GNANGARA ROAD BUSHLAND, LANDSDALE/CULLACABARDEE

Boundary Definition: bushland taken to cadastre boundary (Boundary adjusted from that in draft *Perth's Bushplan.*)

SECTION 1: LOCATION INFORMATION

Bush Forever Site no. 196 **Area (ha):** bushland 236.6
Map no. 35 **Map sheet series ref. no.** 2034–II NE, 2034–II NW
Other Names: Part Submission Area 299, Telecommunication Centre
Local Authorities (Suburb): Shire of Wanneroo (Landsdale), Shire of Swan (Cullacabardee)

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS
Bassendean Dunes
Bassendean Sands (Qpb: S8)
Bassendean Dunes/Pinjarra Plain
Bassendean Sands over Guildford Formation (Qpb/Qpa: S10)
Wetlands (within the Bassendean Dunes/Pinjarra Plain)
Holocene Swamp Deposits (Qhw: Cps)
VEGETATION AND FLORA
Vegetation Complexes
Bassendean Dunes
Bassendean Complex — Central and South
Floristic Community Types: *not sampled, types inferred
Supergroup 2: Seasonal Wetlands
*4 *Melaleuca preissiana* damplands
Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau
*20a *Banksia attenuata* woodlands over species-rich dense shrublands (Dames and Moore 1998)
*21c Low-lying *Banksia attenuata* woodlands or shrublands
*22 *Banksia ilicifolia* woodlands
*23a Central *Banksia attenuata* — *B. menziesii* woodlands
REGIONAL WETLANDS
Wetland Types: dampland, palusplain
Natural Wetland Groups
Bassendean—Pinjarra transition OR Bassendean with fluvial features
Bennett Brook (B/P.4)
Bassendean Dunes
Gnangara (B.2)
Jandakot (B.3)
Wetland Management Objectives: Conservation (119.2ha), Resource Enhancement, Multiple Use
Swan Coastal Plain Lakes EPP: none identified
THREATENED ECOLOGICAL COMMUNITIES
Not assessed, Endangered (floristic community type 20a)

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: vegetated wetland, vegetated uplands
Vegetation and Flora: limited survey (Clarke and Keighery 2000a, Dames and Moore 1998, DEP 1996 & 1998 fenceline observations)
Structural Units: mapping (Clarke and Keighery 2000a, Dames and Moore 1998)
Uplands: Woodland to Low Woodland dominated by combinations of *Eucalyptus calophylla*, *E. marginata*, *Banksia menziesii*, *B. attenuata* and *B. ilicifolia* over species-rich Shrublands over Herblands and Sedgelands
Wetlands: Woodland, Low Open Forest, Low Woodland, Open Woodland and Low Open Woodland dominated by *Melaleuca preissiana*, *Eucalyptus calophylla* and *Banksia ilicifolia* and combinations of these (*Banksia menziesii* and *B. attenuata* may also be present); Closed to Open Low Heaths dominated by *Verticordia nitens*, *Astartea* aff. *fascicularis*, *Hypocalymma angustifolium* and *Pericalymma ellipticum*; Mixed Sedgelands of *Lyginia barbata* and *Desmocladus flexuosus*
Scattered Native Plants: not assessed
Vegetation Condition: >80% Excellent, <15% Very Good, with areas of severe localised disturbance
Total Flora: >170 native taxa (Clarke and Keighery 2000a) (estimated >50% expected flora)
Significant Flora: *Verticordia nitens*

Fauna: Significant mammal species: Quenda (Friend 1996 D)
Linkage: adjacent native vegetation to the north (Site 193 across road), south (Site 198 across road) and east; part of Greenways 13, 22 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)
Other Special Attributes: recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

Criteria: Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation
Recommendation: Other Government Land Mechanism (see Table 3, Volume 1).

GNANGARA ROAD BUSHLAND, LANDSDALE/CULLACABARDEE

Boundary Definition: bushland (part taken to cadastre)/conservation wetland boundary

SECTION 1: CADASTRAL INFORMATION

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

Bushplan Site no. 196 **Map no.** 39, 40, 46 **Map sheet series ref. no.** 2034–II NE, 2034–II NW

Other Names
Part Submission Area 299, Telecommunication Centre

Local Authorities (Suburb)
Shire of Wanneroo (Landsdale), Shire of Swan (Cullacabardee)

Ownership Categories
Commonwealth Government, State Government

Area (ha): total 362.9; bushland 281.9

Zoning
MRS: Public Purposes-Special Uses, Rural, Important Regional Roads
TPS: General Rural, Landscape

Lot/Location/Reserve numbers (Purpose), Street name
1, 10 Gnangara Rd; 5, 55 Park St

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS

Bassendean Dunes
Bassendean Sands (Qpb: S8)

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

Wetlands (within the Bassendean Dunes/Pinjarra Plain)
Holocene Swamp Deposits (Qhw: Cps)

VEGETATION AND FLORA

Vegetation Complexes

Bassendean Dunes
Bassendean Complex — Central and South

Floristic Community Types: *not sampled, types inferred

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

Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau
*21c Low lying *Banksia attenuata* woodlands or shrublands
*22 *Banksia ilicifolia* woodlands
*23a Central *Banksia attenuata* — *B. menziesii* woodlands

REGIONAL WETLANDS

Wetland Types: dampland, palusplain

Natural Wetland Groups

Bassendean—Pinjarra transition OR Bassendean with fluvial features
Bennett Brook (B/P.4)

Bassendean Dunes
Gnangara (B.2)
Jandakot (B.3)

Wetland Management Objectives: Conservation (27.5ha), Resource Enhancement, Multiple Use

Swan Coastal Plain Lakes EPP: none identified

THREATENED ECOLOGICAL COMMUNITIES

Not assessed

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: vegetated wetland, vegetated uplands

Vegetation and Flora: limited survey (DEP 1996, 1998, fenceline observations; Mattiske Consulting Pty Ltd 1997)

Structural Units

Uplands: *Eucalyptus calophylla* Woodland; *Eucalyptus calophylla* and *E. marginata* Woodland; *Banksia menziesii, B. attenuata* and *B. ilicifolia* Low Woodland; *Banksia menziesii* and *B. attenuata* Low Woodland; *Banksia menziesii, B. attenuata* Low Open Forest with scattered emergent *Eucalyptus calophylla; Xanthorrhoea brunonis* Open Low Heath with *Verticordia nitens* and *Stirlingia latifolia*

Wetlands: *Melaleuca preissiana* and *Eucalyptus calophylla* Woodland; *Verticordia nitens* Open Heath with scattered emergent *Banksia ilicifolia, B. menziesii* and *Melaleuca preissiana*; Mixed *M. preissiana, Banksia attenuata, B. menziesii* Low Open Forest, with scattered emergent trees of *Eucalyptus calophylla*; Closed to Open Low Heaths dominated by *Astartea* aff. *fascicularis, Hypocalymma angustifolium* and *Pericalymma ellipticum*; Mixed Sedgelands of *Lyginia barbata* and *Loxocarya flexuosa*

Scattered Native Plants: not assessed

Vegetation Condition: 80% Excellent, 15% Very Good, with areas of severe localised disturbance
Total Flora: not known
Significant Flora: *Verticordia nitens*

Fauna: no systematic survey. Significant mammal species: Quenda (Friend 1996 D)

Linkage: adjacent native vegetation to the north (BS193 across a road), south (BS198 across a road) and east; part of proposed Greenways 14, 22 (Tingay, Alan & Associates 1997a); part of a regionally significant fragmented bushland/wetland linkage (Volume 2A, Map 8)

Other Special Attributes: recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

Criteria: Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

Opportunities and/or Constraints

Opportunities: Bushplan Site/part Bushplan Site subject to Swan and Canning Rivers EPP; location of conservation category wetlands; under TPS Landscape Zoning

Constraints: under MRD regional road requirements, General Mineral Resource Area (sand)

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

LEGEND

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

2034 - II NE

IV	I
III	II (NW, NE, SW, SE)

2034

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

PERTH'S BUSHPLAN MAP INDEX

N

SCALE

0 500 1000

Metres

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

ntw-map11//environ/bushplan//bushv2_46.dgn

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

Wetlands Data supplied by Water and Rivers Commission

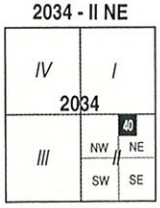
Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

Bushplan Site Map

LEGEND

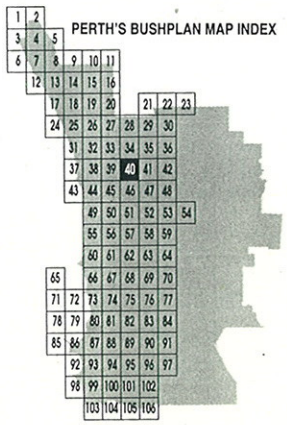
- 472 — Bushplan Sites With Regionally Significant Bushland
- Other Native Vegetation
- Conservation Category Wetlands
- Bushplan Sites With Some Existing Protection
- 696 — Lot Number, Location Number
- Channel Wetlands
- Local Government Boundary

2034 - II NE



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

PERTH'S BUSHPLAN MAP INDEX



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Metres

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

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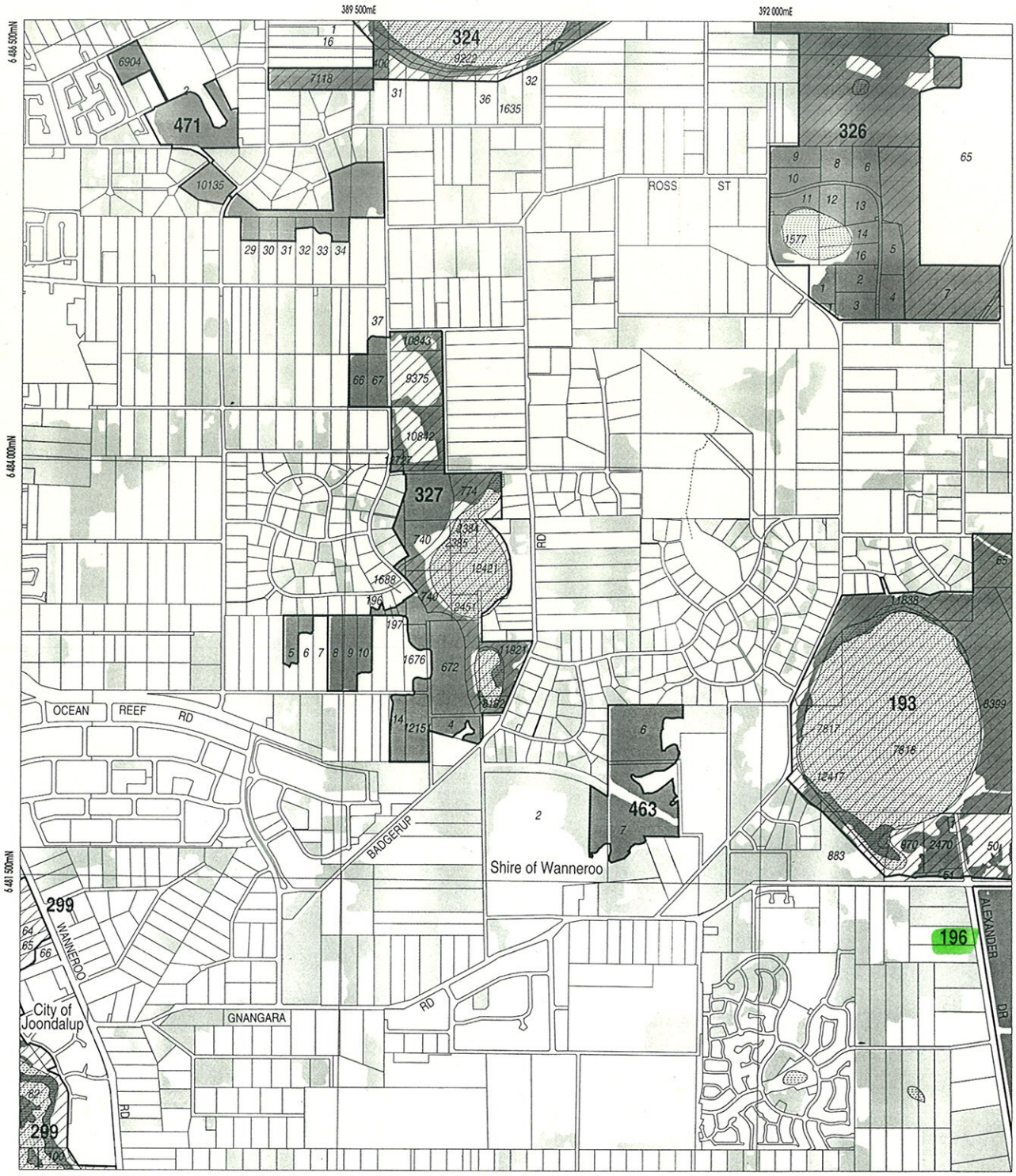
Cadastral Data supplied by Department of Land Administration, W.A.

Wetlands Data supplied by Water and Rivers Commission

Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

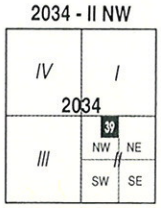
Bushplan Site Map



LEGEND

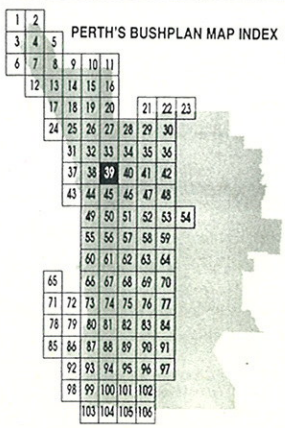
- 472 — Bushplan Sites With Regionally Significant Bushland
- Other Native Vegetation
- Conservation Category Wetlands
- Bushplan Sites With Some Existing Protection
- 696 — Lot Number, Location Number
- Channel Wetlands
- Local Government Boundary

2034 - II NW



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

PERTH'S BUSHPLAN MAP INDEX



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SCALE

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Metres

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

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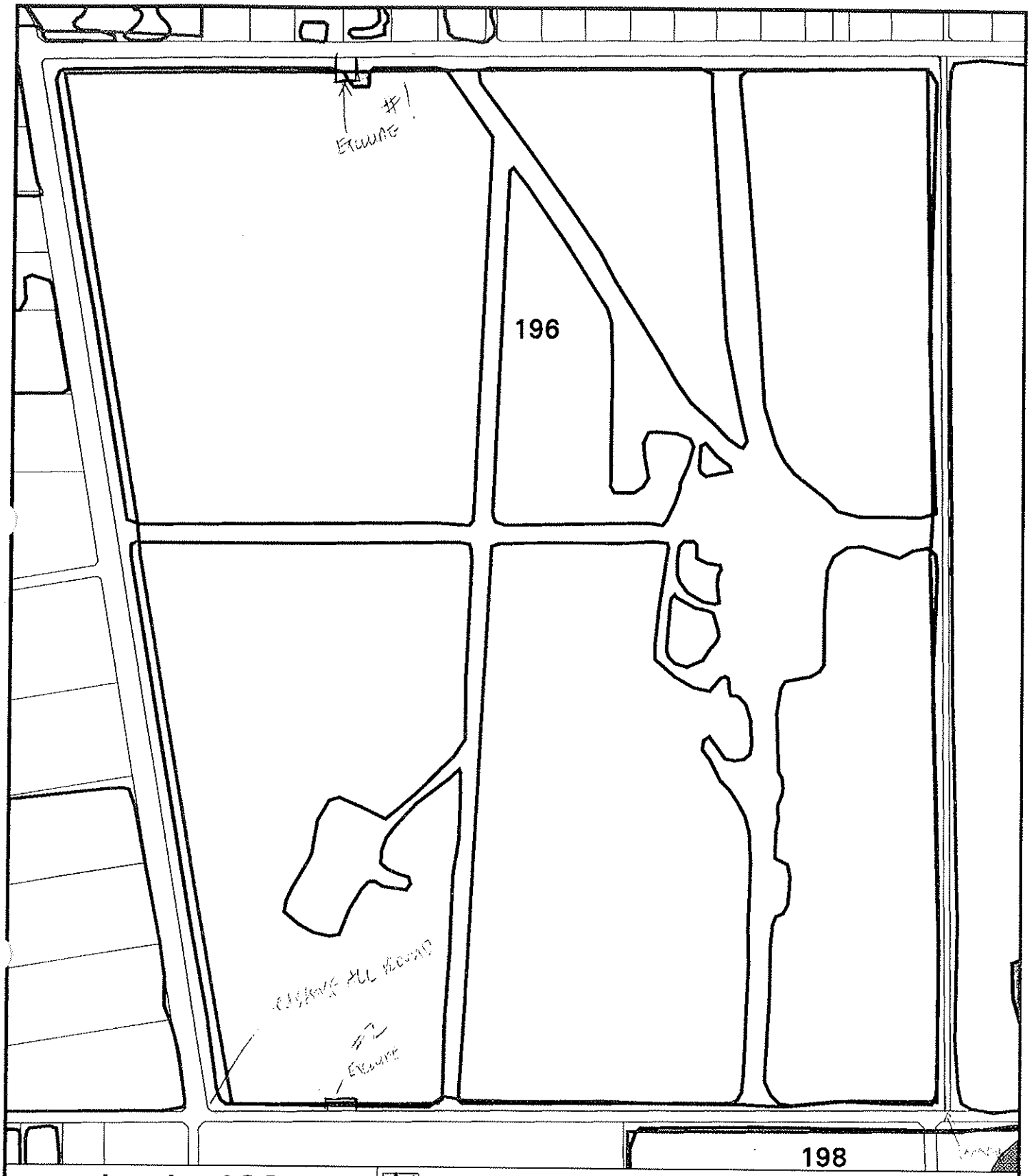
Cadastral Data supplied by Department of Land Administration, W.A.

Wetlands Data supplied by Water and Rivers Commission

Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

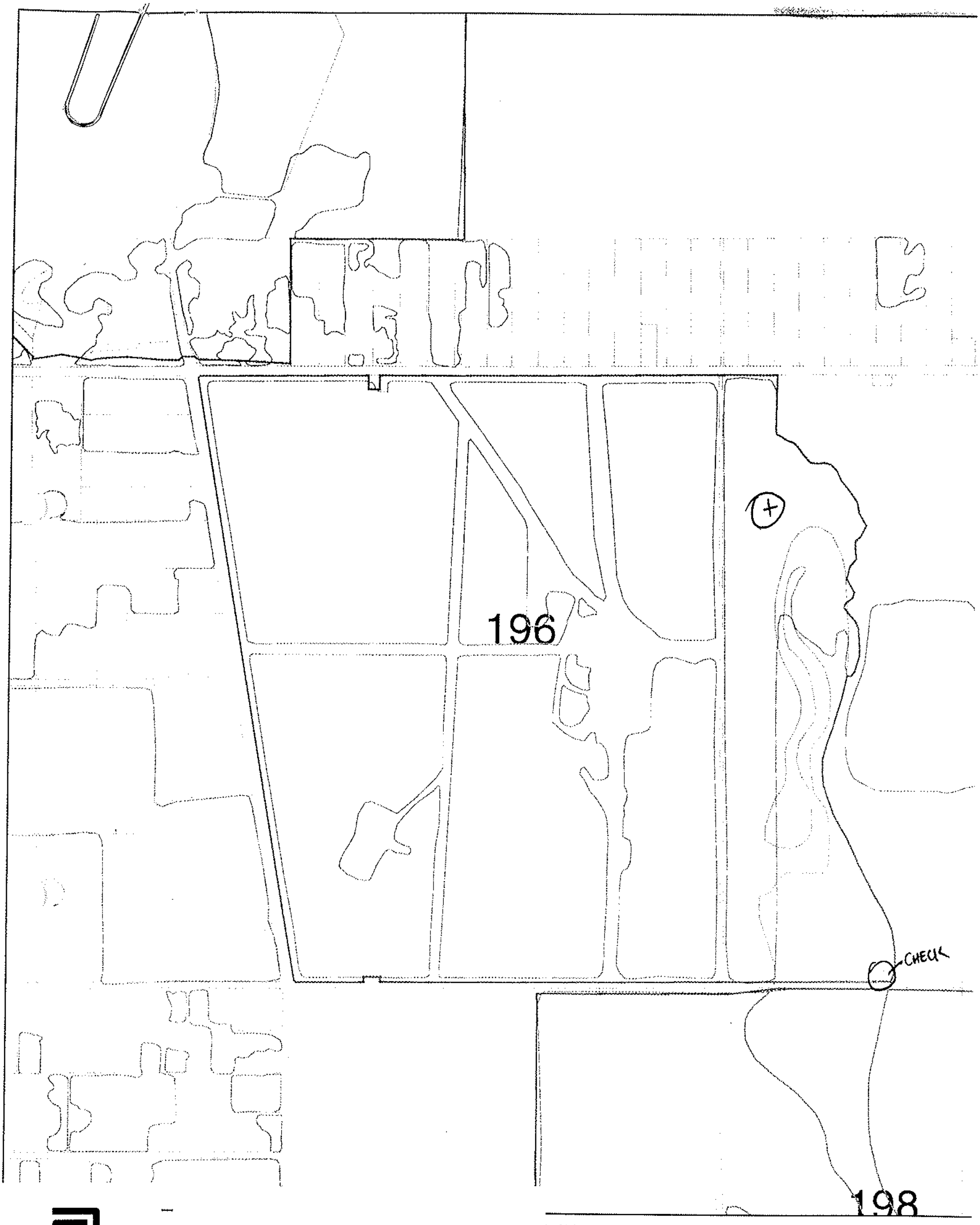
Bushplan Site Map



bp site 196

MFP INTERNAL USE ONLY	
Prepared By: Andrea Zappacosta	
Prepared For:	
Map Ident: plot980526_1	
Date: 26 May 98	
Scale 1:9885	

- AG VEG 1998 BOUNDARY THEME
- Cadastre
- Bushplan sites refno 1-500 SCP BOUNDARY THEME
- cons category wetlands
- Verified CCWs



CADASTRE CHECK FOR 198.

NOTE CHANGES FOR UPDATE SUMMARY

NEEDS TO BE CHECKED

CORRECTED

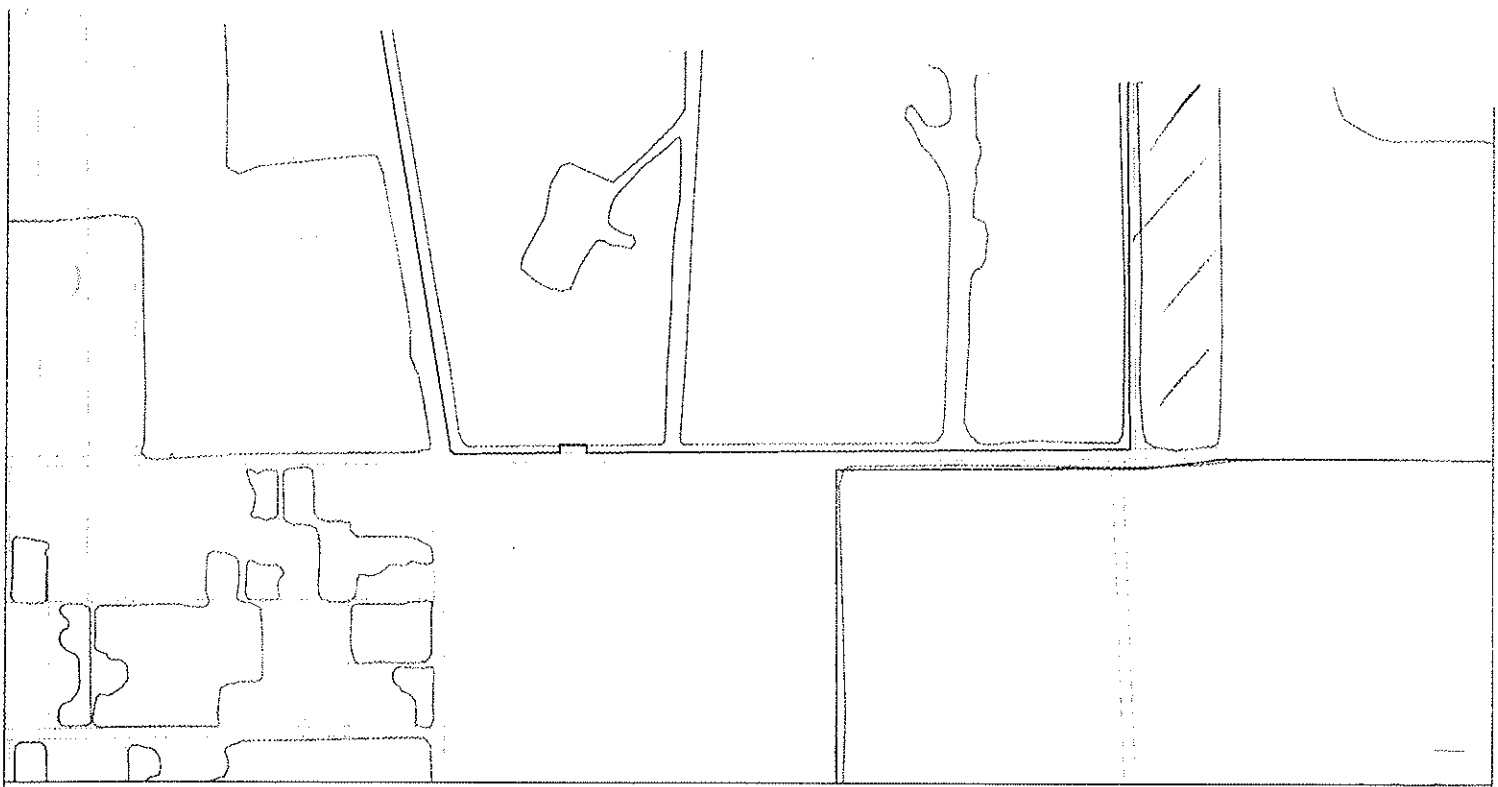
B BK/TG 22/10/98.

N

KJK. 3/7

CS 196

? Addition - includes Conservation category Wetlands



BUSHPLAN SITES CORRECTED

WESTERN AUSTRALIAN PLANNING COMMISSION

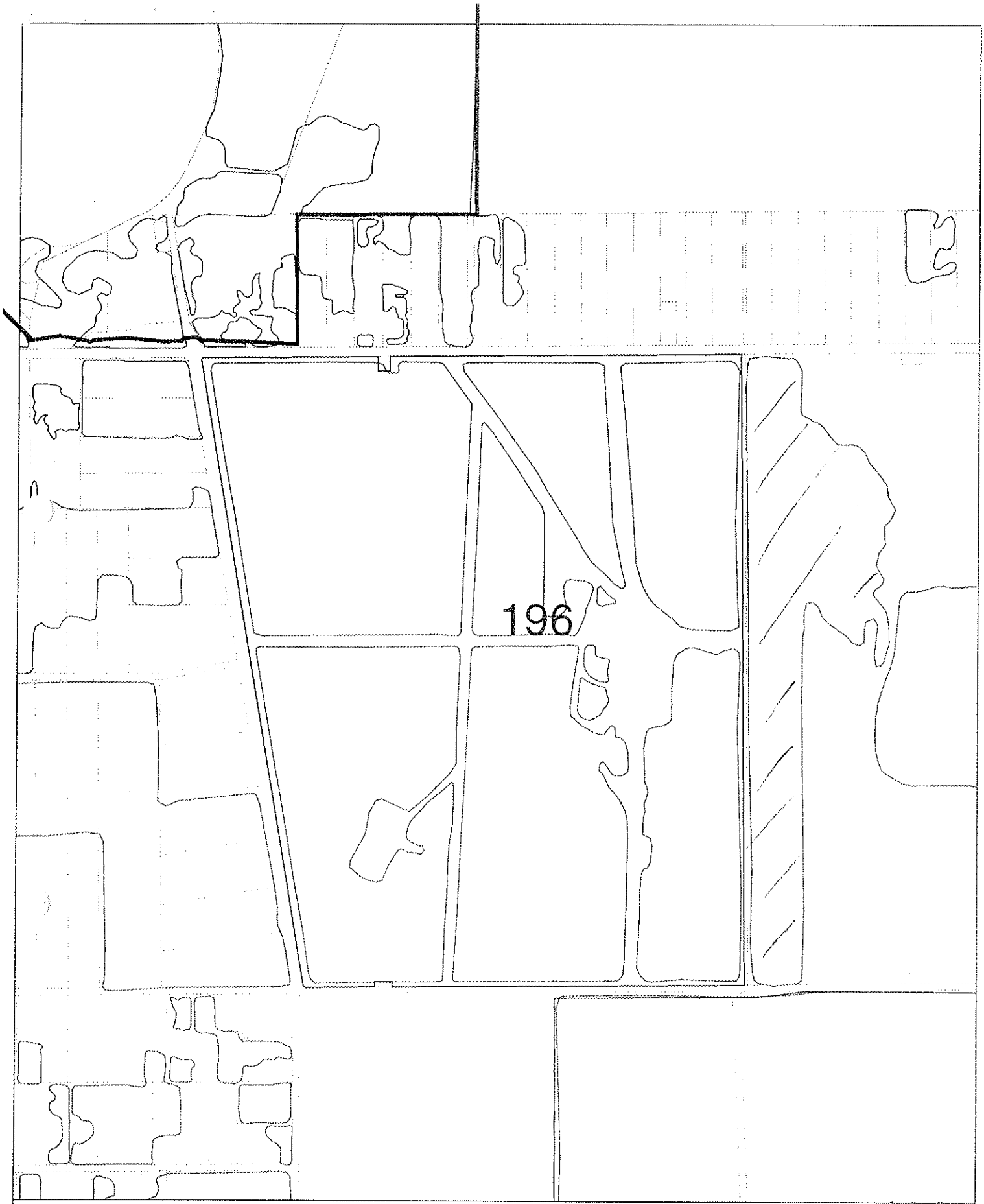
CUSTOMER FOCUS WESTERN AUSTRALIA

N

SCALE 1:2500

0 50m

Metres



BUSHPLAN SITES CORRECTED

THE GOVERNMENT OF WESTERN AUSTRALIA

WESTERN AUSTRALIAN PLANNING COMMISSION

CUSTOMER FOCUS WESTERN AUSTRALIA

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SCALE 1:2500

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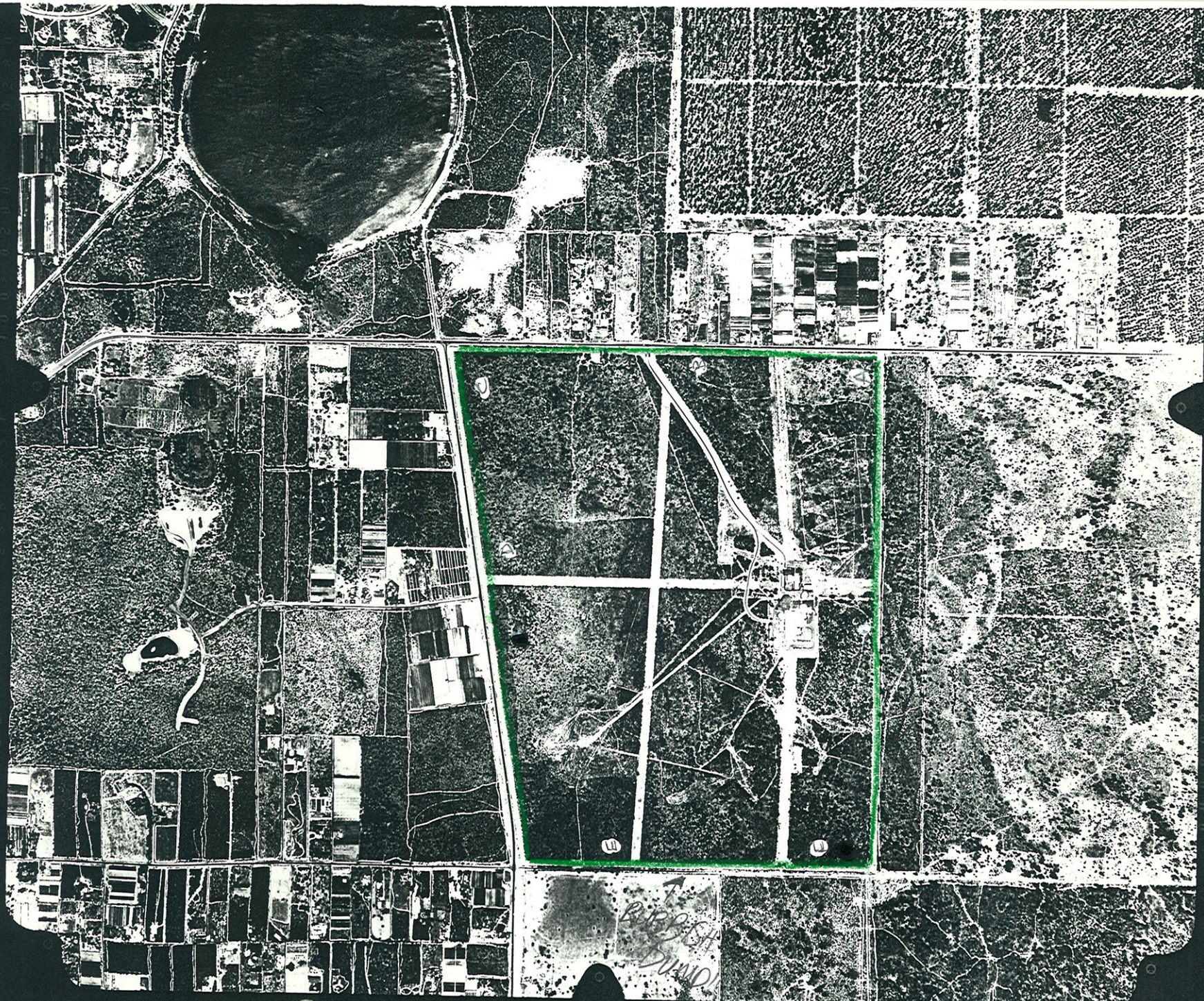
Metres



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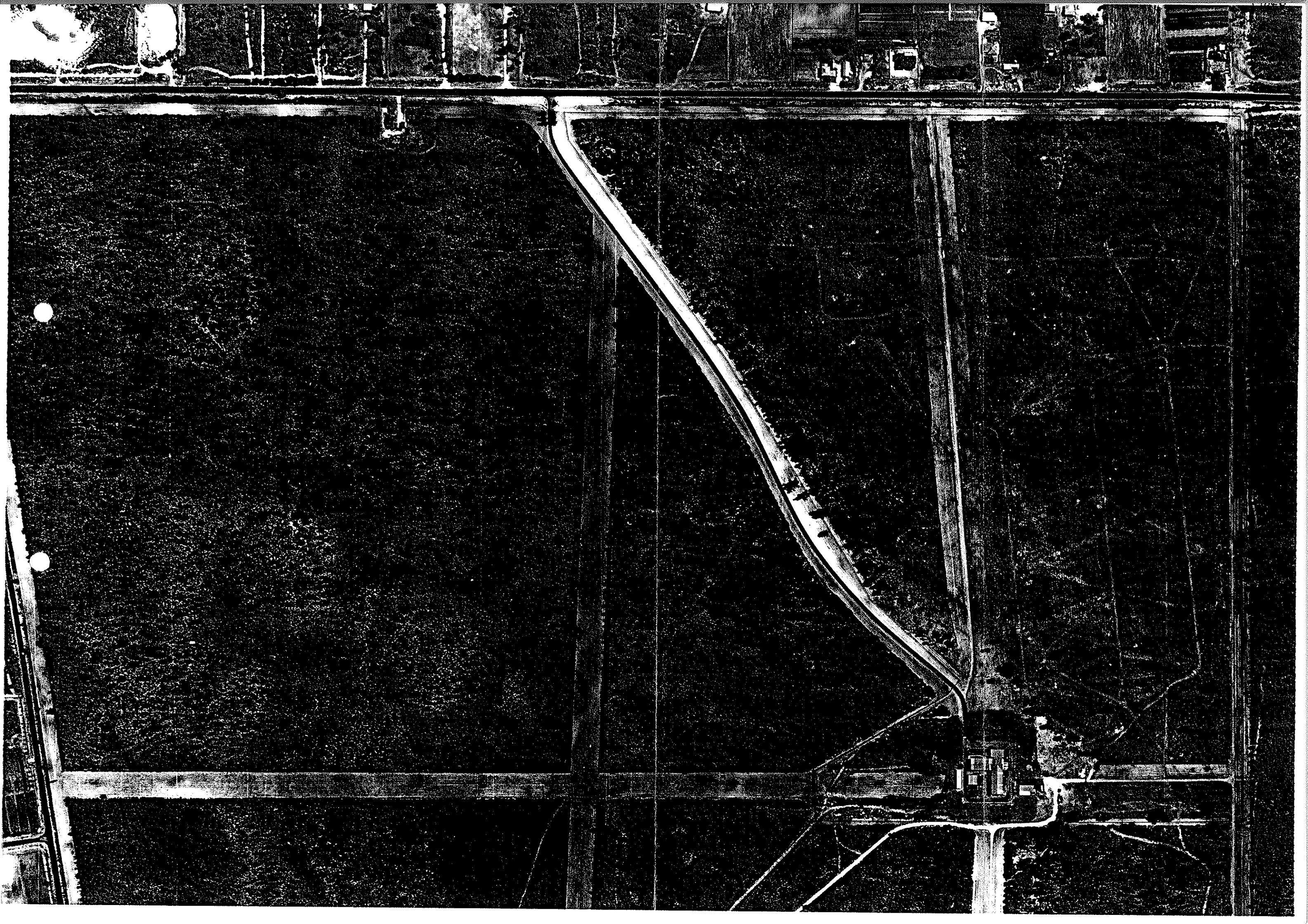
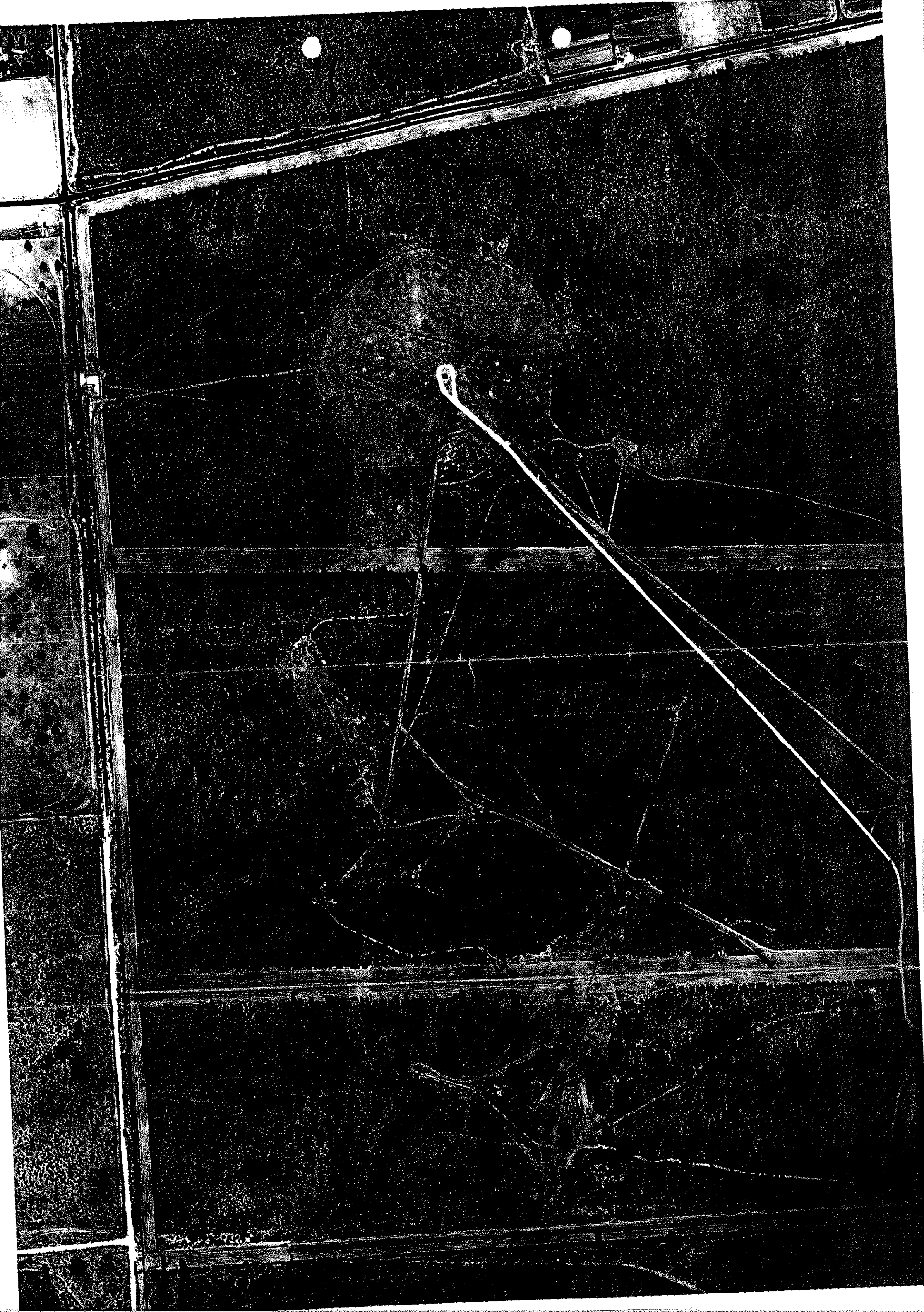




BS 196

Veg Details

Map Ident: plot000204_3	DATE: 04 Feb 2000
Prepared By: Sean Collingwood	Prepared For: SPC
Scale 1:10000	MFP INTERNAL USE ONLY

0 500 m

- Bushplan Sites (boundaries)
- Cadastre with Lot Numbers
- Southern River Complex
- Bassendean Complex-Central And South
- Karrakatta Complex-Central And South
- PROPOSED GREENWAYS
- Conservation Category Wetlands - Boundaries
- Contours - 1m & 2m (WAWA)

Map 1

GNANGARA ROAD

SUB-STATION

ESA TRANSPORTABLE ANTENNA SITE

ESA 15M S/X BAND ANTENNA

TELESAT ANTENNAS

ALEXANDER DRIVE

KINGSWAY (PARK) ROAD

20 METRE FIRE BREAK

40 METRE FIRE BREAK

1.5M LIMESTONE ROAD WITH 10M FIRE BREAK ON EACH SIDE OF ROAD

NOTES: 1. ALL NORTHING/EASTING GRID POINTS/ANTENNAS/BUILDINGS/STRUCTURES/ROADS & PAVING LOCATIONS ON THIS DRAWING TO BE USED AS REFERENCE ONLY. NOTE ALL POSITIONS TO BE VERIFIED BY A QUALIFIED SURVEYOR PRIOR TO COMMENCEMENT OF ANY SITE PROJECT.

2. ALL PERIPHERAL SITE SERVICES & WATER SITE SERVICES LOCATIONS SHOWN ON THIS DRAWING IS TO BE USED AS REFERENCE ONLY. PRIOR TO ANY BUILDING, PAVING OR PARTITIONING TO COMMENCE POSITIONS OF SITE SERVICES MUST BE VERIFIED ON SITE WITHIN THE AFFECTED AREA.

3. CIVIL AND CIVIL AND OTHER ITEMS SITE AND BUILDING DRGS SHOULD BE READ IN CONJUNCTION WITH (REFERENCE):

- CIVIL & CIVIL: DRG 910294/A237 GA1 - OVERALL SITE PLAN.
- CIVIL & CIVIL: DRG 910294/A237 GA2 - PART SITE PLAN.
- CIVIL & CIVIL: DRG 910294/A237 GA3A - SITE SERVICES.
- CIVIL & CIVIL: DRG 910294/A237 GA3 - PERTH 7A ANTENNA PEDESTAL PLAN.
- CIVIL & CIVIL: DRG 910294/A237 GA4 - PERTH 7A ANTENNA PLATFORM PLAN DETAILS.
- CIVIL & CIVIL: DRG 910294/A237 GA10 - WALKWAY DETAILS.
- CIVIL & CIVIL: DRG 910294/A237 GA11 - PERTH 7A ANTENNA STAIR DETAILS.
- CIVIL & CIVIL: DRG 4244/GA 01 - OVERALL BUILDING PLANS.
- CIVIL & CIVIL: DRG 4244/GA 02 - BUILDING SECTIONS DETAILS.
- CIVIL & CIVIL: DRG C1 - CIVIL WORKS LAYOUT PLAN.
- CIVIL & CIVIL: DRG C2 - CIVIL WORKS CONSTRUCTION DETAILS.
- CIVIL & CIVIL: DRG C3 - CIVIL WORKS DRAINAGE CROSSOVER.
- CIVIL & CIVIL: DRG. S201 - RADOME/ANTENNA PLATFORM SPEC. NOTES & CABLE TRAY DETAILS.
- CIVIL & CIVIL: DRG. S202 - RADOME/ANTENNA PLATFORM FOOTING PLAN & DETAILS.
- CIVIL & CIVIL: DRG. S203 - RADOME/ANTENNA PLATFORM FOOTING PLAN & DETAILS.
- CUMMINS MAGNER PROJECT NO. 5599.16 DRG. NO. S1 - PERTH 9M ANTENNA & ROOF SHELTER FOUNDATIONS & DETAILS.
- CIVIL & CIVIL: DRG 910046-CIV1 - TELE. BLD. EXTENSIONS PLAN, FLOOR & PAVING PLAN.
- CIVIL & CIVIL: DRG. 491061-03 - TELE. BLD. PAVING AND DRAINAGE LAYOUT
- CIVIL & CIVIL: DRG. 491061-02 - TELE. BLD. PAVING AND DRAINAGE LAYOUT
- CIVIL & CIVIL: DRG 491061-GA1 - TELE. BLD. LOCATION PLAN
- CIVIL & CIVIL: DRG. 491061-GA2 - TELE. BLD. SITE PLAN
- CIVIL & CIVIL: DRG. 491061-GA/5 - TELE. BLD. FLOOR PLAN
- CIVIL & CIVIL: DRG. 491061-GA/6 - TELE. BLD. FLOOR PLAN
- CIVIL & CIVIL: DRG. 491061-GA/7 - TELE. BLD. FLOOR PLAN
- CIVIL & CIVIL: DRG. 491061-GA/4 - TELE. BLD. FLOOR PLAN
- CIVIL & CIVIL: DRG 491061-GA/10 - TELE. BLD. ROOF PLAN
- CIVIL & CIVIL: DRG. 491061-GA/77 - TELE. BLD. ARTIST EXTERNAL WALLS
- CIVIL & CIVIL: DRG 491061-GA/11 - TELE. BLD. DETAIL PLAN
- CIVIL & CIVIL: DRG 491361-GA/39 - TELE. BLD. EXTERNAL SIGNAGE
- CIVIL & CIVIL: DRG 491361-GA/41 - GNANGARA ROAD ENTRY SIGNAGE
- DEPT OF HOUSING & CONSTRUCTION: DRG. WE 44/557 - TGA SITE LAYOUT
- DEPT OF HOUSING & CONSTRUCTION: DRG. WC 44/1024 - TGA SITE LAYOUT & DETAIL PLAN
- DEPT OF HOUSING & CONSTRUCTION: DRG. WA 45/1334 - SATELLITE BUILDING FLOOR PLAN
- DEPT OF HOUSING & CONSTRUCTION: DRG. WA 45/1333 - SATELLITE BUILDING DETAIL PLAN
- DEPT OF HOUSING & CONSTRUCTION: DRG. WE 45/1140 - SATELLITE BUILDING SITE LAYOUT
- AUSTRALIAN SURVEY OFFICE: DRG. A3-1661 - MARITIME BUILDING AREA
- AUSTRALIAN SURVEY OFFICE: DRG. AS-2749 - MARITIME BUILDING AREA PLAN AS CONSTRUCTED
- TELSTRA: DRG. GG-S00709 - COMPLEX TYCOM GENERAL ARRANGEMENT & SITE DETAILS
- CUMMINS MAGNER: JOB NO. 5220, DRG. NO. S6-24 - PERTH 5A ANTENNA FOUNDATION FRAMING.
- CUMMINS MAGNER: JOB NO. 4132, DRG. NO. A5 - TELESAT SITE LAYOUT PLAN
- SANDVIK & PINDER: DRG. NO. 9637-A1-01 - POWER UPGRADE LOCATION PLAN/SUB-STATION SITE PLAN
- SANDVIK & PINDER: DRG. NO. 9637-A3-04 - POWER UPGRADE GENERATOR FLOOR PLAN
- SANDVIK & PINDER: DRG. NO. 9637-A2-01 - POWER UPGRADE CABLE TRAY SUPPORT/LINKWAY ELEVATIONS
- SANDVIK & PINDER: DRG. NO. 9637-A2-02 - POWER UPGRADE CABLE TRAY SUPPORT/LINKWAY ELEVATIONS
- SANDVIK & PINDER: DRG. NO. 9637-A7-01 - POWER UPGRADE SUB-STATION PLANE PLAN
- PINNELL: DRG. NO. PQ7003-C-003 - POWER UPGRADE CIVIL WORKS LAYOUT

4. FOR ENLARGED DETAILS (1:500) WITHIN FENCED MARITIME TELECOMMUNICATIONS SATELLITE BUILDINGS AREA REFER TO DRG. GG-S00712 SHEET 02.

5. ANY CHANGES TO THIS DRG. SHOULD BE REFLECTED ONTO DRG'S GG-S00701, GG-S00709, GG-S00711, GG-S00715, GG-S00716 & GG-S00717.

6. FOR FULL MARITIME AREIAL LAYOUT DETAILS REFER DRG. GG-A00701

7. FOR SYNCHRONOUS BUILDING/GENERATOR SWITCHBOARD ROOM/HV SWITCHROOM/ MAIN BUILDING SWITCHBOARD/TRANSFORMER ROOM ELECTRICAL CABLE LADDER DETAILS & DETAILS OF CABLE TRAY SUPPORT/LINKWAY BETWEEN HV SWITCHROOM & MAIN BUILDING REFER TO DRAWINGS: 9637-A1-04, 9637-A1-05, 9637-A2-01, 9637-A2-02, 9637-A3-01, 9637-A7-02, PQ7003-M-003, PQ7003-S-006 & PQ7003-A-009

SCALE: METRES 0 50 100

SCALE 1:2500

ISSUE	D.A.	CHANGES	DRN	CKD	APPD & DATE
5	987026	REVISED ISSUE - PITC POWER UPGRADE AS-BUILT DETAILS ADDED	JC	AG/JC	AG 18-2-99

PERTH ITC - GNANGARA
ENTIRE PITC SITE

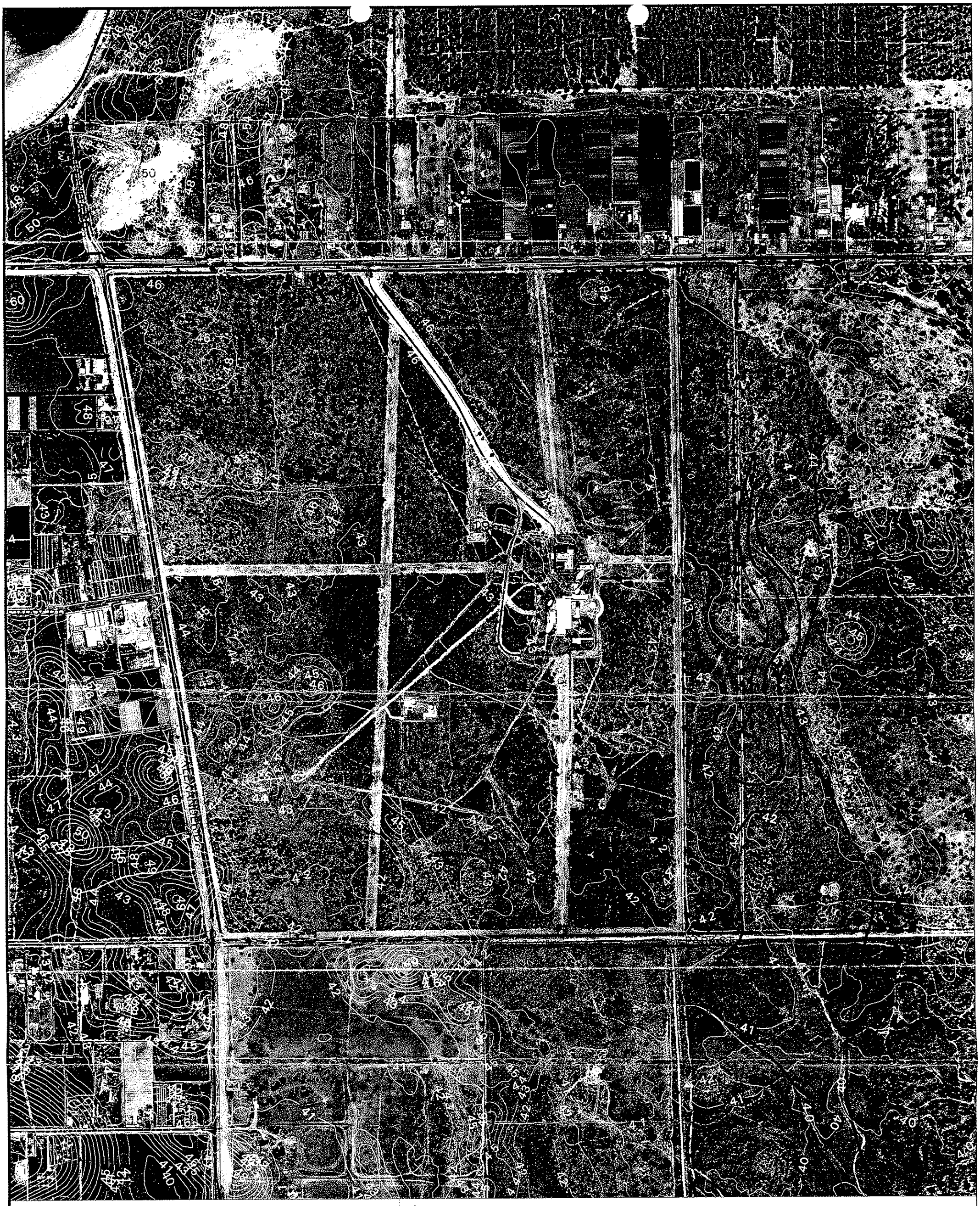
SITE LAYOUT

Telstra

DRAWING No. GG-S00712

SHEET 01 OF 2

Dbd17777
A3TYC01
IF JOB 98



BS 196

Aerial 1999

Bushplan Sites (boundaries)

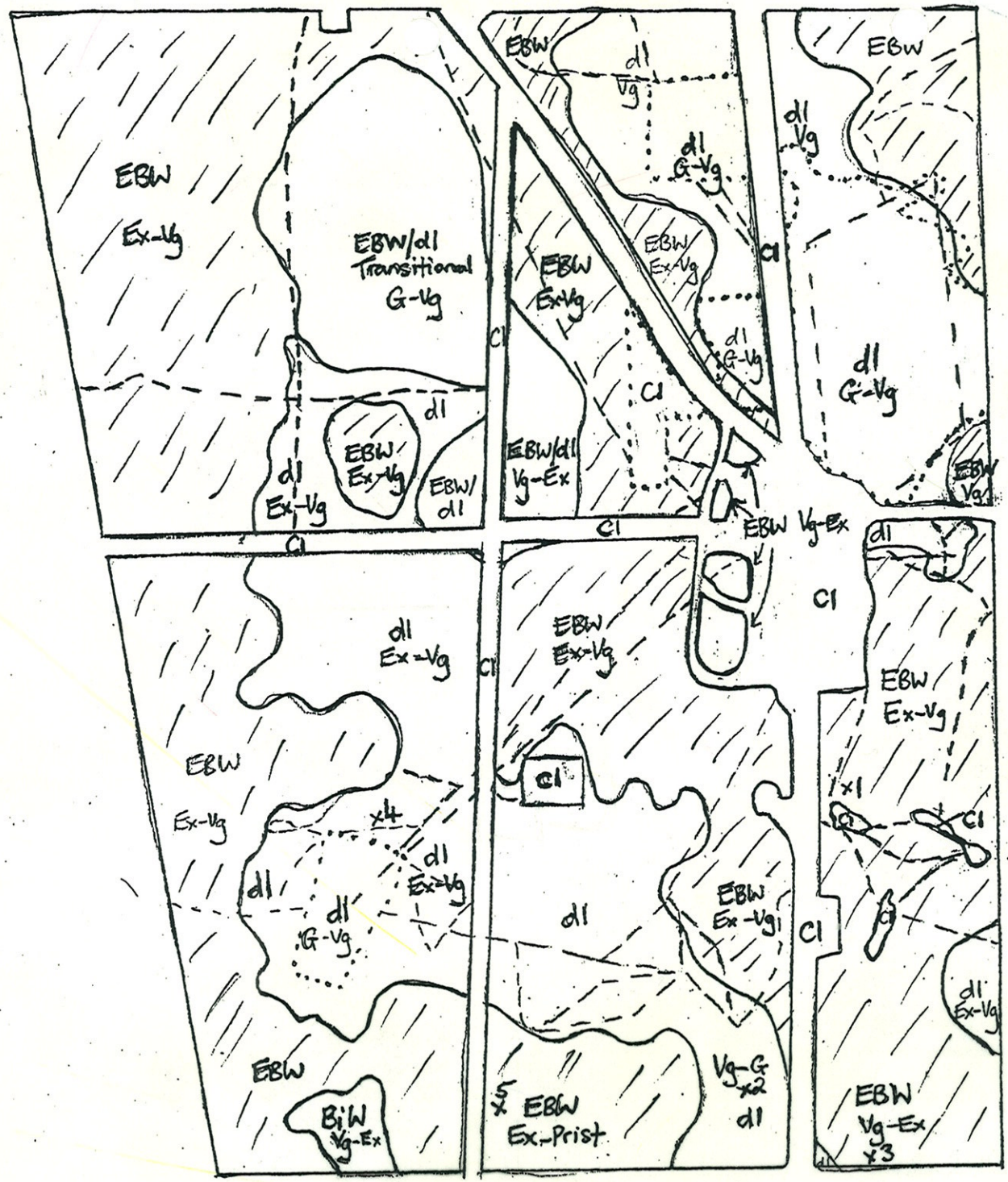
Cadastre with Lot Numbers Blue - Overlay Images

Conservation Category Wetlands - Boundaries

Contours - 1m & 2m (WAWA)

Map Ident: plot000204_2	DATE: 04 Feb 2000
Prepared By: Sean Collingwood	Prepared For: SPC
Scale 1:10000	MFP INTERNAL USE ONLY

0 500 m



MAP 3: Vegetation Map after Bushplan 2000 (DEP 2000)

Scale 1:10,000

.... Areas recently cleared or being kept clear

--- Tracks

EBW Eucalypt/Banksia Woodland

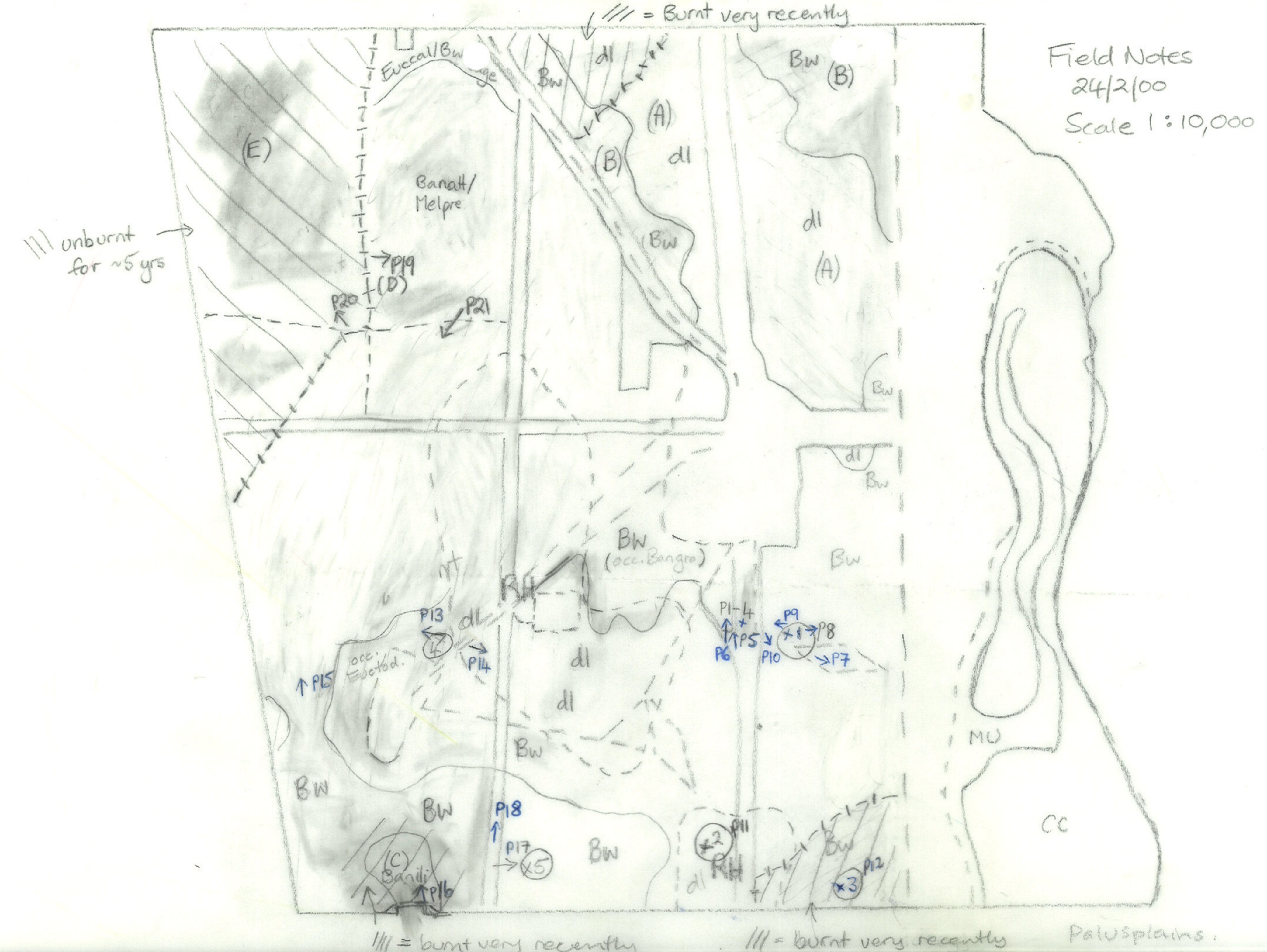
BiW Banksia ilicifolia Woodland

dl Dampland (Scattered Emergent Melaleuca preissiana over heath)

x4 Site Descriptions (DEP, 2000)

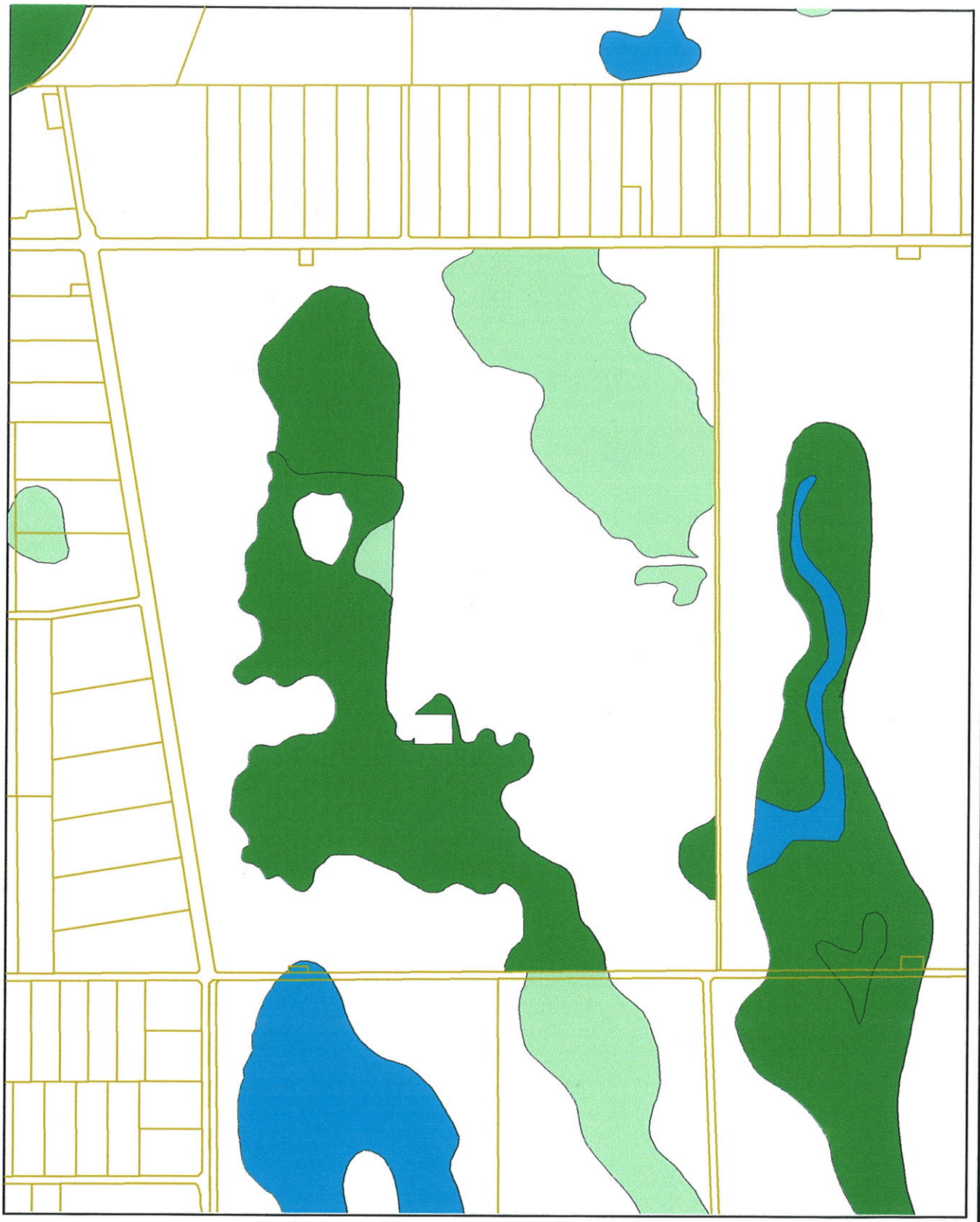
Ex-Vg. Condition Rating (Ex Excellent, Vg Very Good, G Good, Prist Pristine)

Cl Cleared


/// = Burnt very recently
Field Notes
24/2/00
Scale 1 : 10,000
//// unburnt for ~5 yrs
Euccal/Bw
(E)
Banatt/ Melpre
(B)
(A)
dl
Bw
P19
(D)
P20
P21
RH
Bw (occ. Bangra)
dl
P1-4
P5
P6
P10
P9
P8
P7
P13
P14
P15
occ. Euctod.
Bw
(C) Banili
P16
P17
P18
P11
P12
MU
CC
//// = burnt very recently
/// = burnt very recently
Palusplains.

Alterations to Wetlands Management Categories near Gnangara Road Bush Forever site 196

POLICY AND PLANNING DIVISION



LEGEND

- Cadastre

Wetlands classification

- Conservation
- Multiple Use
- Not Assessed
- Rehabilitation

Scale 1:15 000

100 0 100 200 300 400 500 Metres

Projection Information

Vertical Datum: Australian Height Datum (AHD)
Horizontal Datum: Geocentric Datum of Australia (GDA 94)

N

GDA

WATER AND RIVERS COMMISSION

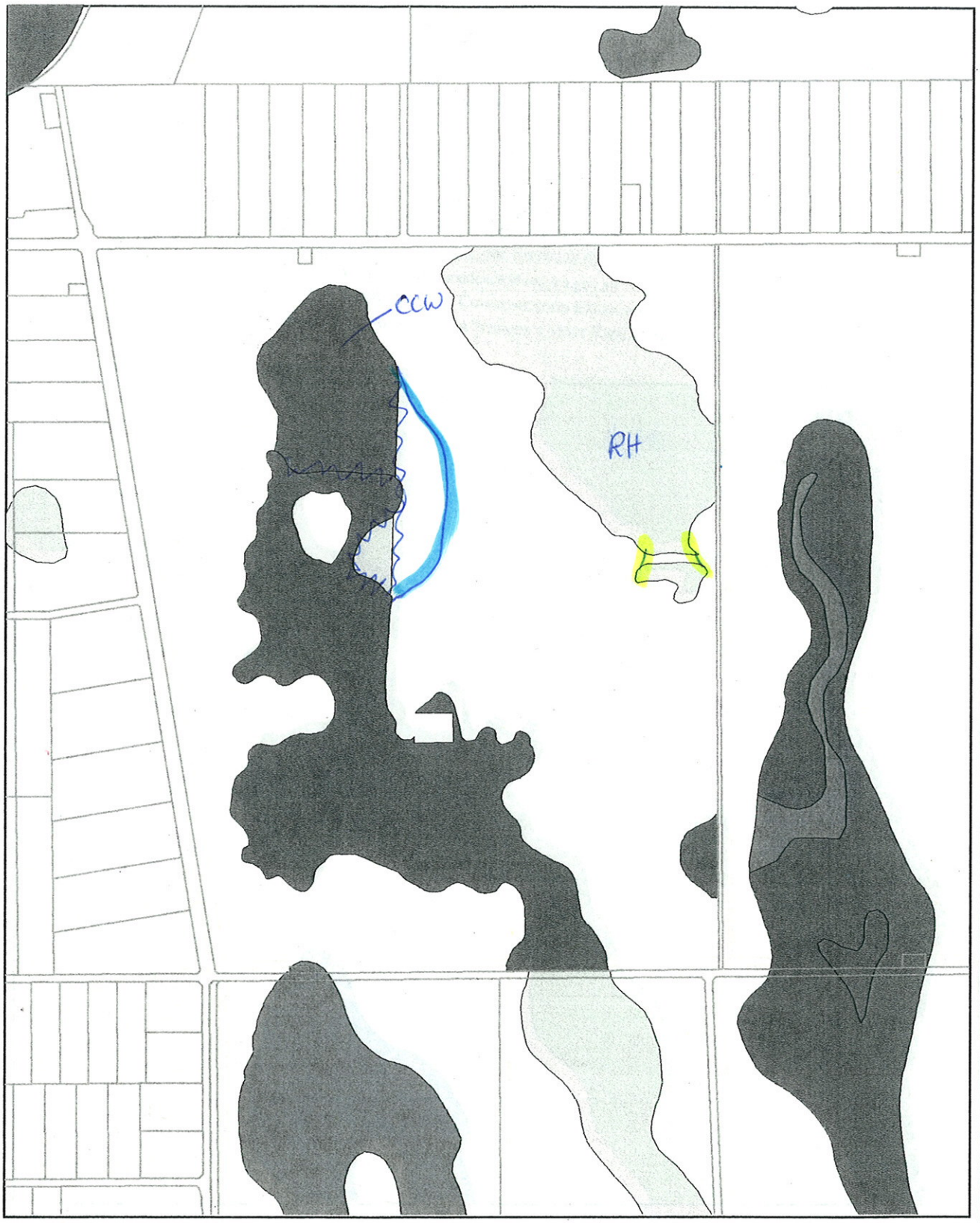
This map is a product of Water and Rivers Commission, Policy and Planning Division and was printed on 15-08-2001.

This map was produced with the intent that it be used for alteration to the Gnangara wetlands area, at the scale of 1:15 000.

While the Water and Rivers Commission has made all reasonable efforts to ensure the accuracy of this data, the Commission accepts no responsibility for any inaccuracies and persons relying on this data do so at their own risk.

Alterations to Wetlands Management Categories near Gnangara Road Bush Forever site 196

POLICY AND PLANNING DIVISION



LEGEND

- Cadastre

Wetlands classification

- Conservation
- Multiple Use
- Not Assessed
- Rehabilitation

Scale 1:15 000

100 0 100 200 300 400 500 Metres

Projection Information

Vertical Datum: Australian Height Datum (AHD)
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BS 196

PBO55

295

Submission on Perth's Bushplan
by
The Bennett Brook Catchment Group

The Bennett Brook Catchment Group wish to commend the State Government on the production of Bushplan, which has a high standard of scientific data, and is very well researched It is extremely important to protect the remnant bushland on the coastal plain before it is irretrievably degraded. The System 6 recommendations were designed to do the same thing, however as they were not implemented, many areas recommended or protection have since disappeared.

The catchment group wishes to draw the following points to your attention:

- It is vital that interim protection in legal terms is given to all Bushplan sites. This may take the form of statutory regulations under the Environmental Protection Act and may be assisted by the use of Planning Control Areas under the Metropolitan Region Town Planning Scheme. The creation of a new category such as Bushland Conservation Zone should be created under the MRS.
- It is also vital that Bushplan be implemented in full as soon as possible. 10 years for implementation is too long, and the aim should be for 4-5 years. The funds set aside for implementation are inadequate, and need to be tripled. This may need to be funded through an environmental levy.
- It is important to introduce Land Clearing Controls through legal regulation, as suggested on p32 (Vol. 1), however it must apply to all levels of government as well as to private landholders, and must have legally enforceable penalties to be effective.
- It is important to launch a major community awareness program about the value of local bushland, and to make the community aware of the unique nature of our flora and fauna and the threats to it.
- Support for private landholders should be increased, through mechanisms such as Land for Wildlife run by CALM.
- The Ministry for Planning currently has a number of policies and plans which need to be integrated ie Bushplan, Livable Neighbourhoods, Greenways, Model Scheme Text, Urban Bushland Policy

The following sites are within the Bennett Brook Catchment, and we wish to make specific comment about them. The catchment group is currently involved in restoration programs in some of these areas, and is keen to assist with the management of the others.

1. Bushplan site [illegible]96: Gnangara Rd Bushland
This area is an important link with Whiteman Park. The area needs to be managed by the landholders for conservation

2. Bushplan site [illegible]: Beechboro Rd Bushland
Another important link with Whiteman Park. The area needs to be vested in a body able to manage it for conservation, in conjunction with the Aboriginal community.

3. Bushplan site [illegible]04: Whiteman Park
Whiteman Park has important areas for bushland conservation. It is important that future developments in the Park do not compromise the integrity of the conservation values. The Ministry for Planning need to allocate more resources to the Park for management of its bushland. The Park is linked to the Swan River via Bennett Brook.

SUBMISSION NO 48

Site 3
SW corner
Marri / Banksia Woodland - Vertnitens
Burnt ± 2 yrs ago

Driving nth along
Eastern Boundary - Southern ½ section
Same as Sites 1 (& 2 if burnt)

occ. Allfras in Site 1/3 type areas
Condition decreases as move north - weedy grasses -
Airacary mainly in understorey ie herb layer
"replaced" by weedy grasses.

(A) Dampland same as Site 2. c emergent Marri & Mel preis.
Slashed for aerial array

(B) Marri / Banksia uplands - same as Site 1/3
Excellent - V good cond

(C) Banillic area - v. bare, not obvious
weed invasion, lots of regen. eg Vartnit
seedlings everywhere

(D) Transitional vegn dl/Bw - v. bare & open - fire?
herb layer not present due to season
& lots of weedy grasses (mainly Aira sp) ~~have~~ are ~~coming~~ replacing
herb layer in bare areas. Lots Kanga activity
Very good condition.

(E) NW Corner block exc - prist
Same vegn as Site 1 but only occ. Eucal. in most of block.
Xanpre dominant in understorey in lower areas & then Allohum etc in understorey in higher areas

Occ Eucmarg in NE block of NW side.

Site Visit - KC, SC, SS

9.30 - 4.00 pm

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA BS196 SITE NUMBER 1

DATE TRIP 24/2/00 RECORDERS K. Clarke

DATE TRIP ______ RECORDERS ______

DATE TRIP ______ RECORDERS ______

BOTANIST ______

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

1. LOCATION of the QUADRAT

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

N

see photo.

(See addition notes for Site 1a Photo 10)

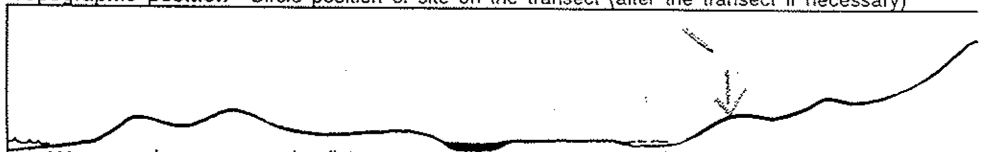
Road Location Gnangara Rd & Alexander Drive

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name K.Clarke Photo No 8

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



2. SITE DATA Circle the correct response.

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

Surface Soil Grey sand ***Colour***

Exposed rock type N/A ~ 0 % surface

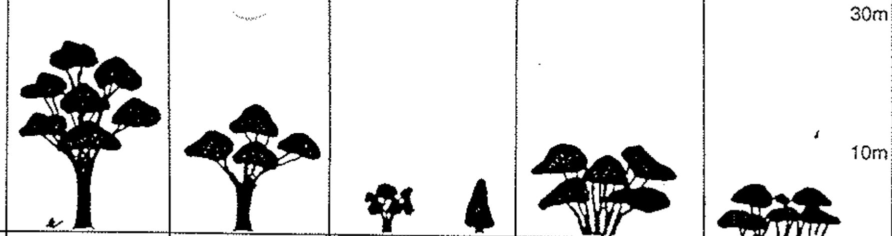
Sub-surface Soil Grey sand - ant hills ***Colour***

Rock type ~ N/A depth to rock

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

Litter 10-20 % cover ***Bare Ground*** <5 %cover

Depth 1-2 cm

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

	SHRUBS over 2m	SHRUBS 2m - 1m	SHRUBS under 1m
LIFE FORM			
COVER CLASS (%)	~~Allo~~ 10-30%	10-30%	10-30%
DOMINANT SPECIES	Ado eug	Alloc hum	Hibb hyp
		Xan brun ?	

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				
COVER CLASS (%)	2-10	2-10%	30-70	
DOMINANT SPECIES	Brimax	~~Petase~~	Alex nit	

4. VEGETATION CONDITION

		COMMENTS
1	'PRISTINE'	Exc - V.good - patches of severe loc. dist. at edges due to clearing for old rhombic ~~ae~~ antennas.
2	EXCELLENT	
3	VERY GOOD	
4	GOOD	
5	DEGRADED	

Lygbar, Jackdens, Burch cong, Pat occ, Stirlat, Pet lin, Macred, Dasbrom, Lom sp, Bos eric, Dam lin, Brizmax, Erh calyc, Glad cary., * Per sac

Lots of bird activity.

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA BS196 SITE NUMBER 2

DATE TRIP 24/2/00 RECORDERS

DATE TRIP RECORDERS

DATE TRIP RECORDERS

BOTANIST

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

1. LOCATION of the QUADRAT

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

N

see air photo

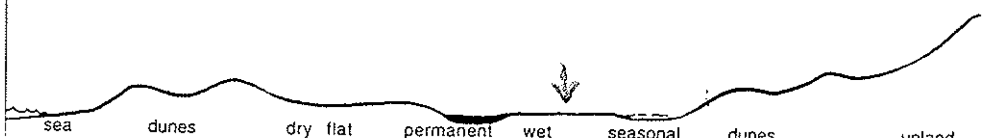
Road Location same as site 1

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name K. Clarke Photo No 11

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



2. SITE DATA Circle the correct response.

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

Surface Soil Light grey sand ***Colour***

Exposed rock type N/A % surface

Sub-surface Soil Dark grey sand ***Colour***

Rock type N/A depth to rock

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

Litter ~30 % cover ***Bare Ground*** ~10 %cover

Depth <1 cm

	TREES over 30m	TREES 10 - 30m	TREES under 10m	MALLEES over 8m	MALLEES under 8m
LIFE FORM (30m, 10m)					
COVER CLASS (%)			<2 (very scattered)		
DOMINANT SPECIES			Mel prei		

	SHRUBS over 2m	SHRUBS 2m - 1m	SHRUBS under 1m
LIFE FORM (2m, 1m)			
COVER CLASS (%)			10 - 30
DOMINANT SPECIES			Mel sp B. (Regent domin in patches)

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM (1m)				
COVER CLASS (%)	2-10	30-70	10-30	
DOMINANT SPECIES	Aira caryph	Phl cil Dos brom	Lys bar Alex nit	

4. VEGETATION CONDITION

		COMMENTS
1 'PRISTINE'		Cleared in past? Grazed? Regenerating well.
2 EXCELLENT		V. good - good, Burnt >5 yrs ago,
3 VERY GOOD		Grazing by Kangs having major
4 GOOD		impact, grazing weeds all over
5 DEGRADED		X patches

Kangaroo droppings > grazing

Lyg bar, Xanbrun?, Mel scab?, Haemspic, Hibbsubu, Dos brom, Orylind, Lyg imb, Hyp angust, Briz max, Aira caryph, Petvel?, Urs anth, Car edu, Erhcal,

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA 35196 SITE NUMBER 3

DATE TRIP 24/2/00 RECORDERS K. Clarke

DATE TRIP ______ RECORDERS ______

DATE TRIP ______ RECORDERS ______

BOTANIST ______

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

1. LOCATION of the QUADRAT

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

N

see photo

Road Location Gnangara Rd.

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name K. Clarke Photo No 12

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

2. SITE DATA Circle the correct response.

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

Surface Soil light grey sand *Colour*

Exposed rock *type* % surface

Sub-surface Soil Dark grey sand *Colour*

Rock *type* depth to rock

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

Litter <5 % cover *Bare Ground* 20 %cover

Depth 1 cm

	TREES over 30m	TREES 10-30m	TREES under 10m	MALLEES over 8m	MALLEES under 8m
LIFE FORM (30m / 10m)					
COVER CLASS (%)		2-10%	30-70%		
DOMINANT SPECIES		Euccal	Banatt		

	SHRUBS over 2m	2m - 1m	SHRUBS under 1m
LIFE FORM (2m / 1m)			
COVER CLASS (%)			30-70%
DOMINANT SPECIES			Xanpre/brun

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM (1m)				
COVER CLASS (%)	<2%	10-30%	2-10%	
DOMINANT SPECIES		Patocc	Desfasc	

4. VEGETATION CONDITION

		COMMENTS
1	'PRISTINE'	6mths-1yr
2	EXCELLENT	V. good-Ex-burnt recently, recovering
3	VERY GOOD	well little weed invasion (only around rabbit burrows)
4	GOOD	
5	DEGRADED	

Rabbit burrows - Airacarph & Carpedu on mounds

Adecyg, Lysinema cil, Drylind, Petlin, Dasybrom, Schinv, Tricoryne elat. Rogcil, Xanpre/brun, Nytflor, Vertnit, Carpedu (Banillic, Melpreis - edges) Baumen

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA BS196 SITE NUMBER 4
DATE TRIP 24/2/00 RECORDERS K. Clarke
DATE TRIP ____ RECORDERS ____
DATE TRIP ____ RECORDERS ____
BOTANIST ____

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

1. LOCATION of the QUADRAT

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

N

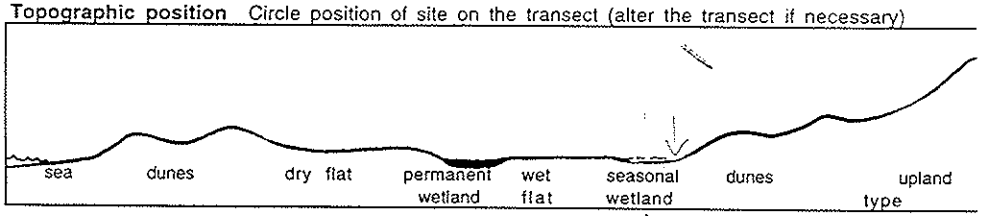
see photo.

Road Location Carrington Rd

Geographic Location Latitude S Longitude E Altitude
Reference Map

Photograph Photographer's Name K Clarke Photo No 13 & 14

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



2. SITE DATA Circle the correct response.

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

Surface Soil Grey sand *Colour*
Exposed rock *type* % surface

Sub-surface Soil Grey sand *Colour*
Rock *type* depth to rock

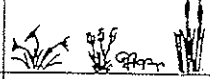
Drainage well (mod) poor depth water cm *Wet* all year winter/spring

Litter <5 % cover
Depth cm

Bare Ground Variable %cover

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

	over 2m	2m - 1m	SHRUBS under 1m
LIFE FORM			
COVER CLASS (%)			70-100%
DOMINANT SPECIES			RegCil Hypang

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				
COVER CLASS (%)	<2%	10-30%	<2%	
DOMINANT SPECIES		Phl cil Pat occ Dasbro		

4. VEGETATION CONDITION

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

COMMENTS
Exc - V. good, burnt v. recently in patches (see photo 13)

Calfras, Periellip, Vert sp (pink), Dav sp, Hypang, Dasbrom Patocc, Phl cil, Schinu, Xanlonz Melscab, Calfras, Acasten
Rabbit/Kang diggings (prob Inter)

0 in dense RegCil to ~10% in Phl cil/Patocc/Dasbro areas.

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA 35196 SITE NUMBER 5

DATE TRIP 24/2/00 RECORDERS K. Clarke

DATE TRIP ______ RECORDERS ______

DATE TRIP ______ RECORDERS ______

BOTANIST K. Clarke

1. LOCATION of the QUADRAT

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

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

N

See photo.

Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name K. Clarke Photo No 17

(Photo 18 – Vertnit along "firebreak")

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

sea | dunes | dry flat | permanent wetland | wet flat | seasonal wetland | dunes | upland type

2. SITE DATA Circle the correct response.

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

Surface Soil Grey sand *Colour*

Exposed rock *type* % surface

Sub-surface Soil Grey sand *Colour*

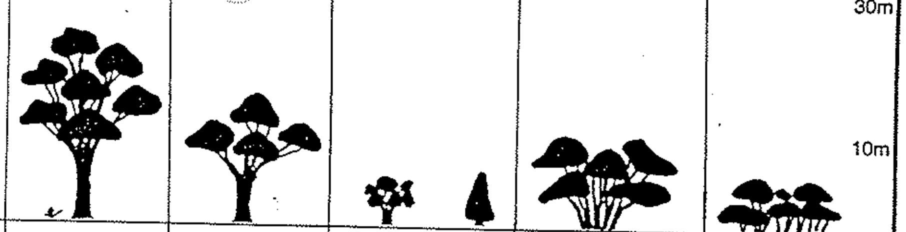
Rock *type* depth to rock

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

Litter % cover *Bare Ground* %cover

Depth <1 cm

	TREES over 30m	TREES 10-30m	TREES under 10m	MALLEES over 8m	MALLEES under 8m
LIFE FORM					
COVER CLASS (%)			10 – 30%		
DOMINANT SPECIES			Banatt Banmen (some Euc tod & Banilic)		



	SHRUBS over 2m	2m - 1m	SHRUBS under 1m
LIFE FORM			
COVER CLASS (%)			10 – 30%
DOMINANT SPECIES			Ere pauc. Sch inv Xan pre/bra (some have trunks)

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				
COVER CLASS (%)	<2%	30-70%	<2%	
DOMINANT SPECIES		Patocc Phlcil Dasybrom		

4. VEGETATION CONDITION

		COMMENTS
1	'PRISTINE'	
2	EXCELLENT	Exc-prist burnt ~ 5 yrs ago, regeneration very well!
3	VERY GOOD	
4	GOOD	
5	DEGRADED	Kang digging/droppings, odd patch of Erinax

Dam lin, Cal fra, Wel scab!, Daw trif at low density. Lech mutt? Cal flav, Amph turb (grass), Epacrid, Jacksdens, Lepang/squa?! Vertnit, Nytflor & Dasbrom, Phlcil (red bases), Haemspic, Petlin, Lygbarb, Pers sacc, Allachim

Lots of seedlings eg Banatt

BUSHLAND PLANT SURVEY RECORDING SHEET 1- use pencil only

BUSHLAND AREA _____ SITE NUMBER _____

DATE TRIP _____ RECORDERS _____

DATE TRIP _____ RECORDERS _____

DATE TRIP _____ RECORDERS _____

BOTANIST _____

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

1. LOCATION of the QUADRAT

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

N

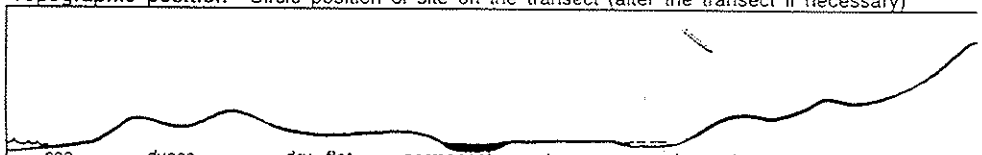
Road Location

Geographic Location Latitude S Longitude E Altitude

Reference Map

Photograph Photographer's Name Photo No

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



2. SITE DATA Circle the correct response.

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

Surface Soil *Colour*

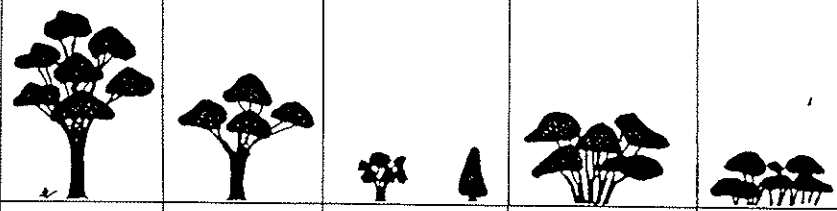
Exposed rock *type* % surface

Sub-surface Soil *Colour*

Rock *type* depth to rock

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

Litter	% cover	*Bare Ground*	%cover
Depth	cm		

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

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

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

4. VEGETATION CONDITION

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

✓ V92 Descriptions updated ✓

DEP SYSTEM 6/BUSHPLAN – SURVEY SHEET B.J. KEIGHERY 6/97

BUSHLAND AREA BS196 Telecommunications SITES YES/NO

DATE 23 January 1998 RECORDERS Corina + Natalie

Observations (edge) transects

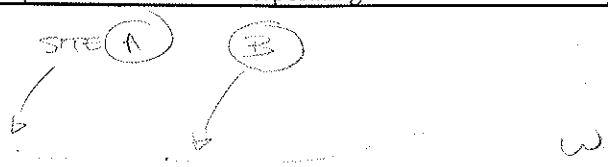
Geographic Location	Latitude	S Longitude	E
Reference Map			

Photograph	Photographer's Name	NATALIE	Photo No	(A) 26	(B) 27	(C)	(D) 28	(E) 29	(F) 30

Covered

Transect of landscape units (draw in transect incorporating features listed and any other relevant unit)

dunes
dry/wet flats
sumplands
uplands
type



Soil - surface	grey sands, ~100cm	sub -soil
Exposed rock	type	% area

FLORA/VEGETATION (list dominant and significant plants below, see over for vege association descriptions)

Eucalypts	*E. calophylla*	*E. wandoo*	*E. marginata*	*E. todtianna*	*E. rudis*	
	E. decipiens	*E. drummondii*	*E. haematoxylon*	*E. lanepoolei*	*E. gomphocephala*	
	E. accedens	*E. patens*	*E. laeliae*	*E. megacarpa*		
Sheoaks	*Allocasuarina fraserana*		*Casuarina obesa*			
Banksia	*B.attenuata*	*B. menziesii*	*B. prionotes*	*B. illicifolia*	*B. grandis*	*B. littoralis*
Melaleuca	*M. preissii*	*M. rhaphiophylla*	*M. lanceolata*		*M. cuticularis*	
Others	*Callitris preissii.*					
Mallees	Eucalypts	*E. argutifolia*	*E. petrensis*	*E. decurva*	*E. foecunda*	*E. latens*

SIGNIFICANT SPECIES / DOMINANT SPECIES

Xanthorrhoea
Nuytsia floribunda.

(see over for vegetaion descriptions)

Vegetation Condition - Keighery 1994 (Trudgen 1993) (show range and indicate predominant class)

1 = 'Pristine' (Excellent)
2 = Excellent (Very Good) EXCEL + VG + EXCELLENT
3 = Very Good (Good)
4 = Good (Poor)
5 = Degraded (Very Poor)
6 = Completely Degraded

Specific aspects of disturbance

partial clearing

weeds (list):

selective removal of species: timber cutting mowing fire grazing dieback %area

fire frequency: (D) burnt ≈ 2-5yrs

'enrichment plantings' (list)

animal impact: horse foxes rabbits cats dogs goats pigs overgrazing by native mammals

soil movement: mining dumping rubbish dumping roadworks

changes in water regimes: flooding drainage watering nutrient influx

Tracks: fire breaks walk trails off road vehicle use animal tracks

Service corridors: SEC Main Roads Water Authority. Telecom

Other

VEGETATION (describe each unit of vegetation using dominants and life form/height class and canopy cover according to the Muir/Keighery codes above)

(A) Mixed Euc calo open woodland (>10m <10%)
w/ occ ① Euc marginata (>10m) <2%
② Allocasuarina fraseriana
Melaleuca preissii TOLW (3-4m) 5%
understorey of XD. 1.5m 50%
③ Banksia ilicifolia
- occ. Adenanthos cyg on edges
- Macrozamia reidlei
occ Banksia littoralis (4m)
occ. Jacksonia sternbergiana
occasionally to 8m
(B) open wetland area
Mel. preissii (3-5m) <10%
occ Jacksonia - Nuytsia floribunda

dense Xanthorrhoea (1m) 15%
Dasypogon (0.5m) 20%
Stirlingia
~~Melaleuca~~ → 0.5m = Eremaea
Calytrix 0.5m
comment: similar to (B) with
(C) More Battery + B menz on corner of Marangaroo + Alexander Drives

Banksia open woodland

(D) Bm + Ba woodland w/ occ emergent Euc. calo (<6m)

- with mixtures of Banksia ilicifolia + Euc. todtiana
occ Nuytsia
occ Macrozamia
Mainly Xanthorrhoea, Hibbertia [illegible]

Fauna comments Daviesia 2%

Sedges 15-20% Lyginia + Loxocarya
Desmocladus (N boubata)
Phlebocarya linearis

Adjacent bushland (refer to aerial photograph)

OTHER COMMENTS

BS196

(E) photo 29

S.W. corner
– similar to (D) but with ↑↑↑ Verticordia nitens
+ ↑d B. illicifolia

... Melaleuca preiss. also creeping in on edges

WETLAND | HEATHLAND WITH EMERGENT TREES

Verticordia nitens (1–1.4m) 60%
Xp
Patersonia
Lepidosperma ?angustatum
Dasypogon brom
Pelaphile linearis

occ emergent Aden cyg + B. illic + Bm + M. preiss
4–6m

(F) Ph 030

i.e. mixed woodland of Bm, Ba, Mp w/ emergent Ec.

Euc calophylla 8m 2%
over Mel preiss, Bank att., Bank menz. 4m 30%
occ. N. f
occ B ill.

X ?? gracilis (60–1m) 40%
Schoenus + Alexgeorgea (10–15) 5–10%
Verticordia (60–1.2) 2%
Stirlingia lat (0.5) <1
Patersonia
Adenanthos (15–2) 2%
v. occ ~~tall~~ tall X ?p.

✳ Urban Fire Control Slashing Document

Perth ITC

Grounds Slashing Program

2/4/ ...

Commencing November 2000

Slashing vegn to what height above ground? "Mulch"/Slashed material being removed or left on ground (fire hazard)? If to be removed use for reveg. – spread on old firebreaks.

Need a diagram showing exact extent of slashing prop.

SLASHING OF THE PERTH ITC BOUNDARY FIRE BREAKS

Note that there is NO ploughing of firebreaks required.

1. Boundary Fire Breaks

North Boundary	1,700 metres long	10 metres wide
South Boundary	1,400 metres long	10 metres wide
West Boundary	1,967 metres long	3 metres wide
East Boundary	1,967 metres long	20 metres wide

- The West boundary fire break is to be slashed **3 metres** where possible on the west side (outside) of the 1m high chain link fence. The areas where the slasher cannot reach due to the narrowness of the boundary are to be slashed with a brush cutter or similar machine. The east side of this fence is not be slashed.
- The South boundary fire break is to be slashed **3 metres** wide on the south side (outside) of the boundary fence.
- The South boundary fire break is to be slashed **10 metres** wide on the north side (inside) of the boundary fence. ← OK
- The East boundary fire break is to be **totally** slashed between the boundary fence and the limestone road, and the the East side of the Transmit Aerial Farm safety fence. ← OK
- On the West side (inside) of the Transmit Aerial Farm safety fence, **3 metres** wide slashing is required. ← OK
- The North boundary fire break is to be slashed **6 metres** wide on the north side (outside) of the 1m high chain link fence.
- The North boundary fire break south of the 1m high chain link fence (inside) is to be **totally** slashed. ← OK
- The South side (inside) of the Transmit Aerial Farm safety fence is to be **6 metres** wide. ← OK

2. Main North/South and East/West Fire Breaks

These fire breaks are **NOT** to be slashed and are to be allowed to re-vegitate. ✓ Good

3. Other Fire Breaks

Adjacent Entry Road	1,400 metres long	12 metres wide
Around ESA Antenna	300 metres long	20 metres wide
Adjacent South Road	570 metres long	40 metres wide
Inside Transmit Antenna Farm	900 metres long	5 metres wide
Main Compound Fence	1,800 metres long	5 metres wide
Telesat Compound	340 metres long	5 metres wide

- The fire break either side of the Main Entry Road is to be **totally** slashed.
- The area around the ESA compounds and the ESA roads are to be slashed **12 metres** wide.
- The fire breaks on either side of the South Road (lime stone road) are to be **totally** slashed.
- The fence line around the Microwave Hut is to be slashed **6 metres** wide on the outside only, and the **entire** inner compound of the Microwave Hut is to be slashed by the use of a brush cutter.
- The fire break all around the main inner compound fence is to be slashed to approximately **6 metres** wide on the outside only.
- The fire break all around the Telesat Canada compound is to be slashed to **6 metres** wide on the outside only.
- The Telesat / Receiver Hut road is to be slashed **3 metres** wide on either side, up to the end of the bitumen section, then **6 metres** wide on either side of the limestone road section to the Receiver Hut.

Radio Services
Slashing Program

NO GO SITE PLAN

Refer to the site plan with RED markings which show areas of NO-GO within the HF Transmit Antenna Farm. These services must be turned off in a controlled manner by Radio Services technical staff to enable the contractor to access the area to commence slashing work.

1. BCMP AERIALS No.'s 1, 2, 3, 4, & 5
For each aerial, the guy wire anchor points are considered the safe outer perimeter. Entry within this perimeter is to be undertaken only when the service is turned off.

2. BOW TIE AERIAL
The base of each mast, the guy wire anchor points and the centre feeder posts are all of concern. Therefore the perimeter of each mast's anchor points and a line 5 metres wide directly between both masts is considered the safe outer perimeter. Entry within this perimeter is to be undertaken only when the service is turned off.

3. OPEN WIRE FEEDERS IN THE SOUTH WEST CORNER
Due to the complexity and multitude of services in this area, a larger perimeter boundary has been established. Entry within this perimeter is to be undertaken only when the services are turned off in a rotating program. This would be considered the most disruptive area (for Telstra and the contractor) within the property.

4. LP MASTS
An area 3 metres wide around the mast is considered the safe outer perimeter boundary. Entry within this perimeter is to be undertaken when the service is turned off.

5. WAAMA
The WAAMA broadcast transmit aerials have significant areas of concern. The entire area around and between both masts is considered the safe outer perimeter boundary. Entry within this perimeter is to be undertaken only when the service is turned off.

HF Aerial Farm Slashing

- This work is not easily measurable due to the numerous variations in the size for the radio masts and guy wires.

- Each radio mast, guy wire anchor block and feeder poles are to have the surrounding vegetation cut by the use of a brushcutter as part of this contract.

- Periodically requests will be made to remove vegetation from within the antenna farm around live transmit aerials. This will require involvement of the Radio Services technical staff to work with the contractor to shut down transmitters and to ensure a safe working environment.

- The receiver hut compound fence line is to be slashed **6 metres** wide on both sides. The **entire area** within the Receiver Hut compound is to be slashed. where is this?

- In the Transmit Aerial Farm, an area no less than **6 metres** shall be slashed and kept clear of all vegetation from each side of all feeder lines, masts, anchor blocks, guy wires and under each side of of antennae, and as directed. * does leave anything unslashed?

- The areas beneath '**all**' aerials and feeders are to be slashed as per the attached diagrams.

- The **entire area** within the Bullsbrook microwave mast guy wires is to be slashed and kept clear of all vegetation to a distance of **6 metres** outside the guy wires. The compound at the base of the mast is to be slashed with the aid of a whipper snipper and kept clear of all vegetation.

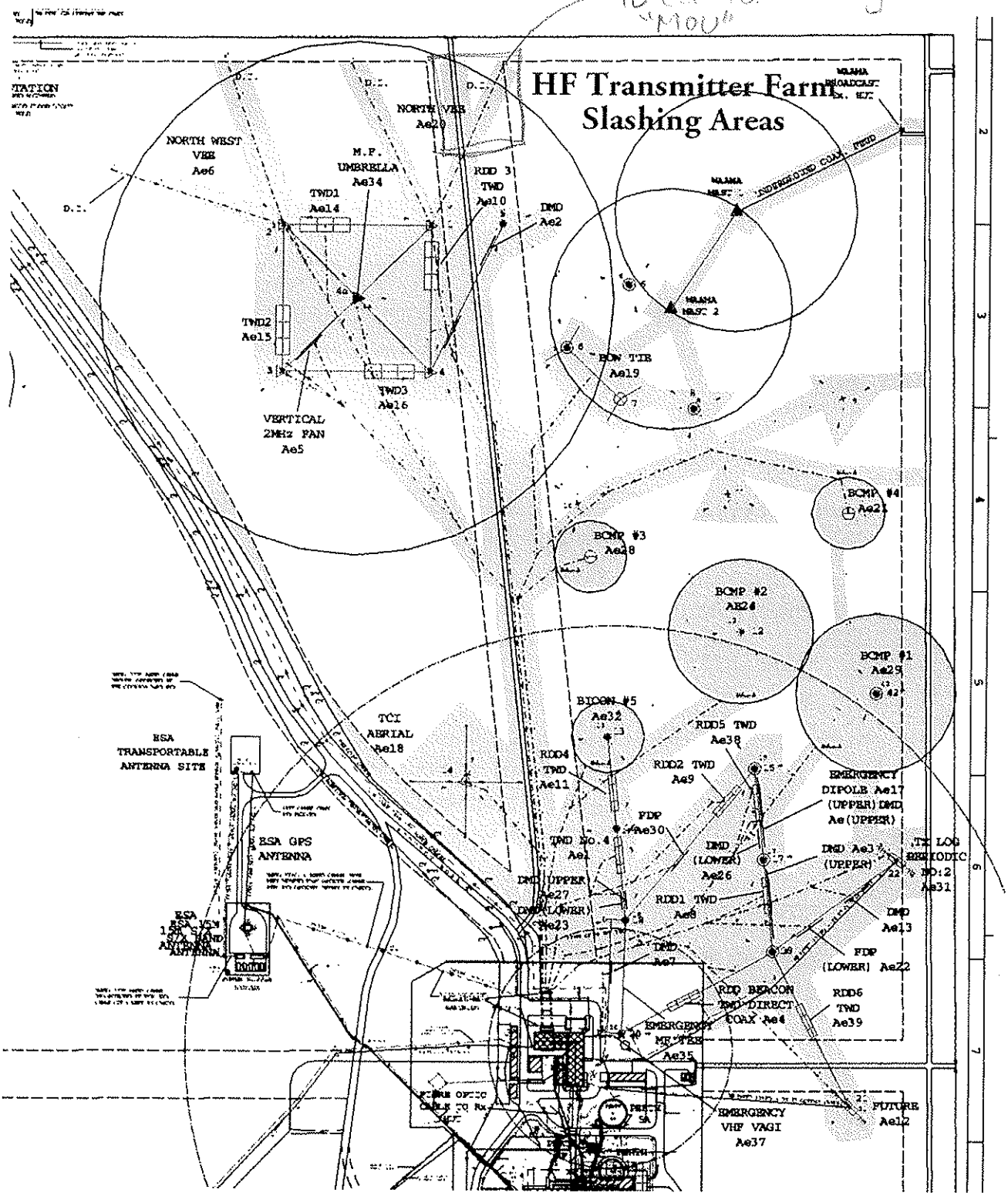
- The area around the receive bi-conical monopole aerial is to be slashed and kept free of vegetation within the guy wires, **6 metres** outside of guy wires and all feeder lines.

The above slashing program has been prepared by, and agreed to by the following parties:

Reg Jones Facilities & Administration PITC	John Holt Manager Perth ITC	Keith Walsh Manager Radio Services
Date:_____	Date:_____	Date:_____

Need a diagram showing exactly the extent of the clearing prog.

* ID'ed for reveg in "MOU"



2 Antenna Farms

1) Transmitting farm (largest)

2) Radio Receivers

? Doesn't show 6m wide slash zones ?

DRAFT PERTH'S BUSHPLAN -

PRELIMINARY VEGETATION ASSESSMENT OF PART BUSHPLAN SITE 196 – GNANGARA ROAD BUSHLAND, LANDSDALE/CULLACABARDEE TELSTRA'S PERTH INTERNATIONAL TELECOMMUNICATIONS CENTRE IN RELATION TO A PROPOSED NEGOTIATED PLANNING SOLUTION

Department of Environmental Protection
B. Keighery and K. Clarke
May 2000

NB:This is informal advice and should not be regarded as formal Section 38 advice under the Environmental Protection Act but represents DEP Bushplan advice subject to ratification through Coordination Group sign off.

BACKGROUND

Telstra's Perth International Telecommunications Centre (PITC) is approximately 80% of Bushplan Site 196. Telstra would like to further develop this land as part of its role as a International Communications Centre. The majority of the area of the PITC is identified in the draft Perth's Bushplan (November 1998) as being bushland (see Map 1) and is therefore identified as part of the Bushplan Site.

Prior to the release of the draft Perth's Bushplan survey by DEP of the PITC land was limited to edge inspection (see Appendix 1). Additional information on the PITC land was available from Mattiske Consulting Pty Ltd (1997, see Appendix 1).

In October 1998 Dames and Moore carried out a limited flora and vegetation survey of the PITC land and the block to the east (Dames and Moore 1998). This study was a component of a Consultative Environmental Review concerning the expansion of the PITC area (BSD 1998). Part of the eastern proposed expansion area is identified in Bushplan Site 196 (see Map 1). The CER was not completed as the expansion proposal was not pursued. Information from this study was not used in the draft Perth's Bushplan (November 1998) as it was not available until after Bushplan's release.

A field inspection of the PICT land was made by Karen Clarke and Sean Collingwood (MfP) and Sandra Santich (DEP) on 24th February 2000. Approximately six and half hours was spent traversing the bushland by vehicle and on foot. This study was limited by the following issues:

- Being February there were relatively few plants flowering and annually renewed plants were dormant. Therefore, vegetation condition assessments may be subject to revision on a mid/late spring inspection.
- Access to the north east corner of the PITC land was restricted due to radiation hazard and survey was limited to fence line inspections.

For the purposes of this report the area of the PITC land is divided into four sections formed by the central east/west and north /south firebreaks (see Map 1). The north east and south east quadrants are further divided by a second north/south firebreak and the north east quadrant is again divided by the access road.

SITE FLORA AND VEGETATION VALUES

The native vegetation on the majority of the area of the PITC land investigated meets the criteria for regionally significant bushland(see Appendix 1) and as such is suitable for inclusion in the Bushplan Site. While there is a section of native vegetation in the north east quadrant that has been significantly altered from its natural state (all trees appear to have been felled and the shrub/herb/sedge layers are kept mown) it appears to retain sufficient native species to be able to able to regenerate to its natural condition and should be retained in the Bushplan Site. That is the boundaries of the Bushplan Site on the PITC land as depicted in the Draft Perth's Bushplan are generally supported, except for the area of bushland now cleared for the Telesat Antenna in the south east quadrant (see Map 1).

Further consideration of the type and quality of the bushland in the PITC land as described in the Dames and Moore (1998) and Bushplan 2000 studies (DEP 2000) is treated under a series of attributes.

Structural Vegetation Units

The 1998 Dames and Moore report briefly describes and maps vegetation (see Map 2) on the PITC land. The units of vegetation identified by Dames and Moore on the PITC land are consistent with those described in Perth's Bushplan, the area being broadly divided into uplands and wetlands with the following vegetation

Uplands: Woodland to Low Woodlands dominated by combinations of *Eucalyptus calophylla, E. marginata, Banksia menziesii, B. attenuata* and *B. ilicifolia* over a variety of species rich shrublands, herblands and sedgelands.

Wetlands: Woodland and Low Open Forest and Low Woodlands and/or Open Woodland to Low Open Woodlands dominated by *Melaleuca preissiana, Eucalyptus calophylla* and *Banksia ilicifolia*, (*Banksia attenuata* and *B. menziesii* may also be present); Open Heaths or Closed to Open Low Heaths dominated by *Verticordia nitens, Astartea* aff. *fascicularis, Hypocalymma angustifolium* and *Pericalymma ellipticum*; Mixed Sedgelands of *Lyginia barbata* and *Loxocarya flexuosa*

(More detailed descriptions of the units can be found in the Dames and Moore report, Draft Perth's Bushplan (see Appendix 1) and Appendix 2).

While the general nature of the vegetation described is consistent between the two studies there are some differences in the extent of these units as interpreted by DEP and Dames and Moore (see Maps 2 and 3). Both studies map a significantly larger area of wetland vegetation than is described in the wetland mapping of the Swan Coastal Plain (Hill *et. al.* 1996b, see Map 4). Further consideration of the extent and quality of the wetland units is given in the following sections on Vegetation Condition and Wetlands.

Floristic Community Types

Perth's Bushplan records that four floristic community types are expected to occur in the area (see Appendix 1). While the 1998 Dames and Moore report lists the same four floristic community types as occurring in the area an additional floristic community type, floristic community type 20a – *Banksia attenuata* woodlands over species rich dense shrublands is identified as possibly being present. Floristic community type 20a is a *Banksia* woodland type that occurs on Spearwood Dunes in the general area of this Bushplan Site (see Bushplan Site 201 to the south-west) and is also recorded on the eastern margins of the Bassendean Dunes and the Foothills. Field inspections for the Dames and Moore study were carried out over a longer period and a more suitable time of the year (three days - 25 June, 15 September and 1 October 1998) and would be expected to record the nature of the various *Banksia* dominated woodlands in more detail. However the information in the Dames and Moore report is not sufficient to be able to be conclusive in this interpretation. Further plot based work is required to conclusively identify the various *Banksia* dominated floristic community types in the PITC land.

The presence of floristic community type 20a would enhance the already considerable values of the Bushplan Site as there are few Bushplan Sites with this combination of *Banksia* dominated woodlands and floristic community type 20a is a threatened ecological community being highly restricted in its current distribution.

Wetlands

Two Resource Enhancement wetlands are mapped for the PITC land (see Appendix 1 and Map 4). Both the Dames and Moore survey and the Bushplan survey have identified a greater area of wetland and additional wetlands within the PITC land (see Maps 2 and 3). Both studies consider the vegetation on the majority of wetlands as being of a quality (Excellent to Very Good and Excellent to Pristine condition) and type that warrants their recognition as Conservation Category wetlands. The presence of Conservation Category wetlands enhances the already considerable values of the Bushplan Site.

The Bushplan 2000 survey maps a greater area of wetland in the north east quadrant (see Map 3) than is depicted in the Dames and Moore study (see Map 2). This is further complicated as the Dames and Moore study maps the majority of this area as 'already developed' and thus excludes the area from the vegetation and vegetation condition maps. While this area is 'developed' it still contains native vegetation (see previous discussion) and is of a type (contains scattered *Melaleuca preissiana)* that places the area as a wetland. The quality and type of vegetation of this wetland places it in the Resource Enhancement category.

It is not uncommon for detailed inspections of bushland areas to map a greater area of wetlands than has been depicted on the general wetland mapping of the Swan Coastal Plain as the base mapping for the study was done on aerial photographs and contour maps. The transitional nature of the wetland vegetation (areas where *Banksia* woodlands merge with wetland vegetation, see Map 2) in the PITC lands would have compounded the problems in interpreting aerial photographs. In addition possible water draw down and the presence of dieback (Dames and Moore 1998) further complicate interpretation of wetland boundaries.

Vegetation Condition
Survey work by Dames and Moore and Bushplan 2000 have recorded the PITC land vegetation as being in generally excellent to very good condition with some areas where there is no obvious disturbance that could be classed as Pristine. These more detailed inspections support the condition assessments in Draft Perth's Bushplan (see Appendix 1) based on aerial photograph interpretation and fenceline inspections. Adjacent Bushplan Sites (Bushplan Site 193 to the north and Bushplan Site 198 to the south) which have similar values to Bushplan Site 196 are of a lesser condition generally than Bushplan Site 196, enhancing the already considerable values of this Bushplan Site.

While the Bushplan 2000 survey reports on the generally excellent to very good condition of the vegetation there are some activities/developments in the PITC land that over time will lead to bushland degradation. These activities/developments include: increasing fragmentation of the area by firebreaks, service corridors, developments and roads; intensity of the kangaroo grazing; design of firebreaks (traverse dieback free and dieback areas) and management of firebreaks. The impact of these activities/developments could be very much reduced by locating any future proposed developments in distinct nodes in already disturbed areas and by using disturbed areas for the location of services. For example, the Telesat Antenna was located near the core of an intact bushland area, not in already existing degraded land on the fire break between the quadrants or the firebreak within the south east quadrant. Also the service corridor for the Antennae appears to have been located parallel to an existing corridor.

Flora
The 1998 Dames and Moore report lists 'common and typical' species for the PITC land and considers that there is suitable habitat in the area for the Priority 4 species *Stachystemon axillaris* and *Conostephium minus*. Plot based work on Bushplan Site 193, immediately to the north of this Site identified 170 native taxa (considered to represent > 50% of native taxa) and it would be expected that Bushplan Site 196 would contain a similarly diverse flora. In addition as the Dames and Moore survey indicated the presence of floristic community type 20a and the bushland area is near the interface between the Bassendean and Spearwood Dune systems it is possible that detailed survey would identify a very rich flora in the Site, the Site having elements of the flora's of both major dune systems.

GENERAL COMMENT/CONCLUSION

The inclusion of the area of the PITC land mapped in Bushplan Site 196 in the Draft Perth's Bushplan is supported. Containing extensive areas of upland and wetland vegetation in generally excellent condition the area is typical and representative of the Bassendean Complex — Central and South and is of very high conservation value and a high priority for protection in Perth's Bushplan. In addition its condition and size make it one of the best of its type in the general area. The presence of a threatened ecological community (floristic community type 20a) as discussed by Dames and Moore would enhance its already considerable values.

Current management that excludes public access and the modest development of the area has contributed to the maintenance of the high quality vegetation. However there does not seem to be an appreciation of the cumulative effects of clearing nodes in bushland areas which become foci for degradation. It is considered that continued piecemeal planning will lead to the degradation of the whole area of the PITC bushland.

Before any further proposals for development are considered for approval a development plan/bushland management plan for the area should be produced. This plan should address the issues raised in this report. A more comprehensive flora and vegetation survey is required to more accurately identify the specific values of the bushland for management as well as for the location of developments. A fauna survey would also be necessary as part of the management plan.

As a matter of urgency further consideration should also be given to expanding the PITC developments to the east into the WAPC lands. The majority of these lands are Degraded to Completely Degraded (aerial photograph interpretation and Dames and Moore 1998) and are more suitable for development. The quality and type of the vegetation in the PITC bushland is such that it should not be cleared for further developments if there is degraded land available.

REFERENCES

(Unlisted references can be found in Draft Perth's Bushplan Volume 2B)

BSD 1998. Draft Consultative Environmental Review – Proposed Expansion of Perth International Telecommunications Centre. Unpublished report for Telstra Corporation Limited, December 1998

Dames and Moore 1998. Telstra Site Vegetation and Flora Survey. Unpublished report for Telstra Corporation Limited, November 1998.

DEP 2000. Perth's Bushplan Survey 2000. Unpublished bushland plot and area records. Department of Environmental Protection, Perth Western Australia.

APPENDIX 1: DESCRIPTION FOR BUSHPLAN SITE 196- GNANGARA ROAD BUSHLAND, LANDSDALE/CULLACABARDEE

Boundary Definition: bushland (part taken to cadastre)/conservation wetland boundary

SECTION 1: CADASTRAL INFORMATION

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

Bushplan Site no. **196** Map no. **39, 40, 46** Map sheet series ref. no. **2034–II NE, 2034–II NW**

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS

Bassendean Dunes

Bassendean Sands (Qpb: S8)

Bassendean Dunes/Pinjarra Plain

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

Wetlands (within the Bassendean Dunes/Pinjarra Plain)

Holocene Swamp Deposits (Qhw: Cps)

VEGETATION AND FLORA

Vegetation Complexes

Bassendean Dunes

Bassendean Complex — Central and South

Floristic Community Types: *not sampled, types inferred

Supergroup 2: Seasonal Wetlands

*4 *Melaleuca preissiana* damplands

Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau

*21c Low lying *Banksia attenuata* woodlands or shrublands

*22 *Banksia ilicifolia* woodlands

*23a Central *Banksia attenuata* — *B. menziesii* woodlands

REGIONAL WETLANDS

Wetland Types: dampland, palusplain

Natural Wetland Groups

Bassendean—Pinjarra transition OR Bassendean with fluvial features

Bennett Brook (B/P.4)

Bassendean Dunes

Gnangara (B.2)

Jandakot (B.3)

Wetland Management Objectives: Conservation (27.5ha), Resource Enhancement, Multiple Use

Swan Coastal Plain Lakes EPP: none identified

THREATENED ECOLOGICAL COMMUNITIES

Not assessed

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: vegetated wetland, vegetated uplands

Vegetation and Flora: limited survey (DEP 1996, 1998, fenceline observations; Mattiske Consulting Pty Ltd 1997)

Structural Units

Uplands: *Eucalyptus calophylla* Woodland; *Eucalyptus calophylla* and *E. marginata* Woodland; *Banksia menziesii, B. attenuata* and *B. ilicifolia* Low Woodland; *Banksia menziesii* and *B. attenuata* Low Woodland; *Banksia menziesii, B. attenuata* Low Open Forest with scattered emergent *Eucalyptus calophylla; Xanthorrhoea brunonis* Open Low Heath with *Verticordia nitens* and *Stirlingia latifolia*

Wetlands: *Melaleuca preissiana* and *Eucalyptus calophylla* Woodland; *Verticordia nitens* Open Heath with scattered emergent *Banksia ilicifolia, B. menziesii* and *Melaleuca preissiana*; Mixed *M. preissiana, Banksia attenuata, B. menziesii* Low Open Forest, with scattered emergent trees of *Eucalyptus calophylla*; Closed to Open Low Heaths dominated

by *Astartea* aff. *fascicularis*, *Hypocalymma angustifolium* and *Pericalymma ellipticum*; Mixed Sedgelands of *Lyginia barbata* and *Loxocarya flexuosa*

Scattered Native Plants: not assessed

Vegetation Condition: 80% Excellent, 15% Very Good, with areas of severe localised disturbance

Total Flora: not known

Significant Flora: *Verticordia nitens*

Fauna: no systematic survey. Significant mammal species: Quenda (Friend 1996 D)

Linkage: adjacent native vegetation to the north (BS193 across a road), south (BS198 across a road) and east; part of proposed Greenways 14, 22 (Tingay, Alan & Associates 1997a); part of a regionally significant fragmented bushland/wetland linkage (Volume 2A, Map 8)

Other Special Attributes: recommended for protection in study of City of Wanneroo bushland (Trudgen 1996)

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Not listed

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

Criteria: Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

Opportunities and/or Constraints

Opportunities: Bushplan Site/part Bushplan Site subject to Swan and Canning Rivers EPP; location of conservation category wetlands; under TPS Landscape Zoning

Constraints: under MRD regional road requirements, General Mineral Resource Area (sand)

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

APPENDIX 2: DESCRIPTION OF VEGETATION UNITS (DEP 2000)

Site 1 - *Eucalyptus calophylla* and *Eucalyptus marginata* Woodland and *Banksia menziesii* and *Banksia ilicifolia* Low Woodland over *Adenanthos cygnorum* Tall Shrubland, *Allocasuarina humilis* and *Xanthorrhoea preissii* Shrubland and *Hibbertia hypericoides* Low Shrubland over **Briza maxima* Very Open Grassland, *Patersonia occidentalis* Very Open Herbland and *Alexgeogria nitens* Sedgeland.
Condition: Excellent to Very Good with patches of severe localised disturbance due to past clearing for rhombic antennas.

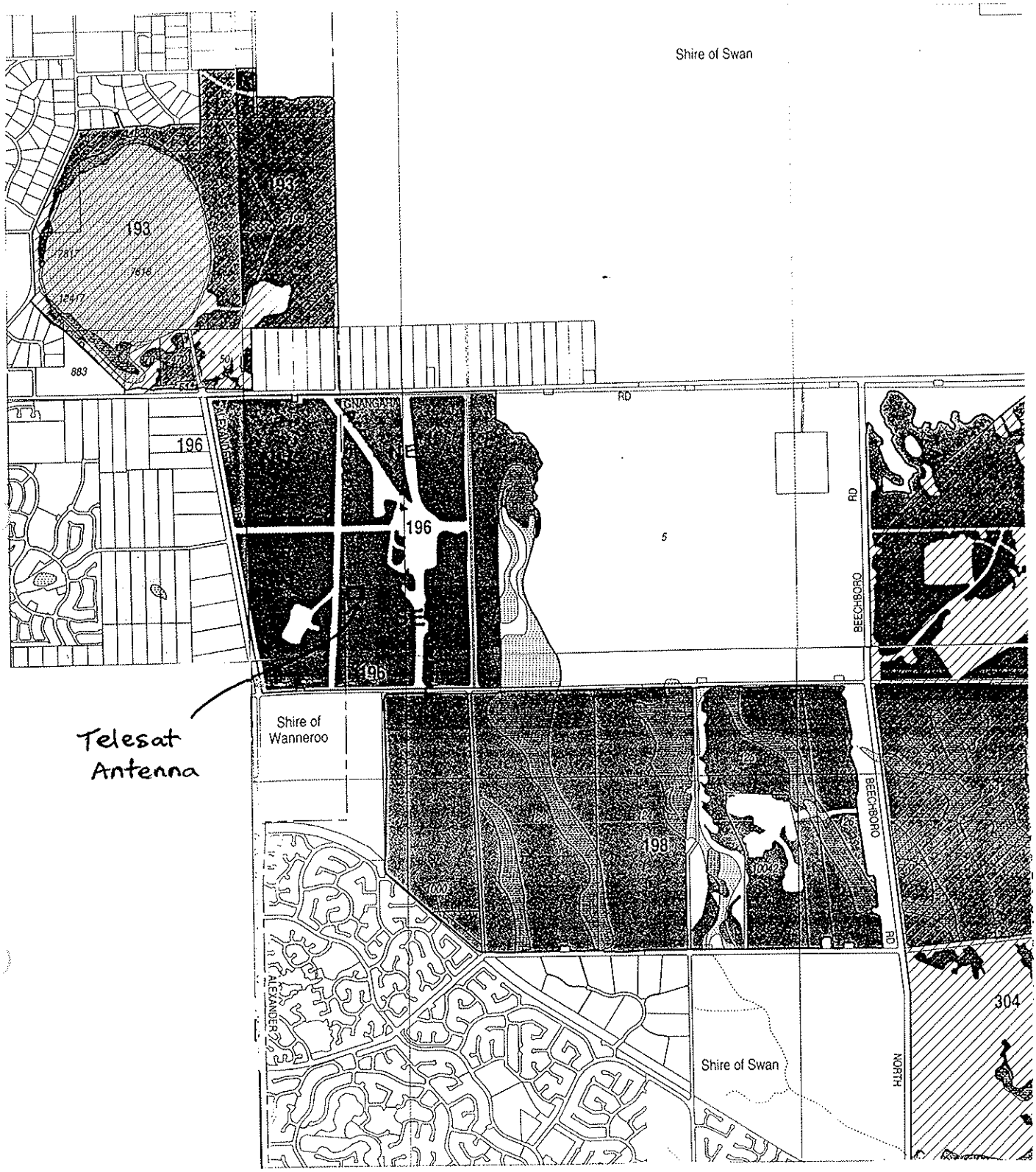
Site 2 - *Melaleuca sp. B* Low Shrubland with scattered emergent *Melaleuca preissiana* over **Aira caryophyllea* Very Open Grassland, *Philotheca ciliata* and *Dasypogon bromeliifolius* Herbland and *Lyginia barbata* and *Alexgeorgea nitens* Open Sedgeland.
Condition: Very Good to Good, bare patches dominated by grassy weeds due to frequent fire and overgrazing by kangaroos.

Site 3 - *Eucalyptus calophylla* Open Woodland over *Banksia attenuata* Low Open Forest over *Xanthorrhoea preissii* Open Low Heath over *Patersonia occidentalis* Open Herbland and *Desmocladus fascicularis* Very Open Sedgeland.
Condition: Very Good to Excellent, burnt very recently and regenerating well, little weed invasion.

Site 4 - *Regelia ciliata* and *Hypocalymma elipiticum* Closed Low Heath with scattered emergent *Melaleuca preissiana* over *Philotheca ciliata, Patersonia occidentalis* and *Dasypogon bromeliifolius* Open Herbland.
Condition: Excellent to Very Good, burnt very recently in patches.

Site 5 - *Banksia attenuata* and *Banksia menziesii* Low Woodland over *Eremaea pauciflora, Scholtzia involucrata* and *Xanthorrhoea preissii* Low Shrubland over *Patersonia occidentalis, Philotheca ciliata* and *Dasypogon bromeliifolius* Herbland.
Condition: Excellent to Pristine, burnt about 5 years ago, regenerating very well.

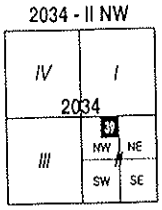
MAP 1: Draft Perth's Bushplan Map for Bushplan Site 196



LEGEND

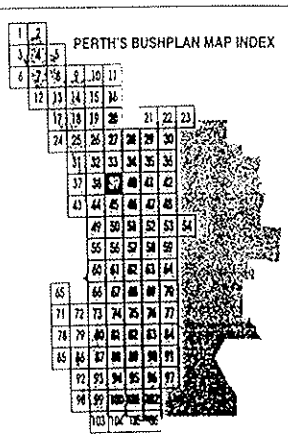
- 472 — Bushplan Sites With Regionally Significant Bushland
- Other Native Vegetation
- Conservation Category Wetlands
- Bushplan Sites With Some Existing Protection
- 696 — Lot Number, Location Number
- Channel Wetlands
- Local Government Boundary

2034 - II NW



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

PERTH'S BUSHPLAN MAP INDEX



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

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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

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Telstra Site
Vegetation and Flora Surveys

for
Telstra Corporation Limited

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REPORT
TELSTRA SITE
VEGETATION AND FLORA SURVEYS
for
Telstra Corporation Limited

1. INTRODUCTION

This report describes the methods and results of vegetation and flora surveys undertaken on two adjoining properties (the Project Area) in Cullacabardee (Figure 1). The first property is located on the east side of Alexander Road between Gnangara Road in the north, and Park Street in the south, and is approximately 287ha in size. This property currently supports Telstra's Perth International Telecommunication Centre (PITC). The second property is slightly smaller (approximately 280ha) and is immediately east of the Telstra property. It consists of the western half of a property owned by the Western Australian Planning Commission and also extends between Gnangara Road and Park Street. This property (referred to throughout this report as the Santa Maria property) was originally used for grazing but it is currently unused.

2. OBJECTIVES

The overall aim of the Project was to identify vegetation and flora constraints to future development on the properties. More specifically objectives of the flora and vegetation surveys were to:

- describe and map the vegetation of the two properties in terms of structure and dominant species according to Muir (1977);
- assess the condition of the vegetation;
- determine which of the floristic community types described and/or listed by Gibson *et al.* (1994) and Keighery (1997) are represented on the properties and the location of these floristic community types and where;
- determine which species of significant flora, particularly Declared Rare Flora (DRF) and Priority Flora are likely to occur on the two properties; and
- determine which, if any, of these species or other significant species occur on the two properties.

3. METHODS

The surveys was carried out in the following four intergrading and overlapping stages:

- review of relevant articles, reports and other sources of information to identify significant flora or vegetation communities that may occur in the area;

- field assessment of the properties to determine community types, distribution and condition of vegetation and presence of rare flora. These assessments were conducted on four days, 25 June, 14 July, 15 September and 1 October 1998,
- identification of plant specimens collected during the field surveys; and
- preparation of this and other, preliminary reports.

3.1 VEGETATION AND FLORA

Provisional maps of the vegetation of the Project Area were drawn based upon enlarged colour aerial photographs. Mapping was refined using information collected in the field on vegetation structure and dominant species.

The determination of which floristic community types are represented in the project area was based on the use of the following information and methods by botanist Dr. Arthur Weston:

- the 'Thirty Group Classification' descriptions of floristic community types in Gibson *et al.* (1994, pp. 29-30, 37, 39-45);
- the sorted two way table in Gibson *et al.* (1994, pp. 31-36), which shows species frequency by community type in Species Groups A through S;
- the descriptions of community types and maps of locations of their sampling quadrats in Gibson *et al.* (1994, Appendix 1);
- the Table 1 list in Keighery (1997) of floristic community types identified by Gibson *et al.* (1994) and additional ones identified subsequently by the Department of Environmental Protection;
- geomorphological and land system information about the Project Area and its surrounds in Gozzard (1986), McArthur and Mattiske (1985) and McArthur (1986);
- lists of floristic community types, bushland areas and locations of sampling quadrats given in appendices of Gibson *et al.* (1994) and Keighery (1997);
- bushland Plant Survey Recording Sheets for sampling quadrats in Whiteman Park; and
- viewing some of the floristic community types recorded near the Project Area and the locations of their nearest sampling quadrats.

The recording of species and collecting of plants were a concomitant part of the vegetation survey field work. Collected plant specimens were pressed and dried before identification using systematic plant keys. Specimens were compared with collections held at the WA Herbarium.

Photographs of the vegetation associations and general notes on physical features were also taken.

3.2 DECLARED RARE AND PRIORITY FLORA

Searches of the following Department of Conservation and Land Management (CALM) databases were undertaken to identify Declared Rare or Priority flora species likely to occur in the Project Area:

- the current, July 1998 Priority Species List for the locations of Whiteman, Gnangara and Cullacabardee;
- the Western Australian Herbarium Specimen database for previously recorded significant species in the area outlined by the following coordinates;
  - 115°53'E, 31°52'S;
  - 115°58'E, 31°45'S; and
- the Threatened (Declared Rare) Flora database for species that have previously been recorded in the area outlined above.

These sources also provided information about conservation codes, localities and distributions, and flowering times. The information about distributions, localities, growth forms, habitats and flowering times provided by CALM is not always comprehensive. For instance, the localities are often only selections and do not include all of the localities given for a listed species in the CALM printouts. Information about growth form and habitat is indicative only but is useful in assessing how likely rare flora is to occur at particular locations in the Project Area.

Additional information for the table was obtained from examination of herbarium specimens and their labels in the Western Australian Herbarium, consultations with other botanists, observations made during previous field work, and information in Atkins (1998), Marchant *et al.* (1987), Hoffman and Brown (1995) and Hopper *et al.* (1990).

One DRF species, one Priority Three species and three Priority Four species are known to occur in the Cullacabardee area (Table 1).

Table 1

Declared Rare and Priority Flora Previously Recorded in the Cullacabardee Area

Species	Conservation Code[1]	Family Code	Distribution and Localities	Growth Form	Habitats	Flowering Period
Conostephium minus	P4	EPAC	Cataby-Belmont, Gnangara, Newburn.	A small shrub similar to *Conostephium pendulum* but with generally smaller flowers and non-ciliate bracts and sepals.	Sandy soil in banksia woodland low in the landscape.	Jul-Sep
Cyathochaeta teretifolia	P3	CYPE	Muchea-Denbarker, Lake Gnangara, Whiteman Park.	Densely-growing sedges with leaves which are up to more than 2 m long and are bluntly oval in cross-section.	Paperbark swamps.	Dec
Drosera occidentalis subsp. *Occidentalis*	P4	DROS	Gingin-Pinjarra, Darling Range, Beechboro.	Pygmy sundew with sparse, open rosette of red leaves and white to very pale pink flowers.	In white peaty sand of margins of winter wet swamps and depressions.	Nov-Dec
Epiblema grandiflorum var. *cyanea* ms	DRF	ORCH	Malaga/Beechboro, Walpole.	Babe-in-the-cradle, often tall orchid with long, narrowly rounded leaf and delicate, pale blue flowers.	Wet, peaty swamps, often among dense sedges and paperbarks.	Late Nov-Dec
Stachystemon axillaris	P4	EUPH	Eneabba-Wanneroo, Gnangara, Whiteman Park.	Erect shrub to 70 cm tall, with narrow alternate leaves and solitary axillary inconspicuous flowers.	On sand low, usually low in the landscape.	Feb-Mar, Jul-Sep

Notes: 1 R: Declared Rare Flora – Extant Taxa – Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection.

X: Declared Rare Flora – Presumed Extinct Taxa – Taxa which have not been collected or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently.

P1: Priority One – Poorly Known Taxa – Taxa which are known from one or a few (generally <5) populations which are under threat.
P2: Priority Two – Poorly Known Taxa – Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat.
P3: Priority Three – Poorly Known Taxa – taxa which are known from several populations, and the taxa are not believed to be under immediate threat.
P4: Priority Four – Rare Taxa – Taxa which are considered to have been adequately surveyed and which, whilst being rare are not currently threatened by identifiable factors.

A similar earlier search of the CALM databases for the area defined by:

- 115° 46' 02" E; 31° 50' 05" S; and
- 116° 03' 30" E; 31° 41' 50" S.

This search listed an additional 39 significant species known to occur in the region (Table 2).

Table 2

Other Significant Species Recorded in the Broader Region

Species/Taxon	Conservation Code[1]	Habitat	Flowering Period
Acacia benthamii	P2		Jul-Sept
Acacia lasiocarpa var. *bracteolata*	P1	Low lying sand over clay, winter wet.	Aug
Acacia oncinophylla subsp *oncinophylla*	P3	Near granite.	-
Angianthus microcephalus	P2	On old shell beds and clay.	Oct
Anthotium junciforme	P4		Dec - Mar
Aotus cordifolia	P3	Occurring in swamps.	Aug - Dec
Caladenia huegelii	R	Low in the landscape, on slopes in banksia woodland.	Sept - Nov
Calothamnus rupestris	P4	Along water courses or granite outcrops.	Jul - Nov
Calytrix sylvana	P4	In scrub between track and cleared land.	Aug - Oct
Centrolepis caespitosa	R		Nov
Cyanicula ixioides subsp. *ixioides* ms	P4		Sept
Darwinia pimelioides	P3	Red loam; around bases of granite and dolerite boulders, high in landscape.	Oct
Eloecharis sp. Kenwick	P3	Clay soils under 6 inches water, dries in summer.	-
Eryngium pinnatifidum subsp. *palustre* ms	P2	Seasonally wet poorly drained flat.	Sept
Grevellea curviloba subsp. *curviloba*	P1	In sand.	Oct
Grevillea thelemanniana	P4	Limestone sands.	May - Sept
Guichenotia tuberculata	P3		Aug-Sept
Haemodorum loratum	P3	Lateritic loam, Wandoo woodland.	Sept - Nov
Halgania corymbosa	P3	Lateritic soil.	Aug-Sept
Haloragis tenuifolia	P1	Swampy areas.	Nov-Dec
Helipterum pyrethrum	P3	Clay or wet mud.	Oct-Nov
Hydatella dioica	R	Muddy clay pans.	Sept - Nov
Hydrocotyle lemnoides	R	Swamps.	Oct
Jacksonia sericea	P3	Sandy flat, *Eucalyptus marginata* open woodland over Banksia low woodland; highly disturbed tuart/jarrah forest.	Dec-Feb
Lambertia multiflora var. *darlingensis*	P3		
Lasiopetalum glabratum	P3		Oct-Nov, also May
Lepidium puberulum	P4		July-Aug
Myriocephalus appendiculatus	P3	Open woodland in coarse sand and clay. Often in moist depressions.	Nov-Dec

Table 2 (*cont'd*)

Species/Taxon	Conservation Code	Habitat	Flowering Period
Nemcia acuta	P3	Near granite rock at edge of small clump of marris near tall scrub.	Aug-Sept
Pityrodia axillaris	P1		
Rhodanthe pyrethrum	P3	Heavy clay soil, winter swamp; damp pasture; in clay around freshwater lake.	Sept – Oct
Schoenus capillifolius	P2	Aquatic herb, growing submerged or on edges, winter wet claypan.	Sep - Nov
Stylidium longitubum	P3	Winter wet claypan.	Oct-Dec
Stylidium mimeticum	P3	Sandy soils.	Dec
Synaphea acutiloba	P3	Tall open Jarrah/Marri woodland.	Jul-Sept
Synaphea pinnata	P4	Brown loam, beneath dense scrub of *Hakea trifurcata*; lateritic soil.	Sept-Oct
Templetonia drummondii	P4	Lateritic and sandy clay soils.	Aug-Sept
Tripterococcus paniculatus ms	P1		Nov
Verticordia serrata var *linearis*	P1	White sand and gravel on road verge.	Sept

Notes: 1 R: Declared Rare Flora – Extant Taxa – Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection.

X: Declared Rare Flora – Presumed Extinct Taxa – Taxa which have not been collected or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently.

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P3: Priority Three – Poorly Known Taxa – taxa which are known from several populations, and the taxa are not believed to be under immediate threat.

P4: Priority Four – Rare Taxa – Taxa which are considered to have been adequately surveyed and which, whilst being rare are not currently threatened by identifiable factors.

4. RESULTS

4.1 GEOMORPHOLOGY AND LAND FORMS

The two properties are part of the Bassendean dune system and consist of thin Bassendean sands over Guildford clays with some patches of Bassendean sands in the western parts of the PITC property and parts of the Santa Maria area (Gozzard 1986). The central part of the PITC site is mapped as peaty clay swamp deposits.

McArthur (1986) maps the area as low hills and ridges of the Jandakot system, poorly drained depressions of the Joel system and flat landscape of the Gavin System. There are two broad drainage lines in the southern part of the Santa Maria site.

The 1:25 000 scale Perth 2034-II NE topographic map shows the properties as being of low relief with contours between 45 m and 50 m.

No standing water was observed on either of the properties at the time of the October survey.

4.2 VEGETATION TYPES

The vegetation of the two properties is shown on Figure 2. Descriptions of the units mapped are outlined in the following sections.

4.2.1 PITC Site (western property)

4.2.1.1 General

The vegetation of the PITC site is predominantly low lying banksia woodlands with an open *Melaleuca preissiana* (paperbark) woodland in the dampland in the centre of the property. Areas have been partially cleared or slashed for facilities located in the northeast corner and southern half of the PITC property. Cleared firebreaks also run around the boundary and dissect the property in both a north-south and east-west direction.

Aerial photographs indicate that the condition of the property has steadily improved since Telstra commenced its operations on site. Areas that were previously highly degraded as a result of grazing have regenerated to healthy bushland.

4.2.1.2 *Banksia* Vegetation Units

The banksia vegetation units range from low forest to open low woodlands. The majority of the banksia units on the site are low woodlands dominated by *Banksia attenuata*, with *Banksia menziesii* (firewood banksia), and scattered *Eucalyptus marginata* (jarrah) and *Corymbia calophylla* (marri) growing over *Xanthorrhoea preissii* (grass tree) and mixed shrubs. Scattered *Nuytsia floribunda* (Christmas tree) and small dense stands of *Adenanthos cygnorum* (woolly bush) may also be present. This vegetation unit occurs throughout the majority of the site.

Not mapped separately

A low forest of *Banksia attenuata* with *Corymbia calophylla*, *Eucalyptus marginata* and *Banksia menziesii* in moderately dense stands occurs around the PITC buildings and along the western edge of the sealed access road. The understorey is generally *Xanthorrhoea preissii* and mixed shrubs with typical species such as *Petrophile linearis, Bossiaea eriocarpa* and *Gompholobium tomentosum.*

An open, low banksia woodland dominated by sparse *Banksia attenuata* and *Banksia menziesii* with occasional *Banksia ilicifolia* occurs on the sandy rises near the southern and southeastern boundaries of the property. The understorey is low scrub to heath typically consisting of *Bossiaea eriocarpa, Petrophile linearis* and *Leucopogon conostephioides.*

A small area of *Banksia ilicifolia* open low woodland over low scrub occurs on the southern boundary of the site.

4.2.1.3 *Melaleuca preissiana* Vegetation Units

The *Melaleuca preissiana* vegetation units occur in the dampland area in the centre of the site and are surrounded by banksia woodland. *Melaleuca preissiana* vegetation units range from dense heath to low woodland. The dense heaths are dominated by *Pericalymma ellipticum* and *Hypocalymma angustifolium* (myrtle), with some sedges, and mainly occur to the southwest of the firebreak intersection in the centre of the site. This area is surrounded by open low woodlands of *Melaleuca preissiana* growing with *Pericalymma ellipticum, Hypocalymma angustifolium* and scattered *Xanthorrhoea preissii*. Moderately dense, low woodlands of *Melaleuca preissiana* are scattered within this unit.

4.2.2 Santa Maria Site

4.2.2.1 General

The majority of vegetation on the Santa Maria site has been significantly impacted by grazing and fire. Towards the centre of the site an area of low banksia woodland appears to have been fenced off in the past and remains in good to very good condition. An area on the western boundary of Santa Maria property, running from Gnangara Road to Park Street, approximately 150m wide, has also been fenced and is in excellent condition. The site is dominated by *Xanthorrhoea preissii* heath and banksia units interspersed with areas of *Corymbia calophylla* low forest or low woodland. Along the western boundary and central/east sections of the property, low *Melaleuca preissiana* woodlands occur in low-lying damplands.

4.2.2.2 *Banksia* Vegetation Units

The low banksia woodlands in the centre of the site and along the western boundary are dominated by *Banksia attenuata* and *Banksia menziesii*, with scattered *Corymbia calophylla* and *Eucalyptus marginata*. The understorey is low scrub to heath with typical species such as *Xanthorrhoea preissii, Petrophile linearis, Bossiaea eriocarpa* and *Gompholobium tomentosum*. Tree density decreases around the edge of these low woodlands.

Open low woodlands with sparse *Banksia menziesii* and a scrub layer of *Adenanthos cygnorum*, and occasionally *Allocasuarina humilis*, occur in the southeast and northeast of the site. Scattered *Nuytsia floribunda* and *Eucalyptus todtiana* (prickly bark) also occur in this vegetation unit. This unit appears to have been significantly impacted by grazing and trampling by livestock.

4.2.2.3 *Corymbia calophylla* Vegetation Unit

Low woodlands to low forest, dominated by *Corymbia calophylla* growing with *Eucalyptus marginata* and scattered *Nuytsia floribunda* are scattered throughout the Santa Maria site. The understorey is generally mixed scrub dominated by *Xanthorrhoea preissii* with pasture grasses and weed species in areas affected by grazing and fire.

4.2.2.4 *Xanthorrhoea preissii* Vegetation Unit

Prior to disturbance, these areas probably formed part of the banksia or *Corymbia calophylla* units, but they have been significantly altered by clearing, grazing and fire. This vegetation unit is dominated by open to dense stands of *Xanthorrhoea preissii* over pasture grasses and weed species such as *Arctotheca calendula* (cape weed), *Austrodanthonia* sp., *Briza maxima* (blowfly grass), *Homeria flaccida* (cape tulip) and *Ehrharta brevifolia*. This unit occurs throughout the site, although it is most common in the northeast and southern sections of the property and among the *Melaleuca preissiana* units in the west.

4.2.2.5 *Melaleuca preissiana* Vegetation Unit

The damplands are generally dominated by *Melaleuca preissiana* low woodland with an understorey of *Xanthorrhoea preissii,* pasture grasses and some sedges. The upper stratum is in good condition, however the understorey has been highly modified as a result of grazing. Very few shrubs and native herbs occur in this vegetation unit on the Santa Maria site, unlike the *Melaleuca preissiana* units present on the PITC site.

4.2.2.6 *Eucalyptus rudis* Vegetation Unit

In the central/southeastern section near the low banksia woodlands is an area of *Eucalyptus rudis* (flooded gum) forest in a depression, surrounded by *Melaleuca preissiana* low woodland. The *Eucalyptus rudis* forest appears to have been impacted on by grazing and has no shrub layer. The understorey is predominantly pasture grasses and weeds.

4.3 FLORISTIC COMMUNITY TYPES

Floristic assemblages and aspects of habitats were compared with floristic community types described and listed in Gibson *et al.* (1994), Keighery (1997) and other information listed above in Section 3.1. Several sites in the vicinity of the Project Area were visited to assist in deciding which floristic community types are represented in the PITC and Santa Maria sites. These and other nearby sites are listed in **Appendix C1**.

The floristic communities defined by Gibson *et al* (1994) and Keighery (1997) have been classified according to the status of reservation, where:

- a community is considered well reserved if it occurs in two widely separated National Parks and/or Nature Reserves;
- a community is considered to be poorly reserved if it is known from only one National Park or Nature Reserve; and
- an unreserved community is one which is not known from any National Park or Nature Reserve.

In addition to the reservation status, each floristic community has also been given a conservation status, where (Gibson *et al* 1994):

- "presumed destroyed" is a community that is totally destroyed or extensively modified that it is unlikely to re-establish ecosystem processes in the foreseeable future;
- a community in a "critical" state is a community with most or all of its known occurrences facing severe modification or destruction in the immediate future;
- an "endangered community" is one which is in danger of severe modification or destruction throughout its range, if casual factors continue to operate;
- a "vulnerable community" is likely to move into the endangered category in the near future if the casual factors continue operating;
- a community is considered at "low risk" if it does not qualify for one of the above categories; and
- if there is inadequately data to assign to one of the above categories the vegetation community is classified as "insufficiently known".

The floristic community types likely to occur in the Project Area are summarised in Table 3 and are described in the following sections.

Table 3

Floristic Community Types in the Project Area

Floristic Community Type	Description	Location in Project Area	Conservation Status	Reservation Status
4	*Melaleuca pressiana* damplands.	• Centre of the IPTC Property. • Western Boundary and central eastern area of Santa Maria site.	Well Reserved	Low Risk
11	Wet Forests and Woodlands.	Small patch of *Eucalyptus rudis* on Santa Maria site may resemble this community.	Well Reserved	Low Risk
20a	*Banksia attenuata* woodlands over species rich dense shrublands.	Possibly scattered throughout the IPTC Property.	Unreserved	Endangered
21c	Low lying *Banksia attenuata* woodlands or shrublands.	Major floristic community on IPTC Property.	Well Reserved	Susceptible
22	*Banksia ilicifolia* woodland.	Small patches on the southern boundary of the IPTC Property.	Poorly Reserved	Susceptible
23a	Central *Banksia attenuata* – *Banksia menziesii*.	• Sandy Rises near the southern and south eastern boundaries of IPTC Property. • Possibly occurred on the Santa Maria Site	Well Reserved	Low Risk

4.3.1 PITC Property

The principal floristic community type represented on the PITC Property is probably Type 21c, low lying *Banksia attenuata* woodlands or shrublands. This community is listed as being well reserved although its conservation status is susceptible.

On the sandy rises near the southern and south-eastern boundaries, the floristic community appears to be Type 23a (Central *Banksia attenuata – B. menziesii* Woodlands) although there may be areas of Community 20a (*Banksia attenuata* woodlands over species rich dense shrublands) throughout. Community 23a is considered well reserved and its conservation status is listed as low risk while 20a is unreserved and endangered.

A small area of *Banksia ilicifolia* woodland along the southern boundary is probably floristic Community Type 22 (*Banksia ilicifolia* Woodland). This community type is poorly reserved and has a conservation status of susceptible.

The *Melaleuca preissiana* damplands in the centre of the site appear to be community Type 4, which is well reserved and has a low risk conservation status.

4.3.2 Santa Maria Property

Due to the high degree of disturbance of the shrub and herb strata on the Santa Maria site it is difficult to classify the vegetation communities as any of the Floristic Community Types listed in Gibson *et al.* (1994). However, the vegetation types present prior to disturbance, may be inferred by looking at the existing overstorey, small remnant patches, individuals of native shrubs and herbs, and position in the landscape. The banksia vegetation in the centre of the site which has retained its structure and native understorey, is an exception.

The banksia unit in the centre of the Santa Maria site is similar to Community Type 23a, *Banksia attenuata – B. menziesii* woodlands.

The *Eucalyptus calophylla* unit is not easily defined, and may be either Community Type 23a or 21c. It has a number of understorey species found in both Community 23a and 21c, such as *Petrophile linearis, Patersonia occidentalis, Adenanthos cygnorum* and *Dasypogon bromeliifolius*.

The *Melaleuca preissiana* damplands along the western boundary and in the central/east sections of the site appear to be community Type 4, but shrub species such as *Pericalymma ellipticum* and *Hypocalymma angustifolium* are generally absent. This community type is well reserved and at low risk.

The small area of *Eucalyptus rudis* forest with a grassy understorey, in the central/southeastern section of the site may resemble community Type 11 (wet forests and woodlands) which is

considered well reserved with a low risk conservation status. However, the absence of native species in its understorey make it difficult to assign a community type.

4.4 VEGETATION CONDITION

The condition of the vegetation in the Project Area is mapped in Figure 3 and described below.

The condition of the various vegetation communities was assessed using the Vegetation Condition Scale provided in Keighery (1994) where:

7 Pristine – pristine or nearly so, no obvious signs of disturbance;
8 Excellent – vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species;
9 Very Good – vegetation structure altered, obvious signs of disturbance;
10 Good – vegetation structure significantly altered by the very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate it;
11 Degraded – basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management; and
12 Completely degraded – the structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

Much of the native vegetation of the PITC site is relatively undisturbed, although areas have been cleared for aerials, the microwave tower, firebreaks, roads and buildings. The uncleared vegetation is generally in excellent to pristine condition with the vegetation structure intact with weed species non-aggressive where present.

The condition of the Santa Maria site is, with the exception of the central area and the western boundary, is degraded to completely degraded. The site has been largely altered by grazing and fire and the understorey is now limited to ground layers of herbaceous plants that are almost all pasture grasses and weeds. The central area of low banksia woodland appears to have been fenced in the past and retains the basic vegetation structure, although it shows obvious signs of disturbance. This area is in good to very good condition with an understorey of native shrubs and weedy herbaceous plants.

The vegetation along the western boundary has also been fenced and is in excellent condition.

4.5 FLORA

4.5.1 General

A list of species recorded during the surveys is included in **Appendix C2**. This species list is incomplete and mainly includes common and typical species in the vegetation communities.

Tree species common in the Project Area include *Banksia attenuata, B. menziesii, Melaleuca preissiana, Corymbia calophylla, Eucalyptus marginata, E. todtiana* and *Nuytsia floribunda.* Also present are *Eucalyptus rudis, Banksia ilicifolia* and *Allocasuarina fraseriana* (sheoak).

Common small shrubs include *Gompholobium tomentosum, Petrophile linearis, Bossiaea eriocarpa, Leucopogon conostephioides, Adenanthos cygnorum, Conostephium pendulum, Hibbertia hypercoides, Hibbertia subvaginata, Xanthorrhoea preissii, Pericalymma ellipticum* and *Hypocalymma angustifolium.*

Common herbs include *Dasypogon bromeliifolius, Patersonia occidentalis, Lyginia barbata* and a number of weed species.

4.5.2 Declared Rare and Significant Flora

No Declared Rare or Priority flora species were found on either of the properties, nor were likely habitats for any of the species listed in Tables 1 or 2 identified. It is possible, however, that some of the higher elevation banksia woodland on the PITC site may be suitable habitats for the Priority 4 species *Conostephium minus* or *Stachystemon axillaris.*

5. DISCUSSION

The dominant vegetation types on the two properties are low banksia woodlands and open low banksia woodlands, with areas of *Melaleuca preissiana* low woodlands in the damp depressions. On the Santa Maria site, much of the original vegetation has been heavily disturbed and is consequently dominated by *Xanthorrhoea preissii* shrubs within a matrix of pasture grasses and weed species.

The floristic communities have similarities with floristic community Types 21c, 23a and 4 described in Gibson *et al.* (1994). Small areas of community Type 22 may also occur. Community Type 20a (*Banksia attenuata* woodlands over species rich dense shrublands) may possibly occur on the sandy rises on the Telstra site.

Comparison with floristic community quadrats and the vegetation types in Whiteman Park indicate that the vegetation and the flora of the Project Area are less diverse than those of Whiteman Park. Whiteman Park sites have greater topographical diversity and range of wetlands. For example, observations in Whiteman Park noted the presence of the Priority species *Cyathochaea teretifolia* and *Aotus cordifolia.* Neither these species nor their habitats were found in the two properties surveyed. No Declared Rare or Priority Flora were found during the surveys, although, some of the banksia woodlands occurring on sandy rises could be potential habitats for the Priority 4 species, *Conostephium minus* or *Stachystemon axillaris.*

The condition of the PITC site, with the exception of cleared areas, is generally in excellent to pristine condition. The Santa Maria site has been extensively grazed and disturbed by fire, and is in a

generally degraded to completely degraded state. An area of low banksia woodland in the centre of the site, which appears to have been fenced in the past, is in good to very good condition.

Constraints on the land use associated with vegetation and flora present on the two properties are shown on Figure 4 and described below.

With the exception of areas already cleared or disturbed, the vegetation communities over the majority of the PITC site should be protected from disturbance due to their excellent to pristine condition. On the Santa Maria site, the area of low banksia woodland in the centre of the site should also be protected and managed to reduce weed infestation and allow regeneration.

The *Corymbia calophylla* low forest has been partially cleared and is generally degraded, although it has retained some of the basic vegetation structure. The *Melaleuca preissiana* low woodlands are similarly degraded, although retain some of the native overstorey. Disturbance to these two vegetation types should be avoided where possible, since there is the potential for some regeneration with management. The remainder of the Santa Maria site is generally completely degraded, dominated by pasture and weed species. These areas are considered suitable for development.

6. ACKNOWLEDGEMENTS

Access to the Western Australian Herbarium collections was essential for carrying out the project and is greatly appreciated.

* * *

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Existing Perth ITC Site

Proposed Expansion Area

0 250m

- *Xanthorrhoea preissii* over pasture grasses and weeds.
- *Low Melaleuca preissiana* woodland over dense heath.
- *Low Melaleuca preissiana* woodland over pasture grasses.
- *Corymbia calophylla* growing with *Eucalyptus marginata* over *Xanthorrhoea preissii* or mixed scrub.
- *Banksia* open low woodlands over *Xanthorrhoea preissii* and mixed scrub.
- *Xanthorrhoea preissii* and mixed scrub.
- Open low *Banksia* woodlands over low scrub.
- Open low woodlands / shrublands with sparse *Banksia menziesii* and a scrub layer of *Adenanthos cygnorum*.
- *Eucalyptus rudis* forest with shrub layer absent.
- Scattered *Banksia ilicifolia* over a heath understorey.
- Areas already developed.

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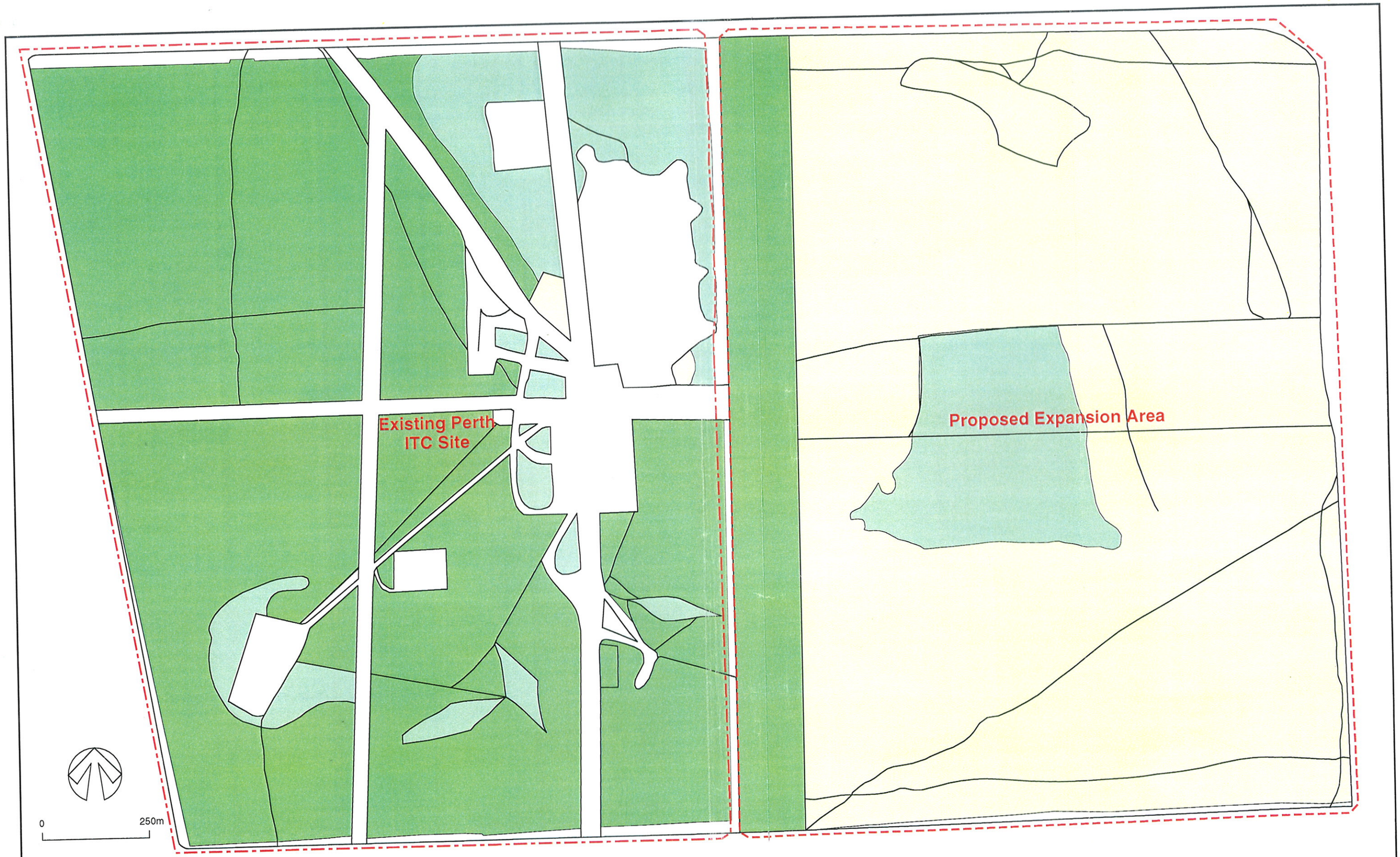
Consultative Environmental Review
PROPOSED EXPANSION OF PERTH ITC SITE

VEGETATION COMMUNITIES

FIGURE

~~6.4~~

MAP 2: Vegetation Map (Dames and Moore 1998)



Vegetation in excellent (2) to pristine (1) condition.

Vegetation in good (4) to very good (3) condition.

Vegetation degraded (5) to completely degraded (6).

Areas already developed.

Note : Condition Scale is based on condition scale outlined in Keighery (1994).

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Consultative Environmental Review
PROPOSED EXPANSION OF PERTH ITC SITE

VEGETATION CONDITION

FIGURE

6.5

draft ?

Memorandum of Understanding (MOU) between Telstra and Ministry for Planning/WAPC

Perth International Telecommunications Centre – Bushland Management Strategy

Prepared for: Telstra

Prepared by: **BSD CONSULTANTS PTY LTD**
BSD Centre, 2 Bagot Road
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Telephone (08) 9273 3888
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January 2001

TABLE OF CONTENTS

1. AIM

The purpose of the Memorandum of Understanding (MOU) is to streamline the process for determining Development Applications for future infrastructure on the Perth International Telecommunications Centre (PITC) site. **Schedule 1** incorporates a Bushland Management Strategy which provides a framework to manage native vegetation on the site, consistent with the objectives of Perth's Bushplan (draft), and therefore provides supporting information and justification for the MOU.

2. PARTIES TO AGREEMENT

This MOU clarifies arrangements between the Western Australian Planning Commission(WAPC) (through the Ministry for Planning) and Telstra to ensure the timely and appropriate processing of Development Applications for future infrastructure and proper environmental management of the PITC site with all parties recognising their respective responsibilities.

When a matter is covered both by the MOU and legislation, nothing in this MOU shall affect the ability of either party to administer the requirements of that legislation.

The MOU is endorsed by the Chief Executive Officer for the Ministry for Planning, as an authorised delegate of the Western Australian Planning Commission and Telstra's National Manager for Urban and Metropolitan Infrastructure Development.

Mr Gary Prattley
Chief Executive Officer
Ministry for Planning
Signature : Date:

Mr Mike Lawrey
National Manager of Urban and
Metropolitan Infrastructure Development
Telstra
Signature: Date:

3. TERM OF AGREEMENT AND REVIEW

The MOU will be reviewed two years from the date of signing, unless otherwise agreed by all parties. As part of the review, an amended MOU may be drafted and agreed to, unless all parties are satisfied with the continuation of the current MOU.

4. PROCEDURES AND PRINCIPLES TO BE FOLLOWED

4.1 TELSTRA

The following procedures and principles are to be followed by Telstra:

1. Future development of infrastructure will be undertaken in accordance with the site's 'Public Purpose–Special Use' Metropolitan Region Scheme (MRS) reservation and the agreed Bushland Management Strategy (Schedule 1) for the PITC.
2. Future infrastructure will be located within the Development area identified in **Figure 1** (Schedule 1).
3. Native vegetation will be managed in accordance with the commitments outlined in **Schedule 1 - Table 1**.
4. Any essential infrastructure required outside the Development area will require lodgement of a detailed development application. Any such application would be referred to relevant government agencies involved in the implementation of Perth's Bushplan.

4.2 MINISTRY FOR PLANNING UNDER DELEGATION FROM THE WAPC

The following procedures and principles are to be followed by the Ministry for Planning (MfP) on behalf of the WAPC:

1. In the assessment of development applications, emphasis is to be placed on the national and international importance of the PITC site at Gnangara.
2. Development Applications to be determined in a 60 day period from the date of receipt in accordance with the MRS Act or within the same period following a written request being sent to Telstra for additional information.
3. The MfP to advise the relevant local government (ie. City of Wanneroo or Swan) to refer a copy of all development applications 7 days (in accordance with the MRS Act) following lodgement with the local government. In this regard, applications are to be concurrently assessed by the Ministry for Planning and the relevant local government, but not determined by the WAPC until advice is received from the local government within 42 days in accordance with the MRS Act.
4. The MfP to advise both local governments (ie. City of Wanneroo and Swan) that development applications are only to be advertised when proposed infrastructure is externally visible from the PITC site boundaries and/or there is a demonstrated potential impact on surrounding existing and approved land uses.

5. Where development proposals are consistent with the MRS and Bushland Management Strategy (**Schedule 1**) in terms of infrastructure being located within Development areas, determination of Development Applications by the WAPC will be granted under delegated authority without referral to those agencies responsible for Perth's Bushplan, including the 'Bushplan Office' within the Ministry for Planning.

6. Development approval conditions will relate to the approved infrastructure and will not require environmental measures, additional to those commitments in **Schedule 1 - Table 1.**

5. LIMITATION

This MOU is without prejudice to Telstra's legislative powers or the statutory responsibilities of the MfP and WAPC.

SCHEDULE 1

BUSHLAND MANAGEMENT STRATEGY

1. INTRODUCTION

Telstra is committed to complying with State and Local Government planning and environmental laws and choose to adopt a pro-active and conciliatory approach to ensure that current and future development can not only coexist, but complement and enhance the environmental values of the site.

Telstra could exercise its right to bypass State and Local laws and obtain infrastructure approvals from the Australian Communications Authority by securing a Facilities Installation Permit, however Telstra would like to avoid such an action and remains confident that any future development or operational issues can be resolved cooperatively with all parties.

The environmental values of the site were recognised when it was included in Perth's Bushplan (draft), as site 196. Since this time assessment of Development Applications for additional infrastructure has become lengthy and complicated, due to referral procedures that are required to be followed with Bushplan sites. This MOU provides a strategic framework for development and bushland conservation.

Telstra has been managing the bushland on the site since 1968. Notwithstanding some clearing aerial photography indicates that the quality of vegetation has been maintain and enhanced, which may be attributed to site security and environmental management.

2. OBJECTIVE

To provide a strategic framework for the future expansion and operation of the PITC such that the site's environmental values are maintained and enhanced.

3. BACKGROUND

Telstra's PITC facility plays an integral role in international telecommunications and is the largest facility of its type in Australia.

The PITC was established in 1966 on the 289ha site located on the south-east corner of Gnangara Road and Alexander Drive, Gnangara. The site is located in both the Cities of Wanneroo and Swan, although the majority of the site is located in the City of Swan. The site was originally selected for a number of reasons including the low radio noise levels associated with its rural environment.

4. TENURE AND RESERVE STATUS

The site is reserved 'Public Purposes – Special Uses' in the MRS and is similarly reserved in the Cities of Wanneroo and Swan Planning Schemes. Given the site's special reservation under the MRS, any future development requires WAPC approval.

5. EXISTING INFRASTRUCTURE

The PITC accommodates a diverse array of infrastructure for the maintenance and provision of a number of local, national and international telecommunication services. The location and nature of infrastructure is shown on **Figure 2** and described below:

- Acquisition and launch support for European Space Agency (ESA), scientific space craft and tracking and monitoring of the payloads during transfer orbit;
- Support of deep space missions;
- Provision of ground support facilities and operational support for INTELSAT satellites in the Indian and Pacific Ocean regions;
- Maintenance support for Telesat Canada facility located on the site;
- Operation and maintenance of INMARSAT systems located on the site, which include support of global maritime distress and safety systems supporting fishing fleets and mining companies, worldwide distress alerting network and global maritime and safety system, operation of digital and analogue phone, fax and data systems;
- Operation of a System 12 telephone exchange to which 63,000 local customers are connected;
- Operation of optical and microwave transmission systems and mobile satellite and radio systems, including the Safety of Life at Sea Service; and
- Provision of satellite links to broadcast the Sydney Olympics to Europe (the most recent function added to the site).

In addition to using electricity from the Western Power grid, the PITC site has on-site diesel generators to ensure a continued supply of power.

6. STRATEGIC IMPORTANCE

The Telstra facility has both national and international importance in terms of providing communication services throughout Australia and overseas. The PITC is considered by Telstra to be one of the two most important satellite sites in Australia (the other site is located in New South Wales), and:

i) Provides services that underpin Australia's export markets;
ii) Maintains social and cultural ties with the rest of the world;
iii) Generates valuable revenue for the Australian Government;
iv) Plays a major role in fulfilling Australia's international obligations; and
v) Plays a key role in the safety of life at sea.

Over $400 million has been invested in the development of the PITC, with further capital being invested on a day to day basis.

7. CONSTRAINTS AND OPPORTUNITIES

7.1 PLANNING

The entire site is reserved for telecommunications purposes in both local government town planning schemes and the MRS. The site has been developed for this purpose since 1966.

Telstra acknowledges that the MfP and WAPC wish to distance future development areas from Alexander Drive and Landsdale in order to minimise potential land use conflicts, as such no future developments are proposed within 600 metres of Alexander Drive.

It is essential that future development can be compatibly accommodated close to the existing main centre. As facilities move away from the main centre the cost of services (power, road and cabling) increases significantly. Dish antenna 'runs' must track satellites in a north/south or east/west direction, to minimise interference (overlooking) between antennas, as such they must 'run' due west and south of the main centre.

It is important to appreciate that only general development areas can be designated, as it is difficult to pinpoint particular sites due to changing technology, detailed feasibility and technical studies that have not yet been undertaken and unknown requirements/proposals from national and international clients, who lease land from Telstra.

Access to the PITC site will continue to be by the main access road from Gnangara Road (**Figure 2**). Minor access roads will be maintained to existing infrastructure and as expansion occurs minor roads and service trenches will need to be constructed. As infrastructure is decommissioned these areas and their access roads will be revegetated where appropriate.

8. ENVIRONMENTAL

8.1 NATIVE BUSHLAND

Vegetation condition and community types are presented in **Appendix A**. As discussed the site has been identified in Perth's Bushplan (draft). Bushplan identifies regionally significant vegetation with the Perth Metropolitan Region, based on a number of criteria. Telstra does not dispute the regional significance of the vegetation, however would like it to be recognised that their security, fencing and management has ensured that the condition of native vegetation (excluding those areas developed) has been maintained and enhanced, particularly compared to adjacent land. Aerial photographs of the site (**Appendix B**) illustrate the changes since the 1960's.

In comparison to the surrounding areas these photographs also show that the use of the site for telecommunications has precluded the establishment of market gardens, clearing for grazing and residential development, factors which have contributed to its inclusion in the Priority One Water Protection Zone.

8.2 Wetlands

Two wetlands occur on the site (Wetlands of the Swan Coastal Plain Volume 2b (December 1995)). These are as follows (**Figure 1**):

Map	Wetland ID No.	Type	Management Category	Impact
2034 11 NE	39416648031	Dampland	Resource Enhancement	1.74 ha
2034 11 NE	39466647932	Dampland	Resource Enhancement	No impact

Neither of these wetlands are required to be protected under a statutory or non statutory policy and as a biophysical feature are well represented in nearby regional parks. To offset the loss of 1.74 ha of dampland Telstra will rehabilitate 4.2ha (50 metre cleared firebreaks) of previously cleared dampland area. It is likely that groundwater abstraction may have significantly lowered the groundwater level in this area. Evidence from the aerial photographs (**Appendix B**) indicates that the dampland vegetation is progressively making a transition to more dryland adapted plant species.

8.3 Groundwater Protection

The site is located above the Mirrabooka semi-confined and unconfined aquifer in a Public Drinking Water Source Area (PDWSA) as declared under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909*.

The Water and Rivers Commission (WRC) is responsible for the management and protection of Western Australia's water resources and has assigned a Priority 1 classification to the groundwater resource at this location. In accordance with the WRC Water Quality Protection Note, Land Use Compatibility in Public Drinking Water Source Area (June 2000), activities associated with communications (receivers/transmitters) can be deemed compatible on the proviso appropriate site management practices are implemented. Telstra does not propose any development within the 'Wellhead Protection Zones' (**Figure 1**).

9. BUSHLAND MANAGEMENT PLAN

Figure 1 delineates the site into a number of areas, that is, Conservation, Multiple Use, Rehabilitation and Development. In the Conservation area no development will occur and the bushland will be maintained for conservation purposes. The Multiple Use area is associated with high frequency antennas where the majority of existing vegetation is retained, however, if development is proposed some minor clearing may be required for guy-wire ground mountings, access roads, antenna base pads, equipment huts and service trenching. It is anticipated that vegetation in these areas will recover over time. The Rehabilitation area is associated with a number of significant firebreaks (50 metre wide). These firebreaks are not all required and therefore will be rehabilitated in accordance with **Figure 1**.

Vegetation Condition	Current		Proposed	
	Ha	%	Ha	%
Cleared - Development area	67	23	31	11
Good, Very Good, Excellent and Pristine	209	72	245[1]	85
Outside Property Firebreaks	13	4	13	4
Rehabilitated	0	0	13	4

1. Conservation + Multiple Use areas

Approximately 72% (209.2ha) of the site has vegetation currently in Good to Pristine condition. Including rehabilitated areas this is likely to increase to 85% (245ha) following the implementation of this Bushland Management Strategy. At the same time cleared areas will be halved from 67ha to 31ha. Should the Bushland Management Strategy be implemented successfully over the next 5 years a clear net environmental gain is expected.

9.1 FUTURE DEVELOPMENT

The Development area will accommodate existing and future infrastructure. Future development includes an extension of the existing antenna run immediately south of the main centre, along an existing cleared 50 metre firebreak. A second main antenna run, 100 metres wide, is proposed immediately west of the main centre for 450 metres. This antenna run also coincides with existing cleared firebreaks which are 50 metres wide. Further future development is generally proposed around the main centre. While **Figure 1** indicates that all vegetation might be cleared in these areas, the practical reality is clearing will be restricted to the absolute minimum necessary for the development of infrastructure.

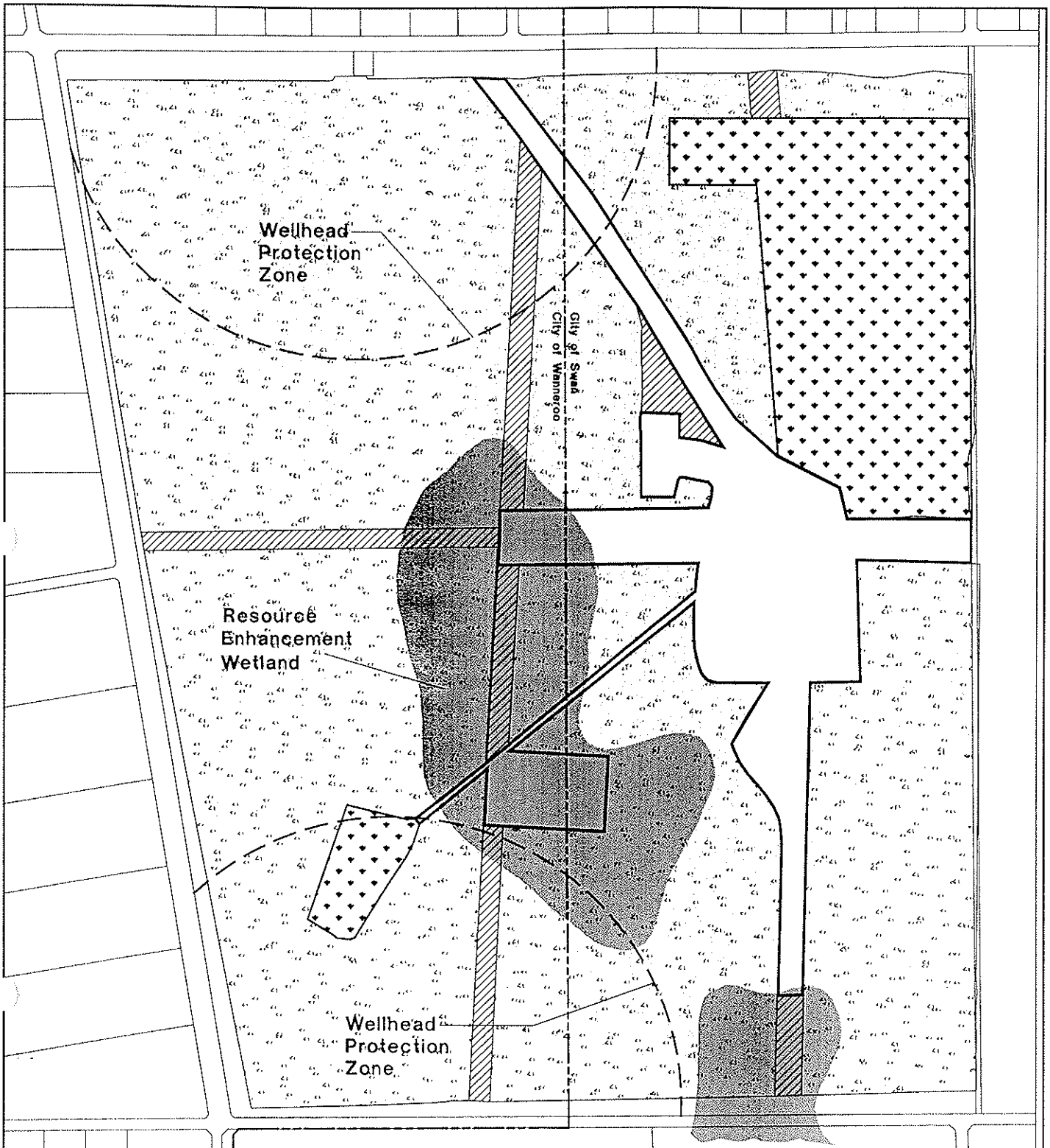
An additional development area has been designated around the existing Telesat compound and the area recently approved for clearance of vegetation. This proposal is reflective of Telesat's future infrastructure requirements and considered reasonable given the amount of bushland that will be conserved or rehabilitated as part of this Bushland Management Strategy.

10. ENVIRONMENTAL COMMITMENTS

Table 1 : Telstra's Bushland Management Commitments

CONSTRUCTION	
i)	Through careful design the minimum amount of vegetation will cleared for future facilities, service trenching and access roads in the Development areas.
ii)	Temporary fencing or flagging will be erected to delineate the extent of clearing for development activities.
iii)	Vegetation clearing will not occur to store, house or park construction vehicles or materials.
iv)	The site manager and project manager responsible for construction will be aware of and comply with these commitments.
REHABILITATION AND WEED CONTROL	
i)	A suitably qualified landscape architect or revegetation specialist will be engaged to prepare a detailed **Rehabilitation and Weed Control Plan** for those areas in the Rehabilitation area.
ii)	The **Rehabilitation and Weed Control Plan** will identify and prioritise those areas from the most degraded to least degraded.
iii)	The **Rehabilitation and Weed Control Plan** will be implemented progressively over 5 years.
iv)	The Rehabilitation and Weed Control Plan will be monitored to ascertain rehabilitation success and modify the Plan, if required.
v)	Tree guards will be considered to protect plants from herbivores (eg. rabbits and kangaroos).
vi)	Plant propagation should be by direct seeding and tube stock.
vii)	Locally occurring and sourced native plants species, including trees, shrubs and herbs, will be used.
viii)	Cleared vegetation will be mulched and/or brushed in the Rehabilitation area.
ix)	The 50 metre firebreaks and disused tracks and facilities in the Rehabilitation area will be mulched to a minimum depth of 100mm.
x)	Fusilade or Glyphosphate will be used to control weed infestations in the Rehabilitation, Multiple Use and Development areas.
xi)	Weed control, mulching and rehabilitation actions will be coordinated and integrated.
xii)	Weed infested areas will be slashed to a height of less than 5 centimetres in winter and early spring to minimise seed set.

FIGURES



LEGEND

- RESOURCE ENHANCEMENT WETLAND
- CONSERVATION AREA
- DEVELOPMENT AREA
- MULTIPLE USE AREA (HIGH FREQUENCY ANTENNAS)
- REHABILITATION AREA

FIGURE 1

PROJECT: P.I.T.C SITE GNANGARA

DRAWING TITLE: BUSHLAND MANAGEMENT PLAN

PRINCIPAL: TELSTRA

ORIGINAL A4

BSD CONSULTANTS
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CITY OF WANNEROO 1 1
Project Number P99051 Drawing Number P595-SK2 Revision B

FIGURE 2

PROJECT **P.I.T.C. SITE GNANGARA**

DRAWING TITLE **SITE PLAN**

PRINCIPAL **TELSTRA**

ORIGINAL A4

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Project Number	Drawing Number	Revision	
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APPENDIX A: AERIAL PHOTOGRAPHS

FIGURE A1

PROJECT	P.I.T.C. SITE GNANGARA
DRAWING TITLE	AERIAL PHOTOGRAPH - 1960's
PRINCIPAL	TELSTRA

ORIGINAL A4

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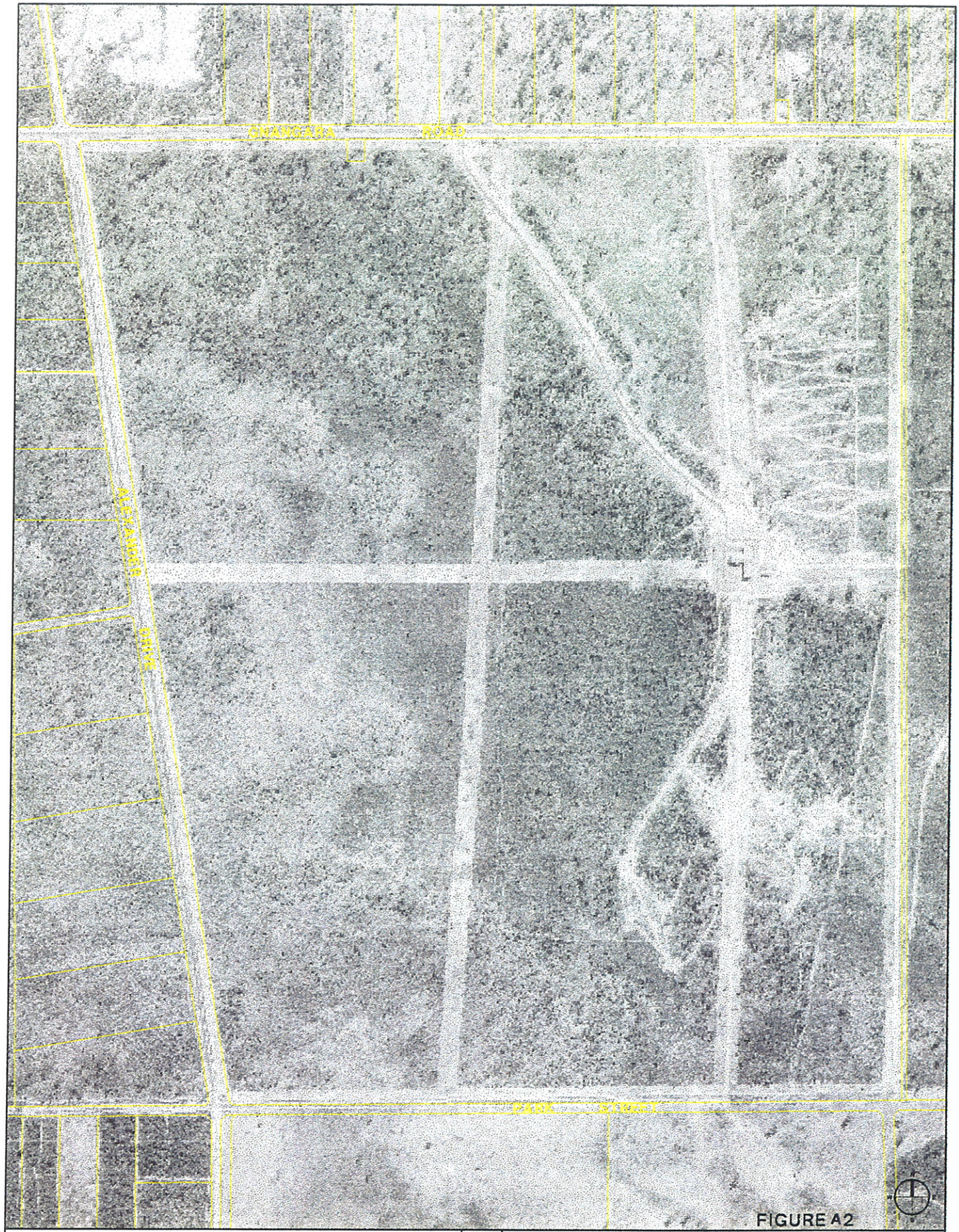

FIGURE A2

PROJECT	P.I.T.C. SITE GNANGARA
DRAWING TITLE	AERIAL PHOTOGRAPH - 1970's
PRINCIPAL	TELSTRA

ORIGINAL A4

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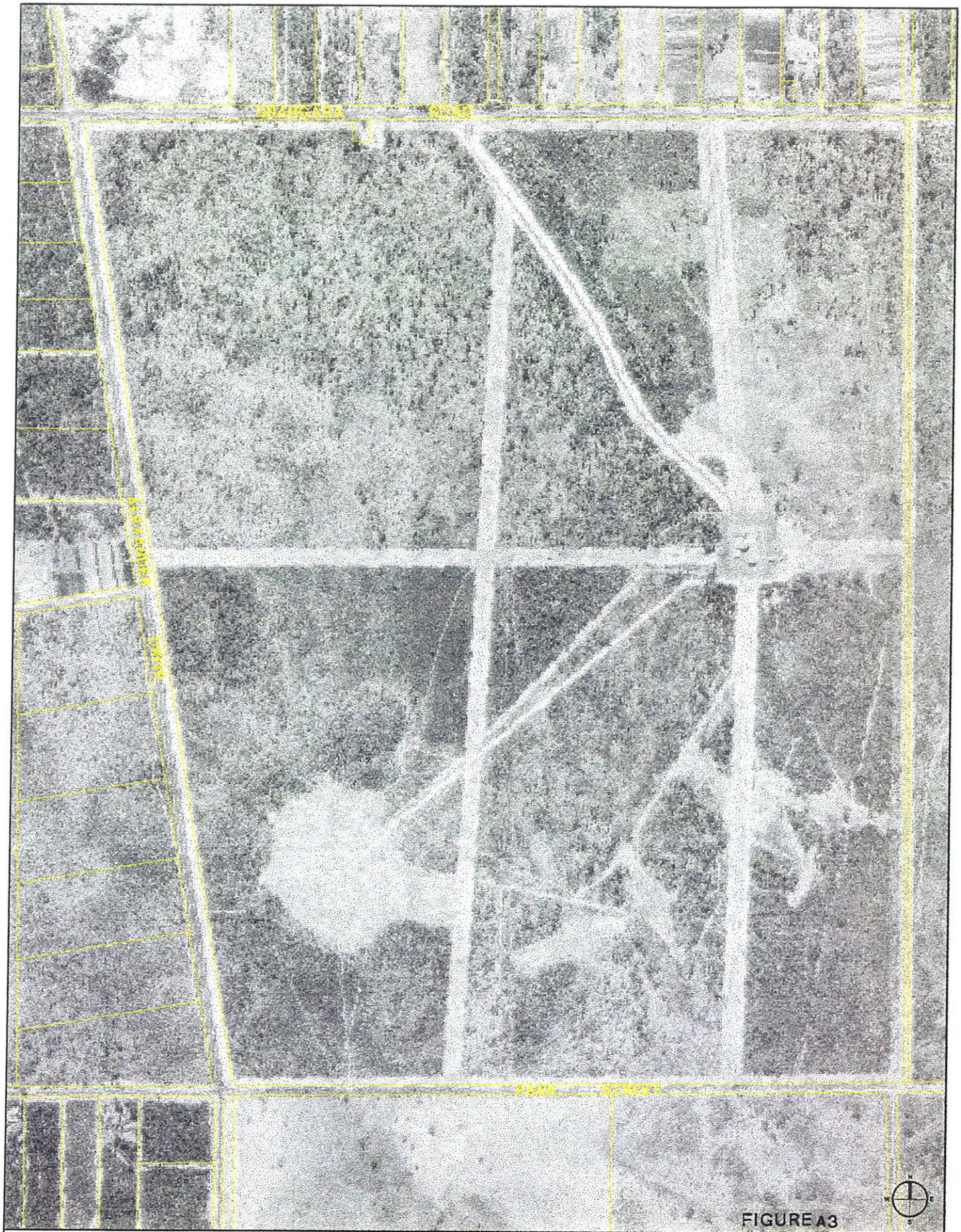

FIGURE A3

PROJECT: P.I.T.C. SITE GNANGARA

DRAWING TITLE: AERIAL PHOTOGRAPH - 1980's

PRINCIPAL: TELSTRA

ORIGINAL A4

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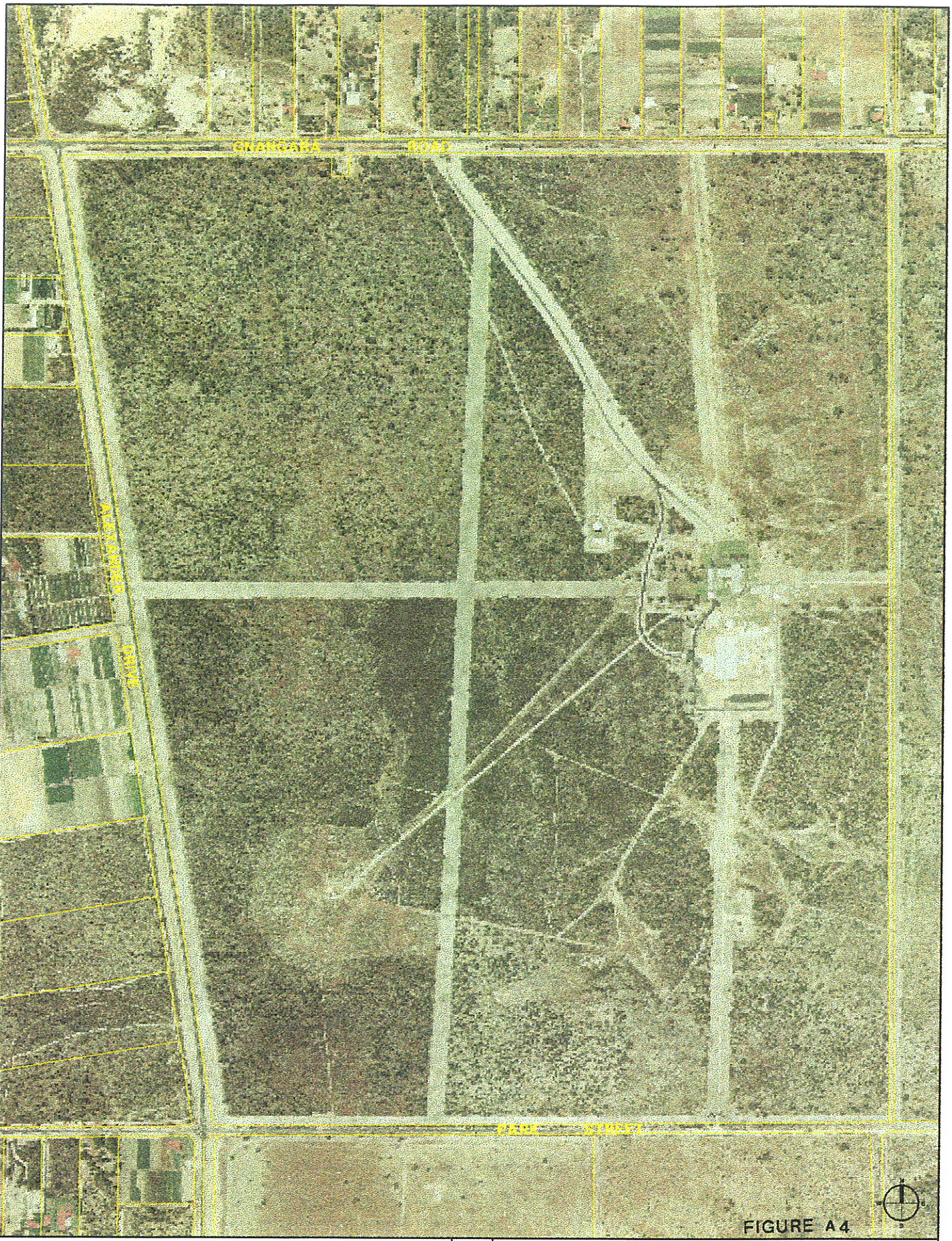

FIGURE A4

PROJECT	P.I.T.C. SITE GNANGARA
DRAWING TITLE	AERIAL PHOTOGRAPH - 1990's
PRINCIPAL	TELSTRA

ORIGINAL A4

BSD CONSULTANTS

CONSULTING ENGINEERS
TOWN PLANNERS
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Date 17.10.00	Scale	1:10,000	
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Project Number	Drawing Number	Revision	
V991-008	V100-SK7		

FIGURE A5

PROJECT	P.I.T.C. SITE GNANGARA
DRAWING TITLE	AERIAL PHOTOGRAPH - 2000
PRINCIPAL	TELSTRA

ORIGINAL A4

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Date 17.10.00		Scale	1:10,000
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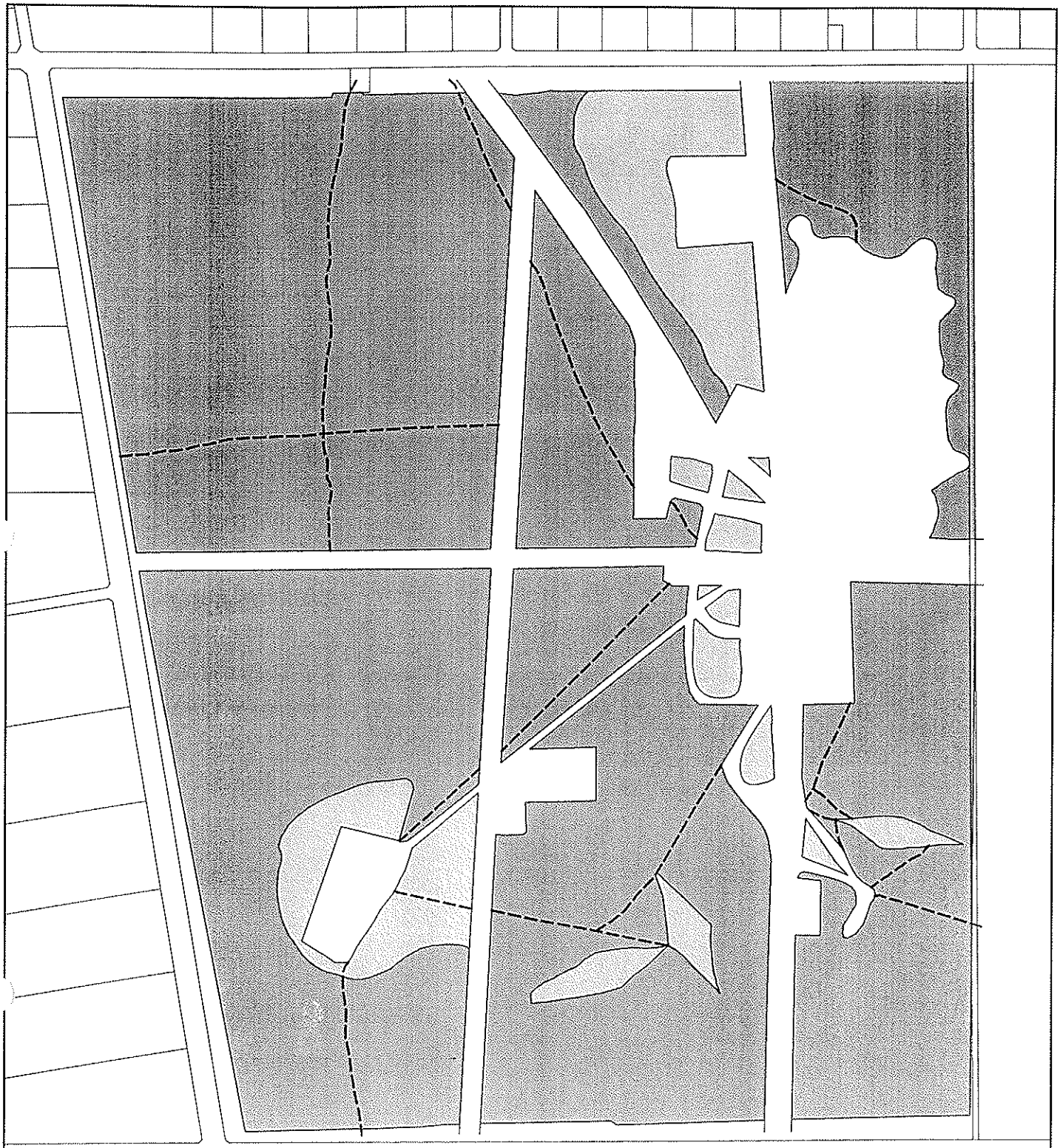
V991-008	V100-SK6		

APPENDIX B: VEGETATION TYPES AND CONDITION



LEGEND

- Vegetation in Excellent (2) to Pristine (1) condition
- Vegetation in Good (4) to Very Good (3) condition
- Areas already Developed

FIGURE B1

SOURCE: DAMES & MOORE, 1998

PROJECT: P.I.T.C. SITE GNANGARA

DRAWING TITLE: VEGETATION CONDITION

PRINCIPAL: TELSTRA

ORIGINAL A4

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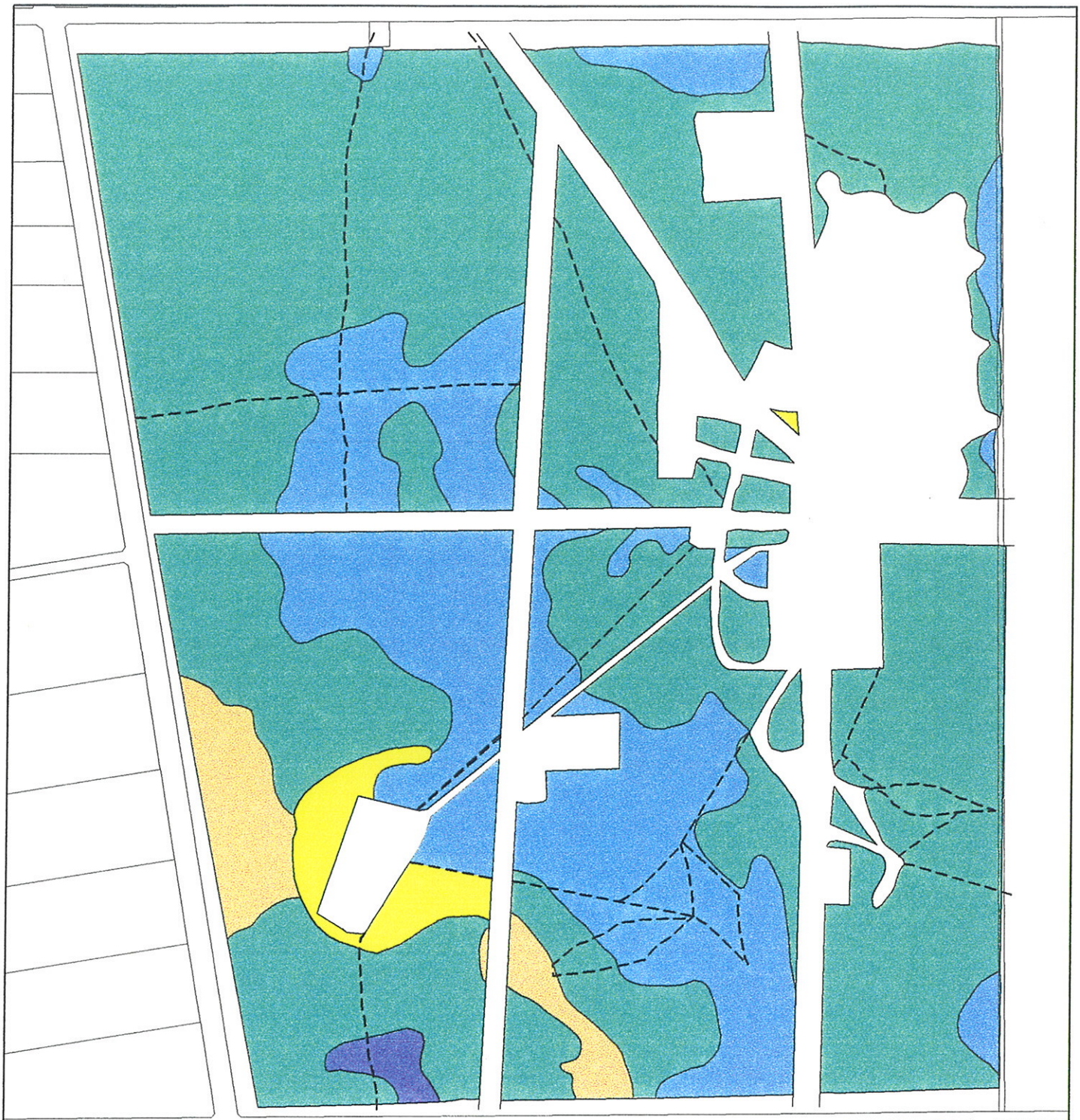
Date 11.09.00 | Scale 1:10,000
Designed | Checked
Drawn DGP | Approved
Local Authority VARIOUS | Sheet 1 Of 1
Project Number V991-008 | Drawing Number V100-SK1 | Revision



LEGEND

- Low Melaleuca preissiana woodland over dense heath
- Banksia open low woodlands over Xanthorrhoea preissii and mixed scrub
- Xanthorrhoea preisii and mixed scrub
- Open low Banksia woodlands over low scrub
- Scattered Banksia ilicifolia over a healthy understorey
- Areas already developed
- Tracks

FIGURE B2

SOURCE: DAMES & MOORE, 1998

PROJECT: P.I.T.C. SITE GNANGARA

DRAWING TITLE: VEGETATION COMMUNITIES

PRINCIPAL: TELSTRA

ORIGINAL A4

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Project Number V991-008 Drawing Number V100-SK2 Revision

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BSD Consultants Pty Ltd

1 ✓

3✓

4✓

5 ✓

6 ✓

8✓

7✓

9✓

Mown area near Site 1

10✓

11✓

in/adj Site 3

12✓

14 ✓ ✓

in/adj Site 3

15 ✓

16 ✓

13 ✓

21

Bushplan Site 196
23-1-98

Area A

Area B

Area D

Area E

Area F

5246 WA 3169(C) METRO REGIONAL AREA & EXT. RUN 11 (5233-5311) 1:20000 15-DEC-92 920676