Titanium Minerals Mining and Rehabilitation, Reserve 31900 Yarloop

---

Cable Sands (WA) Pty Ltd

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 944
July 1999

ISBN. 0 7309 8148 7
ISSN. 1030 - 0120
Assessment No.1210

Summary and recommendations

This report provides the Environmental Protection Authority's (EPA's) advice to the Minister for the Environment on the proposal by Cable Sands (WA) Pty Ltd (Cable Sands) to mine mineral sands and rehabilitate Reserve 31900, Yarloop. The area is currently a "C" Class Reserve vested in the Shire of Harvey for sand extraction and rubbish disposal.

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

An earlier proposal from Cable Sands for mining in this area was assessed by the EPA in Bulletin 838 (EPA, 1996). At that time, the EPA determined that mining in Reserve 31900 would compromise its objective to ensure that the abundance, diversity, geographic distribution and productivity of the Floristic Community Types 3b and 20b were protected. The EPA therefore recommended that mining and further clearing of vegetation be excluded from Reserve 31900.

Present proposal

The present proposal differs from Cable Sands' first proposal in the following ways:

- it includes purchase of a nearby piece of private land as a "land swap". This land is intended to provide comparable conservation values to those which would be lost by mining in Reserve 31900. A conditional contract of sale exists between the proponent and the present owner, Wesfarmers Bunnings Limited (Bunnings). If the mining proposal is approved, the proponent has made a commitment to purchase this area of land and donate it to the National Parks and Nature Conservation Authority (NPNCA) for inclusion in the Conservation Estate;

- following mining, the proponent will rehabilitate all disturbed areas of Reserve 31900 with local native plants. The proponent will also develop and implement a weed control plan in Reserve 31900; and

- the proponent will install fencing around Reserve 31900, the two adjoining Reserves (31901 and A23307) and around the portion of land to be donated to the Conservation Estate.

Relevant environmental factors

Although a number of environmental factors were considered by the EPA in the assessment, it is the EPA's opinion that the following are the environmental factors relevant to the proposal, which require detailed evaluation in the report:

(a) Floristic Community Types 3b and 20b - the direct impacts from clearing to mine the resource;

(b) Rubbish tip and existing sand extraction area - relocation of existing tip into the sand extraction area;

(c) Rehabilitation - restoration of soil profile and revegetation;

(d) Groundwater - impacts on quality and quantity of groundwater;

(e) Noise - impacts on neighbours; and

(f) Aboriginal culture and heritage - impacts on sites of Aboriginal significance.

Conclusion

The EPA has considered the proposal by Cable Sands to mine mineral sands and rehabilitate Reserve 31900, Yarloop.

Overall, the EPA has concluded that parts of the remnant native vegetation in Reserve 31900 have been extensively degraded by:

- the existing rubbish tip within the Reserve;
- uncontrolled firewood collection;
- impacts from previous sand excavation within the Reserve; and
- the spread of weeds within part of the Reserve.

The EPA notes that the proposal would result in the loss of approximately 6.1 hectares of remnant native vegetation out of a total of 12.8 hectares of remnant native vegetation within Reserve 31900. However, given that the proponent has committed to:

- securing an adjacent area (9 hectares) of privately owned land with native vegetation including Floristic Community Type 20b for inclusion into the Conservation Estate;
- rehabilitating the existing rubbish tip and sand excavation area (6.9 hectares) within Reserve 31900; and
- installing fencing around Reserve 31900 and two adjacent Reserves (totalling 32 hectares), and around the additional piece of land to be donated to the Conservation Estate,

the EPA has concluded that, on balance, the proposal would result in a net environmental gain. This is summarised in Section 4.

The EPA also notes that, on the completion of mining and satisfactory rehabilitation, it is proposed that Reserve 31900 be vested with the NPNCA and managed by the Department of Conservation and Land Management (CALM).

The EPA has therefore concluded that it is unlikely that the EPA's objectives would be compromised, provided there is a satisfactory implementation by the proponent of the proponent's commitments and the recommended conditions set out in Appendix 1 and summarised in Section 5.

The EPA has also provided advice in relation to the widening of South West Highway and the vesting of Reserves 31901 and A23307 into the Conservation Estate.

Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is for Mining and Rehabilitation in Reserve 31900, Yarloop, the area is currently a "C" Class Reserve vested in the Shire of Harvey for sand extraction and rubbish disposal, and forms an extension of an existing mining operation which was previously assessed and reported on in Bulletin 838 released in December 1996;
2. That the Minister considers the report on the relevant environmental factors as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out Appendix 1 and summarised in Section 5, including the proponent's commitments;
4. That the Minister imposes the conditions and procedures recommended in Appendix 1 of this report;

5. That the Minister notes the other advice provided by the EPA in Section 6 regarding the high conservation value of vegetation on Reserves adjoining Reserve 31900, and that the Minister writes to the Minister for Transport and the Minister for Lands seeking their support for these to be incorporated in the Conservation Estate vested in the NPNCA.

Conditions

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions which the EPA recommends be imposed if the proposal by Cable Sands to mine mineral sands and rehabilitate a portion of Reserve 31900, and fence additional reserves and donate part of Location 826 at Yarloop, is approved for implementation. These conditions are presented in Appendix 1. Matters addressed in the conditions include the following:

(a) that the proponent be required to fulfil the commitments in the Consolidated Commitments Statement set out as an attachment to the recommended conditions in Appendix 1;

(b) in order to manage the environmental impacts of the project the proponent shall demonstrate that there is in place an Environmental Management System;

(c) the proponent shall develop a Mining and Rehabilitation Plan; and

(d) the proponent shall develop a Rubbish Tip Decommissioning Plan.

Contents

Tables

Figures

Appendices

1. Recommended Environmental Conditions and Proponent's Consolidated Commitments
2. Dominant species for Floristic Community Types 3b and 20b
3. Weed species found in Reserve 31900
4. List of submitters
5. References
6. Summary of Public Submissions and Proponent's Responses
7. Predicted noise levels for mining within Reserve 31900, Yarloop

1. Introduction

The proponent, Cable Sands (WA) Pty Ltd (Cable Sands), proposes to mine mineral sands in a portion (approximately 13 hectares) of Reserve 31900 (total area of 19.7 hectares), Yarloop. The present proposal is an extension to the proponent's existing Yarloop mining operation. The project area is 2 kilometres south east of the Yarloop township (Figure 1). Reserve 31900 is an area containing EPA *Threatened or Poorly Reserved Plant Communities Requiring Interim Protection* (EPA, 1994). The area is currently a "C" Class Reserve vested in the Shire of Harvey for sand extraction and rubbish disposal, however, 65% (12.8 hectares) of this Reserve is remnant vegetation. The central 35% (6.9 hectares) of Reserve 31900 is severely degraded due to rubbish dumping, sand extraction, invasive weeds, and uncontrolled firewood collection.

The proponent's existing mineral sands mine at Yarloop was assessed by the EPA at the level of Consultative Environmental Review (CER) in 1996. The EPA published its report and recommendations to the Minister for the Environment in Bulletin 838 (EPA, 1996). A statement of environmental approval was published on 17 April 1997. The mine commenced operations in the same year.

In considering the original Yarloop mine proposal, the EPA recommended that Reserve 31900 should be excluded from mining and further clearing because it would compromise the poorly reserved Floristic Community Types 3b and 20b.

The proponent submitted the present proposal for mining of Reserve 31900 on 23 March 1998. The new proposal differs from the original Yarloop mine proposal for the following reasons:

- it includes purchase of a nearby piece of private land (9 hectares of Location 826, located on the opposite side of South West Highway) as a "land swap". The proponent contends that this area of land has comparable conservation values to those which would be lost by mining in Reserve 31900. A conditional contract of sale exists between the proponent and the present owner, Wesfarmers Bunnings Limited (Bunnings). If the mining proposal is approved, the proponent has made a commitment to purchase this area of land and donate it to the National Parks and Nature Conservation Authority (NPNCA) for inclusion in the Conservation Estate;

- following mining, the proponent will rehabilitate all disturbed areas of Reserve 31900 (including the rubbish tip and existing sand excavation area) with local native plants. The proponent will also develop and implement a weed control plan in Reserve 31900; and

- the proponent will install fencing around Reserve 31900, the two adjoining Reserves (31901 and A23307) and around the portion of Location 826 to be donated as a "land swap".

Following referral of the present proposal, the level of assessment was set at Public Environmental Review (PER). Formal assessment of the proposal at PER level was considered necessary due to the conservation significance of Reserve 31900. The PER document prepared for the proponent (Cable Sands, 1998a) was released for an eight week public review closing on 31 August 1998. A total of 21 submissions was received.

In compiling this report, the EPA has considered the relevant environmental factors associated with the proposal, issues raised in the public submissions, specialist advice from the Department of Environmental Protection (DEP) and other government agencies, the proponent's response to submissions and the EPA's own research and expertise.

Further details of the proposal are presented in Section 2 of this report while Section 3 discusses environmental factors relevant to the proposal. Section 4 summarises the net environmental outcomes of the proposal before and after mining. The Conditions and Procedures to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 5. Section 6 provides the EPA's Other Advice, Section 7 presents the EPA's Conclusions and Section 8, the EPA's Recommendations.

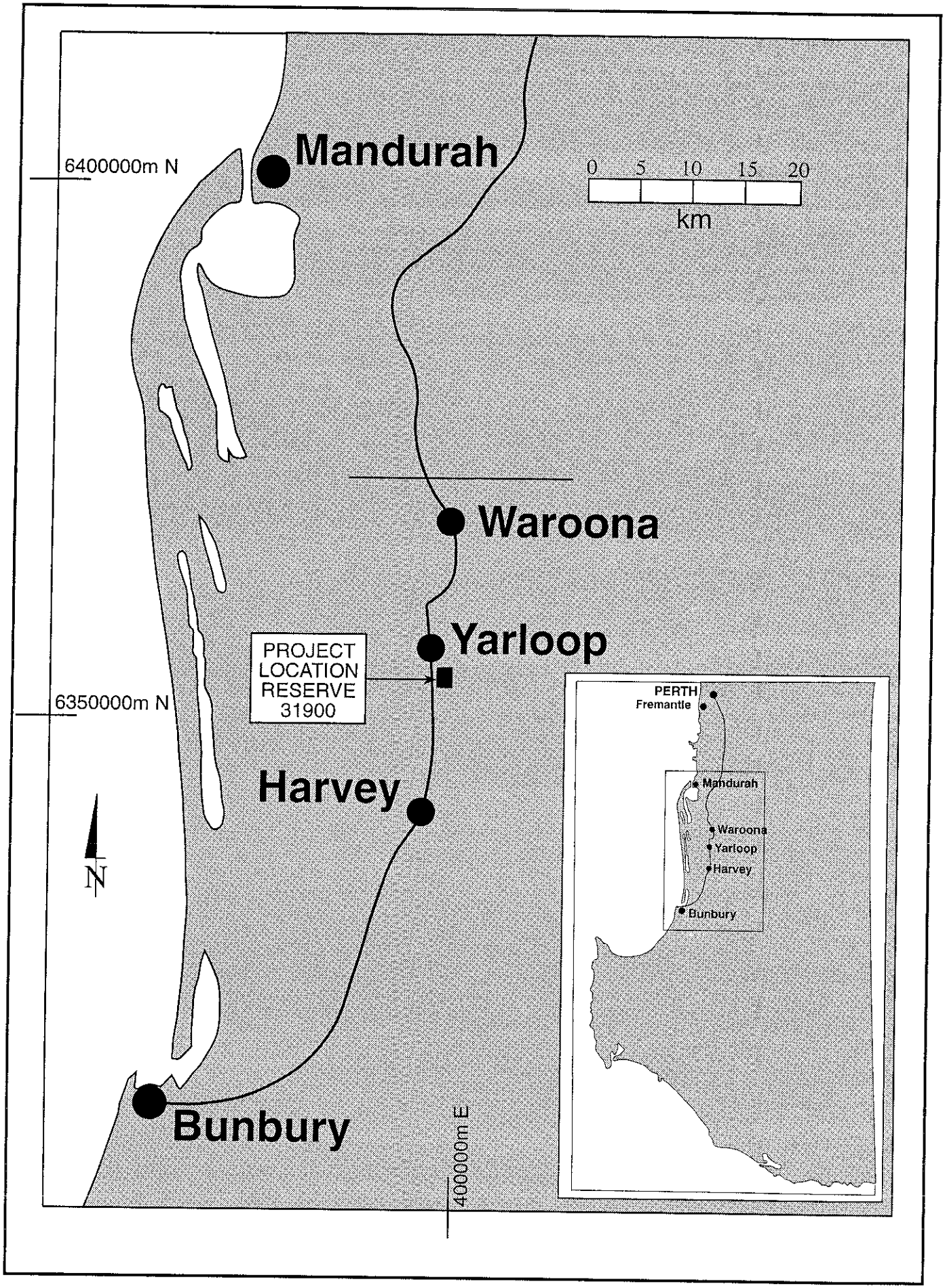

Figure 1. Project area, Yarloop.

Appendix 1 contains the recommended environmental conditions and the proponent's commitments. The dominant species for Floristic Community Types 3b and 20b are listed in Appendix 2. The major weed species found in Reserve 31900 are listed in Appendix 3. A list of people and organisations that made submissions is provided in Appendix 4. References are listed in Appendix 5.

Appendix 6 contains a summary of the public submissions and the proponent's responses. The summary of public submissions and the proponent's responses is included as a matter of information only and does not form part of the EPA's report and recommendations. The EPA has considered issues raised in public submissions when identifying and assessing relevant environmental factors. Appendix 7 contains the predicted noise levels for mining within Reserve 31900, Yarloop.

2. The proposal

The proposal involves the mining of mineral sands in part of Reserve 31900 and is an extension to the existing mining operations at Yarloop (Figures 1, 2 and 3), a "land swap" (Figure 4), rehabilitation of Reserves 31900 and fencing of adjacent reserves.

The mining proposal is for extraction of approximately 178,000 tonnes of heavy mineral concentrate (HMC) within Reserve 31900. The Reserve area would be dry mined over a 16 month period. Dry mining consists of the vegetation present being removed and the topsoil stripped and stockpiled separately (South West Development Authority, 1990). Conventional earthmoving machinery, such as scrapers, loaders and bulldozers would be used to mine the ore body. No additional infrastructure (water and power) would be required within the Reserve.

Primary processing of extracted sand will be carried out using equipment and facilities at the proponent's existing mining operation adjacent to Reserve 31900. Primary processing comprises the removal of "slimes". Slimes are a by-product of mineral sands mining and consist of clay fractions that have been thickened by a flocculent (thickener). The proponent proposes to manage this by-product by placing the slimes into dams, to be dried and, after a period, rehabilitated. No slimes dams would be required within Reserve 31900. Instead, slimes would be put into already-approved dams within the existing Yarloop Mineral Sands Mine (Figure 2).

All HMC would be transported via the existing roads. All processing of the HMC would be through the proponent's existing secondary processing plant at North Shore, Bunbury.

The area of mining in the Reserve is anticipated to be about 9.1 hectares of which 6.1 hectares supports native vegetation of conservation significance, consisting of Floristic Community Type 3b. Some remnant vegetation of Floristic Community Type 20b also exists within the Reserve but would not be directly affected by the proposal. Floristic Community Type 3b consists of Jarrah-Marri woodlands and 20b consists of slender banksia and/or Jarrah woodlands (Gibson, 1994).

The proposal also includes mining below the Yarloop Rubbish Tip area (within Reserve 31900) (Figure 3). The Yarloop Rubbish Tip has operated as a regional rubbish tip for approximately 25 years. The rubbish tip will be closed on 31 July 1999. Under the present proposal, it will be decommissioned by the proponent on behalf of the Shire of Harvey. The original proposal included the movement of about 90% of the rubbish within Reserve 31900 to an already-disturbed area within the adjacent sand excavation area. However, the proposal has been modified to include movement of all of the rubbish. The proponent proposes to cover the re-located rubbish with a clay cap and then with a layer of topsoil. The re-located rubbish tip area and all other disturbed areas will then become part of the overall rehabilitation to be carried out within Reserve 31900 at the completion of mining.

It is proposed that, once mining has been completed and the area rehabilitated to a satisfactory standard, Reserve 31900 will be recommended for vesting in the NPNCA and managed by the Department of Conservation and Land Management (CALM) as an "A" Class Nature Reserve.

The proposal also includes purchase and donation of a piece of private land (9 hectares) which the proponent indicates has similar remnant native vegetation to that within Reserve 31900.

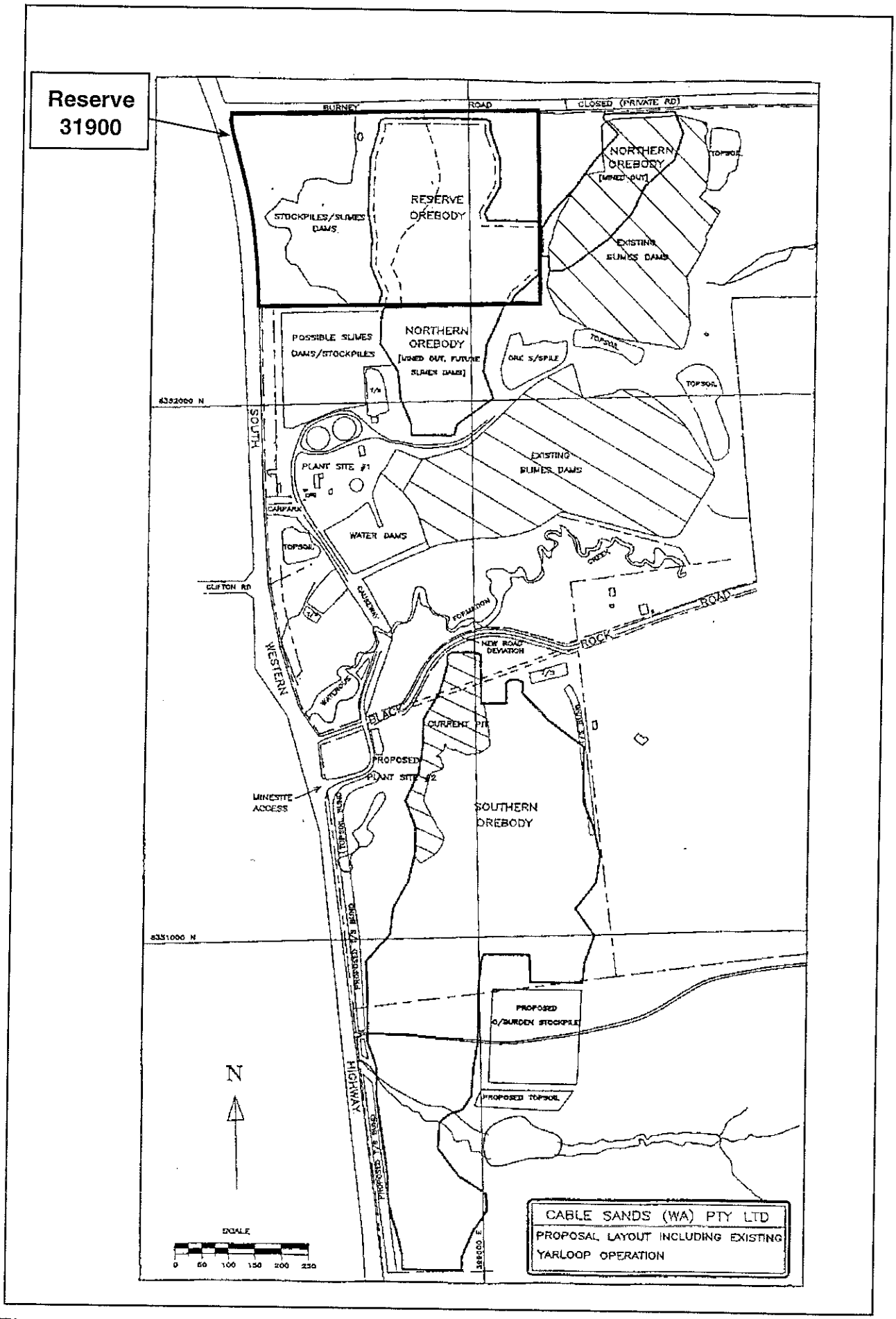

Figure 2. Existing and proposed mining areas.

Figure 3. Reserve 31900 showing remnant vegetation.

This additional piece of land is presently owned by Millars (WA) Pty Ltd (a subsidiary of Wesfarmers Bunnings Limited) and is situated on the opposite (west) side of South West Highway (Figure 4). Following purchase by the proponent, this piece of land would be donated for incorporation into the Conservation Estate.

Finally, the proponent will install fencing around Reserve 31900, the two adjoining Reserves (31901 and A23307) and around the portion of Location 826 to be donated as a "land swap".

The main characteristics of the proposal are summarised in Table 1 below. Since release of the PER, a number of modifications have been made by the proponent. These are also included in Table 1.

Table 1. Summary of key proposal characteristics

Element	Description
Life of project (mine production)	16 months approximately of mining (this does not include rehabilitation).
Size of ore body	178,000 tonnes of HMC approximately.
Area of disturbance (including access)	13 hectares approximately (6.1 hectares of remnant vegetation and 6.9 hectares of disturbed rubbish tip and sand excavation areas). The 6.1 hectares of remnant vegetation to be cleared consists of Floristic Community Type 3b (Jarrah-Marri woodlands).
Major components - waste dump, infrastructure (water supply, roads, etc)	Use existing facilities and infrastructure (water and power). No additional infrastructure will be required.
Water supply - source maximum annual requirement	Existing bores located on Brockman Road approx 4 kilometres west of the mine site. Approximately 803 Megalitres per annum.
Rehabilitation methods	Mined areas backfilled and regraded. Remaining timber used for habitat logs. Baseline vegetation survey. Weed and dieback management. A propagation strategy including, seed collection, direct return of topsoil to be maximised, direct seeding, smoke treatment and translocation. Development of specific rehabilitation performance criteria, a monitoring programme and contingency plans. Allocation of adequate resources (equipment and appropriately trained and experienced personnel).
HMC transport - truck movements	Utilising existing roads, no additional trucking anticipated over and above that associated with existing operation.
Rubbish Tip - relocation of existing rubbish to sand excavation area	The existing rubbish tip is located in Area 3 (Figure 3). All of the rubbish will be excavated and reburied in Area 2 (the existing sand excavation area) and capped. It will form part of the rehabilitation programme for the entire Reserve.
Land Swap - proposed vesting in the NPNCA and managed by CALM	Inclusion of 9 hectares (portion of Location 826) in the Conservation Estate (Figure 4). The proponent contends that the remnant native vegetation is in excellent condition, and contains Floristic Community Type 20b (slender banksia and/or Jarrah woodlands).
Installation of fences	Reserves 31900, 31901, A23307 and land swap area to be fenced to restrict access to these areas (Figure 4).
End landuse for Reserve 31900 (intended)	Reserve 31900 will be vested in the NPNCA for conservation purposes and managed by CALM.

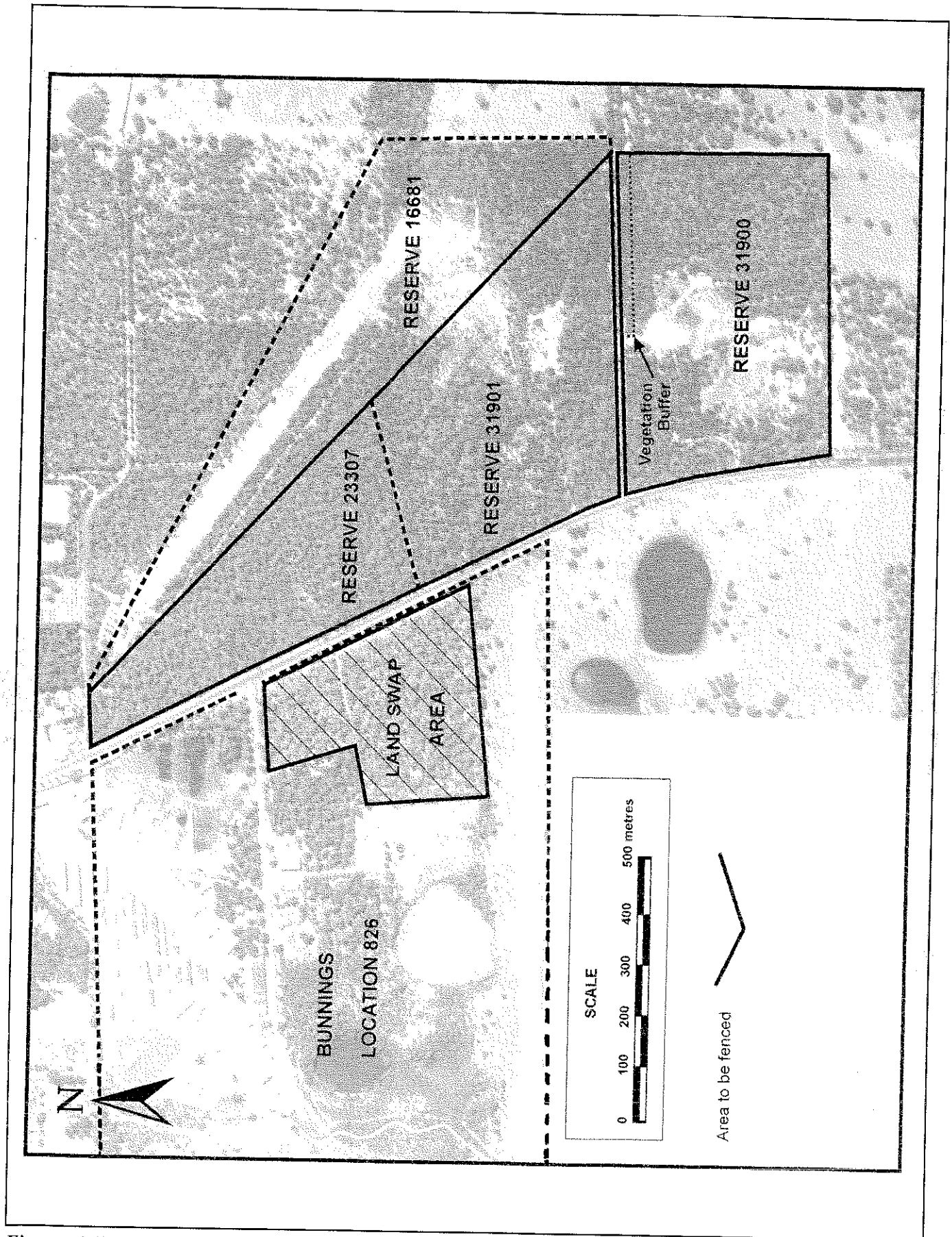

Figure 4. Location of Reserves 31900, 31901, A23307, 16681 and Bunnings Location 826 (land swap area).

3. Relevant Environmental Factors

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The identification process is summarised in Table 2.

Having considered appropriate references, public and government submissions and the proponent's response to submissions, in the EPA's opinion, the following are the environmental factors relevant to the proposal:

(a) Floristic Community Types 3b and 20b - the direct impacts from clearing to mine the resource;

(b) Rubbish tip and existing sand extraction area - relocation of existing tip into the sand extraction area;

(c) Rehabilitation - restoration of soil profile and revegetation;

(d) Groundwater - impacts on quality and quantity of groundwater;

(e) Noise - impacts on neighbours; and

(f) Aboriginal culture and heritage - impacts on sites of Aboriginal significance.

Details of the relevant environmental factors and their assessment are contained in Sections 3.1 to 3.6. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. Submissions on the PER are summarised before the EPA's assessment for each relevant factor.

In assessing each relevant environmental factor, the EPA determines whether or not the proposal can meet the objective set for that factor.

A summary of the assessment of the environmental factors is presented in Table 3.

3.1 Floristic Community Types 3b and 20b

Description

The proposed mining will predominantly impact on Floristic Community Type 3b located within "C" Class Reserve 31900. The two main Floristic Community Types located within Reserve 31900 contain two locally and regionally significant communities:

- Type 3b - Marri *(Corymbia calophylla)* - Jarrah *(Eucalyptus marginata)* woodland on sandy clay soils; and

- Type 20b - Slender Banksia *(Banksia attenuata)* and/or Jarrah *(E. marginata)* woodlands of the eastern side of the Swan Coastal Plain.

The proposal would result in the destruction of 6.1 hectares of predominantly Floristic Community Type 3b. Mining would not directly impact on Floristic Community Type 20b.

The present proposal differs from Cable Sands' first proposal in the following ways:

- it includes purchase of a nearby piece of private land (9 hectares of Location 826, located on the opposite side of South West Highway) as a "land swap". The proponent contends that this area of land has comparable conservation values to those which would be lost by mining in Reserve 31900. A conditional contract of sale exists between the proponent and the present owner, Bunnings. If the mining proposal is approved, the proponent has made a commitment to purchase this area of land and donate it to the NPNCA for inclusion in the Conservation Estate;

Table 2. Identification of Relevant Environmental Factors

FACTOR	PROPOSAL COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF RELEVANT ENVIRONMENTAL FACTORS
INTEGRATING PROCESS			
Biodiversity	Clearing of 6.1 hectares of native vegetation within Reserve 31900. Reserve 31900 contains EPA *Threatened or Poorly Reserved Plant Communities Requiring Interim Protection*. The Floristic Community that is of a type that is rare or poorly represented in the region is predominantly 3b. However, some 20b does exist within the Reserve.	**Public** • the proponent acknowledges, that if some mining was allowed in area 4, it would involve some loss of structure and biodiversity (p35). Would the EPA's objective concerning these vegetation types be compromised if this occurred? • does Cable Sands recognise that after mining, the biodiversity would never be the same as before mining?	This factor will be dealt with under Floristic Community Types 3b and 20b.
Nature Conservation Values	Clearing of 6.1 hectares of native vegetation within Reserve 31900. Reserve 31900 contains EPA *Threatened or Poorly Reserved Plant Communities Requiring Interim Protection*. The Floristic Community that is of a type that is rare or poorly represented in the region is predominantly 3b. However, some 20b does exist within the Reserve.	**Public** • clearing will result in further fragmentation of the vegetation. • CALM is already proposing to include this Reserve into the Conservation Estate. The creation of this new (CALM) Reserve will create a large continuous Reserve of 52 hectares. The alternative, proposed by Cable Sands, would create an area of 42 hectares, which is not adjacent to the existing area, but is split by the South West Highway. • did Cable Sands consider that the Bunnings land (portion of Location 826) is adjacent to an air strip, degraded to the West and has heavy industry and residential areas to the North? A member of the public explained that Bunnings' are already proposing to retain Location 826 as a buffer for its new mill.	This factor will be dealt with under Floristic Community Types 3b and 20b.

FACTOR	PROPOSAL COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF RELEVANT ENVIRONMENTAL FACTORS
BIOPHYSICAL			
Floristic Community Types 3b and 20b	Clearing of 6.1 hectares of native vegetation within Reserve 31900. Reserve 31900 contains EPA *Threatened or Poorly Reserved Plant Communities Requiring Interim Protection*. The Floristic Community that is of a type that is rare or poorly represented in the region is predominantly 3b. However, some 20b does exist within the Reserve. The area is currently a "C" Class Reserve vested in the Shire of Harvey for sand extraction and rubbish disposal, however, the majority of this Reserve is remnant vegetation in good condition. The Reserve contains 19.7 hectares of land of which 6.1 hectares of native vegetation of conservation significance will be directly affected by mining. Another 6.9 hectares already disturbed will be rehabilitated.	**Government** CALM stated that: • the PER states that neither of the threatened Floristic Community Types 3b and 20b are distinctly present, but instead a continuum of the two types exists. This vegetation type has high conservation value because it is a continuum between the threatened 3b and 20b vegetation.	**Considered to be a Relevant Environmental Factor.**
Declared Rare Flora	The Reserve contains 19.7 hectares of land of which 6.1 hectares of native vegetation of conservation significance will be directly affected by mining. Another 6.9 hectares already disturbed will be rehabilitated.	**Public** • a submitter asked whether Cable Sands is proposing a more detailed spring survey to determine if Declared Rare or Priority species are present?	No Declared Rare and Priority Flora have been recorded in the proposal area. The proponent has completed the spring survey and no declared rare flora were identified. **Not considered to be a relevant factor.**
Fauna	The Reserve contains 19.7 hectares of land of which 6.1 hectares of native vegetation of conservation significance will be directly affected by mining. Another 6.9 hectares already disturbed will be rehabilitated.	**Public** • the fauna assessment conducted by W.G. Martinick & Associates should be verified for its validity. Local knowledge suggests there are more fauna species present than were found. • the split Reserve that results from this mining proposal will require macro fauna (Kangaroos etc.) to cross the highway and they are unlikely to do this. The Proposal makes little mention of these animals. There is no mention in the PER of Wallabies that roam this area.	No Declared Rare and Priority Fauna has been recorded in the proposal area. CALM advised that the proposed actions are not considered to significantly threaten fauna species present. **Not considered to be a relevant factor.**

FACTOR	PROPOSAL COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF RELEVANT ENVIRONMENTAL FACTORS
Specially Protected (Threatened) and Priority Fauna	The Reserve contains 19.7 hectares of land of which 6.1 hectares of native vegetation of conservation significance will be directly affected by mining. Another 6.9 hectares already disturbed will be rehabilitated.	No comments received.	No Declared Rare and Priority Fauna has been recorded in the proposal area. CALM has advised that there is no Specially Protected (Threatened) and Priority Fauna in Reserve 31900. **Not considered to be a relevant factor.**
Landform	The relocation of the rubbish tip and the mining void will impact on the landform of the local area.	No comments received.	The landform factor warrants further evaluation and is dealt with under the factor rehabilitation.
Rehabilitation	Clearing of 6.1 hectares of native vegetation within Reserve 31900. Reserve 31900 contains EPA *Threatened or Poorly Reserved Plant Communities Requiring Interim Protection*. The Floristic Community that is of a type that is rare or poorly represented in the region is predominantly 3b. However, some 20b does exist within the Reserve. The Reserve contains 19.7 hectares of land of which 6.1 hectares of native vegetation of conservation significance will be directly affected by mining. Another 6.9 hectares already disturbed will be rehabilitated. The rehabilitation of 6.1 hectares of native vegetation in the area that will be disturbed may not adequately replace existing remnant vegetation found within Reserve 31900.	**Government** The DEP indicated that: • the duration of the rehabilitation, maintenance and monitoring programmes implied in the PER are not long enough to ensure the area will be satisfactorily rehabilitated. **Public** • the rehabilitation techniques proposed which suggest the site can be rehabilitated, do not take into account the recalcitrant (difficult) nature of the plant species. • for seed collection to be appropriate, it must occur over a minimum of at least one-year to enable collection of the full range of species present in the area. • does the rehabilitation programme for the Bunnings land (proposed land swap) include fencing to keep out cattle? In addition, will the Bunnings land be included in the weed control programme and rehabilitation proposed for Reserve 31900? • the area to the east of the Rubbish Tip has large numbers of mature She- Oaks and this area should not be mined.	**Considered to be a Relevant Environmental Factor.**

FACTOR	PROPOSAL COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF RELEVANT ENVIRONMENTAL FACTORS
POLLUTION			
Dust	Clearing, mining activities, and heavy mineral concentrate stockpiles will give rise to dust issues. Mining activities will increase ambient dust levels. Nearest resident is 650 metres away.	**Public** • the dust from the current operations already impacts on nearby residents. • the strong easterly winds during the summer months will cause problems with dust. This has occurred at the current operations. • the mining operations are creating large amounts of dust which deposit on the surrounding farms and facilities.	Dust management is addressed by the proponent in Commitments 14 and 15. Subject to DEP requirements under Part V of the *Environmental Protection Act 1986* and the Department of Minerals and Energy requirements. There has been 1 formal dust complaint since commencement of the mining operations at Yarloop in 1997. **Factor can be managed through Part V process and does not warrant further evaluation by EPA.**
Greenhouse gases	Emissions of carbon dioxide, a greenhouse gas, would potentially result from activities such as internal combustion engines in mining equipment and vehicles and the clearing and subsequent decomposition of vegetation and soil organic matter.	**Government** The DEP notes that: • the proponent has committed, through energy efficiency measures, to reduce as far as is practicable greenhouse gas emissions.	The proponent is committed to reducing greenhouse gases. Total emissions are small. **Further evaluation by the EPA is not warranted.**
Radiation	Mining of heavy mineral concentrate will remove the majority of the elements contributing to the current background levels of gamma radiation.	No comments received.	The proponent is required to meet the statutory obligations of the *Radiation Safety Act 1975, Radiation Safety (General Regulations 1983, Mine Safety and Inspection Act 1994* and the *Explosives and Dangerous Goods Act 1961.* **Further evaluation by the EPA is not warranted.**

FACTOR	PROPOSAL COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF RELEVANT ENVIRONMENTAL FACTORS
Groundwater	Mining and processing activities, which require water abstraction may lead to drawdown of the water table in the vicinity of the mine.	**Government** The Water and Rivers Commission indicated that: • the PER identifies that the mine will be supplied with water from the existing Brockman Road borefield. Other groundwater users are already experiencing problems with bores drying up and increased salinity levels. Groundwater abstraction from the borefield was to be from the deeper semi confined Leederville Formation aquifer; and • Cable Sands extract a considerable volume of groundwater and this is currently under investigation by the WRC. Given that Cable Sands is currently only drawing half their forecasted water, have they confirmed if they have recorded increasing salinity levels in the production bores even before the full abstraction rate is achieved? **Public** • a submitter asked whether the slimes (clay and silt fraction) dams are going to be located on the old rubbish disposal site and hence contribute to leaching of contaminants into the water table.	**Considered to be a Relevant Environmental Factor.**
Noise	Mining activities will increase ambient noise levels. The nearest residence is 650 metres away.	**Government** The Department of Minerals and Energy: • the results of more recent noise modeling and monitoring were not included in the PER. **Public** • Cable Sands indicate that they will comply with the appropriate noise regulations. Are Cable Sands going to apply for a noise regulations exemption? • noise from the current operations already affects nearby residents. How will Cable Sands ensure that noise will not get any worse as a result of this mining project proceeding?	**Considered to be a Relevant Environmental Factor.**
SOCIAL SURROUNDINGS			
Visual Amenity	The visual amenity from the South West Highway and surrounding neighbours may be temporarily disrupted by clearing and mining.	**Public** • a submitter indicated that the Shire of Harvey District Planning Scheme recommends that for the area generally between the South West Highway and the Darling Scarp, that mining should be discouraged, clearing restricted and important landscape features placed in Reserves. The existing mining operations in Benger and Yarloop demonstrate that mining impacts the visual amenity. • Reserve 31900 has mature dense Jarrah and She-Oak of great beauty. This contributes significantly to the landscape value of Yarloop and the South West Highway.	Visual amenity is addressed by the proponent in Commitment number 21. Clearing will be buffered from the South West Highway by existing remnant vegetation. **Further evaluation by the EPA is not warranted.**

FACTOR	PROPOSAL COMPONENT WITH POSSIBLE IMPACT	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF RELEVANT ENVIRONMENTAL FACTORS
Aboriginal Culture and Heritage	Clearing and mining operations at the minesite may destroy unknown sites unless a survey outlines their locations and suggests strategies to avoid them or minimise impacts.	**Government** The Aboriginal Affairs Department (AAD) stated that: • it is recommended that the proponent undertakes an Aboriginal Heritage Survey and consult with the local Aboriginal community. • if skeletal remains or an Aboriginal site are unearthed, the AAD should be informed immediately rather than the Department of Minerals and Energy. Cable Sands should also contact the Police Service and the local Aboriginal Community.	**Considered to be a Relevant Environmental Factor.**
OTHER			
Rubbish Tip and existing sand extraction areas	The relocation of the rubbish tip within Reserve 31900, the impact from seepage into the groundwater and the potential for contamination when moving the rubbish.	**Government** The Water and Rivers Commission stated that: • if the proposal results in digging up of rubbish that has already been buried at the tip site, the disturbance and re-burying of this material may result in chemicals and other contaminants leaching more freely into the water table.	**Considered to be a Relevant Environmental Factor.**
Community Consultation	Mining and associated impacts on the surrounding land users and key stakeholder groups.	**Public** • there does not seem to have been very much community consultation on the proposal or its resulting impacts. • the PER states that community consultation to the wider community will occur when on site operations begin. Why does Cable Sands consider that this is an appropriate time to inform the general public?	Two groups have been established by the company to foster community consultation. **Further evaluation by the EPA is not warranted.**
Transport	Transport of raw materials and products impact on surrounding land users, the key stakeholder groups and South West Highway.	**Public** • the PER details truck movements along the highway and concludes, based on Cable Sands own report, that the number of trucks using the Highway is insignificant. • the safety and health of children is of paramount importance. The increase in trucks entering and leaving the minesite will increase the danger to children using this section of the highway and to everyone else.	The proponent will utilise the existing transport route for the existing operations. No increase in truck movements is proposed. **Further evaluation by the EPA is not warranted.**

Table 3. Summary of Assessment of Relevant Environmental Factors

RELEVANT FACTOR	RELEVANT AREA	EPA OBJECTIVES	EPA ASSESSMENT	EPA ADVICE
Floristic Community Types 3b and 20b	Remnant vegetation communities in Reserve 31900.	Maintain the abundance, species diversity, geographic distribution and productivity of Floristic Community Types 3b and 20b.	The EPA considers that the proponent has provided sufficient information at this stage on the vegetation communities with additional vegetation surveys. The EPA notes that Floristic Community Type 20b is more restricted overall than Community Type 3b. In addition to the Bunnings land swap area which contains predominantly Community Type 20b, the following additional commitments have been made by the proponent. ***Proponent's Commitments:*** • *Locate infrastructure for mining and primary processing on cleared land outside Reserve 31900 (Commitment 3).* • *Donate a portion of Location 826 (9 hectares) for incorporation into the conservation estate (Commitment 4).* • *Maintain vegetation clearing to a practical minimum (Commitment 7).* • *Fence areas of Reserves A23307 and 31901 to restrict access (Commitment 5).* • *Retain and fence the area of overstorey on Loc 816 immediately east of the Reserve and facilitate growth of native understorey species (Commitment 6).* • *Retain a strip of native vegetation along the northern boundary of Reserve 31900 for a fauna corridor (Commitment 11).*	Having particular regard to: • the limited extent of clearing (6.1 hectares) of the vulnerable Community Type 3b within Reserve 31900; • the "land swap" arrangement, would result in securing of 9 hectares of land which includes the endangered Community Type 20b for conservation purposes; • the proponent installing fencing around Reserve 31900, the two adjoining Reserves (31901 and A23307) and around the "land swap" area (portion of Location 826) to assist in their management; and • the proponent rehabilitating presently degraded portions of Reserve 31900 (6.9 hectares), along with areas to be disturbed by mining (6.1 hectares), it is the EPA's opinion that, on balance, the proposal would result in a net environmental gain, and can therefore be managed so that the EPA's objective for this factor is not unduly compromised, provided that the contract of sale for the portion of Location 826 is implemented, and arrangements put in place for donation of the land to the NPNCA, before mining commences within Reserve 31900.
Rubbish Tip and sand extraction areas	Existing disturbed area and groundwater beneath the active rubbish tip.	To maintain the quality and quantity of groundwater so that existing and potential uses, including ecosystem maintenance, are protected.	The EPA considers that the proponent has provided sufficient information on the general approach to re-location and decommissioning of the existing rubbish tip to manage the risk to groundwater resources, including provision of a clay capping.	Having particular regard to: • the advice of the WRC regarding the limited vulnerability to groundwater contamination in the area; • the clayey nature of soils in the area, and the depth to groundwater; and • the potential to improve management of the rubbish by capping it with a liner, it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's environmental objective for this factor provided that a condition is imposed requiring the proponent to prepare a Rubbish Tip Decommissioning Plan before commencing ground-disturbing activities (refer draft condition 5).

RELEVANT FACTOR	RELEVANT AREA	EPA OBJECTIVES	EPA ASSESSMENT	
Rehabilitation	Disturbed areas in Reserve 31900.	Ensure proposal area, and any other area affected by the proposal, is rehabilitated to a standard consistent with the biodiversity and floristic values of Reserve 31900.	The EPA notes that the incorporation of the slime by-product into the soil profile will enhance soil productivity. This has the potential to improve the moisture retention, soil stability and fertility of the soil. This will also enable efficient use of the slime by-product and minimise the need to have additional slimes dams. ***Proponent's Commitments:*** • *Preserve as much seed and plant material as practical for rehabilitation (Commitment 9).* • *Rehabilitate unmined degraded areas in Reserve 31900 west of the mining areas (Commitment 10).*	Having particular regard to: • the intended future inclusion of Reserve 31900 in the Conservation Estate; • the proponent's commitments to rehabilitate (using local native plant species) the areas mined and already disturbed within Reserve 31900, and additional areas of the Reserve which have been identified as degraded (Commitment 10); and • the Mining Act requirement for a rehabilitation bond to be provided by the proponent which cannot be released until such time as the area is satisfactorily rehabilitated, it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's environmental objective for rehabilitation, provided that a condition is imposed requiring the proponent to prepare a Mining and Rehabilitation Plan containing the components discussed above to the requirements of the EPA, on advice from CALM, the DEP, DME and WRC. Some components of the MRP including the baseline vegetation survey and the mining strategy are to be completed before commencing ground-disturbing activities. Other components are to be completed within 12 months of commencing ground-disturbing activities (refer draft condition 4).

RELEVANT FACTOR	RELEVANT AREA	EPA OBJECTIVES	EPA ASSESSMENT	
Groundwater	Groundwater within Reserve 31900, including the underlying groundwater.	To maintain the quality and quantity of groundwater so that existing and potential uses, including ecosystem maintenance, are protected.	The EPA is aware that the WRC has received complaints from Yarloop and Cookernup residents about impacts on the quality and quantity of groundwater in their domestic bores. The WRC has been working with the proponent to resolve these issues. As a result of these discussions, the EPA understands that the proponent undertook a groundwater testing programme to evaluate impacts of abstraction on groundwater in the surrounding area (W. Tingey, pers. comm., 22 June 1999). The WRC has advised that the results of these investigations were inconclusive. However, as a result of these investigations the WRC has set up working arrangements with the proponent to resolve the residents' water concerns. These working arrangements include ongoing liaison with the affected local residents. The WRC has indicated that the groundwater area will be proclaimed under the *Rights in Water and Irrigation Act 1914* to ensure the groundwater users in the area are protected. ***Proponent's Commitments*** *Development and implementation of a groundwater management plan to the satisfaction of the Water and Rivers Commission and the DEP (Commitments 17 and 18).*	Having particular regard to: • the proponent's commitment to prepare a Groundwater Management Plan for the Yarloop Mine site; and • WRC's current actions to manage groundwater and its intention to proclaim the area under the *Rights in Water and Irrigation Act 1914*, it is the EPA's opinion that the proposal is capable of meeting the EPA's objective for groundwater.

RELEVANT FACTOR	RELEVANT AREA	EPA OBJECTIVES	EPA ASSESSMENT	
Noise	Area surrounding Reserve 31900 which includes nearby residences.	Ensuring that noise impacts emanating from the proposal comply with statutory requirements and acceptable standards.	The EPA considers that the proponent has provided sufficient information on the noise issue and has proposed additional management strategies. There has been a formal complaint about noise levels from the existing operation. ***Proponent's Commitments*** • *develop and implement a Noise Management Plan for the Yarloop Mine, including Reserve 31900 to the satisfaction of the DEP (Commitment 12 and 13);* • *restrict earthmoving operations at night within the pit to a practical minimum (Commitment 13);* • *replace reversing beepers with flashing lights at night (Commitment 13);* • *fit acoustic exhaust mufflers to all earth moving machinery, as required (Commitment 13); and* • *construct noise reducing bunding where appropriate (Commitment 13).*	Having particular regard to: • the commitment by the proponent to develop and implement a Noise Management Plan for the Yarloop Mining area, including Reserve 31900, to cover both the existing operations and the proposed operations; • the existing operations now being managed to meet the Noise Regulations; • the proposed operations being of a similar nature and further away from noise sensitive premises (residences); and • the proposed operations can therefore be managed to meet the Noise Regulations, it is the EPA's opinion that the proposal is unlikely to compromise the EPA's environmental objective for noise.
Aboriginal Culture and Heritage	The areas within Reserve 31900 to be cleared and mined or otherwise excavated.	To ensure that the proposal complies with the requirements of the *Aboriginal Heritage Act 1972* and ensure that changes to the biological and physical environment resulting from the project do not adversely affect cultural associations with the area.	***Proponent's Commitments*** • *The proponent has committed to undertaking an Aboriginal Heritage survey prior to mining in the reserve.* • *Cease production in any area where Aboriginal sites are discovered and consult with DME and the Department of Aboriginal Affairs.*	Having particular regard to: • the commitments made by the proponent; • the *Aboriginal Heritage Act 1972*; and • an Aboriginal Archaeological and Ethnographic survey being undertaken, it is the EPA's opinion that the proposal is capable of meeting the EPA's objective in regard to Aboriginal culture and heritage.

- following mining, the proponent will rehabilitate all disturbed areas of Reserve 31900 (including the rubbish tip and existing sand pit) with local native plants. The proponent will also develop and implement a weed control plan in Reserve 31900; and

- the proponent will install fencing around Reserve 31900, the two adjoining Reserves (31901 and A23307) and around the portion of Location 826 to be donated as a "land swap".

Submissions on the PER

Issues raised in submissions on the present proposal included concerns that the proposed clearing would result in fragmentation of the vegetation, threaten the survival of important ecological communities and result in a loss of many species from the area. Other comments were that the proposed "land swap" area is not of comparable conservation value to the area to be mined, and is quite disturbed with tracks, weed invasion and in some places mill waste.

Additional comments raised in the submissions included:

- the proponent acknowledges, that if some mining was allowed in area 4, it would involve some loss of structure and biodiversity (p35). Would the EPA's objective concerning these vegetation types be compromised if this occurred?

- does Cable Sands recognise that after mining, the biodiversity would never be the same as before mining? and

- CALM indicated support for the portion of Location 826 being added to the Conservation Estate.

Assessment

The area considered for assessment of this relevant environmental factor is the Forrestfield Vegetation Complex (Figure 5), which coincides with the Ridge Hill Shelf landform (Department of Conservation and Environment, 1980).

The EPA's environmental objective for this factor is to ensure that the species diversity and abundance, geographic distribution and productivity of Floristic Community Types 3b and 20b are maintained.

The EPA estimates that, for the Forrestfield Complex as a whole, 92-98% of the original bushland has been cleared. For Floristic Community Types 3b and 20b, between 2-8% of the original area in the Forrestfield Complex remains. The largest remaining area of good quality Community Types 3b and 20b is located in Reserve 31900 and the adjacent Reserves 31901 and A22307 (Figure 4). These Reserves taken together have been recognised by the EPA as a "*threatened or poorly reserved plant community requiring interim protection*" (EPA, 1994).

A recent detailed assessment commissioned by Environment Australia and CALM (English and Blyth 1997) identified Community Type 3b as "vulnerable"[1] and Community Type 20b as "endangered"[2].

Reserve 31900 is presently vested in the Shire of Harvey for rubbish disposal and sand extraction. Reserve 31901 is vested with Main Roads Western Australia for sand extraction and Reserve A22307 is unvested for the purpose of National Park.

---

[1] An ecological community is classified as *vulnerable* if it is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community which is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range (English and Blyth 1997).

[2] An ecological community is classified as *endangered* if it is found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future (English and Blyth 1997).

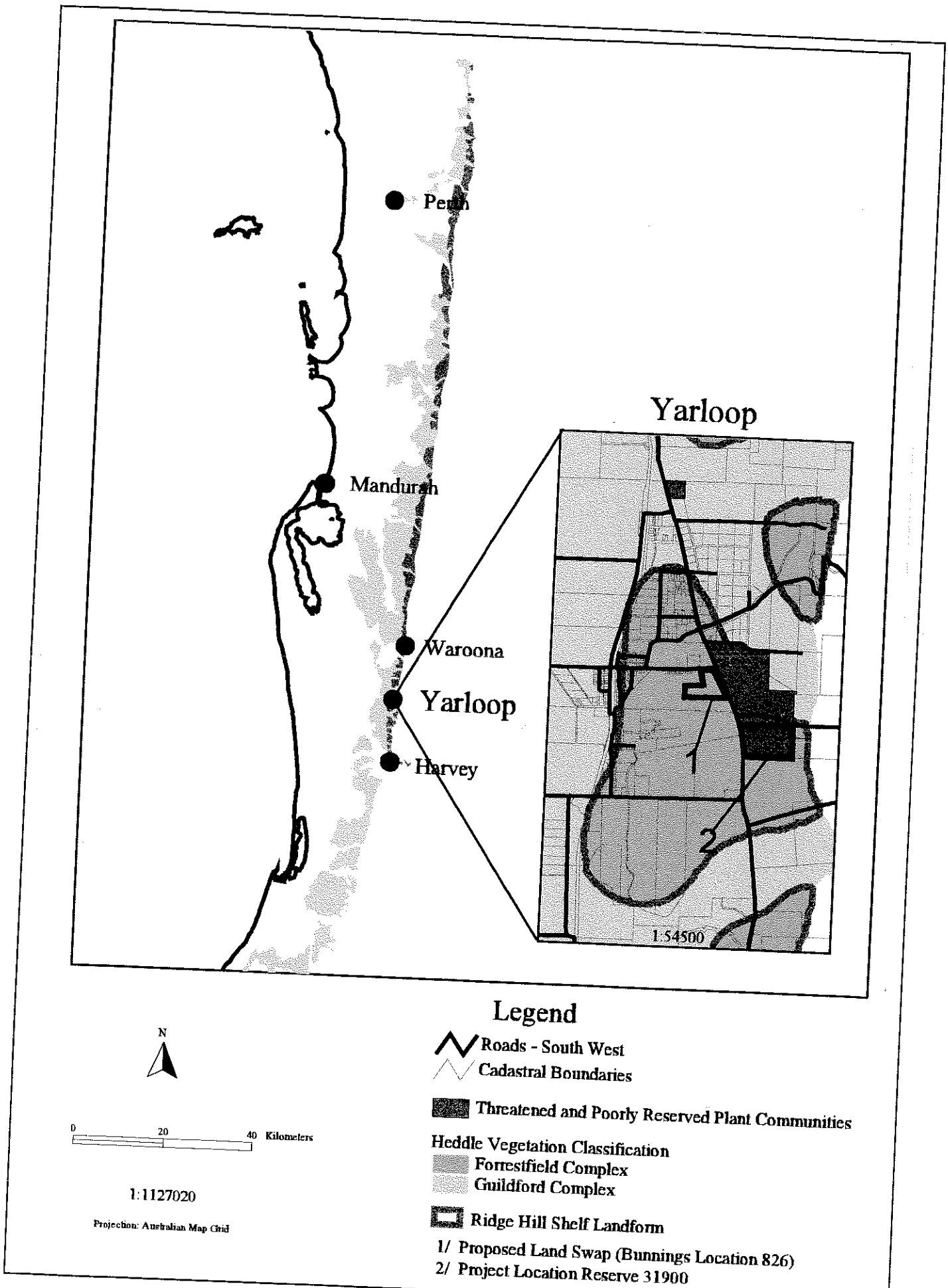

Figure 5. Yarloop and the Forrestfield and Guildford Vegetation Complexes.

The remnant vegetation within Reserve 31900, which occupies 65% (13 hectares) of the Reserve area, will continue to deteriorate if it is not managed effectively. The viability of the remnant native vegetation is threatened in the long-term because the present management of the site has allowed rubbish dumping and sand extraction which has lead to the spread of invasive weeds. Uncontrolled firewood collection also occurs in the Reserve. With uncontrolled public access there is also a risk of fire and spread of dieback. The adjacent Reserves and the remnant bushland on private land are similarly threatened by uncontrolled public access.

The EPA is aware that the proposed System 6 update outside the Perth Metropolitan Area will identify the significance of Reserve 31900 and recommend its protection and management. Such management needs to include measures to protect remnant bushland from progressive degradation through waste dumping, firewood collection, sand extraction, grazing, burning, spread of dieback and invasion by weeds.

An earlier proposal from Cable Sands for mining in this area, without any compensatory land swap, was assessed by the EPA in Bulletin 838 (EPA, 1996). At that time, the EPA determined that the removal of 6 hectares of Floristic Community Type 3b in Reserve 31900 would compromise its objective to ensure that the species diversity and abundance, geographic distribution and productivity of the Floristic Community Types 3b and 20b are protected. The EPA therefore concluded that mining should not take place in the Reserve.

In regard to the present proposal, the EPA notes that, while 6.1 hectares of predominantly Floristic Community Type 3b would be destroyed, the proposal would result in the inclusion of land (9 hectares) into the Conservation Estate from Location 826 as a "land swap". The "land swap" area is located on the opposite side of South West Highway (Figure 4). This would not provide for direct replacement of the conservation values to be lost because the vegetation to be cleared for mining would be predominantly Type 3b, while the "land swap" area contains Type 20b. The EPA notes while both these Floristic Community Types are of high conservation significance, Community Type 20b is classified as "endangered" and is therefore rarer than the Community Type 3b vegetation which is classified as "vulnerable" and which would be lost.

The EPA also notes the concerns expressed in submissions regarding the condition of remnant vegetation in the "land swap" area. A report commissioned by Cable Sands found that most of the bushland on the Bunnings land is in good condition with only a few areas of weeds along tracks and firebreaks. However, there are also a few pits dug and piles of cut timber, mainly in the central area of the land (Mattiske, 1998). Despite these impacts, CALM has advised that the land should be vested in the NPNCA as an "A" Class Nature Reserve. The EPA considers that the condition of the vegetation on the land is of a standard which clearly warrants inclusion in the Conservation Estate and that fencing of the land and vesting it in the NPNCA, should enhance its condition with time.

A summary of the net environmental losses and gains is provided in Section 4.

Summary

Having particular regard to:

(a) the limited extent of clearing (6.1 hectares) of the vulnerable Community Type 3b within Reserve 31900;

(b) the "land swap" arrangement, would result in securing of 9 hectares of land which includes the endangered Community Type 20b for conservation purposes;

(c) the proponent installing fencing around Reserve 31900, the two adjoining Reserves (31901 and A23307) and around the "land swap" area (portion of Location 826) to assist in their management; and

(d) the proponent rehabilitating presently degraded portions of Reserve 31900 (6.9 hectares), along with areas to be disturbed by mining (6.1 hectares),

it is the EPA's opinion that, on balance, the proposal would result in a net environmental gain, and can therefore be managed so that the EPA's objective for this factor is not unduly compromised, provided that the contract of sale for the portion of Location 826 is implemented,

and arrangements put in place for donation of the land to the NPNCA, before mining commences within Reserve 31900.

3.2 Rubbish tip and existing sand extraction area

Description

Mining activities as part of the present proposal, will include most of the area of the existing rubbish tip. Before mining, Cable Sands proposes to excavate 90% of the contents of the existing rubbish tip and re-bury it in the sand excavation area within Reserve 31900 (Figure 6). On completion of mining, all disturbed areas will be rehabilitated with local native plants.

Reserve 31900 is vested in the Shire of Harvey for sand extraction and rubbish disposal. The rubbish tip and sand excavation areas are located within two areas of Reserve 31900 (Figure 3):

- **Area 2** - degraded land previously used for sand extraction, covering an area of 3.9 hectares which is operated by the Shire of Harvey to serve the Yarloop community; and

- **Area 3** - degraded land previously used for rubbish disposal, covering an area of 3.0 hectares in the centre of the Reserve.

There are approximately 3000 cubic metres of waste located within the rubbish tip area (C. Lockwood, Shire of Harvey, pers. comm., 23 April 1999). The rubbish tip waste is likely to have a wide variety of materials including motor vehicles, general household waste, garden clippings and farm animal carcasses. There are also large items of rubbish (eg concrete house slabs) currently lying on the periphery of both the rubbish tip and sand excavation sites.

Submissions on the PER

The Water and Rivers Commission (WRC) provided the following comment:

- if the proposal results in digging up of rubbish that has already been buried at the tip site, the disturbance and re-burying of this material may allow chemicals and other contaminants to leach more freely into the water table.

Assessment

The area considered for assessment of this factor is the existing disturbed area and groundwater beneath the active rubbish tip.

The EPA's environmental objective for this factor is to maintain the quality and quantity of groundwater so that existing and potential uses, including ecosystem maintenance, are protected.

The EPA in its assessment of Cable Sands' previous proposal recommended that the Shire of Harvey decommission the existing rubbish tip and establish an alternative site outside Reserve 31900 for rubbish disposal and sand excavation purposes to ensure protection of the significant conservation values of Reserve 31900 (EPA, 1996).

With regard to the current proposal, the EPA notes that it provides an opportunity to apply resources for rehabilitation and management to already disturbed areas (6.9 hectares) in the Reserve. Areas 2 and 3 within the rubbish tip are currently degraded to varying degrees by present and past activities (such as loss of vegetation, excavation, dumping, introduction of weeds and possible groundwater contamination), associated with the rubbish tip and sand excavation. As such this has reduced the overall conservation value of the Reserve and is a major threat to the remaining vegetated portions.

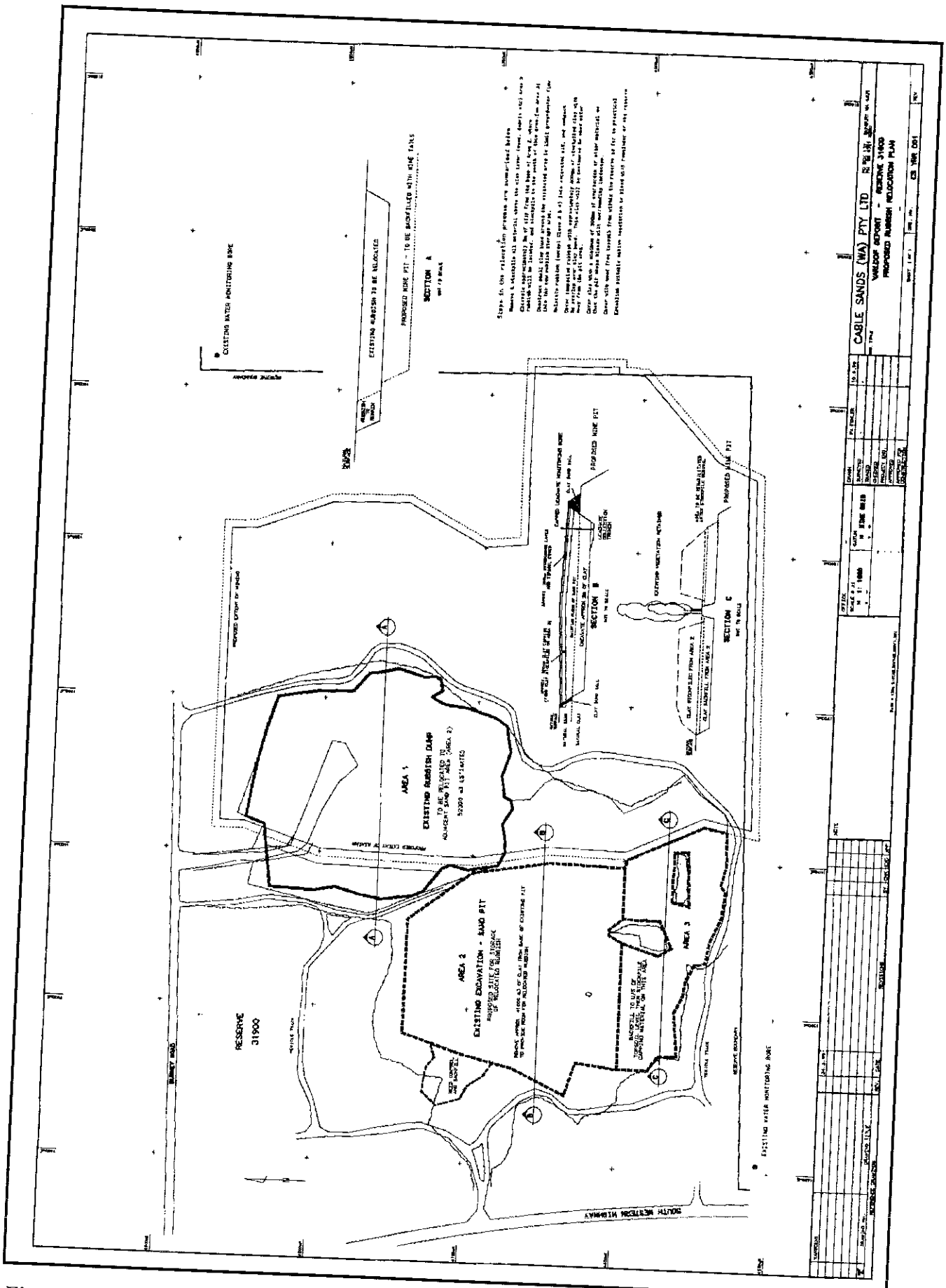

Figure 6. Yarloop Rubbish Tip relocation within Reserve 31900.

Reserve 31900 is located in a region which is designated by the WRC as having moderate vulnerability to groundwater contamination. The soils in the area are generally clayey.

The DEP provided advice that the rubbish could be re-located within the Reserve without undue risk to groundwater resources provided that adequate separation was maintained between the rubbish and the highest groundwater level, and the rubbish was capped with a liner to control infiltration.

Cable Sands has carried out investigations which have indicated that the area where the rubbish is to be re-located is underlain by soils which are of a clayey nature, and the depth to groundwater is greater than 4 metres. This will provide adequate separation to groundwater in accordance with the DEP's draft *Code of Practice for Rural Landfill Management* (DEP, 1996).

Cable Sands intends to cap the rubbish with a clay liner formed from clay obtained on-site. The DEP normally requires that clay capping achieves a permeability of less than 10^{-9}m/sec to adequately control infiltration and leachate generation. If the clays obtained on-site cannot be worked to achieve this permeability, then they will need to be amended, or additional clay imported, to achieve a sufficiently low permeability.

Cable Sands intends to inspect the rubbish as it is excavated and if any Class III or Class IV wastes are identified they will be transferred to an appropriate licensed landfill site. This would need to be made a condition of any approval to relocate the rubbish.

The EPA considers that in view of the extent of disturbance of the existing rubbish which is required, all of the rubbish, not just the 90% affected by mining, should be relocated to the new area and capped with the liner. This would reduce the potential for ongoing leachate from the site.

The EPA therefore recommends that if the rubbish is to be relocated on the Reserve, it should be in accordance with a management plan prepared to the requirements of the EPA on the advice of the DEP and WRC. The following key elements should be addressed in the plan:

- type and permeability of underlying soils;
- separation distance to groundwater;
- capping material and permeability; and
- inspection on disposal of any Class III and IV wastes.

Summary

Having particular regard to:

(a) the advice of the WRC regarding the limited vulnerability to groundwater contamination in the area;

(b) the clayey nature of soils in the area, and the depth to groundwater; and

(c) the potential to improve management of the rubbish by capping it with a liner,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor provided that a condition is imposed requiring the proponent to prepare a Rubbish Tip Decommissioning Plan before commencing ground-disturbing activities (refer draft condition 5).

3.3 Rehabilitation

Description

Reserve 31900 has a total area of 19.7 hectares. The proposal will result in mining of 6.1 hectares of native vegetation which when added to the existing areas of disturbance to be mined and or rehabilitated will result in disturbance to 13 hectares (65%) of the Reserve. The area to be mined includes 6.1 hectares of native vegetation of conservation significance and 3.0

hectares of degraded native vegetation in the centre of the Reserve that was used for sand extraction and rubbish disposal. An additional 3.9 hectares that has also been used for sand extraction and rubbish disposal will be disturbed (but not mined) to re-locate the rubbish tip (Figure 3). Section 3.1 includes a description of the vegetation communities. Mining of the rubbish disposal areas is discussed in Section 3.2.

Following completion of mining, the proponent proposes to rehabilitate all disturbed parts of Reserve 31900. The rehabilitation programme will revegetate the areas disturbed or mined, and will be extended to existing areas of vegetation that will not be mined, but have been identified by the proponent as degraded. The proponent would develop a Mining and Rehabilitation Plan (MRP) in consultation with CALM. The plan will specify the rehabilitation objectives for Reserve 31900 and provide details of the rehabilitation techniques, the monitoring programme and performance criteria for rehabilitated areas.

The mining operations will be subject to the requirements of the *Mining Act 1978* (Mining Act) with respect to mining and rehabilitation. The Mining Act will require the proponent to submit a rehabilitation bond that is calculated on the amount of area disturbed by the mine. The bond is held by the Department of Minerals and Energy (DME) until such time as the area is satisfactorily rehabilitated.

Submissions on the PER

Issues raised in public submissions included concerns that a large number of mature sheoaks to the east of the rubbish tip would be removed and that the proposed rehabilitation and monitoring programmes are not long enough to ensure that the mined areas will be satisfactorily rehabilitated. Submitters also felt that the rehabilitation techniques proposed by the proponent do not take into account the difficulties that may be encountered propagating and regenerating many of the plant species found in Reserve 31900 and that the proposed seed collection programme should occur over at least a one year period to enable the full variety of species to be collected.

Other submissions expressed a view that the proponent should extend the rehabilitation and weed control programme to include the proposed "land swap" area (Location 826).

Assessment

The area considered for assessment of this factor is the disturbed areas in Reserve 31900.

The EPA's environmental objective for this factor is to ensure the proposal area, and any other area affected by the proposal, is rehabilitated to a standard consistent with the biodiversity and floristic values of Reserve 31900.

Reserve 31900 is currently vested with the Shire of Harvey. The EPA notes that CALM has advised that Reserve 31900 is intended, in the long-term, to be incorporated into the Conservation Estate along with Reserves A23307 and 31901 which are adjacent to Reserve 31900. In the future, the amalgamation of these Reserves will form a larger contiguous Reserve vested in the NPNCA and managed by CALM.

The EPA notes that in addition to rehabilitation of the areas directly affected by this proposal, the proponent will also rehabilitate areas of degraded native vegetation within the Reserve.

The EPA is aware that the proponent has previous experience rehabilitating a range of environments. However, it is also important to note that the company has limited experience rehabilitating bushland in this particular environment.

Reserve 31900 contains vegetation communities of conservation significance (refer section 3.1). The vegetation communities found in the Reserve are a combination of taxa and it is this association that makes the vegetation communities unique. Rehabilitation of Reserve 31900 for eventual inclusion in the Conservation Estate requires rehabilitation to the highest possible standard.

The EPA notes that the proponent has committed to developing and implementing a MRP that would specify the rehabilitation objectives for Reserve 31900 and provide details of the rehabilitation techniques, the monitoring programme and completion criteria for rehabilitated areas. The EPA considers that development of this plan is fundamental to the success of the rehabilitation programme and so has recommended that the requirement to develop the MRP is included as a condition (refer draft condition 4).

In considering the proponent's commitment to development of this plan, the EPA notes that the measure of success of the proponent's rehabilitation is dependent on development of performance criteria that reflect the values of the vegetation of Reserve 31900. Additional quantitative base-line vegetation data is required upon which to formulate performance criteria for rehabilitated areas.

The EPA therefore recommends, that as part of the MRP, the proponent develop and implement a baseline vegetation survey to the satisfaction of the EPA in consultation with CALM, DEP and DME prior to ground-disturbing activities which provides data suited to setting performance criteria for rehabilitation. The proponent will then be required to develop performance criteria based upon the results of the baseline survey. Performance criteria will be to the satisfaction of the EPA and will be developed in consultation with CALM, DEP and DME.

The MRP should also specify the rehabilitation techniques to be applied by the proponent in Reserve 31900. These techniques, to be developed in consultation with CALM, DEP and DME, will be required to reflect 'best practice' rehabilitation. The EPA is aware that current best practice in the mineral sands industry utilises direct return of topsoil to mined areas to maximise the potential for rehabilitation success. This can, and is being achieved by the industry, through careful mine planning and integration of the mining and rehabilitation programmes. To ensure that best practice rehabilitation is conducted by the proponent, the EPA has also recommended that the proponent be required to submit a mining strategy in the MRP. The mining strategy will outline the sequence of mining and rehabilitation events to ensure that opportunities for direct return of topsoil are maximised.

The EPA notes that vegetation communities found in this area result from a combination of physical, biological and environmental factors. In this environment, with its relatively deep water table, the success of rehabilitation is likely to be critically dependent on re-establishing the soil profile and the groundwater hydrology. In particular, the EPA considers that the moisture-retention capacity of the soil is important. The EPA expects that re-establishment of soil profiles and the local groundwater hydrology will also be addressed in the MRP to the satisfaction of the EPA on advice from CALM, DEP, DME and WRC.

In response to concerns raised in the public submissions about propagating and regenerating plant species, the proponent has indicated that rehabilitation will involve a range of techniques to ensure regeneration of as many species as possible back into rehabilitation areas. This will include techniques to encourage genotypic and species diversity such as direct seeding, planting, application of smoke treatment, and translocation of difficult species and understorey species. Seeds and vegetative material used in rehabilitation of the Reserve will be collected by licensed operators from areas in the vicinity to ensure the propagation of native plants of local provenance. These techniques will be detailed in the MRP.

The EPA further notes that dieback (*Phytophthora spp.*) is present in Reserve 31900. The EPA expects that the proponent's MRP would include an appropriate dieback management strategy for Reserve 31900. Consideration should be given to using dieback resistant stock when planting Jarrah trees in rehabilitation areas.

The proponent in its response to the concerns raised in the public submissions about the removal of mature sheoaks has indicated that approximately 25 percent of the area east of the existing rubbish tip in Reserve 31900 will remain undisturbed. The EPA notes that the rehabilitation strategy will address the creation of a range of habitat for fauna and the recruitment of trees to reflect the relative dominance of this and other species that existed prior to mining.

Location 826 will be fenced as part of the proponent's commitments but will otherwise remain un-rehabilitated. Public submissions expressed a view that the proponent should be required to extend the weed control programme and rehabilitation programme to include Location 826. Should mining proceed, this location will be vested in the NPNCA and will be managed by CALM. The EPA notes that management of this location will be the responsibility of the vested authority.

In conclusion, the development and implementation of an MRP that incorporates the recommendations of the EPA to:

- develop and implement a pre-mining baseline vegetation survey suited to setting performance criteria;
- develop and implement performance criteria for rehabilitated areas linked to the baseline vegetation survey;
- develop and implement a mining strategy that integrates the mining and rehabilitation schedules, and amongst other things, maximises the use of directly returned topsoil; and
- develop and detail best practice rehabilitation techniques,

can ensure that the mined area is rehabilitated to a standard consistent with the surrounding vegetation communities found in Reserve 31900. In particular, the development of performance criteria for rehabilitated areas based upon specific data from the pre-mining vegetation communities present in Reserve 31900 will ensure that the proponent retains responsibility for the area until such time as the performance criteria are met and the area is satisfactorily rehabilitated. Until the proponent has achieved the rehabilitation objective, the DME will retain the rehabilitation bond imposed under the requirements of the Mining Act.

Summary

Having particular regard to:

(a) the intended future inclusion of Reserve 31900 in the Conservation Estate;

(b) the proponent's commitments to rehabilitate (using local native plant species) the areas mined and already disturbed within Reserve 31900, and additional areas of the Reserve which have been identified as degraded (Commitment 10); and

(c) the Mining Act requirement for a rehabilitation bond to be provided by the proponent which cannot be released until such time as the area is satisfactorily rehabilitated,

it is the EPA's opinion that the proposal is capable of being managed to meet the EPA's environmental objective for rehabilitation, provided that a condition is imposed requiring the proponent to prepare a Mining and Rehabilitation Plan containing the components discussed above to the requirements of the EPA, on advice from CALM, the DEP, DME and WRC. Some components of the MRP including the base-line vegetation survey and the mining strategy are to be completed before commencing ground-disturbing activities. Other components are to be completed within 12 months of commencing ground-disturbing activities (refer draft condition 4).

3.4 Groundwater

Description

The proponent indicates in the PER document that the proposal to mine within Reserve 31900 requires approximately 800 megalitres of water annually for processing purposes and dust control. This is a continuation of the existing operation's water supply rate.

The proponent would obtain the majority (approximately 70%) of its water requirements from the existing groundwater bores, which are located on Brockman Road approximately 4 km west of the mine site (Figure 7). Water would also be obtained from the nearby Waterous Formation

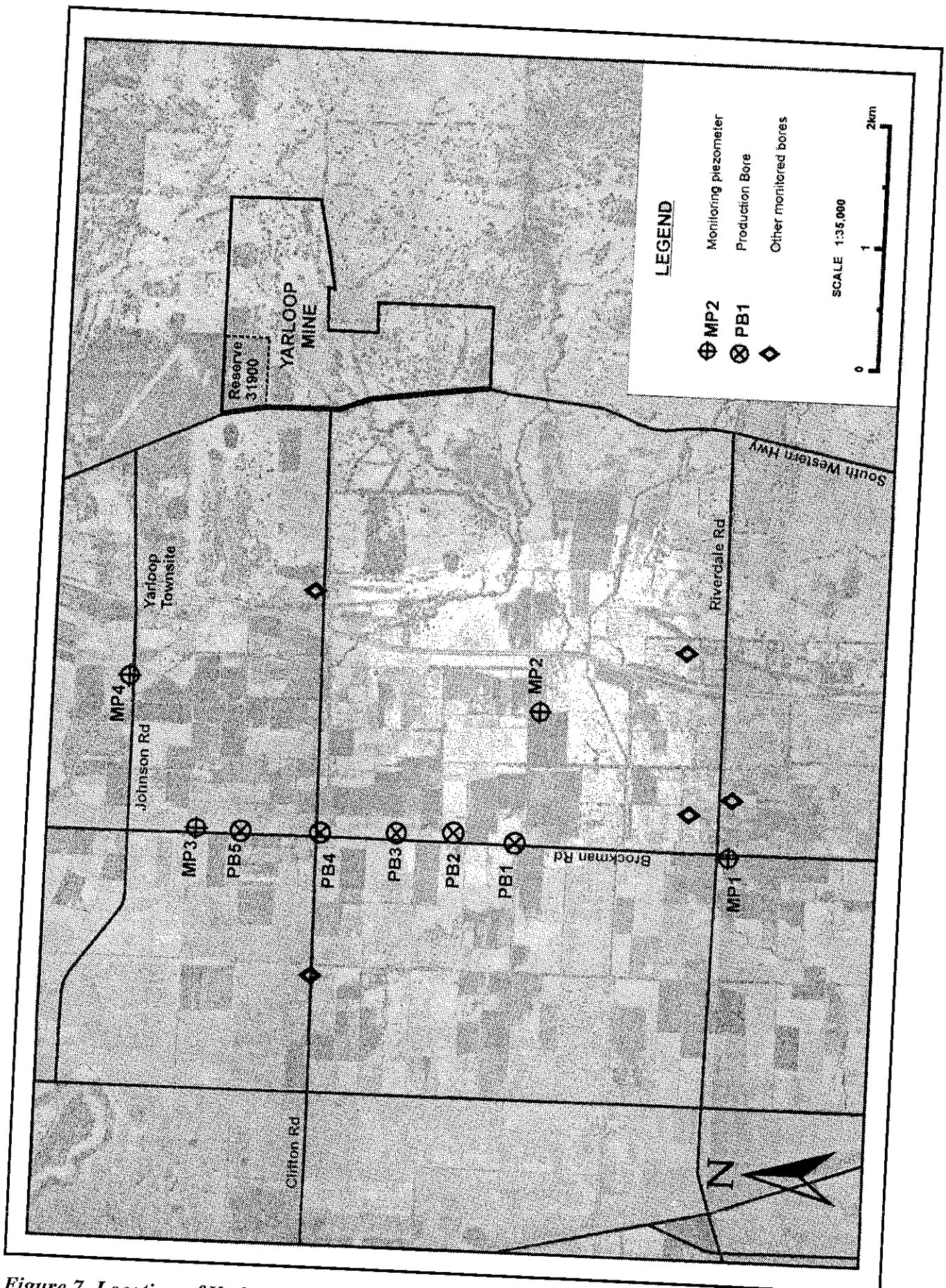

Figure 7. Location of Yarloop Mine borefield and groundwater monitoring bores.

Creek and the proponent has also indicated that a supplementary water supply can be sourced from the South West Irrigation Co-operative (Cable Sands, 1998a).

Groundwater abstraction for mining use has the potential to lower local groundwater levels and impact on other groundwater users and native flora in the area.

Submissions on the PER

The Water and Rivers Commission (WRC) provided the following comments:

- the PER identifies that the mine will be supplied with water from the existing Brockman Road borefield. Other groundwater users in the area have reported problems with bores drying up and increased salinity levels; and
- Cable Sands extract a considerable volume of groundwater and this is currently under investigation by the WRC. Given that Cable Sands is only drawing half its forecasted water consumption rates, it will be important to identify if the company has confirmed recordings of increasing salinity levels in the production bores even before the full abstraction rate is achieved.

A submitter asked whether:

- the slimes (clay and silt fraction) dams are going to be located on the old rubbish disposal site and hence contribute to leaching of contaminants into the water table.

Assessment

The area considered for assessment of this factor is the area within a 4 kilometre radius of the Brockman road borefield. This is the area where groundwater levels could be affected by abstraction of groundwater.

The EPA's environmental objective for this factor is to maintain the quality and quantity of groundwater so that existing and potential uses, including ecosystem maintenance, are protected.

The Yarloop Minesite lies within the area of the unconfined superficial aquifer of the Waroona flow system and overlies the semi-confined Leederville aquifer. The superficial aquifer, which is approximately 20 metres thick, is directly recharged by infiltrating rainfall.

Residents in the vicinity of the mining operation draw water from this shallow aquifer.

The Brockman Road borefield abstracts groundwater from both the unconfined superficial aquifer and the semi-confined Leederville aquifer, to supply the existing and proposed minesites.

The EPA is aware that the WRC has received complaints from Yarloop and Cookernup residents about impacts on the quality and quantity of groundwater in their domestic bores. The WRC has been working with the residents and the proponent to resolve these issues. As a result of these discussions, the EPA understands that the proponent undertook a groundwater testing programme to evaluate impacts of abstraction on groundwater in the surrounding area (W. Tingey, pers. comm., 22 June 1999). The WRC has advised that the results of these investigations were inconclusive. However, as a result of these investigations the WRC has set up working arrangements with the proponent to resolve the residents' water concerns. These working arrangements include ongoing liaison with the affected local residents.

In addition, the WRC has required the proponent to prepare an operating strategy for the Brockman Road borefield. The operating strategy addresses issues such as water balance, water requirements, dispute resolution, monitoring, water use efficiency, reporting and other appropriate commitments. The proponent has also obtained a surface water licence to divert water from nearby Waterous Formation Creek to reduce the requirements for groundwater.

The WRC has advised that the area within which the Brockman Road borefield is located is not currently proclaimed under the *Rights in Water and Irrigation Act 1914*, and therefore the

proponent does not require a licence at this stage (W. Tingey, pers. comm., 8 July 1999). The WRC is currently proceeding, however, to proclaim the area to provide for ongoing management. In the interim, the WRC has general powers under the *Rights in Water and Irrigation Act 1914* to direct the proponent regarding the amount of groundwater it can abstract, if it considers abstraction is having an excessive impact on other users.

The EPA notes that the proponent has committed to developing and implementing a Groundwater Management Plan, which would include monitoring provisions and the Operating Strategy, for the existing mining operation and water usage for Reserve 31900 (Commitments 17 and 18). This will include assessment and monitoring in relation to potential impacts on surrounding land users. The Plan should also address monitoring of native vegetation to ensure abstraction is not impacting on vegetation which may be reliant on the shallow water table.

The proponent has indicated that the rubbish from the Yarloop Rubbish Tip will be relocated and buried at a level several metres above the water table. This aspect has been addressed in Section 3.2. The EPA considers that the relocation and capping of the rubbish will reduce the risk of future contamination to groundwater from this source.

In response to the submission about slimes (clay fractions) dams being located on the rubbish tip area, the EPA notes that the proponent has committed to locating the slimes dams in an alternative location that is not on top of the re-located rubbish. The proponent proposes to put the slimes into the existing slimes dams on the already approved project area shown in Figure 2. The underlying soils are clayey in nature and would reduce the transmission of contaminants.

Summary

Having particular regard to:

(a) the proponent's commitment to prepare a Groundwater Management Plan for the Yarloop Mine site; and

(b) WRC's current actions to manage groundwater and its intention to proclaim the area under the *Rights in Water and Irrigation Act 1914*,

it is the EPA's opinion that the proposal is capable of meeting the EPA's objective for groundwater.

3.5 Noise

Description

Adverse noise impacts are potentially associated with the development of any mining proposal. Dry mining using earth-moving equipment will generate noise largely from bulldozers, scrapers and trucks. An additional noise source will be the trucking of the heavy mineral concentrate from the mine past existing residences along Burney Road and South Western Highway.

The closest residence is approximately 650 metres from the proposed mine area (G. Kininmonth, pers comm., 8 July 1999).

Submissions on the PER

Submitters expressed concern that results of more recent noise modelling and monitoring were not included in the PER. In addition there was concern expressed in relation to whether Cable Sands would apply for an exemption under the Noise Regulations if noise became a problem and how Cable Sands intended to ensure noise would not worsen as a result of mining proceeding.

Assessment

The area considered for assessment of this factor is the area surrounding Reserve 31900 which includes nearby residences.

The EPA's environmental objective for this environmental factor is to ensure that noise impacts emanating from the proposal comply with statutory requirements and acceptable standards.

With regard to Cable Sands' existing mining operations at Yarloop, the EPA notes that some neighbouring residents have raised concerns about noise issues and that these issues have been resolved. The EPA also notes that the closest residence to the proposed mining operation is approximately 650 metres whereas the closest resident to the existing Yarloop mining operation is 150 metres. Therefore, as the mining of Reserve 31900 will involve the use of the same equipment at a greater distance from noise sensitive premises than the existing Yarloop mine, the EPA expects that noise issues can be adequately managed.

With regard to the existing operations, measures have been put in place to manage noise to a satisfactory level and/or reach satisfactory arrangements with the owners of neighbouring properties. The predicted noise levels for mining within Reserve 31900 are included in Appendix 7.

In addition, the EPA notes that Cable Sands has indicated that noise levels arising from the existing Yarloop mining operations currently comply with the *Environmental Protection (Noise) Regulations 1997* at noise sensitive premises (Cable Sands, 1998a). Cable Sands in its response to submissions also indicated that noise generated from operations within Reserve 31900 would not give rise to levels in excess of those specified in the Regulations (Cable Sands, 1998b). No exemption from the Regulations would be sought.

Furthermore, the EPA notes that management measures employed at the existing Yarloop mine will be applied to this proposal and that the proponent has committed to preparing and implementing a Noise Management Plan to ensure appropriate management of environmental noise issues relating to the Yarloop mine site including Reserve 31900.

The proponent has made commitments to:

- develop and implement a Noise Management Plan for the Yarloop Mine, including Reserve 31900 (Commitment 12 and 13);
- restrict earthmoving operations at night within the pit to a practical minimum (Commitment 13);
- replace reversing beepers with flashing lights at night (Commitment 13);
- fit acoustic exhaust mufflers to all earth moving machinery, as required (Commitment 13); and
- construct noise reducing bunding where appropriate (Commitment 13).

With regard to the noise management plan, the EPA notes that this will be developed in consultation with the DEP, prior to the commencement of mining, and that it expects the plan to address potential noise impacts on neighbouring residences.

Summary

Having particular regard to:

(a) the commitment by the proponent to develop and implement a Noise Management Plan for the Yarloop Mining area, including Reserve 31900, to cover both the existing operations and the proposed operations;

(b) the existing operations now being managed to meet the Noise Regulations;

(c) the proposed operations being of a similar nature and further away from noise sensitive premises (residences); and

(d) the proposed operations can therefore be managed to meet the Noise Regulations,

it is the EPA's opinion that the proposal is unlikely to compromise the EPA's environmental objective for noise.

3.6 Aboriginal culture and heritage

Description

Clearing of the site for mining is likely to destroy sites if they exist within the proposed mine. No sites are known within the area and, it is thought that, given the lack of raw materials and water it is unlikely that sites, if they exist, would have been frequently used. However, no survey of the site has been carried out yet.

Submissions

The Aboriginal Affairs Department (AAD) stated that the PER mentions that AAD had been consulted. Cable Sands were advised that the likelihood of sites occurring is unlikely, however, the statement is also most likely based on no heritage survey having been undertaken on the site. The AAD recommended that the proponent undertakes an Aboriginal Heritage Survey and consult with the local Aboriginal community to ensure that no heritage sites are affected by development.

The AAD also submitted that, in the event skeletal remains or an Aboriginal site are unearthed, then as well as the DME. Cable Sands should also contact the Police Service and local Aboriginal Community and AAD.

Assessment

The area considered for assessment of this factor is the areas within Reserve 31900 to be cleared and mined or otherwise excavated.

The EPA's objective in regard to this environmental factor is to ensure that the proposal complies with the requirements of the *Aboriginal Heritage Act 1972* and to ensure that changes to the biological and physical environment resulting from the project do not adversely affect cultural associations with the area.

The EPA notes that the proponent was advised by the Aboriginal Affairs Department that the likelihood of sites occurring is usually influenced by factors such as availability of water, access to raw materials (eg. quartz or chert), the presence of dominant features and the level of disturbance or development of land. Based on these considerations it is unlikely that there are recorded sites in the proposal area. The proponent therefore concluded that further investigation is not warranted.

However, the EPA further notes the submission from AAD which recommends that the proponent undertakes an Aboriginal heritage survey and consult with the Aboriginal community, to ensure that no heritage sites are affected by the development. The EPA recommends that the Aboriginal archaeological and ethnographic survey be undertaken before ground disturbing activities, to the satisfaction of the AAD.

The proponent has committed to the following:

- the proponent has committed to undertaking an Aboriginal heritage survey prior to mining in the Reserve (Commitment 20); and
- to cease production in any area where Aboriginal sites are discovered and consult with DME and the Department of Aboriginal Affairs (Commitment 21).

Having particular regard to:

(a) the commitments made by the proponent;

(b) the *Aboriginal Heritage Act 1972*; and

(c) an Aboriginal Archaeological and Ethnographic survey being undertaken;

it is the EPA's opinion that the proposal is capable of meeting the EPA's objective in regard to Aboriginal culture and heritage.

4. Net environmental outcomes

This section on net environmental outcomes considers the overall impacts from the mining and rehabilitation proposal and the proposed "land swap" portion of Location 826. It therefore incorporates the outcomes of the EPA's consideration of the relevant environmental factors previously discussed in Section 3.1 to 3.6.

Table 4 shows that there is no current reservation for the purpose of conservation over these areas and at the moment there is no active management of Reserve 31900 for conservation. After mining, a Reserve where disturbed areas have been rehabilitated would result. It is intended that, Reserve 31900 will subsequently be vested in the NPNCA and managed by CALM.

Table 4. Condition of vegetation and land purpose before and after mining within Reserve 31900 and part Location 826

	Before Mining				After Mining			
Condition & purpose	Native vegetation, conservation	Native, not conservation	Rehabilitated, conservation	Degraded, not conservation	Native vegetation, conservation	Native, not conservation	Rehabilitated, conservation	Degraded, not conservation
Location & use								
31900 (1) native vegetation		4.6 ha			4.6 ha			
31900 (2) sand extraction				3.9 ha			3.9 ha	
31900 (3) rubbish tip				3.0 ha			3.0 ha	
31900 (4) native vegetation		6.1 ha					6.1 ha	
31900 (5) native vegetation		1.9 ha 0.2 ha			1.9 ha 0.2 ha			
Portion of Location 826		9.0 ha			9.0 ha			
Totals		21.8 ha		6.9 ha	15.7 ha		13.0 ha	

Table 5 indicates the net environmental gain achieved by the management after mining of existing threatening processes, which are not managed effectively at the moment.

Table 5. Threatening processes before and after mining within Reserve 31900 and part Location 826

		Before Mining		After Mining	
Location & use	**Area**	**Tenure and purpose**	**Threatening processes**	**Tenure and purpose**	**Management of threatening processes**
31900 (1) native vegetation	4.6 ha	"C" Class Reserve for sand extraction and rubbish tip	weeds, uncontrolled access, fire	"A" Class, conservation	•Weed management •Controlled access •Reservation for conservation
31900 (2) sand excavation	3.9 ha	"C" Class Reserve for sand extraction and rubbish tip	cleared, sand extraction	"A" Class, conservation	•Rehabilitation •Weed management •Controlled access •Reservation for conservation
31900 (3) rubbish tip	3.0 ha	"C" Class Reserve for sand extraction and rubbish tip	cleared, rubbish dumping	"A" Class, conservation	•Rehabilitation •Weed management •Controlled access •Reservation for conservation
31900 (4) native vegetation	6.1 ha	"C" Class Reserve for sand extraction and rubbish tip	weeds, uncontrolled access, fire	"A" Class, conservation	•Rehabilitation •Weed management •Controlled access •Reservation for conservation
31900 (5) native vegetation	1.9 ha 0.2 ha	"C" Class Reserve for sand extraction and rubbish tip	weeds, uncontrolled access, fire	"A" Class, conservation	•Weed management •Controlled access •Reservation for conservation
Portion of Location 826, native vegetation	9.0 ha	Freehold	weeds, uncontrolled access, fire, grazing	"A" Class, conservation	•Controlled access •Grazing excluded •Reservation for conservation

Table 6 indicates that, while losses and gains are not directly comparable there will be environmental gains after mining due to the donation of 9 hectares of Location 826 and the proposed rehabilitation, fencing and vesting of the additional Reserves into the Conservation Estate. The EPA considers that these gains will result in a net positive affect to the loss of 6.1 hectares through additional clearing in Reserve 31900.

Table 6. Net environmental gains before and after mining in Reserves 31900, 31901, A23307 and part Location 826

		Before Mining		After Mining		
Location & use purpose	Area	Condition	Management	Condition	Management	Comment
31900 (1) none	4.6 ha	native vegetation	none	native vegetation	fenced, conserved	Gain
31900 (2) sand pit	3.9 ha	degraded	Part V Licence under the *EP Act 1986* until rubbish tip closure	rehabilitated re-located, capped	fenced, conserved	Gain
(3) rubbish tip	3.0 ha	degraded			rehabilitated, conserved	Gain
31900 (4) none	6.1 ha	native vegetation	none	rehabilitated	fenced, conserved	Loss
31900 (5) none	1.9 ha	native vegetation	none	native vegetation	fenced, conserved	Gain
	0.2 ha					
Portion of Location 826, freehold	9.0 ha	native vegetation	private land	native vegetation	fenced, conserved	Gain
A23307 unvested national park	12.9 ha	native vegetation	none, to be conserved	native vegetation	fenced, conserved	Gain
31901 MRWA sand extraction	19.1 ha	native vegetation	to be conserved	native vegetation	fenced, conserved	Gain
Total	60.7 ha					

5. Conditions and Commitments

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal, and following discussion with the proponent, the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable. They do, however, provide a clear statement of the action to be taken as part of the proponent's responsibility for, and commitment to, continuous improvement in environmental performance. The commitments modified if necessary to ensure enforceability then form part of the conditions to which the proposal should be subject if it is to be implemented.

The EPA may, of course, also recommend conditions additional to that relating to the proponent's commitments.

5.1 Proponent's commitments

The proponent's commitments as set in the PER and subsequently modified, as shown in Table 7 and included in Appendix 1 should be made enforceable.

Table 7. Summary of Proponent Commitments

Commitment (Who/What)	Objective (Why)	Action (How/where)	Timing (When)	Whose Advice	Measurement Compliance Criteria
1. Incorporate environmental aspects of Reserve 31900 into the Yarloop Environmental Management and Monitoring Plan (EMMP).	To ensure environmental management is in accordance with EPA objectives and continually improves	Incorporate into environmental management system	Prior to construction and throughout mine life	DEP and DME	Submission of EMMP.
2. Report environmental performance on an annual basis.	To inform Government on environmental performance of the proposal	Incorporate into environmental management system	Operation and decommissioning	DEP	Receipt of annual report
3. Locate infrastructure for mining and primary processing on cleared land outside Reserve 31900.	To minimise impact on vegetation in Reserve 31900	Within the reserve.	Prior to and during mining	DME	Infrastructure not present on the reserve
4. Acquiring part of Location 826 for eventual incorporation into the Conservation Estate.	To increase security of Forrestfield Complex	By acquiring part of Location 826	During mining within Reserve 31900	DEP	Letter from proponent
5. Fence areas of Reserves 23307, 31901 to restrict access to these areas.	To reduce threatening processes in these Reserves	Adjoining Reserves	During mining	CALM	Advice with annual reports
6. Retain and fence the area of overstorey on the Loc 816 immediately east of the reserve and facilitate growth of native understorey species.	To provide a buffer to conservation values of Reserves 31900 and 31901	Within fenced area of Loc 816	During mining	DEP	Advice with annual reports
7. Maintain vegetation clearing to a practical minimum.	To minimise impact on vegetation in Reserve 31900	Within the reserve	During mining	DME	EMMP meets CALM requirements
8. Fence and consolidate the rubbish tip to minimum practical area (assuming tip operations are to remain on site).	To enhance conservation values of the reserve	Within the reserve	Post mining	Shire of Harvey	Letter from Shire
9. Preserve as much seed and plant material as practical for rehabilitation.	To facilitate rehabilitation success	Within the reserve	Prior to mining	CALM	Rehabilitation Plan meets CALM requirements
10. Rehabilitate unmined degraded areas in Reserve 31900 west of the mining areas.	To consolidate values of Reserve 31900	Incorporate with Rehabilitation Plan	During mining	CALM	Rehabilitation Plan meets CALM requirements
11. Retain a strip of native vegetation along the northern boundary of Reserve 31900.	To provide a buffer and fauna corridor between Res 31900 and 31901	Incorporate in Mine Planning	Prior to mining	CALM	Rehabilitation Plan meets CALM requirements
12. Develop a noise management plan.	To ensure appropriate management of noise issues	For all Yarloop Mining including Reserve 31900	Prior to Mining	DEP	Letter from DEP

Commitment (Who/What)	Objective (Why)	Action (How/where)	Timing (When)	Whose Advice	Measurement Compliance Criteria
13. Implement a noise management plan.	To ensure appropriate management of noise issues	For all Yarloop Mining including Reserve 31900 Restrict earthmoving operations at night within the mining pit to a practical minimum. Replace reversing beepers with flashing lights at night. Fit acoustic mufflers to earthmoving equipment as required. Construct noise reducing bunding where appropriate.	Throughout mine life	DEP	Advice with annual reports
14. Wet haulage roads with a water cart as required.	To minimise dust emissions	Within and in the vicinity of the reserve	Throughout mine life	DME, DEP	Letter from DME with annual report
15. Stockpiles will be vegetated as far as practicable to prevent dust emissions.	To minimise dust emissions	Within and in the vicinity of the reserve	Throughout mine life	DME, DEP	Letter from DME with annual report
16. Keep disturbed areas to a minimum.	To minimise dust emissions	Within and in the vicinity of the reserve	Throughout mine life	DME, DEP	Letter from DME with annual report
17. Develop a groundwater management plan.	To ensure appropriate management of water abstraction from borefield	Around borefield area	Prior to mining	WRC, DEP	Letter from WRC
18. Implement a groundwater management plan.	To ensure appropriate management of water abstraction from borefield	Around borefield area	Throughout mine life	WRC, DEP	Advice with annual reports
19. Enhance or maintain vegetation screens.	To minimise impacts on visual amenity	Around mining area	Throughout mine life	DEP	Advice with annual report
20. Undertake ethnographic and archaeological studies in the reserve.	To ensure heritage values are recognised	Within the reserve	Prior to mining	AAD	Letter from AAD
21. Cease production in any area where Aboriginal sites are discovered and consult with DME and Dept of Aboriginal Affairs.	To comply with the Aboriginal Heritage Act 1972	Within the mining area	Throughout mine life	AAD	Letter from AAD

5.2 Recommended conditions

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions which the EPA recommends be imposed if the proposal by Cable Sands to mine mineral sands and rehabilitate a portion of Reserve 31900, fence additional reserves and donate part of Location 826 at Yarloop is approved for implementation.

These conditions are presented in Appendix 1. Matters addressed in the conditions include the following:

(a) that the proponent be required to fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 1;

(b) in order to manage the environmental impacts of the project the proponent shall demonstrate that there is in place an Environmental Management System;

(c) the proponent shall develop a Mining and Rehabilitation Plan; and

(d) the proponent shall develop a Rubbish Tip Decommissioning Plan.

It should be noted that other regulatory mechanisms relevant to the proposal are:

- the imposition of the rehabilitation bond under the *Mining Act 1978*; and
- controls on groundwater abstraction under the *Rights in Water and Irrigation Act 1914*.

6. Other Advice

- **Widening of the South West Highway**

The assessment of the present mining proposal has identified that Main Roads Western Australia (MRWA) is proposing to widen the South West Highway through the western side of Reserve A22307 (Figure 4). CALM has agreed to the widening of the South West Highway by 3 to 5 metres along the western side of this Reserve (R. Powell, pers. comm., 23 October 1998).

Reserve A23307 is an area containing EPA *Threatened or Poorly Reserved Plant Communities Requiring Interim Protection* (EPA, 1994). Reserve A23307 is currently unvested with the purpose of National Park.

The widening of the South West Highway has the potential to affect these important plant communities. The EPA recommends that, before making a decision on widening the South West Highway, MRWA should liaise with CALM for advice on reducing the impacts on these communities.

MRWA should also communicate with the local people and conservation groups to inform them of actions being taken to avoid or mitigate impacts on the threatened or poorly reserved plant communities. The EPA also recommends that the Minister write to the Minister for Transport advising of the high conservation value of the vegetation in the area and the need to consider how impacts can be avoided.

- **Vesting of Reserves into the Conservation Estate**

In its original assessment of the Yarloop Mineral Sands Mine (Bulletin 838), the EPA previously recommended that Reserves 31901 and A22307 be vested in the NPNCA for conservation purposes.

The EPA notes that CALM has commenced discussions with Main Roads Western Australia to vest Reserve 31901 into the Conservation Estate.

The EPA recommends that the Minister writes to the Minister for Transport and Minister for Lands seeking their support for these Reserves to be incorporated into the Conservation Estate. This is crucial to the protection of remnant native vegetation around Yarloop.

7. Conclusions

The EPA has considered the proposal by Cable Sands to mine mineral sands and rehabilitate Reserve 31900, Yarloop.

Overall, the EPA has concluded that parts of the remnant native vegetation in Reserve 31900 have been extensively degraded by:

- the existing rubbish tip within the Reserve;
- uncontrolled firewood collection;
- impacts from previous sand excavation within the Reserve; and
- the spread of weeds within part of the Reserve.

The EPA notes that the proposal would result in the loss of approximately 6.1 hectares of remnant native vegetation out of a total of 12.8 hectares of remnant native vegetation within Reserve 31900. However, given that the proponent has committed to:

- securing an adjacent area (9 hectares) of privately owned land with native vegetation including Floristic Community Type 20b for inclusion into the Conservation Estate;
- rehabilitating the existing rubbish tip and sand excavation area (6.9 hectares) within Reserve 31900; and
- installing fencing around Reserve 31900 and two adjacent Reserves, and around the additional piece of land to be donated to the Conservation Estate,

the EPA has concluded that, on balance, the proposal would result in a net environmental gain. This is summarised in Section 4.

The EPA also notes that, on the completion of mining and satisfactory rehabilitation, it is proposed that Reserve 31900 be vested with the NPNCA and managed by the Department of Conservation and Land Management (CALM).

The EPA has therefore concluded that it is unlikely that the EPA's objectives would be compromised, provided there is a satisfactory implementation by the proponent of the proponent's commitments and the recommended conditions set out in Appendix 1 and summarised in Section 5.

The EPA has also provided advice in relation to the widening of South West Highway and the vesting of Reserves 31901 and A23307 into the Conservation Estate.

8. Recommendations

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is for Mining and Rehabilitation in Reserve 31900, Yarloop, the area is currently a "C" Class Reserve vested in the Shire of Harvey for sand extraction and rubbish disposal, and forms an extension of an existing mining operation which was previously assessed and reported on in Bulletin 838 released in December 1996;

2. That the Minister considers the report on the relevant environmental factors as set out in Section 3;

3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out Appendix 1 and summarised in Section 5, including the proponent's commitments;

4. That the Minister imposes the conditions and procedures recommended in Appendix 1 of this report;

5. That the Minister notes the other advice provided by the EPA in Section 6 regarding the high conservation value of vegetation on Reserves adjoining Reserve 31900, and that the Minister writes to the Minister for Transport and the Minister for Lands seeking their support for these to be incorporated in the Conservation Estate vested in the NPNCA.

Appendix 1

Recommended Environmental Conditions and proponent's consolidated commitments

RECOMMENDED ENVIRONMENTAL CONDITIONS

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT 1986)

TITANIUM MINERALS MINING AND REHABILITATION, RESERVE 31900, YARLOOP, SHIRE OF HARVEY

Proposal: The mining of mineral sands and rehabilitation within Reserve 31900 (total area 13 hectares; 6.1 hectares of native vegetation to be cleared) (total Reserve area 19.7 hectares). The proposal also includes a land swap of approximately 9 hectares of nearby land, fencing of Reserves 31901 and A23307 and relocation, of the rubbish tip within Reserve 31900.

The project area is located within the Shire of Harvey, approximately 2 kilometres south east of the township of Yarloop. Reserve 31900 is vested in the Shire of Harvey for sand extraction and rubbish disposal, as documented in schedule 1 of this statement.

Proponent: Cable Sands (WA) Pty Ltd

Proponent Address: Koombana Drive, North Shore, Bunbury WA 6230

Assessment Number: 1210

Report of the Environmental Protection Authority: Bulletin 944

The proposal to which the above report of the Environmental Protection Authority relates may be implemented subject to the following conditions and procedures:

1 Implementation

1-1 Subject to these conditions and procedures, the proponent shall implement the proposal as documented in schedule 1 of this statement.

1-2 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment determines, on advice of the Environmental Protection Authority, is substantial, the proponent shall refer the matter to the Environmental Protection Authority.

1-3 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment determines, on advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

2 Proponent Commitments

2-1 The proponent shall implement the consolidated environmental management commitments documented in schedule 2 of this statement.

2-2 The proponent shall implement subsequent environmental management commitments which the proponent makes as part of the fulfilment of conditions and procedures in this statement.

3 Environmental Management System

3-1 In order to manage the environmental impacts of the project, and to fulfil the requirements of the conditions and procedures in this statement, prior to ground-disturbing activities, the proponent shall demonstrate to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection that there is in place an Environmental Management System which includes the following elements:

1 An environmental policy and corporate commitment to it;

2 Mechanisms and processes to ensure:

(1) planning to meet environmental requirements;

(2) implementation and operation of actions to meet environmental requirements;

(3) measurement and evaluation of environmental performance; and

3 Review and improvement of environmental outcomes.

3-2 The proponent shall implement the environmental management system referred to in condition 3-1.

4 Rehabilitation

4-1 To ensure that rehabilitation is optimised, consistent with the long term objective to incorporate Reserve 31900 into the Conservation Estate, the proponent shall develop a Mining and Rehabilitation Plan. This plan shall be developed to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Department of Conservation and Land Management, the Water and Rivers Commission and the Department of Minerals and Energy.

This Plan shall address:

1. baseline vegetation survey;
2. optimal clearing techniques;
3. mining strategy that integrates the mining and rehabilitation schedules and reestablishing soil profile and groundwater hydrology;
4. weed management;
5. dieback management including the use of dieback resistant stock;
6. propagation strategy including, seed collection, direct return of topsoil maximised, direct seeding, smoke treatment and translocation;
7. development of specific rehabilitation performance criteria;
8. a monitoring programme to determine rehabilitation success;
9. contingency plans in the event that rehabilitation is not likely to meet, or does not meet performance criteria; and

10. allocation of resources (equipment and appropriately trained and experienced personnel).

Components 1 to 6 of this Plan shall be prepared prior to ground-disturbing activities. The remaining components shall be prepared within 12 months of ground-disturbing activities commencing.

4-2 The proponent shall implement the Plan required by condition 4-1.

4-3 The proponent shall make the Plan required by condition 4-1 publicly available, to the requirements of the Environmental Protection Authority.

5 Yarloop Rubbish Tip Decommissioning Plan

5-1 Prior to ground-disturbing activities, the proponent shall prepare a Rubbish Tip Decommissioning Plan to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Department of Conservation and Land Management and the Water and Rivers Commission. The Plan shall be prepared in consultation with the Shire of Harvey.

This Plan shall address:

1. regulatory requirements;
2. respective responsibilities of the proponent and the Shire of Harvey;
3. tip closure;
4. relocation of all of the rubbish;
5. leachate control including adequate impermeable capping;
6. odour management;
7. site rehabilitation;
8. groundwater monitoring; and
9. contingency plans for disposal of any Class III or IV materials discovered in the tip.

5-2 The proponent shall implement the Rubbish Tip Decommissioning Plan required by condition 5-1.

5-3 The proponent shall make the Rubbish Tip Decommissioning Plan required by condition 5-1 publicly available, to the requirements of the Environmental Protection Authority.

6 Decommissioning Plan

6-1 At least six months prior to decommissioning, the proponent shall prepare a Decommissioning Plan to ensure that the Reserve is suitable for inclusion in the surrounding Yarloop Reserves System (see Schedule 1), to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Department of Conservation and Land Management and the Department of Minerals and Energy.

This Plan shall address:

1 removal or, if appropriate, retention of plant and infrastructure;

2 identification of contaminated areas, including provision of evidence of notification to relevant statutory authorities.

6-2 The proponent shall implement the Decommissioning Plan required by condition 6-1 until such time as the Minister for the Environment determines that decommissioning and / or rehabilitation is / are complete.

6-3 The proponent shall make the Decommissioning Plan required by condition 6-1 publicly available, to the requirements of the Environmental Protection Authority.

7 Proponent

7-1 The proponent for the time being nominated by the Minister for the Environment under section 38(6) or (7) of the Environmental Protection Act 1986 is responsible for the implementation of the proposal until such time as the Minister for the Environment has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person in respect of the proposal.

7-2 Any request for the exercise of that power of the Minister referred to in condition 7-1 shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the proposal in accordance with the conditions and procedures set out in the statement.

7-3 The proponent shall notify the Department of Environmental Protection of any change of proponent contact name and address within 30 days of such change.

8 Commencement

8-1 The proponent shall provide evidence to the Minister for the Environment within five years of the date of this statement that the proposal has been substantially commenced.

8-2 Where the proposal has not been substantially commenced within five years of the date of this statement, the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment will determine any question as to whether the proposal has been substantially commenced.

8-3 The proponent shall make application to the Minister for the Environment for any extension of approval for the substantial commencement of the proposal beyond five years from the date of this statement at least six months prior to the expiration of the five year period referred to in conditions 8-1 and 8-2.

8-4 Where the proponent demonstrates to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority that the environmental parameters of the proposal have not changed significantly, then the Minister may grant an extension not exceeding five years for the substantial commencement of the proposal.

9 Compliance Auditing

9-1 The proponent shall submit periodic Performance and Compliance Reports, in accordance with an audit programme prepared in consultation between the proponent and the Department of Environmental Protection.

9-2 Unless otherwise specified, the Chief Executive Officer of the Department of Environmental Protection is responsible for assessing compliance with the conditions, procedures and commitments contained in this statement and for issuing formal, written advice that the requirements have been met.

9-3 Where compliance with any condition, procedure or commitment is in dispute, the matter will be determined by the Minister for the Environment.

Note: On 17 April 1997 the Minister for the Environment approved a proposal for "mining of titanium minerals, 2 km south of Yarloop (1032)", (Statement No.442) in which part of the proposal within "C" Class Reserve No. 31900 may not be implemented.

The Proposal

Schedule 1

The mining of mineral sands (total area 13 hectares; 6.1 hectares of native vegetation to be cleared) within Reserve 31900 (total Reserve area 19.7 hectares). The project area is located within the Shire of Harvey, approximately 2 kilometres south east of the township of Yarloop. Reserve 31900 is vested in the Shire of Harvey for sand extraction and rubbish disposal. The Reserve forms part of the Yarloop Reserves System (see Figure 4). The proposal includes rehabilitation of Reserve 31900 and fencing of Reserves A23307 and 31901 and proposed purchase and donation of another piece of land for addition to the Conservation Estate (Figure 4). The proposal also includes the relocation of the rubbish tip within Reserve 31900.

Key Characteristics Table

Element	Description
Life of project (mine production)	16 months approximately of mining (this does not include rehabilitation).
Size of ore body	178,000 tonnes of HMC approximately.
Area of disturbance (including access)	13 hectares approximately (6.1 hectares of remnant vegetation and 6.9 hectares of disturbed rubbish tip and sand excavation areas). The 6.1 hectares of remnant vegetation to be cleared consists of Floristic Community Type 3b (Jarrah-Marri woodlands).
Major components - waste dump, infrastructure (water supply, roads, etc)	Use existing facilities and infrastructure (water and power). No additional infrastructure will be required.
Water supply - source maximum annual requirement	Existing bores located on Brockman Road approx 4 kilometres west of the mine site. Approximately 803 Megalitres per annum.
Rehabilitation methods	Mined areas backfilled and regraded. Remaining timber used for habitat logs. Baseline vegetation survey. Weed and dieback management. A propagation strategy including, seed collection, direct return of topsoil to be maximised, direct seeding, smoke treatment and translocation. Development of specific rehabilitation performance criteria, a monitoring programme and contingency plans. Allocation of adequate resources (equipment and appropriately trained and experienced personnel).
HMC transport - truck movements	Utilising existing roads, no additional trucking anticipated over and above that associated with existing operation.
Rubbish Tip - relocation of existing rubbish to sand excavation area	The existing rubbish tip is located in Area 3 (Figure 3). All of the rubbish will be excavated and reburied in Area 2 (the existing sand excavation area) and capped. It will form part of the rehabilitation programme for the entire Reserve.
Land Swap - proposed vesting in the NPNCA and managed by CALM	Inclusion of 9 hectares (portion of Location 826) in the Conservation Estate (Figure 4). The proponent contends that the remnant native vegetation is in excellent condition, and contains Floristic Community Type 20b (slender banksia and/or Jarrah woodlands).
Installation of fences	Reserves 31900, 31901, A23307 and land swap area to be fenced to restrict access to these areas (Figure 4).
End landuse for Reserve 31900 (intended)	Reserve 31900 will be vested in the NPNCA for conservation purposes and managed by CALM.

Figures

Figure 3. Reserve 31900 showing remnant vegetation.

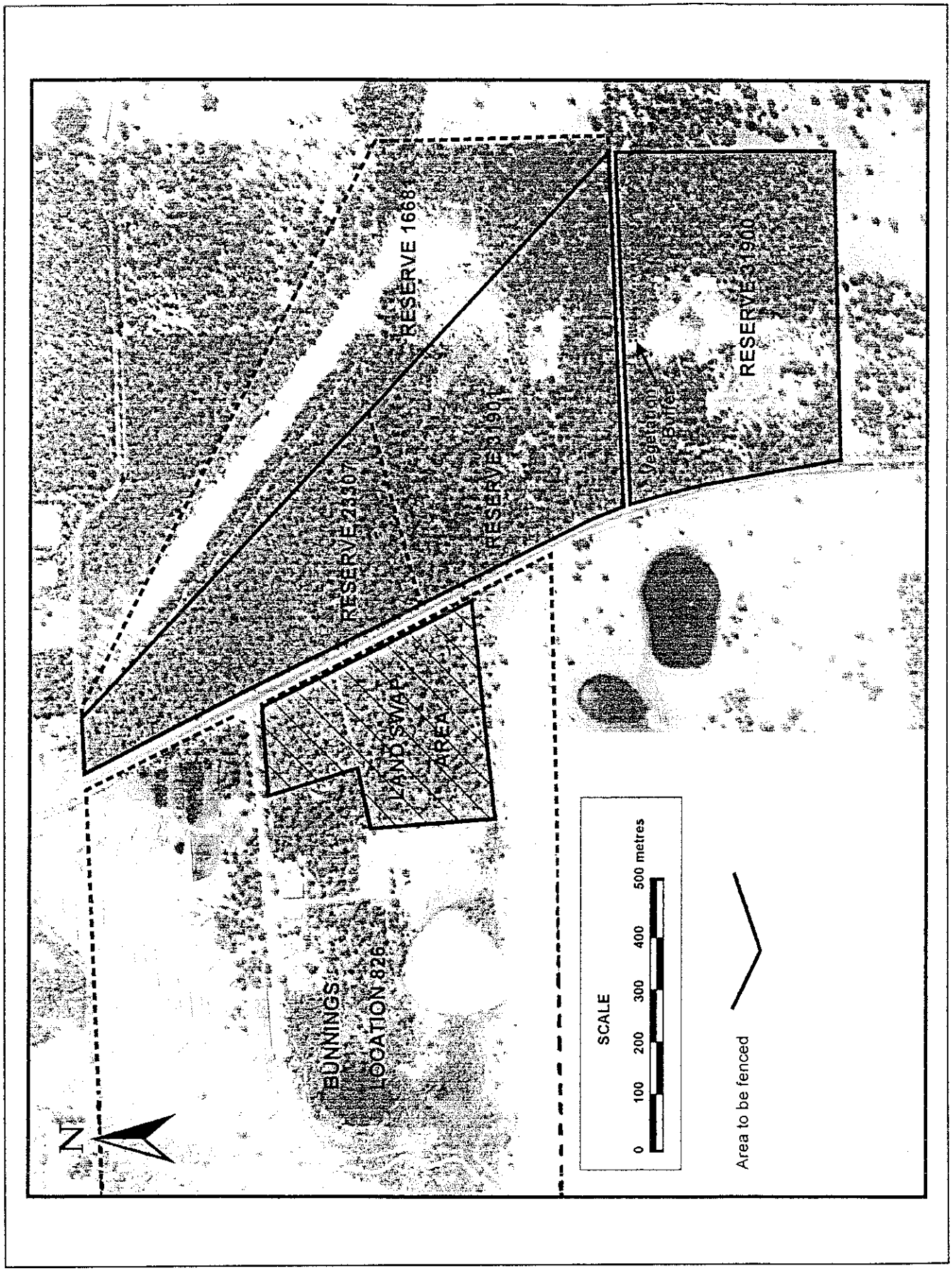

Figure 4. Location of Reserves 31900, 31901, A23307, 16681 and Bunnings Location 826 (land swap area).

Schedule 2

Proponent's Consolidated Environmental Management Commitments

6 July 1999

TITANIUM MINERALS MINING AND REHABILITATION, RESERVE 31900, YARLOOP, SHIRE OF HARVEY (1210)

CABLE SANDS (WA) PTY LTD

Table 7. Summary of Proponent Commitments

Commitment (Who/What)	Objective (Why)	Action (How/where)	Timing (When)	Whose Advice	Measurement Compliance Criteria
1. Incorporate environmental aspects of Reserve 31900 into the Yarloop Environmental Management and Monitoring Plan (EMMP).	To ensure environmental management is in accordance with EPA objectives and continually improves	Incorporate into environmental management system	Prior to construction and throughout mine life	DEP and DME	Submission of EMMP.
2. Report environmental performance on an annual basis.	To inform Government on environmental performance of the proposal	Incorporate into environmental management system	Operation and decommissioning	DEP	Receipt of annual report
3. Locate infrastructure for mining and primary processing on cleared land outside Reserve 31900.	To minimise impact on vegetation in Reserve 31900	Within the reserve.	Prior to and during mining	DME	Infrastructure not present on the reserve
4. Acquiring part of Location 826 for eventual incorporation into the Conservation Estate.	To increase security of Forrestfield Complex	By acquiring part of Location 826	During mining within Reserve 31900	DEP	Letter from proponent
5. Fence areas of Reserves 23307, 31901 to restrict access to these areas.	To reduce threatening processes in these Reserves	Adjoining Reserves	During mining	CALM	Advice with annual reports
6. Retain and fence the area of overstorey on the Loc 816 immediately east of the reserve and facilitate growth of native understorey species.	To provide a buffer to conservation values of Reserves 31900 and 31901	Within fenced area of Loc 816	During mining	DEP	Advice with annual reports
7. Maintain vegetation clearing to a practical minimum.	To minimise impact on vegetation in Reserve 31900	Within the reserve	During mining	DME	EMMP meets CALM requirements
8. Fence and consolidate the rubbish tip to minimum practical area (assuming tip operations are to remain on site).	To enhance conservation values of the reserve	Within the reserve	Post mining	Shire of Harvey	Letter from Shire
9. Preserve as much seed and plant material as practical for rehabilitation.	To facilitate rehabilitation success	Within the reserve	Prior to mining	CALM	Rehabilitation Plan meets CALM requirements
10. Rehabilitate unmined degraded areas in Reserve 31900 west of the mining areas.	To consolidate values of Reserve 31900	Incorporate with Rehabilitation Plan	During mining	CALM	Rehabilitation Plan meets CALM requirements
11. Retain a strip of native vegetation along the northern boundary of Reserve 31900.	To provide a buffer and fauna corridor between Res 31900 and 31901	Incorporate in Mine Planning	Prior to mining	CALM	Rehabilitation Plan meets CALM requirements
12. Develop a noise management plan.	To ensure appropriate management of noise issues	For all Yarloop Mining including Reserve 31900	Prior to Mining	DEP	Letter from DEP

Commitment (Who/What)	Objective (Why)	Action (How/where)	Timing (When)	Whose Advice	Measurement Compliance Criteria
13. Implement a noise management plan.	To ensure appropriate management of noise issues	For all Yarloop Mining including Reserve 31900 Restrict earthmoving operations at night within the mining pit to a practical minimum. Replace reversing beepers with flashing lights at night. Fit acoustic mufflers to earthmoving equipment as required. Construct noise reducing bunding where appropriate.	Throughout mine life	DEP	Advice with annual reports
14. Wet haulage roads with a water cart as required.	To minimise dust emissions	Within and in the vicinity of the reserve	Throughout mine life	DME, DEP	Letter from DME with annual report
15. Stockpiles will be vegetated as far as practicable to prevent dust emissions.	To minimise dust emissions	Within and in the vicinity of the reserve	Throughout mine life	DME, DEP	Letter from DME with annual report
16. Keep disturbed areas to a minimum.	To minimise dust emissions	Within and in the vicinity of the reserve	Throughout mine life	DME, DEP	Letter from DME with annual report
17. Develop a groundwater management plan.	To ensure appropriate management of water abstraction from borefield	Around borefield area	Prior to mining	WRC, DEP	Letter from WRC
18. Implement a groundwater management plan.	To ensure appropriate management of water abstraction from borefield	Around borefield area	Throughout mine life	WRC, DEP	Advice with annual reports
19. Enhance or maintain vegetation screens.	To minimise impacts on visual amenity	Around mining area	Throughout mine life	DEP	Advice with annual report
20. Undertake ethnographic and archaeological studies in the reserve.	To ensure heritage values are recognised	Within the reserve	Prior to mining	AAD	Letter from AAD
21. Cease production in any area where Aboriginal sites are discovered and consult with DME and Dept of Aboriginal Affairs.	To comply with the Aboriginal Heritage Act 1972	Within the mining area	Throughout mine life	AAD	Letter from AAD

Appendix 2

Dominant species for vegetation 3b and 20b

The dominant species for Floristic Community Types 3b and 20b are in table below (Gibson, 1994). These were identified in Reserve 31900 (Mattiske, 1997). The common names, where available are located adjacent to the species names (common names are from Bennett, 1991).

	Type 3b	**Type 20b**
Trees	*Eucalyptus marginata* (Jarrah), *Corymbia calophylla* (Marri) occasional sites, *Allocasuarina fraseriana* (She-Oak), *Xylomelum occidentale* (Woody Pear)	*Banksia attenuata* (Slender Banksia), *Eucalyptus marginata* (Jarrah), *Allocasuarina fraseriana* (She-Oak)
Shrubs	*Xanthorrhoea preissii* (Common Grasstree), *Xanthorrhoea gracilis* (Slender Grass tree), *Stirlingia latifolia* (Blueboy)	*Grevillea wilsonii* (Wilson's Grevillea), *Xanthorrhoea gracilis* (Slender Grass Tree), *Hibbertia hypericoides* (Yellow Buttercups)
Herbs	*Phlebocarya ciliata, Mesomelaena tetragona*(Semaphore Sedge), *Drosera erythrorhiza* (Red Ink Sundew)	*Tetraria octandra, Mesomelaena tetragona* (Semaphore Sedge), *Lomandra serica* (Silky Mat Rush)

Appendix 3

Weed Species found within Reserve 31900

Mattiske (1997) found that there were 16 introduced (weed) species in Reserve 31900. However, the predominant species include:

- *Watsonia meriana* (Watsonia);
- *Watsonia bulbillifera* (Bulbil Watsonia); and
- *Zantedeschia aethiopica* (Arum Lily).

There are also a number of weed grasses evident, these include:

- *Briza maxima* (Blow Fly Grass);
- *Ehrharta calycina* (Perrennial Veldt Grass);
- *Ehrharta longiflora* (Annual Veldt Grass); and
- *Pennisetum dandestinum* (Kikuyu Grass).

Appendix 4

List of Submitters

Government Agencies:

Aboriginal Affairs Department
Department of Conservation and Land Management
Department of Minerals and Energy
Shire of Harvey
Water and Rivers Commission

Organisations:

Cookernup Community Association
Conservation Council of WA
Denmark Environment Centre
Harvey River Land Care Development Council
Murray Districts Rifle Clubs Assoc.
Wildflower Society of WA
Yarloop Resident's Assoc.
Yarloop Workshops

Individual:

Mr and Mrs Armstrong
Mr Bird
Mr Bunce
Mr Cattach
Mr and Mrs Gartrell
Mr Jenkins
Mr and Mrs McDonnell
Mrs Venables

Appendix 5

References

Bennett, E.M. (1991), *Common and Aboriginal Names of Western Australian Plant Species*, 2nd ed. Wildflower Society of Western Australia.

Cable Sands (WA) Pty Ltd (1996), *Yarloop Titanium Minerals Mine, Consultative Environmental Review*. Bunbury, Western Australia.

Cable Sands (WA) Pty Ltd (1998a), *Mining of Yarloop Reserve 31900*, Public Environmental Review. Bunbury, Western Australia.

Cable Sands (WA) Pty Ltd (1998b), *Response to submissions*, unpub. Bunbury, Western Australia.

Department of Conservation and Environment (1980), *Atlas of Natural Resources Darling System Western Australia*, Western Australia.

Department of Environmental Protection (1996), *Code of Practice for Rural Landfill Management* , Perth, Western Australia.

English, V., and Blythe, J. (1997), *Identifying and conserving threatened ecological communities in the south west botanical province*. unpub. Perth, Western Australia.

Environmental Survey and Management Pty Ltd (1998), *Reserve 31900 Herbaceous Flora: Spring 1998*, Prepared on behalf of Cable Sands (WA) Pty Ltd, unpub. Perth, Western Australia.

EPA (1993), *Draft Western Australian Water Quality Guidelines for Fresh and Marine Waters*. Report and recommendations of the Environmental Protection Authority, Bulletin 711, October 1993, Perth, Western Australia.

EPA (1994), *GIS Threatened or Poorly Reserved Plant Communities Requiring Interim Protection*, Perth, Western Australia.

EPA (1996), *Mining of Titanium Minerals, 2km south of Yarloop (Cable Sands (WA) Pty Ltd)*. Report and recommendations of the Environmental Protection Authority, Bulletin 838, December 1996, Perth, Western Australia.

Erickson, R., George, A.S., Marchant, N.G., Morcombe, M.K. (1979), *Flowers and Plants of Western Australia*, Sydney, Reed Publishing, Australia.

Geological Survey of Western Australia (1980), *Geological Series - Explanatory Notes, Pinjarra, Western Australia*, Perth, Western Australia.

Gibson, N., Keighery, B.J., Keighery, G.J., Burbidge, A.H., and Lyons M.N. (1994), *A floristic survey of the southern Swan Coastal Plain*. Unpublished report for Australian Heritage Commission, prepared by the Department of Conservation and Land Management and the Conservation Council of WA (Inc), Perth, Western Australia.

Kininmonth, G., Cable Sands (WA) Pty Ltd (1999), pers. comm., 8 July 1999, Capel, Western Australia

Lockwood, C., Shire of Harvey (1999), pers. comm. 23 April 1999, Yarloop, Western Australia.

Mattiske (1997), *Vegetation Survey of Selected Reserves at Yarloop*, Prepared on behalf of Cable Sands (WA) Pty Ltd December 1997. unpub., Perth, Western Australia.

Mattiske (1998), *Flora and Vegetation Values on Bunnings Land Yarloop*, Prepared on behalf of Cable Sands (WA) Pty Ltd, July 1998.

Powell, R. Department of Conservation and Land Management (1998), pers. comm. 23 October 1998, Perth, Western Australia.

South West Development Authority (1990), *South West Mineral Sands Industry Report - An Information Handbook*, Perth, Western Australia.

Tingey, W. Water and Rivers Commission (1999), pers. comm. 22 June 1999, Bunbury, Western Australia.

Tingey, W. Water and Rivers Commission (1999), pers. comm. 8 July 1999, Bunbury, Western Australia.

Appendix 6

Summary of submissions and proponent's response to submissions

RESERVE 31900 YARLOOP
CABLE SANDS (WA) PTY LTD
RESPONSES TO SUMMARY OF SUBMISSIONS

1. GENERAL COMMENTS

1.1. This proposal has previously been put forward and was refused on the grounds that did not meet the EPA's objective to protect Types 3b and 20b vegetation Community Types. Why is this proposal being re-assessed?

Differences between this proposal and the original proposal are significant and warrant a new assessment. These differences relate to improved environmental management of the whole of Reserve 31900 to remove threatening processes, provision of private land with conservation value to the Conservation Estate and further botanical work on the vegetation in the Reserve.

Management of Reserve 31900 that is additional to the original assessment includes;

- fencing of the boundary of the Reserve to restrict unauthorised access
- rehabilitation of non-mined degraded areas to native vegetation
- removal of weeds from areas current
- burial of existing rubbish to prevent dispersal by wind

Provision of land is the purchase and donation of a 9.91 hectares portion of Location 826 to the Conservation Estate to be managed by CALM.

The botanical work undertaken as part of this proposal includes an assessment of the vegetation communities as presented in the Mattiske reports "Vegetation Survey of Selected Reserves at Yarloop" and " Flora and Vegetation Values of Bunnings land Yarloop" and the additional work included in the amended Environmental Survey and Management report "Yarloop Mineral Sands Lease: Assessment of Remnant Vegetation and Recommendations for Restoration".

1.2. Lack of management by the present land managers should not be used as an excuse to mine

The PER presents a detailed proposal that provides numerous conservation benefits. These are reviewed in terms of current and anticipated land usage and threatening processes with and without the implementation of the proposal. Current land management of the Reserve is not being put forward as an excuse to mine although it is relevant to a review of the issues presented in the proposal.

1.3. Although inclusion of Location 826 in the Conservation Estate is desirable, it should not be done at the expense of the vegetation in Reserve 31900.

Without the approval for mining and rehabilitation of Reserve 31900, there is little or no chance that a portion of Location 826 will be included in the Conservation Estate.

1.4. This is one of the few Reserves of untouched remnant vegetation and should be protected at all cost.

Reserve 31900 is not a Reserve of untouched remnant vegetation, although some sections are largely intact. There are a number of Reserves, including those adjacent to Reserve 31900, and private land which contain similar remnant native vegetation. In the long term the rehabilitated Reserve and the incorporation of a portion of Location 826 into the Conservation Estate will provide better protection for the conservation values of the native vegetation at Yarloop.

2. FLORA AND CONSERVATION VALUE

2.1. Was it Cable Sands intention to give the readers the impression that Reserve 31900 is not an important example of native vegetation?

The PER (pg 34) has indicated that parts of Reserve 31900 has significant conservation value. Proponent commitments to purchase and provide a portion of Location 826 to the Conservation Estate and to rehabilitate degraded areas of the Reserve reflects the Reserve's conservation value.

2.2. The Public Environmental Review (PER) claims that the vegetation in Reserve 31900 would continue to deteriorate if the proposal is not implemented. In the PER's assessment of alternatives (6.1.4) there was no mention of a previous Ministerial Statement (note 3 of statement 442) which required the Department of Conservation and Land Management (CALM) to upgrade the conservation status of the Reserve from C class to A class and that all three Reserves are to be vested for conservation purposes. Did Cable Sands consider this upgrade in conservation status, and the implications it would have on the management of these Reserves when determining the threatening processes analysis?;

Note 3 in the Ministerial statement is a procedure and not a condition of approval. The proponent believes that the implementation of the proposal will facilitate the implementation of the Minister's procedure as well as enhance the overall conservation value of the Reserve. The removal of threatening processes, rehabilitation of the Reserve and the addition of portion of Location 826 should more than compensate for any impact from mining in the Reserve.

2.3. The PER claims that neither of the threatened Floristic Community Types 3b and 20b are distinctly present, but instead a continuum of the two Types exists. Why is this continuum of the two Types any less valuable and in less need of preservation, than either of the two distinct Types? This vegetation Type has high conservation value because it is a continuum between the threatened 3b and 20b vegetation. The fact that it is a continuum in no way diminishes its conservation value and it may well be one of only a few examples of such a transition zone and therefore important for future research.

Continuums do have conservation value and the proponent has undertaken to compensate for any loss in conservation value over the short to medium by offering a portion of Location 826 and rehabilitation of other areas in the Reserve.

2.4. Will clearing result in further fragmentation of the vegetation and will this fragmentation threaten the survival of threatened communities?

Mining will result in some temporary fragmentation of vegetation in the eastern part of the Reserve. Rehabilitation and management of a larger area of the Reserve following mining will reduce the threat to the threatened communities in the long term. Long term threats to the these communities that will be continue if mining does not proceed include;

- possible further expansion of the area used for rubbish disposal
- continued unauthorised dumping of rubbish in areas away from the main tip
- continued weed encroachment into vegetated areas
- continued spread of existing rubbish throughout the Reserve
- continued vehicle access throughout the Reserve

2.5. The PER suggests that the continuum, as identified in this report, is not covered by the Environmental Protection Authority (EPA) objectives.

The PER does suggest that the vegetation continuum is covered by the EPA objective for vegetation communities. The PER points out the problems of identifying Type 3b and 20b communities at Yarloop and indicates that the Forrestfield Vegetation Complex is the appropriate community for assessment of this factor.

2.6. The proponent acknowledges, that if some mining was allowed in area 4, it would involve some loss of structure and biodiversity (p35). Would the EPA's objectives concerning these vegetation Types be compromised if this occurred?

The implementation of the proposal and the associated proponent environmental commitments would not compromise the EPA objective for vegetation communities. As outlined elsewhere, the provision of land to the Conservation Estate and the rehabilitation of Reserve 31900 result in an improvement in the conservation values at Yarloop.

The provision of land with conservation value significantly increases the total area of land that will be managed for conservation. At present none of the Reserves at Yarloop have a conservation vesting although 32 hectares of land (Reserves 31901 and 23307) are expected to change vesting in the future. The 9.91 hectares of Bunnings land will initially be the only land managed for conservation and will approximately 23% of the land managed for conservation if the vesting changes occur.

The rehabilitation and management of Reserve 31900 reduces the ongoing threatening processes currently occurring in the Reserve and provides a situation that is more likely to see the maintenance of conservation values for the adjoining Reserves and the remainder of Reserve 31900. In addition, the rehabilitated areas will also have conservation values.

2.7. If mining in area 4 was allowed, the buffer to area 5 would be destroyed. Would this compromise the EPA's objective (as above)?

Refer 2.6 above.

2.8. Does Cable Sands recognise that after mining, the biodiversity would never be the same as before mining?

The term "biodiversity" has been defined as "the variety of life in all its forms, levels and combinations and includes ecosystem, species and genetic diversity" (IUCN, WWF & UNEP 1991). The biodiversity outcome following the implementation of the proposal should include consideration of the reduction of threatening processes (including weeds), restoration of degraded areas and the increased representation of vegetation communities in the Conservation Estate. Because biodiversity may be different does not mean it is any less valuable.

2.9. The PER did not include the whole or a summary of the consultant's report (Mattiske Consulting PTY LTD) and therefore, lacks the detail necessary to allow adequate assessment. Why was this report not included?

The key findings of the report were included in the PER document. Copies of the report have also been made available to DEP, CALM, the Wildflower Society and a local resident. It was not considered appropriate that the detailed scientific report should be included with the PER.

2.10. A number of limitations have been identified in the Mattiske report which brings into question the findings. Cable Sands should address the following issues, and determine if they affect the findings of the report.

2.10.1. The field sampling took place at a time when many annual species were not present. Is further field work proposed to obtain a more complete species list?;

2.10.2. Are Cable Sands proposing a more detailed survey to determine if declared rare or priority species are present?;

(2.10.1 & 2.10.2) No further work is considered necessary. Numerous site visits have been undertaken by a number of botanists, including spring 1996 when annual species would be expected to be present. The survey work undertaken is considered sufficient to determine the presence of declared rare or priority flora.

2.10.3. Can Cable Sands provide further explanation of the methodology, as it is difficult to compare this report to other studies?;

Methodology from the Mattiske report "Vegetation Values of Selected Reserves at Yarloop" is given below.

The majority of the field work was undertaken by two botanists from Mattiske Consulting Pty Ltd on 23rd July 1997. The whole of Reserve 31900 was sampled on a 100 metre grid from north to south. Appendix D illustrates the positions of all these transects. Mr G. Kinninmonth from Cable Sands Pty Ltd flagged the area of the proposed mine area prior to the commencement of the survey.

The first transect was 50m west of the Reserve boundary and the second was 150m west. For each transect, sites were recorded at 50m, 150m and 250m south of Burney Road. When returning to Burney Road a transect was walked at 50m west of the transect to ensure the vegetation associations were the same and to record any additional plant species. The transect at 150m nearly bordered the current tip area so due to the disturbance recorded the third transect was placed 50m west of the tip and the fourth transect 100m west of the tip. A site was recorded at 50m on the third transect, but at 75m the edge of the degraded sand quarry would have been sampled so this transect was aborted and a site to the south, behind the tip was sampled. The fourth transect had sites recorded at 50m and 150m. An additional site was sampled about 50m in from the South West Highway as it was the only area observed with *Melaleuca thymoides*, *Acacia alata* and *Jacksonia sternbergiana*.

In the adjacent Reserves three sites were sampled, one opposite the first, second and fourth transects undertaken in Reserve 31900. An additional three sites were also recorded along the fire break beside the adjacent Reserves and the rifle range. These were at 400m, 300m and 100m east along the firebreak

from the South West Highway. Three sites were sampled in the Bunnings land parallel to the South West Highway.

Location 5322 was surveyed on 3rd December 1997. Two sites were sampled in the 3b vegetation Type and three sites in the 20b vegetation Type.

At each site a GPS reading was taken, the approximate age since fire, litter Type and cover (%), bare ground (%) and soil colour and structure ratio was recorded. Each species was listed and the height recorded, together with the percentage of each species alive and dead. Samples were collected of those plants whose identity needed to be confirmed and these were checked with the collections at the Western Australian Herbarium.

All the sites were compared for similarity using Bray-Curtis similarity coefficient to compare the percentage cover of each species present and Jaccard binary similarity coefficient to compare the presence absence of the different species between each sampled site.

2.10.4. Site 7A is not mentioned in the text but appears in Table 1;

Site 7A is included in the text in Section 4.2.3 of the Mattiske report. It is an example of Type 20b vegetation found in Reserve 23307.

2.10.5. 11 Sites were sampled on Reserve 31900 but only 3 on the Bunnings land and the latter were all near the highway. How was the sampling intensity and site selection determined?;

The Bunnings land was not surveyed in detail until it is was known whether this land could be purchased from the owner by Cable Sands for incorporation into the Conservation Estate. Initially three sites were recorded in 1997 and then a further 12 sites were recorded in July 1998. The first three sites were chosen near the South West Highway to compare the vegetation with that on the eastern side of the highway. The twelve sites were selected on a grid basis to maximise the coverage of the Bunnings land.

2.10.6. How was the list of dominant species for Community Types 3b and 20b derived from Gibson Et. Al. (1994)? Is section 4.A.3 of Mattiske et al. (1997) a diagnostic method for distinguishing between community Types 3b and 20b as used by Gibson Et. Al. (1994)?;

Confusion by the reader in the interpretation of the list in 4.1.3 arose from the assumption that that these lists relied on Gibson et al only. This was not case as field data highlighted that additional species occurred within Keighery 3b and 20b areas.

2.10.7. In this list, the dominant species Xylomelum occidentale is incorrectly assigned to community Type 3b, whereas Gibson Et. Al. (1994) lists it as a typical species of 20b. The discussion which follows on page 5 of Mattiske Et. Al. (1997) is confusing. What are the implications of the presence of this species?

2.10.8. Corymbia calophylla does not have to be present to characterise Community Type 3b (Gibson Et. Al. 1994);

2.10.9. Mesomelaena tetragona is listed as typical of both 3b and 20b Types by Gibson et al. (1994) not just 3b as stated in Mattiske Et. Al. (1997);

2.10.10. How was the conclusion that a continuum of species rather than two distinct Community Types derived from the discussion of the similarity between the sample sites based on the Bray Curtis and Jaquard indices (section 4D of the Mattiske Et. Al. 1997) ?;

(2.10.7 – 2.10.10) A number of professional botanists have attempted to define vegetation from different perspective's. Confusion has arisen from the broad interpolation from several plots established by Gibson et al which were located at different ends of the vegetation Type spectrum. These were then translated into boundaries by Keighery on the basis of aerial photographs and then questioned by Mattiske Consulting Pty Ltd on the ground by gridding the area. In earlier reports by Mattiske Consulting Pty Ltd there was an attempt to match the data with 3b and 20b boundaries as defined by Keighery and this led to the confusion in the reading the text and tables in Mattiske Consulting Pty Ltd 1998.

It is important to understand the underlying causative factors determining the patterns of vegetation. The proposal occurs in an area on the interface between fluvatile deposits off the Darling Scarp and the aeolian deposits from the west. This has led to parts of the Reserve having a lens of sand over lateritic soils resulting in the occurrence and gradual change of species which occur predominantly on leached grey sands to those that occur on lateritic soils. Hence the continuum or gradual change across the Reserve from west to east. This interpretation of the continuum was based on the lack of site groupings that corresponded to the map as prepared by Keighery and also on the subtle shift in species from west to east associated with the soil types.

2.10.11. The methodology used by Mattiske Et. Al. (1997) for distinguishing Community Types is different to that of Gibson Et. Al. (1994). Is this methodology far less rigorous than Gibson? More useful comparisons should have been made with the data in Gibson Et. Al. (1994) to clearly illustrate the floristics of the Reserves surveyed;

The methodology adopted by Mattiske Consulting Pty Ltd is more rigorous as all species are recorded within a radius of each site at more locations. Gibson et al should not be used as the only reference in the assessment of the work of Mattiske.

2.10.12. It would appear that 62 species in Reserve 31900 are not found in the adjacent Reserves. Doesn't this point out the high conservation value of this Reserve?;

The difference in the number of species between Reserve 31900 and other Reserves may relate to the greater degree of sampling in Reserve 31900 and that adjacent areas had been recently burnt, temporarily lowering the number of species.

3. FAUNA

3.1. The fauna assessment conducted by W.G. Martinick & Associates should be verified for its validity. Local knowledge suggests there are more fauna species present than were found during the site inspections and this brings into question the findings of the report. Are additional fauna investigations proposed?

No rare or endangered species were found during site inspections and the conclusion of the assessment was that such species are unlikely to be dependent on the habitats that would be impacted by mining. This conclusion is considered valid given the location of Reserve 31900 as part of an island of relatively open native vegetation with poor prospects of supporting diverse or rare fauna in the long term. Gazetted bird species that could visit the Reserve are wide ranging in daily and seasonal habits and consequently are unlikely to

be affected by the mining operation. No additional fauna surveys are considered necessary.

3.2. The split Reserve that results from this mining proposal will require macro fauna (Kangaroos etc.) to cross the highway and they are unlikely to do this. They are more likely to migrate to adjacent farmland, which is less protected. Will the intense light and noise force fauna away from the area?

Some fauna habitat will be temporarily lost during the mining operations. This is a relatively small part of the fauna habitat available in the group of Reserves and adjoining vegetated land. Experience elsewhere suggests that kangaroos quickly become accustomed to mining activities.

3.3. Will the fauna displaced by this mining proposal have safe access to location 826?

Access for fauna between Location 826 and the eastern side of the highway will not change. No provision for crossings is considered warranted given that the area impacted by mining is a relatively small portion of the total area of vegetated Reserve and freehold land (including Loc 826) that is available as fauna habitat.

3.4. The details and generalisations about fauna are unsatisfactory. Why Didn't Cable Sands append the fauna surveys to the PER?

The fauna surveys were appended to the original CER. Little comment was made regarding these findings at this stage. The important findings of the fauna assessment have been included in the PER.

3.5. A large family of Western Grey Kangaroos reside in Reserve 31900. Although they are not rare or endangered, they are a protected species and have already been heavily impacted by the present mining activities. The Proposal makes little mention of these animals. What are Cable Sands proposing to do, regarding the safe relocation of these and other fauna?

Relocation of the kangaroos that use Reserve 31900 is considered unwarranted. These kangaroos and other fauna will probably use the adjacent Reserves initially. In the long term a larger area of native vegetation providing suitable habitat will be available.

3.6. There is no mention in the PER of Wallabies that roam this area.

No wallabies, or evidence suggesting the presence of wallabies, were identified during the fauna studies. If present, the same issues relate to the wallabies as to the kangaroos (see response to 3.5)

4. LAND EXCHANGE

4.1. The PER argues that by being allowed to mine the 6.1 hectares in Reserve 31900, that after it is rehabilitated and 10 hectares of Bunnings land of comparable conservation value is purchased and included into the Reserve, then better medium to long term biodiversity and nature conservation outcomes will be achieved. In making this assertion did Cable Sands consider the following issues.

4.1.1. Rubbish dumping should be managed regardless of the outcome of this proposal;

Cable Sands believes all land should be managed appropriately. Availability of resources for appropriate management is not always guaranteed however. The proposal will result in a Reserve that is more likely to be managed appropriately in the long term.

4.1.2. The Department of Conservation and Land Management (CALM) has initiated a process of vesting the two Reserves to the North of Reserve 31900 as A class Reserves. What is Cable Sands understanding of the progress of this vesting process?;

The change in vesting of Reserves 23307 and 31901 has been initiated. Progress at this stage is slow due to delays in discussions between CALM and MRWA (who are the current vesting body for Res 31901). There will probably be no change in vesting in the near future.

4.1.3. The creation of this new (CALM) Reserve will create a large continuous Reserve of 52 hectares. This new Reserve will have a highly desirable shape and perimeter to area ratio enabling better management and long term viability of the Reserve. The alternative, proposed by Cable Sands, would create an area of 42 Hectares, which is not adjacent to the existing area, but is split by the South West Highway. Will Cable Sands confirm that the Reserve that results from the mining proposal proceeding, will be smaller than the CALM Reserve created from amalgamating the existing Reserves?;

The change in vesting of the two Reserves will result in the management for conservation of 32ha of land (Res 23307 and Res 31901). Reserve 31900 is currently vested with the Shire of Harvey and no change in vesting has been initiated (D Mingham, CALM, pers comm 5/10/98). Acquisition by Cable Sands of 9.91ha of freehold land for incorporation with the other Reserves will result in a substantial increase in the area to be managed for conservation purposes (from 32 to 42 hectares). If the vesting change of Reserves 23307 and 31901 does not eventuate, Loc 826 will be the only area of land managed for conservation.

4.1.4. When determining if the land proposed for the swap is comparable, did Cable Sands consider that the Bunnings land is adjacent to an air strip, degraded to the West and has heavy industry and residential areas to the North?

4.1.5. How can offering a portion of land that is on the opposite side of the highway be considered a satisfactory substitute for the Reserve land?

(4.1.4 & 4.1.5) Cable Sands considered various aspects of the proposed land swap including adjacent land use. The value of the land includes its intrinsic vegetation values and its location in relation to the Reserves immediately east of the highway.

4.1.6. Bunnings are already proposing to retain location 826 as a buffer for its new mill. What is gained from the purchase of this block by Cable Sands?

Bunnings have reviewed a number of options for Location 826. The acquisition and donation of this land guarantees that the land can be managed appropriately for conservation.

4.2. The area is presently being polluted by wind blown rubbish. This should cease regardless of whether the mining proposal proceeds.

Wind blown rubbish is one of a number of issues relating to present land use. Some of these issues will not be resolved merely by removing the Rubbish Tip.

4.3. The comparative condition of the vegetation also needs to be considered. Inspection of the 6.1 hectares in the eastern part of Reserve 31900 which is proposed for mining reveals it is in excellent condition with little disturbance or weed invasion. In contrast, location 826 is quite disturbed with tracks, weed invasion and in some places mill waste. Has this area been grazed by cattle? Why is this site considered of equal or higher conservation value?

Conservation value of location 826 is addressed in the Mattiske report "Flora and Vegetation Values on Bunnings Land Yarloop" forwarded to the DEP in

August 1998. These values are significant despite the fact that some cattle occasionally access the relevant part of Loc 826.

4.4. Table 4 is misleading as it is based on the premise that rubbish disposal will continue, which should not be the case. The threatening value of rubbish which is apportioned a high value, causes the Reserve 31900 block to record a low overall rating when the results are averaged. If the rubbish is controlled, as it is required to be, then this threatening factor would not be important, and Reserve 31900 would record a higher overall value and conservation status.

Rubbish disposal and uncontrolled access are currently threatening the conservation values of vegetation in the Reserve. There is no guarantee that these threatening processes will cease. The Shire of Harvey has not resolved the issue of providing rubbish disposal facilities for Yarloop residents and is still negotiating with the DEP for a solution to this problem (including the possibility for continued use of Reserve 31900). Even if rubbish disposal is removed from the Reserve, threatening processes still persist with unauthorised rubbish disposal, unauthorised access and weed encroachment.

4.5. The purchase of location 826 is considered a poor substitute for Reserve 31900 land unless it includes the lake on this location. This lake is considered to be the last of the Foothills Lake System and is currently un-cleared. The Lake (wetlands) on location 826 is of great conservation value and surveys have recorded up to 20 different bird species using these lakes. Why haven't Cable Sands considered purchasing this part of location 826?

Inclusion of the designated area of Location 826 is part of a mining proposal that offers significant conservation benefits. Purchase of additional land, including the wetlands to the west, has been considered but the conservation values of the wetland are not comparable with those of the vegetation in the Reserve. Also the costs of such an additional acquisition was prohibitive. . Cable Sands does not have unlimited funds for purchase of land with conservation value out of proportion with the potential impacts on the vegetation values of the Reserve.

4.6. What is the outcome of the agreement to purchase location 826 if approval is only given to mine some and not all of the areas proposed?

No consideration has been given to partial approval of mining in the Reserve. The feasibility of the proposal relies on the whole of the identified orebody being mined.

4.7. Approval for this mining proposal should not be given unless location 826 is purchased. Although this is advocated in the PER, can Cable Sands confirm if mining will only occur, once this land has been purchased?

Cable Sands is committed to purchase and donation of the portion of Location 826 to the Conservation Estate if mining as proposed is approved. An agreement for purchase of the land, subject to approvals, will be available prior to completion of the approval process. At this stage, the agreement is anticipated to be available in approximately 4 weeks.

4.8. Cable Sands has offered location 826 to the Harvey Shire if they are allowed to mine. This area is not pristine bush and with what the residents have put up with over the years and what Cable Sands have already extracted, they should donate this location anyway.

It is not feasible for Cable Sands to purchase and donate land out of proportion to potential mining impacts and return on investment. Cable Sands is committed to donating land to the Conservation Estate based on its intrinsic

conservation value in compensation for potential disturbance of areas in the Reserve with significant conservation value.

The purchase and transfer of the land in Loc 826 will result in the land being owned by CALM for conservation purposes.

4.9. The proposed purchase of location 826 which primarily contains Type 20b threatened Community, may not replace the values of the Type 3b threatened Community found in Reserve 31900. Has Cable Sands investigated the presence and availability of areas containing the threatened 3b Community as close to Reserve 31900 as possible?

The area disturbed by mining on the eastern side of the Reserve is a continuum between vegetation Types 3b and 20b. Cable Sands investigated a number of options regarding purchase of land containing suitable vegetation. The proposed area of location 826, containing threatened Community Type 20b was seen as the most appropriate to replace the 3b/20b continuum on Reserve 31900.

5. IMPACTS OF MINING

5.1. Area Mined

5.1.1. Statements made give the impression that a larger area will be left unmined than is the case. Cable Sands state they will only mine 9.1ha of the total area of 19.7 hectares of sites 3 and 4. The slimes dams will be located on site 2 (3.9ha) and this will leave only 6.7 hectares untouched. Can Cable Sands confirm that these areas will be impacted? If this is all that remains undisturbed, then it will not be of much conservation value.

Areas to be impacted by mining are areas 2(3.9ha), 3(3ha) and 4(6.1ha) on figure 5 in the PER. Of these, area 4 is the only area with native vegetation that will be cleared. Although there is no ore to be mined in Area 2 (highly disturbed area), substantial work is required to rehabilitate this area and it is logical to use the area for mining purposes prior to rehabilitation.

5.1.2. The area to be mined is confusing. It is stated that the additional components not included in the original proposal, and therefore make this proposal different, are rehabilitation, management and protection of 10.6 hectares. In fact, the areas identified in this proposal would require very little rehabilitation. These areas would be the remaining bush in areas 1 (4.6 hectares) and 5 (1.9 and 0.2 hectares) which totals 6.7 hectares. This unmined area (6.7 hectares), would not require rehabilitation to maintain it in its present condition and the reason for the proposal is therefore questionable.

Additional rehabilitation is required in Area 2 from that outlined in the original proposal. Area 3 is also larger than in the original proposal as more ore has been identified. In addition, area 1 requires some weed eradication, fencing and some rubbish removal and area 5 will require fencing and some weed removal. The present proposal also includes the donation of privately owned land (a portion of Location 826) to the Conservation Estate which is greater in area than Area 4.

5.1.3. The rest of areas 2 (3.9 hectares), 3(3 hectares) and 4 (6.1 hectares) is a total of 13 hectares that would be mined or used for bund walls, stockpiles and slimes. Cable Sands would be mining 6.7 hectares of pristine bush which is currently part of a larger area of 8.5 hectares of uninterrupted old growth forest.

The 6.1 hectares of land with vegetation in good condition is part of an 8.2 hectares area (refer Figure 5 in the PER).

5.2. **Operating Impacts**

5.2.1. Will the remaining unmined areas of vegetation be threatened by the pit faces of up to 23 metres in depth. What impacts will these mining pits have on the adjacent unmined vegetation? Has Cable Sands considered subsidence and impacts on the localised water table, which may result from the close proximity of the mining pits?

Experience at Waroona and Yarloop indicates that there is little or no impact of mining at depth next to the vegetation in the area. No adverse impacts are anticipated during the mining phase in the Reserve. The pit is filled progressively as mining passes so that the pit is only at depth for a relatively short time. Subsidence has not been experienced at the Yarloop mine where the pits have been deeper to date than will be mined in the Reserve. Monitoring has not indicated any adverse impacts on the water table in the area adjacent to the mining operation.

5.2.2. Will mining result in small islands of undisturbed vegetation, in what is presently an uninterrupted block? How will these islands of vegetation be protected from adjacent mining operations?

There will be a small island of vegetation and two areas with a larger perimeter to area ratio than at present. In the long term however there will be a much better shape to reduce boundary affects. The areas of native vegetation not mined will be protected by a setback from the mining operations and restricting access to these areas.

5.2.3. Page 9 of the PER states that a typical mine operation is 7 Days per week 24 hours per day. On page 11 it is stated as six days per week 24 hours per day. Will Cable Sands clarify their operating times?

Typically mining is seven days a week and this will apply at Yarloop for most of the operation. Initially six days per week operation may be undertaken.

5.3. **Groundwater**

5.3.1. The PER identifies that the mine will be supplied with water from the existing Brockman Road bore field. In the original CER for the existing mine, the company made a commitment that the mine would have insignificant impact from water abstraction and would not affect other users. Other groundwater users are already experiencing problems with bores drying up and increased salinity levels as a result of Cable Sands existing operations. Has the company identified if it is impacting other users in the area?

Cable Sands is currently working with the Water and Rivers Commission to determine the impacts of groundwater abstraction on neighbouring users. The results of a recent intensive testing programme were inconclusive and further discussions are pending. Cable Sands is also discussing these issues with landowners who may be impacted.

5.3.2. Groundwater abstraction for the borefield was to be from the deeper semi confined Leederville Formation aquifer. There are reports from other users in the area that the existing mining operations are affecting their supply and quality of water. Was the current borefield constructed in the Leederville Formation Aquifer as required, or was it screened in the superficial shallow aquifer?

The current borefield was not required to be constructed in the Leederville Formation and the original proposal (see NOI and CER for the original Yarloop proposal) specified abstraction from the shallow superficial aquifer.

Discussions with the Water and Rivers Commission are continuing to clarify this issue.

5.3.3. Cable Sands extract a considerable volume of water and this is currently under investigation by the Water and Rivers Commission. Given that Cable Sands is currently only drawing half their forecasted water, have they confirmed if they have recorded increasing salinity levels in the production bores even before the full abstraction rate is achieved?

Investigations are currently taking place into impacts of abstraction on the groundwater. There is no intention for abstraction from the Yarloop borefield to increase significantly.

5.3.4. The proposed minesite is located on an unconfined superficial aquifer and in an area where recharge to the deeper confined aquifer is considered possible. As such the groundwater resources in the area are considered vulnerable.

Potential impacts on recharge to the deeper confined aquifer, if any, are very localised in terms of the total area that would be involved in recharging this aquifer.

5.3.5. The Environmental Management System (EMS) proposed in the document does not mention the reporting and investigation of pollution incidents which may have adverse affects on the environment. How will Cable Sands report these incidents?

Cable Sands accredited EMS requires reporting of all environmental incidents and appropriate response. Where applicable these will be reported to the DEP and/or WRC. As part of the operating licence for Yarloop, Cable Sands is required to report any breaches of licence conditions including pollution incidents. In addition, the EMMP for Yarloop indicates that Cable Sands will respond to anomalous monitoring results in consultation with DEP and/or WRC.

5.3.6. If the proposal results in digging up of rubbish that has already been buried at the tip site, the disturbance and re-burying of this material will result in chemicals and other contaminants to leach more freely into the water table. It is recognised that these contaminants would already be leaking, but at a slower rate than if they were disturbed. If the rubbish site is mined, how will Cable Sands dispose of the rubbish in a manner that prevents contaminants leaching?

The rubbish already on site will be relocated and buried at a level several metres above the water table. Contaminants already within the rubbish will continue to leach and there may be some temporary acceleration of this leaching. However, given the short operating life of the mine, this is considered minor in terms of the overall impact of the rubbish tip.

5.3.7. The slimes dams are to be located on the old tip site. As these dams are unlined there will be constant water seepage leaching through the rubbish. This will increase the leaching of contaminants into the water table. Will this cause a health concern to other local users of this water, including the Cookernup and Yarloop townships, which draw water from this groundwater supply?

Slimes dams dry out primarily by evaporation, with some seepage also contributing. It is not anticipated that there will be a substantial increase in the leaching of contaminants from the rubbish. Subsequently, there will be no additional health concerns for Cookernup and Yarloop water users.

6. REHABILITATION

6.1. The rehabilitation techniques proposed by Mattiske which suggest the site can be rehabilitated, do not take into account the recalcitrant nature of many of the species and that they cannot currently be propagated. The cost of propagating many of the species at the numbers required is prohibitively expensive and is therefore unlikely to be carried out by the company.

6.2. The rehabilitation section of the PER describes appropriate seed collection methods. What is the appropriate method? For seed collection to be appropriate, it must occur over a minimum of at least one-year to enable collection of the full range of species present in the area. Given the intent of Cable Sands to begin mining as soon as is possible how will this be achieved?

6.3. There are many species of flora for which seed cannot be collected. If seed collection of these species is not carried out and this is an isolated remnant, how will the species be regenerated?

(6.1, 6.2, & 6.3) The proponent is committed to recruiting as many species as possible into rehabilitation areas. A range of propagation techniques will be applied to encourage genotypic and species diversity including seeding, planting, smoke treatment, translocation of recalcitrant species and translocation of understorey species and soil. Seeds or cuttings will be collected by licensed operators from the Reserve and other areas in the vicinity to ensure the propagation of local endemic species.

Seed and cutting material for rehabilitation will be a sourced from adjacent areas and areas in the Reserve left undisturbed following mining.

6.4. Will topsoil be loosely deposited in low (< 1.5m) stockpiles to maintain soil and biologic processes?

Stockpile size will be kept to a practical minimum and maintained for as short a time as possible on areas already disturbed by previous tip operations or on adjoining farmland. Translocation of understorey species together with topsoil will facilitate further the maintenance soil and biological processes.

6.5. The topsoil recovered from Reserve 31900 will be very high quality. Has Cable Sands considered using some of this topsoil to rehabilitate other disturbed lands, in areas proposed for inclusion in the Conservation Estate? This may lead to a better overall result in the rehabilitated mined land.

Cable Sands' primary consideration is the successful rehabilitation of Reserve 31900. Given that topsoil will be diluted to rehabilitate a larger area than is cleared during mining there will be no spare topsoil available for other Reserves.

6.6. Final requirements of the tip area rehabilitation plan will be dependant on the requirement of the Shires waste minimisation and recycling strategy.

The rehabilitation plan will be prepared in consultation with the Shire of Harvey to ensure that the plan reflects the waste disposal intentions of the Shire.

6.7. Has Cable Sands investigated the possibility of constructing stockpiles outside of the Reserve area to minimise disturbance in Reserve 31900?

Stockpiles in Reserve 31900 will only be located on the degraded area 2 or on areas cleared for mining. This will mean that there is likely to be stockpiles located off the Reserve as well as on it.

6.8. Will the rehabilitation programme for the Bunnings land include fencing to keep out cattle? Will the Bunnings land be included in the weed control programme proposed for Reserve 31900?

Portion of Location 826 (Bunnings land) will be given to the CALM for vesting with the NPNCA who will be responsible for the management of this land. Fencing will be undertaken by Cable Sands as part of the subdivision of this part of Loc 826.

6.9. Whilst some portions of the Reserve may be considered by some people as acceptable to mine, the treed area to the east of the rubbish tip has large numbers of mature She- Oaks and this area should not be mined.

About 25% of the area east of the active rubbish tip in the Reserve will remain undisturbed following mining. The rehabilitation plan will address the creation of a range of habitat for fauna and the recruitment of trees to reflect the relative dominance that existed prior to mining. An abundance of She-Oaks can adversely modify the biodiversity values of the Reserve.

6.10. There appears to be a lack of commitment to ongoing monitoring of the success of the rehabilitation.

6.11. The duration of the rehabilitation, maintenance and monitoring programmes implied in the PER are not long enough to ensure the area will be satisfactorily rehabilitated. As a minimum the proponent should be responsible for a five-year rehabilitation plan period and an additional ten-year monitoring and maintenance programme.

(6.10 & 611) The rehabilitation plan will include a program for monitoring the progress of rehabilitation.

6.12. The research listed below is relevant to understanding the success of the Mineral Sands Industry rehabilitation programmes. Based on the results of this Type of research, how does Cable Sands consider that the rehabilitation and maintenance programmes they have proposed in the PER will be long enough to ensure the area is satisfactorily rehabilitated?

6.12.1. Jackson and Fox (1996/2) observed ant communities at Tomago in NSW and concluded that the impact of mining was severe even after 18 years. The massive disruption by both clearing and mining was demonstrated by the almost total change in the composition of the ant communities.

6.12.2. Twigg and Fox (1991), observing a previous mine path in the Myall Lakes National Park, NSW, states that following the destruction of lizard habitat, it seems likely that a period well in excess of 20 years may be necessary before the lizard fauna on the mining path reach pre- mining levels.

6.12.3. Fox ET. Al. (1996/1) having studied the rehabilitation of vegetation following mining at Tomago, NSW, concluded that after 17 years of regeneration cleared and mined sites had not returned to the pre- disturbance state. Understorey height, amount of vegetation and species richness on mined sites have not achieved the levels in the original forest.

(6.12., 6.12.1, 6.12.2, 6.12.3)The proponent is committed to the utilisation and assisting in the development of the latest rehabilitation techniques that apply to the rehabilitation of mineral sand mining areas in the south west of Western Australia. The application of these techniques, the provision of land with significant conservation value to the Conservation Estate and the control of threatening processes to other areas of the Reserve will result in a better environmental outcome than if the proposal did not proceed.

7. SOCIAL ISSUES

7.1. Transfer Station

7.1.1. The proposal to mine leaves the Shire of Harvey trying to find a site for the rubbish transfer station. What are Cable Sands obligations to participate and contribute to this process?

Cable Sands will work in with the Shire of Harvey to establish an appropriate facility in Reserve 31900 if this is required. If the Shire decides to locate a facility outside Reserve 31900 in the near future, Cable Sands will rehabilitate the whole of the Reserve.

7.1.2. Has Cable Sands investigated the impacts that any relocation of the proposed transfer station will cause?

7.1.3. Discussion with the Shire of Harvey reveals that relocation of the transfer station is opposed on Reserve 31900. The other location for this transfer station is the corner of Boundary Road and the South West Highway, within 250 metres of residences. Has Cable Sands considered that the relocation to this site will cause environmental problems to the residents, such as smoke from the burning of garden waste, odour, flies, windblown rubbish and encourage feral animals, in what is currently a lovely treed area?

7.1.4. Given the small size of the transfer station and the fact that it could be well managed, why wont it be left at the tip site after mining?

7.1.5. Did Cable Sands consider that residents will be affected if the transfer station is moved too far from residences?

(7.1.4 & 7.1.5) Relocation of the proposed transfer station is an issue for the Shire of Harvey and the DEP to resolve. Cable Sands is not responsible for resolving the issue of relocation (or not) of the transfer station. This issue is coincidental with the mining proposal.

7.1.6. Council is considering a proposal to locate the Yarloop sewerage treatment plant in the mined area. What is the status of this proposal? If it goes ahead will this further reduce the areas rehabilitated to conservation purposes.

Cable Sands understands that location of the Yarloop sewerage treatment plant is not being considered for Reserve 31900. Water Corporation is investigating options for location of this facility including an area to the east of Reserve 31900. These options do not include Reserve 31900 to Cable Sands knowledge.

7.2. Aboriginal Heritage

7.2.1. The PER comments that the Aboriginal Affairs Department has been consulted in regard to recorded sites in the proposed development area. Cable Sands were advised that the likelihood of sites occurring is unlikely. This statement is most likely true, but the statement is also most likely based on no heritage survey being undertaken in the development area. It is recommended that the proponent undertakes an Aboriginal Heritage Survey and consult with the local aboriginal Community to ensure that no heritage sites are impacted during development.

An Aboriginal Heritage Survey is considered unnecessary due to the likelihood that no archaeological sites are present (no water, raw materials or dominant features are present) and the level of disturbance of the Reserve. The Reserve has operated as an active tip for the last 25 years without the presence of any Aboriginal Heritage sites being indicated.

However, given Cable Sands desire for a prompt resolution of this proposal, the company is willing to commit to an Aboriginal Heritage survey prior to mining in the Reserve.

7.2.2. The PER identifies that if in the event skeletal remains or an aboriginal site are unearthed, then the Department of Minerals and Energy will be advised. Cable Sands should contact the Police Service, the local Aboriginal Community and the Aboriginal Affairs Department.

Cable Sands commits to contacting the Police and the Aboriginal Affairs Department in the event of finding skeletal remains or an aboriginal site.

7.3. **Community Consultation**

7.3.1. There does not seem to have been very much community consultation on the proposal or its resulting impacts.

Community consultation has been at a level considered appropriate for the project and has included site visits, stakeholder briefings, a media release coinciding with the release of the PER, phone calls to interested parties and discussions about the project with immediate neighbours.

7.3.2. Section 1.5 of the PER states that community consultation to the wider community will occur when on site operations begin. Why does Cable Sands consider that this is an appropriate time to inform the general public?

The relevant section of the PER refers to media releases where appropriate and provides an example of commencement of operations as one such appropriate instance. This will be the first time when Cable Sands' activities in the Reserve will be readily visible and may impact on tip users.

7.4. **Landscape Value**

7.4.1. The Shire of Harvey District Planning Scheme makes specific reference to places of landscape value and conservation of places of heritage value. It recommends that for the area generally between the South West Highway and the Darling Scarp, that mining should be discouraged, clearing restricted and important landscape features placed in Reserves. The comments on Page 54 of the PER make no reference to these planning requirements. In regard to visual amenity impacts, the PER concludes that dense tree planting and bunding will ensure visual amenity is maintained. Existing mining operations in Benger and Yarloop demonstrate that mining impacts the visual amenity. The construction of bunds, which is proposed in the PER, destroys the vista to the scarp and will significantly impact visual amenity. This proposal is inconsistent with the requirements of the District Planning Scheme. Will this proposal be referred to the Harvey Shire Council?

The Shire of Harvey is aware of the proposal and has provided comment to the EPA. Impacts on visual amenity of mining in the Reserve are minimal because of the area that will remain uncleared between the Highway and the mining area. This will more than 75m wide for most of western boundary.

7.4.2. Reserve 31900 forms part of an area, which has mature dense Jarrah and She-Oak of great beauty. This contributes significantly to the landscape value of Yarloop and the South West Highway. How will Cable Sands replace these landscape values? All steps should be taken to avoid any risk to, or loss of this beautiful remnant forest.

The landscape value as viewed from the South West Highway is unlikely to be impacted by the mining operation which is well screened by the existing vegetation. The areas impacted by mining will, in the long term, have improved landscape values as a larger area will contain native vegetation.

7.4.3. The total area of She-Oak country has been earmarked as a tourist attraction to compliment the Yarloop Workshops.

The areas where the she-oaks dominate are immediately adjacent to the rubbish tip and are unlikely to compliment tourist activities associated with the Yarloop Workshops. In the long term, the rehabilitation of the Reserve will allow a greater range of options to be considered for the Reserve, possibly including tourism.

7.4.4. Extension of the mine life will directly impact the lifestyle and peaceful environment of the residents by a minimum of 16 months. The current operations, which are causing a major impact on our tranquil environment, have already been extended beyond there initial projected time. How can Cable Sands guarantee the life of mine will not be extended?

Current operations have not been extended beyond the initial projected time as set out in the original CER. Mining is unlikely to extend beyond the projected time given the current market situation for mineral sands products.

7.5. **Noise and Dust**

7.5.1. Cable Sands indicate that they will comply with the appropriate noise regulations. There are provisions in the regulations for allowing unreasonable noise to be made, especially during construction. Do Cable Sands intend to draw on these provisions if noise becomes a problem, as they have done already, at the current operations?

Cable Sands does not believe that noise generated from operations within the Reserve will give rise to levels in excess of those specified in the regulations.

7.5.2. Why were the results of more recent noise modelling and monitoring not included in the PER?

Noise modelling and monitoring that has been undertaken at the current operation represents the worst case scenario where mining operations are within 100 m of the nearest premises. Mining in the Reserve is more than between 800 and 1200m from the nearest residence who is currently approximately 400m from the operating wet plant.

7.5.3. Noise and dust from the current operations already significantly impacts the quality of life of residents who live nearby. In particular, it is affecting our children. How will Cable Sands ensure that noise and dust will not get any worse as a result of this mining project proceeding?

Mining in Reserve 31900 is significantly further away from neighbours than the current Yarloop operations and is unlikely to pose a greater problem to neighbours. Noise and dust issues at Yarloop are continually being assessed and operational improvements made (eg recent modifications to acoustic muffling of earthmoving equipment).

7.5.4. The strong easterly winds during the summer months will cause problems with dust. This has occurred at the current operations and they have been unable to contain it with the equipment they have on site. What additional programmes and equipment are Cable Sands proposing to control dust?

The strong easterly winds are the greatest potential problem for dust emissions. The situation with the current operations is potentially worse than the proposed mining in Reserve 31900 where licence limits are unlikely to be exceeded. With the current operations, additional application of dust suppressants (including slimes form the process circuit), use of the sprinkler

system for the mine access road and improved management of the timing of potentially dust generating activities has or will occur.

7.5.5. The mining operations are creating large amounts of dust which deposit on the surrounding farms and facilities. This land is used for dairying and the farmers are subject to strict regulations on their milk quotas for cleanliness. An increase in dust will make what is already an onerous task more difficult and less cost effective. The whole dairy operations will be impacted by dust and noise. How does Cable Sands propose to reduce noise and dust from their current operations, affecting their neighbours and prevent them increasing, if the mining of this area proceeds?

Examples of ongoing improvements in dust and noise management are given above. Mining in the Reserve will not have an adverse impact on the dust or noise issues for neighbouring residents.

7.6. **Transport**

7.6.1. The PER details truck movements along the highway and concludes, based on Cable Sands own report, that the number of trucks is insignificant. Has this Cable Sands report been verified. Users of this stretch of highway disagree that this impact is insignificant. The single lane highway is already inadequate and poorly maintained for the existing amount of traffic. With no passing lanes the winding highway will become further congested. What information did Cable Sands base these statements on?

Information in the draft Southern Province transport strategy (Department of Transport, 1996) indicates that the highway between Yarloop and Bunbury has 5000 – 7000 vehicle movements per day. The current trucking operations (approximately 35 return trips per week day for two weeks each month) represent less than 1% of the total vehicle movements. The trucking from Yarloop replaced that from Waroona which was undertaken using a similar regime and which passed along the South West Highway through Yarloop.

7.6.2. Will trucking occur 24 hours per day, seven days a week?

The trucking regime for this proposal will be the same as for the existing mining operation. There will obviously be a 16 month extension of the time that trucking takes place. Trucking is normally undertaken between Monday and Friday during daylight hours although there is sometimes a requirement to operate outside these times.

7.6.3. The safety and health of children is of paramount importance. The increase in trucks entering and leaving the minesite will increase the danger to children using this section of the highway and to everyone else. Why didn't Cable Sands discuss in the PER if the number of trucks would increase as a result of this mining proposal? How will Cable Sands ensure safety is maintained at this entrance?

The daily number of trucks will not increase although there will be a 16 month extension of the time period that trucking will occur. The entrance to the Yarloop mine has been designed in consultation with the Department of Main Roads to provide as safe an entrance to the highway as possible. A turning lane and large signs have also been installed to reduce the likelihood of accidents at the turnoff to the site.

Appendix 7

Predicted noise levels for mining within Reserve 31900

(Cable Sands, 1999)

		Typical worst case operating levels at 150m	Noise Regs (no influencing factors)	Calculated levels Level at 650m =level at 150m -log(650/150)*20			
				650m factor 3dB	750m factor 3dB	1100m Factor 0dB	1250m factor 4dB
Daytime	La10	47	45	34	33	30	29
	La1	55	55	42	41	38	37
	Lamax	61	65	48	47	44	43
19-22	La10	42	40	29	28	25	24
	La1	46	50	33	32	29	28
	Lamax	58	55	45	44	41	40
22-7	La10	39	35	26	25	22	21
	La1	43	45	30	29	26	25
	Lamax	45	55	32	31	28	27