

AREA INFORMATION

System 6 Area (C or M) or Update Area (Update) *Yorloop 2*

Conservation Area	
Nature Reserve	
Reserve No	
National Park	
Reserve No	
Local Government	
Reserve No	
Other	
Proposed Conservation Areas	
Local Government	<i>Shire of Waroona</i>
Reserve No	<i>22215 (Drainage & Camping)</i>
Other	

Conservation Area

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

TOTAL AREA

Bushland Area	<i>40</i>	hectares
Completely Degraded	<i>1.5 ha</i>	
<i>Frequent fires, partially cleared, track, invasive weeds bamboo</i>		

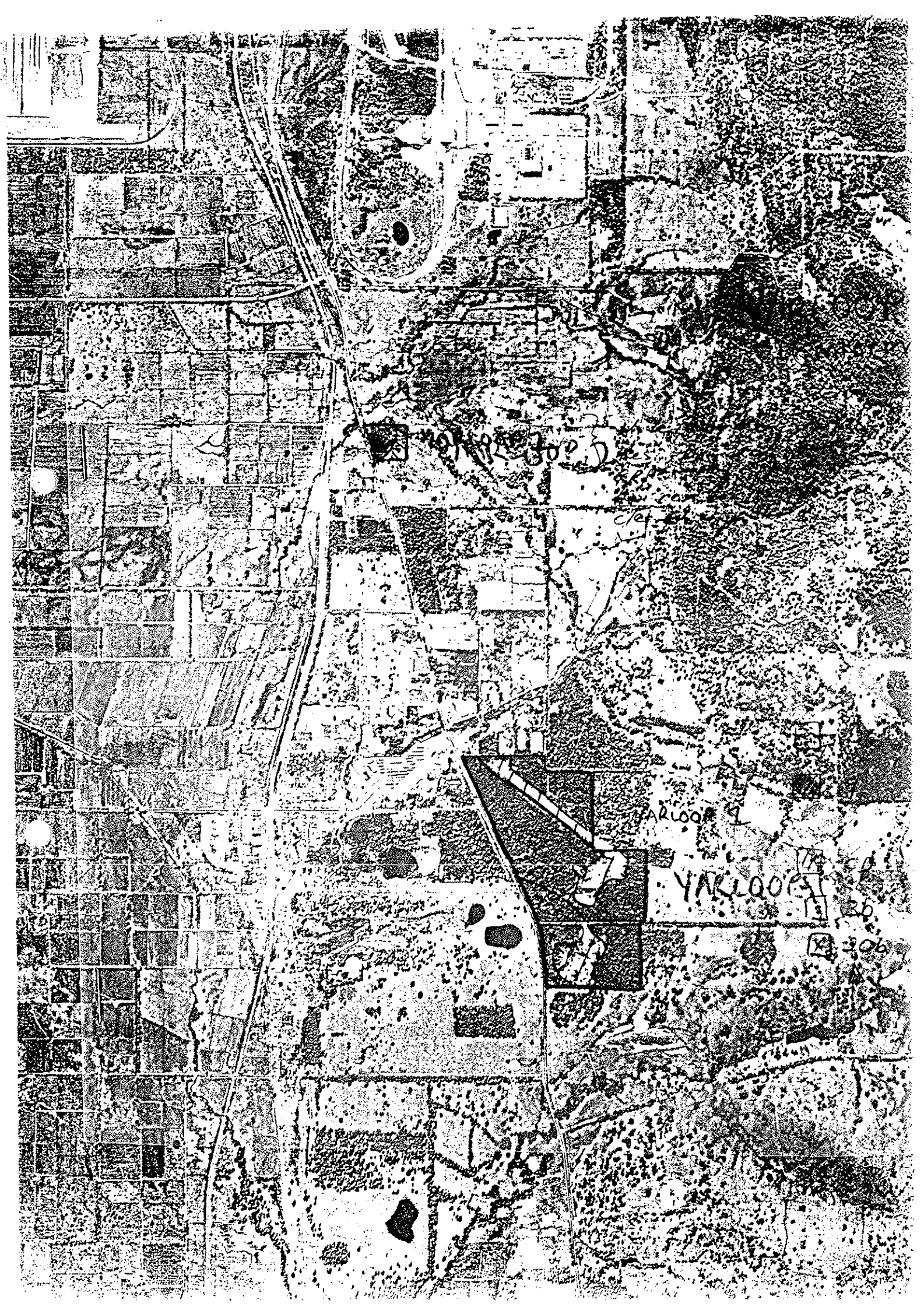
AREA MAPPED FLORISTIC UNITS

Units	Site (Condition)	Code <i>G: YARL</i>	Bound	Area (ha)
<i>3c</i>	<i>Ø1 (3.5) overall condition is such not sat. core cons area → 5</i>		<i>B</i>	<i>1375</i>
<i>9</i>	<i>Ø2 (2)</i>		<i>B</i>	<i>1125</i>

Boundaries determined by use of

aerial photograph	<i>Metro Street Directory run 11 5085 5/1/91</i>
orthophoto	<i>2032 II SE 8/1991</i>
vegetation map	<i>Field when sites located</i>
soil map	<i>Environ Geol M52</i>

MURRAY CALM



YARLOOP 1

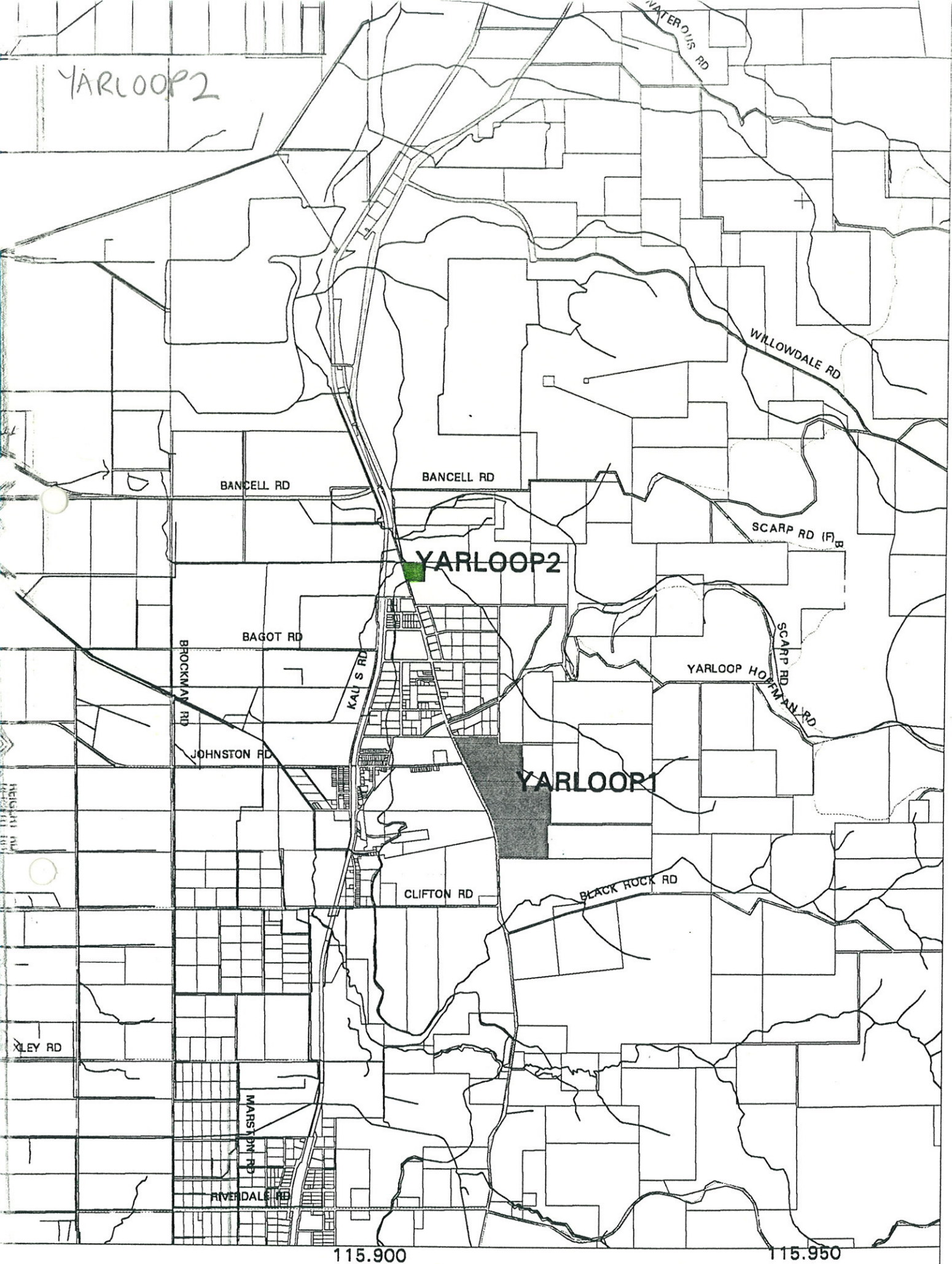
YARLOOP 2

YARLOOP 3

YARLOOP 4

36

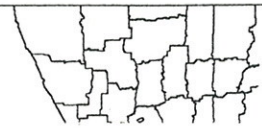
306



SYSTEM SIX RESERVE RECOMMENDATIONS
 Digital data provided by the Department of
 Environmental Protection.

Digital Cadastral data supplied by the
 Department of Land Administration, Perth
 Western Australia.

CHANNEL WETLANDS:
 Information provided by the Water
 Authority of Western Australia 1994



Department of Environmental Protection System 6 Update: Site Based Flora List for Yarloop2

(extracted from the CALM Swan Coastal Plain database, Yar101,02, 60 taxa, 25/5/95)

Anthericaceae

- Borya scirpoidea
- Caesia micrantha
- Caesia occidentalis
- Thysanotus dichotomus
- Thysanotus thyrsoideus
- Tricoryne humilis

Asparagaceae

- * Myrsiphyllum asparagoides

Asteraceae

- Hyalosperma cotula
- * Hypochaeris glabra

Centrolepidaceae

- Aphelia cyperoides

Colchicaceae

- Burchardia multiflora

Cuscutaceae

- * Cuscuta epithymum

Cyperaceae

- Chorizandra cymbaria
- Cyathochaeta avenacea
- * Cyperus tenellus
- Lepidosperma angustatum
- Lepidosperma squamatum
- Mesomelaena tetragona
- Schoenus discifer
- Schoenus odontocarpus
- Schoenus sp. 2 (GJK 5739) scps
- Schoenus subbarbatus "Royce 2872" scps
- Tetraria octandra

Dasyogonaceae

- Lomandra caespitosa
- Lomandra purpurea
- Lomandra suaveolens

Dilleniaceae

- Hibbertia subvaginata

Droseraceae

- Drosera gigantea

Epacridaceae

- Astroloma sp. scps

Goodeniaceae

- Dampiera alata

Dampiera linearis
Scaevola phlebopetala

Haemodoraceae

Conostylis aculeata
Haemodorum sp. scps

Iridaceae

Patersonia occidentalis

Lauraceae

Cassytha glabella
Cassytha racemosa

Mimosaceae

Acacia pulchella
* Acacia pycnantha
Acacia saligna

Myrtaceae

Astartea aff. fascicularis sthst
Eucalyptus calophylla
Hypocalymma angustifolium
Melaleuca leptoclada
Pericalymma ellipticum

Papilionaceae

Daviesia preissii
Gompholobium polymorphum
Hovea trisperma var. trisperma
Kennedia prostrata
Nemcia capitata

Philydraceae

Philydrella pygmaea

Poaceae

* Briza maxima
Stipa campylachne
Tetrarrhena laevis

Proteaceae

Grevillea bipinnatifida
Hakea varia
Synaphea petiolaris

Restionaceae

Loxocarya fasciculata

Stackhousiaceae

Tripterococcus brunonis

Stylidiaceae

Stylidium emarginatum

ENTERED ON GIS

Name: Report on the Floral Values of the Bushland in Yarloop Townsite
opposite Johnston Road
Date: 24/04/2006
Capture Author: Thomas Leong

Comments:

Polygon

Created to match document study area with low level of accuracy

Accuracy Levels:

- High = Document contained visual references easily copied, resulting in little or no polygon boundary errors
- Acceptable = Document contained visual references with complex boundaries, resulting in possible polygon boundary errors
- Low = Document contained little or no visual references, resulting in polygon boundary errors

Attributes

Report Info – Captured without problems

Custodial/Contact – Captured without problems

Content – Captured without problems

Report on the Floral Values of the Bushland in Yarloop Townsite opposite Johnstone Road

Greg Keighery

This area is in the townsite of Yarloop. It lies immediately south of reserves 23307 and 31901, bounded to the north by Johnstone Road, south by an aircraft landing strip and the west by a main drain (figure 1).

VEGETATION PRESENT AND CONDITION

The block has a tall woodland to forest of *Eucalyptus marginata* (Jarrah) over *Xylomelon occidentale* on colluvial yellow sands on the northern margins (Marked J in Figure 2). This woodland is in excellent condition and shares 117 of the 135 species of shrubs and perennial herbs presently recorded in the reserves to the north (Table 1). This figure will undoubtedly increase with a spring survey and is considered about 65% complete at present. The most significant species present on the private block is *Scholtzia ciliata*, here a major disjunction south of its normal range. The species is rare in the Yarloop reserves but has a substantial population on the northern boundary of this block.

This woodland merges downslope into a *Banksia attenuata* dominated woodland, with scattered Jarrah and Casuarina trees, as wind blown white-grey sands become deeper. This area has been (and is?) heavily grazed in the past and has significant invasion of annual weedy grasses scattered through the area. The condition deteriorates as one approaches the edges of the block and the cleared areas (Figure 2) in the middle. Here perennial pasture grasses and Inkplant (*Phytolacca octandra*) become common. Overall the condition of this vegetation is poor.

The vegetation between the lakes has been severely disturbed by grazing and clearing and consists either of scattered Jarrah, Casuarina, *Banksia* or *Eucalyptus calophylla* (Marri) trees over pasture grasses with scattered native shrubs such as *Kunzea ericifolia*. The area has been excavated for rubbish disposal, there are bulbous weeds such as Freesias and *Watsonia* and several car bodies. West of the lakes Marri woodland dominates over *Kunzea ericifolia*, this appears to have been partially cleared in the past. The condition of this vegetation is poor to degraded, and Dieback disease appears to be widespread.

The three lakes contain most of the species which are not recorded in the Yarloop reserves (Table 1), this is not surprising as they have no wetlands.

Lake 1 (Figure 2) had a fringing woodland of *Melaleuca preissiana* and *M. raphiophylla*, however, most of the large trees are dead and a new line of trees are currently establishing around the lake margin. The lake may have been lower in the past. The southern margin contains a diverse herbfield under the trees of native and introduced aquatics and mud dwelling species.

Lake 2 has a fringing woodland of *Melaleuca preissiana* and *Melaleuca raphiophylla* with emergent *Eucalyptus rudis* (Flooded Gums) over sedges of *Lepidosperma longitudinale* and *Juncus pallidus*. The lake margins have a herbfield of *Centella cordifolia*, *Gratiola peruviana* and *Myriophyllum* sp. Weeds such as Blackberries and *Watsonia* are scattered throughout and there has been substantial rubbish dumping.

Lake 3 had a surrounding low woodland of *Melaleuca preissiana*. The centre was dry and completely covered by the pasture grass *Cynodon dactylon* (Couch) with scattered clumps of dead *Juncus pallidus*.

CONCLUSIONS

The Jarrah vegetation of the northern margin of the block is in excellent condition, and is very similar to the Yarloop reserves. As much of this vegetation should be retained as possible.

The *Banksia* and Marri woodland and lakes of the western two thirds of the area have very low flora values and are all rated as poor to degraded in condition. Fauna values of the lakes may be significant.

FLORA OF RESERVES 31900, 3672, 16681, 23307, 31901 AND PRIVATE LAND AT YARLOOP
 *= present on private block, name indicates only present on private block

Yarloop Reserves

Private Land

Aizoaceae

1 Macarthuria sp

Amaranthaceae

Alternanthera nodiflora 1

*Amaranthus lividus 16

Anthericaceae

2 Agrostocrinum scabrum
 3 Caesia micrantha
 4 Caesia occidentalis
 5 Chaemascilla corymbosa
 6 Thysanotus ? manglesianus
 7 Tricoryne elatior
 8 Tricoryne tenella

Arthropodium capillipes 2

* 3

* 4

* 5

* 6

* 7

Apiaceae

7 Homalosciadium homalocarpum
 10 Hydroctyle callicarpa
 1 Pentapeltis peltigera
 2 Trachymene pilosa
 3 Xanthosia huegelii

Centella cordifolia 8

* 9

* 10

* 11

* 12

Caryophyllaceae

*Corrigiola littoralis 17

Casuarinaceae

4 Allocasuarina fraseriana
 5 Allocasuarina humilis

* 13

* 14

Caesalpiniaceae

6 Labichea punctata

* 15

Colchicaceae

7 Burchardia umbellata

* 16

Cyperaceae

Baumea articulata 17

Baumea juncea 18

*Cyperus tenellus 16

Cyperus alterniflorus 17

Fimbristylis velleata 20

Lepidosperma longitudinale 1

8 Lepidosperma ?tenue
 9 Lepidosperma squamatum
 20 Mesomelena ?graciliceps
 1 Mesomelaena tetragona
 2 Tetraria capillaris

* 2

* 3

* 4

* 5

* 6

3	<i>Tetragia octandra</i>	* 7	
	Dasygonaceae		
4	<i>Calectasia cyanea</i>	* 8	
5	<i>Dasygon bromeliifolius</i>	* 9	
6	<i>Lomandra caespitosa</i>	* 30	
7	<i>Lomandra hermaphrodita</i>	* 1	
8	<i>Lomandra preissii</i>	* 2	
9	<i>Lomandra purpurea</i>	* 3	
30	<i>Lomandra sonderi</i>		
1	<i>Lomandra sericea</i>	* 4	
2	<i>Lomandra suaveolens</i>	* 5	
	Dilleniaceae		
3	<i>Hibbertia acerosa</i>	* 6	
4	<i>Hibbertia amplexicaulis</i>		
5	<i>Hibbertia huegelii</i>	* 7	
6	<i>Hibbertia ?montana</i>		
7	<i>Hibbertia hypericoides</i>	* 8	
	Droseraceae		
8	<i>Drosera erythrorhiza</i>	* 9	
9	<i>Drosera stolonifera</i>	* 40	
	Epacridaceae		
60	<i>Astroloma pallidum</i>	* 1	
1	<i>Constephium pendulum</i>	* 2	
2	<i>Styphelia tenuiflora</i>	* 3	
	Euphorbiaceae		
3	<i>Phyllanthus calycinus</i>	* 4	
4	<i>Stachystemon vermicularis</i>	* 5	
	Goodeniaceae		
5	<i>Dampiera linearis</i>	* 6	
6	<i>Lechenaultia biloba</i>	* 7	
	<i>Lechenaultia ?floribunda</i> ?		
7	<i>Scaevola calliptera</i>		
8	<i>Scaevola phelbopetala</i>	* 9	
9	<i>Scaevola repens</i>	* 30	
	Haemodoraceae		
SD	<i>Anigozanthos manglesii</i>	* 1	
1	<i>Conostylis juncea</i>	* 2	
2	<i>Conostylis setigera</i>		
3	<i>Haemodorum loratum</i>		
4	<i>Haemodorum spicatum</i>	* 3	
1	<i>Phelocarya ciliatum</i>	* 4	
6	<i>Phelbocarya filifolia</i>		
	Iridaceae		
	<i>*Freesia hybrid</i>	————— 15	
7	<i>Patersonia juncea</i>	* 5	
8	<i>Patersonia occidentalis</i>	* 6	
	<i>*Watsonia bulbifera</i>	————— 14	
	Juncaceae		
	<i>Juncus pallidus</i>	7	

Lamiaceae		
9	Hemiandra pungens	* 8
Lauraceae		
60	Cassytha micrantha	
	Cassytha racemosa	9
Loganiaceae		
1	Logania serpyllifolia	* 60
2	Mitrasacme paradoxa	
Loranthaceae		
3	Nuytsia floribunda	* 1
Mimosaceae		
4	Acacia huegelii	* 2
	Acacia ?lasiocarpa	3
5	Acacia latericola	
6	Acacia preissiana	
7	Acacia pulchella	* 4
8	Acacia saligna	* 5
9	Acacia sessilis	* 6
70	Acacia stenoptera	* 7
Myrtaceae		
1	Eucalyptus calophylla	
2	Eucalyptus marginata	
	Astartea fascicularis	8
		* 9
		* 70
	Eucalyptus rudis	1
	Kunzea ericifolia	2
	Kunzea recurva	3
	*Leptospermum laevigatum	13
	Melaleuca preissiana	4
	Melaleuca raphiophylla	5
3	Melaleuca ?scabra	
4	Melaleuca thymiodes	* 6
5	Scholtzia ciliata	* 7
Orchidaceae		
1	Caladenia discoidea	
7	Caladenia flava	
8	Lyperanthus nigricans	
	Cryptostylis ovata	8
		* 9
	*Monadenia bracteata	12
9	Prasophyllum parvifolium	* 70 80
80	Pterostylis vittata	* 1
1	Pterostylis recurva	* 2
2	Thelymitra crinita	* 3
Orobanchaceae		
3	Orobanche minor	* 4
Papilionaceae		
4	Bossiaea ericarpa	* 5
5	Bossiaea sp (229)	* 6
	*Cytissus prolifera	11
6	Daviesia divaricata	* 7

7	Daviesia physodes	* 8
8	Daviesia preissii	* 9
9	Gompholobium aristatum	* 80 90
		Gompholobium confertum 1
90	Gompholobium knightianum	* 2
1	Gompholobium marginatum	* 3
2	Gompholobium ovatum	* 4
3	Gompholobium polymorphum	* 5
4	Gompholobium preissii	* 6
5	Gompholobium shutleworthii	
6	Hovea chorizemifolia	* 7
7	Hovea trisperma	* 8
8	Kennedia coccinea	* 9
9	Kennedia prostrata	* 90 100
		*Lupinus cosentinii — 7
100	Pittosporaceae	
	Pronaya fraseri	* 1
	Phormiaceae	
	Dianella revoluta	* 2
2	Stypandra glauca	
	Phytolaccaceae	
		Phytolacca octandra 3
	Poaceae	
3	Amphipogon turbinatus	* 4 — 10
	*Briza maxima 2	
4	Danthonia occidentalis	* 5 — 6
		*Digitaria ciliaris — 5
		*Eragrostis curvula — 6
		Eragrostis elongata 8
5	Neurachne alopecuroidea	* 6
		*Pennisetum clandestinum — 4
		*Stenotaphrum secundatum — 5
6	Stipa campylachne	* 7
7	Stipa flavescens	* 8
8	Tetrarrhena laevis	* 100 110
	Polygalaceae	
9	Comesperma calymega	* 1
110	Comesperma virgatum	
	Polygonaceae	
		*Rumex sp — 3
	Proteaceae	
1	Adenanthos meisneri	* 2
2	Banksia attenuata	* 3
3	Banksia grandis	* 4
		Banksia illicifolia 5
4	Conospermum stoechadis	* 6
5	Dryandra bipinnatifida	* 7
6	Dryandra nivea	* 8
7	Grevillea quercifolia	* 9
8	Grevillea wilsonii	* 90 120

- 9 Hakea cyclocarpa
- 120 Hakea ruscifolia
- 1 Persoonia elliptica
- 2 Persoonia saccata
- 3 Petrophile linearis
- 4 Stirlingia latifolia
- 5 Xylomelon occidentale

- Hakea prostrata 1
- * 2
- Hakea varia 3
- * 4
- * 5
- * 6
- * 7
- * 8

Restionaceae

- 6 Hypolaena exsulca
- 7 Loxocarya fasciculata
- 8 Loxocarya flexuosa
- 9 Lyginia barbata

- * 9
- Leptocarpus sp. 120/30
- * 1
- * 2
- * 3
- Restio microcodon 4

Rosaceae

- *Rubus fruticosus — 2

Rubiaceae

- 130 Opercularia apiciflora
- 1 Opercularia hispidula

- * 5

Rutaceae

- 2 Eriostemon spicatus

- * 6

Scrophulariaceae

- Gratiola peruviana 7

Solanaceae

- *Solanum ammericanum — 1

Stylidiaceae

- 3 Stylidium piliferum
- 4 Stylidium schoenoides

- * 8

Thymeleaceae

- 5 Pimelea suaeveolens

- * 9

Tremandraceae

- 6 Tetratheca hirsuta

- * 120 140

Violaceae

- 7 Hybanthus floribundus

- * 1

Xanthorrhoeaceae

- 8 Xanthorrhoea gracilis
- 9 Xanthorrhoea preissii

- * 2

- * 3

139 Natives
+ 3 weeds

143 Natives
18 weeds

162

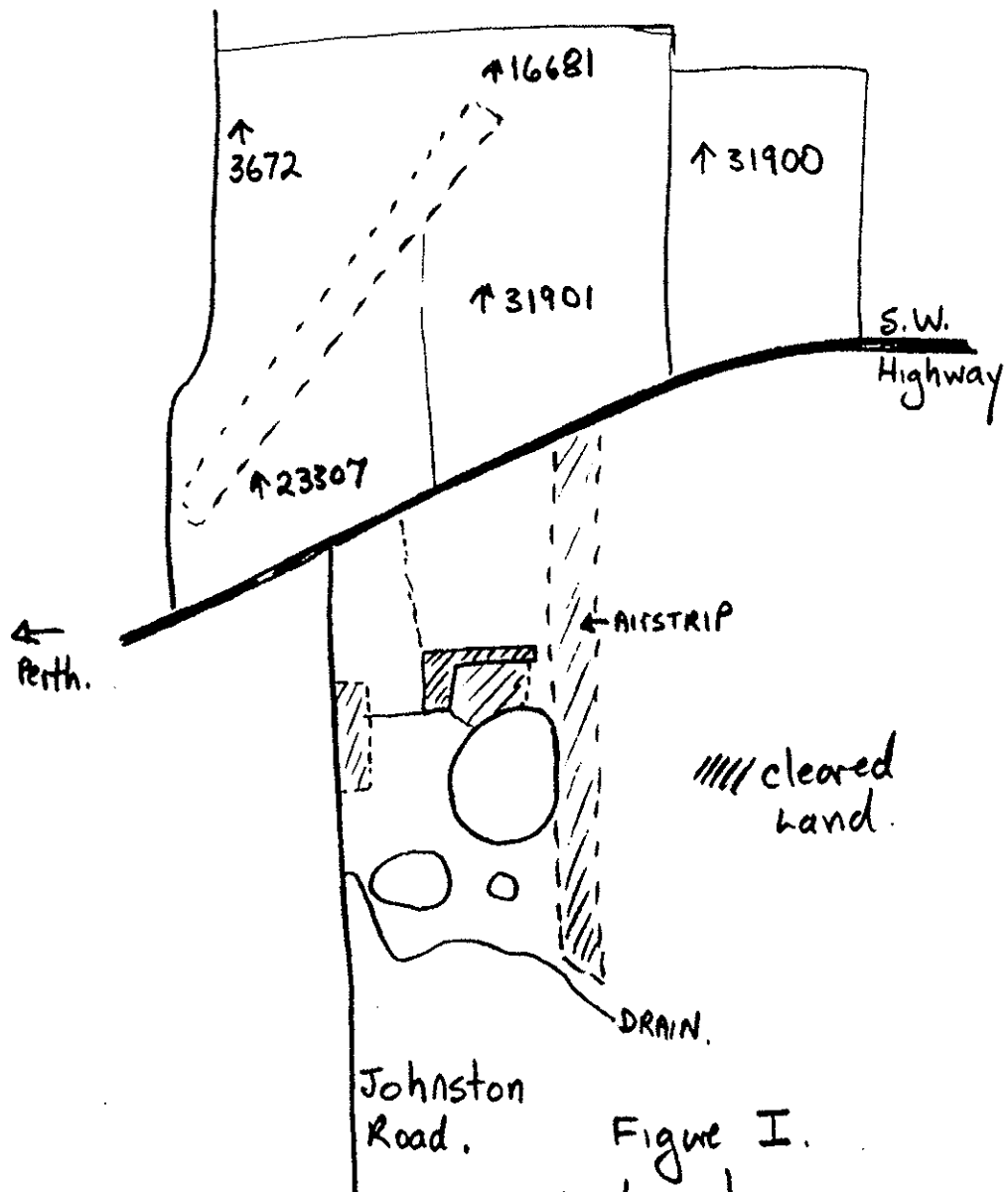
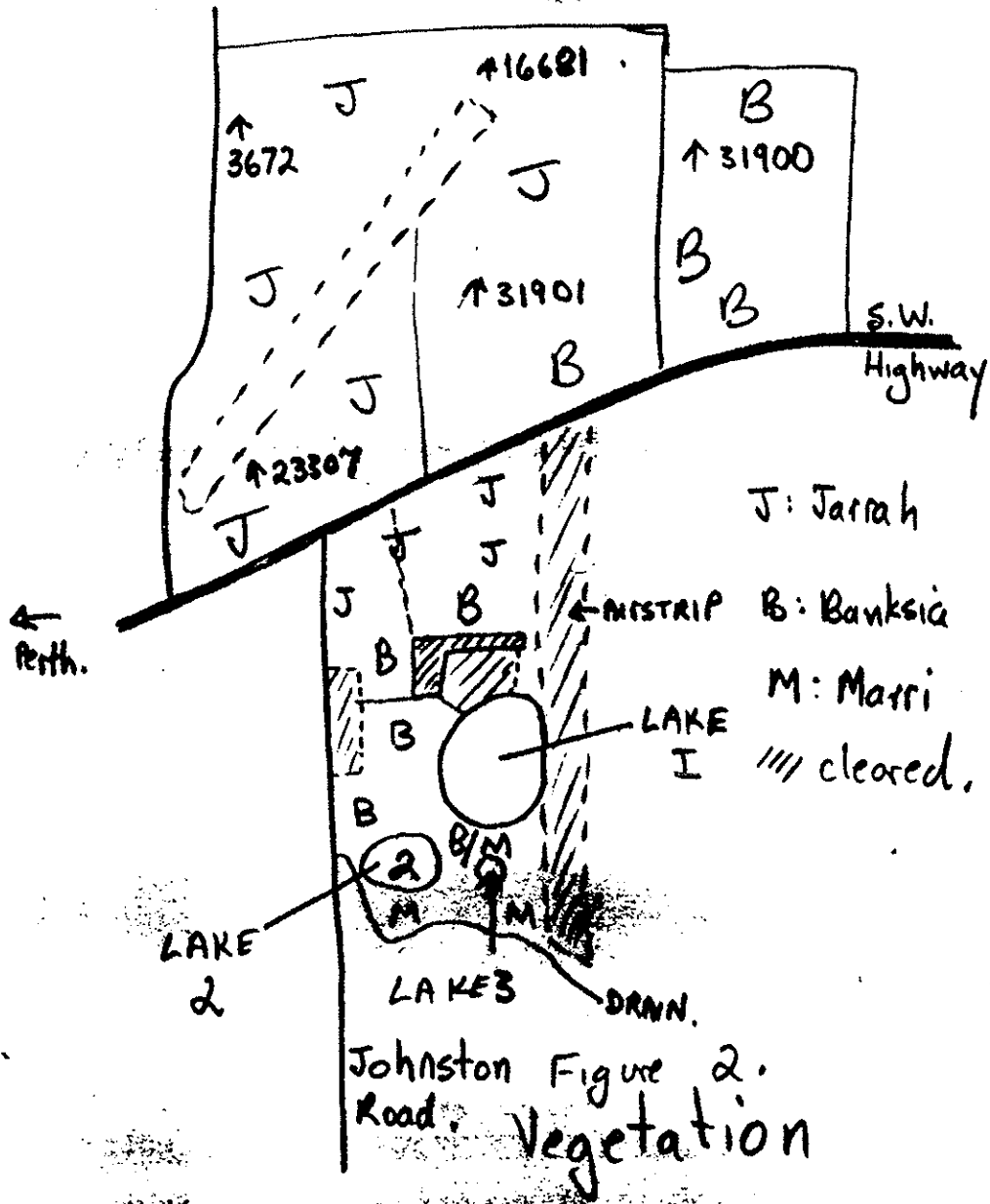
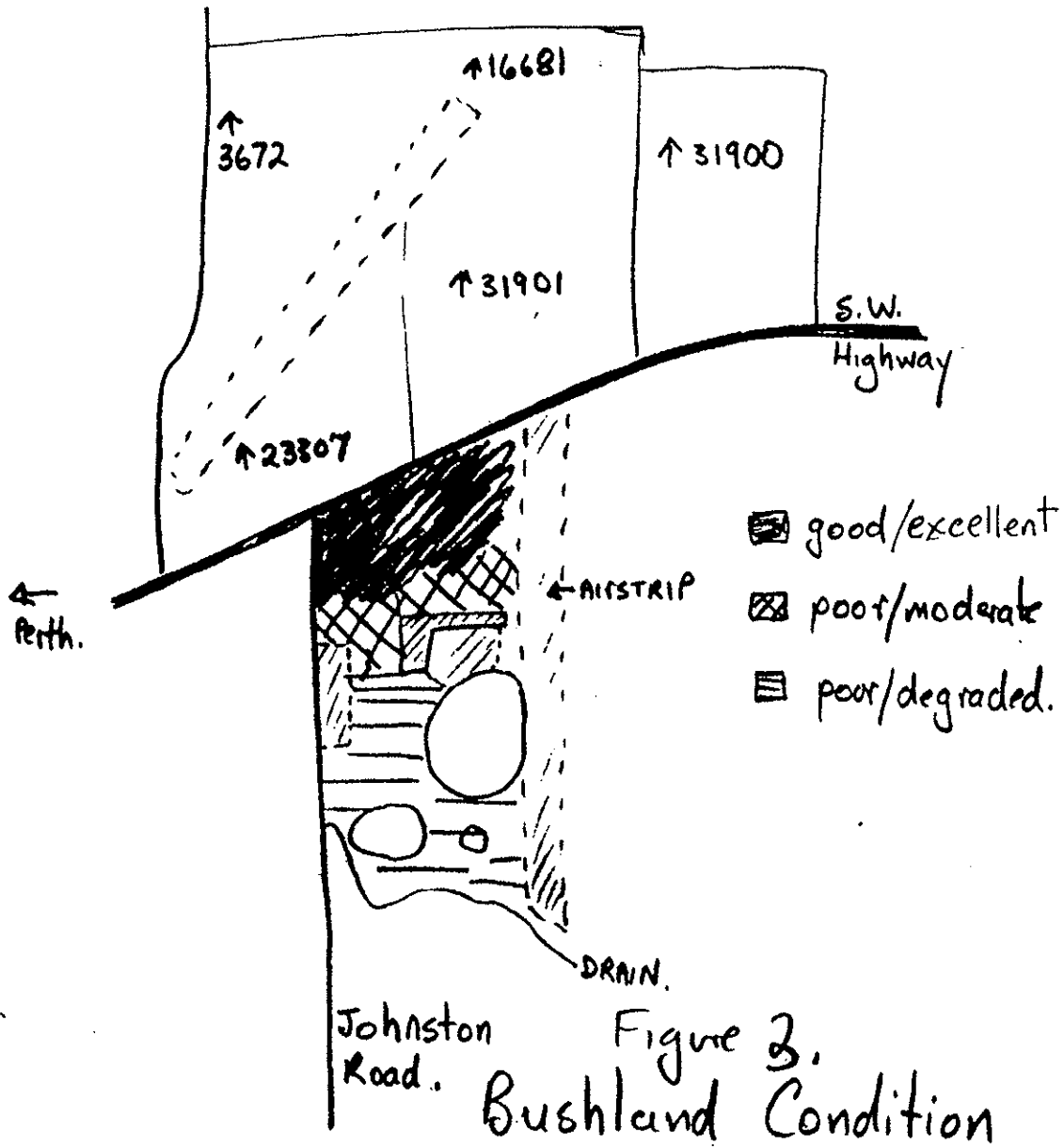


Figure I.
Location





CONSERVATION BRANCH
INTRA DEPARTMENTAL ADVICE
NB: For Internal Use Only

TO: GARY WHISSON
SUBJECT: Yarloop - mining in Reserve 31900
FROM: Malcolm Trudgen
DATE: 8/6/98

*Discussed with Kim Taylor / Melinda Phillips
Kim agreed further legal clarification of these
issues should be sought. He was to follow this
up.*

Please could I be provided with a copy of your final advice. Thank you.

*up.
gwh*

A NEW PROPOSAL ??????

The acceptance of the 1998 proposal by Cable Sands Pty Ltd to mine in Reserve 31900 raise several important concerns, including:

- is it really a new proposal;
- if the EPA/DEP has erred in this belief, is it acting illegally; and
- if it is a new proposal what is the threshold for a new proposal?

Before discussing the merits of the Cable Sands Yarloop issue, it is necessary to discuss what is meant by the word proposal in the context of environmental management in Western Australia. I have taken the concept to be the development that the proponent wishes to carry out rather than consequent actions necessary to carry out the desire, especially where subsequent actions or developments are required by law or by regulatory authorities, or can reasonably be seen to be being done to facilitate gaining approval. Thus the actions surrounding a development can be divided into a proposal (a development or actions to further some wish, such as to mine an orebody and sell the ore obtained), actions necessary for the proposal to proceed (such as submitting referral documents to the EPA, obtaining local government approvals) and actions necessary to carry out requirements such as rehabilitation, dust control etc.

In its 1996 CER, Cable Sands (WA) Pty Ltd seems to have had such a view of the use of the word proposal in relation to environmental management in Western Australia. In the executive summary of their 1996 PER, Cable Sands describe their then proposal in the following way: "This Consultative Environmental Review relates to a Cable Sands (WA) Pty Ltd proposal for the mining of titanium minerals from a deposit identified at Yarloop." (Cable Sands 1996) This is quite different to the usage in the referral document submitted by Cable Sands in March 1998 where it

*Copied to Melinda 27/7 re status + whether we
need to follow it up with Alison Clarke
gwh*

says "This document briefly describes a proposal for Cable Sands (WA) Pty Ltd to mine, rehabilitate and manage an area of Reserve 31900 at Yarloop." (Cable Sands 1998, paragraph 1, p. 1).

In the same document, Cable Sands (1998, paragraph 4 and dot points, p. 1) says "The original mining proposal included clearing and mining a section of Reserve 31900. This section of the proposal was not approved by the Minister. The new proposal differs significantly from the original proposal in a number of ways.

- Additional vegetation investigations have increased knowledge of the reserve and adjoining areas and has highlighted some anomalies in the original proposal and assessment.
- This proposal looks at rehabilitation and management of a much wider area than originally considered. Whereas the original was confined to the mining area within Reserve 31900, this proposal looks at the whole of Reserve 31900.
- There is a strong probability that Cable Sands will be able to obtain an area of land with comparable values to those in Reserve 31900. This land is adjacent to the Yarloop reserves and would be made available by the company for inclusion in the conservation estate if mining were to proceed in the reserve.
- Further evaluation of the orebody has identified an additional 30,000 tonnes of heavy mineral concentrate (HMC)."

I will discuss the dot points as one to four.

Dot point one relates to understanding of the knowledge of the vegetation of Reserve 31900 and adjoining areas, while this change in knowledge is interesting in its own right, it does not alter the proposal as such. Rather, what it alters is the understanding of the status of the vegetation on the reserve (which is still considered regionally significant). The vegetation is not the proposal, the proposal is to clear the vegetation and mine the minerals in the soil beneath it.

Dot point two relates to "rehabilitation and management of a much wider area than originally considered.", such actions (rehabilitation and management) are part of what society, through the EP ACT and its administration (including the effect of public submissions), has said are requirements to responsibly carry out a proposal such as the mining of an orebody. While commitments to them are necessary for permission to be granted to carry out the proposal to mine, they are not part of that proposal. The offer to rehabilitate and manage a wider area than actually mined is actually an inducement to give approval to mine, rather than part of the actual proposal to mine. Also, while not as well defined in the 1996 document the commitment to rehabilitation of a wider area is not new, the executive summary of the June 1996 CER states " The opportunity will be taken, in consultation with

relevant authorities to improve the condition of the degraded area to the west of the orebody."

Dot point three is a promise to carry out a land swap. Again, it is not part of the proposal to mine. It is in fact an inducement to allow the proposal (if you like, a proposal to do a land swap to gain permission for another proposal). This is also not a new item, the same land swap was proposed in relation to the 1996 proposal. (The reference to an inducement is not to suggest impropriety, such tradeoffs can give win-win situations but, only to properly define what is being said.)

Dot point four identifies a further 30,000 tonnes of HMC that Cable Sands wishes to mine in the Reserve. This is presumably in the extra three hectares that Cable Sands wishes to mine in the Reserve (10,000 tonnes per hectare). The original proposal identified 200,00 tonnes of HMC in the Reserve in six hectares, or approximately 33,000 tonnes per hectare. An additional 15% extension of an orebody is not an unusual occurrence in mining, in fact many mines have much greater extensions to their orebodies and what may have happened here is that Cable Sands has changed its view of what is economic to mine. Certainly, it would be surprising if Cable Sands had not had previous experience with orebodies not being exactly as modelled and this extension of the orebody could easily be seen as not unexpected or unlikely under the original (1996) proposal.

The critical paragraphs in the legal opinion are the second last and last (which continues over the page) of the second page.

The second last paragraph relates to the extension of the rehabilitation programme, as discussed above, this, while more detailed in the current proposal, is not a new commitment. The last paragraph discusses the extent to which the changes (ie. the greater area of mining proposed) will affect the environment. The main environmental issue relating to Reserve 31900 is the impact on vegetation and the increased area of mining is on an already cleared part of the Reserve.

I think therefore, that the legal opinion is actually that the proposal is not new.

ZZZZZZZZZZZZZZ

Cable Sands (1996). Yarloop titanium minerals mine. Consultative Environmental Review. June 1996. Cable Sands (WA) Pty Ltd.

Cable Sands (1998). Mining and rehabilitation of Reserve 31900 at Yarloop. Referral document, March 1998. Cable Sands (WA) Pty Ltd.