisation, of these values has not occurred because of inadequate weighting for the conservation of natural areas in the planning process and the inadequacy of the "System Six" report (EPA 1980) as a basis for the conservation of natural areas on the coastal plain.

8.2 Recommendations

- The value of the Wilbinga study area for the conservation of flora and vegetation should be accepted as sufficiently high for it not to be considered for the site of the proposed industrial area.

- The values of the Breton Bay study area for conservation should be more fully defined before detailed planning for the development of an industrial site at that location and such planning should fully take these values into account. (The rediscovery of *Chorizema varium* at Breton Bay, the recognition of *Diplolaena microcephala* aff. var. *microcephala* as a distinct variety and the extensions of the

known ranges of several species to the Breton Bay study area illustrates how poorly known the area is and the need for a detailed botanical survey of the area.)

- Unfortunately, the highest conservation values of the Breton Bay site are concentrated within the proposed core. These should be preserved by a modification of the plans to shift as much as possible of the intensive development to existing cleared areas within the study area.

- Particular emphasis should be placed on the protection of the population of *Chorizema varifolium* located at the south end of Breton Bay by setting aside an area around it. The size of this area should be set after discussions with the Department of Conservation and Land Management (CALM) however, an area of 400-500 ha may be neccessary for long term maintenance of the population. The passage of services, clearing or other development should be excluded from this area. Other rare flora should also be specially protected.

- To ensure balance between development and conservation on the coastal strip north of Perth the setting aside of an industrial site in the region should be linked to proper allowance for conservation in the region by protection of the Wilbinga area.

APPENDIX ONE: **Flora recorded for the Wilbinga and Breton Bay study areas**

Species recorded from the Wilbingia study area are indicated in the right hand column by the letters Wc (core) and Wb (buffer). Species from the Breton Bay study area are indicated by the letters Bc (core) and Bb (buffer). To allow comparison to other coastal areas on the Swan Coastal Plain species recorded from the Leschenault Peninsula (Trudgen 1984), the coast of the Shire of Mandurah (Trudgen 1988) and the Alkimos and Ningana areas (Trudgen 1989) just south of Wilbinga have been included and are indicated by the letters LP, MC, A and N respectively. An asterix (*) before a species indicates it is introduced to Western Australia.

PTERIDOPHYTA (ferns)				
DENNSTAEDTIACEAE				
Pteridium aquilinum	LP			
GYMNOPHYTA				
ZAMIACEAE				
Macrozamia reidlei		MC	A/N	Wb,Wc
ANGIOSPERMAE (flowering plants)				
MONOCOTYLEDONS				
RUPPIACEAE				
Ruppia megacarpa	LP			
JUNCAGINACEAE				
Triglochin calcitrapa	LP			Wb /Bb
Triglochin centrocarpa		MC		
Triglochin mucronata	LP	MC		
Triglochin striata	LP			
Triglochin trichophora	LP			Bb,Bc
POACEAE				
*Agropyron racemosum			A/N	
*Aira caryophyllea	LP			
*Aira cupaniana			A/N	
*Ammophila arenaria	LP	MC		
Amphipogon turbinatus			A/N	Wb,Wc
Arundo donax	LP			
*Avena fatua	LP	MC	A/N	
*Briza maxima	LP		A/N	Wb,Wc
*Briza minor	LP		A/N	
*Bromus madritensis		MC		
*Bromus diandrus			A/N	Wc
*Catapodium ridgidum			A/N	

*Cynodon dactlyon	LP				
Danthonia acerosa			A/N		
Danthonia caespitosa			A/N		
Danthonia setacea		MC			
Danthonia occidentalis.			A/N		
*Ehrharta calycina			A/N		
*Ehrharta longiflora	LP	MC	A/N		
*Lolium multiflora		MC			
Microlaena stipoides			N		
Neurachne alopecuroidea				Wb	
*Poa annua	LP				
Poa drummondiana	LP	MC	A/N		
Poa porphyrocladus			A/N		Bc
Poa poiformis		MC			
Poa sp.					Bc
Spinifex hirsutus	LP	MC	A/N	Wb,Wc	
Spinifex longifolius	LP	MC	A/N	Wb,Wc/Bb,Bc	
Sporobolus virginicus		MC			Bc
Stipa campylachne		MC			
Stipa compressa		MC	A/N		
Stipa flavescens		MC	A/N	Wb,Wc	
Stipa ? variabilis	LP	MC			
*Vulpia membranacea		MC		Wb,Wc	
*Vulpia myuros	LP				
CYPERACEAE					
Baumea juncea	LP	MC	N	Wb	
Bulboschoenus caldwelli	LP	MC			
Caustis dioica				Wb	
Carex preissii	LP	MC	N		
*Cyperus laevigatus		MC			
Cyperus tenellus	LP				
Cyperus tenuiflorus	LP				
Gahnia trifida	LP	MC			
Isolepis cernua			A/N	Wb,Wc/Bb,Bc	
Isolepis marginata		MC			
Isolepis nodosa	LP	MC	A/N	Wb,Wc/Bb,Bc	
Isolepis sp.	LP				
Lepidosperma angustatum	LP	MC		Wb,Wc/Bb,Bc	
Lepidosperma costale			A		
Lepidosperma ? costale		MC			
Lepisosperma gladiatum	LP	MC	A/N	Wb,Wc/Bb,Bc	
Lepidosperma ? gracile		MC			
Lepidosperma longitudinale	LP				
Lepidosperma squamatum			A		
Lepidosperma scabrum			A	Wb	
Lepidosperma sp. (B)		MC			
Schoenus clandestinius			A	?Wc	
Mesomelaena stygia			A/N	Wb,Wc/Bb,Bc	
Schoenus curviflorus		MC.	A	Wb,Wc	
Schoenus grandiflorus		MC	A/N	Wb,Wc/Bb,Bc	

Schoenus lanatus		MC		
Schoenus latitans				Wb
Schoenus nanus		MC		
Scoenus pedicellatus				Wb
Schoenus subbartus			A/N	
Schoenus sp.		MC		
Schoenus sp.		MC		
? Tetraria octandra				Wc
ARACEAE				
*Zantedeschia aethiopica	LP			
RESTIONACEAE				
Alexgeorgia nitens			A	Wb
Hypolaena exsulca			A	?Wb
Lepidobolus chaetocephalus				Wb,Wc/Bb
Loxocarya cinerea		MC		
Loxocarya flexuosa		MC	A/N	Wb,Wc/Bb,Bc
Loxocarya pubescens	LP			
Loxocarya sp. (B)		MC		
Loxocarya sp.				Wb
Lyginia barbarta		MC	A	Wb
Restio scariosus		MC	(male & female)	
Restio sp.				Wb
CENTROLEPIDACEAE				
Centrolepis drummondii	LP	MC	N	
JUNCACEAE				
*Juncus bufonius	LP			
Juncus kraussii ssp. australis	LP	MC		
Luzula meridionalis		MC		
DASYPOGONACEAE				
Acanthocarpus preissi	LP	MC	A/N	Wb,Wc/Bb,Bc
Calectasia cyanea		MC		
Lomandra caespitosa			A	Wb
Lomandra hermaphrodita				Wb
Lomandra maritima		MC	A/N	Wb,Wc/Bb,Bc
Lomandra micrantha		MC		
Lomandra purpurea		MC		
Lomandra ? sericea				Wb
Lomandra suaveolens		MC	A	M6
Lomandra sp.	LP			
XANTHORRHOEACEAE				
Xanthorrhoea brunonis ssp. semibarbata		MC		
Xanthorrhoea preissii		MC	A/N	Wb,Wc/Bb,Bc
PHORMIACEAE				
Dianella divaricata		MC	A/N	Wb,Wc/Bb,Bc

ANTHERICAEAE				
Arthropodium capillipes		MC		
Caesia parviflora		MC		
Chamaescilla corymbosa		MC		
Corynotheca micrantha		MC	A/N	Wb,Wc/Bb,Bc
Laxmania sessiliflora ssp australis			A	
Sowerbaea laxiflora		MC	A/N	Wb,Wc/Bb,Bc
Thysanotus arenarius	LP	MC	A/N	Wb,Wc/Bb,Bc
Thysanotus patersonii	LP	MC	A/N	Wb,Wc/Bb,Bc
Thysanotus sparteus		MC		
Thysanotus triandrus			A/N	
Tricoryne elatior	LP	MC	A/N	Wc /Bb,Bc
ASPHODELACEAE				
*Asphodelus fistulosus	LP (probably a mis-identification of Trachyandra divaricata)			
Bulbine semibarbarta	LP			
*Trachyandra divaricata		MC	A/N	Wb,Wc/Bb,Bc
COLCHICACEAE				
Burchardia umbellata		MC	A/N	Wb
Wurmbea monantha	LP	MC		
Wurmbea pygmaea		MC		
HAEMODORACEAE				
Anigozanthos humilis		MC	A	Wb,Wc/Bb,Bc
Anigozanthos manglesii		MC	A/N	Wb,Wc/Bb,Bc
Conostylis aculeata ssp. aculeata	LP	MC	A/N	
Conostylis bracteata				Wb
Conostylis candicans ssp. calcicola		MC	A/N	
Conostylis pauciflora ssp euryhipis		MC	A/N	Wc/Bb,Bc
Conostylis teretifolia ssp planescens			A	Wb,Wc/Bb,Bc
Conostylis pauciflora X candicans		MC		
Conostylis bracteata X candicans				Wb,Wc
Haemodorum laxum			A	Wb
Haemodorum spicatum			A	
Haemodorum paniculatum			A/N	
IRIDACEAE				
*Gladiolus cayophyllaceus		MC	A/N	Bb,Bc
Orthrosanthos laxus		MC	A	Bb
Patersonia occidentalis		MC		Wb,Wc
*Romulea rosea			A/N	
ORCHIDACEAE				
Acianthus reniformis var. huegelii		MC		
Caladenia exilis (MS)		MC		
Caladenia flava		MC		Bb,Bc
Caladenia latifolia	LP	MC		Wc/Bb,Bc
Caladenia longicauda		MC		Wb,Wc

Caladenia menziesii	LP	MC		
Caladenia pectinata		MC		
Diuris longifolia				Wb,Wc
Elythranthera brunonis		MC		
Eriochilus dilatatus	LP	MC		
Lypreanthus nigicans				Wb
Microtis unifolia			A/N	
Microtis sp. (material inadequate)		MC		
Prasophyllum elatum		MC		
Prasophyllum giganteum		MC		
Prasophyllum hians		MC		
Prasophyllum macrostachyum ssp. nov.		MC		
Pterostylis vittata		MC		Bc

DICOTYLEDONS

URTICACEAE

Parietaria debilis	LP	MC	A/N	

CASUARINACEAE

Allocasuarina fraseriana		MC	A/N	Wb
Allocasuarina humilis		MC	A/N	Wb,Wc/Bb,Bc
Allocasuarina lehmanniana				Wb
Casuarina obesa		MC		

PROTEACEAE

Adenanthos cygnorum			N (only one plant seen)	
Banksia attenuata		MC	A/N	Wb,Wc/Bb,Bc
Banksia grandis		MC	A/N	Wb
Banksia ilicifolia				Wb
Banksia leptophylla				Bb
Banksia littoralis		MC		
Banksia menziesii			A/N	Wb,Wc/Bb,Bc
Banksia prionotes				Wb, /Bb,Bc
Conospermum canaliculatum				Wb,Wc
Conospermum incurvum				Wb
Conospermum stoechadis				Wb,Wc/Bb,Bc
Conospermum triplinervium		MC	A/N	
Dryandra nivea		MC	A/N	Wb,Wc/Bb,Bc
Dryandra sessilis	LP	MC	A/N	Wb,Wc/Bb,Bc
Grevillea crithmifolia		MC		Wb,Wc
Grevillea thelemanniana		MC	A/N	Wb,Wc/Bb,Bc
Grevillea vestita		MC	A/N	? Wc/Bb,Bc
Hakea costata			A/N	Wb,Wc/Bb,Bc
Hakea lissocarpha		MC	A/N	Wb,Wc/Bb,Bc
Hakea prostrata	LP	MC	A/N	Wb,Wc/Bb,Bc
Hakea ruscifolia		MC	A/N	Wb,Wc/Bb,Bc
Hakea trifurcata		MC	A/N	Wb,Wc/Bb,Bc
Hakes undulata				Bb
Hakea varia		MC		
Persoonia comata			A/N	Wb,Wc

Persoonia saccata		MC	-	
Petrophile brevifolia			A	Wb,Wc/Bb,Bc
Petrophile linearis		MC	A	Wb,Wc
Petrophile macrostachya			A/N	Wb,Wc/Bb,Bc
Petrophile serruriae		MC	A/N	Wb,Wc/Bb,Bc
Stirlingia latifolia		MC	A	Wb,Wc
Synaphea spinulosa		MC		Wb,Wc/Bb,Bc
SANTALACEAE				
Exocarpos sparteus	LP	MC	A/N	Wb,Wc/Bb,Bc
Leptomeria empetriformis		MC		Wb,Wc/Bb
Leptomeria lehmanii		MC		
Leptomeria preissiana			N	
Leptomeria spinosa			N	
Santalum acuminatum	LP	MC		Wb,Wc/Bb,Bc
OLACACEAE				
Olax benthamiana				Wc
LORANTHACEAE				
Amyema miquelii		MC		
Nuytsuia floribunda		MC	A/N	Wb,Wc/Bb,Bc
POLYGONACEAE				
*Emex australia	LP	MC		
CHENOPODIACEAE				
Atriplex cinerea		MC		
Atriplex hypoleuca	LP	MC		
Enchylaena tomentosa				Wb,Wc/ Bc
Halosarcia indica ssp. bidens	LP	MC		
Halosarcia halocnemoides ssp halocnemoides	LP	MC		
Halosarcia syncarpa		MC		
Rhagodia baccata	LP	MC	A/N	Wb,Wc/Bb,Bc
Salsola kali		MC		
Sarcocornia blackiana		MC		
Sarcocornia quinqueflora	LP	MC		
Sarcocornia ?quinqueflora				Bc
Suaeda australis	LP	MC		
Threlkedia diffusa	LP	MC		W48
AMARANTHACEAE				
Ptilotus drummondii		MC		
Ptilotus polystachyus			A	Bb
Ptilotus manglesii				Wb
Ptilotus stirlingii			A/N	
GYROSTEMONACEAE				
Tersonia cyathifolia		MC		Wb,Wc/Bb,Bc

AIZOACEAE				
*Carpobrotus edulis			A/N	Wb,Wc/Bb,Bc
Carpobrotus virescens	LP	MC	A/N	
*Tetragonia decumbens	LP	MC	A/N	Wb,Wc/Bb,Bc
Tetragonia implexicoma		MC		
Tetragonia tetrgoniodes			N	
Threkeldia diffusa			A	
MOLLUGINACEAE				
Macarthuria australis				Wb,Wc
PORTULACACEAE				
Calandrinia brevipedata	LP			Wb,Wc/ Bc
Calandrinia calyptrata	LP	MC		
Calandrinia corrigiogloides		MC		Wb,Wc/Bb,Bc
Calandrinia granulifera				Wb,Wc
Calandrinia liniflora		MC ?	A/N	Bc
CARYOPHYLLACEAE				
*Cerastium ? diffusum	LP			? Wc
*Cerastium glomeratum				Bb,Bc
*Petrohagia velutina	LP		A/N	
*Polycarpon tetraphyllum	LP			
*Silene nocturna		MC		
RANUNCULACEAE				
Clematis microphylla	LP	MC	A/N	Wc
Clematis pubescens		MC		
Ranunculus colonorum	LP	MC		
*Ranunculus muricatus	LP	MC		
LAURACEAE				
Cassytha flava			A/N	
Cassytha glabella		MC	N	Wc/Bb
Cassytha pomiformis			N	
Cassytha racemosa	LP	MC	A/N	Wb,Wc/Bb,Bc
FUMARIACEAE				
*Fumaria capreolata	LP			
BRASSICACEAE				
*Brassica tournefortii	LP	MC		
*Cakile maritima	LP	MC	A/N	Wb,Wc
*Heliophila pusilla		MC	A/N	Wb /Bb,bc
*Lepidium bonariense			N	
Stenopetalum lineare	LP (probably misidentificaion of S. robustum)			
Stenopetalum gracilis (previously S. robustum)	MC			
DROSERACEAE				
Drosera erythorrhiza		MC		Wb,Wc/Bb,Bc

Drosera glandulifera		MC	-	Wb
Drosera macrantha		MC		Wb,Wc/Bb,Bc
Drosera pallida		MC	A	
Drosera stolonifera		MC		
CRASSULACEAE				
Crassula colorata	LP	MC	A/N	Wb,Wc/Bb,Bc
*Crassula decumbems		MC		
Crassula exserta			A/N	
*Crassula glomerata		MC	A/N	Wb /Bb,Bc
Crassula natans	LP			Wc
Crassula pedicellosa	LP			Wb
PITTOSPORACEAE				
Billardiera variifolia		MC		
Pittosporum phylliraeoides var. phylliraeoides	LP	MC	N	Wc
?Pronaya fraseri				Wc
MIMOSACEAE				
Acacia alata	LP	MC	A/N	Wb /Bb,Bc
Acacia cochlearis	LP	MC	A/N	Wb,Wc/Bb,Bc
Acacia cyclops			A	
Acacia huegelii				Bc
Acacia idiomorpha		MC	A/N	Wb,Wc/Bb,Bc
Acacia lasiocarpa var. lasiocarpa	LP	MC	A/N	Wb,Wc
Acacia pulchella var. glaberrima		MC		Bc
Acacia pulchella var. pulchella	LP	MC	A/N	Wb,Wc/Bb,Bc
Acacia rostellifera	LP	MC	A/N	
Acacia saligna				Wb /Bb
Acacia sessilis				Bb
Acacia spathulifolia		MC	A/N	Wb,Wc/Bb,Bc
Acacia truncata		MC		
Acacia wildenowiana				Bb,Bc
Acacia xanthina			A	
Acacia rostellifera x saligna				
PAPILIONACEAE				
Bossiaea eriocarpa		MC	A/N	Wb,Wc/Bb,Bc
Burtonia conferta		MC		
Chorizema varium				Bb
(Thought to be extinct prior to the current survey.)		MC	N	Wb,Wc/Bb,Bc
Daviesia divaricata		MC		Wb,Wc/Bb,Bc
Daviesia decurrens				Wb
Daviesia nudiflora		MC		
Daviesia physodes				
(D. pectinata = D. decurrens)		MC	A/N	Wb,Wc/Bb,Bc
Gompholobium tomentosum	LP	MC	A/N	Wb,Wc/Bb,Bc
Hardenbergia comptoniana		MC		Wb,Wc/Bb,Bc
Hovea pungens		MC	A/N	Wb,Wc
Hovea trisperma				

Isotropis cuneifolia		MC	A	Wb,Wc
Jacksonia furcellata	LP	MC	A/N	Wb
Jacksonia sternbergiana		MC	A/N	WB,Wc
Jacksonia stricta			A/N	Wb,Wc/Bb,Bc
Kennedia coccinea	LP	MC		
Kennedia prostrata		MC	A/N	Wb,Wc/Bb,Bc
*Medicago ? lupulina	LP			
*Medicago polymorpha			A/N	
*Meliotis indica			A/N	
Mirbelia spinosa				Bb,Bc
Nemcia reticulatum		MC	A/N	Wb,Wc/Bb,Bc
(Oxylobium reticulatum = Nemcia reticulatum)				
Sphaerolobium medium				Wb,Wc/Bb,Bc
Sphaerolobium ?medium			A/N	
Sphaerolobium aff. macranthum		MC		
Templetonia retusa	LP	MC	A/N	Wb,Wc/Bb,Bc
*Trifolium campestre			A/N	
GERANIACEAE				
*Erodium cicutarium	LP	MC		Wb,Wc/Bb,Bc
*Geranium molle	LP (poss. misid. G. solanderi)N			
Geranium solanderi		MC	A/N	
*Pelargonium capitatum	LP	MC	A/N	
Pelargonium littorale		MC	A	
OXALIDACEAE				
*Oxalis corniculata	LP			
*Oxalis pes-caprae	LP			
ZYGOPHYLLACEAE				
Zygophyllum fruticulosum	LP	MC		Bc
Zygophyllum simile		MC		
RUTACEAE				
Boronia alata		MC		
Boronia crenulata		MC		
Boronia ramosa				
Diplolaena dampieri	LP	MC		
Dipolaena microcephala (? relationship to var. drummondii)				
Dilolaena micrcephala var microcephala				Wc/Bb,Bc
Eriostemon spicatus		MC		Wb,Wc/Bb,Bc
POLYGALACEAE				
Comesperma calymega			A	
Comesperma confertum		MC		
Comesperma integerrimum			A/N	Wc
Comesperma virgatum		MC		Wc/Bb,Bc
Comesperma volubile		MC	A	
EUPHORBIACEAE				
Adriana quadripartita	LP	MC	A/N	Bb,Bc

*Euphorbia peplus	LP	MC	-	Bb,Bc
*Euphorbia terracina			N	
Phyllanthus calycinus	LP	MC	A/N	Wb,Wc/Bb,Bc
Poranthera microphylla	LP	MC		Wc/Bb
Ricinocarpos glaucus		MC	A	Bb,Bc
STACKHOUSIACEAE				
(Stackhousia huegelii = Stackhousia monogyna			A/N	Wb,Wc/Bb
Stackhousia monogyna				Wb,Wc
Triterococcus brunonis				
SAPINDACEAE			A	Wb,Wc/Bb,Bc
Dodonaea aptera		MC		
Dodonaea ?		MC	N	Wb /Bb,Bc
Diplopeltis huegelii				
MALVACEAE		MC		
Alyogyne huegelii			N	Wb,Wc/Bb,Bc
? var.glabresens				
RHAMNACEAE		MC		
Cryptandra arbutiflora		MC	N	Wb,Wc/Bb,Bc
Cryptandra mutila			A	Wc/Bb
Cryptandra pungens	LP	MC	A/N	Wb,Wc/Bb,Bc
Spyridium globulosum			A/N	Bb,Bc
Spyridium tridentatum		MC	A/N	Wb,Wc/Bb,Bc
Trymalium albicans				
STERCULIACEAE	LP	MC		
Guichenotia ledifolia	LP	MC	A/N	
Thomasia cognata		MC	A	Wb,Wc/Bb,Bc
Thomasia triphylla		MC		
Lasiopetalum membranaceum				
DILLENIACEAE		MC		Wc
Hibbertia acerosa	LP	MC		
Hibbertia cuneiformis				Wb
Hibbertia huegelii		MC	A/N	Wb,Wc/Bb,Bc
Hibbertia hypericoides		MC	A/N	Wb,Wc/Bb,Bc
Hibbertia racemosa			A	Wb,Wc/Bb
Hibbertia spicata ssp. leptotheca				
FRANKENIACEAE		MC		Bc
Frankenia pauciflora				
VIOLACEAE		MC	A	Wb,Wc/Bb,Bc
Hybanthus calycinus				
THYMELAEACEAE		MC		Wb
Pimelea argentea				

Pimelea calcicola		MC	A	Wb,Wc/Bb,Bc
Pimelea ferruginea		MC	A/N	Wb,Wc/Bb,Bc
Pimelea gilgiana				Wb,Wc/Bb,Bc
Pimelea rosea		MC		
Pimelea sulphurea				Wb
MYRTACEAE				
Agonis flexuosa	LP	MC		
Baeckea robusta				Wb
Calothamnus quadrifidus			A/N	
Calothamnus sanguinieus				
Calytrix angulata			A	Wb
Calytrix sp				Bb
Chamelaucium uncinatum				Wb,Wc/Bb,Bc
Eremaea pauciflora			A	Wb
Ereama sp				Wb,Wc
Eucalyptus calophylla		MC		
Eucalyptus decipiens		MC	A	Wb,Wc/Bb,Bc
Eucalyptus foecunda		MC		Wb M1 B36
Eucalyptus gomphocephala	LP	MC	A/N	Wb,Wc/Bb,Bc
Eucalyptus marginata		MC	A/N	Wb
Eucalyptus rudis		MC		
Eucalyptus todtiana			A	Wb,Wc/Bb,Bc
Eucalyptus "argutifolia" (MS) = M.I.H. Brooker 8608 (declared rare species)				Bb
Eucalyptus "petrensis" (MS) (priority species)				Bb
Hypocalymma robustum		MC		
Kunzea ericifolia				Wb
Leptospermum spinescens			A/N	Wb,Wc/Bb,Bc
Leptospermum oligandrum				Wb
Melaleuca acerosa		MC	A/N	Wb,Wc/Bb,Bc
Melaleuca cardiophylla			A/N	Wb,Wc/Bb,Bc
Melaleuca cuticularis	LP	MC		
Melaleuca aff. hamulosa	LP			
Melaleuca huegelii		MC	A/N	Wb,Wc/Bb,Bc
Melaleuca scabra				Wb
Melaleuca rhaphiophylla	LP	MC		
Melaleuca trichophylla			A	
Melaleuca thymoides		MC		
Melaleuca uncinata		MC		
Melaleuca viminea		MC		
Scholtzia laxiflora				Wb,Wc
Verticordia ?penigera				Bb
ONAGRACEAE				
Epilobium billardierianum		MC		
*Oenothera drummondii		MC		
HALORAGACEAE				
Haloragis sp				Wc

APIACEAE				
Apium annuum	LP			
Apium prostratum ssp. prostratum var. prostratum		MC		
Centella asiatica	LP	MC		
Daucus glochidiatus	LP	MC	A/N	Wb,Wc/Bb,Bc
Eringium pinnatifidum		MC	N	
Homalosciadum homalocarpum		MC	A/N	
Hydrocotyle blepharocarpa		MC		Bb,Bc
Hydrocotyle diantha	LP			Wc
Hydrocotyle ? hispidula	LP			
Hydrocoyyle pilifera				Bb
Hydrocotyle tetragonocarpa	LP	MC		Wc
Platysace sp.		MC		
Trachymene caerulea	LP	MC		Wb
Trachymene pilosa	LP	MC	A/N	Wb,Wc/Bb,Bc
Trachymene sp				Bb,Bc
Xanthosia huegelii			A	
Xanthosia pusilla		MC		
EPACRIDACEAE				
Acrotriche cordata		MC	A/N	Wb,Wc
Astroloma ciliatum		MC		Wc
Astroloma microcalyx		MC		Wb,Wc
Astroloma pallidum		MC	A/N	Wb,Wc/Bb
Astroloma sp.		MC		Wb,Wc
Conostephium pendulum			A	Wb
Conostephium preissii		MC		
Leucopogon insularis			A	
Leucopogon parviflorus	LP	MC	A/N	Wb,Wc/Bb,Bc
Leucopogon polymorphus		MC	A/N	Wb,Wc/Bb,Bc
Leucopogpn aff.polymorphus			A/N	
Leucopogon propinquus		MC	A/N	Wb,Wc/Bb,Bc
Leucopogon racemulosus		MC		
Leucopogon sp				Wc
Lysinema ciliatum		MC	N	Wb,Wc/Bb,Bc
PRIMULACEAE				
*Anagallis arvensis	LP	MC	A/N	Wb,Wc/Bb,Bc
Samolus junceus		MC		
Samolus repens	LP	MC		
GENTIANACEAE				
*Centaurium erythraea			A/N	
LOGANIACEAE				
Logania vaginalis	LP	MC		
Mitrasacme paradoxa		MC		Bb,Bc
APOCYNACEAE				

Alyxia buxifolia	LP	MC	-	
CONVOLVULACEAE				
*Convolvulus arvensis	LP			
*Cuscuta epithymum		MC		
Dichondra repens	LP	MC		
Wilsonia backhousei		MC		
Wilsonia humilus		MC		
AVICENNIACEAE				
Avicennia marina	LP			
LAMIACEAE				
Hemiandra pungens	LP	MC	A/N	Wb,Wc/Bb,Bc
Westringia dampieri				Wc
SOLANACEAE				
Anthocercis ilicifolia ssp. ilicifolia		MC		Wb,Wc/Bb,Bc
Anthocercis littorea	LP	MC	A/N	Wb,Wc
*Solanum nigrum	LP	MC	A/N	Wb,Wc
Solanum simile	LP			
*Solanum sodomaeum		MC	A/N	Wb,Wc
Solanum symonii		MC		
SCROPHULARIACEAE				
*Bellardia trixago	LP	MC		
*Dischisma arenarium	LP	MC	A/N	Wb,Wc/Bb,Bc
*Parentucellia latifolia		MC		Bb
Veronica aff.calycina		MC	A	
OROBANCHACEAE				
Orobanche australiana	LP (Probably mis-identification of O. minor)			
*Orobanche minor		MC	N	
MYOPORACEAE				
Eremophila glabra	LP	MC	N	Wb,Wc/Bb,Bc
Myoporum caprarioides		MC		
Myoporum insulare	LP	MC	A/N	Wb,Wc/Bb,Bc
Myoporum tetrandrum	LP (Probably mis-identification of E. caprarioides)			
PLANTAGINACEAE				
Plantago exilis		MC		
*Plantago lanceolata	LP			
Plantago sp				Bb,Bc
RUBIACEAE				
*Galium murale	LP			Bb
Galium sp.	LP			
Opercularia hispidula		MC		
Opercularia vaginata	L	MC	A/N	Wb,Wc/Bb,Bc

*Sherardia arvensis	LP			
CUCURBITACEAE				
*Cucurbita pepo			N	Wb,Wc
CAMPANULACEAE				
*Wahlenbergia capensis			A	Bb
Wahlenbergia ? gracilenta		MC		
LOBELIACEAE				
Grammatotheca bergiana	LP			
Lobelia alata	LP	MC		
Lobelia heterophylla			N	
Lobelia ? heterophylla	LP			
Lobelia tenuior		MC	A/N	
Isotoma hypocrateriformis		MC	A/N	Bc
GOODENIACEAE				
Dampiera linearis		MC		Wb,Wc/Bb,Bc
Lechenaultia linarioides			A/N	Wc
Scaevola canescens		MC	A/N	Wb,Wc/Bb,Bc
Scaevola crassifolia	LP	MC	A/N	Wb,Wc/Bb,Bc
Scaevola globulifera		MC		
Scaevola holosericea		MC	N	
Scaevola paludosa			A	Wb,Wc
Scaevola phlebopetala				Bb
Scaevola nitida		MC	A/N	Wb,Wc
Scaevola thesioides		MC	A/N	Bb,Bc
Verreauxia reinwardtii			A	
STYLIDIACEAE				
Levenhookia stipitata			A/N	
Stylidium brunonianum			A/N	Wc
Stylidium calcaratum			A/N	
Stylidium bulbiferum		MC		
Stylidium junceum		MC	A/N	Bc
Stylidium piliferum		MC	A	Wb
Stylidium schoenoides		MC		
Stylidium repens				Wb,Wc
Stylidium aff. repens			A	
Stylidium sp. (S. maritima M. S.)		MC	A/N	Bb
ASTERACEAE				
Asteridea pulverulenta		MC		
Angianthus tomentosus		MC		
*Arctotheca calendula	LP	MC		Wb,Wc/Bb,Bc
*Arctotheca populifolia	LP	MC		Wb,Wc
Brachycome bellidioides		MC		
Brachycome iberidifolia		MC		Wc/Bb,Bc
Calocephalus brownii	LP	MC		Wb,Wc/Bb,Bc
*Carduus pycnocephalus	LP			

Cotula australis	LP			Bc
Colula cotuloides	LP			
Cotula coronopifolia	LP	MC		
*Dittrichia graveolens	LP			Wb,Wc/Bb,Bc
Gnaphalium sphaericum			A/N	
Helichrysum cordatum	LP	MC	A/N	Wb,Wc/Bb,Bc
Helipterum corymbosum			Wb	/Bb,Bc
Hyalospermum cotula		MC		Bb,Bc
*Hypochaeris glabra			A/N	Wb,Wc/Bb,Bc
Ixiolaena viscosa		MC		
Lagenifera hugelii	LP	MC	A	Wb,Wc/Bb,Bc
Leptorhyncuos scabrus		MC	A/N	
Millotia tenuifolia	L	MC	A/N	Wc,Wb
Olearia axillaris	LP	MC	A/N	Wb,Wc/Bb,Bc
Olearia rudis		MC	A/N	Wb,Wc/Bb,Bc
Pithocarpa pulchella		MC		Bc
Podolepis canescens			A	
Podolepis gracilis		MC	A/N	
Podolepis lessonii		MC		Wb,Wc
Podotheca angustifolia		MC	A/N	
Podotheca chrysantha		MC		
Podotheca gnaphalioides			A/N	Wc
Quinetia urvillei		MC	A/N	Wb,Wc/Bb,Bc
Senecio lautus	LP	MC	A/N	
ssp maritimus				Wb,Wc/Bb,Bc
Senecio ramosissimus		MC		
Siloxerus humifusus			A/N	
*Sonchus oleraceus	LP	MC		Wb,Wc/Bb,Bc
*Urospermum picroides			N	
*Ursinia anthemoides			A/N	Wb,Wc/Bb,Bc
Waitzia citrina	LP			Wb
Waitzia suaevoleons		MC	A/N	

of Gould's Wattled Bats used for a maternity roost.

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THE NORTHERN-MOST SURVIVING POPULATION OF THE SOUTHERN BROWN BANDICOOT (*ISOODON OBESULUS*) IN WESTERN AUSTRALIA

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ABSTRACT

The Southern Brown Bandicoot or Quenda, *Isoodon obesulus*, was once widespread across southern Western Australia, but now occurs in reduced numbers and in a reduced range. For many years it was gazetted under the Wildlife Act in Schedule I as in need of special protection because it is rare or likely to become extinct, but is now listed by the Department of Coservation and Land Managment as a Priority 4 species (not currently threatened but in need of monitoring). It has been greatly reduced on the Swan Coastal Plain. A roadkill specimen was collected in August 1997 which shows that there is a population in the Wilbinga area east of Guilderton. This population is the northern-most known surviving population. The next population known to the south is near Two Rocks. The vegetation of the site reported here is Banksia woodland with a diverse shrub and perennial herb understorey. Although this species occurs in any dense vegetation, it is now most often found in wetter sites which provide the most favourable habitat. There are no wetlands nearby and examination of the surrounding area suggested that the animals may be surviving because of the presence of patches of dense heath over limestone. The site is crown land in State Forest 65 which is likely to remain as native vegetation. There are extensive areas of native vegetation in the State Forest and adjacent. The size and extent of the population are not known, and further study is required to assess the long term viability of the population. The population is probably threatened by fox predation as this is believed to be the main threat to all populations. Just to the north of the site considered here the remaining native vegetation is more broken up along the Moore River and there may be less opportunity for this species to survive and to move between remnants. The population described here may well be the northern-most population likely to be still surviving.

SPECIMEN AND HABITAT

A roadkill specimen was collected on 15th August 1997 on the Perth-Lancelin Road north of Wilbinga Grove at SLK 24.35 which is at 115°36'39"E, 31°21'41"S, and approximately 10km east of Guilderton. The specimen was donated to the W.A. Museum (accession number M47780). The specimen was an adult male of 1.6kg after it was collected. It was picked up in the late afternoon and was probably killed the previous night so its true weight could have been greater.

The vegetation of the site is Banksia woodland with 20–30% tree cover dominated by *Banksia attenuata* and *B. menziesii*, with smaller numbers of *Eucalyptus todtiana*, *Allocasuarina fraseriana* and *Nuytsia floribunda*, over a diverse and patchy shrub and perennial herb stratum of 30–70% cover with no dominants and mainly less than one metre tall, on grey sand over yellow sand. The site had not been burnt for many years and had a high litter cover of 70–100%.

Examination of an aerial photograph showed that there were no wetlands near the site, but there were patches of dense heath. Some of these were visited and found to be dense heath on shallow sand over limestone or on limestone. Typically these had tall shrubs 1–2m tall and giving 70–100% cover. The most common species were *Dryandra sessilis*, *Hibbertia hypericoides* and *Melaleuca acerosa*.

The only evidence of bandicoots on the ground were a few diggings and droppings within the heath, but rabbits were abundant and obscured most signs.

The site is within a block of State Forest 65 which includes extensive areas of native vegetation locally, and pine plantations further south.

DISCUSSION

The Southern Brown Bandicoot was once widespread across southern Western Australia, but now occurs in reduced numbers and in a reduced range (Friend 1990, Braithwaite 1995). For many years it was gazetted under the Wildlife Act in Schedule 1 as in need of special protection because it is rare or likely to become extinct, but is now listed by the Department of Coservation and Land Managment as a Priority 4 species (not currently threatened but in need of monitoring). In particular it has been greatly reduced on the Swan Coastal Plain.

The specimen collected here represents the northern-most known population. The next population to the south is near Two Rocks (T. Friend pers. comm.). There are no recent specimens in the W.A. Museum north of Yanchep and Bullsbrook, and the population in Yanchep National Park is sparse (CALM 1989).

The habitat described here is part of the extensive Jurien System of Beard (1979), and agrees well with Beard's description of "The general vegetation is *Banksia* low woodland with scrub-heath on limestone ridges and occasional small patches of stunted eucalypts". This system is the northern continuation of the Spearwood dunes and extends to north of Jurien Bay. Examination of the site suggested that the Bandicoots were more common in the heath than in the Banksia woodland, but no detailed survey was carried out. Bandicoots are not restricted in habitat and occur in any vegetation which is dense enough. The heath on limestone is probably providing the best available habitat locally but the animals would not be restricted to it.

The site is part of a block of State Forest 65 which is likely to remain as native vegetation as there is no proposal to change its use (CALM 1994).

The Southern Brown Bandicoot is thought to have declined greatly due to fox predation, and locally due to loss of habitat. Originally it occurred from Shark Bay (Baynes 1990) to the Hampton Tableland right on the southern edge of the Nullarbor (Baynes 1987), which includes all of the South-Western Botanical Province. It still occurs widely from just north of Perth to east of Esperance but only in more coastal areas (Friend 1990).

There are large areas of potential habitat in State Forest 65 and adjacent lands, but the size and extent of the population is not known. There is another block of State Forest 65 and other large areas of native vegetation to the north, but regional maps show that these vegetated areas are more isolated. In particular there is extensive old clearing along the Moore River just to the north of the site discussed here. This fragmentation may make it more difficult for populations to survive, and the population described here may well be the northern-most population likely to be still surviving.

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THE DI[ET] OF NESTLING STRAW-NECKED IBIS, *THRESKIORNIS SPINICOLLIS*, AT CAPEL, WESTERN AUSTRALIA

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ABSTRACT

The diet of nestling Straw-necked Ibis near Capel, Western Australia was determined by examining the gizzard contents of 18 moribund birds aged approximately four to seven weeks old which were collected at the nest. We identified a total of 1240 invertebrate prey recovered from 19 prey taxa. The number of prey in each taxon, the volume of stomach contents they represented and the proportion of birds feeding on each taxon were recorded and used to calculate an Index of Relative Importance for each prey taxon. The top five ranking prey for nestlings 4–5 weeks old were lepidopteran larvae, two species of scarab beetles, a carabid beetle and an unknown terrestrial crustacean. Nestlings 5–6 weeks old ranked a scarab beetle highest, followed by a carabid beetle, unidentified pupae, another scarab beetle and an unidentified beetle. Nestlings 6–7 weeks old ranked lepidopteran larvae highest, followed by snails, two species of scarab beetle and a carabid beetle. Overall, the nestling diet was similar to that reported for adult Straw-necked Ibis in other studies. There was no evidence that the nestlings had died because of poor nutrition.

INTRODUCTION

The Straw-necked Ibis *(Threskiornis spinicollis)* inhabits marshlands and drier land where arthropods are abundant (Blakers *et al* 1984). Barker and Vestjens (1989) summarised the diet of adult birds on the basis of studies

THE WILBINGA AND BRETON BAY SITES

A COMPARATIVE APPRAISAL OF THEIR VERTEBRATE FAUNA

Prepared for: Halpern Glick Maunsell

By: Ninox Wildlife Consulting

ember 1991

CONTENTS

ANNEX 1 List of vertebrate species recorded during the field surveys of the Breton Bay and Wilbinga heavy industry site options.

STATUS: I = Introduced species;
B = Recorded breeding

AREA	STATUS	BRETON BAY	WILBINGA
BIRD SPECIES			
DROMAIIDAE			
Emu		X	X
PHALACROCORACIDAE			
Pied Cormorant		X	
ACCIPITRIDAE			
Black-shouldered Kite			X
Brown Goshawk			X
Wedge-tailed Eagle		X	X
Little Eagle		X	X
Marsh Harrier		X	
FALCONIDAE			
Brown Falcon		X	X
Australian Kestrel		X	X
TURNICIDAE			
Painted Button-quail		X	
LARIDAE			
Silver Gull		X	
Caspian Tern		X	
Crested Tern		X	
COLUMBIDAE			
Common Bronzewing		X	
Crested Pigeon		X	
CACATUIDAE			
White-tailed Black-Cockatoo			X
Galah		X	X
PLATYCERCIDAE			
Port Lincoln Ringneck		X	X
CUCULIDAE			
Pallid Cuckoo			X
Fan-tailed Cuckoo			X
Horsfield's Bronze-Cuckoo		X	X
Shining Bronze-Cuckoo		X	X
ALCEDINIDAE			
Laughing Kookaburra	I		X
MEROPIDAE			
Rainbow Bee-eater			X
HIRUNDINIDAE			
White-backed Swallow		X	X
Welcome Swallow		X	X
MOTACILLIDAE			
Richard's Pipit		X	X
CAMPEPHAGIDAE			
Black-faced Cuckoo-shrike		X	X
MUSCICAPIDAE			
Scarlet Robin			X
White-breasted Robin		X	

ANNEX 1 Continued

AREA	STATUS	BRETON BAY	WILBINGA
Rufous Whistler		X	X
Grey Shrike-thrush		X	X
Grey Fantail		X	X
Willie Wagtail	B	X	X
SYLVIIDAE			
Brown Songlark		X	
MALURIDAE			
Splendid Fairy-wren		X	X
Variegated Fairy-wren		X	
White-winged Fairy-wren		X	X
ACANTHIZIDAE			
White-browed Scrubwren		X	
Weebill			X
Western Gerygone		X	X
Inland Thornbill		X	X
Western Thornbill			X
Yellow-rumped Thornbill			X
MELIPHAGIDAE			
Red Wattlebird	B	X	X
Little Wattlebird		X	
Yellow-throated Miner		X	X
Singing Honeyeater		X	X
Brown Honeyeater		X	X
New Holland Honeyeater			X
White-cheeked Honeyeater		X	
Tawny-crowned Honeyeater		X	X
Western Spinebill		X	X
PARDALOTIDAE			
Spotted Pardalote	B	X	
Striated Pardalote			X
ZOSTEROPIDAE			
Silvereye		X	X
GRALLINIDAE			
Australian Magpie-lark		X	
ARTAMIDAE			
Black-faced Woodswallow		X	
CRACTICIDAE			
Grey Butcherbird		X	X
Pied Butcherbird			X
Australian Magpie		X	X
CORVIDAE			
Australian Raven		X	X
MAMMAL SPECIES			
MACROPODIDAE			
Western Grey Kangaroo		X	X
LEPORIDAE			
Rabbit	I	X	X
CANIDAE			
Fox	I	X	X
BOVIDAE			
Feral Goat	I	X	

ANNEX 1 Continued

AREA	STATUS	BRETON BAY	WILBINGA
REPTILE SPECIES			
GEKKONIDAE - Geckos			
Phyllodactylus m. marmoratus			X
Underwoodisaurus milii			X
PYGOPODIDAE - Legless Lizards			
Aprasia repens			X
Pygopus l. lepidopodus			X
AGAMIDAE - Dragon Lizards			
Pogona m. minor		X	X
Tympanocryptis a. adelaidensis		X	X
SCINCIDAE - Skinks			
Cryptoblepharus plagiocephalus			X
Ctenotus fallens		X	
Egernia napoleonis			X
Hemiergis quadrilineata		X	X
Lerista elegans		X	X
L. lineopunctulata		X	X
L. praepedita		X	X
Menetia greyii			X
Morethia lineoocellata		X	
M. obscura			X
Omolepida branchialis		X	X
Tiliqua r. rugosa		X	X
TYPHLOPIDAE - Blind Snakes			
Ramphotyphlops australis		X	
ELAPIDAE - Elapid Snakes			
Notechis curtus		X	
Rhinoplocephalus gouldii		X	
Vermicella bertholdi			X
V. semifasciata			X

ANNEX 2 List of vertebrate species recorded or expected to occur in the habitats present within the proposed Breton Bay and Wilbinga heavy industry sites.

KEY

R = Recorded during site inspection

X = Expected to occur

A = Mainly aerial

= Rare, or otherwise in need of special protection

+ = Introduced species

Habitat 1: shoreline and coastal margin supporting salt-tolerant vegetation such as *Spinifex hirsutus* and *S. longifolia* (Strand - Vegetation Types: Cm, Sl);

Habitat 2: primary dune system with unstable areas and protected valleys supporting various heaths, shrublands and scrub of *Scaevola crassifolia, Spyridium globulosum, Melaleuca acerosa, Chamalaucium uncinatum* or *Acacia* species including *Acacia rostellifera*. (Quindalup Q1-4 - Vegetation Types: Sc, ScDa, SgSc, SgMa, Ma, CuMa, AMa);

Habitat 3: secondary dune system and exposed calcrete areas supporting open heaths, shrubland and scrub of *Dryandra sessilis, Hibbertia hypericoides, Melaleuca acerosa, Melaleuca heugelii, Eucalyptus* species *Melaleuca cardiophylla, Frankenia pauciflora* and *Allocasuarina humilis*. (Spearwood, Shallow Soils - Vegetation Types: DsHh, DsMa, Mh, E, Mc, Fp, Ah);

Habitat 4: deeper soils supporting low open woodlands and low open forests typified by *Banksia* species, Tuart *Eucalyptus gomphocephela* and Redheart *Eucalyptus decipiens* (Spearwood, Deeper Soils - Vegetation Types: BAh, BHh, BDs, AfB, BEp, BMs, Bi, Ed, Eg);

Habitat 5: pasture and cleared land.

ANNEX 2 Continued.

HABITAT CODE	1	2	3	4	5
BIRD SPECIES					
DROMAIIDAE					
Dromaius novaehollandiae, Emu		x	R	x	x
ANHINGIDAE					
Anhinga melanogaster, Darter	x				
PHALACROCORACIDAE					
Phalacrocorax carbo, Great Cormorant	x				
P. varius, Pied Cormorant	R				
P. sulcirostris, Little Black Cormorant	x				
P. melanoleucos, Little Pied Cormorant	x				
PANDIONIDAE					
Pandion haliaetus, Osprey	A	A			
ACCIPITRIDAE					
Elanus notatus, Black-shouldered Kite	A	A	R		A
Lophoictinia isura, Square-tailed Kite				A	
Haliastur sphenurus, Whistling Kite				A	
Accipiter fasciatus, Brown Goshawk			A	R	A
A. cirrhocephalus, Collared Sparrowhawk				A	
Haliaeetus leucogaster, White-bellied Sea-Eagle	A	A			
Aquila audax, Wedge-tailed Eagle	A	A	R	R	A
Hieraaetus morphnoides, Little Eagle	A	A	R	A	A
Circus assimilis, Spotted Harrier		A	A	A	A
C. aeruginosus, Marsh Harrier		A	R		A
FALCONIDAE					
# *Falco peregrinus*, Peregrine Falcon	A	A	A	A	A
F. longipennis, Australian Hobby				A	
F. berigora, Brown Falcon		A	A	R	A
F. cenchroides, Australian Kestrel	A	A	R	R	R
TURNICIDAE					
Turnix varia, Painted Button-quail		x	R	x	
OTIDIDAE					
Ardeotis australis, Australian Bustard			x		x
HAEMATOPODIDAE					
Haematopus longirostris, Pied Oystercatcher	x				
CHARADRIIDAE					
Vanellus tricolor, Banded Lapwing			x		x
Pluvialis squatarola, Grey Plover	x				
Charadrius ruficapillus, Red-capped Plover	x				
SCOLOPACIDAE					
Limosa lapponica, Bar-tailed Godwit	x				
Calidris alba, Sanderling	x				
LARIDAE					
Larus novaehollandiae, Silver Gull	R	x			
Hydroprogne caspia, Caspian Tern	R				
Sterna bergii, Crested Tern	R				

ANNEX 2 Continued.

HABITAT CODE	1	2	3	4	5
COLUMBIDAE					
+ *S. senegalensis*, Laughing Turtle-Dove				x	x
Phaps chalcoptera, Common Bronzewing		R	x	x	x
Ocyphaps lophotes, Crested Pigeon			R		
CACATUIDAE					
Calyptorhynchus funereus latirostris,					
# White-tailed Black-Cockatoo		x	x	R	x
Cacatua roseicapilla, Galah				R	x
LORIIDAE					
Glossopsitta porphyrocephala,					
Purple-crowned Lorikeet				x	
PLATYCERCIDAE					
Purpureicephalus spurius,					
Red-capped Parrot				x	
Platycercus icterotis,					
Western Rosella				x	x
Barnardius zonarius,					
Port Lincoln Ringneck		R	x	R	R
Neophema elegans, Elegant Parrot			x	x	x
CUCULIDAE					
Cuculus pallidus, Pallid Cuckoo				R	
C. pyrrhophanus, Fan-tailed Cuckoo		R		x	
Chrysococcyx basalis,					
Horsfield's Bronze-Cuckoo				R	
C. lucidus, Shining Bronze-Cuckoo		R	x	R	
STRIGIDAE					
Ninox novaeseelandiae,					
Southern Boobook				x	
TYTONIDAE					
Tyto alba, Barn Owl				x	x
PODARGIDAE					
Podargus strigoides, Tawny Frogmouth				x	
AEGOTHELIDAE					
Aegotheles cristatus,					
Australian Owlet-nightjar				x	x
APODIDAE					
Apus pacificus, Fork-tailed Swift	A	A	A	A	A
ALCEDINIDAE					
+ *Dacelo novaeguineae*,					
Laughing Kookaburra				x	x
Halcyon sancta,					
Sacred Kingfisher				x	
MEROPIDAE					
Merops ornatus, Rainbow Bee-eater	A	A	A	R	A
HIRUNDINIDAE					
Cheramoeca leucosternum,					
White-backed Swallow	A	R	R	R	
Hirundo neoxena, Welcome Swallow	R	A	R		R
Cecropis nigricans, Tree Martin				A	A
MOTACILLIDAE					
Anthus novaeseelandiae,					
Richard's Pipit	x		R	x	R
CAMPEPHAGIDAE					
Coracina novaehollandiae,					
Black-faced Cuckoo-shrike		R	x	R	x

ANNEX 2 Continued.

HABITAT CODE	1	2	3	4	5
Lalage sueurii, White-winged Triller			x	x	x
MUSCICAPIDAE					
Petroica multicolor, Scarlet Robin			x	R	x
P. goodenovii, Red-capped Robin		x			x
Melanodryas cucullata, Hooded Robin			x	x	x
Eopsaltria georgiana, White-breasted Robin		R			
Pachycephala pectoralis, Golden Whistler				x	
P. rufiventris, Rufous Whistler		R	x	R	x
Colluricincla harmonica, Grey Shrike-thrush		R		R	
Oreoica gutturalis, Crested Bellbird		x	x	x	
Rhipidura fuliginosa, Grey Fantail		R	x	R	
R. leucophrys, Willie Wagtail		R	x	R	x
SYLVIIDAE					
Cinclorhamphus mathewsi, Rufous Songlark	x	x	x		R
C. cruralis, Brown Songlark	x	x	x		x
MALURIDAE					
Malurus splendens, Splendid Fairy-wren		R	x	R	
M. lamberti, Variegated Fairy-wren		R	x	R	
M. leucopterus, White-winged Fairy-wren		x	R		
ACANTHIZIDAE					
Sericornis frontalis, White-browed Scrubwren		R	R	R	
Smicrornis brevirostris, Weebill				R	
Gerygone fusca, Western Gerygone		R		R	
Acanthiza apicalis, Inland Thornbill		R	x	R	
A. inornata, Western Thornbill				R	
A. chrysorrhoa, Yellow-rumped Thornbill		R	x	R	x
NEOSITTIDAE					
Daphoenositta chrysoptera, Varied Sittella				x	
MELIPHAGIDAE					
Anthochaera carunculata, Red Wattlebird	R	R	R	R	
A. chrysoptera, Little Wattlebird		R	x	R	
Manorina flavigula, Yellow-throated Miner			x	R	R
Lichenostomus virescens, Singing Honeyeater	x	R	R	R	x
L. ornatus, Yellow-plumed Honeyeater				x	
Melithreptus lunatus, White-naped Honeyeater				x	
Lichmera indistincta, Brown Honeyeater		R	R	R	
Phylidonyris novaehollandiae, New Holland Honeyeater		x	R	R	
P. nigra, White-cheeked Honeyeater		R	R	x	
P. melanops, Tawny-crowned Honeyeater		R	R	R	

ANNEX 2 Continued.

HABITAT CODE	1	2	3	4	5
Acanthorhynchus superciliosus, Western Spinebill		x	x	R	
EPHTHIANURIDAE					
Ephthianura tricolor, Crimson Chat		x	x	x	x
E. albifrons, White-fronted Chat		x	x	x	x
DICAEIDAE					
Dicaeum hirundinaceum, Mistletoebird		x		x	
PARDALOTIDAE					
Pardalotus punctatus, Spotted Pardalote	x	R		x	
P. striatus, Striated Pardalote				R	
ZOSTEROPIDAE					
Zosterops lateralis, Silvereye	x	R	R	R	x
GRALLINIDAE					
Grallina cyanoleuca, Australian Magpie-lark			R	R	R
ARTAMIDAE					
Artamus personatus, Masked Woodswallow		x	x	x	x
A. cinereus, Black-faced Woodswallow		R	R	x	R
A. cyanopterus, Dusky Woodswallow			x	x	x
CRACTICIDAE					
Cracticus torquatus, Grey Butcherbird		R	R	R	x
C. nigrogularis, Pied Butcherbird				R	
Gymnorhina tibicen, Australian Magpie		x	R	R	R
Strepera versicolor, Grey Currawong				R	
CORVIDAE					
Corvus coronoides, Australian Raven	x	R	R	R	R
C. bennetti, Little Crow	x	x	x	x	x
MAMMAL SPECIES					
TACHYGLOSSIDAE					
Tachyglossus aculeatus, Short-beaked Echidna		x	x	x	
DASYURIDAE					
Sminthopsis gilberti, Common Dunnart		x	x	x	
S. griseoventer, Common Dunnart		x	x	x	
BURRAMYIDAE					
Cercartetus concinnus, Western Pygmy-possum				x	
TARSIPEDIDAE					
Tarsipes rostratus, Honey-possum		x	x	x	
MACROPODIDAE					
Macropus irma, Western Brush Wallaby		x	x	x	
M. fuliginosus, Western Grey Kangaroo		R	R	R	x
MOLOSSIDAE					
Tadarida australis, White-striped Mastiff-bat		A	A	A	A
Mormopterus planiceps, Little Mastiff-bat		A	A	A	A
VESPERTILIONIDAE					
Nyctophilus major, Greater Long-eared Bat		A	A	A	A
N. geoffroyi, Lesser Long-eared Bat		A	A	A	A

ANNEX 2 Continued.

HABITAT CODE	1	2	3	4	5
Chalinolobus gouldii, Gould's Wattled Bat		A	A	A	A
C. morio, Chocolate Wattled Bat		A	A	A	A
Falsistrellus mckenziei, Great Pipistrelle		A	A	A	A
Eptesicus regulus, King River Eptesicus		A	A	A	A
MURIDAE					
Pseudomys albocinereus, Ash-grey Mouse		x	x	x	
Rattus fuscipes Bush Rat	x	x	x	x	x
+ *R. rattus* Black Rat	x	x			
+ *Mus musculus*, House Mouse	x	x	x	x	x
OTARIIDAE					
# *Neophoca cinerea*, Australian Sea-lion	x				
LEPORIDAE					
+ *Oryctolagus cuniculus*, Rabbit	x	R	R	R	x
CANIDAE					
+ *Vulpes vulpes*, Fox	x	R	R	x	x
FELIDAE					
+ *Felis catus*, Feral Cat	x	x	x	x	x
BOVIDAE					
+ *Capra Hircus*, Feral Goat		x	x	R	x
AMPHIBIAN & REPTILE SPECIES					
LEPTODACTYLIDAE Frogs					
Heleioporus eyrei				x	x
Limnodynastes dorsalis				x	x
Myobatrachus gouldii				x	x
Pseudophryne guentheri				x	x
GEKKONIDAE Geckos					
Crenadactylus o. ocellatus		x		x	
Diplodactylus alboguttatus		x	x	x	
D. polyophthalmus				x	
D. s. spinigerus	x	x	x	x	
Phyllodactylus m. marmoratus	x	x		R	
Underwoodisaurus milii		R	R		
PYGOPODIDAE Legless Lizards					
Aclys concinna		x		x	
Aprasia repens	x	x	x	R	
Delma fraseri	x	x	x	x	
D. grayii	x	x	x	x	
Lialis burtonis	x	x	x	x	
Pletholax g. gracilis				x	
Pygopus l. lepidopodus	x	x	x	R	
AGAMIDAE Dragon Lizards					
Pogona m. minor	R	R	R	R	x
Tympanocryptis a. adelaidensis	x	R	R	R	
SCINCIDAE Skinks					
Cryptoblepharus plagiocephalus				R	
Ctenotus fallens	R	R	R	R	
C. gemmula				x	
C. lesueurii				x	
Egernia kingii	x	x	x		

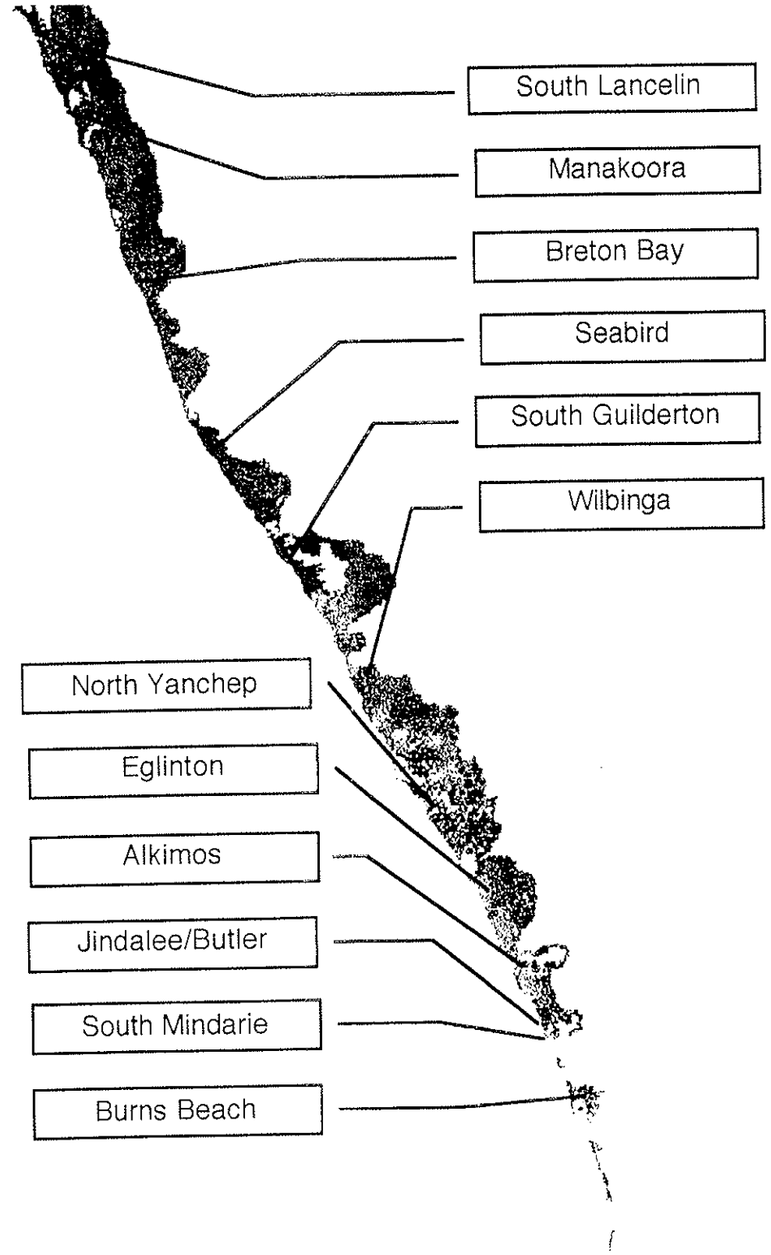
ANNEX 2 Continued.

HABITAT CODE	1	2	3	4	5
E. napoleonis		R	R	x	
Hemiergis quadrilineata		x	x	R	x
Lerista elegans	x	R	R	R	
L. lineopunctulata	x	R	R	R	
L. praepedita	x	R	R	R	
Menetia greyii	x	x	x	R	
Morethia lineoocellata	x	R	R	R	
M. obscura				R	
Omolepida branchialis	R	R	R	R	
Tiliqua occipitalis	x	x	x	x	x
T. r. rugosa	R	R	R	R	x
VARANIDAE Monitors					
Varanus gouldii	x	x	x	x	x
V. t. tristis				x	
TYPHLOPIDAE Blind Snakes					
Ramphotyphlops australis	R	x	x	x	
BOIDAE Pythons					
# *Morelia spilota imbricata*		x	x	x	
M. s. stimsoni		x	x	x	
ELAPIDAE Elapid Snakes					
Demansia psammophis reticulata	x	x	x	x	
Notechis curtus	x	R	x	x	
N. scutatus occidentalis	x	x	x	x	x
Pseudonaja a. affinis	x	x	x	x	x
Rhinoplocephalus gouldii	x	x	x	R	x
Vermicella bertholdi	x	R	x	R	
V. bimaculata	x	x	x	x	
V. calonotos		x	x	x	
V. f. fasciolata	x	x	x	x	
V. semifasciata	x	x	x	R	

Halpern
Glick
Maunsell

Burns Beach Property Trust

Distribution of Quindalup Dune Vegetation and Coastal Landforms in the Whitfords to Lancelin Subsector



Response to Department of Environmental Protection Request

H. Limestone / Banksia

C5 = 6 HD sites
Sites along Mogumber W Rd

5.5 km W 8/11/94
Ford Panel XGM 168
Van white
Hilux 4x4 7LB 164
Ute

Wilbinga South
Gates 7.5 km from Wanneroo Rd
0.0 from gate to Wilbinga
3.5 km to M1 N fence corner
on coastal Boundary
4.5 km TOKYU Ø6 & Ø7 from
gate
Sites on M1 located
previous trip very similar
to Ø6 & Ø7 not located
7.1 gate to WKB Ø1 & Ø2

7/11/94

M1 / Wilbinga Interface
and M1 (Quindalups)
M1 / Coastal strip, outside fenceline
largest patch S, Q4, older Q's
A. Sites 2 2 sites Mel / Q4

A1. Young / old

A/B, 2 sites Dune / Hollow
alternatives

C Dune - Bank - Dry Ridge / 'Swale'

D Tuart Banksia
Wilbinga. (Spearwood / limestone)
E Mellec patches

F Coastal area limestone to
coast Mel. and Low Thickets
Walk in to get sites

G. Scaevola nitida

WILB Ø7

O: km gate

To NW Euc. Foecunda

over simplified same

unit.

WILBINGA 9/11/94

WILB Ø8/9/10 Area is

a mosaic of Øs & KLS (see

map) KLS both low & high

in landscape.

Photos at Ø8 & Ø10 to

show landscape.

Dominants

Ac rost (dull or bright green)

Ac truncata (bright green)

Dry sessilis

Lw. maritima ridges

Mel hueg.

} gives comb of vege struct units.

occ patches Ac. xanth &

Santalum (pale green)

Seed Pickers

Toyota 4WD T. 277

1.4 from WILB Ø1 & Ø2 to

N fenceline Tokyo Land.

N fenceline pt from track to

Ø1 & Ø2 to Ø3 & Ø4

= 0.8 km

WILBINGIA

Robert Morley

Morley Rd

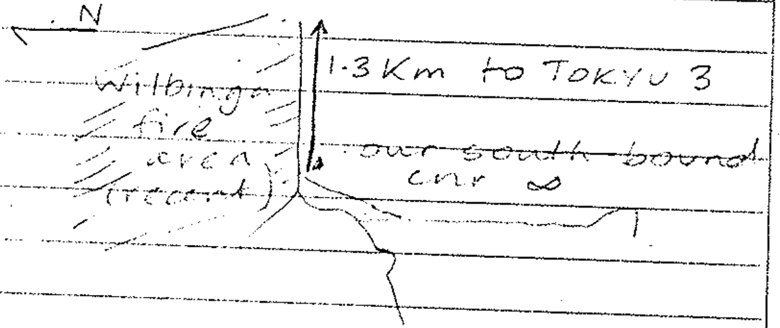
LOWER CHITTERING 6084

O. Gate to N

Condition: generally seems to be excellent, mass at time sampling & annuals dead but density >90% in patches bare ground. * Hel. pusilla most evident weed.
Cows attracted to area.

Site Ø12
Species rich Coastal Shrublands other species in area are Dod. quad, Thom triplylla. General cond as Ø12 to lower pnb old settlement area.

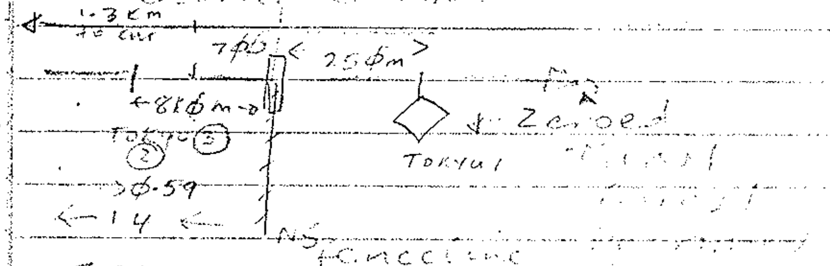
Wilbinga burnt to S
extension to W difficult to
see from track.



TOKYU Ø4 1.55 km
Adj Dry sessilis Heath
Sample in Wilbinga adj
Nok in Swales Bank Wood
~~vehicle~~
Zeroed at photo 38 of
Acacia xanthina Ø.55Km
to NS fence + gate
2.1 Km at Mill turned
back East.
TOKYU Ø5 2.4 Km
3.5 Km at gate into Bore field

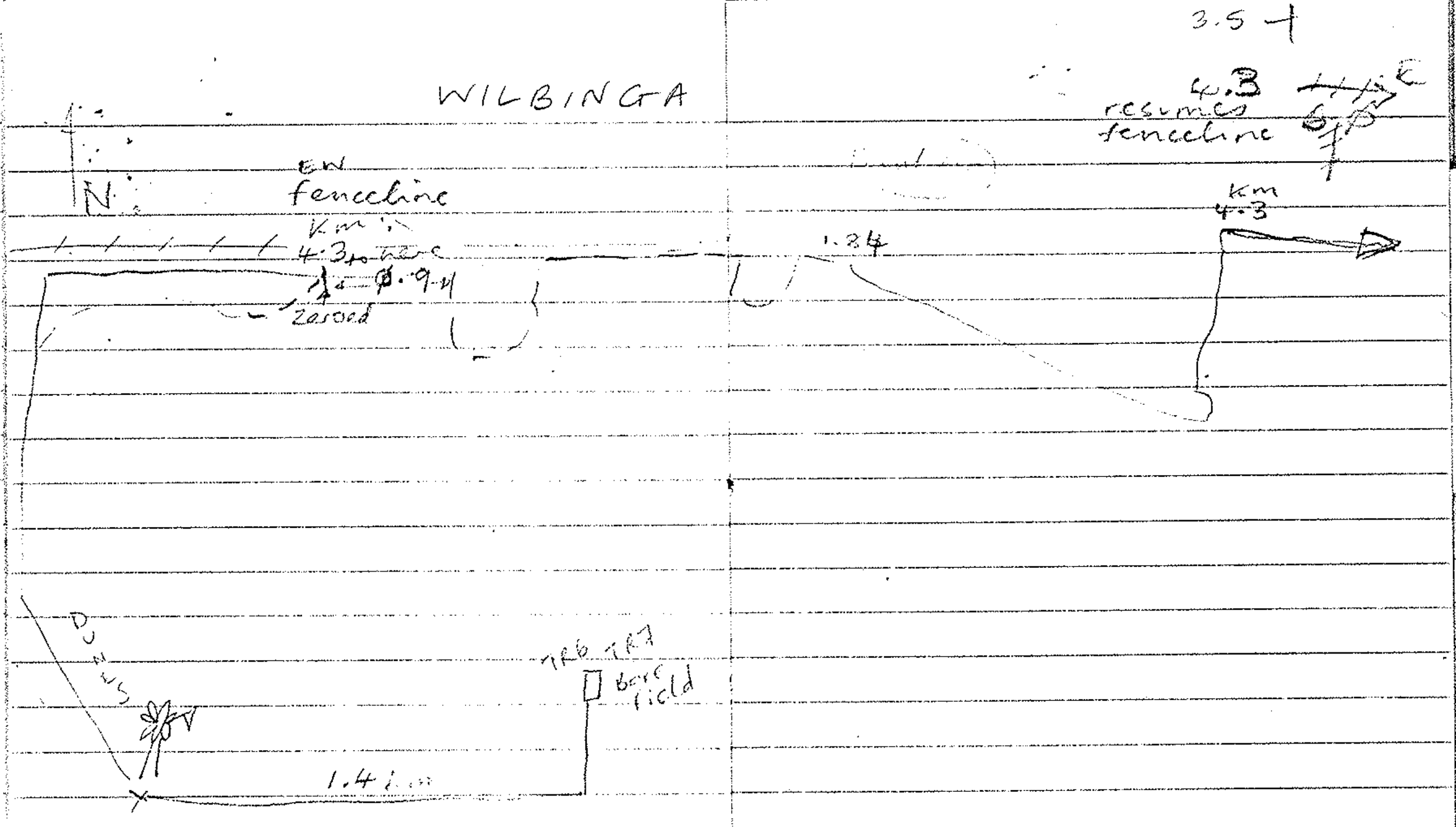
M1 - 6km from EW fenceline

Wilbinga
Burnt banksia



TOKYU 1
Ø.25 km East of
NS fence
0.8 km from Ø1 = Euc decipiens
1.4Km turned back + zeroed
(on a ridge - Banksia)
Ø.59 Km TOKYU 2
Ø.7 km TOKYU 3 =
700 m W of NS fenceline

Zeroed odo again
Ø1.3 at cnr turning Sth.
~~In Wilbinga:~~
Fire stops // to this south
bound track



- ridges near water
tanks to TOKYU Ø4

Tokyu #3

3-11-94

Tokyu #4

3-11-94

Tokyu #5

3-11-94

Tokyo Ø1
3-11-94

Tokyo Ø2
3-11-94

↑

Tokyu #6

8-11-94 →

↓

Tokyu #7

8-11-94

Tokyu #2

(F3 Neg E(37))

F6/13

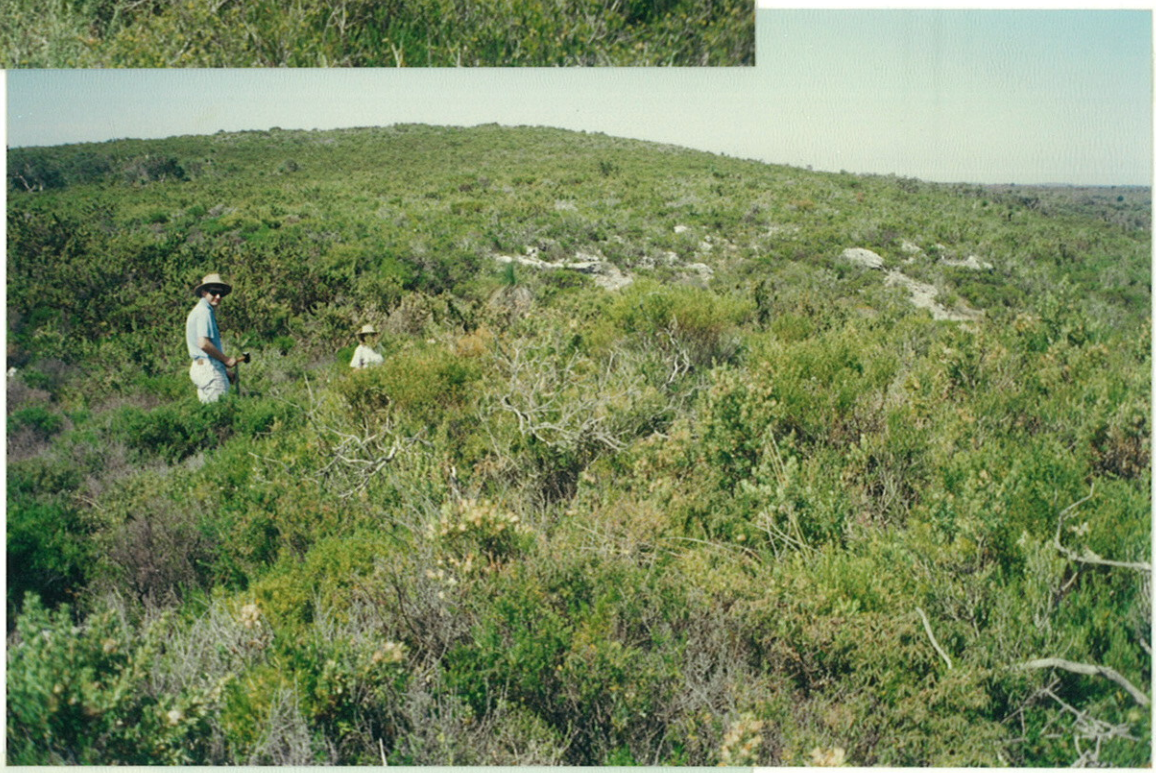
Wilb Ø1
8-11-94

Wilb Ø2
8-11-94

Wilb Ø3
8-11-94

WLB Ø4

8-11-94



WLB Ø5

8-11-94

WLB Ø6

8-11-94

WilbØ7
8-11-94

WilbØ8
9-11-94

WilbØ9
9-11-94

WLB 10
9-11-94

WLB 11
9-11-94

WLB 12
9-11-94

Scenery at
Wilbinga
9-11-94

looking NW
from Wilb 08
9-11-94

WHB 13

9-11-94

Coastal scenery at Wilsons

Variations of

Alyogyne huegelii

at Wilbanga

9-11-94

← Variations

Alyogyne
huegelii
in Wub 08
9-11-94

Melaleuca
huegelii

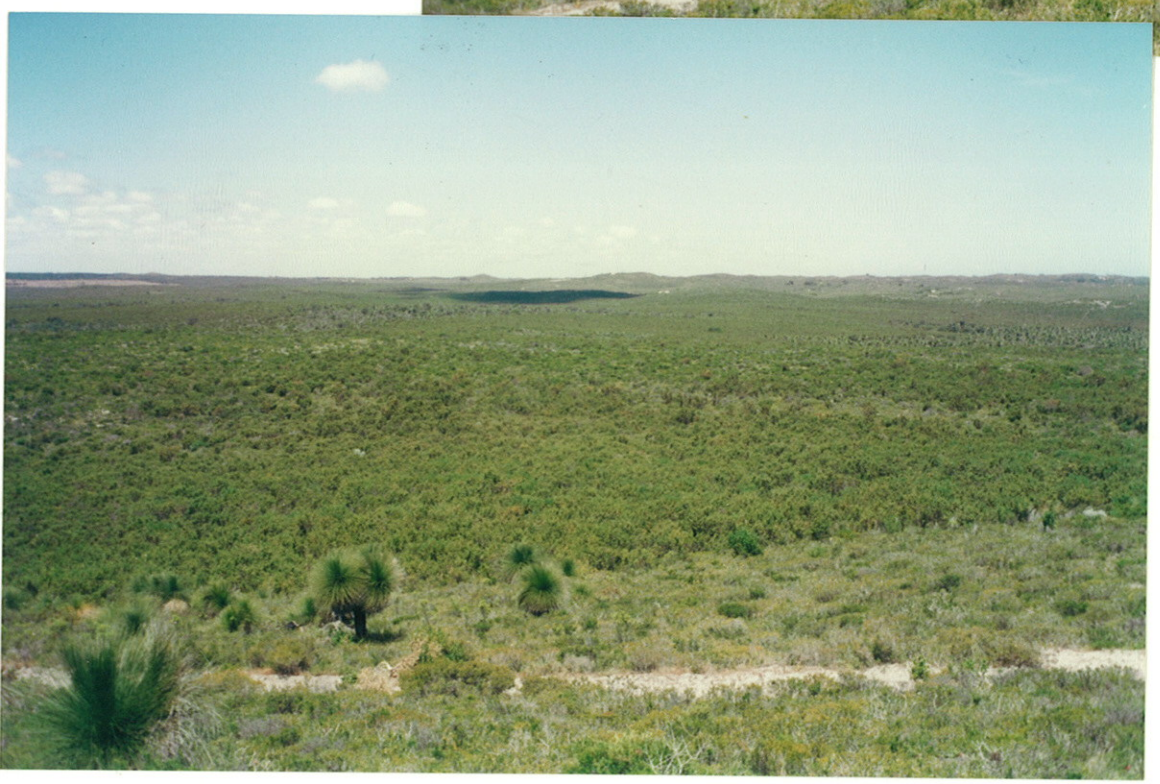
at Wilbinga

9-11-94

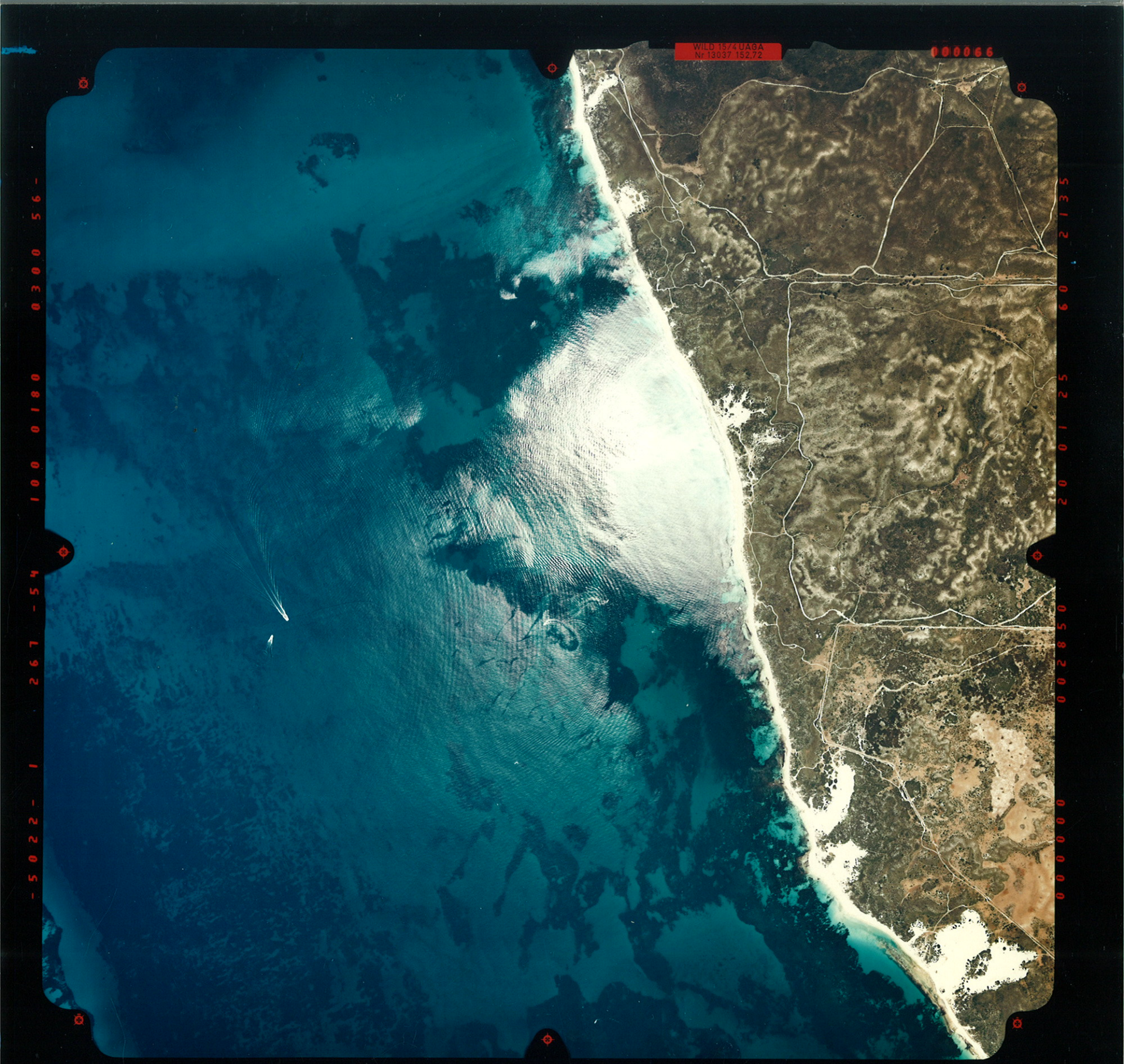
looki[illegible] north
from Wilb Ø8

WILBINGA

9-11-94



5001 WA 3163(C) METRO REGIONAL AREA & EXT. RUN 1 (5001-5003) 1:20000 04-DEC-92 920676



5002 WA 3163(C) METRO REGIONAL AREA & EXT. RUN 1 (5001-5003) 1:20000 04-DEC-92 920676

5006 WA 3163(C) METRO REGIONAL AREA & EXT. RUN 2 (5004-5009) 1:20000 04-DEC-92 920676

5007 WA 3163(C) METRO REGIONAL AREA & EXT. RUN 2 (5004-5009) 1:20000 04-DEC-92 920676

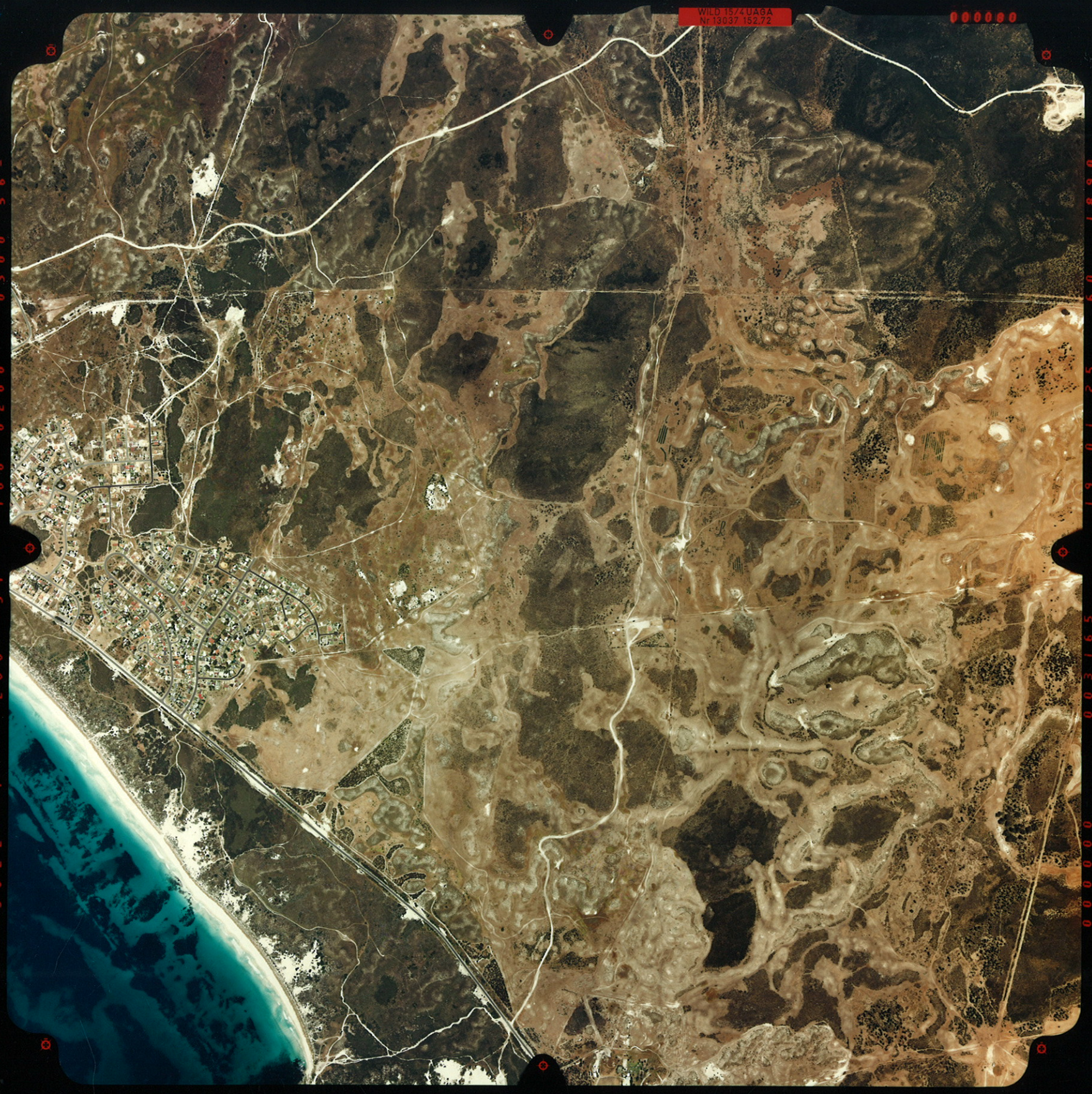
5008 WA 3163(C) METRO REGIONAL AREA & EXT. RUN 2 (5004-5009) 1:20000 04-DEC-92 920676

5009 WA 3163(C) METRO REGIONAL AREA & EXT. RUN 2 (5004-5009) 1:20000 04-DEC-92 920676

5010 WA 3163(C) METRO REGIONAL AREA & EXT. RUN 3N (5010-5018) 1:20000 04-DEC-92 920676

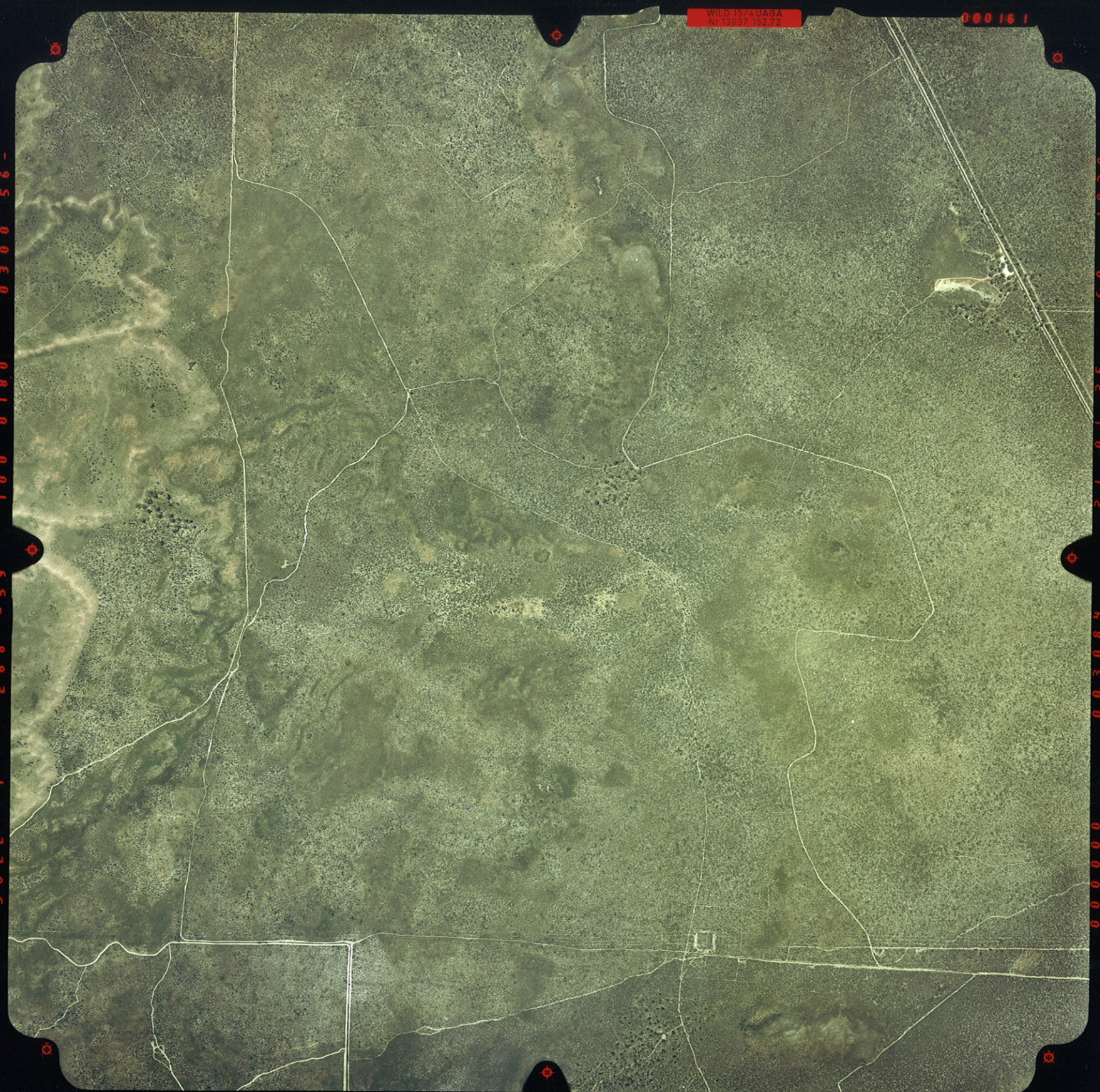
5012 WA 3163(C) METRO REGIONAL AREA & EXT. RUN 3N (5010-5018) 1:20000 04-DEC-92 920676

5013 WA 3163(C) METRO REGIONAL AREA & EXT. RUN 3N (5010-5018) 1:20000 04-DEC-92 920676

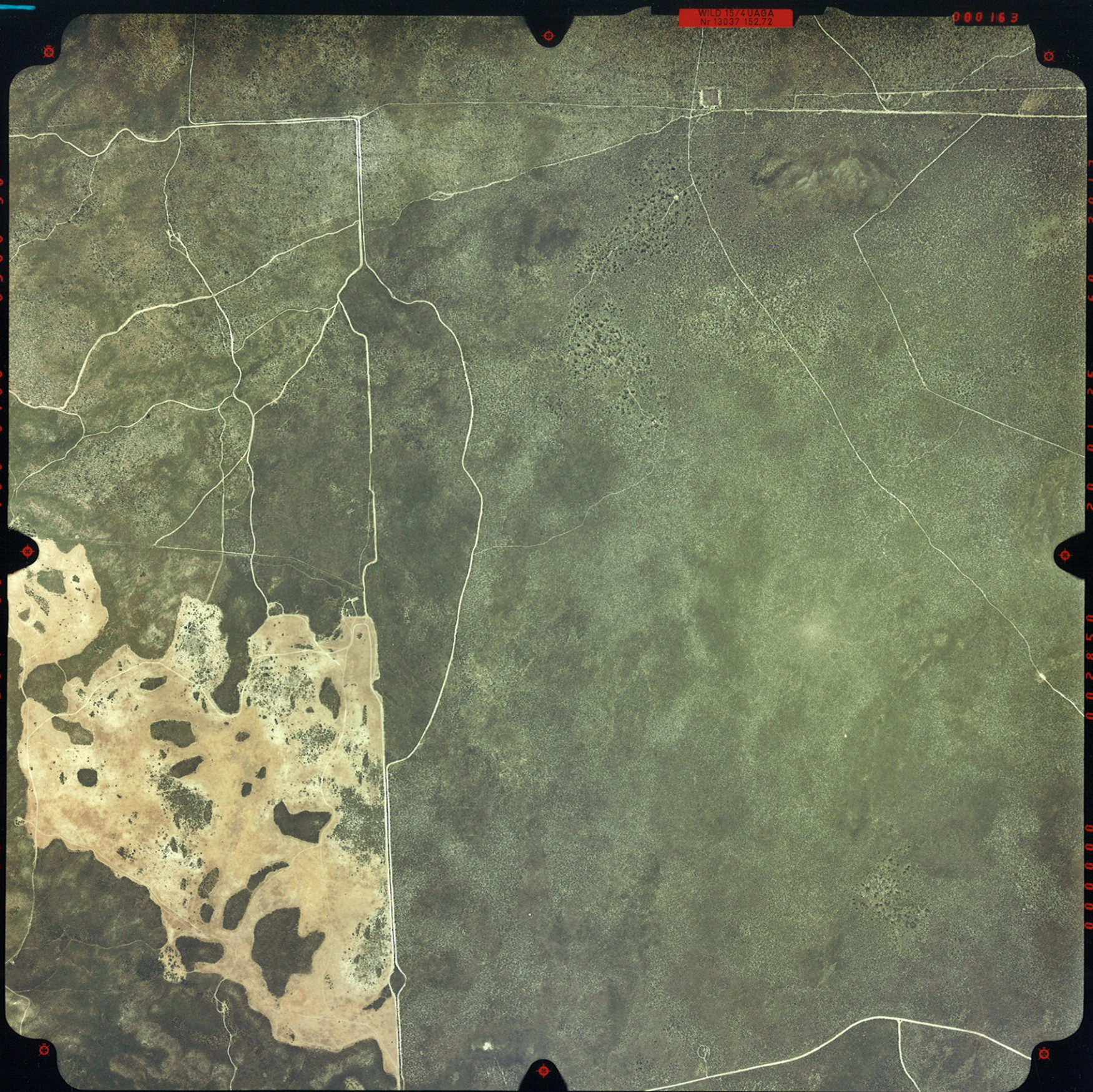


5014 WA 3163(C) METRO REGIONAL AREA & EXT. RUN 3N (5010-5018) 1:20000 04-DEC-92 920676

5108 WA 2813(C) COASTAL WETLANDS AREA "A" RUN 19 (5001-5112) 1:20000 9.12.89 890121



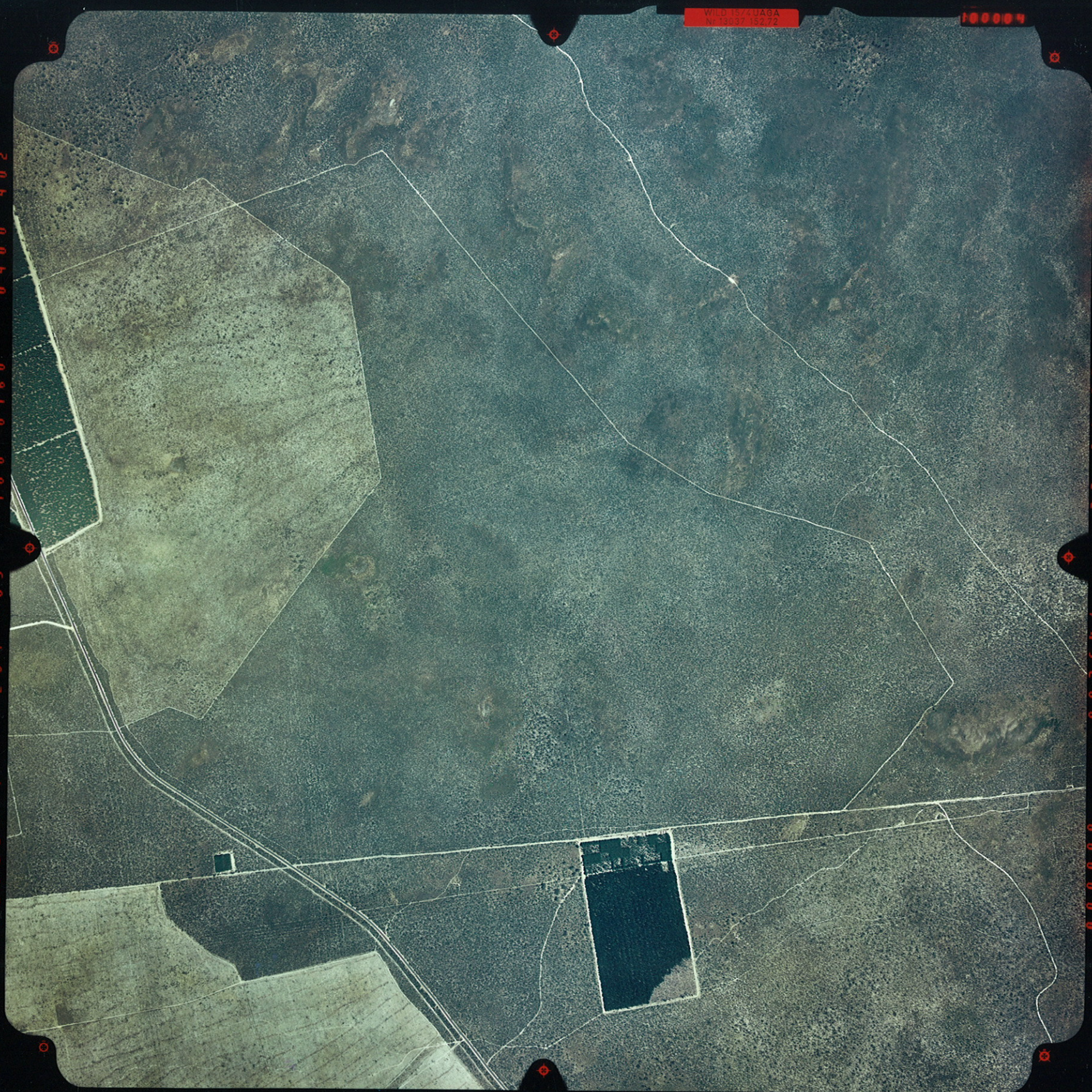
5110 WA 2813(C) COASTAL WETLANDS AREA "A" RUN 19 (5001-5112) 1:20000 9.12.89 890121



5112 WA 2813(C) COASTAL WETLANDS AREA "A" RUN 19 (5001-5112) 1:20000 9.12.89 890121

5113 WA 2812 (C) COASTAL WETLANDS AREA "A" RUN 18 (5113-5188) 1:20000 9.12.89 890121

5118 WA 2812 (C) COASTAL WETLANDS AREA "A" RUN 18 (5113-5188) 1:20000 9.12.89 890121



5120 WA 2815(C) COASTAL WETLANDS AREA "A" RUN 20 (5120-5210) 1:20000 13.12.89 890121