

The pipeline corridor passing through the significant remnant bushland at Buller is of great concern to CALM. This is the last sizable remnant bushland of it's type represented on the swan coastal plain that remains relatively intact. In addition it contains a significant Banksia sp - Banksia menziesii, that is at it's range end for the Swan Coastal Plain and should there fore be protected from further loss.

Two options emerged from discussions on site:

1) Given the significant nature of the vegetation at Buller, the loss of any vegetation must be minimised and one of the two western options identified in the SER would be a preferred ecologically sensitive option rather than the Preferred Option running parallel on the eastern side of the existing corridor.

2) One of the questions posed was; Given the existing pipeline corridor has already been cleared to its 30m width through the Buller bushland area with provision for up to 6 more pipes, is there really a need for a further 20m clearing to the east for the second corridor? The answer, which requires further investigation was; There may be scope to reduce the additional corridor to a 10m width with the use of thicker walled pipes.

Option 2 appears to offer a substantial compromise to keep the two corridors parallel and negate the need for the western option. There is an existing 6m to 8m wide fire break running parallel to the east of the existing corridor with a strip of bushland 2m to 4m width that incorporates the fence line. If the 10 m option was adopted then the loss of bushland vegetation would be reduced to the 2m to 4m fence line.

Grant N Lamb

Environmental Officer  
Environmental Protection Section  
CALM Kensington  
Ph - 9334 0474  
Mob - 042 992 0002  
grantl@calm.wa.gov.au

-----Original Message-----

From: Bronwen Keighery [mailto:bjkeighe@it.net.au]  
Sent: Tuesday, 10 August 2004 6:50 AM  
To: Lamb, Grant  
Cc: Gary Whisson  
Subject: Notes from Guthrie, Kemerton and Buller Inspection Trip

Hi Grant

I have been out of action for few days (since Friday afternoon). I

think I saw a message from you on my work e-mail on Friday. If this

is so can you please send it to this e-mail address so I can respond.

Cheers Bronwen

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X-Sieve: CMU Sieve 2.2  
Subject: RE: Notes from Guthrie, Kemerton and Buller Inspection Trip  
Date: Tue, 10 Aug 2004 08:14:29 +0800  
Thread-Topic: Notes from Guthrie, Kemerton and Buller Inspection Trip  
Thread-Index: Acr+biIzIVE8jJETTiqLeZ6h/vgsvAAAJH2g  
From: "Lamb, Grant" <grantl@calm.wa.gov.au>  
To: "Bronwen Keighery" <bjkeighe@it.net.au>  
X-OriginalArrivalTime: 10 Aug 2004 00:14:30.0051 (UTC) FILETIME=[013DBF30:01C47E6F]  
X-Spam-Status: (home.it.net.au) No, score=-4.8 (BAYES\_00,RCVD\_IN\_RFCI)  
X-Scanned-By: MIMEDefang 2.43

Hi Bronwen

Sorry to hear that the fall you had at Kemerton has aggravated your injuries. Hope you recover soon.

Here is the quick not I sent out. Cheers

Grant

I would like to thank everyone for giving their time and professional approach to achieving what I believe are some positive resolutions to the Kemerton and Buller alignment issues for the DBNGP corridor on the recent field trip.

I have put together a summary of the outcomes discussed and would appreciate responses or comments as soon as possible so I can prepare an update for the Conservation Commission on our way forward.

#### 1) Kemerton

Phil Bayley will prepare an updated map showing the following alignment decisions as discussed in the field (see following dot points) and disseminate.

This map will require written approval in principal from all parties to the GPWG as soon as possible in order for work to commence on vegetation surveys and alignment analysis.

Travelling south easterly from the "Proposed Alignment", the alternative alignment looked at passing to the south of the wetlands on the western boundary of the Richardson Road refuse tip, before crossing over Richardson Road at a point between the tip to the north and the cemetery to the south (preferably picking up the fence line and incorporating the two fire breaks either side). This section passes through remnant private property (pp) vegetation.

On the eastern side of Richards Road the alignment takes right hand turn and heads south before taking a 45 degree turn (just north of the Harvey River diversion drain) to the east and cross under the existing north/south powerline corridor and the Harvey River diversion drain, emerging on the eastern side of an EPP lake, within the north eastern boundary of Guthrie Forest Block. This section mostly traverses pp paddocks and skirts along side a small patch of pp remnant bushland. The proposed alignment then continues in a southerly direction through a narrow neck of vegetation at the eastern end of Guthrie Forest block. Continuing south through uncleared pp wetlands and parallel to the small narrow rectangular section of Guthrie block to the east, it passes through a narrow neck of a CC wetland before again running in a southerly direction through pp paddocks, with a couple of minor directional changes to cross the Wellesley River.

After crossing the Wellesley River the alignment takes a turn to the west to again cross the Wellesley River and traverse a small patch of pp bush land. It continues further west crossing the same north/south powerline corridor and pp plantation terminating at the new Kemerton power station currently under construction.

#### 2) Buller

## KEIGHERY Bronwen

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**From:** Lamb, Grant [grantl@calm.wa.gov.au]  
**Sent:** Tuesday, 27 July 2004 1:06 PM  
**To:** WHISSON Gary; KEIGHERY Bronwen; David HARRINGTON (E-mail); Phillip Bayley (E-mail); Libby Mattiske (E-mail); Garkaklis, Mark; Hanly, Peter  
**Cc:** Caporn, Norm; Dick Austin (E-mail)  
**Subject:** Kemerton/Buller Field trip

The Kemerton /Buller field trip has been confirmed for Wed 4th and Thurs 5th August.

Accommodation has been tentatively booked at the Coombana Bay Holliday Resort opposite Bunbury's city centre. Two chalets, each with three separate bedrooms, shared kitchen/living and bathroom at a corporate rate of \$98 per chalet.

Can people please confirm the days they will be attending and if you wish to use the booked accommodation.

This accommodation is optional and you are welcome to seek other accommodation if it better suits you.

The approximate Itinerary for the trip is as follows.

Wed 4th

10:00 Hrs - Meet at the corner of Old Coast Road and Forestry Road - Proceed to Proposed pipeline corridor location and discuss issues.

12:30 Hrs - Lunch (a pre packed lunch or provisions at a local shop)

13:30 Hrs - Continue onto Guthrie Block. - Discuss alignment issues regarding the corridor traversing lands in and around sensitive wetlands areas.

14:30 Hrs - Continue onto Kemerton substation site. - Discuss alignment issues regarding the corridor traversing lands in and around sensitive wetlands areas.

15:30 Hrs - Travel to Bunbury CALM and review findings and recommendations (Opportunity for use of office equipment if required)

17:00 Hrs - Travel to Bunbury accommodation for the evening.

Thurs 5th

08:00 Hrs - Set off for Buller Nature Reserve.

09:30 Hrs - Traverse proposed alignment and discuss vegetation issues in relation to the proposed alignment and investigate feasibility of the other Buller options.

12:00 Hrs - Lunch (a pre packed lunch or provisions at a local shop)

13:00 hrs - Complete investigations and review findings and recommendations

14:30 Hrs - Return to Perth

Regards

Grant N Lamb

Environmental Officer  
Environmental Protection Section  
CALM Kensington  
Ph - 9334 0474  
Mob - 042 992 0002  
grantl@calm.wa.gov.au

### **Location and extent of the Muchea Limestones in the Kemerton Silica Sands area**

On the basis of survey to date the extent of the restricted floristic community type mosaic - "Shrublands and woodlands on Muchea Limestones" is shown on Map 1.

Within the area of the "Shrublands and woodlands on Muchea Limestones" four broad vegetation units can be distinguished.

- *Eucalyptus decipiens* unit: This woodland to open forest is dominated by combinations of *Eucalyptus decipiens*, *E. calophylla*, *Banksia littoralis* and *Agonis flexuosa* on the eastern rise and *Eucalyptus decipiens* and *Agonis flexuosa* on the central southern rise. The area previously delineated between 33° 08.161" and 115° 47.871", 33° 08.353" and 115° 47.868" and 33° 08.188" and 115° 48.013" is part of the eastern rise.
- *Melaleuca raphiophylla* and *Eucalyptus decipiens* Low Forest: This unit fringes the rises.
- *Melaleuca* species Shrublands/Sedgeland/Herbland wetland mosaic: This unit is dominated by a complex suite of *Melaleuca* species associated with a series of sedges, rushes and herbs. At times the sedges, rushes and herbs occur without the *Melaleuca* layer.
- *Melaleuca raphiophylla* Low Forest: This unit is associated with the deeper wetland areas, some of which contain areas of EPP lakes and areas of *Baumea articulata*.

Survey to the north of the current mine site in the area of the Gwalia Nature Reserve identified a series of clay based wetlands but did not locate a similar suite of communities or any areas of *Eucalyptus decipiens*.

### **Significant species**

The first of the reports in this series listed a series of significant taxa. It is worth noting the following additional species/information.

*Alogyne huegelii* var *huegelii*: It appears that this taxon may be a newly delineated *Alogyne*, *A. angustiloba* Conran ms. The only determined specimens of this taxon in the WA Herbarium are from adjacent to Yanchep National Park.

*Calandrinia* sp Kenwick (GJ Keighery 10905): The specimens of this taxon in the WA Herbarium currently appear to encompass two taxa. Both of these taxa appear to be present in the *Melaleuca* species Shrublands/Sedgeland/Herbland wetland mosaic area. However one is more restricted than the other, currently known from the Brixton Street Wetlands and the study area.

Further work on both of these taxa is required to determine both their taxonomic and conservation status. The limited nature of their distributions indicates both may well be listed as Declared Rare Flora.

*Original work.*

**Muchea Limestones of the Kemerton Silica Sands Project Area**

**Report 2: Extent of Muchea Limestone Community Mosaic in the  
Kemerton Silica Sands Area and the Gwalia Nature Reserve**

**BJ Keighery<sup>1</sup>, GJ Keighery<sup>2</sup>, BM Hyder-Griffiths<sup>1</sup>, Jill Pryde<sup>2</sup> and Melissa  
Hoskins<sup>2</sup>**

**February 2004**

**1 Department of Environment**

**2 Department of Conservation and Land Management**

## Background

The area of Muchea Limestones communities in the Kemerton Silica Sands area was initially located on a brief field survey by DEP staff in October 1997 (Bronwen Keighery and Michelle Mifka, as reported in Keighery 1998). Subsequent work in the area by Muir (1999) and Mattiske Consulting (2003) did not result in further information or delineation of these areas.

As part of continuing studies of the Muchea Limestones from Gingin north to Kemerton (most southern location known of Muchea Limestones) BJ Keighery (DOE) and GJ Keighery (CALM) visited Kemerton Silica Sands area on 2 September 2003 to begin a detailed documentation of this area of Muchea Limestones. Approximately three hours was spent traversing the area. This work focused on:

- estimating the area in which limestone was most apparent in the soils; and
- location of a transect of plots to be established in late spring/early summer

From the September work the extent of the Muchea Limestone *Eucalyptus decipiens* and *Eucalyptus calophylla* dominated vegetation in the Kemerton Silica Sands area was delineated using three GIS points and the eastern and southern boundary of the area. However it was noted that

".....the full extent of Muchea Limestone vegetation in the adjacent western area is yet to be documented and described. Work on this documentation is continuing and is being done as part of a broader study being conducted on the Muchea Limestone communities over their known range."

## Muchea Limestones of the Kemerton Silica Sands Project Area

### Survey Work

As part of continuing studies of the Muchea Limestones from Gingin to Kemerton (most-southern location known of Muchea Limestones) four further survey sessions have been undertaken. These are summarised below.

#### October 2003

Survey work: further general survey and established and sampled seven 10 by 10m plots (see Map 1)

Participants: two days by BJ Keighery, BM Hyder-Griffiths and Jill Pryde.

#### November 2003

Survey work: further general survey and re-sampled plots

Participants: two days by BJ Keighery, BM Hyder-Griffiths; one day John Dell (DOE), Jill Pryde, Melissa Hoskins and Bec Ryan (DPI).

#### February 2004

Survey work: further general survey

Participants: two hours by BJ Keighery, BM Hyder-Griffiths, John Dell and Gary Whisson

# KEMERTON MEETINGS

3/3/99

(1)

M/Ka

- Report presentation + copies of report.
- Peer review - Elias Bennett } MET still needs
- Peer review - Charlie Welka } to have EPA look at
- Invertebrate } peer review being provided.

BM

Three techniques applied, superimposed all  
3 come up to 4 categories of land.

BK surprised area 25

MT Agreed outlined reasons, discussed  
options on plain

MT

Development side look what  
needed, minimize outcomes for  
1995 conservation values

GW Determination of good veg

BK/GW Regional significance veg is  
issue not which ones developable  
at such.

M

No more work on invertebrates, look  
instead at developing criteria

# Phase 2

- fauna
- follow light green
- no invertebrates to be done
- ephemeral work flora + flora plots.

Discussions concerning work to be done

- determination of decision
- but to supply what EPA requested.
- further flora work discussed, will not

## Timelines

- resolve invertebrates issue, propose alternative issues.
- EPA within month April  
at least
- MET requires week to consider
- EPA meeting 30/3/99 - 6/4/99.
- \*\* most suitable meeting advise post meeting. 22/2/99.
- Invertebrates out of session (smaller meeting)



3/3/99 (3)

## Invertebrates

- Mark Harvey Discussions  
BM - groups suggested as  
wanted group for taxonomic  
work not to biological interp.
- MT - group with adequate  
work to get some results  
NOT for monitoring, get some  
into on conservation value  
Aim spend money wisely for  
two outcomes  
- advice taken from  
Museum on practicality
- BM/MT  
Trapping techniques not same,  
not analyse but MT asked  
for to look at presence +  
diversity. Also collect  
data in manner could be  
used elsewhere.



**KEIGHERY Bronwen**

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**From:** Hoskins, Melissa  
**Sent:** Wednesday, 9 February 2005 2:08 PM  
**To:** KEIGHERY Bronwen  
**Subject:** RE: referencing kemerton map

thanks bronwen. hope you're feeling alright now. the full reference is now included in the letter and it will be sent this week.

yep the bootine road occurrence is the one that was purchased and is now being managed for conservation (its a nature reserve). greg nominated this community for downlisting to the endangered category at the time.

in the scoping document for the management plan to be prepared for carousel swamp that cliff morris sent via email this morning it states that the northern ironstone community is present???

-----Original Message-----

**From:** KEIGHERY Bronwen [mailto:bronwen.keighery@environment.wa.gov.au]  
**Sent:** Wednesday, 9 February 2005 12:25 PM  
**To:** Hoskins, Melissa  
**Subject:** RE: referencing kemerton map

Hi Melissa

Apologies for taking so long to reply initially I was in the field then I have been home ill and working. My out of office message only works in DoE!

Yes, that is the reference and the map is actually part of that report. The full report referencing should be used somewhere. The first bit is missing below ie **Muchea Limestones of the Kemerton Silica Sands Project Area Report 2:**

Thanks for the other information. It is great that a large area has been bought (is this the area along Bootine Rd?). Was the degree of variation in the Muchea Limestones and the ongoing management issues with all protected remnants considered in the change in category?

Cheers Bronwen

-----Original Message-----

**From:** Hoskins, Melissa [mailto:melissah@calm.wa.gov.au]  
**Sent:** Wednesday, 9 February 2005 9:15 AM  
**To:** KEIGHERY Bronwen  
**Subject:** RE: referencing kemerton map

so reference it as ...as mapped in Report 2: Extent of Muchea Limestone Community Mosaic in the Kemerton Silica Sands Area and the Gwalia Nature Reserve, B.J. Keighery, G. Keighery, B. Hyder-Griffiths, J. Pryde and M. Hoskins, 2005

or

...as mapped in B.J. Keighery, G. Keighery, B. Hyder-Griffiths, J. Pryde and M. Hoskins, 2005

Also, the muchea limestone community is listed as 'endangered' in the state. It was downgraded to this category in 2001 as a result of the purchase of a large occurrence. It is still listed under the Cth's EPBC Act as 'endangered'.

-----Original Message-----

**From:** KEIGHERY Bronwen [mailto:bronwen.keighery@environment.wa.gov.au]  
**Sent:** Wednesday, 9 February 2005 9:04 AM  
**To:** Hoskins, Melissa  
**Subject:** RE: referencing kemerton map

Please use reference to the report

-----Original Message-----

**From:** Hoskins, Melissa [mailto:melissah@calm.wa.gov.au]  
**Sent:** Tuesday, 1 February 2005 2:55 PM  
**To:** KEIGHERY Bronwen  
**Subject:** referencing kemerton map

In the notification letter, we state ...that the boundaries are an approximation of the occurrence of the community, as mapped by Bronwen Keighery, Department of Environment 2004. Are you happy with this reference?

-----Original Message-----

**From:** KEIGHERY Bronwen  
[mailto:bronwen.keighery@environment.wa.gov.au]  
**Sent:** Tuesday, 1 February 2005 2:32 PM  
**To:** Hoskins, Melissa  
**Subject:** Fax shows correct boundaries - thanks

**Bronwen Keighery**  
Senior Environmental Officer  
Terrestrial Ecosystem Branch  
Policy and Coordination Division  
EPA Service Unit  
Department of Environment  
Telephone 9222 7028  
Fax 9322 2850

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Department of  
**Industry and Resources**

Our Ref: R0780/1993 V19

Dumas House  
2 Havelock Street  
West Perth 6005  
Western Australia  
ABN 69 410 335 356

Mr Gary Whisson  
Manager  
Terrestrial Eco-Systems  
Department of Environment  
Level 8 West Australia Square  
141 St Georges Tce  
PERTH WA 6000

*Bronwen FYI*

Telephone +618 9222 5555  
Facsimile +618 9222 5055  
www.doir.wa.gov.au

Dear Gary

**KEMERTON INDUSTRIAL PARK**

I refer to our recent telephone conversation regarding the meeting to be held with the Kemerton Industrial Park Coordinating Committee (KIPC Committee) to discuss the alignment of the proposed gas pipeline into Kemerton Industrial Park.

As discussed a meeting has been arranged for 2pm Thursday 30 September 2004 at the South West Development Commission offices, Level 9, 61 Victoria Street, Bunbury.

The purpose of the meeting is for the KIPC Committee to be briefed on the Department of Environment's position regarding the alternative pipeline corridor route into Kemerton Industrial Park. In particular access into Kemerton's northern infrastructure corridor ie. the central route proposed by the Gas Pipeline Working Group.

If you require further details on the above, please do not hesitate to contact Nigel Goodall on 9222 3810 (Tuesday and Thursday) or 9457 7665 other days.

Yours sincerely

*Carol Smith*  
Carol Smith

Project Officer  
INFRASTRUCTURE PLANNING & MANAGEMENT

21 September 2004



## **QUILTY ENVIRONMENTAL**

10 Turner St, Warnbro, W.A. 6169

Tel: (08)9593 1417

Mobile: 0412-926 715

Fax: (08)9593 1561

E-mail: [qe@vianet.net.au](mailto:qe@vianet.net.au)

**DATE:** 25 January 1999

**PAGE 1 OF: 1**

**TO:** DEP

**ATTENTION:** Bronwyn Keighery/Malcolm Trudgen/Gary Williams

**SUBJECT:** 3 Feb Meeting

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Confirming advice left on Bronwyn's answer machine last week that the above meeting re Kemerton is postponed to permit DRD and LandCorp to review the draft report before it is forwarded to DEP.

I will contact you once the draft is forwarded to discuss an alternative meeting date.

*John Quilty*

cc Barry Muir

**MUIR****FACSIMILE TRANSMISSION**

TO: Bronwen Keighery	OF: DEP
COPY TO: -----	DATE: 2 February 1999      TIME:
FROM: Barry Muir	FAX NO.: <del>9365 3382</del> 9485 1187
NO. PAGES (including cover): 1	JOB NO.: ME98-002-006

**If you receive this facsimile transmission in error, would you please contact the sender immediately.**

Hi Bronwen

My apologies for not getting back to you sooner. Finalising the report has been hectic, as you might imagine.

This is just a short note to thank you for sending me the Kemerton information. It was most helpful, and your input is much appreciated. I look forward to seeing you again soon.

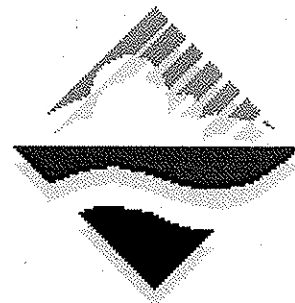
Cheers

Barry

Muir Environmental 1400 Coulston Road, BOYA, Western Australia 6058 Telephone: (61 8) 9299 6804; Fax: (61 8) 9299 8302 Worldwide Web Site: <a href="http://www.ilnet.net.au/~muirenv/index.html">http://www.ilnet.net.au/~muirenv/index.html</a>	RBN 0081977R Email: <a href="mailto:muirenv@ois.com.au">muirenv@ois.com.au</a>
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# Facsimile Message



**ATTENTION:** Aerial Photo Section  
**ORGANISATION:** DOLA  
**FROM:** Bronwen Keighery/Gary Whisson (Manager)  
**DATE:** 9/4/98  
**TELEPHONE:** (08) 9222 7028 Fax. (08) 9485 1187  
**PAGES:** 2 including this sheet  
**SUBJECT:** Photographs Bunbury Region

---

**MESSAGE:**

Please supply colour photocopies of current <sup>photography</sup> (I understand this to be taken on 6/10/96) of the 'Project Area' on the attached map.

**Department of Environmental Protection**  
Westralia Square, 141, St Georges Terrace, Perth, Western Australia, 6000.  
Facsimile: (08) 9322 1598 Telephone: (08) 9222 7000

*Supported G. Whisson*

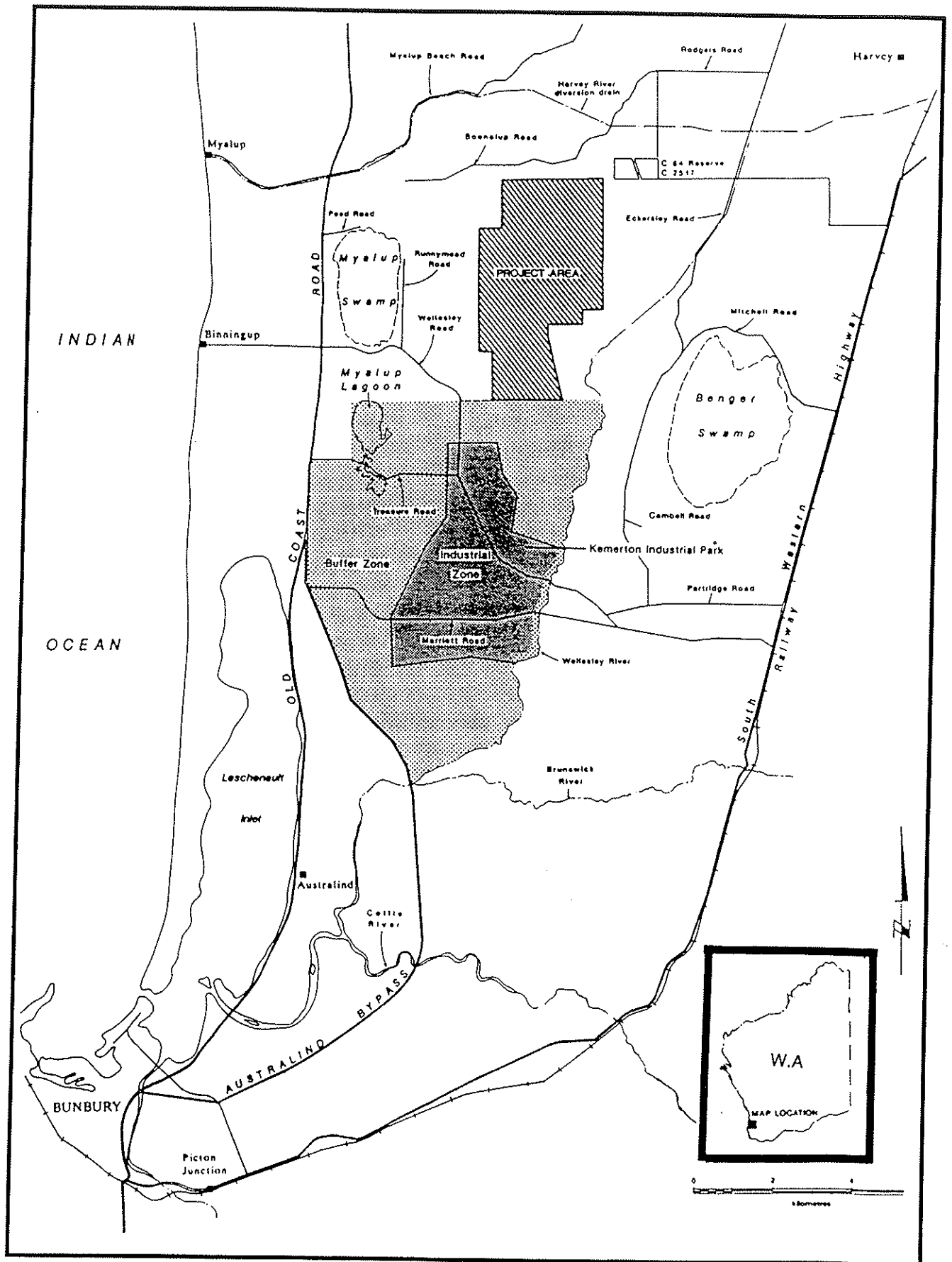


Figure 1. Location of Kemerton Silica Sand Project (Adapted from PER Gwalia 1993b)).

11/1/99

# KEMERTON - GWALIA / INDUSTRIAL LANDS

## Attendance

John Pully, Roy Poir, Gary Williams,  
Melinda Tiedger, Bronwen Keightley

## Update Progress

- ✓ Field work 1998 complete, no substantial interp or writing
- ✓ Interim Report, idea to identify
  - secure areas
  - major areas contention
- ✓ subsequent DRD/Landcorp
- ✓ idea both meetings to identify major problems NOT to endorse findings of work to this date. (NOT need to actually look at material in detail, NO commitments here)  
ie looking for glaring problems.
- ✓ Outcome REPORT: EPA/DEP identify areas that still need to be resolved and what accepted of value

## Detail

✓ original estimate for 9 plots 250  
Maps (some problems with part out)  
① boundaries units / sample points indicated (380 standard sites includes Gibson Plots)

- extra plots to be done (Murchison Limestone area in Phase 2 + one other green areas)
- some plots required to be checked some additional plots (locate in February follow up later April/July)
- explained needs to be sampled late spring / early summer (some discussion possibly need to January report (extra) or extend report)

11/1/99

- some problems with sampling times  
November / Feb will miss some species  
need to compare with near species  
richness

② Vegetation map 9 units + cleared/pines,  
scale: 20,000, compare with 1:5000 ie  
not able to do required 6mths work  
for 1:5000 for whole area (ie limited  
by time and resources allocated)

- 'Key will be if data adequate'  
- assessed some available information need to  
access

### ③ Values Assessment

3.1 'Intuitive' - used DRE, Priority Team,  
apparent floristic richness, 'intuitiveness',  
unusual wetlands, 'poached wetlands'

NEED combination of factors critical  
to interpret transect which is  
the best transect, what alternatives  
Resolution

- keep much possible  
- identify areas highest conservation  
value  
- transect's available ranking  
for conservation

Discussed value of transect in 'Sewer Gullies'  
Kerentov lands

M67 Reference to 7 Bushplots needing  
to deal with area later

3.2 MUIR INDICES

3.3 Station 4 Craig

11/1/79

## Issues / Date to follow up

- Gwella transect - into own M. Milka
- CAMP/Gibson Sites
- Jarmanick Wetland Info
- Phase 1 for February but need to have knowledge that Phase 2 will not be ready (expectation DRO/EPA report expected)
- location of Muder Limestone

## Interim Report

- not clearly accepted in process
- DRO/EPA expect report to answer problems
- GW look for a 'conservative' boundary NOT maximum boundary (CONCERN) - degree confidence in boundaries
- expect in couple weeks rough draft for DEP.

## MET Concerns

- (site mapping (approximate time problems) (1:20000 agreed GWIS / GWAH))
- difficulty into being used to look at other areas

- Flexibility in briefing to EPA.
- be clear where agreement / disagreement NOT include areas of dispute
- PHASE 1 will need to be 'qualitied' but expecting some confidence

# OUTCOME

- Report 2 weeks DRAFT to DEP  
31/1/99 (DRO) 2-3 weeks DEP.

- Subsequent Meeting to look at comment on boundaries to present to

33 EPA  
25/2/99.

Define

- agreed area
- qualified area
- disputed area

- EPA (19/2/99) require completed  
Drafting note Notes 10/1/99.

- EPA Deadline tight need to  
define time used time  
\* Memo to Gwil to define parameters

- next meeting February this:

Group 3/2/99. 10am. (DRO meeting  
to be held next week)

- MET will discuss boundaries  
of disputed areas.

## DEP Pos<sup>n</sup>

1. We acknowledge + value existing Gwalian commitments to EYP when dead.
2. This issue is based on remnant vegetation. Further work on SLP has demonstrated + identified the value of remnants particularly of threatened communities (the most threatened of which are where heavy soils meet coastal plain sands.
3. What DEP wants to achieve out of this proposal is:
  - (a) protection of remnant vegetation marked (A) on map (as threatened community)
  - (b) <sup>protected</sup> transect of continuous remnant vegetation across the plain (E → W) from heavy soil to coastal sands. THIS IS THE LAST PLACE DEP WOULD THIS IS POSSIBLE (?) → approximately (B) on map
  - (c) integration of transect if possible with Klemton DA extension + buffer for hgt. purposes
  - (d) Next stage should define minor areas for the remainder of the Gwalian block + the areas to be retained.

## DEP Pos<sup>n</sup> Kemerton Sands

1. We acknowledge + value existing Gwalia commitments to EYP later deal.
2. This issue is based on remnant vegetation. Further work on SCP has demonstrated + identified the value of remnants particularly of threatened communities (the most threatened of which are where heavy soils meet coastal plain sands.
3. What DEP wants to achieve out of this proposal is:
  - (a) protection of remnant vegetation marked (A) on map (as threatened community)
  - (b) <sup>protected</sup> transect of continuous remnant vegetation across the plain (E → W) from heavy soil to coastal sands. THIS IS THE LAST PLACE LEFT WHERE THIS IS POSSIBLE (?) → approximately (B) on map
  - (c) integration of transect if possible with Kemerton IA extension + buffer for hgt. purposes
  - (d) Next stage should define mine areas for the remainder of the Gwalia Block + the areas to be retained.



8/4/98

## GWALIA - KEMERTON

### Cabin Summary

EAC (i) Need agreed position (Bernard)  
to protect some values and some mining

(ii) meetings with Gwalia to resolve

- Gwalia boundaries incorrect
- 'Minerals to owner'
- Deal for 'whole of site' (Gwalia pos. con)  
by ceding 1st lands.
- RS was to allow to mine EPP Lake
- Cabinet agreed to expand Kemerton  
(including to acquisition of lands except  
Gwalia property)

TO DO

- ~~Best~~ Obtain photographs
- Design 'protected area'

*Sullivan  
2000  
K. Ben  
Carr*

**Report on Biodiversity Impacts  
Clearing of Native Vegetation  
Kemerton Silica Sand Project - Western Extension**

**Kemerton Silica Sand Pty Ltd**

**Summary of Information**

Proponent:	Kemerton Silica Sand Pty Ltd (KSS)
Land	Kemerton Silica Sand Project - Western Extension
Location:	Kemerton, 12 km south west of Harvey WA
Shire:	Harvey
NOI Date:	1997
Clearing Notified:	Approx 150 ha
Intended Use:	Dredge Mining of Silica Sands

**Purpose of this Report**

This report provides background information on the potential biodiversity impacts of the proposed vegetation clearing for mining within the Kemerton Silica Sands Project area - Western Extension. It identifies those biodiversity criteria which the proposal is unlikely to meet. Some of these criteria require more information if a clear judgement is to be made on the impacts of the proposed land clearing.

This report is addition to a report titled "Issues associated with the Vegetation and Flora Values of the Kemerton Silica Sands Project Area" prepared by the Department of Environmental Protection (Keighery 1998) and should be read in conjunction with this report.

**Background**

In 1993 Gwalia Consolidated Ltd (Gwalia) proposed a silica sand mine on privately owned land over which they had an option to purchase. This proposal was assessed by the DEP/EPA at a Public Environmental Review (PER) level (Gwalia 1993). The recommendations of the EPA was that the proposal could proceed subject to a number of binding environmental conditions (EPA 1994).

In April 1997 Kemerton Silica Sand Pty Ltd proposed a subsequent western extension covering an additional 210 ha. (John Consulting Services 1997) This western extension is currently being assessed under section 46 of the Environmental Protection Act as changes to Environmental conditions.

This report examines the potential impacts on biodiversity values of the proposed western extension. Due to limitations in the data available and the lack of definition of what values are exclusive to the proposed western extension area compared to the whole of the project area this report generally refers to the whole of the project area and specifically refers to the proposed western extension only where more detailed information is available which is exclusive to the western extension.

## **Biodiversity Issues**

The following section evaluates the clearing of native vegetation (but not other land uses) based upon the "Principles for Evaluation of Native Vegetation" as detailed in Safstrom and Craig (1996) and adopted by the EPA in August 1996. The Biodiversity Criteria are reproduced in italics below followed by an assessment of the criterion.

### **1.0 Regional Processes**

#### **1.1 Water**

*Native Vegetation should be retained if the clearance of the vegetation is likely to cause deterioration in surface and groundwater catchments which result in increases in salinity and eutrophication.*

There are potential issues of salinity arising from the increased salinity of the water in the dredge lake. This has been estimated as an increase of up to 10 % compared to the local groundwater salinity (Dames and Moore 1993). This may lead to a plume of more saline groundwater spreading downstream from the dredge lake due to groundwater through-flow. This plume of higher salinity groundwater may have an effect of the vegetation down gradient of the dredge pond.

There is an additional issue associated with a potential water table draw down effect on native vegetation in the vicinity of the project. The drawdown on nominated wetlands on the site "are expected to be generally less than 1 m" though according to Dames and Moore (1993) "the predicted drawdowns at the nearest wetlands are between 0.5 and 1.5 m." Drawdowns of this magnitude could have significant impacts on wetland vegetation and associated biota.

#### **1.2 Soil**

*Native vegetation should be retained if the clearance of the vegetation is likely to contribute to soil erosion, waterlogging or flooding.*

There are minimal risks associated with soil erosion, waterlogging or flooding from the proposal based on the available information. However the capacity for soil erosion does exist during the land clearing phase. Erosion risks will need to be addressed through an adequate environmental management plan which is implemented during land clearing and mining operations.

### 1.3 Corridors and Buffers

*Native vegetation should be retained if the land provides a corridor or steeping stone between areas of conservation land or the land provides a buffer or is an inlier to areas reserved for conservation.*

The land in the proposed western extension of the project area has important corridor values with adjoining native vegetation to the north, west and south-west. The land forms a corridor and steeping stone between the western part of the Kemerton Industrial buffer area to the south west and the uncleared parts of the Myalup pine plantation to the north. The proposed western extension would reduce the existing corridor of native vegetation within the project area by approximately 70 %.

### 1.4 Aesthetics and Cultural

*Native vegetation should be retained if the land has high landscape values, has special physiographic features, aboriginal sites or heritage value.*

The project area's aesthetic values have not been addressed by the proponent. They are likely to be moderate to high bases on the Visual Quality Classification - Frame of Reference for the Swan Coastal Plain. The classification of CALM (1994) gives a high scenic quality value to "strongly defined patterns of woodland, dune and wetland vegetation and also to all wetlands, estuaries and swamps." Clearance of vegetation and mining development within the proposed western extension would however not be seen by many viewers external to the project area.

The aboriginal sites and aboriginal heritage values have been previously assessed by the proponent through a archaeological and ethnographic survey (Lantzke et al 1993). Apparently no sites of significance were located in the western extension (Gwalia 1997).

## 2.0 Representation

### 2.1 Flora

*Native vegetation should be retained if it contains or is likely to contain threatened flora or flora of special interest.*

*DRF and Priority flora:*

Six Priority taxa as defined by CALM (Atkins 1997) have been positively recorded for the project area. These are:

Taxa	Priority Ranking
<i>Boronia capitata subsp gracilis</i>	Priority Two
<i>Dillwynia dillwyuioides</i>	Priority Three
<i>Anthotium junciforme</i>	Priority Three
<i>Myriophyllum echinatum</i>	Priority Three
<i>Acacia semitrullata</i>	Priority Three
<i>Acacia flagelliformis</i>	Priority Four

Of these *Acacia semitrullata*, is the only one that appears to be found within the proposed western extension (Gwalia 1997).

There are also tentative identification of the following taxa within the project area;

Taxa	Priority Ranking
<i>Schoenus</i> sp. Waroona	Priority Three
<i>Drosera occidentalis subsp. occidentalis</i>	Priority Four

In addition based on these species known habitat preference the following may also be present in the project area and a detailed survey in late Spring may locate them;

Taxa	Priority Ranking
<i>Hydatella dioica</i>	Declared Rare Flora
<i>Centrolepis caespitosa</i>	Declared Rare Flora
<i>Schoenus capillifolius</i>	Priority Two

In addition to these species there are an additional 7 species found in the project area that are considered to be significant in some manner. These are;

Taxa	Significance
<i>Boronia juncea subsp. juncea</i>	Recommended P 1 taxa, only known location of this taxa
<i>Evandra pauciflora</i>	uncommon sedge
<i>Eucalyptus decipiens</i>	Associated with Muchea Limestones
<i>Pimelea rosea</i>	Associated with Muchea Limestones
<i>Stipa flavescens</i>	Associated with Muchea Limestones
<i>Gahnia trifida</i>	Associated with Muchea Limestones
<i>Logania vaginalis</i>	Associated with Muchea Limestones
<i>Melaleuca acerosa</i>	Unusual form growing to 2 m
<i>Melaleuca brachyphylla</i>	Uncommon sp on the Swan Coastal Plain
<i>Hakea trifurcata</i>	Small flowering form
<i>Hibbertia perfoliata</i>	Uncommon, poorly collected sp on the Swan Coastal Plain

There are also 3 that are at the limit of their known ranges within the project area these area

Taxa	Limits
<i>Verticordia nitens</i>	Southern limit of range on Swan Coastal Plain
<i>Banksia menziesii</i>	Southern limit of range on Swan Coastal Plain
<i>Cyathochaeta stipoides</i>	Northern limit of range

Of these *Boronia juncea subsp. juncea* a recommended P 1 taxa, and potential Declared Rare Flora is found within the western extension. The project area is the only known location of this taxa and all occurrences of it within the proposed western extension should be protected from all disturbance.

The project area contains a diverse assemblage of flora. Six priority flora have been identified and a further 3 priority and 3 DRF taxa may occur in the area based on their known habitats. One Priority Three Species and one future Priority One species (Potentially DRF) have been found within the proposed western extension.

## 2.2 Plant Communities

*Native vegetation should be retained if it contains or is likely to contain threatened plant communities.*

The project area contains two broad scale vegetation types, these are;

Heddl Vegetation Complex	Conservation Status
Bassendean Complex-Central and South	less than 15 % remaining on the Swan Coastal Plain
Serpentine River Complex	Less than 10 % remaining on the Swan Coastal Plain

In addition it contains poorly represented vegetation types on the interface between these two communities and a rare intact transect through the three major landforms on the Swan Coastal Plain. The area of Bassendean Complex remaining in the project site is one of the largest area of this vegetation types still in existence on the Swan Coastal Plain. Approximately 150 ha of this is within the proposed western extension

In addition to these broad scale vegetation complexes a total of 24 plant community types have been mapped in the project area. This is a diverse range of community types and reflects the variety of communities present. A total on 13 of these communities were considered to be significant by Matiske (1993) these types are;

Matiske Vegetation Type	Significance
A2, C2, D1, D3, E3, F1, F2, F3, H3 A3, H1, H2 A1, A3, H1, H2	Poorly represented regionally Contain population of significant Flora Communities with a high diversity of native taxa

Three Floristic Groups identified in the Project area are classed as Threatened Ecological Communities These are;

- 1b Southern *E. calophylla* woodlands on heavy soils - Vulnerable
- 7 Herb Rich saline shrublands in Clay Pans- Vulnerable
- Muchea Limestones (After Keighery and Keighery 1995) - Critically Endangered

According to a report prepared by the proponents (Gwalia 1997) the western extension area does cover communities defined as Critical, Endangered or Vulnerable on the Swan Coastal Plain by Gibson *et al.* (1994). The Muchea Limestone Communities are not found within the proposed western extension.

## 2.3 Diversity

*Native vegetation should be retained if it contains areas of very high species richness.*

The vegetation in the project area generally has a species richness. It ranges from 65.0 to 16.9 species per 10 X 10 m Plot (100m<sup>2</sup>) High Species Richness as defined by Safstrom and Craig (1996) is over 25 - 30 perennial species per 100 m<sup>2</sup>. The average species richness for 9 community types described for the Swan Coastal Plain by Gibson *et. al.* (1994) and identified in the Project area by B J Keighery (Keighery 1998) are given below;

Floristic Community Type Codes	General Description of Floristic Community Types	Average Species Richness per Floristic Community Type
1b	Southern <i>E calophylla</i> woodlands on heavy soils	65.0
2	Southern wet shrublands	50.3
4	<i>Melaleuca preissiana</i> damplands	33.2
7	Herb rich saline shrublands in clay pans	44.8
12	<i>M. teretifolia</i> and / or <i>Astartea aff. fascicularis</i> shrublands	27.3
13	Deeper wetlands on heavy soils	16.9
21A	Central <i>Banksia attenuata</i> - <i>E. marginata</i> woodlands	52.0
21B	Southern <i>Banksia attenuata</i> woodlands	57.5
25	Southern <i>E. gomphocephala</i> - <i>Agonis flexuosa</i> woodlands	48.1

The proponents report identifies the species richness in plant communities in the proposed western extension (See Table 1 page 7 in Appendix One). The Mean species richness identified within 8 plant communities as surveyed in the western extension is consistently lower than that identified by Gibson *et al* (1994) and documented above.

## 2.4 Wetlands

*Native vegetation should be retained if it contains wetlands of significance.*

The vegetation in the project area contains 9 wetlands. These wetlands have been identified as belonging to the Jandakot suite and are typically microscale to mesoscale irregular shaped and coalescing depressions occurring in the Bassendean Dunes (V & C Semeniuk Research Group 1993). The wetlands in the project are the most southerly occurrence of this suite type and are the only occurrence of this suite type south of the type locality at Jandakot.

Nine wetlands in the Project area are protected under the EPP (Swan Coastal Plain Lakes) Policy which was established by the Department of Environmental Protection in December 1992. Though it is proposed to protect 7 of these wetlands from the direct impacts of the existing and proposed mining the proposed buffer with of approx 100m around wetland No. 4 will not be sufficient to adequately protect its values. Buffer widths of up to 2000 m are needed to protect groundwater values of wetlands on the Swan Coastal Plain (Davies and Lane 1995). Wetland No 4 is located within 50 m of the northern boundary of the western extension. Buffer widths between this wetland and any proposed dredge pond in the western extension should be maximised.

The wetland of the Kemerton area have been assessed by V & C Semeniuk Research Group (1993) as having Regional significance based on the following criteria.

1. Geographic Distribution
2. Diversity
3. Condition

4. Representativeness
5. Functions
6. Scarcity
7. Integrity of Linked Systems

## 2.5 Local Representation

*Native vegetation should be retained if within a 15 km radius of the remnant there is less than 20% of the original cover of any plant community on the land represented by :*

*(i) viable occurrences in NPNCA National Parks or Nature Reserves.*

*(ii) viable occurrences in other Crown land or Remnant Vegetation Protection Scheme covenants.*

The local representation of the two vegetation types found within the project area are shown below;

Hedde Vegetation Complex	CALM Status	Area (HA)	Percentage of Vegetation Complex	Percentage of 15 km radius (on land)
Bassendean Complex - Central and South	Executive Director Freehold	1116.9	8.2	
	Nature Reserves	24.4	0.2	
	State Forests	1895	14	
	Not CALM Lands	10420	76.6	
	KSS future CALM	140 +/- 10%	1.0	
<b>Sub Totals</b>		13596	100	23
Serpentine River Complex	Executive Director Freehold	0	0	
	Crown Freehold - CALM	233	5	
	Nature Reserves	173	4	
	State Forest Total	4	0.1	
	Not CALM Lands	4171	90.8	
	KSS future CALM	10	0.1	
<b>Sub Totals</b>		4591	100	8
<b>Totals</b>		60236		100

# The Serpentine River Complex is equivalent to the Guildford type.



The proposed western extension only contains the Bassendean vegetation type. The figures of 0.2% and 4 % for Bassendean and Serpentine respectively do not meet the objective of 20 % representation. In addition the long term 100 years + viability of these occurrences is unknown. Information is currently not readily available for quick analysis of the vegetation that is within other crown reserves or Remnant Vegetation Protection Scheme Covenant areas.

The representation within a 15 km radius of the western extension have not been calculated, however as the western extension is centred virtually at the same point as the whole project area the above figures will not alter . What will alter the above figure is the inclusion of part of the project area within secure conservation estate as proposed in the original PER (Gwalia 1993). In addition if the land within the Kemerton Industrial Buffer zone was transferred to secure conservation estate from 'CALM Executive director freehold" it would add to the above representation figures substantially especially for the Bassendean vegetation type.

## **2.6 Regional Representation**

*Native vegetation should be retained if it includes vegetation communities not well conserved in the region compared with the original cover as represented in the Interim Biographical Representation in Australia (IBRA).*

The project area is within the Swan Coastal Plain IBRA Bioregion. This bioregion has a reservation status of 1 - 5% This represents the area that is reserved within all conservation lands within the Bioregion (Thackway and Cresswell 1995).

## **2.7 Wildlife**

*Native vegetation should be retained if it contains or is likely to contain rare fauna.*

Some surveys of fauna were carried out in the Project area prior to the preparation of the original PER document in 1993 (Bamford and Ninnox 1993 a &b). These surveys didn't record the presence of any Declared Threatened Fauna however The following Declared Threatened Fauna species were assessed as being likely to utilise the area based on their known habitat preference

Resident species;

Red-eared Firetail

Chuditch

Western Ringtail Possum

Carpet Python

Southern Brown Bandicoot

Migrants and/or nomadic species;

Australasian Bittern

Freckled Duck

Peregrine Falcon

Carnaby's Black Cockatoo

Baudins Black Cockatoo

Whilst the limited fauna surveys to date have apparently not recorded any of these species, this does not prove that Declared Threatened Fauna does not make use of the project area or proposed western extension. The fauna survey work did however record two priority four listed mammal species, within the project are. These are the Western Brush Wallaby, and the Water Rat. The Western Brush Wallaby was found within woodland areas which

have similar habitat values as the proposed western extension and thus could be expected to be found in this area.

## **2.8 Habitats**

*Native vegetation should be retained if it has significance as habitat for wildlife or if a loss of diversity by clearing part of the land will adversely impact on fauna dependent on a mosaic of vegetation types.*

The large size of the project area and its relatively undisturbed nature indicate that it has significant value for a wide variety of fauna species. The likely presence of feral predators in the area does not significantly diminish its value as these predators can be controlled by the landholder and fauna can re-establish if there are remnant populations present. The proposed western extension has habitat value as part of the larger intact project area. Any development in the western extension will diminish its value to indigenous fauna species.

## **3.0 Viability**

### **3.1 Area**

*Large areas have higher conservation values, the maximum possible area of a remnant should be retained. Groups of small remnants can support fauna able to move between remnants and threatened species.*

Clearing of the proposed western extension area would reduce the size of the vegetation remnant on the property. It would also further fragment the remnant vegetation in the project area.

### **3.2 Shape**

*Very narrow areas of retained vegetation are less likely to be viable and of reduced value as corridors.*

The proposed clearing in the western extension will reduce the width of the existing vegetation, leaving some narrow strips adjacent to the western and eastern edges of the project area.

### **3.3 Intactness**

*Remnants with little or no intact vegetation are unlikely to be viable.*

The existing vegetation in the western extension is intact. After the mining operation the remnant will still be intact though of a much smaller area.

### **3.4 Diseases and Pests**

*The vegetation should be free of major disease and pests such as Dieback. Disease free vegetation is more important for retention if similar vegetation communities in nearby reserves are diseased.*

*Phytophthora cinnamoni* has been found in the region. The dieback status of the remnant vegetation in the western extension is not known in detail. Further work is necessary to determine the die back status of the proposed western extension.

### **3.5 Invasive Plants**

*Presence of invasive plants capable of, or with potential to disrupt ecosystem processes.*

There are many invasive plants within the area that have the potential to spread especially as a result of the numerous disturbances associated with the proposed mining. Every effort should be made to remove or reduce the impacts of the plants prior to any expansion of existing mining.

### **3.6 Adjacent Uses**

*Adjacent to native vegetation, land uses impacting on the viability of the vegetation must be considered.*

The land adjoining the proposed western extension area is primarily mixed farming. This has the potential for long term degradation of the bushland area.

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## Summary

The proposal for continued sand mining in the proposed western extension has a number of environmental impacts. Overall other locations in the project area have greater environmental significance and efforts should be made to protect these values.

## Recommendations

It appears that some land clearing may be permissible within the proposed western extension provided the following conditions are met;

- the area of this vegetation type held in secure conservation reserves within a 154 km radius of the western extension is expanded to meet the EPA's Biodiversity criteria
- All wetlands are protected with adequate buffer zones
- All DRF and Priority One flora and *Boronia juncea subsp. juncea* are adequately protected.
- The biological impacts due to groundwater drawdown effects be adequately investigated

Report Prepared by

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Environmental Systems Division

Status : Draft Date : 13/3/98

Community responses: Opposition on the grounds of location of industry on the ridge and on environmental grounds.

## 8. Structure planning

### 8.3 Review of land requirements without a port

"In addition to the visual and environmental considerations, deletion of land identified from the northern section of the final Structure Plan can also be supported on the grounds that, without a port at Kemerton, less land will be required for an expanded industrial core.

It is acknowledged that the Welker report (1996) indicates that if a port was not developed at Kemerton, the amount of land require to accommodate future industry would be 956 ha gross (refer Table 8). It is also acknowledged that the final Structure Plan provides for more than 956 ha of additional industrial core area (the final Structure Plan (Stage 6) results in an expanded core of approximately 1505 ha gross - based on the gross area of the 'super lots').

{Note: Time constraint have meant that remaining sections have not be summarised, important areas in this regard include the drainage proposals.}

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## C. COMMENT ON THE KEMERTON EXPANSION STUDY, FINAL DRAFT REPORT

The disparity between the actual conservation value of the vegetation of the study area and the depiction of the vegetation of the area given in the Kemerton Expansion Study, Final Draft Report is very significant. The soil map in the document gives a good indication of this when compared to the vegetation map given in the report, which has just two categories for native vegetation (moderately and well vegetated). The report should have contained a proper vegetation and flora survey, including a map for the whole area of plant communities such as that prepared for the Kemerton Silica Sands mine area. Despite the fact that the area retains large areas of relatively intact bushland in a region that is generally highly cleared and includes areas previously designated for conservation as a part of a multipurpose buffer for the current Kemerton Industrial Park, there is no realistic reference to the significance of the vegetation in a regional context.

The absence of a detailed vegetation and flora survey has also lead to the flora values of the core area and buffer areas being grossly understated. There is no information in the document as to the richness of the flora, or even a well informed estimate of what it would be likely to be. The latter would have been possible if available reports had been reviewed by an appropriate specialist. The limitations of the information presented from searches of the CALM databases have not been noted. It should be noted here, that it is very common for more species of significant flora (DRF, priority flora, rare but not previously known flora and other significant species such as ones at the end of their range or with disjunct

populations) to be found when areas as poorly known as the Kemerton Expansion Study area are properly surveyed.

The description of fauna values (apart from scattered references to waterfowl) of the study area consists of just over one and a half lines (23 words!). It is a gross trivialisation that reflects badly on the authors of the document and those who have authorised its release. This document should have presented a detailed fauna survey with a thorough analysis of fauna conservation values that actually gave an understanding of the fauna values of the area. Instead, fauna values are so misunderstood by the authors of the document that they have been mis-interpreted as relating only to rare and endangered fauna. What is presented is not even an analysis of the likely values but a bald statement regarding information from CALM's database.

It is inappropriate that a major, Government initiated, proposal has been presented for public review with third rate description of the existing biological environment. Government Departments do not have the excuse that small companies have that they do not have access to experienced advice on what is appropriate for an assessment of the environment. It would not be unreasonable to suggest that the level of information presented is so inadequate that only persons with direct knowledge of the biological values present would be able to make any assessment of the impact of the proposal on the biological environment. The document does not provide an adequate basis for effective consideration of biological constraints or of ways to plan to avoid or minimise environmental impacts. For most members of the public, the information given on fauna would be of no use in developing an informed opinion of the proposal.

This lack of description of and appreciation of biological factors is a major problem with the document, for as well as only giving a desultory description of biological constraints, it then largely ignores them in the allocation of areas to the "cells" to be made available for industrial development. In this regard, the exercise is an example of very poor planning. A good planning exercise would have properly evaluated the biological and other constraints and then sought solutions that maximised the retention of biological values rather than simply sought to meet a perceived need. In a nutshell, the standard of planning and assessment in relation to biological factors that has gone into this document is very poor, a better document would have identified the scale of conflict between biological factors and the development proposed.

The lack of realistic identification of biological factors as real constraints (section 6.9) is indicative of a lack of appreciation of the values of the area; founded partly in an absence of either specific biological surveys for the report or competent compilation of existing data, and partly in a lack of expertise in the understanding of such values. The standard of assessment of biological factors as constraints is unacceptable in a document that discusses a project of the scope of the proposal for Kemerton. In effect, the only constraints that have been explicitly accepted relate to cost and EPP

wetlands and the only ones implicitly accepted relate to public opposition to areas west of Old Coast Road being developed.

The lack of identification of biological factors as constraints has meant that they were not taken into account in section 6.10 (Preliminary core/buffer definition (qualitative assessment)) and in preparation of the composite constraints map for the study area.

Community expectations (as discussed in section 7) have been taken only as local community expectations and disregard the wider community and the widely held expectation that development proposals will take into account biological factors.

It appears from section 7 of the Kemerton Expansion Study that a major determinant of the design of the proposed expansion has been access (see the first three dot points in section 7.1 p 60 - quoted above - and Plan 20) to the existing industrial area, Bunbury and other areas, with the extension of the central linear access road as an important part of the design (later sections also identify the north-south orientation as important in pollutant dispersal). This has had the effect of promoting a northward, eastward, westward and southward (for a proposed wastewater treatment plant) growth for the expansion in the study, into areas previously considered as buffer (note, however, that not all of the draft proposals were taken up in the Industry 2030 Document). Unfortunately, while this may fit well with some factors such as noise and air pollution, it does not fit very well with biological factors. This partly relates to the further intrusion of the industrial area into the central part of the areas of remnant bushland and partly to the particular areas destroyed and the loss of continuity across the Swan Coastal Plain. In section 7.2.1 of the study, it is explicitly stated that "The underlying premise in developing the core options plan was the need to ensure that there were no restrictions on land use outside the study area." (My underlining.) This further suggests that a reasonable interpretation is that there has been inadequate attention paid to biological factors in the design of the industrial area as well as to site selection.

Section 8.3 (Review of land requirements without a port) indicates that the draft final structure plan (Plan 22, which is the same as that presented in *Industry 2030* as the final Structure Plan (Figure 8 of the latter report) allows for 1505 ha gross of industrial land while the Welker report (Welker 1996) indicates that if a port was not developed at Kemerton, the amount of land required to accommodate future industry would be 956 ha gross". This suggests that there is a capacity to reduce the environmental cost of the new structure plan by a combination of allowing less land for industry and redefining how industrial development is distributed in the region.

#### **D. VEGETATION AND FLORA CONSERVATION VALUES OF THE AREA**

The study area of the Kemerton Expansion Study, Final Draft Report (BSD Consultants 1997) contains vegetation with very significant conservation values at the regional scale. These include areas of vegetation that are of critical importance

in meeting EPA objectives for the conservation of vegetation types and their associated flora and fauna on the Swan Coastal Plain between Perth and Bunbury.

The very high level of the vegetation, flora and fauna conservation values of the Kemerton area and areas immediately adjoining it can be appreciated by an understanding of the high degree of clearing of the Swan Coastal Plain south of the Swan River and the very poor representation of the biological wealth of the area in conservation reserves.

The degree of clearing of the Swan Coastal Plain south of the Swan River is very high. This area has a long history of clearing for agricultural development, urbanisation, industry and services (roads, powerlines, gas pipelines). The clay soils of the eastern side of the Plain are particularly highly cleared due to their desirability for agriculture, including irrigation. The Kemerton area includes small areas of the vegetation of these soils, some of which are in the area vested in CALM (from the KSS land). Only a few percent of these soils remain uncleared (Keighery and Trudgen 1992). The sandy soils of the Quindalup, Spearwood and Bassendean Dune Systems are not as highly cleared, with the Quindalup (which are not represented in the reduced Kemerton study area) fairs better than the others due to their infertility. However, although better than the clay soils, the degree of clearing of the Bassendean and Spearwood Dune System south of the Swan River is so high that any significant areas of vegetation on them have high conservation value. The value of remaining areas being increased by larger size, better condition and continuity with other types.

The particular vegetation complex on the Bassendean Dunes in the Kemerton study area is the Bassendean Vegetation Complex - Central and South. Most of the significant remnants of this vegetation complex are located in the Kemerton to Harvey area and the Perth Metropolitan area. It is quite highly cleared with probably less than 15% {← CHECK} of its original extent remaining. The vegetation complex on the Spearwood Dunes in the Kemerton study area is the Karrakatta Vegetation Complex - Central and South. This vegetation complex has also suffered extensive clearing and degradation, with the areas in the Kemerton study area being significant as the largest remaining in good condition in the southern part of its distribution. Area remaining ?? {← CHECK} On the west of the Karrakatta Vegetation Complex - Central and South in the study area is an area of the Yoongarillup Vegetation Complex, while the conservation status of this vegetation complex is better than that of the others in the study area, it contains significant wetlands and vegetation in which Tuart (*Eucalyptus gomphocephala*) is dominant. The conservation status of Tuart is generally considered to be unsatisfactory.

Ab:  
Tudley's area  
not south  
of Perth  
less than this

There is only one national park on the Swan Coastal Plain south of the Swan River and north of Bunbury. This is Yalgorup National Park, which is only moderate in size. Most of Yalgorup National Park is area representing the vegetation of the Quindalup Dunes and the major lakes that the park includes, there is a smaller part



*Importantly study are together with  
lands to north in Kemerton Swan  
Sea's represent transition PP/BS/SS*

that protects areas of the vegetation of the Spearwood Dunes and the Yoongarillup Vegetation Complex. However, the area of the Spearwood Dunes protected in Yalgorup National Park is part of a separate, and presumably younger (as it is further to the west), occurrence of this dune system.

There are also some nature reserves on the Swan Coastal Plain between the Swan River and Bunbury. However, none of these is large and a number have been compromised due to dieback infection. There are no substantial reserves representing the southern extent of the Bassendean Dune System.

*introduced through utility easement*

*and diversity.*

#### **E. COMMENT ON THE PARTS OF THE INDUSTRY 2030; GREATER BUNBURY INDUSTRIAL LAND AND PORT ACCESS PLANNING DOCUMENT RELATING TO THE KEMERTON INDUSTRIAL PARK AREA**

The "Industry 2030; Greater Bunbury industrial land and port access" document is in part a summary document but it also formally presents the "Draft final structure plan" (p 43) for the Kemerton expansion study. This "Draft final structure plan" is the core of the document in relation to setting the zoning for allocation of industrial land for expansion of the Kemerton Industrial Park. It is the major end result of the studies carried out for the Kemerton Industrial Expansion Study, as discussed in BSD Consultants (1997).

The Draft final structure plan significantly expands the area to be set aside for industrial land use in the Kemerton Industrial Park. It would also re-affirm and expand the use of areas as buffer to the industrial park and re-affirm the General Farming and State Forest use of areas to the north of the buffer.

#### **F. IMPACT OF THE PROPOSAL ON VEGETATION, FLORA AND FAUNA CONSERVATION VALUES OF THE KEMERTON EXPANSION STUDY AREA**

The proposal as currently envisaged by the proponents will have a very large impact on the vegetation, flora and fauna conservation values of the area.

The impact will be partly direct, from actual clearing for industry of the vegetation and its associated flora and fauna and partly indirect.

The direct impacts will include:

1. Clearing for areas to be developed for industry.
2. Clearing for roadworks.
3. Clearing of new easements for moving major powerlines.
4. Clearing for other new services (communications cables, pipelines for water and gas.
5. Clearing for installation of drainage scheme with large open drains.
6. Clearing for the wastewater treatment plant at the south of the industrial area.

The draft final structure plan would also harden community expectations that further clearing for farming purposes in the northern parts of the buffer was acceptable.

The indirect impacts will include:

1. Changes in the vegetation caused by altering of the hydrology of the area. The massive drainage system to be installed will result in significant changes to the hydrology of the area. This will result in very significant changes to the vegetation. Areas that are currently damplands are likely to become much drier, causing an expansion of dryland vegetation types and a loss of many populations of flora species restricted to the damplands.
2. The opening up of the area by the creation of roads and an increase in traffic will lead to an increase in weed invasion into the vegetation, degrading the vegetation, reducing or destroying populations of native species unable to compete and making the vegetation more fire prone (the drainage will exacerbate the latter factor as well).
3. The larger population using the area and the presence of more buildings will lead to increased frequency of fires due to a combination of burning to protect property values and an increase in arson. The increased frequency of fire will lead to loss of vegetation stature and quality and exacerbate the influx of weeds.
4. the increase in access to the area will also increase the likelihood of the introduction of dieback disease (*Phytophthora cinnamomi*) into remaining areas of bushland (area particularly susceptible as low water table)
5. the increase in pollution levels, for example SO<sub>2</sub>, will have varying impacts on the biota.
6. changes to movement of animals and plant propagules due to the breaking up of the vegetation. This will lead to animal populations becoming less viable and plant populations being restricted from spreading as the animals are restricted.

#### G. CONSERVATION INITIATIVES NEEDED TO PROTECT VALUES IN THE AREA

In the absence of effective protection of the environmental values of areas in and near the Kemerton Industrial Park, it is likely that these values will be gradually eroded. Effective protection means placing large areas in secure reserves that have security of purpose and are managed by an appropriate agency. This was envisaged in the previous proposal to establish a Conservation park in the buffer area for the Kemerton Industrial Park. The current expanded industrial area includes areas that were to be included in this Conservation park. \*

Map of existing conservation park associated with Kemerton Industry area.  
The need for effective conservation in the Kemerton Industrial Park area and surrounds should be judged in the context of:

→ The exclusion of these areas is not justified in conservation terms

1. The very poor conservation status of the Swan Coastal Plain south of the Swan River;
2. The poor conservation status of the Bassendean Dune System south of the Swan River;
3. The very poor conservation status of the Spearwood Dune System south of the Swan River;
4. The extremely poor conservation status of the eastern side of the Swan Coastal Plain, particularly south of the Swan River;
5. the very poor conservation status of wetlands on the Swan Coastal Plain south of the Swan River;
6. the extremely poor conservation status of riverine vegetation and associated upland vegetation on the Swan Coastal Plain south of the Swan River. Note in this context, that the areas of vegetation along the Brunswick River south of the Kemerton Industrial Park are probably the last chance on the southern Swan Coastal Plain to protect such vegetation as part of a transect from a river into a significant sized area of bushland;
7. the great reductions that have already occurred in the populations of most flora and fauna species native to the Swan Coastal Plain south of the Swan River;
8. the fact that the area in conservation reserves on the Swan Coastal south of Perth falls far short of internationally accepted desirable levels such as the IUCN minimum of 10%.
9. the EPA criteria for protecting biodiversity.

A reasonable analysis of the above points is that reservation of a significant proportion of the areas of native vegetation in the study area and adjoining it are crucial to salvaging a moderately good conservation outcome on the Swan Coastal Plain between Perth and Bunbury. As such, this area is a key site in the Government endorsed System 6 update program. The scale of the conflict in the study area and surrounding areas between the needs for conservation and development is very high but, not beyond resolution. If the result of the process under way is that areas of high conservation value are sterilised from this high value use by allocation to development for industrial agricultural or plantation development then the planning process will have failed to balance the needs for conservation and development. Therefore, an effective consideration of conservation values needs to be urgently included in the planning for the kemerton Industrial park.

The ideal (in the context of the present remaining extent of native vegetation, rather than an absolute ideal) solution would be the creation of a large reserve including most of the existing bushland in the Kemerton Expansion Study area and some areas adjoining it. However, acknowledging that industrial expansion in the area is favoured by Government the practical balance that can be achieved is protection of those areas that are not essential for the core industrial area. In this context, it should be noted that the area proposed for industrial core is significantly larger than was considered to be needed in Welker (1996, quoted in BSD Consultants 1997) if no port was developed at Kemerton. The actual area should be defined after appropriate vegetation, flora and fauna surveys have been carried out. However, an approximate boundary is shown on the overlay attached to the aerial photograph mosaic that accompanies this memo.

#### **H. PLANNING NEEDED TO REDUCE IMPACTS ON THE VEGETATION, FLORA AND FAUNA BY THE ONGOING DEVELOPMENT OF THE INDUSTRIAL PARK**

In addition to the major consideration of conservation issues needed at Kemerton to provide representative reservation of the vegetation, flora and fauna of the southern Swan Coastal Plain, the design of the industrial area should be required to take into account the impact on the biological environment of the major development(s) involved and ameliorate the impact as much as possible. This should involve:

1. redesigning the planned development to allow retention of key large representative blocks of bushland incorporated into secure buffer areas;
2. designing the development in such a way that vegetated links are maintained between areas set aside for conservation;
3. where such links do not exist, rehabilitating areas to provide links.
4. where possible, facilities such as road and rail lines should be planned to use existing easements to avoid further fragmentation of the native vegetation. This should also be applied to services such as telecommunications optical fibre lines and the proposed Western Power ocean outfall pipeline which would cross the study area;
5. road and rail design should include features to allow movement by native fauna between areas of native vegetation they separate and techniques to minimise the spread of weeds along their corridors;
6. to avoid further fragmentation of the native vegetation relocation of the Bunbury-Cannington 132 kV transmission line should be to an existing easement or to already cleared land, as should any new power lines;

6. Detailed studies of the potential impact of water extraction via drainage (to reduce the water table) and from bores for water for industry usage on the native vegetation should be carried out before finalisation of zoning and

7. Unless very wide, vegetated links should not be considered as areas set aside for conservation as narrow corridors are subject to degradation and require substantial management to maintain most of their biological conservation values (there are some exceptions to this, depending on the soil and vegetation types).

8. The points listed in section G in relation to planning of development of the industrial park implementation should be part of the DEP input into the process of development of the industrial park.

## J. REFERENCES

BSD Consultants (1997). *Kemerton expansion study, final draft report*. Prepared for: Study Management Group (which included DRD, LandCorp, W.A, Planning Commission and South West Development Commission) by BSD Consultants, Subiaco W.A.

International Aluminium Consortium of Western Australia (1985). (Quoted in BSD Consultants 1997)

Welker, C. (1996). *Kemerton industrial land demand study*.

Check Drainage issues with WC Townsman.

NB: Already pollution plumes in the groundwater from existing industry on site.

Expansion

Could be implemented as staged process

Kemerton Industrial Park Board - should have conservation representation given the significance of the area. It does CAW

\* Option of relocating KSS <sup>to reserves on cleared land and requiring this area for conservation</sup> should be considered as part of process of ensuring environmentally acceptable outcome.

7. the bushland area in the buffers around the industrial area should not be considered as available for disposal areas for solid waste, these should be placed in already disturbed areas;

9. use of material from excavating drains as fill to minimise disturbance

The above points should be taken as indicative of the level of planning needed to minimise the impact of the expansion of the Kemerton Industrial area, rather than as an exhaustive list.

This overall planning should include a commitment to developing a management plan for the study area to ensure that avoidable impacts do not occur and that ongoing impacts are minimised. The management plan should include planning for fire control, management of dieback disease, management of weed invasion and management of other impacts related to the development of the industrial estate and its ongoing operation. Given the nature of the development (a large development in a largely naturally vegetated area), it would not be unreasonable for the industry operating in the area to contribute to the cost of managing their impacts under the user pays principle. The overall cost would be minimal and would help facilitate environmental acceptance of industry and attainment of best practice environmental standards.

## I. RECOMMENDATIONS

1. The northern group of cells on the draft final structure plan should be deleted from the proposed industrial core expansion. *These cells conflict with the area ~~that~~ being considered by the ~~EMU~~ as a conservation area as part of the approval of an extension of the ~~area~~ <sup>of the</sup> ~~area~~ <sup>1985</sup> ~~area~~ <sup>main</sup> ~~area~~ <sup>area.</sup>*
2. The re-zoning of areas for industrial development should ~~either~~ <sup>→ biodiversity values</sup> be delayed until adequate information is available on the vegetation ~~or should have a joint or alternative use so that if areas of particular significance are identified then it is practical to exclude such areas from development zones.~~ *of the Kemerton area*
3. The overall process of zoning and development should retain flexibility so that when more detailed knowledge of conservation values of the native vegetation in the Kemerton Expansion Study area is available then areas will still be able to be protected.
4. Current zonings outside the proposed buffer that might allow clearing of significant native vegetation should be ammended so as to discourage the perception that this is an available option. For example the "General Farming" category should also refer to ~~maintenance~~ <sup>conservation</sup> of native vegetation. ✓
5. The vegetation and flora values of the Kemerton Expansion Study area should be properly defined by a combination of a review of existing information and appropriate survey by appropriate consultants. Similar work should be carried out for fauna.

*draft structure plan be revised to*  
The ~~study~~ should recognise that the Kemerton ~~area and adjoining~~ <sup>expansion Study boundary</sup> ~~lands to the north~~ supports conservation values that cannot be protected elsewhere and in accordance with the study objectives should ~~be~~ <sup>"</sup> have adequate infrastructure + land available to be developed and planned in a planned, environmentally & socially acceptable manner

MEETING No: 82

ATTACHMENT 4

**[KEMERTON SILICA SAND PROJECT]**  
(Assessment No. 980)

**[Kemerton Silica Sand Pty Ltd]**

The EPA submits the following recommendations:

**Recommendation 1**

That the Minister for the Environment considers the report on the relevant environmental factors of Vegetation Communities (3.2), Groundwater quantity (3.3) and Groundwater quality (3.4).

**Recommendation 2**

The Minister for the Environment notes that the EPA has concluded that the proposal can be managed to meet the EPA's objectives, and thus not impose an unacceptable impact on the environment, provided there is satisfactory implementation by the proponent of the recommended conditions and procedures as set out in Section 4 of this report.

**Recommendation 3**

That the Minister for the Environment imposes the conditions and procedures consistent with those set out in Section 4 of this report.



## Vegetation and Flora Conservation Values of the Kemerton Silica

### Background and Information Sources

While Stage Two of the Kemerton Silica Sands Project is currently being assessed this report details values of the entire naturally vegetated area (study area). This was considered necessary in the light of new information and the interpretation of previous information, according to a more detailed knowledge of the vegetation and flora of the Swan Coastal Plain (after Atkins 1997, Gibson *et al.* 1994, DEP 1996 and English and Blyth 1997). These data indicated that there are important flora and vegetation conservation issues that were not addressed in the previous assessment. These issues relate to the identification of threatened ecological communities, possible occurrences of Declared Rare Flora, occurrences of additional Priority Flora and the diversity of major landform units in and adjacent to the Kemerton Silica Sands Project area.

When appropriate the vegetation and flora conservation values are related to the biodiversity criteria developed for the consideration of clearing proposals by the EPA (Safstrom and Craig 1996).

This report considers aspects of the vegetation and flora values of the Kemerton Silica Sands Project as described in flora and vegetation information supplied by Gwalia Consolidated Ltd, information collated by DEP in 1993 and limited field work by DEP staff in 1997 (field visit by Bronwen Keighery and Michelle Mifka, 1.5 days October 1997).

### Representation of Vegetation Complexes (after Heddle *et al.* 1980)

Within the Perth Metropolitan Area (PMA) government policy, as detailed in the Urban Bushland Strategy (Government of WA 1995) recognises that at least 10% of each vegetation complex should be protected for conservation of bushland. Outside the PMA there is general recognition through the 'MOU for the protection of remnant vegetation on private land in the agricultural region of WA' (March 1997) that 20% of each local government area should remain as native vegetation. As a consequence, it is generally recognised, that between 10 and 20% of each ecological community should be retained as native vegetation. In addition the biodiversity criteria developed for the consideration of clearing proposals (Safstrom and Craig 1996) consider this 20% representation in a 15kms radius of the area proposed to be cleared.

As vegetation complexes are mapped for the System 6 area these can be used as basis for the determination of percentage of each complex remaining. The entire area of the Kemerton Silica Sands Project (Map 1) is mapped as being on the Bassendean Complex (Central and South), abutting the Serpentine and Guildford Complex to the east and the Karrakatta Complex (Central and South) to the west (Heddle *et al.* 1980 and Mattiske 1993b, Map 1). However some of the plant communities mapped by Mattiske (1993b) are considered to be representative of communities of the eastern side of the Swan Coastal Plain and as such would be more correctly mapped in the Guildford Complex (Map 2 and sections on Floristic Community Types and Flora below). That is the study area contains areas of Bassendean Complex (Central and South), Guildford Complex and the interface between them. As it is generally considered that less than 15% of the former and much less than 10% of the later of the complexes remains uncleared on the Plain (Dixon *et al.* 1994, Keighery and Trudgen 1992, Trudgen and Keighery 1995) the entire study area is of regional conservation value.

Summary: The Kemerton Silica Sands Project area is considered to contain areas of Bassendean Complex (Central and South), Guildford Complex and the interface between them and as it is generally considered that less than 15% of the former and much less than 10% of the later of the complexes remains uncleared on the Plain the entire study area is of regional conservation value. In addition the study area provides an opportunity to conserve a transect on the Plain through three major landform units; Spearwood Dunes, Bassendean Complex (Central and South) and Guildford Complex and the interfaces between them.

one of the largest remaining remnants of Bassendean CS occurring in the southern portion of its range.



## Floristic Community Types and Threatened Ecological Communities

The DEP field inspection in conjunction with Matiske (1993a & b) was used to infer regional floristic groupings (floristic community types) after Gibson *et al.* (1994) and DEP (1996). All floristic community types considered to be present in the study area (Table 1) were identified in Gibson *et al.* (1994). A total of seven regional floristic groupings are considered to be present in the study area, a relatively diverse assemblage. An additional group is present to the west of the area giving a total of eight groups in the transect across the three major landform units.

Floristic community types 1b, 2 and 7 are principally associated with the eastern side of the Swan Coastal Plain (that is the Pinjarra Plain with which the Guildford Complex is associated). When compared with the plant communities mapped by Matiske (1993a & b) floristic community type 1b is considered to be associated with units B1 and C3 and floristic community type 7 with D2, F2, F3 and areas of F1 (Map 2). Of particular interest is an area where communities D2, F2 and F3 are mapped (M, Map 2). This area contains a sequence of species considered to be associated with areas of Muchea Limestones (Keighery and Keighery 1995, see Flora below). No area of these communities is known south of Gosnells and the only protected areas are north west of Gingin. Communities 1b, 7 and the Muchea Limestones floristic community type mosaics are classified as threatened ecological communities (English and Blyth 1997).

Species richness in the floristic community types ranges from 16.9 to 65.0 per 100 square metres (Table 1). At least three of the floristic community types (1b, 21a and 21b) would be considered to show high species richness (Safstrom and Craig 1996, Criterion 2.1.3). In addition floristic community types 2 and 7 show high species richness in regard to both perennials and annuals. Communities of heavy soil wetlands, woodlands on the eastern side of the Plain and *Banksia* Woodlands, show high species richness. *characteristically*

Summary: The Kemerton Silica Sands Project area is considered to contain a diversity of regional floristic groupings (eight floristic community types). Five of these floristic community types show high species richness. In addition the study area provides an opportunity to conserve a transect of regional floristic groupings on the Plain through three major landform units; Spearwood Dunes, Bassendean Complex (Central and South) and Guildford Complex and the interfaces between them. Three floristic groups are classified as threatened ecological communities. *rare*

## Plant Communities

Twenty four plant communities have been mapped, representing a diverse assemblage of communities (Matiske 1993b). This diversity is particularly evident in the variety of wetland communities (Matiske 1993b). Thirteen of these communities were considered to be of significance by Matiske (1993b) as they:

- are poorly represented regionally (A2, C2, D1, D3, E3, F1, F2, F3 and H3)
- contain populations of particularly significant flora (A3, H1 and H2)
- contain communities with a high diversity of native taxa (A1, A3, H1 and H2).

Summary: - The study area contains a high degree of diversity of plant communities, thirteen of which have been identified as having significance.

## Wetlands

A diverse assemblage of wetland communities were described by Matiske (1993a and 1993b). The current status of the wetlands (other than those mined) is as described or better than in 1993 having recovered from disturbance caused by grid clearing for exploration. In addition it is considered from the DEP survey and interpretation of the Matiske (1993b) survey results in light of Semeniuk (1987), Gibson *et al.* (1994) and DEP (1996) that the area also contains a diverse assemblage of wetland types and wetlands floristically typical of the Pinjarra Plain (see Floristic Community Types above).

Summary: The wetlands in the study area are significant as they

- form a diverse assemblage of wetlands types (after Semeniuk 1987)
- form a diverse assemblage of wetland plant communities (Matiske 1993b)
- represent a floristic sequence of wetlands of the Bassendean Dune System and the Pinjarra Plain and the interface between them
- contain a series of wetlands and their associated uplands.

*Boronia* Ref to Semeniuk Dec 93 not included what is the constraint on them ref?

## Flora

Matiske (1993b) identified 291 native taxa in the study area. The brief DEP October 1997 survey work identified a further 28 native taxa. It would be expected from long term survey of other areas (Ruabon Nature Reserve 390 native taxa (Keighery *et al.* 1996a), Capel Nature Reserve 381 native taxa (Keighery *et al.* 1996b)), in the region that similar levels of survey in the study area would identify a flora of close to 400 native taxa.

## Significant Flora

### Declared Rare Flora and Priority Taxa

Six priority taxa (Atkins 1997) are recorded for the Reserve (Matiske 1993b and DEP 1997): *Boronia capitata* subsp. *gracilis* (2, Matiske 1993b), *Dillwynia dillwynioides* (3), *Anthotium junciforme* (3), *Myriophyllum echinatum* (3), *Acacia semitrullata* (3, Matiske 1993b) and *A. flagelliformis* (4, Matiske 1993b). The priority 3 taxon, *Schoenus* sp. Waroona and priority 4 taxon *Drosera occidentalis* subsp. *occidentalis* are also tentatively identified from the study area (material was too immature for definitive identifications). It is also considered, based on the habitats available, that the following Declared Rare Flora (R) and priority taxa may be present in the area: *Hydatella dioica* (R), *Centrolepis caespitosa* (R) and *Schoenus capillifolius* (2). These species are all small annual aquatics that can only be located through detailed survey in late spring.

All priority taxa identified or potentially identified, additional to Matiske (1993b), are found on the heavy soil wetland communities to the east (Map 2). *Dillwynia dillwynioides* is also found in wetlands to the west and would be expected in plant communities H1, possibly H2, F1 and F2. That is it would be expected to be found in the area of Stage Two.

### Other significant taxa/species groups

*Boronia juncea* subsp. *juncea* (Rutaceae)

Matiske (1993a and 1993b) located five populations of this taxon in the study area (Map 2). Recent work on a revision of the species has identified the material from the study area (*Boronia juncea* - true type DW 184/EH304) as *Boronia juncea* subsp. *juncea* (Paul Wilson pers. comm.). This is the only known location of *Boronia juncea* subsp. *juncea*. The first collections of this taxon were made by Preiss in the Wellington district in 1839. While this taxon is not currently on CALM's priority list it is recommended that it be listed in 1998 as Priority 1 (Ken Atkins pers. comm.). That is further survey work is considered necessary to determine whether it should be gazetted as Declared Rare Flora. If no further populations are located it would be expected to be recommended for recognition as Declared Rare Flora. Matiske (1993b) and Johns Consulting Services (1997) considered this the taxon with highest conservation significance in the study area.

*Cyathochaeta stipoides* (Cyperaceae)

*Cyathochaeta stipoides* was found in the wetland adjacent to the northern margin of the dredge pond (Site 2, Map 2). This is one of four (possibly five) species of *Cyathochaeta* found on the Swan Coastal Plain. *Cyathochaeta stipoides* ms (K. Wilson pers. comm.) is currently known from Bow Bridge to the Scott River Plain and the Capel Nature Reserve (Keighery *et al.* 1996b). The populations in Capel Nature Reserve were previously considered to represent the most northern population and the only record of this species on the Plain (Keighery *et al.* 1996b).

*Evandra pauciflora* (Cyperaceae)

This sedge grows in damp lands on the Plain from Anstey Road Bushland in Forrestdale to the Capel Nature Reserve. This distinctive sedge with its emergent weeping flowering branches is a distinctive feature of the wetlands with mixed shrub heaths.

#### Species characteristic of Muchea Limestones

An area of *Eucalyptus decipiens* Closed Tree Mallee was identified at Site 12 (Map 2) by DEP. Associated with this community were a series of species considered characteristic of communities associated with Muchea limestones (Keighery and Keighery 1995). These are *Eucalyptus decipiens*, *Pimelea rosea*, *Stipa flavescens*, *Gahnia trifida* and *Logania vaginalis*. A series of uncommon and restricted taxa on the Plain were also found in this community. These are:

- an unusual form of *Melaleuca acerosa* growing to two metres (possibly unnamed species of *Melaleuca* in Mattiske 1993b)
- *Melaleuca brachyphylla* an uncommon species on the Plain (possibly unnamed species of *Melaleuca* in Mattiske 1993b)
- *Hakea trifurcata* small flowered form previously only known from the Peel-Harvey region
- *Hibbertia perfoliata* an uncommon poorly collected species on the Plain.

Mattiske (1993b) listed all of these species but the significance of this community has only recently been delineated (Keighery and Keighery 1995). Gibson *et al* (1994) considered the communities of Muchea Limestones to be extinct.

#### Species characteristic of the eastern side of the Plain

Approximately forty taxa present in the study area are characteristic of the heavier soils of the eastern side (or southern side of the Plain south of Busselton) of the Swan Coastal Plain.

#### Species at the limit of their range

At least two taxa, *Verticordia nitens* and *Banksia menziesii*, are at the southern limits of their distribution on the Swan Coastal Plain in the study area. *Verticordia nitens* (Morrison) is a conspicuous summer flowering species which is common to the north of Perth but very uncommon south of Perth. Only two areas with large populations are known to the south of Perth. This record of *Banksia menziesii* is the most southern and is somewhat disjunct from the nearest known population in the Peel area.

*One sp. Cyathochaeta styoides is at the northern limit of its range in the study area.*

Summary: The study area contains a diverse assemblage of flora representative of the two major landforms present in the area. Six priority taxa have been identified in the area. Another three priority taxa and two DRF may occur in the area. A detailed late spring survey would be required to locate these taxa. Over 45 taxa in the area are considered to be of special significance.

### General Summary

The principal conservation values of the vegetation and flora in the Kemerton Silica Sands Project Area are:

- all vegetation complexes are inadequately represented according to DEP's Biodiversity criteria (Safstrom and Craig 1996, Map 1)
- the study area contributes to a transect of vegetation complexes (Map 1) and regional floristic communities characteristic of the three major landforms of the Plain (Spearwood Dunes, to west area, Bassendean Dunes and Pinjarra Plain) and the area of Stage Two is central to the transect
- some of the regional floristic groupings/community complexes are 'threatened ecological communities', one vegetation association is not known from any other reserve south of Gingin, and no other area is known south of Perth
- the area contains a high degree of diversity of vegetation associations (Mattiske 1993), wetland types, floristic community types and flora which is probably unique and gives the area regional significance *a high degree of significance at the regional level.*
- over 50 significant taxa are found in the study area one of which is not currently known from any other area.

### REFERENCES

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## DEPARTMENT OF ENVIRONMENTAL PROTECTION

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TO: - MICHELLE MIFKA  
FROM: - BRONWEN KEIGHERY  
SUBJECT: - SUMMARY DRAFT COMMENT ON KEMERTON SILICA SANDS  
PROJECT - STAGE 2  
DATE: - 19TH DECEMBER 1997

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As discussed earlier this week I will be on away next week but back the following week. Below is a very brief summary of the values of the area, a detailed background statement will be prepared and these statements further justified by 30th December.

### Summary

This is summary of the main values of the vegetation in the Kemerton Silica Sands lands

- all vegetation complexes are inadequately represented according to DEP's Biodiversity criteria (Safstrom and Craig 199X, Map 1)

- the area contributes to a transect of vegetation complexes (Map 1) and regional floristic communities (Table 1) characteristic of the three major landforms of the Plain (Spearwood Dunes , to west area, Bassendean Dunes and Pinjarra Plain)

- some of the regional floristic groupings are 'threatened ecological communities' (Table 2)

- the area contains a high degree of diversity of vegetation associations (Mattiske 1993), wetland types, floristic community types and flora which is probably unique and gives the area regional significance

- the area of Stage Two is central to the transect.

### Also note

- The areas of threatened ecological communities - very diverse wetlands - are to the east and are mostly located in the area to be vested in CALM. However these are threatened by clearing and changes in the water table associated with Stage One. A condition of the previous approvals was that the cleared areas would be revegetated. Considering the nature of the wetlands observed and described by Mattiske 1993 these would not be possible to be restabilised.

- One vegetation association is not known from any other reserve south of Gingin, and no area is known south of Perth.

**Table 1: Floristic Community Types identified Gibson *et al.* (1994) and in the System 6 and part 1 Update (DEP 1996).**

**Key**

**Column 1: Floristic Community Type Codes**

The numbers of the types additional to Gibson *et al.* are italicised if they are subsets of an existing group (in type 19, 20, 23 and 30) and italicised and preceded by an S if they are supplementary groups.

**Column 2: General description of Floristic Community Types**

Descriptions are based on generalised information from all plots in the group. Structural units are categorised into forest, woodlands, shrublands, sedgelands and herblands after Gibson *et al.* (1994).

**Column 3: Average Species Richness per Floristic Community Type**

Average species richness per 10X10m plot less those species only occurring in a single plot (singletons). Some community types can have a high proportion of singletons and these estimates of average species richness are underestimates in some cases.

**Supergroup 1 - Foothills/Pinjarra Plain**

1b	Southern <i>E. calophylla</i> woodlands on heavy soils	65.0
2	Southern wet shrublands	50.3

**Supergroup 2 - Seasonal Wetlands**

4	<i>Melaleuca preissiana</i> damplands	33.2
7	Herb rich saline shrublands in clay pans	44.8
12	<i>M. teretifolia</i> and / or <i>Astartea</i> aff. <i>fascicularis</i> shrublands	27.3
13	Deeper wetlands on heavy soils	16.9

**Supergroup 3 - Uplands, centred on Bassendean Dunes**

21a	Central <i>Banksia attenuata</i> - <i>E. marginata</i> woodlands	52.0
21b	Southern <i>Banksia attenuata</i> woodlands	57.5

**Supergroup 4 - Uplands centred on Spearwood and Quindalup Dunes**

<b>Spearwood Dunes</b>		
25	Southern <i>E. gomphocephala</i> - <i>Agonis flexuosa</i> woodlands	48.1

**Table 2: Threatened Ecological Communities on the Swan Coastal Plain (English and Blyth 1997).**

**KEY**

**Bold Type** Ecological Communities in the PMA

CR Critically Endangered

EN Endangered

VU Vulnerable

\* Community further defined by DEP 1996, here as identified by Gibson *et al.* 1994

**A. Floristic Community Types**

**Supergroup 1 - Foothills/Pinjarra Plain**

1b	Southern <i>E. calophylla</i> woodlands on heavy soils	VU
----	--	----

**Supergroup 2 - Seasonal Wetlands**

7	Herb rich saline shrublands in clay pans	VU
---	--	----

**B: Restricted floristic community type mosaics**

<b>Muehea Limestones (Keighery and Keighery 1995)</b>		CR
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Bronwen,

I managed to locate a couple of maps that show what areas are going to be vested in CALM. The current mining area is within stage 2. If you have any problems identifying the mine route, please let me know, and I will try and find something else for ~~you~~ you.

I was told by Simon Williamson that the Safstrom report is coming today/tomorrow. (Well see!) I have been advised that Bernard & Bryan want Kemerton Silica Sand project to be released by 5 Dec 97. So I am going to EPA on 6 Nov 97.

This means I will need your input ASAP. I am sorry about this, do you think that it will be enough time?

Regards

Michelle Mifka  
22/10

Printed By: Bronwen Keighery 15/10/97 6:07 PM

Page: 1

From: Michelle Mifka (13/10/97) Bronwen Keighery (13/10/97) Michelle Mifka (10/10/97)

To: Bronwen Keighery

CC:

BCC:

Priority: Normal

Date sent: 13/10/97 10:05 AM



**Reply to:** RE>>Overnight accommodation - 16/10

Dear Bronwen,

I am really close to Bridget, my address is 250 Wharf St, Cannington.

Thanks Michelle

-----  
Date: 13/10/97 9:35 AM

To: Michelle Mifka

From: Bronwen Keighery

Thanks Michelle. I've spoken to Debbie Wodman at Mattiske Consulting who will be meeting us and taking us around the area. Debbie has done the work so she knows the area. We have arranged to meet at 9am on the West Coast Highway so I will need to pick people up at about 7am. Bridget is in Wilson. Please let me know where you live so we can work out the logistics of collecting us all.

Bronwen

-----  
Date: 10/10/97 4:04 PM

To: Bronwen Keighery

From: Michelle Mifka

I have booked three rooms at the Oak Tree Lodge (Bed and Breakfast), South West Highway in Yarloop, \$30 per night. I hope this is Ok?

Michelle



To: Department of Environmental  
Protection

Attention:

Bronwen Keighery

Fax number:

9322 1598

From: Debbie Woodman

Pages (inc. this one): 1.

Date: 10-10-1997

MATTISKE CONSULTING  
28 Central Road (corner Burt St)  
KALAMUNDA WA 6076

Tel: (08) 9257 1625

Fax: (08) 9257 1640

Email: mattiske@wt.com.au

<http://www.wt.com.au/~mattiske>

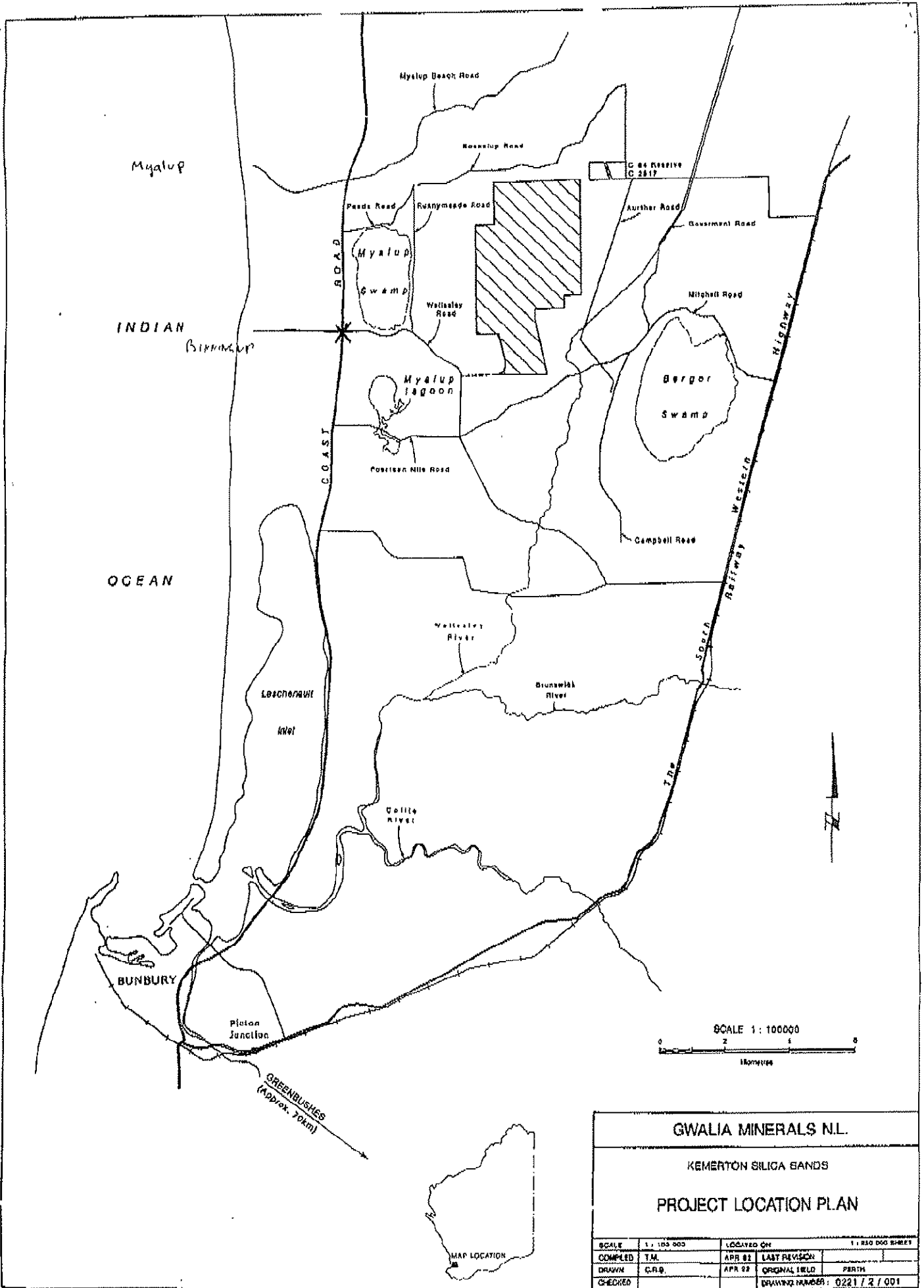
Fax No.: F097/362

Bronwen,

Attached is a map showing the mine location.

It is probably easiest if we meet on the  
corner of Wellesley Rd and the Coast Highway  
at 9:00 am on Thursday 16th. I will be  
driving a white Toyota Landcruiser.

Debbie Woodman

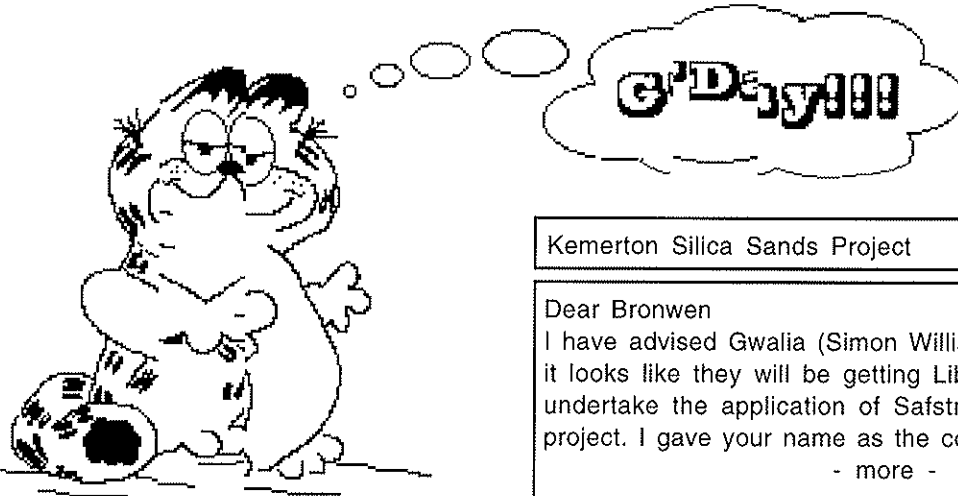


GWALIA MINERALS N.L.					
KEMERTON SILICA SANDS					
PROJECT LOCATION PLAN					
SCALE	1 : 100 000	LOCATED ON	1 : 250 000 SHEET		
COMPILED	T.M.	APR 82	LAST REVISION		
DRAWN	C.P.B.	APR 82	ORIGINAL FIELD	PERTH	
CHECKED			DRAWING NUMBER : 022172/001		

Printed By: Bronwen Keighery 1/8/97 9:56 AM  
From: Michelle Mifka (1/8/97)  
To: Bronwen Keighery  
CC:  
BCC:  
Priority: Normal

Page: 1

Date sent: 1/8/97 9:43 AM



Kemerton Silica Sands Project

Dear Bronwen  
I have advised Gwalia (Simon Williamson) to contact you, it looks like they will be getting Libby Mattiske to undertake the application of Safstrom Criteria for the project. I gave your name as the contact person. For  
- more -

your site visit to Kemerton please call the Mine Manager, Ross Nairn on 08 97 201 400.  
Regards Michelle

# Record of Telephone Call

Call from	Call to <i>DEBBIE WOODMAN</i>	Folio No.
Dept	Dept <i>MATTISKE CONSULTING</i>	File No.
Subject <i>LEMERTON VISIT</i>	Date <i>10/10/97</i>	Time

Details

• 9 AM Meet on Highway (Woolloose)  
map will be used today.

• Report gone to proponents  
? when copy will come to DEP

Action taken/Recommendation(s) (where applicable)

Approval (if required)



Department of Environmental Protection

Westralia Square, 8th Floor, 141 St Georges Terrace, Perth WA 6000

# Record of Telephone Call

Call from	Call to MATTISKE CONSULTING	Folio No.
Dept	Dept 9257 1625	File No.
Subject GUALIA - Kemerton Sands	Date 25/9/97	Time 2.15
Details		
<p>- Kemerton Site Visit</p> <p>- no contact since propose to go on 11/9/97 (unavailable as BP coordinating group meeting in the morning).</p> <p>- Debbie will contact if Libby M. is not available.</p>		
<p>LIBBY - RING tomorrow 26/9/97 (no call, ring 30/9/97)</p> <p>30/9/97 - spoke to L. Mattiske Report 80% complete needs L. Mattiske to finalise</p> <p>Elinor - Tuesday Morning LM will contact GUALIA</p> <p>NOTE: Subsequently changed to 15/10-10-97 Elinor will contact about meeting time Report will be sent before field trip LM contact Gualia</p>		
Action taken/Recommendation(s) (where applicable)		
<p>Notified Michelle Pitka of progress 26/9/97</p>		
Approval (if required)		
Mo		



Department of Environmental Protection

Westralia Square, 8th Floor, 141 St Georges Terrace, Perth WA 6000

# Record of Telephone Call

<small>From</small> Simon Williamson	<small>Call to</small> Browner Keigley	<small>Folio No.</small>
<small>Dept</small> Remerton Silica Sds	<small>Dept</small> Conservation	<small>File No.</small>
<small>Subject</small> Custalia	<small>Date</small> 25/8/97	<small>Time</small> 1:15

Details

- Simon Williamson had not writing apologies
- Explained outline System 6 Update / Perth's Bushplan (after Setstrom)
- Libby's overview would be useful, wait for this. Simon will see how going visit after 8/9/97
- Sufficient enough information to indicate regionally significant would need to inspect to do final interpretation
- Libby (or other) could accompany, would be useful.

Action taken/Recommendation(s) (where applicable)

- Await reply from S Williamson on Maltske Report and if able to accompany.

Approval (if required)



# Meeting Notes

Name <b>BRONWEN K AND MICHELLE M.</b>		Folio No.
Branch <b>CONS / RESOURCE</b>		File No.
Subject	Date <b>29 / 7 / 97</b>	Time

People in attendance

Items	Action required	Action by
<ul style="list-style-type: none"> <li>• Have been asked to prepare assessment according to 'Safety criteria'</li> <li>• Indications regionally significant from Flora, BJK to visit</li> <li>• Michelle told to contact Conservation Branch - will re-contact to say my name Simon Williamson 9263 5526</li> <li>• Assessment obj sig based on report plus visit by BJK. Problems with Curdia               <ul style="list-style-type: none"> <li>- previous proposal outside ministerial conditions (Audit process showing, want more information)</li> <li>- other issues 'unconcern' with environmental issues??</li> </ul> </li> </ul>		

