

# **Heavy minerals mine — Beenup**

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**Mineral Deposits Limited**

**Report and recommendations of the  
Environmental Protection Authority**

**Environmental Protection Authority  
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## Foreword

In January 1990, in a foreword to the assessment of the last major heavy minerals mine proposal at Jangardup, south of Nannup, the Environmental Protection Authority recognised the high level of public interest in prospects for the establishment of the mineral sands industry in the south coast region.

The Authority stated that it "... believes that it should make no final recommendations about any other major mineral sand mining proposals in the south coast region until a regional assessment is considered." It recommended that such an assessment take account of the need to optimise the social, environmental and regional economic benefits to the community. The Authority's objective was to have the need to assess mining in a regional context on the south coast considered by Government. The EPA particularly sought to have addressed the issue of sensitive areas where mining would not be appropriate.

In April 1990 the Government issued two documents, prepared by the Department of Resources Development, in response to the Environmental Protection Authority's recommendation. These documents were entitled "South Coast Mineral Sands - Government Policy" and "South Coast Mineral Sands - Government Strategy". As the name suggests, these documents were based on existing Government policies. Although providing a useful summary of the status-quo, they did not address the identification of which areas may be suitable for mining and which should be reserved from it. The Environmental Protection Authority considers that while they were a starting point these documents did not amount to a regional assessment and therefore a more comprehensive analysis of issues relevant to the industry in the region is still required.

During 1990 the "Mineral Sands - Doing it Better" committee, chaired by the General Manager of the Environmental Protection Authority, reported on ways to improve communication about and environmental performance in the mineral sands industry. This committee could have an important role in future as a forum for debate about issues of concern to the community and the industry.

The Department of Resources Development (DRD) has now a much more comprehensive strategy for the mineral sands industry for all of Western Australia, with public input. Recent regional press advertisements have called for public nominations of interest in this new process. The Environmental Protection Authority has reviewed the scope of this study and considers that it covers many important and relevant issues. The Authority welcomes this more comprehensive and public approach, the results of which will be available in 1991.

In view of the commitment by Government to prepare a comprehensive and public strategy for the mineral sands industry throughout the State, the Environmental Protection Authority now believes that this should meet a large part of the objectives for a regional assessment covering the south coast region.

Some additional topics require a regional overview by the Environmental Protection Authority.

The Authority now has before it a proposal to develop a heavy minerals mine at Beenup, 17 km north-east of Augusta. The Authority believes that three issues which need to be examined in a regional context by the new strategy are of particular importance in the light of the Beenup proposal but are beyond the scope of the assessment report on Beenup specifically. These issues are:

- heavy transportation in the south-west, particularly the choice between road and rail transport with regard to the emission of Greenhouse gases. This would properly be covered by Department of Resources Development;
- identification of locations where mineral sands mining would not be environmentally acceptable; and
- identification of locations where downstream processing would not be environmentally acceptable. The Environmental Protection Authority intends to co-ordinate work on these last two issues.

Given the recent release of the Government Policy on national parks, which foreshadowed exploration and potential mining in areas now part of or proposed for inclusion in the D'Entrecasteaux National Park, the possibility exists that more mining may be proposed in the south coast region. This raises the

possibility of increased product tonnage making the continuing review of rail transport important and increases the urgency to define those locations where mining and processing would be environmentally unacceptable. These cumulative issues illustrate that the Beenup proposal should not be considered as a development in isolation and emphasises the need for a regional strategy which goes beyond the issues which can be considered in an assessment report on an individual proposal.

Consideration should extend to established and future land uses which may not be compatible with mining such as national parks or other areas with very high conservation, landscape or recreational values. Some tourism, urban, rural or other small business developments will also require special consideration if mining is contemplated in some areas. Considering the extent to which many landuses in the region depend on natural and quality of life values, the Authority considers that not only should the environment be protected but also people should have an opportunity to publicly examine a long term future which may include mining and the ways in which it might best be integrated into the area such that existing benefits are not lost at the expense of the economic benefits which may accrue from mining.

While the Department of Resources Development could reasonably be expected to collate technical information about mineral prospectivity, infrastructure and economic matters the Environmental Protection Authority firmly believes that the Authority itself should be pro-active and take the lead in identifying those areas where mining, secondary processing or similar activity would not be an environmentally acceptable landuse. At the same time the Authority would expect to evaluate relevant social issues using the expertise of the Social Impact Unit, and make transportation recommendations which are consistent with the State Greenhouse strategy.

The Authority believes that it should consider these issues on a regional basis rather than being constrained to examining environmental impacts on a project by project basis as each proposal is put to it. The Authority intends to undertake this analysis and to publish the results. In this connection the Authority would expect to work in parallel with the Department of Resources Development and any other agencies involved in developing their strategy.

## **Summary and recommendations**

The Environmental Protection Authority has assessed a proposal by Mineral Deposits Limited (MDL) to mine and concentrate heavy mineral sands at Beenup, 17km north-east of Augusta, and truck the product to Bunbury (Figures 1 and 2).

The proposal was referred to the Environmental Protection Authority in 1989 and assessed at Environmental Review and Management Programme (ERMP) level, recognising that the site bordered the Scott National Park and that sand mining had not previously occurred in this area. The proposal is one of the first in which the Environmental Protection Authority has undertaken assessment of social issues, with the assistance of the Social Impact Unit.

Public interest in the proposal was high and 136 individual written submissions and some 380 form letters were received on the proposal.

### **The proposal**

Mineral Deposits Limited proposes to mine about 50ha of farmland per year, by dredging, to produce 500,000 tonnes of heavy minerals annually, for at least 20 years.

The dredge would float on the natural watertable surface and reach to the bottom of the deposit without the need to raise or lower the water table.

Minerals would be separated from the ore in a wet concentrator floating behind the dredge and by dry concentration at a dry mill at the north of the site.

Sand and fine tailings would be returned to the dredge pond and subsequently rehabilitated to re-establish both pasture and belts of native vegetation.

Mineral products would be trucked to Bunbury via Sue's Road and a route, to be proposed by the Main Roads Department, which is yet to be assessed by the Environmental Protection Authority.

Some 200 construction workers and later 115 permanent employees would work on the proposal.

### **The location**

The mine-site and dry mill are proposed to be established on private farmland which is about 65% cleared.

The site adjoins other farms and the Scott National Park. Drainage is to the south and west to the Scott and Blackwood Rivers respectively.

Surficial groundwater supports native vegetation, pasture and stock waterpoints. A large, deep aquifer of good quality water exists, at greater depth, in the Lesueur sandstone.

Dieback disease occurs in the area and many native flora species are susceptible to it. A number of rare and other species of interest occur in the region although no gazetted rare species occur on the mining path.

Augusta is the main town in the area with a wide range of community services. Some are being used near to their capacity. The present economy is largely reliant on agriculture and tourism. A significant number of retired people live in the area.

### **Issues**

The Environmental Protection Authority has previously said it believes that a regional assessment of the mineral sands industry in the lower south west should be considered. The Environmental Protection Authority now believes that further initiatives such as that recently commenced by the Department of Resources Development and other initiatives within the Authority to identify locations where mining or downstream processing would not be environmentally acceptable, should meet this need.

The key issues specifically related to the Beenup proposal are:

- management of surface water flows;
- management of clay fraction tailings (slimes);
- protection of Scott National park;
- identification and management of rare flora;
- comprehensive dieback management;
- monitoring of groundwater aquifers;
- development of a suitable package to support local infrastructure;
- management of impacts on nearest neighbours;
- transportation; and
- rehabilitation.

These issues have either been addressed in commitments made by the proponent or in the recommendations of the Environmental Protection Authority. The issues and the Environmental Protection Authority's recommendations are outlined below.

### **Recommendation 1**

**The Environmental Protection Authority has concluded that the proposal as modified by the process of Interaction between the proponent, the Environmental Protection Authority and public and government agencies consulted is environmentally acceptable and could proceed subject to:**

- **the proponent's commitments; and**
- **the Environmental Protection Authority's recommendations in this report.**

The Environmental Protection Authority considers that any approval for the proposed based on this assessment should be limited to five years. Accordingly, if the proposal has not been substantially commenced within five years of the date of this report, then such approval should lapse. After that time, further consideration of the proposal should occur only following a new referral to the Authority.

The Authority notes that during the detailed implementation of proposals, it is often necessary or desirable to make minor and non-substantial changes to the designs and specifications which have been examined as part of the Authority's assessment. The Authority believes subsequent statutory approvals for this proposal could make provision for such changes, where it can be shown that the changes are not likely to have a significant effect on the environment.

Since MDL proposes to maintain the natural groundwater level in the dredge pond, no significant environmental effects on the surrounding water table are anticipated. Monitoring and careful management will, however, be required.

### **Recommendation 2**

**The Environmental Protection Authority recommends that a comprehensive groundwater monitoring programme, as part of an overall Environmental Management Programme, be developed and implemented to the satisfaction of the Environmental Protection Authority, on the advice of the Geological Survey and the Water Authority of Western Australia, prior to excavation of the dredge pond, and that additional drawdown attributable to the proposal should not exceed half a metre at the boundary of any neighbouring land.**

Surface water management and the prevention of turbid water releases to the adjacent Park or rivers will be an important aspect of the proposal. The approach to surface water management proposed by MDL should manage such water flows satisfactorily but the Environmental Protection Authority believes that details for surface water management should be presented in a detailed environmental management programme.

### **Recommendation 3**

**The Environmental Protection Authority recommends that a comprehensive surface water management plan, as part of an overall Environmental Management Programme, be prepared by the proponent to the satisfaction of the Environmental Protection Authority, on advice from the Department of Agriculture, and subsequently implemented before site works commence.**

MDL propose a novel approach to directly return slimes to the dredge pond which should mitigate the usual problems of slimes handling and drying. The Environmental Protection Authority believes the proposed approach should be reviewed after 12 months of operation and an environmentally acceptable contingent method of slimes handling be implemented if the new method does not perform to expectations.

### **Recommendation 4**

**The Environmental Protection Authority recommends that the proponent review and report to the Environmental Protection Authority on slimes handling operations 12 months after the commissioning of the dredge and that continued operation be to the satisfaction of the Minister for the Environment, on the advice of the Environmental Protection Authority in consultation with the Department of Mines. The Environmental Protection Authority further recommends that, should slimes handling not be to the satisfaction of the Minister for the Environment, then the proponent should develop and implement a contingency plan satisfactory to the Minister for the Environment, on the advice of the Environmental Protection Authority, within 12 months, or cease operations.**

The fungal causative agent of dieback disease is likely to already be widespread on the Scott Coastal Plain. Accordingly, precautions to limit the further spread and intensification of the disease are appropriate.

### **Recommendation 5**

**The Environmental Protection Authority recommends that comprehensive dieback management prescriptions be developed by the proponent, in consultation with the Department of Conservation and Land Management, to the satisfaction of the Minister for the Environment on the advice of the Environmental Protection Authority and the Department of Conservation and Land Management, prior to any earthmoving operations at the mine-site, for road construction or to obtain construction materials for earthworks.**

In consultation with the local community, the proponent has developed road transport via Sue's Road as an economically viable option which the community found preferable to sea transport alternatives. Some 30% of people making submissions would prefer rail transport, however, although it has been stated that high capital costs are prohibitive at present. Given public preferences and the potential to reduce Greenhouse Gas emissions, the Environmental Protection Authority believes the rail option should be kept under review for opportunities to capitalise on the transport of heavy minerals in conjunction with other freight.

### **Recommendation 6**

**The Environmental Protection Authority recommends that rail transport be kept under review by Government with a view to planning for regional heavy transport by rail in the future.**

The social impacts of the proposal should be manageable provided the proponent's commitments are met, suitable local infrastructure is provided and the needs of the community are monitored.

### **Recommendation 7**

**The Environmental Protection Authority recommends that formal liaison, monitoring and public reporting processes be established by the proponent to the satisfaction of the Environmental Protection Authority, upon advice from the Social Impact Unit prior to the commissioning of the dredge, to monitor, review and manage the social impact of the project throughout its life.**

Those neighbours nearest to a development often experience the highest levels of impacts but may not directly benefit from it. Noise is the issue requiring the closest attention in this case. Noise generated by the proposal should comply with guidelines set by the Environmental Protection Authority for all residences throughout Western Australia. Even if these guidelines are met, it is possible that some noise may be perceived as intrusive by a few near neighbours. 'Good neighbour' relations by the proponent to manage this possibility are encouraged by the Environmental Protection Authority.

### **Recommendation 8**

**The Environmental Protection Authority recommends that the maximum noise levels at residential premises surrounding the proposed mine and dry mill should not exceed:**

**50dB(A) from 7am-7pm, Monday to Saturday**

**45dB(A) from 7am-7pm, Sunday**

**45dB(A) from 7pm-10pm, every day**

**40dB(A) from 10pm-7am, every day**

**and should not cause unacceptable annoyance due to tonal or impulsive components.**

Effective rehabilitation, consistent with the surrounding land, is vital to sustainable landuse after mining. The Environmental Protection Authority endorses the proposed approach of community consultation about end landuse objectives.

### **Recommendation 9**

**The Environmental Protection Authority recommends that a rolling rehabilitation plan be developed within 12 months of the commencement of productive mining and regularly reviewed, to the satisfaction of the Environmental Protection Authority on advice from the Departments of Mines, Agriculture and Conservation and Land Management.**

## **Conclusion**

Following assessment of the proposal and commitments made by Mineral Deposits Limited, the Environmental Protection Authority has concluded that the mining of heavy minerals at Beenup and the transport of products via Sue's Road is environmentally acceptable subject to the operation being carried out in accordance with the commitments in the ERMP, the proponent's additional commitments made in response to submissions and the recommendations of the Environmental Protection Authority.

The Environmental Protection Authority further concludes that the transport of products north of Sue's Road and the provision of electrical power to the site are still subject to environmental and social assessment by the Authority, with public review.





# 1. Introduction

Mineral Deposits Limited (the proponent) proposes the mining and concentration of heavy mineral sands at Beenup, 17km north-east of Augusta, and transportation of the products by road to Bunbury (Figures 1 and 2).

The Environmental Protection Authority determined that an Environmental Review and Management Programme (ERMP) was required to assess the proposal, following referral in 1989. This level of assessment was set in recognition of the size of the operation, the 'greenfields' location adjacent to Scott National Park, the magnitude of the associated transport task and the range of social impacts flowing from the introduction of a new industry with 115 employees into a region previously largely dependent on agriculture and tourism.

This proposal is one of the first in which the Environmental Protection Authority has undertaken an assessment of social issues with the assistance of the Social Impact Unit.

Accordingly, draft guidelines for the ERMP were circulated to specialist and community groups prior to their finalisation and issue to the proponent. This proposal was also notable for the level of community consultation and interaction initiated by the proponent. Government agencies, including the Environmental Protection Authority and Social Impact Unit, also participated in a number of community interactions, ranging from field days to individual meetings, designed to facilitate the exchange of information about the area and the assessment process. The Department of Mines also co-ordinated meetings to consider rehabilitation options.

The proponent's consultation programme has been both extensive and intensive. The provision of information to and involvement of the community in the project's design has broken new ground in the development and assessment of major resource projects in Western Australia.

The proponent's commitment to ongoing consultation and monitoring is strongly supported.

Community interaction led to significant modifications to the proposal, notably the abandonment of ocean based transport options as a result of public concern as well as engineering and economic factors.

The Environmental Protection Authority commends both the proponent for its community consultation initiatives and community members for their active response to opportunities to become informed about and comment on the proposals.

The Environmental Review and Management Programme was released for a 10 week public review period in April 1990. During this period, a Government Policy and Strategy on Mineral Sands Mining in the South-West was released by the Department of Resources Development in response to an earlier call by the Environmental Protection Authority for an overview of sand mining prospects in the region (Environmental Protection Authority, Bulletin 422). A report to the Augusta-Margaret River Shire Council on the social aspects of the community by CSIRO scientists was also released during the review period. In addition, the Council commissioned a consultant to review the Environmental Review and Management Programme and community members funded another consultant to undertake a hydrological assessment of the proposal.

Following the receipt of submissions from the public and expert advice from other Government departments and its own officers, the Environmental Protection Authority forwarded a consolidated list of additional questions to the proponent (Appendix B). The Environmental Protection Authority has considered the ERMP, public submissions, other expert advice and the proponent's responses to the submissions in its assessment of this proposal.

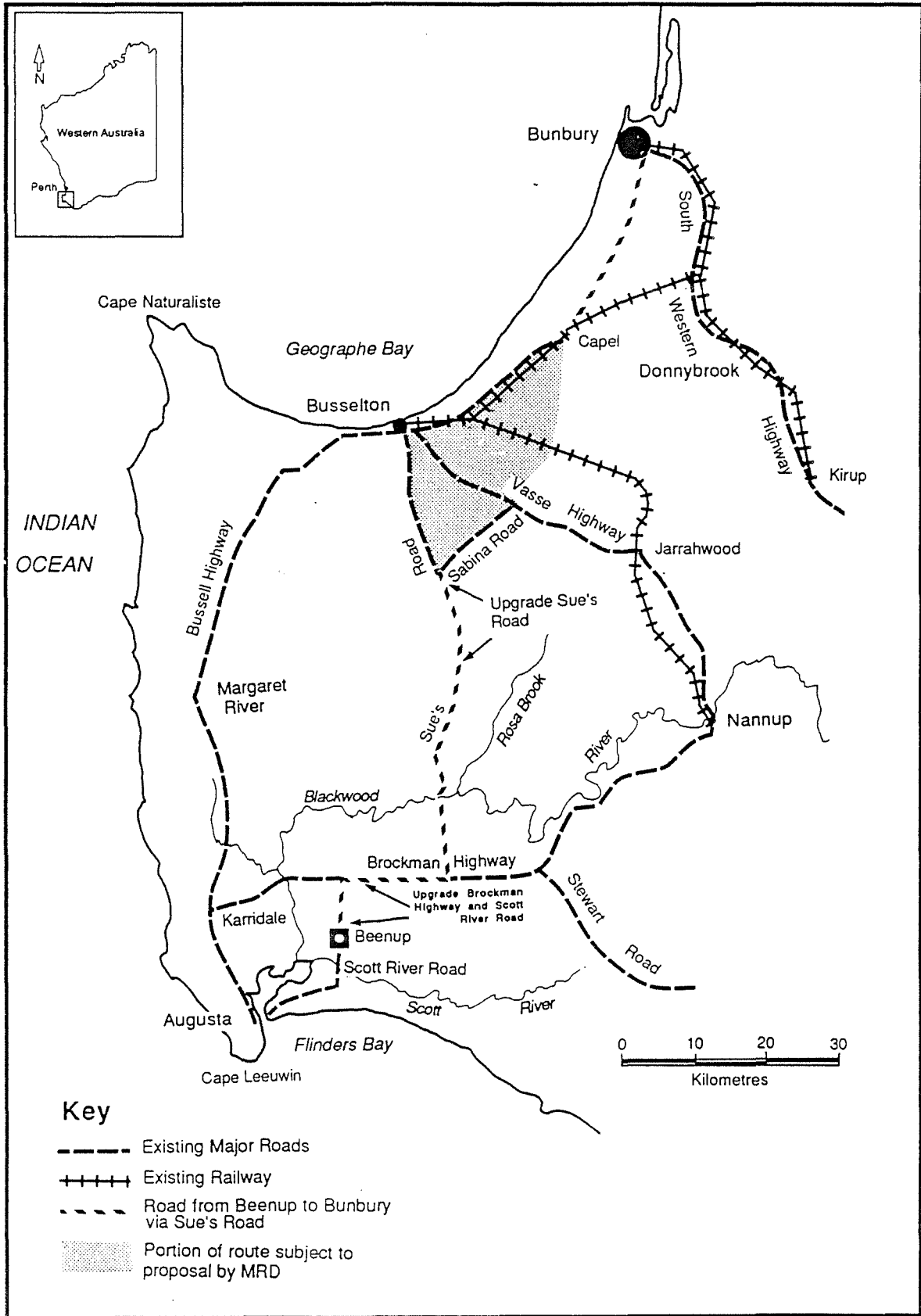


Figure 1: Proposed transport route

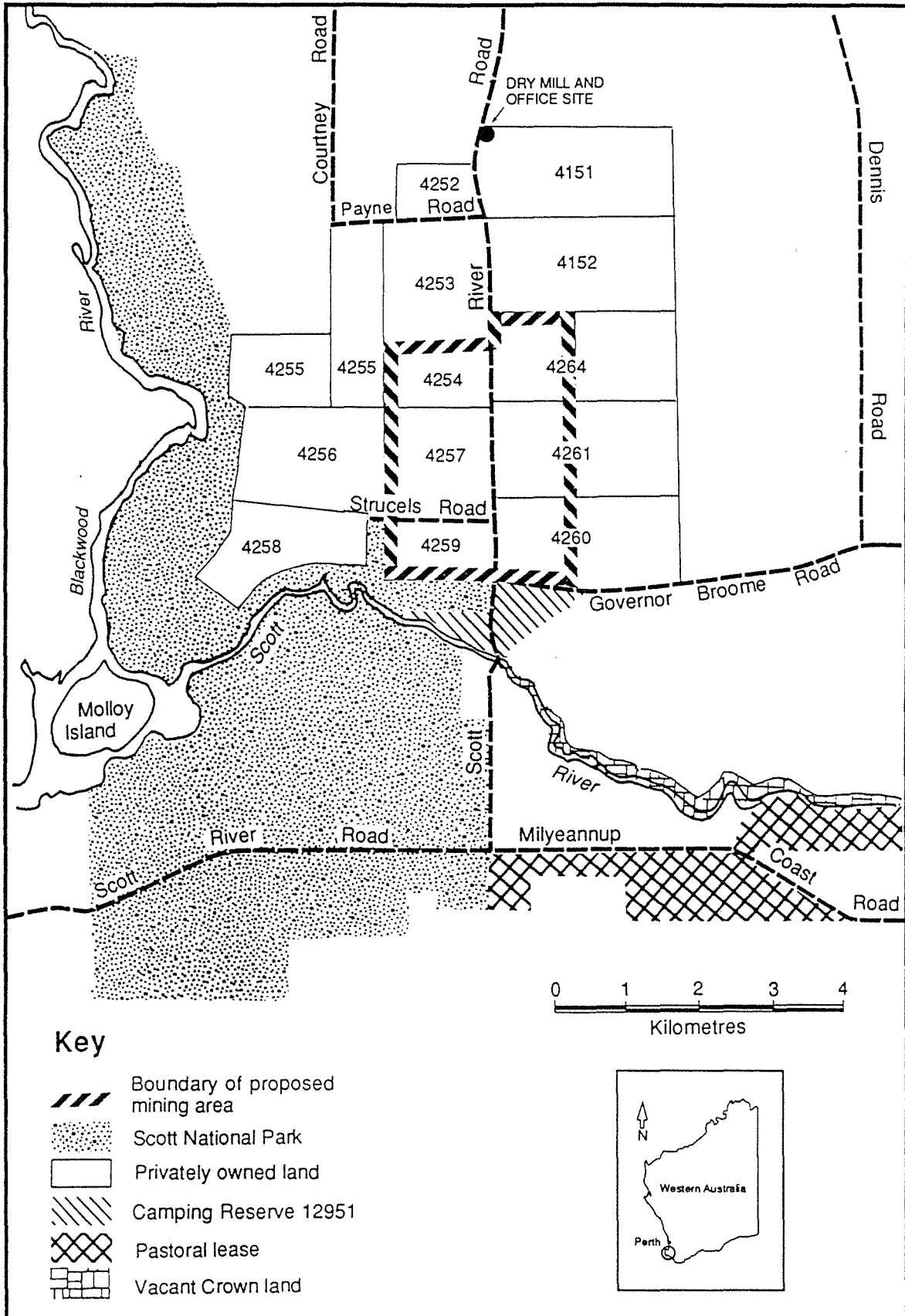


Figure 2: Land tenures

## 2. The proposal

### Mining and separation

Mineral Deposits proposes to produce 500,000 tonnes of heavy minerals per year. At about 4% heavy mineral concentration, this would require the mining of about 12 million tonnes of ore. Mineral Deposits state that in excess of 500 million tonnes of ore exist. This resource would be sufficient to sustain a 500,000t/yr operation for at least 20 years. The stated intention if approvals are received is for construction to commence in 1991, with mining and trucking beginning in late 1992.

The proposal involves clearing of any remnant vegetation, removal and re-use of topsoil, ripping of ironstone hardpan, and then dredging of the ore at a rate of 3000 tonnes per hour, 23 hours per day. The dredge pond would measure 390m x 1000m at the surface and advance about 3.5m per day. Dredging would therefore cover about 50ha per year. Use of a sufficiently long dredge arm would permit mining to the full 50m depth of the deposit without the necessity to reduce the water table by pumping water out of the pond.

The dredged ore would be concentrated by washing with water via multiple spirals housed in a 'wet concentrator', also floating on the dredge pond. Waste sand, or tailings, would be returned to the rear of the dredge pond and fine materials or 'slimes' are proposed to be returned directly to the dredge pond with a proportion pumped into evaporation ponds for drying prior to re-incorporation into the surface of the sand tailings.

The wet concentrate is proposed to be trucked via the existing alignment of Scott River road to the 'dry plant' at the north of the site (Figure 2). The haulage route will be unsealed within the mine-site and sealed from the northern edge of the mine-site to the dry plant. Public traffic will be re-routed east of the dry plant.

At the dry plant, the concentrate would be dried by coal fired heaters. Dry concentrate would then be separated into its constituent minerals of ilmenite, zircon, rutile, garnet and unsaleable or 'trash' minerals. The very low percentage of monazite in the ore is expected to comprise less than 0.001% of the concentrate and end up diluted through the constituent products. At such a low concentration of monazite from the dry mill, none of the products will approach the level at which they would be classified as radioactive under the relevant transport regulations.

Further waste sand and unsaleable minerals are proposed to be returned to the sand tailings and further slimes would be dried in evaporation ponds before recovery and re-incorporation into the surface of the tailings.

### Product transport

Mineral Deposits proposes to engage contractors to transport the dried and separated products in purpose built, covered trucks to Bunbury. Some 120 trips per day would be required, operating 24 hours per day, five days per week. The preferred route comprises Scott River Road, Brockman Highway then Sue's Road.

Beyond Sue's Road to the Vasse and Bussell Highways, the route will be determined by a social, environmental and design study currently being undertaken by the Main Roads Department. This study has included public participation. An environmental assessment consistent with the provisions of the Environmental Protection Act will be required for the selected route. Mineral Deposits Limited proposes that the transport route will be sealed throughout its length. Back-loading of coal for the dryers, from Bunbury, is being negotiated by the proponent.

### Services

Services required on the mine-site include water, power and telecommunications. Water for potable uses at the dry mill is proposed to be drawn from two bores in the deep Lesueur aquifer. This source is proposed due to its suitable quality and absence of *Phytophthora* or other biological contamination.

The dredge pond would be expected to fill naturally by rainfall and groundwater inflow, finally reflecting the level of the surrounding surficial aquifer. 'Make-up' water to compensate for evaporation in summer and maintain the level of the pond equivalent to that of the surrounding surficial aquifer is proposed to be drawn from the Lesueur aquifer. On average, up to 558,000m<sup>3</sup>/yr of groundwater would be drawn from the Lesueur aquifer. This represents less than 1% of the available annual recharge.

During winter, Mineral Deposits proposes that the dredge pond be self-contained with the excess of rainfall over evaporation being accommodated by bunds around the pond and by evaporation losses from washing and pumping circuits.

Water for use in the wet concentration plant and for the slurry transport of ore, concentrate, tailings and slimes is planned to be drawn from the dredge pond. It would either be re-circulated to the pond directly or via tailings disposal or lost to evaporation. The proposal makes provision for the connection of a SECWA power supply to the mine, plant site and construction accommodation facilities. The routing of this supply, possibly from the Manjimup area would be determined by SECWA and subject to environmental review with public input in its own right.

Telecommunications would be supplied by Telecom either by land-line or remote transmission to receival facilities on site. Land-lines would be expected to comply with usual Telecom route selection procedures and be accommodated in existing road or other easements.

The peak construction workforce of 200 is proposed to be housed in temporary accommodation with single workers on-site and workers with families in Augusta. Mineral Deposits expect the permanent workforce to find their own accommodation based either on their existing dwellings for local recruits and existing or new private construction in established centres and surrounding areas. No 'company town' or subsidised accommodation is proposed. The proponent expects both construction and permanent workers to find their own way to work.

### 3. The location

The proposed mine and dry mill would be located 17km north-east of Augusta. The nearest localities are East Augusta and Alexander Bridge. The site is comprised of private property which is about 65% cleared and sown to pasture which supports beef cattle production. Road reserves traverse the area. The mine-site is bounded by private property on the east, west and north and is bordered by Scott National Park and a camping reserve to the south. The site is overlain by mining lease applications which extend to the boundaries of the Scott National Park to the south and west. Exploration licence applications extend over the park but there are no proposals for any development there. These exploration applications also effectively exclude other operators from these areas. It is expected that these applications would lapse pursuant to the no mining policy applicable to Scott National Park under the Government's new policy on national parks.

The deposit occurs on the sandy Scott Coastal Plain where drainage is poorly defined and water logging occurs as a result of clays and hardpan impeding the excess of rainfall over evaporation in winter. Average annual rainfall is 1000mm/yr. Drainage is to the west and south into the Blackwood and Scott Rivers respectively. Strong onshore winds coupled with dry conditions are prevalent in summer.

Groundwater hydrology comprises the near surface or surficial aquifer in the surface sands and the deeper aquifer in the Lesueur sandstone below intervening clay layers. The Lesueur aquifer is a very large, good quality water resource which is largely untapped. Surficial groundwater is used for farm purposes.

About 35% of the area supports native vegetation comprising jarrah - marri woodland, heath communities and sedgelands. Two gazetted rare flora species, 10 species from the reserve flora priority list and four other species of special interest were recorded. All but one of these occur either outside the area to be disturbed or are represented elsewhere. A new genus with affinities to *Loxocarya* species requires further study to define its distribution.

The dieback disease attributed to *Phytophthora* species appears to be widespread on both private and reserved land in the area.

While the Scott Coastal Plain in general has received limited study of the fauna, it is regarded as likely to support all the faunal species recorded from the project location which is entirely on alienated, predominantly cleared land.

The two species of rare fauna recorded, the Peregrine falcon and the Red-eared fire-tail finch are widely distributed, although uncommon, in the south-west.

No archaeological material or sites of significance to Aboriginal people have been recorded from the area.

Socially, the immediate area is characterised by absentee and resident owned farm holdings and people seeking a rural lifestyle. Augusta provides a focus for a wide range of services and infrastructure provision is generally good. A number of services are, however, near to their limit; notably primary schooling, wastewater treatment, water supply and housing.

The proponent undertook an extensive community consultation programme and significant aspects of the proposal were altered as a consequence of this community input. A number of community consultations with government agencies also took place.

Tourism related development is straining the availability of funds to service permanent residents, according to the Shire Council. Current zoning in the proposal area is 'rural' under the Augusta-Margaret River Shire town planning scheme.

## 4. Environmental issues raised in submissions

There were 136 individual written submissions on the Beenup proposal and some 380 form letters were also received. The topics raised were grouped according to Table 1 and the questions listed in Appendix B put to Mineral Deposits Limited for response. Submissions were received from local and state organisations and some 61% were from people in the Augusta-Margaret River Shire. A list of those making written submissions is contained in Appendix F. The main issues of concern to submitters were transport, local infrastructure, dieback, surface and groundwater effects, impacts on nearest neighbours and conservation/rehabilitation.

Tables 1: Issues raised in public submissions

Issue No.	Issue	% raising the issue
1	Philosophy/lifestyle	29
2	Slimes/surface shrinkage	8
3	End landuse/create waterbodies	2
4	Sue's Bridge campsite; provide new	7
5	Community infrastructure	43
6	Economics/resource use	19
7	Transport, accidents/Bussell Highway/day only	45
8	Nearest neighbour impacts/control workforce	5
9	Support project/not opposed/commend interaction	11
10	Employment	17
11	Improved transport	2
12	Accommodation stock rental/land prices	7
13	Dieback, mine, transport route	38
14	Rail preferred	30
15	Conservation - surveys inadequate, rare species	30
16	National Park - no mining within	19
17	Rehabilitation - plan, soil microbes, few of 326 species	30
18	Salinisation	15
19	Lesueur aquifer effects	36
20	Surface aquifer effects on users, rare species	36
21	Electricity supply/alternative if not in place?	9
22	Road transport alternatives - Scott Road, Ludlow	6
23	Greenhouse - dry mill, trucks v rail emissions	21
24	Processing on site/guarantee none	21
25	CFCs in extinguishers	4
26	Waste timber re-use	4
27	Tourism effects	15
28	Regional assessment inadequate/make CSIRO available	20
29	Scott/Blackwood Rivers	21
30	Air emissions	10
31	Radiation	8
32	Management plans inadequate	26
33	Fuel/power consumption	13
34	Dust/noise/light pollution	36
35	Surface water management	22
36	Archaeology - report limestone/Aboriginal sites	2
37	Landscape/visual pollution	8
38	Population increase/pressure on coast and park	12
39	Ban pets	3
40	Provide ore reserve detail	2



Many of the issues raised were very probably as a consequence of limited data available in the ERMP. While a number of issues are addressed by commitments in the ERMP, several other issues of concern to submitters were subsequently addressed by further community consultation and additional commitments in the responses. There were, however, some outstanding issues which are covered by the recommendations of the Environmental Protection Authority in this report.

The social impact study, prepared as part of the ERMP, adequately identified potential impacts to the Shire and the broader community and provided appropriate information in respect to infrastructure and population profiles. Potential impacts to nearest neighbours were, however, one area which required additional attention. The ERMP did not address all these aspects in management commitments. A number of submissions received during public review of the ERMP raised important issues relating to management of social impact and provision of local infrastructure. Questions summarising these issues and designed to encourage further commitment or attention were forwarded to the proponent.

## 5. Environmental impacts and their management

The Environmental Protection Authority has identified the key environmental issues requiring detailed consideration as:

- management of surface water flows;
- management of clay fraction tailings ('slimes');
- protection of the adjacent Scott National Park;
- identification and management of rare flora populations;
- development of a comprehensive dieback management plan;
- adequate monitoring of groundwater aquifers;
- development of a suitable package to support local infrastructure;
- management of impacts on nearest neighbours;
- transportation proposals; and
- rehabilitation.

A number of these issues have been fully or partially addressed by the proponent's own commitments, several of which were developed as a consequence of community input. The key issues and the key commitments and further actions required are listed in short in Table 2 below and more fully in Table 3 in Appendix A. The commitments are fully documented in the ERMP and in the proponent's response to submissions. A summary appears in Section A of the proponent's responses (Appendix B). Additional requirements have been addressed by the Environmental Protection Authority's recommendations in this report.

**Table 2: Key Issues, commitments and further actions required**

ISSUE	KEY COMMITMENTS BY PROPONENT	FURTHER ACTIONS REQUIRED
Surface water	<ul style="list-style-type: none"> <li>• Diversion around dredge pond</li> <li>• No discharges from dredge pond to Scott National Park or rivers</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare detailed water management plan and make public</li> </ul>
Deposition of slimes	<ul style="list-style-type: none"> <li>• Directed to settling ponds</li> <li>• New technology to handle disposal to dredge pond</li> </ul>	<ul style="list-style-type: none"> <li>• Develop contingency plan</li> </ul>
Protection of Scott National Park	<ul style="list-style-type: none"> <li>• 100m buffer</li> <li>• Dieback control</li> <li>• Surface water control</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare detailed dieback management plan and make public</li> <li>• Water management plan as above</li> </ul>
Flora	<ul style="list-style-type: none"> <li>• Further surveys, publicly available</li> <li>• Details of rare species provided to CALM</li> <li>• Compliance with all regulations</li> </ul>	<ul style="list-style-type: none"> <li>• Satisfactory</li> </ul>
Dieback	<ul style="list-style-type: none"> <li>• Develop dieback management programme to satisfaction of CALM and EPA</li> <li>• Detailed survey before operations commence</li> </ul>	<ul style="list-style-type: none"> <li>• Develop detailed management prescriptions prior to any earthmoving operations on mine-site or transport route</li> </ul>

Groundwater	<ul style="list-style-type: none"> <li>• Design to avoid substantial drawdown</li> <li>• Add water from deep bores to dredge pond in summer to maintain water table</li> <li>• Fortnightly monitoring in winter, quarterly in summer prior to construction; weekly during initial years of operation</li> </ul>	<ul style="list-style-type: none"> <li>• Comprehensive monitoring to EPA satisfaction on advice of Water Authority and Geological Survey</li> </ul>
Social infrastructure	<ul style="list-style-type: none"> <li>• Ensure Shire is not financially disadvantaged by project</li> <li>• Continue local consultative group</li> <li>• Favour local people for employment</li> <li>• Arrange supply of accommodation for construction workforce</li> </ul>	<ul style="list-style-type: none"> <li>• Establish formal liaison, monitoring, public reporting, and management of social impacts throughout project life</li> </ul>
Nearest neighbours	<ul style="list-style-type: none"> <li>• Dust generation will be controlled as necessary</li> <li>• Installation of light shields if neighbours are directly illuminated</li> <li>• Design sound barriers, reduce pitch of reversing horns, avoid disruptive noise at night wherever possible</li> <li>• Undertake further baseline and periodic monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Satisfactory</li> <li>• Conform with sound levels in Appendix E</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>• Total length of product haul route to be sealed</li> <li>• Provision of road safety features to Main Roads Department or Shire standards</li> <li>• Haulage 24 hours per day, limited to Monday to Friday</li> </ul>	<ul style="list-style-type: none"> <li>• Satisfactory</li> <li>• Ongoing review by Government of rail options</li> <li>• Route north of Sue's Road subject to Environmental Protection Authority assessment</li> </ul>
Rehabilitation	<ul style="list-style-type: none"> <li>• Broad plan as per agreement with Community Consultative group</li> <li>• Co-operation with CALM and Kings Park Board on regeneration trials for species of special interest</li> </ul>	<ul style="list-style-type: none"> <li>• Rolling rehabilitation plan regularly reviewed by EPA, Mines, CALM and Dept of Agriculture</li> </ul>

The Environmental Protection Authority considers that these environmental issues have been addressed adequately by either environmental management commitments given by the proponent or by the Environmental Protection Authority's recommendations in this report.

The Environmental Protection Authority has made a number of recommendations below about the proposal in general and the key issues requiring additional environmental management.

## **Recommendation 1**

**The Environmental Protection Authority has concluded that the proposal as modified by the process of interaction between the proponent, the Environmental Protection Authority and public and government agencies consulted is environmentally acceptable and could proceed subject to:**

- **the proponent's commitments; and**
- **the Environmental Protection Authority's recommendations in this report.**

The Environmental Protection Authority considers that any approval for the proposed based on this assessment should be limited to five years. Accordingly, if the proposal has not been substantially commenced within five years of the date of this report, then such approval should lapse. After that time, further consideration of the proposal should occur only following a new referral to the Authority.

The Authority notes that during the detailed implementation of proposals, it is often necessary or desirable to make minor and non-substantial changes to the designs and specifications which have been examined as part of the Authority's assessment. The Authority believes subsequent statutory approvals for this proposal could make provision for such changes, where it can be shown that the changes are not likely to have a significant effect on the environment.

Key issues are discussed under the sub-headings below, with attendant recommendations as appropriate.

## **Water management**

Water management would normally be the main issue with the potential to affect the environment in a large mineral sands dredging operation. Coupled with the dependence of neighbours and the natural environment on groundwater, this issue has raised considerable comment in submissions. Normally, mining depth is controlled by raising or lowering the water level in the dredge pond to float the dredge higher or lower in the mining profile. These changes in pond water level consequently cause lowering or raising of the surrounding groundwater table with the potential for consequent effects on the surrounding environment.

Mineral Deposits Limited does not propose to raise or lower the water level in the pond as a means of controlling mining depth. The dredge is proposed to have an especially long cutter arm to allow it to reach the bottom of the deposit from the normal groundwater surface level. Small changes only in the water level, of the order of a 0.5m rise due to winter rainfall and a 0.3m fall due to summer evaporation, are anticipated. Mineral Deposits Limited proposes to maintain the water level in the pond at the same level as the surrounding groundwater level by introducing extra water from deep bores, independent of the surficial aquifer, in summer and retaining winter rainfall which falls directly on the pond behind perimeter bunds.

Both the Water Authority of Western Australia and the Geological Survey have been asked to comment on the proposal and neither agency has expressed residual concerns that the operation will adversely affect groundwater levels or quality significantly (Appendices B and C). Consequently, no environmentally significant impacts on the surrounding environment are anticipated. Accordingly, the Environmental Protection Authority finds that the proposed groundwater management method is environmentally acceptable.

It will, however, be important to monitor groundwater levels and quality to ensure that they are not being unduly affected by pond operations. The Authority therefore concludes that a comprehensive monitoring programme is required, together with a limit on extra drawdown due to the operation at neighbouring boundaries. The Authority concludes that any additional drawdown of the groundwater should not exceed half a metre, consistent with experience on and conditions set for groundwater abstraction for public water supply on the Gnangara mound. This limit is also consistent with that set for the proposed Jangardup operation, which is also on the Scott Coastal Plain.

## **Recommendation 2**

**The Environmental Protection Authority recommends that a comprehensive groundwater monitoring programme, as part of an overall Environmental Management Programme, be developed and implemented to the satisfaction of the Environmental Protection Authority, on the advice of the Geological Survey and the Water Authority of Western Australia, prior to excavation of the dredge pond, and that additional drawdown attributable to the proposal should not exceed half a metre at the boundary of any neighbouring land.**

Effective management of surface water flows and the prevention of turbid or polluted discharges to the Scott or Blackwood Rivers were also of concern to people making submissions.

The proponent has made a commitment that no turbid water will be discharged to the Scott National Park or the rivers. The Environmental Protection Authority supports this objective and has concluded that the proposals put forward for surface water management are broadly capable of meeting the objective. Detailed designs for surface water management will be required as part of an ongoing Environmental Management Programme. The Authority is aware that large holding dams such as those for slimes retention at the dry mill and the bunds around the dredge pond will need to conform with standards supervised by the Department of Mines and may also be referable structures under legislation administered by the Water Authority. The Environmental Protection Authority concludes therefore that there is adequate regulation to ensure that these structures will be effective from an environmental point of view.

The Authority believes that the detailed design and implementation of surface water management plans will be an important component of their success and accordingly concludes that it should provide advice, in consultation with other appropriate agencies, on their environmental acceptability. Accordingly, the Authority makes the following recommendation.

## **Recommendation 3**

**The Environmental Protection Authority recommends that a comprehensive surface water management plan, as part of an overall Environmental Management Programme, be prepared by the proponent to the satisfaction of the Environmental Protection Authority, on advice from the Department of Agriculture, and subsequently implemented before site works commence.**

Mineral Deposits Limited proposes technology novel to the mineral sands industry to deal with the fine silt and clay sized material (slimes) which generally require considerable area for drying prior to rehabilitation.

These drying areas can be larger than the operating mine area and remain bare for some years, particularly at sites with a high rainfall to evaporation ratio, such as Beenup.

The introduction of proprietary technology to return the slimes directly to the dredge pond, without the need for large drying areas, potentially represents an environmental breakthrough for the industry.

While the technology is still subject to patent and hence still confidential, the Environmental Protection Authority has been briefed on the technology and is satisfied that it will be sufficiently effective to be environmentally acceptable.

In the event that there are start-up problems, the Authority is satisfied that commitments by the proponent to install and operate more conventional drying and thickening technology if required, can be undertaken in an environmentally acceptable manner.

The Environmental Protection Authority concludes that use of new technology for slimes handling could be environmentally acceptable and makes the following recommendation.

## **Recommendation 4**

**The Environmental Protection Authority recommends that the proponent review and report to the Environmental Protection Authority on slimes handling operations 12 months after the commissioning of the dredge and that continued operation be to the satisfaction of the Minister for the Environment, on the advice of the Environmental Protection Authority in consultation with the Department of Mines. The Environmental Protection Authority further recommends that, should slimes handling not be to the satisfaction of the Minister for the Environment, then the proponent should develop and implement a contingency plan satisfactory to the Minister for the Environment, on the advice of the Environmental Protection Authority, within 12 months, or cease operations.**

## **Dieback**

Dieback diseases are caused by soil borne fungi of the genus *Phytophthora*.

Control of the spread and intensification of dieback disease is obviously a high priority for an area where national park and forest values may be at risk. This issue was raised in 38% of public submissions.

Accurate dieback mapping is difficult on pastured farmland without susceptible indicator species and may be inaccurate in other areas which have not been quarantined, to prevent further undetected introductions, for a period of years.

Nonetheless, the Authority is aware that the causative agent of dieback disease is likely to be widespread on the Scott Coastal Plain, on both cleared and uncleared land. Accordingly, precautions to limit the further spread and intensification of the disease are appropriate. Simply put, these relate to preventing the transfer of infected soil and control of the spread of waterlogging conditions in periods of warm weather conducive to the growth of the *Phytophthora* fungus.

Practical control of the disease is limited to controlling the movement of fungal spores into or out of the site in fresh soil on the wheels or underbody of vehicles or in water flowing from the site.

Provided fresh soil movement within the site is isolated from that outside, then the transfer of disease should be controlled. Heating and drying the product minerals would prevent the fungus surviving in this material.

Similarly, if water running onto the site is diverted around the mining operation then this operation should not contribute to the spread of dieback from the site.

The Environmental Protection Authority concludes that the practical control of dieback disease on the mine-site and haul route requires comprehensive management plans. The proponent has made commitments for the control of dieback and the Authority makes the following recommendation with respect to the detailed content, timing and approval of such plans.

## **Recommendation 5**

**The Environmental Protection Authority recommends that comprehensive dieback management prescriptions be developed by the proponent, in consultation with the Department of Conservation and Land Management, to the satisfaction of the Minister for the Environment on the advice of the Environmental Protection Authority and the Department of Conservation and Land Management, prior to any earthmoving operations at the mine-site, for road construction or to obtain construction materials for earthworks.**

Commitments by the proponent for the provision of a 100m buffer strip between the mine and the surrounding park and for the prevention of unauthorised access between the site and the park will also assist in the control of disease.

Similarly, controls on surface water runoff from the site and on groundwater levels will contribute to the management of additional flooding during warm conditions which could otherwise exacerbate disease intensification.

Accordingly, the Authority concludes that its recommendations 3 and 4 for groundwater monitoring and surface water management should also assist in dieback control.

## Transport

Some 45% of submitters asked questions about the transport of mineral sand products from Beenup to Bunbury. The proponent undertook a consultative programme with the local community prior to finalisation of the ERMP and, partly as a consequence, ruled out sea transport and opted to use road transport.

Some 30% of submitters said they preferred rail transport from the point of view of reduced disruption, reduced fuel usage and for other reasons.

The Authority believes that rail options should be kept under constant review by Government, consistent with the finding that such an option would produce at least 35% less Greenhouse gases per year and the proponent's commitment to reconsider the use of rail transport should it become viable and competitive.

The parameters necessary to make rail transportation viable and economic should be examined in the regional strategy planned by the Department of Resources Development so that future planning of heavy haulage regionally can be directed towards this option.

## Recommendation 6

**The Environmental Protection Authority recommends that rail transport be kept under review by Government with a view to planning for regional heavy transport by rail in the future.**

The Environmental Protection Authority has concluded that the proposal for road transport via Sue's Road is manageable and environmentally acceptable in the light of the proponent's commitments to biological and dieback surveys of the route, provision of a detailed dieback management programme, sealing of the route, agreement with the Department of Conservation and Land Management on any gravel sources in State Forest, additional noise monitoring during operating conditions and the provision of noise bunding if required.

The Authority has considered the proponent's commitment to investigate gas as a fuel source for the haul trucks and encourages the adoption of this fuel source as a means of reducing Greenhouse gas emissions from road transport vehicles.

The Authority is aware that the part of the route from the north of Sue's Road to Bunbury is not yet finalised and clearly states that such portion of the route will be required to undergo environmental assessment by the Authority, with public review.

## Social

Generally, the proposal's social aspects can be categorised into infrastructure, transport and nearest neighbour impacts.

Infrastructure requirements have been examined in detail by the Augusta-Margaret River Shire Council, government agencies and the proponent. Infrastructure requirements normally provided by state government agencies (eg, education, health, community services, housing, water and policing) were examined by the relevant government agencies and no insurmountable problems with existing capacity were identified, although the need to provide for increases in water supply and sewerage treatment in the future was highlighted by the Water Authority. Education was also highlighted for careful monitoring and ongoing consultation between the proponent, Shire and Education Department.

Housing availability is another area where careful monitoring will be necessary during the construction and operational phases.

Contribution to local infrastructure was an issue raised in a number of submissions and is subject to negotiations between the proponent and the Shire. While the Authority does not have a direct role in these negotiations, it is aware of the proponent's commitment that the Shire will not be financially disadvantaged by the project. The proponent's commitment to finalising an infrastructure funding package with the Shire is therefore critical.

The minerals produced are proposed to be transported on local and regional roads. The issue of transport was identified early on as critical and investigations led to the proposal for the route outlined in the ERMP. Ongoing consultation and further investigation, especially in relation to the route north of Sue's Road, should ensure that impacts are identified, assessed and managed. This northern part of the route will be subject to a separate assessment by the Environmental Protection Authority.

The proponent's responses to questions raised in public submissions include additional commitments on the management of impacts, ongoing consultation and monitoring. These commitments are important and need to be fulfilled. A few areas, however, were not specifically addressed and these relate to details on the provision of infrastructure and the construction and maintenance of the transport route.

The Environmental Protection Authority considers that the proponent should continue to liaise with relevant government agencies and the Shire to ensure that outstanding matters relating to infrastructure are finalised.

In addition, the Environmental Protection Authority makes the following recommendation to ensure that outstanding social issues are finalised.

### **Recommendation 7**

**The Environmental Protection Authority recommends that formal liaison, monitoring and public reporting processes be established by the proponent to the satisfaction of the Environmental Protection Authority, upon advice from the Social Impact Unit prior to the commissioning of the dredge, to monitor, review and manage the social impact of the project throughout its life.**

### **Nearest neighbours**

Those neighbours nearest to a development often experience the highest levels of impacts but may not directly benefit from it. Accordingly, it is most appropriate that particular attention is paid to these nearest neighbours impacts.

Nearest neighbour impacts generally relate to noise, dust, light, increased traffic and change of lifestyle. These issues were raised in 36% of submissions. Change in lifestyle will be reflected in landuse change; the presence of a non-farming workforce; increased number of people; and a change in the 'pace' of life. The extent and rate of change, as well as an individual's ability to cope with change, are the key factors that will determine the significance of the impacts. Lifestyle impacts relate directly to this and the change may be significant for those people living in the vicinity of the mine.

Accepting that the change is significant places a great deal of importance on the proponent following 'good neighbour' practices. It also requires a company philosophy which acknowledges that measures beyond statutory requirements are required. The individuals being impacted are themselves in the best position to determine appropriate solutions which will assist them in coping with the change. In this respect, the onus should be on the proponent to accept the responsibility to implement the solutions.

Given the proponent's commitments and the Environmental Protection Authority's recommendations for dust and light control and ground and surface water management, the Authority concludes that unacceptable environmental impacts should not occur at the boundaries of properties occupied by the nearest neighbours. Continuous attention to these issues and to 'good neighbour' relations by the proponent will be required.

On the subject of noise, the Environmental Protection Authority concludes that noise generation could be managed within guidelines set by it for all residences throughout Western Australia (see Appendix E for example Noise Pollution Control Conditions).



## **Recommendation 8**

**The Environmental Protection Authority recommends that the maximum noise levels at residential premises surrounding the proposed mine and dry mill should not exceed:**

**50dB(A) from 7am-7pm, Monday to Saturday**

**45dB(A) from 7am-7pm, Sunday**

**45dB(A) from 7pm-10pm, every day**

**40dB(A) from 10pm-7am, every day**

**and should not cause unacceptable annoyance due to tonal or impulsive components.**

Given the present rural nature of the area around the Beenup proposal, it is possible that noise levels within the guidelines will be perceived as intrusive and result in complaints from those few noise sensitive properties adjacent to it. While the Environmental Protection Authority will insist that the guidelines are complied with at all times, it urges the proponent to be particularly sensitive to the perceptions of the nearest neighbours and to take whatever additional reasonable steps are necessary to mitigate any complaints, consistent with 'good neighbour' relations.

The Environmental Protection Authority considers that ongoing and direct consultation should be undertaken with people living in the vicinity of the mine and its associated facilities in order to identify and implement measures to minimise and manage impacts from its construction and operation.

The proponent's commitment to ongoing consultation and monitoring is supported.

## **Rehabilitation**

The Environmental Protection Authority regards effective rehabilitation of the site, consistent with the management of the surrounding land, as vital to providing sustainable landuse after mining. Accordingly, the Environmental Protection Authority endorses the approach of community consultation about end landuse objectives, consistent with the broad strategy outlined in the ERMP. The point was raised in submissions that rehabilitation similar to the native vegetation currently on the property should be undertaken where such native vegetation is now present. Others favoured the redevelopment of agricultural land. This issue could profitably be considered by the consultative committee. The Environmental Protection Authority believes that rehabilitation should be stable and sustainable consistent with the approved landuse of the surroundings. Accordingly, the Authority makes the following recommendations.

## **Recommendation 9**

**The Environmental Protection Authority recommends that a rolling rehabilitation plan be developed within 12 months of the commencement of productive mining and regularly reviewed, to the satisfaction of the Environmental Protection Authority on advice from the Departments of Mines, Agriculture and Conservation and Land Management.**

## **Greenhouse gases and air emissions**

The Environmental Protection Authority has pursued the issue of Greenhouse gas emissions related to the transport of mineral products. The proponent and the Department of Transport have independently provided data which agree closely and confirm that transportation by road would generate about 35% more carbon dioxide than the cheapest (although apparently still constrained by high initial capital cost) rail option, involving road haulage to Nannup and rail transport from there to Bunbury.

The Environmental Protection Authority notes the proponent's commitment to reconsider the use of rail should it become competitive and believes that this option should be kept under review by Government as outlined in Recommendation 6.

The Authority has also requested more information about the dryers to be used in the dry mill and has recently received the results of detail sulphur dioxide modelling of emissions from the dryer exhaust. The Authority has satisfied itself as to the veracity of this modelling and concludes that ground level sulphur dioxide concentrations would not be harmful and would be well below the standards proposed by the Australian and New Zealand Environment Council.

The Authority notes the submissions suggesting that gas may be a preferable fuel to coal for the dryers. While agreeing that this is the case, the Authority believes that the use of coal is environmentally acceptable here because the tonnage is relatively small, air quality standards will be maintained and the piping in of gas could result in additional environmental impacts such as additional clearing of forest or other native vegetation to lay the line.

## **6. Conclusion**

Following assessment of the proposal and commitments made by Mineral Deposits Limited, the Environmental Protection Authority has concluded that the mining of heavy minerals at Beenup and the transport of products via Sue's Road is environmentally acceptable subject to the operation being carried out in accordance with the commitments in the ERMP, the proponent's additional commitments made in response to submissions and the recommendations of the Environmental Protection Authority.

The Environmental Protection Authority further concludes that the transport of products north of Sue's Road and the provision of electrical power to the site are still subject to environmental assessment by the Authority, with public review.



## **Appendix A**

**Table of commitments, management and conclusions on  
environmental issues for the Beenup proposal**



**Table 3: Commitments, management and conclusions on environmental issues - Beenup**

ISSUE	IMPACT PREDICTED BY PROPONENT	COMMITMENTS BY PROPONENT		INITIAL CONCERNS OF EPA/PUBLIC	STRATEGY TO ADDRESS			CONCLUSION/ NOTES
		MANAGEMENT	MONITORING		MORE WORK	MANAGEMENT	MONITORING	
Transport Road	~ 120 trucks/day 24 hrs/day 5 days/week	<ul style="list-style-type: none"> <li>Use Sue's Road rest up to Govt.</li> <li>Road sealed.</li> <li>Study route alternative north of Sue's Road</li> <li>Accel + Decel lanes.</li> <li>Stop + heavy haulage advisory signs.</li> <li>Speed limits in populated areas.</li> <li>Gravel from private sources, own property or by application to CALM.</li> <li>Flora + Dieback surveys along Sue's Road &amp; other forest roads.</li> </ul>	<ul style="list-style-type: none"> <li>Monitor sound levels at houses on Scott R Road/ Brockman Hwy Junction                             <ul style="list-style-type: none"> <li>Reduce noise to acceptable level if req.</li> </ul> </li> <li>Traffic study of Bussell Hwy to record drop in use due to Sue's upgrade.</li> </ul>	<ul style="list-style-type: none"> <li>Houses close to road on Vasse Hwy in Yoongarillup - elsewhere?</li> <li>Accidents/ Disruption/Noise.</li> <li>Need EPA assessment of road routes north of Sue's Road</li> <li>Road kills of fauna</li> </ul>	<ul style="list-style-type: none"> <li>Public study by MRD</li> <li>Vegetation/ Dieback surveys as proposed</li> </ul>	<ul style="list-style-type: none"> <li>Comply with all regulations.</li> <li>Reduce by good illumination &amp; safe driving practices.</li> <li>Flora and Dieback Mgt Plans as proposed.</li> </ul>	<ul style="list-style-type: none"> <li>Obtain background traffic counts/ noise levels.</li> <li>Ongoing dieback monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>Environmentally manageable.</li> </ul>
Rail	High capital cost			<ul style="list-style-type: none"> <li>'Rail preferred' mentioned in 30% of submissions.</li> </ul>	<ul style="list-style-type: none"> <li>Ask Westrail for data.</li> </ul>		<ul style="list-style-type: none"> <li>Proponent to review if expansion planned.</li> </ul>	<ul style="list-style-type: none"> <li>Future rail option to be kept under review by Govt.</li> </ul>
Sea	Not Preferred			<ul style="list-style-type: none"> <li>Sea options may be resurrected.</li> </ul>	<ul style="list-style-type: none"> <li>Would require future EPA assessment if proposed.</li> </ul>			<ul style="list-style-type: none"> <li>Not proposed</li> </ul>

ISSUE	IMPACT PREDICTED BY PROPONENT	COMMITMENTS BY PROPONENT		INITIAL CONCERNS OF EPA/PUBLIC	STRATEGY TO ADDRESS			CONCLUSION/ NOTES
		MANAGEMENT	MONITORING		MORE WORK	MANAGEMENT	MONITORING	
<u>Social</u>  Adequate Community infrastructure  eg. Schools, Police, Water Supply, Hospitals etc.	Additional resources and infrastructure required for schools, police, recreation facilities, social support services, water and sewerage	<ul style="list-style-type: none"> <li>Agreement to be reached with Shire to ensure "Shire is not financially disadvantaged by the project".</li> <li>"Investigate" with Shire and consultative group.</li> </ul>	None	<ul style="list-style-type: none"> <li>Proponent to contribute to all of these</li> </ul>	<ul style="list-style-type: none"> <li>Shire/ SIU/ DRD to negotiate with proponent</li> </ul>	<ul style="list-style-type: none"> <li>State to ensure satisfactory arrangements in place</li> </ul>	<ul style="list-style-type: none"> <li>Proponent to monitor to assist state planning</li> </ul>	<ul style="list-style-type: none"> <li>Could be socially acceptable.</li> <li>Requires agreement on assistance package.</li> <li>Requires ongoing monitoring</li> </ul>
Rates	No predictions	See Above?	None	<ul style="list-style-type: none"> <li>Rates will rise</li> </ul>	<ul style="list-style-type: none"> <li>Shire to negotiate with proponent</li> </ul>		<ul style="list-style-type: none"> <li>Shire to monitor with proponent assistance.</li> </ul>	<ul style="list-style-type: none"> <li>Assist Shire to monitor</li> </ul>
Rents/ Housing Stock	Additional family homes and flats reqd, plus caravan accommodation. Stock adequate in Margaret River, tight in Augusta. More staff than expected available locally; will reduce pressure	<ul style="list-style-type: none"> <li>None - CO policy for perm. workforce to provide own accomm.</li> <li>Temp. workforce accomm. provided on site and Caravan Park in Augusta.</li> </ul>	None  None	<ul style="list-style-type: none"> <li>Insufficient stock</li> <li>Pressure on rents</li> </ul>				<ul style="list-style-type: none"> <li>Proponent to monitor to assist state planning.</li> </ul>

ISSUE	IMPACT PREDICTED BY PROPONENT	COMMITMENTS BY PROPONENT		INITIAL CONCERNS OF EPA/PUBLIC	STRATEGY TO ADDRESS			CONCLUSION/ NOTES
		MANAGEMENT	MONITORING		MORE WORK	MANAGEMENT	MONITORING	
Disruption	Social adjustment "inevitable"	<ul style="list-style-type: none"> <li>• Qualified local people employed where possible.</li> <li>• Provide training for plant operators.</li> <li>• Continue consultative group.</li> </ul>	None	<ul style="list-style-type: none"> <li>• Itinerant workers and children will disrupt towns and schools.</li> </ul>		<ul style="list-style-type: none"> <li>• Policy on workforce behaviour to be consistent with community expectations.</li> </ul>	<ul style="list-style-type: none"> <li>• Management to monitor workforce demographics.</li> </ul>	<ul style="list-style-type: none"> <li>• Adjustment will occur.</li> <li>• Should be socially acceptable.</li> </ul>
<u>Dieback</u> Minesite/ National park	Dieback present <ul style="list-style-type: none"> <li>• SW part of mine</li> <li>• NE, off the mine</li> <li>• Widespread in park</li> </ul>	<ul style="list-style-type: none"> <li>• Washdown</li> <li>• Re-instate drainage</li> <li>• Off-site transport confined to raised, paved roads</li> <li>• Dieback management plan to form part of mine plan</li> <li>• 100 m buffer</li> </ul>	<ul style="list-style-type: none"> <li>• Dieback survey of minesite if project approved</li> <li>• Research monitoring methods</li> <li>• Containment measures in native rehab. to be researched</li> </ul>	<ul style="list-style-type: none"> <li>• Dieback survey and map should be produced before approval</li> <li>• Dieback management plan should be subject to public scrutiny</li> <li>• Dieback may spread to Scott National Park</li> </ul>	<ul style="list-style-type: none"> <li>• Dieback survey and map before construction commences - now started</li> </ul>	<ul style="list-style-type: none"> <li>• Dieback plan to CALM/EPA satisfaction before construction</li> <li>• Plan available to public at CALM/EPA/site</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring programme in place before construction</li> <li>• Monitoring results and summaries public</li> </ul>	<ul style="list-style-type: none"> <li>• Likely low additional risk is environmentally acceptable given stringent management proposed and existing extent of impact.</li> </ul>



ISSUE	IMPACT PREDICTED BY PROPONENT	COMMITMENTS BY PROPONENT		INITIAL CONCERNS OF EPA/PUBLIC	STRATEGY TO ADDRESS			CONCLUSION/ NOTES
		MANAGEMENT	MONITORING		MORE WORK	MANAGEMENT	MONITORING	
Dieback cont.				<ul style="list-style-type: none"> <li>• Infected SW corner should be quarantined</li> <li>• Charges to surface moisture regime in summer may increase opportunities for dieback spread in summer</li> </ul>	<ul style="list-style-type: none"> <li>• Drainage management Plan</li> </ul>	<ul style="list-style-type: none"> <li>• Dieback mgt plan</li> <li>• Water management plan to prevent significant additional surface flooding off-site</li> </ul>	<ul style="list-style-type: none"> <li>• Baseline map and periodic remap of Scott N.P.</li> <li>• Periodic re-mapping to modify mgt. plan</li> <li>• Monitor surface flows</li> </ul>	<ul style="list-style-type: none"> <li>• 100 m buffer and drainage containment to control risk, acceptable</li> </ul>
Transport Route	"Potential to spread dieback"	<ul style="list-style-type: none"> <li>• Dieback management programmes for gravel extraction and road construction to satisfaction of CALM and EPA.</li> <li>• Dieback mapping throughout route and alternatives before construction.</li> <li>• Uninfected gravel only to be used on dieback free sites.</li> </ul>	None	<ul style="list-style-type: none"> <li>• Gravel sources need to be quarantined before determining dieback status</li> </ul>		<ul style="list-style-type: none"> <li>• Appropriate testing programme</li> <li>• Redirect drainage to better manage existing dieback</li> <li>• Conservative management</li> <li>• Seal road</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor transport route for dieback</li> </ul>	<ul style="list-style-type: none"> <li>• Manageable, improved drainage and sealing will improve long term dieback control</li> </ul>

ISSUE	IMPACT PREDICTED BY PROPONENT	COMMITMENTS BY PROPONENT		INITIAL CONCERNS OF EPA/PUBLIC	STRATEGY TO ADDRESS			CONCLUSION/ NOTES
		MANAGEMENT	MONITORING		MORE WORK	MANAGEMENT	MONITORING	
<p><u>Groundwater</u></p> <p>Shallow aquifer</p>	<p>0.5 m pond level increase in winter</p> <p>0.3 m pond level decrease in summer</p> <p>No impact on shallow aquifer caused by Lesueur abstraction due to intervening silt and clay layers</p>	<ul style="list-style-type: none"> <li>No winter discharge from pond</li> <li>Supply makeup water from Lesueur aquifer to ensure no drawdown of the regional watertable in summer</li> <li>100 m buffer on Park</li> </ul>	<ul style="list-style-type: none"> <li>Bores monitored weekly during initial years</li> </ul>	<ul style="list-style-type: none"> <li>Mixing of layers will result in salinisation and pH changes/ sulphate release</li> <li>Drawdown of shallow aquifer will deplete stock and pasture supplies and compromise flora and fauna in the Scott National Park</li> <li>Miscalculations and inadequate data</li> <li>Sealing of dredge pond will result in barrier to groundwater flow with consequent flooding up-flow and drought down-flow</li> <li>Level dredge pond will result in head changes causing increased drawdown up-flow and increased saturation down-flow</li> </ul>	<ul style="list-style-type: none"> <li>Study water chemistry</li> <li>Provide more data and recalculate</li> <li>Clarify impact of pond on local shallow aquifer</li> <li>Communicate impacts and management plan to public</li> </ul>	<ul style="list-style-type: none"> <li>Develop water quality management plan before mining as per commitments</li> <li>Specify pond design, operation and management plan - make public</li> </ul>	<ul style="list-style-type: none"> <li>Monitor water chemistry in pond</li> <li>Specify number, location and regime of monitoring before construction</li> <li>Monitor pond and regional groundwater performance</li> </ul>	<ul style="list-style-type: none"> <li>No regional drawdown planned</li> <li>Groundwater levels manageable within range of natural fluctuation and acceptable</li> <li>Ensure limit of 0.5m additional drawdown at neighbouring boundaries</li> <li>Impacts likely to be small and acceptable</li> <li>Any Drawdown largely limited by buffer</li> <li>See Appendices C and D</li> </ul>

ISSUE	IMPACT PREDICTED BY PROPONENT	COMMITMENTS BY PROPONENT		INITIAL CONCERNS OF EPA/PUBLIC	STRATEGY TO ADDRESS			CONCLUSION/ NOTES
		MANAGEMENT	MONITORING		MORE WORK	MANAGEMENT	MONITORING	
Lesueur aquifer	Abstraction from 150 - 200m depth  Depressurisation confined by silt and clay layers above		<ul style="list-style-type: none"> <li>Weekly bore monitoring</li> </ul>	<ul style="list-style-type: none"> <li>Wastage of Lesueur resource</li> <li>User to pay for use</li> <li>Leakage between shallow and Lesueur aquifers causing watertable drawdown</li> <li>Geol. Survey studies to be completed</li> </ul>	<ul style="list-style-type: none"> <li>Proponent to illustrate usage versus storage and recharge to public</li> <li>Obtain Geol. Survey advice on any interaction</li> </ul>	<ul style="list-style-type: none"> <li>WAWA to licence use</li> </ul>	<ul style="list-style-type: none"> <li>Specify number, location and regime of monitoring before construction</li> </ul>	<ul style="list-style-type: none"> <li>No significant impact expected, acceptable</li> <li>Bores to be licenced</li> </ul>
<u>Conservation</u>  Vegetation communities; Flora and Fauna	<p>312ha of remnant vegetation removed for mining</p> <p>1.4ha of <i>Banksia occidentalis</i> heath removed</p> <p>24.4ha low sedgeland removed, 77.6ha preserved on locn. 4264</p> <p>No gazetted rare species to be cleared</p> <p>Restricted <i>Boronia</i> sp. to be cleared</p>	<ul style="list-style-type: none"> <li>170ha of conservation significance on Loc. 4264 to be fenced and preserved</li> <li>Water table maintained to prevent drawdown impacts</li> </ul>	<ul style="list-style-type: none"> <li>Buffer strip in Scott National park to be botanically surveyed before mining and annually thereafter for this species</li> <li>Significant members now found located in Park</li> </ul>	<ul style="list-style-type: none"> <li><i>Hypocalymma aff. cordifolium</i> from Reserve Flora Priority List found totally on mining area</li> <li>5 or 6 Reserve species and 2 or 3 species of interest have populations on mine area</li> <li>Data and map of rare flora species inside and outside mine area to CALM</li> <li>Flora and fauna surveys inadequate</li> </ul>	<ul style="list-style-type: none"> <li>Map rare species and species of interest and provide to CALM - now commenced</li> </ul>	<ul style="list-style-type: none"> <li>Develop research and management plan for rare species and others of special interest</li> <li>Apply for permission to take rare species if encountered</li> <li>Cede Loc 4264 of conservation significance to NPNCA if requested</li> <li>Additional flora and fauna surveys and research to aid rehab. plans</li> <li>Develop clearing management plan</li> </ul>	<ul style="list-style-type: none"> <li>Further surveys to monitor status of rare and other species in secure conservation reserves</li> <li>Monitor fauna status in Park in parallel with groundwater monitoring</li> </ul>	<ul style="list-style-type: none"> <li>Manageable and acceptable with proposed additional survey and management commitments</li> </ul>

ISSUE	IMPACT PREDICTED BY PROPONENT	COMMITMENTS BY PROPONENT		INITIAL CONCERNS OF EPA/PUBLIC	STRATEGY TO ADDRESS			CONCLUSION/ NOTES
		MANAGEMENT	MONITORING		MORE WORK	MANAGEMENT	MONITORING	
Clearing	312ha remnant vegetation cleared	<ul style="list-style-type: none"> <li>Millable timber recovered</li> <li>100m buffer proposed</li> <li>Clearing minimised</li> <li>Existing tracks used wherever possible</li> </ul>	None	<ul style="list-style-type: none"> <li>Large trees with nest hollows to be cleared outside nesting season</li> <li>Waste timber to be chipped and used as mulch</li> </ul>		<ul style="list-style-type: none"> <li>Use vegetation as mulch wherever possible</li> </ul>	<ul style="list-style-type: none"> <li>Annual audit and reporting</li> </ul>	<ul style="list-style-type: none"> <li>100m buffer sufficient</li> <li>Acceptable management</li> </ul>
Rehabilitation	<p>Temporary major disruption</p> <p>Incorporation of slimes will result in improved pasture</p> <p>Native revegetation to leave a useful natural resource</p>	<ul style="list-style-type: none"> <li>Broad rehab. plan</li> <li>72% agriculture</li> <li>13% native vegetation</li> <li>11% water course planting with natives</li> <li>4% buffer zone to Scott National Park of natives</li> <li>Compatible landforms</li> <li>Integrated drainage</li> <li>Topsoil conserved</li> </ul>	<ul style="list-style-type: none"> <li>Regular monitoring of all rehabilitation and additional planting as required</li> </ul>	<ul style="list-style-type: none"> <li>Detailed, rolling plan required before approval</li> <li>Few of the 326 recorded species proposed for use in rehab.</li> <li>No proposals to use understorey species</li> <li>No completion criteria proposed</li> <li>Rehabilitation bonds should be posted</li> </ul>	<ul style="list-style-type: none"> <li>Reconsidered species range, contribution from topsoil to be included; make public</li> <li>Bonding by Dept. Mines under review</li> </ul>	<ul style="list-style-type: none"> <li>Limit of 6 months on stockpiling of soil supporting native vegetation</li> <li>Develop detailed rehab. plan within one year of start of mining, review annually; make public</li> <li>Set interim criteria, review in 5 yrs; make public</li> <li>Annual rehab. plan subject to EPA review, make public</li> </ul>	<ul style="list-style-type: none"> <li>Annual rehab. monitoring programme within 2 yrs of mining, make public</li> <li>Monitor rehab. and review completion criteria, make public</li> </ul>	<ul style="list-style-type: none"> <li>Environmentally acceptable</li> <li>Completion criteria to be developed</li> <li>Buffer acceptable</li> <li>Limit of 6 months on stockpiling of soil supporting native vegetation</li> </ul>

ISSUE	IMPACT PREDICTED BY PROPONENT	COMMITMENTS BY PROPONENT		INITIAL CONCERNS OF EPA/PUBLIC	STRATEGY TO ADDRESS			CONCLUSION/ NOTES
		MANAGEMENT	MONITORING		MORE WORK	MANAGEMENT	MONITORING	
<u>Emissions/ Pollution</u>  Dust	Potential for dust generated by high winds	<ul style="list-style-type: none"> <li>Clearing minimised</li> <li>Mesh fences on cleared areas if req.</li> <li>Vegetative cover on longer term pasture topsoil stockpiles</li> <li>Tailings treated with mesh fencing</li> <li>Cover crops used to protect respread topsoil</li> <li>Progressive replanting of mined areas</li> <li>Product stockpiles to be watered</li> <li>Watering of haul roads</li> </ul>	<ul style="list-style-type: none"> <li>None proposed</li> </ul>	<ul style="list-style-type: none"> <li>High winds will cause major dust problems</li> <li>Dust nuisance will affect neighbouring stock, pasture and native vegetation</li> </ul>		<ul style="list-style-type: none"> <li>Detailed dust management plan before clearing including contingency planning for high dust days</li> </ul>	<ul style="list-style-type: none"> <li>Meteorological monitoring service to predict high dust risk days</li> <li>Dust monitoring programme in place before clearing</li> </ul>	<ul style="list-style-type: none"> <li>Manageable</li> <li>Dust monitoring programme reqd.</li> </ul>
SO <sub>2</sub> NO <sub>x</sub>	No predictions for output of combustion products	<ul style="list-style-type: none"> <li>High standard vehicle maintenance</li> <li>Investigate gas as fuel</li> </ul>	<ul style="list-style-type: none"> <li>On board computers to monitor truck performance</li> </ul>	<ul style="list-style-type: none"> <li>No details of gaseous emission levels and any controls necessary in ERMP</li> <li>Pollution will be exported if product is sent to overseas sulphate route plants</li> </ul>	<ul style="list-style-type: none"> <li>Provide information on drymill operations and emissions sources and controls before Works Approval and Licencing - now provided</li> </ul>		<ul style="list-style-type: none"> <li>Monitor emission points to EPA satisfaction</li> </ul>	<ul style="list-style-type: none"> <li>Plant acceptable</li> <li>SO<sub>2</sub> + NO<sub>x</sub> plant emissions within accepted standards</li> </ul>

ISSUE	IMPACT PREDICTED BY PROPONENT	COMMITMENTS BY PROPONENT		INITIAL CONCERNS OF EPA/PUBLIC	STRATEGY TO ADDRESS			CONCLUSION/ NOTES
		MANAGEMENT	MONITORING		MORE WORK	MANAGEMENT	MONITORING	
CO <sub>2</sub> , Greenhouse Gases	0.3% of State's output (6.7MW)  Equivalent to 40,000t coal  Diesel fuel needs for transport equivalent to 3525 t CO <sub>2</sub> /per	<ul style="list-style-type: none"> <li>No CFC pressure packs</li> <li>Halon free fire extinguishes to be investigated</li> <li>Refrigerant recycling</li> </ul>		<ul style="list-style-type: none"> <li>Greenhouse audit inadequate</li> <li>"Unnecessary" generation of Greenhouse Gases</li> </ul>		<ul style="list-style-type: none"> <li>Figures for CO<sub>2</sub> generation provided</li> <li>Halon fire extinguishers being phased out in WA generally</li> </ul>		<ul style="list-style-type: none"> <li>Power requirement now about 9MW</li> <li>Rail would generate about 35% less CO<sub>2</sub> than road transport. Rail option to be kept under review</li> </ul>
Radiation	Levels similar to background, no impacts	None required	None proposed	<ul style="list-style-type: none"> <li>Monitoring required to verify no problems during operation, especially inside dry mill</li> </ul>		<ul style="list-style-type: none"> <li>Adequate dust control in dry mill</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring programme to be developed to comply with Dept Mines regulations in consultation with Health Dept.</li> </ul>	

ISSUE	IMPACT PREDICTED BY PROPONENT	COMMITMENTS BY PROPONENT		INITIAL CONCERNS OF EPA/PUBLIC	STRATEGY TO ADDRESS			CONCLUSION/ NOTES
		MANAGEMENT	MONITORING		MORE WORK	MANAGEMENT	MONITORING	
Noise	<p>Calculated that sound levels will meet regulations for Category A2</p> <p>Concluded that this means no impact will occur at the mine site</p> <p>49dB(A) calculated for transport truck noise at 2 residences on corner of Scott River Road and Brockman Highway</p> <p>Construction to be confined to daylight hours wherever possible</p>	<ul style="list-style-type: none"> <li>Construction of noise barrier or re-alignment of haul road</li> </ul>	<ul style="list-style-type: none"> <li>Measurement to be taken under operating conditions</li> <li>Measurements of actual trucks to be made prior to commencement of haul road construction</li> </ul>	<ul style="list-style-type: none"> <li>Noise levels will exceed background by 3-21 dB(A) at mine</li> <li>EPA 'policy' is now for blanket limits regardless of area - operations would be inside limits but in the area where complaints can be expected from a few nearest neighbours</li> <li>Tonal characteristics may be annoying</li> <li>Increases in sound power levels due to down wind propagation and inversions should be allowed for</li> </ul>	<ul style="list-style-type: none"> <li>24 hour background surveys required on site - done by EPA</li> <li>Designs to attenuate noise at nearest residences need consideration</li> </ul> <ul style="list-style-type: none"> <li>Re-evaluate</li> </ul>	<ul style="list-style-type: none"> <li>Develop designs for noise alternation at nearest residences</li> <li>Develop contingency plans for mitigation if noise levels are annoying - advise neighbours of these plans</li> <li>Consider under body exhausts for trucks to keep noise below barriers</li> </ul>	<ul style="list-style-type: none"> <li>Pre and Post operations monitoring schedule required</li> </ul>	<ul style="list-style-type: none"> <li>Noise limits to be as per model conditions in Appendix E</li> <li>Sound levels must be within current EPA policy levels, therefore acceptable</li> <li>Complaints are likely from nearest neighbours</li> </ul>

ISSUE	IMPACT PREDICTED BY PROPONENT	COMMITMENTS BY PROPONENT		INITIAL CONCERNS OF EPA/PUBLIC	STRATEGY TO ADDRESS			CONCLUSION/ NOTES
		MANAGEMENT	MONITORING		MORE WORK	MANAGEMENT	MONITORING	
Noise cont.				<ul style="list-style-type: none"> <li>No consideration of dredge construction noise or noise from on-site crushing of caprock</li> <li>No allowance for blasting if ripping unsuccessful</li> </ul>		<ul style="list-style-type: none"> <li>Evaluate construction noise and propose management - advise neighbours</li> <li>Develop contingency plan for blasting if required</li> </ul>	<ul style="list-style-type: none"> <li>Monitor construction noise</li> </ul>	<ul style="list-style-type: none"> <li>Regulations must be complied with</li> </ul>
Light	No predictions made	<ul style="list-style-type: none"> <li>Commitment to mitigate light spill impacts on neighbours</li> </ul>	<ul style="list-style-type: none"> <li>Informal monitoring of complaints</li> </ul>	<ul style="list-style-type: none"> <li>Light spill may annoy residents and attract and kill fauna, especially invertebrates</li> <li>Use high stands and downward shielding</li> </ul>	<ul style="list-style-type: none"> <li>Design lighting to limit spills and avoid annoyance</li> </ul>	<ul style="list-style-type: none"> <li>Rectify annoyance</li> </ul>	<ul style="list-style-type: none"> <li>Monitor any annoyance</li> </ul>	Acceptable
Downstream Processing	None planned thus no impact predicted	None required	None required	<ul style="list-style-type: none"> <li>Downstream processing may be proposed in future - Some submissions requested that the proponent should guarantee this won't happen</li> </ul>		<ul style="list-style-type: none"> <li>EP Act, Public Assessment</li> </ul>		<ul style="list-style-type: none"> <li>Not a proposal</li> <li>Could not occur without referral to EPA</li> </ul>



ISSUE	IMPACT PREDICTED BY PROPONENT	COMMITMENTS BY PROPONENT		INITIAL CONCERNS OF EPA/PUBLIC	STRATEGY TO ADDRESS			CONCLUSION/ NOTES
		MANAGEMENT	MONITORING		MORE WORK	MANAGEMENT	MONITORING	
<u>Surface Waters</u>	Disruption of drainage lines  Discharges to drainages	<ul style="list-style-type: none"> <li>Construct and stabilise diversion channels</li> <li>Construct silt traps</li> <li>Turbid water will not be allowed to enter National Park</li> </ul>	<ul style="list-style-type: none"> <li>Regular monitoring of major drainages and rivers</li> </ul>	<ul style="list-style-type: none"> <li>Discharge of turbid or polluted waters to Park and Rivers</li> </ul>		<ul style="list-style-type: none"> <li>Require detailed management plan to EPA satisfaction on advice of Dept. Agriculture</li> </ul>	<ul style="list-style-type: none"> <li>Require detailed monitoring plan to EPA satisfaction and compliance with discharge licence</li> </ul>	<ul style="list-style-type: none"> <li>Could be made acceptable by appropriate management</li> </ul>
		<ul style="list-style-type: none"> <li>Settlement and turbidity control</li> </ul>	<ul style="list-style-type: none"> <li>Routine monitoring</li> </ul>	<ul style="list-style-type: none"> <li>As above</li> </ul>		<ul style="list-style-type: none"> <li>Licencing, no discharges outside licence conditions</li> </ul>	<ul style="list-style-type: none"> <li>Reporting to EPA</li> </ul>	<ul style="list-style-type: none"> <li>Manageable</li> </ul>
<u>Slimes Handling</u>	Turbidity increase confined to dredge pond	<ul style="list-style-type: none"> <li>No discharge from dredge pond</li> <li>Slimes retained in pond by propriety on barge separation method</li> </ul>		<ul style="list-style-type: none"> <li>Discharge to surroundings</li> <li>Disruption of groundwater flows</li> <li>Contingency if new methods fail</li> </ul>	<ul style="list-style-type: none"> <li>Further development of new method</li> </ul>	<ul style="list-style-type: none"> <li>Contingency plan or confidential briefing to EPA satisfaction</li> </ul>	<ul style="list-style-type: none"> <li>Part of above</li> <li>Part of groundwater monitoring programme</li> </ul>	<ul style="list-style-type: none"> <li>Manageable</li> <li>New technology represents opportunity for significant improvement in environmental performance - acceptable</li> </ul>
<u>Land Use</u>								
Regional Assessment	Government Task	None	None	<ul style="list-style-type: none"> <li>Regional strategy should be prepared prior to reporting on this proposal</li> </ul>	<ul style="list-style-type: none"> <li>Industry wide strategy to be produced by DRD with public input</li> </ul>			<ul style="list-style-type: none"> <li>Scope of study public</li> <li>Public involvement in Strategy</li> </ul>
End Land Use	Equal or better agricultural production	<ul style="list-style-type: none"> <li>Rehabilitation plan designed to restore agriculture and buffer Park</li> </ul>	<ul style="list-style-type: none"> <li>Routine Monitoring</li> </ul>	<ul style="list-style-type: none"> <li>Restore agriculture</li> <li>Restore native vegetation</li> </ul>		<ul style="list-style-type: none"> <li>Detailed rolling rehabilitation plan and completion criteria</li> </ul>	<ul style="list-style-type: none"> <li>Ongoing monitoring programme</li> </ul>	<ul style="list-style-type: none"> <li>Manageable balance achievable - acceptable</li> </ul>

ISSUE	IMPACT PREDICTED BY PROPONENT	COMMITMENTS BY PROPONENT		INITIAL CONCERNS OF EPA/PUBLIC	STRATEGY TO ADDRESS			CONCLUSION/ NOTES
		MANAGEMENT	MONITORING		MORE WORK	MANAGEMENT	MONITORING	
<u>Energy Use</u> Supply Route  Increase in Supply Capacity	SECWA responsibility  No impact	None	None	<ul style="list-style-type: none"> <li>Public Input to supply route</li> <li>Increased capacity could pre-empt secondary processing</li> <li>No direct impacts of increased supply</li> </ul>	<ul style="list-style-type: none"> <li>SECWA to prepare environmental review</li> <li>No secondary processing possible without public EPA review</li> </ul>	<ul style="list-style-type: none"> <li>EPA will assess with public input</li> </ul>		Satisfactory
<u>Energy Used</u>	Energy conservation maximised	<ul style="list-style-type: none"> <li>Solar power to be investigated at design stage for offices</li> <li>Energy conservation incorporated into design of equipment and trucks</li> <li>Trucks may use gas</li> <li>Rail to be used if economic in future</li> </ul>	<ul style="list-style-type: none"> <li>Computerised monitoring</li> </ul>	<ul style="list-style-type: none"> <li>Energy use should be minimised</li> </ul>		<ul style="list-style-type: none"> <li>Rail to be kept under review by Govt.</li> </ul>		Satisfactory
<u>Workforce Impacts on Environment</u>	Manageable through education (but is private individuals responsibility)	<ul style="list-style-type: none"> <li>Workforce education</li> <li>Recruit workers locally wherever possible</li> </ul>	<ul style="list-style-type: none"> <li>Routine</li> </ul>	<ul style="list-style-type: none"> <li>Effect of increased human pressure on Park and elsewhere due to increased population attracted by mine</li> </ul>		<ul style="list-style-type: none"> <li>Workforce education</li> </ul>		Manageable

ISSUE	IMPACT PREDICTED BY PROPONENT	COMMITMENTS BY PROPONENT		INITIAL CONCERNS OF EPA/PUBLIC	STRATEGY TO ADDRESS			CONCLUSION/ NOTES
		MANAGEMENT	MONITORING		MORE WORK	MANAGEMENT	MONITORING	
<u>Landscape</u>	Small, steam plume and lights only visible from Augusta	<ul style="list-style-type: none"> <li>Green colour for plant</li> <li>Tree screening</li> </ul>	None	<ul style="list-style-type: none"> <li>Visual intrusiveness               <ul style="list-style-type: none"> <li>- from a distance</li> <li>- from neighbours</li> </ul> </li> </ul>				Impact limited, Acceptable
<u>Archaeology</u>	None	None	<ul style="list-style-type: none"> <li>Record and report finds</li> </ul>	<ul style="list-style-type: none"> <li>Limestone platforms or other archaeological material to be reported to Museum</li> </ul>		<ul style="list-style-type: none"> <li>Reporting to occur as appropriate</li> </ul>		Acceptable to Museum

Table 3 shows the environmental issues potentially associated with the proposal and the commitments to manage or monitor them made by the proponent in either the ERMP or in responses to submissions.

The 'initial concerns' column encompasses all queries raised initially while the 'more work, management and monitoring' columns to the right show the approaches needed to tackle the issues. Consequently, either additional work was done (shown in the 'more work' column), extra commitments were made (shown in the 'proponent's commitments' column) or recommendations were made by the Environmental Protection Authority in this report (shown in the 'conclusions' column).

## **Appendix B**

**Proponent's responses to questions  
raised in public submissions**



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# Beenup Heavy Mineral Sands Mine Proposal

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*Answers to ERMP Public Responses*



In the attached document Mineral Deposits Limited submits to the EPA responses to the questions raised by the public and Government Departments on the proposed Heavy Mineral Mine at Beenup. The proponent also outlines below the commitments already made in the ERMP together with the additional commitments it has made (printed in bold type) as a result of extra work completed since the ERMP was published. The proponent has also summarized (in part B below) the changes and modifications it has made to the project through public consultation.

## A. PROJECT COMMITMENTS SUMMARY

### 6.0 SUMMARY OF ENVIRONMENTAL MANAGEMENT COMMITMENTS

If approval for the project is granted, the proponent will carry out the following actions before, during and after the proposed operation, according to the particular requirements of each commitment, to the satisfaction of the EPA.

#### 6.1 CONSTRUCTION PHASE

##### 6.1.1 Accommodation for temporary workforce

During the peak construction period, temporary single persons quarters, recreation facilities and messing facilities will be provided adjacent to the dry mill site. Accommodation for married personnel will be provided via existing commercial caravan parks and, subject to Shire Council agreement, at a caravan park to be constructed at the old Bullers Mill site adjacent to the Alexandra Bridge. This caravan park will be handed over to the Shire Council at the conclusion of the construction phase for management as a community facility.

**The Company is proposing that its single persons quarters be located on site and that a wet mess be located in this area. Following discussions with the Shire and local business groups, it is no longer proposed to build the Alexander Bridge Caravan Park. It is now proposed that the married accommodation be supplied within Augusta in the Flinders Bay Caravan Park. This would enable families of the construction workforce to integrate with the local community and bring some benefits, from an economic point of view, back into the Augusta township.**



## 6.2 MINING

### 6.2.1 Environmental awareness

An environmental awareness programme will be established for the Company's workforce. All personnel working on the project will be required to observe environmental guidelines both within the mine site and in adjoining areas.

### 6.2.2 Groundwater

The mining operation will be designed to avoid substantial draw-down of the water table; if water table draw-down does occur during the summer months, it will be minor and confined to the immediate locality of the dredge pond. During summer, if required, make-up water will be supplied to the dredge pond from several bores in the Lesueur Formation at a depth of 150 to 200 m.

### 6.2.3 Surface water

Existing surface drainage channels that are encountered by the mining operation will be temporarily diverted around the dredge pond. These channels will be established at least 12 months prior to requirement, to enable vegetation to regenerate and stabilize. Silt traps will be constructed on major drainage channels, downstream of the mining operation. Where practical, water from the slimes dam will be decanted and returned to the dredge pond. Providing turbidity is at an acceptable level, excess decant water from the slimes dam will be discharged into existing drainage channels (during the winter wet season).

### 6.2.4 Slimes disposal

Slimes will be directed to settling ponds for disposal after they have dried. A portion of the slimes will be incorporated into the topsoil destined for pasture areas and the remainder will be incorporated into the tailings near the surface.

### 6.2.5 Minimization of disturbance

Clearing of native vegetation will be kept to an absolute minimum. Wherever possible, access roads and easements will follow existing tracks.

### 6.2.6 Site preparation

The treatment of vegetation and soil on land in advance of mining will as described in Section 3.1.9.2 of the ERMP.

### 6.2.7 Aboriginal artefacts

Should any archaeological material be uncovered during the process of earth moving, the Department of Aboriginal Sites of the Western Australian Museum will be immediately notified.

**The proponent will report any occurrence of Limestone platforms to the W.A. Museum.**

#### 6.2.8 Dust control

The generation of dust from areas such as topsoil, tailings, concentrate heaps and haul roads will be controlled as necessary by the control measures detailed in Section 4.7.2 of the ERMP.

#### 6.2.9 Flora and vegetation of conservation value

The eastern half of Location 4264 will be excluded from mining.

#### 6.2.10 Lighting

**If lighting causes direct illumination at neighbours residences, the Company will install appropriate light shields.**

#### 6.2.11 Noise Mitigation

**The Company will design if necessary a series of sound barriers to prevent the escape of noise from loading areas. It will apply to have the pitch of reversal horns reduced and will avoid, wherever possible, disruptive noise at night. The Company is currently undertaking further base line noise monitoring and will continue with periodic monitoring during both the construction and operation phases.**

### 6.3 REHABILITATION

The type of vegetation to be returned to the mined area will be as drawn up after consideration of the recommendations by the final land use Work Party and the Community Consultative Group viz:

- (a) 72% agriculture, including possible community purposes, e.g. a commercial tree crop.
- (b) 13% rehabilitation of the main remnants of native vegetation back to native vegetation.
- (c) 11% planting of native plants along major water courses, to assist in stabilizing the soil and absorbing fertilizer nutrients leached from farming activities.
- (d) 4% planting of a buffer zone of native tree and understorey species along the southern boundary, adjacent to the Scott National Park.

Rehabilitation procedures will be as listed in Section 4.2.2 of the ERMP document.

**Detailed rehabilitation plans will be prepared well in advance of the commencement of mining operations and these will be available for public inspection. There will be a continuing programme of evaluating proven rehabilitation techniques and modifying them as necessary for the Beenup situation. Members of the public will be kept informed of this programme through the Consultative process.**

**The Company will co-operate in regeneration trials for Rare and Endangered Flora species, Reserve List Species and Species of Interest as appropriate with CALM and the Kings Park Board.**

#### 6.4 Mineral Processing

##### 6.4.1 Water supply

The water supply for the dry mill will be obtained from two bores in the Lesueur Formation at a depth of 150 to 200 m, which will not affect the water table nearer the surface. Much of the water in the plant will be recycled and the discharge of excess water is not planned. As a precaution, a silt trap will be constructed downstream of the settling dam.

##### 6.4.2 Waste disposal

Sand and other waste products which are removed from the concentrate in the mineral processing will be returned to the mine site for disposal. The disposal of other wastes such as garbage and workshop waste will be disposed of at an approved disposal area within the Shire.

##### 6.4.3 Visual amenity

The dry mill and office will be screened from the road by planting of indigenous trees and shrubs.

**The Company proposes to clad its site buildings with appropriately coloured green colourbond, thereby minimizing the visual disturbance with the surrounding land.**

#### 6.5 TRANSPORT OF MINERAL PRODUCT

##### 6.5.1 Transport route

The selection of the preferred transport route, the upgrading of parts of this route as required and the conditions under which the mineral product will be transported will be as described in Section 4.3.2 of the ERMP document reiterated below.

##### 4.3.2.1 Upgrading of roads

The total length of the preferred route will be sealed. All roads will be constructed to MRD or Shire standards as appropriate.

At the intersections where Scott River Road and Sues Road meet the Brockman Highway, the highway will be widened to incorporate a deceleration lane. The intersection of Sabina Road with the Vasse Highway will include an acceleration lane. All intersections will be positioned to provide clear visibility for a distance of 400 m in both directions.

"Stop" signs will be installed at the three intersections. Signs will be placed along the route to indicate the presence of heavy haulage vehicles. Speed restrictions will be imposed in populated areas.

Sound levels at the two houses near the intersection of Scott River Road and Brockman Highway will be recorded under actual operating conditions and appropriate measures will be taken, if necessary, to reduce the sound levels to acceptable levels.

The provision of a sealed all weather road, suitable for heavy haulage, between Capel and the project site, will alter existing traffic patterns. It is anticipated that heavy haulage traffic along the Bussell Highway between Capel and Margaret River will be reduced. To quantify these changes, the proponent is currently undertaking a traffic study. (\*) The study should be completed by April, 1990.

(\*) This study has been completed and given to MRD.

#### 4.3.2.2 Operation of trucks

The proposed hours of operation are 24 hours per day in three shifts, five days per week. No haulage of mineral product is proposed during Saturday and Sunday. As a condition of the haulage contract, the contractor will be required to maintain the vehicles in a safe operating condition. The mineral will be securely covered by a tarpaulin to prevent spillage en-route.

#### 4.3.2.3 Management of dieback

The widening and re-alignment of some sections of the transport route, and the extraction of gravel for road construction, have the potential to spread dieback. A dieback management programme for these operations will be developed by the proponent to the satisfaction of CALM and EPA.

The proponent will carry out the following studies.

- (a) Description and appraisal of the vegetation and flora along the entire Sues Road-Sabina Road route. The condition of the vegetation will be assessed, with particular emphasis on the occurrence of dieback. A more detailed study will be carried out in the proposed Whicher Reserve section, where a number of possible route alternatives (Figure 4.3) will be studied to ensure minimum impact, both with respect to dieback control and flora.
- (b) Description of the terrain, drainage and soils with particular emphasis on regional drainage and how the proposed upgrading may affect this drainage.
- (c) Description of the fauna and faunal habitats of areas that would be disturbed by the proposed upgrading.

- (d) Survey the areas that would be disturbed by the proposed upgrading for cultural and archaeological sites.

The proponent will endeavour to obtain gravel from private sources, including an investigation of the iron pan contained within the proposed mining area.

If there is any shortfall in requirements, the proponent will make a formal approach to CALM for its requirements. The spread of dieback will be prevented by using only uninfected sources of gravel in areas currently free of dieback.

### **6.5.2 General**

**A new heavy haulage route from the mine to Capel will be developed. This route will use Scott River Road, Brockman Highway, Sues Road and then a route selected by BSD (a consultant to the MRD) to link Sues Road and the Capel Bypass. This route will be constructed to comply with the latest Austroad standards and will meet MRD requirements.**

**The heavy haulage route from Vasse Highway to the mine will be clearly designated as a heavy haulage route with warning signs.**

**The Company is willing to meet the costs associated with the haulage of its mineral product. It is finalizing agreement with the Shire's on the proportion of upgrading, sealing and maintenance levels for all haulage roads.**

**The Company is willing to reconsider the use of rail if it should ever become viable and competitive.**

### **6.5.2 Noise mitigation**

Noise levels at the intersection of Scott River Road and Brockman Highway will be reduced to acceptable levels if necessary by the use of measures outlined in Section 4.8.3 of the ERMP document.

## **6.6 CONTROL OF THE SPREAD OF DIEBACK**

### **6.6.1 Dieback survey**

To enable a dieback management plan to be incorporated into the mine management plan, a detailed dieback survey will be carried out over the entire mining area, after approval to proceed is granted and before operations commence.

### **6.6.2 Drainage**

The drainage on the mining area will not be altered after mining. Existing drainage lines will be reconstituted after mining in positions and flow directions similar to the pre-mining situation.

### 6.6.3 Control measures

Vehicles moving from infected to uninfected areas will be washed down. Trucks transporting mineral products from the dry mill to Bunbury will not travel further south than the dry mill. The access of vehicles of mine workers to the mining area will be restricted to raised gravel surfaced roads and raised gravel parking areas.

### 6.6.4 Further studies

Measures to control and contain any dieback in native vegetation areas to be returned after mining, will be studied in the early years of mining, when the rehabilitation will be largely in the form of pastures.

### 6.6.5 Publication

**The Company will make its dieback control strategies available to the public via the EPA Library, the Shire Library and the Company's offices. A dieback survey of the Eastern and Northern sections of the Scott National Park will be completed early in 1991 and this will be made available to the public. Ongoing monitoring of these sections of the National Park will occur. All aspects of the Dieback Management strategy will be to the satisfaction of EPA and CALM.**

## 6.7 AUDIT OF GREENHOUSE GASES

Commitments to reduce the emission of greenhouse gases to as low as practical will be as outlined in Section 4.5 of this ERMP.

## 6.8 MONITORING

Monitoring will be undertaken in the following areas and the results reported as appropriate to the Department of Mines, the Department of Conservation and Land Management and the Environmental Protection Authority. The results from various monitoring programmes will be viewed regularly in relation to the appropriate management programme and the management programme will be modified as necessary.

### 6.8.1 Groundwater

The number of bores being monitored will be increased and during the initial years, these bores will be monitored on a weekly basis.

#### 6.8.1.1 Groundwater Monitoring

**The Company has increased its monitoring of bores prior to approval and construction to a fortnightly basis in winter and a quarterly basis during summer, to obtain detailed information on groundwater fluctuations.**

## 6.8.2 Surface water

Monitoring of the water quality of the Blackwood and Scott Rivers will continue on a regular basis. The major drainage channels on and leaving the mining area will also be monitored regularly.

### 6.8.2.1 Surface Water Monitoring

**Monitoring of the water quality in the Blackwood and Scott Rivers, is currently being undertaken on a fortnightly basis during winter and a quarterly basis in summer. In addition, major drainage channels are also being monitored. This information will be used to assist in the development and on-going monitoring of the surface water management plan.**

## 6.8.3 Flora, Fauna and vegetation

A buffer strip within the Scott National Park, in that section where the Park is contiguous with the mining area, will be botanically surveyed before mining commences and monitored annually thereafter.

### 6.8.3.1 Flora and Fauna Monitoring

**Flora and fauna surveys of the eastern and northern sections of the Scott National Park will be completed over the period October 1990 to June 1991. The results of these surveys will be available to the public.**

**The Company will provide some trial nest boxes in areas of native re-vegetation to determine whether these assist in the return of fauna to the rehabilitation sites.**

**The Company will provide detailed studies of flora and fauna along the proposed transport route, which crosses CALM land, to CALM prior to the route being finalized.**

## 6.8.4 Rehabilitation

The progress of rehabilitating areas will be monitored regularly and reported annually.

## 6.8.5 Dieback

Methods for monitoring the presence of the dieback organism in the dredge pond and drainage channels will be researched. Other parts of the mining area will be monitored for dieback as required, dependent on the results of the dieback survey. The buffer strip referred to in Section 6.8.3 will also be monitored for the presence of dieback.

## 6.9 ECONOMIC

### 6.9.1 Employment

The proponent will advertise all permanent positions in the local newspaper, in keeping with the policy of employing suitably qualified local residents where possible.

Electrical and mechanical apprenticeships offered by the proponent will be available for suitable local school-leavers.

Where competitive with alternative suppliers, local business activities will be supported.

The proponent is an equal opportunity employer.

**The Company will provide training programmes for plant operators who have no appropriate experience.**

**The Company will favour local people when employing its permanent workforce.**

**The Company will provide an induction programme for its construction and permanent workforce to highlight sensitive environmental and local issues.**

### 6.9.2 Infrastructure

The capital cost of infrastructure for the project will be borne by the proponent, in conjunction with other major users of the infrastructure facilities.

Upon obtaining approval for the project, agreement will be reached with the Shire to ensure that the Shire is not financially disadvantaged by the project.

**A total funding package is being finalized with the Shire to enable them to cater for the incoming population.**

### 6.9.3 Agricultural production

Areas of the pastoral land (937.3 ha), currently owned by MDL, that are not committed to the mining operation, will remain available for agricultural production. Post mining areas of rehabilitated pasture will be made available for agricultural use as soon as is practical.

### 6.9.4 Tourism

The potential for tours of the operation will be investigated in conjunction with the Augusta-Margaret River Tourist Bureau. Any funds generated from the tours will be for the benefit of the Tourist Bureau or local charities.



## 6.10 SOCIAL

### 6.10.1 Workforce

Suitably qualified local residents will be employed where possible. This will provide direct interaction between existing residents and employees new to the area. The proponent will provide the necessary training for plant operators, rather than rely on obtaining personnel who already have the appropriate work skills.

### 6.10.2 Accommodation

During the construction phase, single persons quarters will be provided on site to minimize pressure on existing rental accommodation.

The viability of constructing a caravan park for use by married persons during the construction phase, and then handing the management of the facility over to the Shire Council, will be further investigated.

Consultation with the Shire and the Beenup Consultative Group will continue, to determine means of minimizing the impact of the incoming construction and permanent operational workforce on existing housing.

**The Company is proposing that its single persons quarters be located on-site and that a wet mess be located in this area. Following discussions with the Shire and local business groups, it is proposed that the married accommodation be supplied within Augusta in the Flinders Bay Caravan Park. This would enable families of the construction workforce to integrate with the local community and bring some benefits, from an economic point of view, back into the Augusta township.**

### 6.10.3 Social infrastructure

The need for additional social facilities to meet current population growth and the increase in population due to the project will be investigated in conjunction with the Shire Council and the Beenup Consultative Group.

It is hoped that the Beenup Consultative Group will play an active role in assisting newcomers to assimilate to their new environment.

MDL personnel currently involved in consultation with the community will continue to be involved through the construction phase and into the operational phase, to maintain continuity of the consultative process.

**The Company will provide annual updates on anticipated workforce changes to the Education Department prior to the new academic years to enable the Department to undertake informed planning.**

## 6.11 MANAGEMENT PLANS

A surface water management plan and a Dieback management plan will be submitted and approved by the EPA. These plans will be available to the public for inspection.

### B. PUBLIC CONSULTATION

Public consultation has continued since the publication of the ERMP. A number of changes and modifications to the plans originally considered by the Company, have occurred due to public input. These developed during and after the preparation of the ERMP.

a) No lowering of the water table is proposed: This is a major change to the proponents original plans and is now the basis of its water management programme.

b) Monitoring of surface waters: Following discussions with local fishermen, farmers, the Consultative Group and attendance at the Blackwood Conference, the proponent held discussions with the Waterways Commission to commence monitoring of the Scott and Blackwood Rivers. It has also included extensive monitoring of the surface drainages from the mine/mill areas impacted by the proposal.

c) Flora, Fauna and Dieback studies of the National Park: Discussions with locals and CALM have shown there is little information available on the Scott National Park. The proponent has commissioned studies of the eastern and northern sections of the Park to commence in October 1990.

d) Publication of Monitoring Results: The proponent has agreed to make all monitoring programmes and the National Park studies available to the public.

e) Construction Workforce: Original proposals to house married construction workers at a new caravan park at Alexander Bridge has been changed following requests from Augusta Business people, the Shire, and numerous local residents. It is now proposed that the married construction workers will be located at the Flinders Bay Caravan Park in Augusta.

f) Noise Studies: Following expressions of public concern, arrangements were made with the EPA for a two week continuous noise survey to be carried out at the nearest neighbour's property. A similar survey will also be conducted in summer.

g) Tree Planting: The proponent has agreed to commence the planting of about 4,000 trees as sight and noise screens in the autumn of 1991 at the dry mill site and at other appropriate locations around the mine site.

h) Continued Consultation: Although the present form of the Beenup Consultative Group will now change, the Company is committed to a continued consultative process. Discussions with the Shire Council are continuing to develop a consultative process that is acceptable to the Company, the Shire and the community.

i) Local Employment: The Company has received over 80 letters enquiring about permanent employment. There have been many local applicants with mining or trucking/farming experience and therefore it is confident that the commitment to employ locally as much as possible will be very successful.

j) Transport Route: One of the factors taken into account in selecting the Sues Road transport route as its preferred option was the extensive input received from the public. This came via local community meetings, direct letters to the Company, the Beenup Consultative Group, the local press and numerous local individuals.

Responses

to

Public Submissions



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# *TRANSPORT*

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## Roads

### QA01

**ROAD TRANSPORT: Q. What is the likelihood of additional accidents attributable to the increased truck traffic on both the existing highway and Sues Road?**

By developing a new heavy haulage route which will divert most of the heavy traffic going to Augusta away from the current tourist routes, the new highway will actually decrease the likelihood of truck accidents on the majority of the Bussell Highway. Sues Road will be constructed in accordance with the latest Austroad Standards to minimize the risk of accidents resulting from increased traffic on this road.

### QA02

**ROAD TRANSPORT: Q. What actions can be taken to reduce this likelihood?**

By clearly designating that Sues Road will be a heavy haulage route, with clear warning signs, it will be made obvious to the public that this is a heavy haulage route. Sues Road will be sealed and engineered in accordance with the latest Austroad standards such that normal driving practices will make it a safe road.

### QA03

**ROAD TRANSPORT: Q. The existing Bussell Highway through the Tuart Forest will not be capable of taking the proposed traffic load, especially at holiday times.**

The proponent agrees with this statement and it therefore has never supported the use of the Bussell Highway through the Tuart Forest as a heavy haulage route. This section of highway is currently being reviewed by the Main Roads Department's consultants.

### QA04

**ROAD TRANSPORT: Q. No additional clearing should occur through the Ludlow Tuart Forest.**

The proponent agrees with this position.

### QA05

**ROAD TRANSPORT: Q. Trucking operations should be confined to daylight hours only.**

To reduce the frequency of truck movements on the road there is a number of choices available to the Company. The lowest truck frequency would be achieved by operating 24 hours per day 7 days per week. However, in recognition of the potential conflict with other users on the weekend, it has been proposed to operate 24 hours a day 5 days a week and have up to 60 truck trips per day over a 24 hour period. It could restrict it to daylight hours only and in effect double the frequency of trucks during the hours of heaviest traffic use. It is the proponent's opinion that it is safer to have the trucks spread throughout the 24 hour period.



**QA06**

**ROAD TRANSPORT: Q. The proponent should pay for all necessary road upgrading.**

Where the only user of the road is the proponent, this is a principal that it would agree with. However, the majority of the roads are public roads and the public will gain a lot of benefit out of having these roads upgraded. It is therefore the Company's opinion that any upgrading beyond that necessary for the haulage of mineral sands, should not have to be paid for by the proponent. The Company is prepared to meet the costs of the upgrading, sealing and maintenance of roads that is necessary for its product haulage, and is finalizing agreement with the Shires on this matter. Existing fuel taxes will be paid by the proponent, so funds will be available to the Government for the maintenance and upgrading of existing public roads.

**QA07**

**ROAD TRANSPORT: Q. Where will the gravel required for road construction come from?**

Gravel sources have been identified on the mine site that will be suitable for sub-base. There is enough sub-base gravel in these areas for the construction of Scott River Road, all of the widening on the Brockman Highway, and the southern portion of Sues Road. Some better sources have been identified from commercially available gravel sources for the top surface of the road. In the northern section of the Sues-Sabina Road some gravel may need to be sourced from CALM and these areas are being negotiated with CALM. Three mining leases for the extraction of gravel in the northern Sues-Sabina Road area, have been applied for by the proponent. The extraction of gravel from these leases will comply with any conditions applied by CALM.

**QA08**

**ROAD TRANSPORT: Q. How much additional forest clearing will be required for road construction? Compensation should be provided for forest lost.**

The amount of additional forest clearing required for road construction has not been determined as yet. The majority of forest clearing necessary will depend upon the curve radii that are acceptable for safe usage and the source areas for construction material. By decreasing the travel speed progressively on curves, and therefore decreasing the safe curve radius, the amount of forest clearing can be minimized. Discussions are being held with MRD and the proponent's design consultants for the road to ensure that minimum forest clearing is necessary. Discussions with CALM are also ensuring that forest clearing is minimized and wherever possible the trees which are cleared will be used for appropriate milling timber. The issue of compensation for forest lost is being discussed with CALM and DRD.

**QA09**

**ROAD TRANSPORT: Q. How will the proponent minimize the number of animals killed on the road, specifically uncommon species such as the chuditch?**

By designing the road to Austroad standards to provide adequate distance vision it will mean that, under normal circumstances, it will be possible to stop safely if an animal is on the road. Clear road shoulders will be maintained to limit the attractiveness of the road verges to animals and provide visibility to drivers. These measures will enable maximum reaction time for drivers to slow down and warn animals (by using the horn), to minimize the animals killed on the road. The chuditch is currently subject to CALM studies and it is not known, at this stage, whether the final road route will impact on the chuditch.

**QA10**

**ROAD TRANSPORT: Q. What route/s is proposed from the top of Sues Road to Capel?**

These routes are being examined at the moment by BSD, the consultant to the Main Roads Department. These include Sabina Road, Kemp-Yoongarillup road, and a number of other options. Once the Vasse Highway is reached there are 8 options that could be used and the consultants report on the preferred option, is awaited. This preferred option will be subject to a normal EPA submission, and the public will have the opportunity to comment upon these proposals.

**QA11**

**ROAD TRANSPORT: Q. Will the as yet unspecified portions of the route be subject to environmental assessment with full public input?**

Yes. This will be prepared by BSD, a consultant to the MRD, and submitted to the EPA for a normal approval process.

**QA12**

**ROAD TRANSPORT: Q. The proposal will improve transportation in the region.**

The proponent agrees with this, as it will open up a heavy haulage route to Augusta, and shorten the distance for traffic travelling from the lower South West region to Bunbury.

**QA13**

**ROAD TRANSPORT: Q. Brockman Highway should be upgraded to four lanes.**

The proponent has been guided by advice from the MRD in this matter. Traffic density levels will not be high enough to warrant a 4 lane highway.

**QA14**

**ROAD TRANSPORT: Upgrading Courtney Road will increase access to, and hence pressure on, Scott National Park. What alternatives exist?**

It is not proposed to upgrade Courtney Road but to upgrade and seal the northern section of Scott River Road from Governor Broome Road to Brockman Highway. This road will provide access to East Augusta. In the future, some sections of Scott River Road may need realignment, and agreement with the Shire will be reached before any new route is proposed.

**QA15**

**ROAD TRANSPORT: Q. What provisions will be made to separate mine trucks and public traffic along that section of Scott River Road which does not pass through Mineral Deposits' property?**

Discussions held with Augusta-Margaret River Shire indicate that the Shire would prefer that the haul road be sealed so that the public traffic along Scott River Road can benefit from the haul road. It has therefore been decided that public transport and mine trucks should not be separated along the sealed section of Scott River Road, as the number of trucks hauling concentrate from the mine site to the dry mill (about 100 per day), will not be a significant hazard to the public.

**QA16**

**ROAD TRANSPORT: Q. What provisions will be made to ease the flow of public traffic past the trucks (eg overtaking lanes, compulsory pull-offs where traffic is banked up behind trucks etc).**

The Sues Road section is being designed to Austroad standards and will meet all standards required for the safe operation of the haul trucks. It appears from initial road design that overtaking lanes will not be necessary, as there will be only short parts of the road where the trucks are likely to slow traffic flow for significant periods of time.

## Rail/Other Alternatives

### QA17

**RAIL/OTHER TRANSPORT: Q. Have alternatives been considered for transportation of the product between the wet and dry plants?**

Studies to date have indicated the most practical means of transport over this 3 to 8 km distance, is by road haulage. Studies are on-going to evaluate alternative methods such as slurry pumping and conveying.

### QA18

**RAIL/OTHER TRANSPORT: Q. The proponent should guarantee that the sea transport option will not be resurrected in future.**

Given the Company's large capital investment in the road transport option, it is not in its best interest to pursue a sea transport option. The Company has indicated that it would be willing to consider rail transport should it be an economic alternative, however, current cost estimates by Westrail preclude this as a viable alternative to road at present. It is therefore considered that, for the foreseeable future, road transport will be used. However, the Company is willing to reconsider the use of rail if it should ever become viable. The Company has no intention of reconsidering the sea transport option now that a viable road transport option has been identified.

### QA19

**RAIL/OTHER TRANSPORT: Q. The products should be transported by rail, resulting in less disruption, less accidents, less fuel use, less dieback spread etc.**

Studies undertaken by Westrail, have concluded that the rail option is not viable from an economic or materials handling point of view. The proposal to transport by rail from Nannup still requires over 60 kms of truck transport and considerable road reconstruction along the Brockman Highway. It also includes 14 kms of new rail detour off the current rail reserve to cross over the Blackwood River and to provide a transfer station close to the Brockman Highway. Recent technical studies of the current Sues Road alignment, indicate that dieback has already been spread along the length of the road. The upgrading and sealing of Sues Road, will permit better dieback control than currently exists along this route.

### QA20

**RAIL/OTHER TRANSPORT: Q. The community should have input in consideration of the rail option.**

Since the Government has stated Westrail's investigation into the rail option, showed that the rail option is not viable, and that it is not willing to have a subsidised rail system, such input is not likely to be effective at present. However, should the rail option become viable in the future, it is expected that Westrail would be the proponent, and would be subject to the normal assessment process with appropriate public input.

**QA21**

**RAIL/OTHER TRANSPORT: Q. Studies of the comparative dollar and environmental costs of rail transport should be published.**

The proponent agrees with this, however the figures are the property of Westrail. Westrail is the only organisation that could provide these figures.

**QA22**

**RAIL/OTHER TRANSPORT: Q. The transport route should not pass through the biologically important Whicher Forest block.**

Studies are currently underway (by BSD), to determine a final route from the north of Sues Road to Vasse Highway, which will best join the new link road to Capel. It may be possible to avoid the proposed Whicher Reserve completely. However, studies are also being undertaken to determine the biological diversity and importance of the proposed reserve. Detailed discussions have been held and are continuing with CALM, on a final route which would have the least impact if it is necessary to go through the area. This reserve has never been studied in full and studies are being undertaken by the proponent's consultants in conjunction with CALM.

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## ***ENERGY USE AND SUPPLY***

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### **QB01**

**ENERGY USE AND SUPPLY: Q. Which alternative route will be used to supply power to the site?**

SECWA are responsible for proposing alternatives. Any route will be subject to public input under the normal EPA assessment process. SECWA have indicated that their first option is for the power supply to come from Manjimup. Alternative power supply corridors are being investigated by SECWA at the moment.

### **QB02**

**ENERGY USE AND SUPPLY: Q. Will full environmental assessment with public input be undertaken for the power supply route?**

Yes.

### **QB03**

**ENERGY USE AND SUPPLY: Q(a). Will the project necessitate construction of a new power station in the region? Q(b). Elsewhere in the state?**

SECWA have indicated to the proponent that the power requirements for this project can be met with current generating capacity, and no new power station will be necessary.

### **QB04**

**ENERGY USE AND SUPPLY: Q(a). What alternative power supply does the proponent propose to use if the power line is not approved in time? Q(b). What impacts might this alternative have?**

(a). SECWA have indicated that they will be able to supply power to the site in time for the Beenup operation to commence. Should unforeseen circumstances delay this power supply to site, the only alternative available to the Company would be to look at generating its own power as an interim measure.

(b). In the event of the 132 kV power supply being unavailable for the scheduled commissioning of the Wet and Dry plants, a temporary diesel driven power supply would need to be established, adjacent to the mining area. This would impact, in the short term, on the level of exhaust gas emissions into the atmosphere and on the noise levels perceived in the area.

Since publication of the ERMP, questions have been raised in public regarding the proposal to install an 18 mW capacity power line, when the Company's requirement was estimated at 8.9 mW. Detail design undertaken since the ERMP was prepared has shown that more power may be needed due mainly to two items: -

1. The dredges being considered vary in power requirement by up to 3 mW.
2. Due to the recycling of water at the dry mill (to reduce the water extracted from the Lesueur Aquifer), more power may be necessary.

SECWA has also indicated that in the future, Augusta could be supplied with power from this line. Due to the marginal cost of installing an 18 mW, rather than a 9 mW capacity line, it was considered sensible to install a higher capacity line.

**QB05**

**ENERGY USE AND SUPPLY: Q. What fuel will be used in the dryers, what emissions will result, and how will these be controlled?**

Fuel used in the dryers will be coal. Principal emission will be steam which will be visible at times dependant on the prevailing weather conditions. Exhaust gases will be wet scrubbed to remove dust, which will be slurried and returned to tailings.

Two process dryers of the fluidized bed type will be installed at the dry Mill. The larger of these dryers, 84 t/h will be installed external to the Dry Mill with coal as the main energy source. A start-up burner fuelled by fuel oil will be incorporated to heat the bed prior to introducing coal feed. The smaller of these dryers, of 6 t/h, will be installed within the Dry Mill. This unit will also be coal fired.

The following provides information for the evaluation of gaseous wastes during the treatment of the mineral sands products based on standard coal available from Collie.

Maximum Chimney Stack Height	25m
Volumetric Flow Rate	
84 t/h dryer	45500 Nm <sup>3</sup> /h
6 t/h dryer	2750 Nm <sup>3</sup> /h
Exhaust Stack Temperature	65° C
Exhaust Gas Composition	
61.9% N <sub>2</sub>	
7.8% CO <sub>2</sub>	
12.7% O <sub>2</sub>	
17.6% H <sub>2</sub> O	
0.034% SO <sub>2</sub>	
Concentration of particulate matter is less than 250 mg/Nm <sup>3</sup> and a size range of minus 5 micron	
Proposed Outlet Velocity	15 m/sec
Humidity	100%

*FOOTNOTE: Nm<sup>3</sup> - "Normal" cubic metres*

**QB06**

**ENERGY USE AND SUPPLY: Q. What opportunities are there for using alternative energy sources on the project (eg solar heating/cooling of buildings, wind pumping, solar cells etc)?**

The Company has concentrated on maximizing energy conservation both in the mining and separation of the mineral, and also in minor areas of energy consumption such as the office buildings. The proposed standard of construction for the office buildings is with insulated walls and double glazed windows to minimize heating and cooling requirements during the winter and summer months respectively. Full detailed design of the offices has not taken into account, at this stage, the use of solar heating and cooling of the buildings or wind pumping. Once detail design is underway, the use of solar hot water will be investigated, together with options for passive solar design in buildings.

Due to the amount, and reliability, of power required for the mine and plant, the use of wind mills etc, is not effective. It is however, in the Company's best interest to keep power consumption as low as possible.

**QB07**

**ENERGY USE AND SUPPLY: Q. What steps have been taken to ensure maximum efficiency in energy usage (eg in pump selection, insulation, use of waste heat in dryers, solar drying, use of on-board computers to optimize fuel usage by trucks).**

Pumps have been selected by computer design programs to give the most energy efficient units for the various duties. The Dry Mill building is not insulated, but is designed to retain heat where relevant. Dryers have been selected for maximum thermal efficiency. Detailed discussions with a number of trucking companies has indicated that on-board computers will be used to optimize fuel usage, brake and clutch wear, and to ensure safe speeds are maintained. Although the haulage contract has not been awarded as yet, the size of the job will mean new, modern trucks will be used with the most modern fuel efficient systems.



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## ***DIEBACK***

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### **QC01**

**DIEBACK: Q. Dieback surveys, maps and plans for control measures should be in place and subject to public scrutiny before the proposal is approved; not subject to approval.**

The management strategies for the containment of dieback are well developed, and have been carried out by government agencies and mining companies for many years. There is no reason to believe that the proponent cannot manage dieback.

The proponent recognises the public interest in being informed about dieback and its containment. It will make its strategies available to the public, via the EPA library, the Shire library, and the Company's offices. Dieback surveys of the mining site and the Scott National Park, will be undertaken in 1990/91 and these surveys will also be made available for public scrutiny. A detailed plan for dieback surveys in the National Park has been submitted to, and agreed to by CALM, and a conceptual management plan for dieback control in the project area has been presented to CALM and EPA.

Detail of the dieback management strategy will be developed as detail design proceeds. Final details will be to CALM and EPA satisfaction.

### **QC02**

**DIEBACK: Q. Given that dieback exists on the site, how will its spread be controlled?**

The natural spread of dieback by moving water and by movement of the fungus through the soil cannot be prevented by any known method. The present infections will continue to spread slowly. Dieback is also commonly spread by human actions which move infected soil and roots. This movement can be prevented by not moving the infected soil and roots into uninfected areas. This process is called dieback hygiene. It requires meticulous attention to the following components:

- . Mapping of the existing infections to identify infected and non infected areas, and monitoring any movement of the infections
- . Implementation of workforce environmental awareness programmes, to ensure understanding of dieback and other environmental issues and management procedures
- . Appropriate design of the site and operations, eg; drainage control strategies, appropriate road sealing
- . Compulsory cleaning of all machinery, materials and vehicles as they enter areas which are not infected, with close monitoring of these activities and inclusion of appropriate contractual requirements for contractors involved in site activities

- . Compulsory cleaning of all dirty machinery, materials and vehicles as they enter the site so that dieback is not introduced to areas which are not infected and so that additional species of dieback are not introduced to the site and to minimize the potential for introduction of exotic weed species
- . Compulsory cleaning of all machinery, materials and dirty vehicles as they leave site, so that dieback is not exported from the mining area.

Although tedious, these methods can control the spread of dieback and they are widely practised. The proponent undertakes to use any or all of the above techniques as deemed appropriate after discussions with CALM, and these steps will be incorporated into the dieback management plan.

The mine site itself will be isolated such that no vehicles will be able to enter or leave the area, without going through clean-down procedures or inspection to determine whether clean-down is required. The transport of wet concentrate from mine site to dry mill will be contained in leak proof trucks and travel on sealed road surfaces so that clean-down procedures will not be needed.

### **QC03**

**DIEBACK: Q. The infected south-west corner of the site should be quarantined and not mined.**

A preliminary dieback survey, carried out since the ERMP was written, has shown that dieback already occurs over much of the mine site and not just in a few areas. Leaving this area in the south west out of the mining will not protect the rest of the mine site from dieback. A detailed dieback management plan will be developed to the satisfaction of the EPA and CALM. As stated previously this will be available for public inspection.

### **QC04**

**DIEBACK: Q. Given the extensive earthworks and vehicle movements proposed how will dieback transfer onto and from the site be controlled?**

There will be a strict separation of vehicles and machinery which work within the mining part of the site from those which enter from the access road and stay only around the dry mill, office, stores and car parks. Vehicles and machinery which work within the mine site will be cleaned if they leave this area, to prevent the spread of dieback. Similarly, dirty vehicles and materials entering the mining and dry mill areas, will be cleaned to prevent the introduction of dieback to sites which are not infected and to prevent the introduction of additional species of dieback and weeds. (See QC02)

Construction contract documents will include clauses requiring the cleaning of equipment - particularly heavy earth-moving machinery - prior to arrival on-site, and this requirement will be closely supervised.

The degree of control required here is not difficult to achieve on a mine site because there is always complete traffic control for other reasons such as normal mine management, safety and security.

#### **QC05**

**DIEBACK: Q. How will the spread of dieback to the Scott National Park be prevented?**

A preliminary dieback survey, carried out since the ERMP was written, has shown that dieback already occurs in the Scott National Park. The full extent of this will be mapped at about the end of 1990, in close consultation with CALM, but at this stage it is expected that it will be found that all the drainage lines from the mining area into the National Park are already infected. There is no possibility of reversing these existing infections, and no possibility of removing the dieback from the mine site or park.

All drainage lines will be restored to their former positions after mining, and there will be no additional spread of dieback caused by mining, due to the control measures mentioned in answers to QC03 and QC04.

Management plans will be drawn up to prevent any introduction of dieback into the National Park by Company vehicles. The management required will involve conventional dieback hygiene procedures applied to all Company vehicle and machinery movements. Additionally, drains will be constructed, where required, to divert surface run-off from the mining area to drainage channels low in the profile. Access in and out of the mine site, will be controlled by blocking off any unofficial tracks and by maintaining perimeter fences.

The extent of dieback infections in the eastern and northern portions of the National Park will be established by a survey to be conducted in 1990/91, and will then be monitored.

#### **QC06**

**DIEBACK: Q. How will the dieback susceptible rare plant species adjacent to the site be protected?**

Plant communities which are to be excluded from the mine site will be protected by applying dieback hygiene within the mine site and ensuring adequate diversion drainage as required. The procedures to be used have been described previously. This hygiene will prevent the introduction and dispersal of dieback into these protected areas even though they are adjacent to the mining activities. It will not prevent the natural spread from any existing infections within the protected areas, and at present there is no proven method available to prevent this spread. The extent of these infections will be monitored during the mining operation, and action will be taken if any useful method becomes available.

#### **QC07**

**DIEBACK: Q. Given the volumes of water in the dredge pond and as run-off, the spread of dieback via overland or sub-surface flow is inevitable.**

The existing infections in the adjacent parts of the Scott National Park (described in the answer to Question QC05 above) show that it is unlikely that there will be any additional areas infected due to water moving off the mining area through natural drainage channels. No new drainage lines will be created. This is basically because all areas downstream are probably already infected and, as outlined in QC05, a survey will commence in 1990/91 to determine the full extent of infection. No additional run-off due to the mining activities will occur. The active mining and dredge pond area will be fully enclosed by bunds. All drainage within the active mining area will be internal into the dredge pond. The dredge pond level will be 2 to 5 metres below existing ground level.

**QC08**

**DIEBACK: Q. The proponent should fund on-going dieback research relevant to the susceptible species in the south coast environment.**

The proponent, in consultation with CALM, is currently providing funding for the study of dieback occurrences in the National Park on the east side of the Blackwood River and the north side of the Scott River. This will establish the baseline characteristics of the park as it is at the moment and predictions of what would be likely to be the case for the Park if the mine did not exist, prior to any activity occurring on the mine site.

The proponent requires information on species susceptibility and other factors relevant to dieback management for rehabilitation and impact studies, and is currently carrying out such studies. It is possible that this could be extended to funding other research or research by other bodies if this becomes the most appropriate way to collect the information.

**QC09**

**DIEBACK: Q. Has the dry mining alternative been considered as an option to minimize the spread of dieback?**

Yes, however since the existing water table is only several metres below ground level and mineralization extends 30-45 metres below the surface, dry mining was not considered a viable alternative. If dry mining were to be introduced it would necessitate massive dewatering which would require disposal, with associated further dieback management difficulties, as well as unacceptable impacts on the surrounding water table. The Company also considers that it would be more practical and effective to manage the spread of dieback in a dredging operation by isolating the immediate mining area from the adjacent surface drainage, than it would be in a dry mining operation where the equipment was traversing the total mining area. It is therefore considered that the dredging operation is a viable alternative that will minimize the spread of dieback.

**QC10**

**DIEBACK: Q. How will dieback spread be controlled during the construction and operation of the road transport route and the power supply route?**

Dieback introduction and dispersal will be managed by applying standard dieback hygiene procedures, as documented in the dieback management plan discussed in QC02. This hygiene has been applied to numerous sites by government, CALM, Main Roads Dept, SECWA, WAWA and commercial operations for many years, and there is no reason to think that the proponent cannot achieve the required hygiene. The results of hygiene procedures will be monitored.

**QC11**

**DIEBACK: Q. How will the proposal to use water for dust suppression be reconciled with the need to minimize the spread of water to control dieback?**

The control of the use of water, which may well be infected with dieback if surface or shallow aquifer water is used, is part of the standard hygiene procedures described previously under Question QC02. The ERMP states (pp. 67-8) that wind fences will be used on disturbed areas if required, and that water from deep bores will be used in preference on the roads.

Deep bore water is not expected to contain dieback, and this will be established once samples are obtained. The roads which are most likely to release dust are short, temporary, unsealed roads within the mine site.

It is quite possible that these will be classified as infected because of existing infections, and it will not be necessary to avoid using potentially infected water on them. Any vehicle leaving the site from these roads will have to be cleaned regardless, as described in QC02. Should surface water be used for dust suppression, it will be treated with fungicides in accordance with standard dieback procedures to the satisfaction of CALM.

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# **GROUNDWATER**

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## **Lesueur Aquifer**

### **QD01**

**GROUNDWATER: Lesueur Aquifer - Q. The project should not proceed until the Lesueur aquifer survey by the Geological Survey is completed and protection of the quality and the quantity of water in the aquifer can be guaranteed.**

The proponent has discussed with the WA Geological Survey the results obtained to date by their drilling. The Company has submitted to the WA Water Authority plans to drill an exploration bore at the dry mill site where both quality and quantity of water in the aquifer can be tested. The Company is confident that the quality and quantity of water in the aquifer will not be at risk by this project, because the quantity of water extracted is expected to represent less than 1% of the normal annual recharge entering the aquifer. This will be quantified following the tests planned for October/November this year. At all stages WAWA will have the licensing rights for these bores, and for any other drilling for water that takes place within the Lesueur aquifer. Any abstraction of water will be according to any licence conditions imposed by WAWA.

During the detailed design process the Company has reassessed its water requirements for the dry mill site and has reduced the requirements from 2 x 400 cubic metres per hour bores, to 2 x 100. Only one of these bores is required to maintain operations, with an estimated normal consumption of 50 cubic metres per hour of bore water. This has been achieved by increased recycling of water within the plant. During the initial start-up, water quantities approaching 100 m<sup>3</sup> per hour will be required.

### **QD02**

**GROUNDWATER: Lesueur Aquifer - Q. The proponent should pay for use of groundwaters.**

The proponent will pay all fees that normally apply to the use of groundwater in the area.

### **QD03**

**GROUNDWATER: Lesueur Aquifer - Q. What is the total storage of the Lesueur aquifer and the annual recharge compared to the proposed use and losses due to evaporation etc?**

Limited data are presently available for the Lesueur Sandstone Formation, however preliminary results from the Geological Survey's "Scott Coastal Drilling Programme" suggest that this Formation is present on both sides of the Alexandra Bridge Fault (a north-south fault approximately one kilometre west of Scott River Road). A formation thickness of 500 to 900 metres is encountered to the north of the study area, thinning to a 150 metre intersection at Governor Broome Road to the south. Groundwater recharge, throughflow and flow directions have not been defined, however it is evident that a very large resource of groundwater is available in the area.

Recent work by the Geological Survey of WA indicated that recharge of the Lesueur aquifer is currently taking place, as recent waters have been identified in the upper sections of the aquifer.

Calculations by the Company show that a recharge area of 17 sq kms of Lesueur Sandstone is necessary to replenish the water used by the operations annually (up to 558,000 m<sup>3</sup>/yr). It is anticipated that this represents less than 1% of the area available for recharge and therefore the impact on the aquifer is expected to be minor.

#### **QD04**

**GROUNDWATER: Lesueur Aquifer - Q. The Lesueur aquifer should be conserved for future domestic, irrigation or other uses.**

So long as the usage of the water by the proponent is not greater than the recharge there should be no loss of water within the aquifer for future use. The proponent has consulted with the WA Water Authority, on the quantities of water required by the proponent and it is their opinion that the quantity will not prejudice the future use of the aquifer.

#### **QD05**

**GROUNDWATER: Lesueur Aquifer - Q. How will the Lesueur aquifer be protected from pollution by fuel spills, sewage, nutrients etc?**

(Part A) Waste produced at the dry mill site will include:

- . sewage
- . slimes (fine clay fraction) from the dry mill
- . sand sized tailings from the dry mill
- . oils and greases from workshops
- . water treatment plant waste

In addition to the waste handling information in Section 3.3.4 of the ERMP document, further details of the waste handling facilities to be provided are given below.

SEWAGE - The quality of sludge waste from the package sewage treatment plant will be very small and will be either reused on-site for landscaping purposes or carted away for disposal at approved land fill sites. Effluent waste will be disinfected by tertiary treatment with chlorine (or similar) and will be used for irrigation on landscaped areas. The approximate magnitude of these wastes would be as follows: -

- . Sludge - 1.5 m<sup>3</sup> per annum
- . Effluent - 10 kl per day

SLIMES - Clay sized slimes will be pumped to the slimes dams and allowed to settle out. These dams are discussed further in QI10.

TAILINGS - Sand sized tailings from the dry mill will be pumped to a tailings stockpile area, where it will be loaded back on to trucks and returned to the dredge pond to the south. Supernatant liquid from the pumped tailings slurry will be contained in a settling pond and returned to the slimes dam.

WORKSHOP OILS AND GREASES - A collection pit and drainage system will be provided at the workshop to contain all waste oils and greases. A liquid/oil separator will be used to recover these oils and greases, and these will be disposed of either by a commercial recycler, or transported to an approved disposal site.

WATER TREATMENT PLANT WASTE - A package water treatment plant will be used for both the construction phase and mine life. Details are given below in Part B.

(Part B) A package water treatment plant will be provided to treat bore water drawn from the Lesueur Formation for use as potable water.

The bores and treatment plant will be located near the dry mill. Details of the final treatment process will be subject to water quality information from a test bore at the site which is yet to be drilled. However, information from other bores in the area and preliminary approaches to package treatment plant suppliers indicates the treatment will consist of aeration and pressure filtration, to reduce the iron content of the water. The iron removed from the water will be returned to the slimes dam.

#### **QD06**

**GROUNDWATER: Lesueur Aquifer - Q. Can the proponent show that extraction of water from the Lesueur aquifer will not affect other users and the environment dependant on shallow groundwater?**

The Lesueur Formation occurs at depths of at least 20 metres and is generally greater than 50 metres below ground level across the study area. (See Figure 2.8 ERMP). Water levels measured in the surficial aquifer are above groundwater levels recorded in the underlying Lesueur Formation. Clearly, there are low permeability horizons preventing downwards migration of surficial waters. Therefore, abstraction of groundwater at depth will have a significantly muted affect, if any, on the shallow groundwater system.

As stated in Section 2.7 of the ERMP, dredging will not penetrate into the grey feldspathic sandstone that occurs between the ore zone and the Lesueur Sandstone. This will mean that this low permeability horizon will continue to act as a hydrological barrier.

#### **QD07**

**GROUNDWATER: Lesueur Aquifer - Q. Will pumping of the Lesueur aquifer result in saline water intrusion from the sea or the Blackwood River?**

Groundwater abstraction from the Lesueur Formation will be within the sustainable yield of the aquifer system. This means that no reduction in the overall hydrostatic head of the Lesueur will occur. Resistivity logs for bore SC5 (Geological Survey Scott Coastal bore) indicate good quality to a depth of at least 180m below ground level at the southern boundary of the proposed mine area. It may therefore be concluded that saltwater intrusion will not occur as a result of groundwater abstraction from the Lesueur Formation. (also refer to QD13)

### Shallow Groundwater

#### **QD08**

**SHALLOW GROUNDWATER: Q. How will the proponent ensure that other users, reliant on shallow groundwater for pasture, stock, irrigation etc will not be affected by draw-down effects?**

Minimal (less than 0.1 metre) impact upon groundwater levels is predicted at a distance of 800 metres from the dredge pond without any additional mitigation measures. As stated in the ERMP it is anticipated that no significant impact will occur on the water table as water will be supplemented from the Lesueur aquifer if required, and therefore other users will not be affected.



**QD09**

**SHALLOW GROUNDWATER: Q. A 0.4m draw-down of the shallow groundwater may be fatal to sensitive and/or rare biota (eg the newly discovered *Loxocarya sp*) in the Scott National Park and elsewhere, which rely on shallow groundwater or winter flooding. How can the proponent prevent this occurring?**

As undertaken on Page 57 of the ERMP, the method of mining will be designed to accommodate the rise in the pond level during winter months and avoid the need to discharge water from the pond. If required during summer, makeup water will be supplied to the dredge pond from several bores in the Lesueur Formation from a depth of 150-200m to ensure that there will be no draw-down of the surficial water table, which supports vegetation. Pumping the makeup water from the deep Lesueur Formation will ensure that no draw-down occurs to the regional surficial water table upon which pastures, native plants and farm dams depend. There will be no impact on the water levels in the shallow aquifer as intercalated clays and silts located above the pumping zone in the Lesueur formation will effectively confine any local depressurization to the lower horizons.

The 0.4m draw-down in the surficial water table suggested in this question is the maximum amount that would occur if no make-up water from the underlying Lesueur Aquifer was used. As stated in the ERMP (p.57), commitment has been given to ensure no draw-down of the surficial aquifer occurs by using make-up water. Monitoring of the regional shallow water table is already underway and will continue during the life of the mine. This will enable the supplementation of the dredge pond to occur as needed.

**QD10**

**SHALLOW GROUNDWATER: Q. Disturbance of the present stratified soil structure with its differential permeabilities and salinities will result in throughflow being impeded and salinization of the groundwater by the release of pockets of poor quality water.**

Disturbance of the existing stratified soil structure will indeed involve a complete redistribution of clay and sand size fractions. Backfilling the mined area will result in flood compaction of the tailings and will incorporate varying percentages of clay fractions (slimes) with depth. Trial laboratory tests of reconstituted samples (with no redistribution of fines) show an increased permeability in most cases (cf. Tables IV-8 and IV-9 of the ERMP). If most of the slimes are mixed over the upper section, then bulk permeability for lower sections may increase. Hence it is not expected that through-flow will be impeded, although it may be enhanced. This effect will be evaluated in situ after mining has commenced.

Although isolated, pockets of poorer quality water do exist in the profile, this water quality is still within recommended levels for potable water. The area receives a substantial rainfall which results in the continual flushing of any stored salts from within the soil profile. There will be no significant increase in salinization as a result of the proposed mining operation, because the small pockets of poorer quality will be diluted.

**QD11**

**SHALLOW GROUNDWATER: Q. Uniform mixing of redeposited sand and slimes tailings will result in damming of through flow following mining, leading to excessive flooding up-flow and excessive soil moisture shortage downflow.**

See answer to question QD10 above.

**QD12**

**SHALLOW GROUNDWATER: Q. The dredge pond will act as a level lake drawing down the water table upflow and resulting in an elevated water table plume downflow. What effect will this have on pasture growth, native vegetation and dieback spread, especially downflow in the National Park where elevated water levels for a greater period of the year may intensify dieback disease?**

The dredge pond will act as a level lake as suggested in the question. The permeability of the clay-rich upper levels of the surficial aquifer is very low (approximately 1 m/day), and therefore the draw-down and plume effects will be restricted. In the worst case, it appears that a 5 to 6 m difference in natural water table level could exist across the distance to be occupied by the dredge pond in some limited locations. The extent of the down-flow plume will be such that 200 m from the dredge pond boundary, no change in the water table will be seen. A similar situation will exist in the upstream draw-down as wall seepage into the pond will be slow.

Monitoring of these effects will be on-going.

**QD13**

**SHALLOW GROUNDWATER: Q. If the dredge pond is excavated below sea level what is to prevent seawater intrusion into the freshwater aquifers?**

The seawater/freshwater interface occurs at a depth of 180 m below ground level (160 m below sea level). It is maintained at this depth by the "weight" of freshwater keeping the seawater out of the aquifers. Since the dredge pond is not removing water, seawater will not intrude into the aquifers as a result of the mining activity.

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## **CONSERVATION**

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### **QE01**

#### **CONSERVATION: Q. Fauna surveys were inadequate.**

The proponent does not agree with this criticism. The Beenup fauna report is comprehensive, in that species are linked to habitat, bird density indices are given and all work is thoroughly referenced. The Company has employed a fauna consulting company of highest reputation and background, for fauna studies in the south west of Western Australia.

The fauna surveys carried out during 1989 characterised the fauna of the subject land and established the range of species that used the land. No rare or endangered species were recorded.

Fauna surveys carried out over longer periods of time such as five years may reveal more detailed information on the seasonal use of the subject land by native fauna. It is unlikely that such surveys would provide additional data to the extent that the project would need to be substantially modified or abandoned.

The nearby Scott National Park was established to provide a protected area for the conservation of faunal species of the Scott River Plain. This area, which, in contrast to the subject land, is undisturbed by farming and grazing activities, provides the most appropriate area for long-term fauna studies in the future. The area covered by the proposal is all farm land and the National Park will not be disturbed.

A fauna survey of the Scott National Park has been commissioned by the proponent, and it will commence in October 1990. During the period October 1990 to May 1991, additional traps will be set within the proposed mine site to provide correlation with data collected last season.

### **QE02**

#### **CONSERVATION: Q. Flora surveys should have extended over a full 12 months.**

Opportunistic collections were made from September 1989 to March 1990. In addition, observations were made during the reconnaissance in June 1989. Therefore, collections were made during a wide breadth of seasonal conditions, although the majority of the collecting was undertaken in the period of peak flowering from September to December, the optimum time for identification of flora.

Previous botanical studies in the area had indicated that the peak flowering period was in the months September to December. From opportunistic collections on the Beenup survey area (and particularly in the period from September to December 1990) the botanists on the project considered that some 80-85% of the flora was identified. This is a high percentage. Additional information will be gathered as part of the on-going environmental and rehabilitation studies carried out during the mining operation.

### QE03

**CONSERVATION: Q. Up to five years of survey data should be collected.**

In flora and vegetation studies for a proposed development it is not current practice in Western Australia to undertake 5 years of data collection. A survey of this duration is not considered necessary over an area such as this which is highly disturbed and is dominated by pasture. No matter how many surveys take place, it is never certain that 100% of the fauna and flora has been recorded.

Fauna surveys carried out over longer periods of time such as five years may reveal more detailed information on the seasonal use of the subject land by the native fauna. It is unlikely that such surveys would provide a significant increase in additional data when the current disturbed nature of the land is considered.

### QE04

**CONSERVATION: Q. Noise and dust will drive fauna away from the area.**

Fauna have been found to quickly habituate to noise. If this was a problem, Kings Park, Bold Park and John Forrest National Park would be faunal wildernesses; Alfred Cove, Point Walter, Herdsman and Monger Lakes would be lacking the thousands of waterbirds which they support; and rare and endangered species such as the *Peregrine Falcon* would not occur within the main Perth city block.

Using waterbirds as an example, the most commonly quoted sources of disturbance are noise, light, human activity and harassment by domestic animals. In 1988, the consultants commissioned an international literature search on faunal disturbance in an attempt to clarify this issue. The following keywords were used: *birds, waterbirds, waterfowl, disturbance, disruption, interference, interruption, human, traffic, domestic animal, animal, light, illumination, noise, sound*. Over 100 publication abstracts were obtained. The impact of noise was primarily associated with human activity such as power boat racing and other water sports, angling and hunting. Noise and light from the mine site are not likely to have a significant impact on waterbirds since there is evidence from the Perth metropolitan area clearly indicating that this group habituates to these disturbances.

A recent study by the Consultants of a bauxite conveyor route showed that bird species were recorded breeding within 10 metres of the operating conveyor. Traplines established less than 50 metres from the conveyor resulted in the majority of vertebrates associated with this particular vegetation community being recorded, including marsupials with pouch young.

### QE05

**CONSERVATION: Q. Rare flora and sensitive fauna may be affected either directly or through loss of habitat due to dieback, groundwater draw-down or other spillover effects from mining.**

A preliminary dieback survey, carried out since the ERMP was written, has shown that dieback already occurs over much of the mining area and in the Scott National Park. The full extent of this will be mapped over the summer of 1990/91, but at this stage it is expected that it will be found that all the drainage lines from the mining area into the National Park are already infected. There is no possibility of reversing these existing infections, and no possibility of removing the dieback from the mining area. The drainage lines, up-slope of the Park (in the mining area), will be re-established to their former positions after mining, and there will be no additional spread of dieback due to the mining within the drainage lines.

Since water will not be released from the dredge pond, into drainage, intensification of dieback within these drainage lines will not occur. The area of elevated water table due to the down-flow plume from the dredge pond (see QD12) will be small, due to the very low permeabilities in the upper surficial aquifer. Since there will be a buffer of at least 100 m between the dredge pond and the National Park boundary, it is not anticipated that intensification of dieback will occur in the areas adjacent to the mine area.

Dieback hygiene measures will be required within the mine site to ensure that dieback is not exported. This will be largely achieved by cleaning of vehicles as they leave the mine site. There is no reason why this degree of management cannot be achieved.

If there is proper management of dieback there will be no spillover from mining in relation to the impact of dieback on sensitive flora and fauna.

In the answer to question QD09, it has been shown that the proponent does not intend to have any groundwater draw-down and therefore there will be no effect on rare flora and sensitive fauna through groundwater draw-down. The answer to question QE04 shows that noise and dust spill-over is not expected to effect fauna.

#### **QE06**

**CONSERVATION: Q. No mention has been made of the rare ground parrot which locals believe may live in the area.**

A recent CALM study of the ground parrot has shown that it appears to be restricted to small areas of the Fitzgerald River and Cape Arid National Parks, is sensitive to disturbance and mainly inhabits heaths which have not been burnt for at least 15 years. Given these criteria and the condition of the proposed mining area, the Consultants believed that it did not warrant inclusion in the predicted list of species for the mining area.

The only large relatively undisturbed heath (in the north-east corner of the project area) was subjected to intensive searching and extra hours of work by a highly skilled ornithologist identifying bird calls during the early morning and late afternoon/early evening, the period of most vocal activity by birds. While locals may consider it to be present in the Scott National Park, and they may be correct, Rock Parrots or Elegant Grass Parrots are known from the area and may be confused with ground parrots.

#### **QE07**

**CONSERVATION: Q. What action will be taken to monitor the effects of the proposal on flora and fauna?**

In the ERMP, it is stated (Section 6.8.3) that botanical surveys will be carried out before mining commences and thereafter at annual intervals in a buffer strip within the Scott National Park, where the park is contiguous with the mining area. The monitoring of fauna will be carried out in the same areas and at the same times. Extensive base line studies in the eastern and northern section of the Scott National Park have been commissioned to commence in October 1990.

#### **QE08**

**CONSERVATION: Q. If spillover effects do affect surrounding flora and fauna what control measures will be adopted?**

As answered in question QE05, the proponent does not believe that spillover effects will affect surrounding flora and fauna. However the monitoring programmes referred to in question QE07 above, will identify any spillover effects, and research will be undertaken to identify the cause

and appropriate control measures if any spillover effects are detected.

#### **QE09**

**CONSERVATION: Q. Additional surveys should be undertaken and the results subject to public input prior to project approval.**

The proponent has already undertaken, as explained in previous answers, to provide long-term monitoring of the buffer strip where the mine site is adjacent to the Scott National Park and the mining area. It believes that the combination of existing data and on-going monitoring will be adequate to ensure environmentally unacceptable impacts are avoided.

#### **QE10**

**CONSERVATION: Q. No studies of aquatic habitats as required by the ERMP guidelines were carried out.**

The guidelines state "the section on the existing environment should provide an overall description of the environment and an appraisal of the physical and ecological systems likely to be affected by all aspects of the proposal. It should concentrate on the significant aspects of the environment subject to potential impact from the development. Only the habitats, resources and potential resources which could be influenced by the project should be described".

This requirement of the guidelines has been met by the studies of the surface and groundwater hydrology (Section 2.7 and 4.1). The marine habitats would have been of relative importance and would have required detailed study, if one of the sea transport options had been chosen (Section 3.4.1.1), or significant draw-down or discharge to rivers was anticipated. This was not the case. The proposed project will not directly interact with aquatic habitats in the area, and hence the proponent does not consider this to be a habitat which could be influenced by the project.

Run-off from the mine area will not be very different from what already exists, although some stream paths will be diverted around the active mining area for short periods. These stream channels will be returned to current drainage lines before leaving the mine site.

#### **QE11**

**CONSERVATION: Q. No studies of invertebrates or the rhizosphere were carried out.**

The guidelines state that "descriptions of the existing environment should concentrate on the significant aspects of the environment subject to potential impact from the development". Whilst the importance of the invertebrate component of the fauna is recognised, it is the vertebrate fauna that is perceived as being subject to the greatest potential impact as a result of the proposed mining operation and therefore requiring the greatest level of study. This mining project covers alienated farm land, most of which is already disturbed and therefore potential effects on the the invertebrates and rhizosphere were not considered likely to have significant environmental impacts on the project area.

#### **QE12**

**CONSERVATION: Q. Mining should be excluded from the area of uncleared native vegetation on the north-western part of the ore-body.**

The Company believes there is no justification for excluding the dieback infected north-western corner of the mining area. Appropriate dieback management and seed collection and soil handling techniques described in Section 3.1.9 of the ERMP will enable acceptable rehabilitation of this area.

**QE13**

**CONSERVATION: Q. Clearing of large trees likely to contain nest hollows should be outside the nesting season.**

This is not an unreasonable suggestion, except it may have to be restricted to bird species as hollow-nesting species of mammal breed at various times of the year and occasionally have more than one breeding season. Most hollow-nesting birds, primarily parrots and cockatoos, nest in the period from August to October.

Given that a large percentage of the proposed mining area has already been cleared of trees, it is not anticipated that a significant number of large trees containing nest hollows will be encountered. However, where they are encountered, it is likely that these trees will be cleared in the dry season, which should be outside the nesting season. The clearing of trees during the spring months would be precluded by the wet season making access for earth moving equipment impractical.

**QE14**

**CONSERVATION: Q. What steps will be taken to provide nest hollows in the replacement vegetation?**

Nesting hollows and other features of faunal habitats will gradually develop in the post-mining vegetation as the vegetation communities develop towards a mature condition. During the intervening period, experience from other rehabilitated mine sites indicates that the developing vegetation provides a range of opportunities year by year for food sources and habitat. The Company will provide some trial nest boxes in areas of native revegetation.

**QE15**

**CONSERVATION: Q. No mining should occur in the Scott National Park.**

This ERMP and mining proposal does not seek the right to mine in the Scott National Park.

**QE16**

**CONSERVATION: Q. What guarantee is there that the proponent will not mine the Scott National Park in future?**

This ERMP and mining proposal does not seek the right to mine in the Scott National Park.

**QE17**

**CONSERVATION: Q. A number of additional rare or restricted flora species, other than those mentioned in the ERMP, may be affected by the proposal where these occur on the mine site. What action will be taken to map and ensure the survival of these species?**

No attempt was made to map the location of all species in the Beenup survey area, however the location of all species found was summarized by community in Appendix VII-2 of the ERMP. The location of all species would require additional gridding work and then would only be as reliable as the degree of gridding.

In the text of the ERMP (Appendix VII - Pages 4 to 9, and Annex VII-3) the location of the rare species, endangered species (Reserve Flora) and species of interest are discussed in relation to communities and areas. In the longer term, the relevance of their specific locations is diminished if the communities are not protected, however, the Company plans to use this data to enable seed collection for regeneration trials.

The representation of the species in the respective communities is summarized in Annex VII-3. The distribution patterns of these species can then be interpreted by comparing these communities with their distribution on the vegetation map (Figure VII-1).

The locations of the gazetted rare flora species were indicated to Department of Conservation and Land Management officers, both through correspondence and field inspections. It is CALM policy not to publish such locations. It is anticipated that some of these species may also be located during the survey of the flora of the Scott National Park in 1990/91.

**QE18**

**CONSERVATION: Q. What additional research is proposed to ensure that species such as the pygmy possum are conserved?**

This animal has a wide distribution. Its geographic range extends through the south-west, the Wheatbelt and Goldfields. While not having a continuous southern distribution, it is also known from South Australia and eastern Victoria. The conservation status of this animal in the south-west is not threatened. The Scott National Park represents a habitat (suitable to the pigmy possum), for conservation and this proposal does not threaten, or intend to mine, the National Park.

**QE19**

**CONSERVATION: Q. Additional surveys to determine the rarity and conservation status elsewhere of plants likely to be affected by clearing of the mine site, the transport route and the power line should be undertaken and subject to public scrutiny prior to project approval.**

The proponent believes that the rarity and conservation status of plants on the mine site has been established, and has taken steps to exclude the location of the rare species from mining. The Company has been conducting studies of the flora and fauna along the transport route in conjunction with CALM and a detailed report will be presented to CALM prior to the route being finalized. The submission by SECWA to the EPA on the power corridor will be available for public scrutiny prior to the approval of the power route.

**QE20**

**CONSERVATION: Q. An accurate distribution map of rare, restricted, and species of special interest should be provided to the relevant authorities prior to finalisation of the assessment.**

The locations of the gazetted rare flora species were indicated to Department of Conservation and Land Management officers, both through correspondence and field inspections. It is CALM policy not to publish such locations.

**QE21**

**CONSERVATION: Q. Widening of Scott River Road and others should only occur after a survey to determine the biologically poorest route through the existing wide road reserves which were created to act as wildflower drives. No disturbance at all should be permitted elsewhere on the road reserves.**

The Scott River Road within the Beenup survey area and near the proposed mill and office sites were surveyed. *Adenanthos detmoldii* was recorded on these areas. This species was previously thought to be threatened, however previous surveys and reconnaissance studies on this project highlighted its occurrence (thousands of plants) in other areas (including Governor Broome



Road). This species is also in cultivation for horticultural purposes.

The proponent believes that the future survival of this species is not threatened by clearing along Scott River Road. Also refer QA08, QA10, QA11 and Section 4.3.2.3(a) of the Beenup ERMP.

**QE22**

**CONSERVATION: Q. The uncleared eastern half of Loc. 4264 should be ceded to CALM as an 'A' class reserve.**

The Company has fenced off the eastern half of Location 4264 to protect the rare species in this area. The future of this area will be determined in consultation with CALM over the next 2 to 3 years.

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## **REHABILITATION**

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### **QF01**

**REHABILITATION: Q. Rehabilitation plans should be modified to include:**

- a. many more of the 326 species documented in the surveys rather than just the few species mentioned in the ERMP.
- b. an understorey component in the areas of native vegetation
- c. native vegetation throughout the north-western part of the ore-body to provide a large long-term buffer to the Scott National Park to the south and west of the mine site.

There appears to have been a series of misinterpretations by different readers of the ERMP (Page 41), in particular the text which discusses the rehabilitation operations. The phrasing "will include" has been ignored in some of the submissions.

The plant FAMILIES Myrtaceae, Cyperaceae and Restionaceae were specifically mentioned in the rehabilitation of drainage lines (Section 3.1.9.2 (b) (i)), as they contain most of the plant species that grow here, including the two dominant tree species that were mentioned, i.e. *Melaleuca preissiana* and *Agonis juniperina*.

Again, in Section 3.1.9.2 (b) (ii), when referring to the rehabilitation of Jarrah/Marri forests, the dominant species were specifically mentioned and the FAMILIES from which most of the understorey species will be drawn, i.e. Papilionaceae and Mimosaceae were referred to. The species from these Families occurring in the understorey were too numerous to list in this section, and the reader is referred to Appendix VII, Flora and Vegetation study.

In most mining operations in the south-west a large variety of species are utilized in rehabilitation programmes. For bauxite miners in the Darling Ranges, seed from a minimum of 75 understorey species are used on some rehabilitation areas, and many more species regenerate from returned topsoil. Where native vegetation currently exists, tree regeneration from topsoil removed and then replaced during the mining operation, is expected to be a significant source of native species. In many areas the concept of replanting trees would not be appropriate, as shrubs appear to be more tolerant of seasonal conditions (e.g. swamps and low lying areas).

### **QF02**

**REHABILITATION: Q. Detailed rehabilitation plans should be prepared and made public before the proposal is approved and progressively updated throughout the mine life.**

It is planned to prepare detailed rehabilitation plans well in advance of the commencement of mining operations (Section 3.1.9.2). These will be made available for public inspection. The overall programme has been drawn up in conjunction with the Beenup Final Land Use Work Party and the technical details will now be developed by the Company's staff and consultants, who have had experience of successful rehabilitation at other mining operations.

There will be a continuing programme of evaluating proven rehabilitation techniques and modifying them as necessary for the Beenup situation. Members of the public will be kept informed of this programme through the consultative process.

### **QF03**

**REHABILITATION: Q. What completion criteria will the proponents aim to achieve before the various categories of rehabilitation are deemed to be successful?**

It is the Company's intention to return the mined area to its current agricultural land-use. As shown in Figure 3.3 of the Beenup ERMP, 72% of the mining area will be returned to pasture. Pastured areas will be rehabilitated using combined pre-mining soil and slimes. This will improve the nutrient-holding capacity of the soils and enable efficient return to production. Rehabilitation will be deemed successful when the land productivity returns to pre-mining levels. This is expected to occur 3 to 5 years after mining.

Establishment of current productivity levels will be determined in studies carried out by consultants over the next 12 to 18 months.

Good quality, responsible rehabilitation of areas of native vegetation on the mined area will take place using the principles outlined below: -

1. Collection of seeds from the area before mining/disturbance.
2. Topsoil removal and storage occurring only in the dry season so that disruption to soil structure and seed loss is minimized.
3. Use of temporary non-regenerating hybrid grasses to stabilize the soil when first returned to the mined area if necessary. Brush (using cleared vegetation) and/or wind fencing will be used if appropriate.
4. Replanting with -
  - a. nursery stock from local seed
  - b. commercially available stock
  - c. local dieback resistant species
  - d. a diversity of understorey and forest/woodland species representative of the vegetation of the original area in appropriate locations
5. Natural regrowth from the replaced soil

The rehabilitation will be regarded as successfully completed when the natural vegetation is self-sustaining (i.e. not requiring assistance), is reasonably similar to the pre-mining structure, and is capable of fulfilling most ecosystem functions. It is expected that detailed completion criteria will be developed to the satisfaction of the EPA and will be updated as appropriate.

### **QF04**

**REHABILITATION: Q. Rehabilitation cannot succeed after the soil profiles have been altered by mining.**

Rehabilitation to native species and pasture has been successfully accomplished in a range of coastal ecosystems after heavy mineral sand mining in other areas in Western Australia (e.g. Mininup, Capel, Eneabba), New South Wales (e.g. Myall Lakes, Jerusalem Creek) and Queensland (e.g. North Stradbroke Island and Fraser Island).

There is no reason to believe this will not be the case for Beenup.

**QF05**

**REHABILITATION: Q. What steps will be taken to preserve or restore the microbial activity of soil which is disturbed?**

After soil is removed from the area before mining, it will be stored for as short a time as possible before being returned to the mined land. During storage, measures such as growing a temporary cover on the soil stockpiles will help to minimize microbial deterioration. Microbial activity will re-establish as revegetation progresses.

**QF06**

**REHABILITATION: Q. Many more trees should be planted on other cleared lands to partially offset the increase in greenhouse gases.**

In developing a rehabilitation plan for the mining operation, the Company took into account the current land use within the Shire, and this was a determining factor in returning land to agricultural purposes. The specific factors that influenced this decision were:-

- a. Currently two-thirds of the Shire's land is non rateable land primarily contained in National Parks, Reserves, State Forests and Crown land.
- b. The project area represents a significant portion of the agricultural land available within the Shire of August-Margaret River (refer Page 43 Beenup ERMP). It was felt that any decrease in rural land available within the Shire, would place added pressure on uncleared portions of land within the Shire, and in addition would reduce the income derived by the Shire on rural land, which is currently in excess of 50% of the Shire's rates.
- c. It is anticipated that there will be an increased requirement for freehold land within the Shire over the next 10 years. Based on the growth rate that has occurred within the Shire over the past 15 years, indications are that growth of approximately 4.5 to 5% will be maintained until the year 2000. With this anticipated growth rate it is expected that there will be increased pressure on rural land to be rezoned either for special rural, hobby farm development or residential. The exclusion of the Beenup project area land from the rural sector would only exacerbate the situation, resulting in clearing of mature trees elsewhere within the Shire.

Long term selective tree planting will occur at the Beenup site to take into account visual screening, rehabilitation of drainage lines and National Park buffer zones. The Company is also prepared to consider trial commercial tree planting programmes in the early years of mine rehabilitation, to establish whether commercial tree crops can be grown on part of the property. Once this is established, a decision can be made on commercial tree plantings.

**QF07**

**REHABILITATION: Q. What additional research is proposed to determine the re-establishment requirements of rare species which will be disturbed by the proposal?**

Firstly, the gazetted rare species will not be directly disturbed by the proposal as they occur on the eastern section of Loc. 4264 and Governor Broome Road, and have been excluded from mining activities. Nevertheless, the possible option of research by the Kings Park Board will be addressed by the Company.

The Company has co-operated in the collection of specimens of *Lambertia orbifolia* for regeneration trials undertaken by the Kings Park Board in consultation with CALM. The Company will expand these rehabilitation trials to other Reserve List Species and Species of Interest.

**QF08**

**REHABILITATION: Q. The Camping Reserve 12951 should be added to the Scott National Park.**

The allocation and changing of the status of the camping reserve is a matter for the Shire and CALM.

**QF09**

**REHABILITATION: Q. A new 20m wide reserve should be acquired, and replanted with native species where necessary, along the length of the transport route.**

It is the Company's intention to use existing road reserves along Scott River Road and Brockman Highway for transportation of minerals. For the road route north along Sues Road to the Vasse Highway a 50 metre wide reserve will be gazetted for the road, but only 15 m will be disturbed. Existing vegetation along this road reserve will be preserved wherever practical. In disturbed areas, such as gravel pits or areas where drainage lines and construction sites have caused disturbance, replanting will occur. This replanting will be done in consultation with CALM.

**QF10**

**REHABILITATION: Q. All disturbance, including gravel pits, associated with road-making should be rehabilitated.**

It is planned to carry out the rehabilitation of all such disturbed areas during the course of the operation to the satisfaction of CALM.

**QF11**

**REHABILITATION: Q. The native vegetation buffer to the National Park should be as wide as possible.**

The proponent has undertaken to develop a 100m wide native vegetation buffer to the National Park, as part of its final land use plan.

**QF12**

**REHABILITATION: Q. Commercial plantation trials should be set up on mined land.**

A plan to establish a 5 Ha trial plot on the mining site to evaluate several species of trees for growing in a plantation, is described in Section 3.1.9.2 (d) in the ERMP and the answer to QF06.

**QF13**

**REHABILITATION: Q. Lakes/wetlands or other water-bodies should be considered as rehabilitation options for activities such as water-skiing to take pressure off natural lakes on the south coast.**

The final land use for the area was considered by a government and community committee, and this group did not think that lakes and wetlands were appropriate for an area that has been basically used for agricultural purposes.

The proponent is keen to return as much land as possible to agriculture so that this type of land is not lost as a result of mining activities. This land use allows for good quality multiple land use to occur. However, Section 3.1.9.2 (e) of the ERMP states, "when mining operations are concluded the dredge pond will be converted into a wetland area or open water recreation area. This final land use decision will be made at the time after community consultation".

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**QF14**

**REHABILITATION: Q. What provision will be made for hollow-nesting species during the early years of rehabilitation?**

Nesting hollows and other features of faunal habitats will gradually develop in the post-mining vegetation as the vegetation communities develop towards a mature condition. During the intervening period, experience from other rehabilitating mine sites indicates that the developing vegetation provides a range of opportunities year by year for food sources and habitat. The Company will provide some trial nest boxes in areas of native revegetation and if successful will make further provision. (See QE13)

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## ***EMISSIONS/POLLUTION POTENTIAL***

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### **QG01**

**EMISSIONS/POLLUTION POTENTIAL: Q. Details of likely caustic and other reagent usage should be provided prior to approval.**

It is highly unlikely that caustic will now be used in separation of the minerals. Caustic is only used when the organic coating of the mineral grains reduces the efficiency of mineral separation, by reducing the magnetic and electrostatic susceptibility of the minerals. The Beenup mineral is not effected by organic coatings and during testwork high levels of recovery of the minerals has been achieved without caustic attritioning of the mineral. However, should it be necessary for MDL to use caustic or other reagents, the Company will provide this detail, as part of the "Works Approval" document to the EPA. This is a separate technical document, required by the EPA prior to any work on-site commencing.

### **QG02**

**EMISSIONS/POLLUTION POTENTIAL: Q. What air emission controls are proposed for the dry mill and other items of fixed and mobile equipment?**

Detailed specifications of all air emission controls will be required by the Pollution Control Division of the EPA, for Works Approval and Licences. The dry mill system includes suction hoods to collect dust, ducting to convey the collected material and separators and cyclone collectors to separate dust from the air stream.

All dry process equipment will be designed and specified with complete dust enclosures. All materials handling equipment will be designed to reduce dust generation in conjunction with an extraction and dust control system, viz:

**SCREENS** - Will be enclosed in a leak tight enclosure and flexible connections to a exhaust ventilation system.

**BUCKET ELEVATORS** - Will be enclosed in a leak tight enclosure under negative pressure with exhaust points at the loading and discharge as necessary.

**BELT CONVEYORS** - All conveyor speeds have been kept low. Dust enclosures and exhausts are included at all entry and discharge points on conveyors (all transfer points).

**ELECTROSTATIC SEPARATORS** - These will be fully enclosed with dust extraction exhausts at the top, which enter the ducting system.

Dust from the ducted system will be collected in a fabric collector, slurried and then pumped to the slimes dam.

Dust extraction from the mineral dryer will be by wet scrubber and pumping to the slimes dam.

Dry ilmenite and zircon product will be stored in silos prior to out-loading for truck haulage. Silos are completely sealed and will be fitted with silo vent filters.

Out-loading to trucks will be by conveyor with dust extraction points at all transfer locations.

Discharge from conveyor to truck will be by an open discharge system. It is envisaged that dust generation will not be a problem at this stage, however, provision is allowed for a ducted dust extraction system.

Drawings and specifications of the dust extraction equipment are not available at this stage, but design requirements will meet or exceed prescribed requirements.

Air pollution control equipment for concentrate product and coal stockpile storage external to the dry mill is by provision of spray equipment for dust suppression.

### QG03

**EMISSIONS/POLLUTION POTENTIAL: Q. A process flow sheet should be supplied to enable pollution control measures to be assessed.**

Standard process flowsheets will not provide details of dust and pollution control measures as flowsheets are designed for metallurgical purposes. However, dust will be controlled via the methods described above (in QG02).

Other possible sources of emissions are outlined below.

Process Dryer Exhaust Stacks - Two process dryers will be installed in the Dry Mill.

The larger of these dryers will process 84 tonne per hour of mineral sand at approximately 6% moisture content.

The dryer hot air generator will be coal fired for a coal feed rate of 2.0 tonne per hour. The smaller dryer has a throughput capacity of 6 t/h of mineral at approximately 6% moisture content and will also be coal fired.

Details of the emissions from both these dryers are given below.

. Maximum Chimney Stack Height	25m
. Volumetric Flow Rate	
84 t/h dryer	45500 Nm <sup>3</sup> /h
6 t/h dryer	2750 Nm <sup>3</sup> /h
. Exhaust Stack Temperature	65° C
. Exhaust Gas Composition	
61.9% N <sub>2</sub>	
7.8% CO <sub>2</sub>	
12.7% O <sub>2</sub>	
17.6% H <sub>2</sub> O	
0.034% SO <sub>2</sub>	
. Concentration of particulate matter is less than 250 mg/Nm <sup>3</sup> and a size range of minus 5 micron	



Proposed Outlet Velocity	15 m/sec
Humidity	100%

**QG04**

**EMISSIONS/POLLUTION POTENTIAL: Q. A radiation management plan should be prepared prior to project approval.**

A radiation management plan is required by the Mines Department as part of the mining regulations and the proponent will be complying with all their requirements.

**QG05**

**EMISSIONS/POLLUTION POTENTIAL: Q. Radiation monitoring programmes should be proposed to verify the predictions of no radiological problems.**

The proponent recognizes that radiation monitoring will be an essential part of its on-going monitoring programme, and makes the following commitments:-

The Company currently has in hand a monthly monitoring programme of airborne radionuclides. The monitoring programme commenced in January 1990 and has continued on a monthly basis since then. Table 1 summarizes the results obtained to the end of September 1990. During this process an airborne total dust count is also collected and these results are also included in Table 1.

**TABLE 1.**  
**SUMMARY OF GROSS ALPHA ACTIVITIES AND**  
**TOTAL DUST - 1990 PROGRESSIVE DATA**

MONTH	GROSS ALPHA		TOTAL
	ACTIVITY	DUST	
	mBq m-3	ug m-3	
January	0.036 ± 0.020		330
February	0.020 ± 0.014		11
March	0.040 ± 0.014		28
April	0.005 ± 0.010		16
May	0.019 ± 0.013		12
June	0.015 ± 0.010		8
July	0.002 ± 0.010		18
August	0.005 ± 0.010		15
September	0.028 ± 0.014		19

Gross alpha and beta activities for surface waters and groundwater samples will also be collected on a six monthly basis. Results of this sampling will be used to supplement the sampling already carried out during the preparation of the ERMP.

Once mining commences, a monitoring programme will be set up in conjunction with the Department of Mines of Western Australia, and it will comply with all the requirements set out by that Department. The proponent will use the cornerstone of normal radiation protection philosophy "as low as reasonably achievable" (alara) in all aspects of this project. Because of the extremely low monazite content of the ore, it is unlikely that significant radiation exposure will occur, but this will be monitored and will comply with levels well below the new standard of 20 milli-sieverts per year (mSv).

#### **QG06**

**EMISSIONS/POLLUTION POTENTIAL: Q. Noise levels are currently low which could result in even statutorily acceptable increases in noise levels being disruptive, particularly at night and on weekends.**

Noise monitoring, on a continual basis over a period of 2 weeks, was undertaken by the EPA in late August. Predictions of approximate sound levels generated by mining and associated activities at the Beenup residential sites were based and modelled on similar mining activities found at Cataby and Capel. Existing ambient sound levels were initially measured during a two day survey period at an existing residence and other relevant locations at Beenup.

The actual mining operations and other environmental conditions could produce, at times, different sound levels to those predicted in the ERMP. If the actual sound levels do exceed the acceptable outdoor assigned levels specified by the regulations, then appropriate steps will be taken to remedy the situation.

#### **QG07**

**EMISSIONS/POLLUTION POTENTIAL: Q. What will the proponent do to manage or mitigate the effects of disruptive noise?**

The proponent will design if necessary a series of sound barriers to prevent the escape of noise from loading areas. It will also apply to have the pitch of reversal horns reduced and will undertake to avoid, wherever possible, disruptive noise at night. As mentioned in the ERMP, if necessary, it will construct sound buffers on Scott River Road at the junction with Brockman Highway to mitigate the effects of trucks at that intersection. Techniques to reduce noise, used by the proponent at its dredging operations and dry mill site in NSW, will also be applied at Beenup.

#### **QG08**

**EMISSIONS/POLLUTION POTENTIAL: Q. No consideration of noise impacts during construction (eg rock crushing, metal grinding, fabrication etc) has been made.**

During construction, work will be restricted to daylight hours wherever possible, and will comply with all statutory requirements. The Company is aware of potential noise impacts and will make every effort to be a good neighbour in this regard.

At the time of the preparation of the ERMP the need to crush gravel during construction had not been established. It now appears that sources of gravel will be available that may not need rock crushing and every effort is being made to use such supplies. If such activities are required the proponent will install the rock crushing facilities in an area where sound buffers will be constructed if necessary. Fabrication will be done off-site where possible. The Company will

comply with all statutory requirements.

#### **QG09**

**EMISSIONS/POLLUTION POTENTIAL: Q. What noise levels are likely during construction and how will they be mitigated or managed?**

The Company will comply with all regulatory requirements on noise control. The Company agrees that normally, construction should be limited to daylight hours. Also refer to QH03(d).

#### **QG10**

**EMISSIONS/POLLUTION POTENTIAL: Q. Comprehensive 24 hour background noise surveys are required before the project proceeds.**

Discussions have been held with the EPA and two (2), fortnightly periods of continuous noise surveys will be carried out on the project area. The first of these was conducted in late August and the second will be in mid-summer. These will provide comprehensive background noise data for more accurate predictions of noise impact.

#### **QG11**

**EMISSIONS/POLLUTION POTENTIAL: Q. What action will be taken to prevent the spill of artificial lighting onto adjacent private properties and the National Park?**

Lighting of both the mine site and the dry mill site will be done such that the lights will be directed onto the work area. There is no reason to believe that the small amount of spillage into the National Park and to local properties, will have any detrimental effect. A recent study by the Consultants of a bauxite conveyor route showed that bird species were recorded breeding within 10 metres of the illuminated conveyor. Traplines established less than 50 metres from the conveyor resulted in the majority of vertebrates associated with this particular vegetation community being recorded, including marsupials with pouch young.

#### **QG12**

**EMISSIONS/POLLUTION POTENTIAL: Q. Light spill could disturb nearby residents or fauna, especially nocturnal invertebrates.**

Lighting of both the mine site and the dry mill site will be done such that the lights will be directed onto the work area. There is no reason to believe that the small amount of spillage into the National Park and to local residences, will have any detrimental effect.

#### **QG13**

**EMISSIONS/POLLUTION POTENTIAL: Q. Fixed lighting should be mounted high up, directed vertically downwards and well shielded to prevent light spill.**

Lighting engineers will be employed by the Company during the detail design phase to ensure the most effective lighting with the least spillage is installed.

Partial lighting of outside areas is required as a safety and security measure. No direct beaming of light away from operating areas will be necessary or anticipated. If lighting causes direct illumination at neighbours residences, the Company will install appropriate light shields.

#### **QG14**

**EMISSIONS/POLLUTION POTENTIAL: Q. How will dust control be achieved in the face of persistent high summer winds in the area?**

There are several areas within the mining operation that could need particular dust control measures. Dust control on the mine site and process plant site will be achieved as follows: -

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a. Pre-stripping and Soil Removal

Pre-stripping and soil removal will be carried out during the summer months to ensure that soil structures are not damaged. Dust control will be achieved by use of water sprays from trucks. This work will be carried out over a limited period during summer.

b. Service and Access Roads

There will be some service and access roads within the mine site that will be unsealed. Dust will be controlled in these areas by the use of water trucks fitted with sprays as necessary. There will only be light traffic on these roads.

c. Wet Concentrates Stockpile

Wet mine concentrate will be dewatered and stockpiled at approximately 10% moisture content. Whilst some drying will occur from the stockpile the turnaround time will be short and the wet mine concentrate will be hauled by road to the dry mill. Due to the moisture content of the concentrate, dust will not be emitted during loading and unloading.

d. Dry Mill Processing Plant

Stockpiling of the concentrate will be needed at the dry mill. Some concentrate may be stored for longer periods, and further drying may result. Provision for dust suppression by water sprays will be made.

Dry product from the dry mill will be stored in enclosed bins for out-loading to haulage trucks, thereby eliminating the potential for dust dispersal.

**QG15**

**EMISSIONS/POLLUTION POTENTIAL: Q. How will wind and water erosion be prevented on cleared areas, tailings dumps and slimes ponds?**

Areas cleared of vegetation and soil in advance of mining will be kept to the absolute minimum in keeping with efficient mine operation. Temporary mesh fences or brushing will be erected if necessary (Section 4.7.2.1 and 4.7.2.2) to prevent wind erosion. Existing water courses will be temporarily diverted around the mining operation (Section 4.1.1.2 (b)).

Tailings will be protected from wind erosion by temporary mesh fences if necessary (Section 4.7.2.4). Water erosion will not be a problem on tailings because of their high permeability to water. Dried slimes will be disposed of by incorporating them in to the tailings. Some of the slimes may be incorporated into the topsoil to be used on pasture areas (Section 4.7.2.5).

**QG16**

**EMISSIONS/POLLUTION POTENTIAL: Q. How will wind dispersal from the product stockpiles be controlled?**

a. Wet Concentrates Stockpiles

Wet mine concentrate will be dewatered and stockpiled at approximately 10% moisture

content. Whilst some drying will occur from the stockpile the turnaround time will be short and the wet mine concentrate will be hauled by road to the dry mill. Due to the high moisture content dust will not be emitted. Stockpiling of the concentrate will be needed at the dry mill. Some concentrate may be stored for longer periods, and further drying may result. Provision for dust suppression by water sprays will be made.

b. Dry Product Stockpiles

Dry product from the dry mill will be stored in enclosed bins for out-loading to haulage trucks, thereby eliminating the potential for dust dispersal. (See QG19).

**QG17**

**EMISSIONS/POLLUTION POTENTIAL: Q. How will dust be controlled, consistent with dieback control, during road construction?**

Although the whole area is already infected with dieback, quarantine measures will be adhered to during road construction such that vehicles entering and leaving the gravel sources will be cleaned down if necessary. Should water be needed for dust suppression, it will be treated with fungicides in accordance with standard dieback procedures. All construction activities will be discussed with and accepted by CALM prior to commencement.

**QG18**

**EMISSIONS/POLLUTION POTENTIAL: Q. Will product haulage trucks be completely enclosed?**

Product haulage trucks and trailers will be fitted with tarpaulins to prevent mineral loss.

**QG19**

**EMISSIONS/POLLUTION POTENTIAL: Q. How will dust be controlled during product loading at the dry mill and dumping at the port?**

A dust extraction and collection system is incorporated into the dry mill design for effective dust control and collection. The final products will be stored in bins equipped with vent filters for further dust removal. Experience shows that dust is minimal at this stage.

Dust extraction is also incorporated in the bin outlets and conveyor transfer points for the truck loading system. Truck loading will be carried out in an enclosed bay with a loading spout from the conveyor discharge.

The Company will ensure that all occupational and community health and safety standards are met at their product storage facilities in Bunbury.

Also refer QG02.

**QG20**

**EMISSIONS/POLLUTION POTENTIAL: Q. Will sulphate pollution, for example, be "exported" from Australia if the mineral sands are processed overseas?**

Advances in sulphate process technology have resulted in: -

- a. Recycling plants for the acid, thereby reducing the amount of acid consumed in the process and eliminating acid disposal problems.

- b. Alternative uses for the iron sulphate ( $\text{Fe}_2\text{SO}_4$ ). In particular, reference is made to a paper, "Sewage Clarification With Magnetite Particles", by N.A. Booker, D. Keir, A.J. Priestley, C.B. Ritchie, D.L. Sudarmanna, M.A. Woods, from the CSIRO division of Chemicals and Polymers, Clayton, Victoria, Australia. In this paper, in which iron sulphate is used to help clarify sewage, a value was placed on the iron sulphate of \$110 per tonne, thereby making it a useful by-product of the sulphate process. The paper also indicates that a large scale plant trial is scheduled for 1990 in Sydney, NSW.

In addition to the technological advances made in the sulphate process, the Beenup ilmenite also has the advantage of being very low in impurities.

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## ***MANAGEMENT PLANS AND MONITORING***

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### **QH01**

**MANAGEMENT PLANS AND MONITORING: Q. The ERMP is largely an environmental review with few elements of management plans evident.**

Where either significant time frames were required to develop detailed management plans, or extensive detailed design was necessary to provide for the development of such management plans the Company has, as an alternative, provided a series of management commitments. These commitments detail standards to which the Company will operate, and it will develop appropriate management plans in consultation with the relevant Government organisations, to meet these commitments. These environmental management plans will be available, from the Company, for public inspection. A copy of these commitments is provided in the ERMP in Section 6 commencing at page 94. Since the preparation of the ERMP document a number of these commitments have been further progressed in more detail, in particular:

- 6.1 CONSTRUCTION PHASE The accommodation of temporary workforce. The Company has negotiated with the Shire a suitable alternative arrangement for housing of the construction workforce. This will involve the housing of the single workforce at a construction camp at the dry mill site. The married workforce will be offered caravan facilities at the Flinders Bay Caravan Park in Augusta. The proposed caravan park construction at Alexander Bridge, will not proceed following extensive consultation with the Shire, business groups and other interested parties.
- 6.2.2 GROUNDWATER The Company is currently discussing with dredge manufacturers dredges suitable for the operation to enable no draw-down of the watertable. This will be progressed to enable the operation to meet the commitment of not drawing down on the watertable.
- 6.2.3 SURFACE WATER The Company is currently developing a detailed surface water management plan to enable the Company to meet its commitments in this area.
- 6.2.4 SLIMES DISPOSAL Further detailed plant design, and the aforementioned surface water management plan, is enabling the Company to prepare a proposal for the management of slimes. The handling of slimes at the wet mill will use a proprietary process developed by MDL. A contingency plan to use flocculants will be used if the process does not perform as expected.
- 6.4.1 WATER SUPPLY During the detailed design process the Company has reassessed its water requirements for the dry mill site and has reduced the requirements from 2 x 400 cubic metres per hour bores, to 2 x 100. Only one of these bores is required to maintain operations, with an estimated normal consumption of 50 cubic metres per hour of bore water. This has been achieved by increased recycling of water within the plant. During the initial start-up, water quantities approaching 100 m<sup>3</sup> per hour will be required.

- 6.5.2 NOISE MITIGATION The Company has co-operated in developing the EPA's programme to conduct 2 weeks continuous noise monitoring in the area both in winter and in summer. This will then determine accurately the background levels of noise and enable the Company to design and implement noise mitigation measures if necessary.
- 6.6.1 DIEBACK, FLORA AND FAUNA SURVEY Further dieback studies have been conducted over the whole mining area and there is currently a proposal for these studies to be extended into the National Park subject to CALM approval. The study within the National Park will deal with the flora, fauna and the presence of dieback. It will identify the current status of dieback within the National Park and make estimates of its spread over the next 20 years.
- 6.6.2 DRAINAGE Plans that will enable the reconstituted mine site drainage system to be similar to the pre-mining situation will be included in the surface water management plan.
- 6.6.3 MEASURES FOR THE CONTROL OF DIEBACK Further detailed design work has been conducted on providing clean-down facilities and the isolation of the active mining area to prevent the spread of dieback. In addition discussions have been held with CALM and EPA regarding management of dieback on the mine site. A detailed dieback management plan will be produced and will be available for public inspection.
- 6.8.1 GROUNDWATER MONITORING The Company has increased its monitoring of bores to a fortnightly basis to obtain detailed information on groundwater fluctuations during winter.
- 6.8.2 SURFACE WATER MONITORING Monitoring of the water quality in the Blackwood and Scott Rivers, is being undertaken on a fortnightly basis. In addition, major drainage channels are also being monitored. This information will be used to assist in the development and on-going monitoring of the surface water management plan.
- 6.9.1 EMPLOYMENT OPPORTUNITIES The Company has advertised its likely requirements for labour in the local newspapers. From this there has been a substantial number of expressions of interest in obtaining work once the mine commences operation. A larger than expected pool of skilled and mine experienced people are currently living within the Shire, indicating that the number of newcomers to the workforce of the Shire will be less than predicted in the ERMP document. The Company will favour local people when employing its permanent workforce.
- 6.9.2 INFRASTRUCTURE The Company has had discussions with the Shire regarding the potential impact of the project on the Shire's finances, and is finalizing the agreement to ensure that the Shire is not disadvantaged by the project.

In addition to the Company's commitments (finalized management plans and management plans currently under preparation), the EPA will also be able to impose Ministerial, Works Approval and Environment Protection Act licence conditions on any approval for the project, to ensure that adequate safeguards to the environment are in place prior to the project commencing operations. The Company accepts this principle.



## **QH02**

**MANAGEMENT PLANS AND MONITORING: Q. Necessary management plans, with provisions for regular updating, should be in place before project approval is granted.**

Good business practice demands that planning is regularly updated with respect to all operating, control and monitoring parameters. Answers to question QH01 above detail some of the commitments already made.

## **QH03**

**MANAGEMENT PLANS AND MONITORING: Q. Specifically, comprehensive management plans are required for:**

- a. Dieback control during construction and operation of the mine site and transport route
- b. Surface water and turbidity control
- c. Rare species protection
- d. Noise
- e. Dust
- f. Rehabilitation
- g. Groundwater quantity and quality protection
- h. Air emissions
- i. Slimes storage, drying and disposal
- j. Water and slimes storage dam construction and maintenance

- a. Dieback control during construction and operation of the mine site and transport route

The type of management required for dieback is well known and presents practical rather than technical problems. These procedures have been carried out for many years by government and commercial operations. There is no reason to believe that the proponent cannot design and implement suitable detailed procedures when the need arises. These detailed procedures will be subject to government review and acceptance in the normal way. A detailed dieback management plan will be produced and will be available for public inspection. Normal procedures are: -

- . Mapping of the existing infections to identify infected and non infected areas, and monitoring any movement of the infections.
- . Implementation of workforce environmental awareness programmes.
- . Appropriate design of the site and operations.
- . Compulsory cleaning of all machinery, materials and vehicles as they enter areas which are not infected.
- . Compulsory cleaning of all dirty machinery, materials and vehicles as they enter the site so that dieback is not introduced to areas which are not infected and so that additional species of dieback are not introduced to the site
- . Compulsory cleaning of all machinery, materials and dirty vehicles as they leave site, so that dieback is not exported from the mining area.

b. Surface Water and Turbidity Control

A detailed surface water management plan, to the satisfaction of the EPA, will be in place before operations commence. Surface water management will be developed around the following principles: -

1. No surface water will leave the "active" mining area, as all drainage will be internal to the dredge pond.
2. Surface water from the rest of the site will continue to flow along current drainage lines unless intersected by the active mining area.
3. If the active mining area crosses a current drainage line, the drainage line will be diverted around the mining area and then returned to the normal drainage route via a silt trap.

Monitoring of the surface water drainages coming off the mine site and of the Blackwood and Scott Rivers upstream and downstream of the mine site, has been in place since June 1990. This programme includes analysis for the following at the frequencies shown: -

pH; EC; TDS; Nutrients; Turbidity	Fortnightly from May to October Quarterly during summer
Major ions; Heavy Metals	Quarterly
Gross alpha and beta activities	Six-monthly

In addition surface waters have been, and will continue to be monitored over single storm events to gain information on changes to water quality over peak flow periods. Rainfall is also being monitored. Further details on surface water and turbidity control are given in answers to questions QI01-05 and QI10.

- c. Rare species protection - The preparation of management plans for the rare species (gazetted and possibly Reserve Flora) should only be undertaken by CALM or in conjunction with CALM. This matter requires consultation with CALM officers, however there is a precedent for developers to assist in funding research on rare species. The Company has fenced off the eastern half of Location 4264 to protect the rare species in this area. The future of this area will be determined in consultation with CALM over the next 2 to 3 years. The Company will co-operate with CALM and the Kings Park Board, in regeneration trials on gazetted rare species.
- d. Noise - Details of noise management are given in Section 4.8.3 of the ERMP. Noise studies undertaken by the Company indicated that, with the exception of the Scott River Road-Brockman Highway intersection, residents will not be subjected to excessive noise levels. As mentioned in the ERMP, sound buffers will be constructed, if necessary, on Scott River Road at the junction with Brockman Highway, to mitigate the noise effects of trucks at that intersection. Techniques to reduce noise, used by the proponent at its dredging operations and dry mill site in NSW, will also be applied at Beenup.

At the time of the preparation of the ERMP the need to crush gravel during construction had not been established. It now appears that sources of gravel will be available that may not need rock crushing and every effort is being made to use such supplies. If such activities are required the proponent will install the rock crushing facilities in an area where sound buffers can be constructed if necessary. Fabrication will be done off-site where possible. During construction, work will be restricted to daylight hours wherever possible. Also refer to QG08.

The Company is currently undertaking further baseline noise monitoring (refer QG10), and will continue with periodic noise monitoring during both constructional and operational phases.

The Company will comply with all regulatory requirements on noise control. It agrees that normally, construction should be limited to daylight hours and noise mitigation methods will be employed if an as required. Such methods may include, restriction of disruptive noises during the night; reduction of noise levels at their source (e.g. reduced pitch on reversing horns); or reduction of noise levels reaching nearby residents by the use of sound barriers. The most appropriate method of management will be dependant on the individual circumstances.

e. Dust - Management plans for dust control will be effected in the following ways: -

1. By use of water sprays on unsealed roads and stockpiles to suppress dry emissions.
2. By dust extraction and collection from all materials handling and process equipment during the dry mill processing.
3. By the use of wet scrubbing of the dryer exhaust.
4. By covering the product being hauled to Bunbury with tarpaulins.

The management plans are further discussed in answers to questions QG02, 14, 16 and 19.

f. Rehabilitation - Details of rehabilitation management plans are given in Section 3.1.9.2 of the ERMP.

The proponent will prepare detailed rehabilitation plans well in advance of the commencement of mining operations (Section 3.1.9.2), to the satisfaction of the EPA. The overall programme has been drawn up in conjunction with the Beenup Final Land Use Working Party and the technical details will now be developed by the Company's staff and consultants, who have been involved with successful rehabilitation programmes at other mining operations.

Good quality, responsible rehabilitation of areas of native vegetation on the mined area will take place using the principles outlined below: -

1. Collection of seeds from the area before mining/disturbance.
2. Topsoil removal and storage occurring only in the dry season so that disruption to soil structure and seed loss is minimized.

3. Use of temporary non-regenerating hybrid grasses to stabilize the soil when first returned to the mined area if necessary. Brushing (using cleared vegetation) and/or wind fencing will be used as appropriate.
4. Replanting with -
  - a. nursery stock from local seed
  - b. commercially available stocks
  - c. local dieback resistant species
  - d. a diversity of understorey and forest/woodland species representative of the vegetation of the original area in appropriate locations
5. Natural regrowth from the replaced soil

The rehabilitation will be regarded as successfully completed when the natural vegetation is self-sustaining (i.e. not requiring assistance), is reasonably similar to the pre-mining structure, and is capable of fulfilling most ecosystem functions. It is expected that detailed completion criteria will be developed to the satisfaction of the EPA and will be updated as appropriate.

Pastured areas will be rehabilitated using the incorporation of pre-mining soil and slimes. This will improve the nutrient-holding capacity of the soils and enable efficient return to production. Rehabilitation will be deemed successful when the land productivity returns to pre-mining levels. This is expected to occur 3 to 5 years after mining.

Establishment of current productivity levels will be determined in studies carried out by consultants over the next 12 to 18 months.

- g. Groundwater Quantity and Quality Protection - An exploration bore into the Lesueur aquifer will be drilled in 1990/91, to enable test pumping to detail the quantity that can be pumped from the aquifer without adversely effecting it. Recent testing of water quality from the Geological Survey hole drilled about 500m from the dry mill site, showed that the water quality is good, with EC being 420 micro S/cm and a TDS of 220 mg/l.

The proponent has discussed with the WA Geological Survey the results obtained to date by their drilling. The Company has submitted to the WA Water Authority plans to drill an exploration bore at the dry mill site where both quality and quantity of water in the aquifer can be tested. At the moment the Company is confident that the quality and quantity of water in the aquifer will not be at risk by this project. This will be quantified following the tests planned for October/November this year. At all stages WAWA will have the licensing rights for these bores, and for any other drilling for water that takes place within the Lesueur aquifer. Any abstraction of water will be according to any licence conditions imposed by WAWA.

Limited data is presently available for the Lesueur Sandstone Formation, however preliminary results from the Geological Survey's "Scott Coastal Drilling Programme" suggest that this Formation is present on both sides of the Alexandra Bridge Fault (a north-south fault approximately one kilometre west of Scott River Road). A formation thickness of 500 to 900 metres is encountered to the north of the study area, thinning to a 150 metre intersection at Governor Broome Road to the south. Groundwater recharge, throughflow and flow directions have not yet been defined, however it is evident that a very large resource of groundwater is available in the area.

Recent work by the Geological Survey of WA indicated that recharge of the Lesueur aquifer is currently taking place, as recent waters have been identified in the upper sections of the aquifer. Calculations by the Company show that a recharge area of 17 sq kms of Lesueur Sandstone is necessary to replenish the water used by operations. It is anticipated that this represents less than 1% of the area available for recharge and therefore the impact on the aquifer is expected to be minor.

- h. Air Emissions - Management plans for air emissions include the plans described above for dust emissions, as well as controls for non-dust emissions. Non-dust air emissions will be controlled by wet scrubbing of emissions from the fluid bed dryer exhaust. Statutory requirements for air emission controls will be met.

Further discussion of air emission management is detailed in answers to questions QG02, 03, 14-19.

- i. Slimes Storage, Drying and Disposal and
- j. Water and Slimes Storage Dam Construction and Maintenance

These two issues are discussed in answers to questions QI01, QI05 and QI10. The handling of slimes is still undergoing assessment. Further detailed plant design, and the aforementioned surface water management plan, is enabling the Company to prepare a proposal for the management of slimes. The handling of slimes at the wet mill will use a proprietary process developed by MDL. A contingency plan to use flocculants will be used if the process does not perform as expected. Handling of slimes at the dry mill site has, however, been established in detail and is given in the answers to the questions listed above.

#### **QH04**

**MANAGEMENT PLANS AND MONITORING: Q. Comprehensive monitoring should be undertaken of all aspects of the operation with the potential to affect the environment. Monitoring results should be accessible to the public and concise summary reports presented to the community regularly.**

The Company will continue comprehensive monitoring for surface water, groundwater, radiation (both in groundwater and airborne), noise, dust, flora, fauna and dieback. Results will be available to the relevant Government agencies. The decision on making these accessible to the public will be subject to their usual procedures. The Company is prepared however to present summary reports to the community via the Community Consultative Process. The Company will also make relevant reports available to the Shire.

#### **QH05**

**MANAGEMENT PLANS AND MONITORING: Q. The slimes dam will be alkaline. It should be lined to prevent aquifer contamination.**

Water used on-site is mildly acid (pH 6.5). It is not envisaged that any chemicals will be added to raise pH levels.

There is no indication at the moment that material going into the slimes dams will be alkaline. During the operation of the dry mill the alkalinity of this material will be monitored.

#### **QH06**

**MANAGEMENT PLANS AND MONITORING: Q. Comprehensive analysis of slimes should be undertaken to best manage drying, shrinkage and rehabilitation.**

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Test work to determine the behavioural characteristics of the slimes has been undertaken. Further test work is currently being conducted to assist in the development of the detailed management plan. A new slimes handling system for use at the dredge/wet mill site, has been developed by MDL, but due to patent delays, the process cannot as yet be detailed here. A contingency plan to use flocculants has also been developed.

#### **QH07**

**MANAGEMENT PLANS AND MONITORING: Q. What management plan will be put in place for fire control and the discharge of the proponents statutory responsibilities in this area?**

Fire control and prevention is part of standard occupational health and safety management programmes.

Management plans for fire control and statutory authority responsibilities will be achieved as follows: -

- . By incorporating the statutory requirements of the WA Mines Department and the West Australian Fire Brigade Board into the design of both the mining plant, and the process plant and infrastructure.
- . By ensuring that in addition to the requirements for fire reticulation, hydrants and hoses, fire extinguishers are installed and maintained in all plant and at appropriate locations in buildings.
- . The storage of flammable liquids shall be in accordance with the statutory regulations.
- . By complying with the provisions of the Bush Fires Act and the local Shire Council with respect to controlled burning and fire breaks.
- . By providing suitable equipment for fire fighting within the mining lease.
- . By appointment of a nominated safety officer for overall fire control and monitoring and training of operations personnel.
- . By developing appropriate working arrangements with CALM and the local Bush Fires Board for the control of bushfires.

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## ***SURFACE WATERS***

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### **QI01**

**SURFACE WATERS: Q. One of the greatest potential impacts of the proposal, will be the failure of a slimes dam or water storage structure and consequent turbidity or dieback impacts on the National Park and Scott or Blackwood Rivers.**

#### Failure of Water Holding and Management Structures

1. Risk of Failure - There are two different types of failure (each with an associated risk) which will be taken into account in the design of water storage and management structures.
  - . The risk associated with structural failure of a dam or diversion channel
  - . The risk associated with "failure to contain", specifically for the water storage structures

It is important to remember that since the water table is 2 to 5 metres below the current ground level, there is therefore no risk of failure associated with the dredge pond. All water storage structures at the mine area will be designed to drain into the dredge pond which will be below ground level.

The available storage within the dry mill area water storage structures (slimes dam and reclaim pond), will be designed to contain rainfall over a 6 hour PMP (probable maximum precipitation). This exceeds the capacity required for a 1 in 100 year rainfall event by more than 10 times. This will require a 0.5 m freeboard and this value is included in the design of these structures.

Storage volumes designed into the silt traps around the mining/mill areas allow for a 1 in 20 year rainfall event, and includes a provision for 33% of the available storage volume to be occupied by silt. The design of all water storage structures will also comply with Department of Mines requirements.

2. Impact of Failure - In association with the detail design of the various water storage and management structures, an assessment of the likely impact of failure will be further developed, to the satisfaction of the Department of Mines and WAWA, in order to determine the necessary design criteria and the impact potential. The following impacts will be detailed further.

2.1 Turbidity - In the event of a system failure, any suspended solids or slimes from the mining area would be significantly diluted. This means, because such a failure would only be likely in extreme flood events when local drainages would have greatly increased water volumes, that the impact on downstream areas is calculated to be low. Surface waters would continue to end up in either the Blackwood or Scott Rivers as they do now.

2.2 Dieback - A preliminary dieback survey, carried out since the ERMP was written, has shown that dieback already occurs in the Scott National Park. The full extent of this will be mapped at about the end of 1990, but at this stage it is expected that it will be found that all the drainage lines from the mining area into the National Park are already infected. There is no possibility of reversing these existing infections, and no possibility of removing the dieback from the mine site or park. The drainage lines will be restored to their former positions after mining, and there will be no additional spread of dieback due to the mining within the drainage lines. To prevent unexpected dieback spread due to possible uncontrolled release from the mining/mill area, diversion (catch) drains will be established and directed to silt traps on all drainage lines leaving mining/mill areas, where there is a potential for increased turbidity or slimes.

Any failure of water holding structures within the mining area would lead to a temporary increase in the volume of the water flowing out from site, and this flow would rapidly decrease as the water fanned out. Such a flow would have little or no impact on the distribution of dieback, unless it caused flooding of areas not already infected. This is unlikely given the small volumes involved, the flat and wet nature of the country, the natural tendency to extensive flooding of the land for long periods each winter, and the existing infections of dieback. These infections can now be expected to be at least at, and possibly above the level of any natural flooding and may have moved further up hill by natural growth.

3. Integrity of Dam Walls - Unlike farm dams, any embankments associated with the dredge pond, slimes dam and storage dams/silt traps will be properly engineered with controlled placement and compaction of embankment materials and provision of adequate seepage control measures to the satisfaction of the Department of Mines. Erosion control measures will be included to ensure the integrity of embankments. These measures may include the placement of rip-rap protection and grassing of embankment slopes.
4. Contingency Plans - As part of the on-going operations on the mine site, earth-moving equipment will be readily available for use in situations where the design events for water holding and management structures are exceeded. This equipment can be used for constructing levees, repairing embankments and digging temporary diversions as required. Disaster planning beyond this is not considered warranted due to the relatively low probability of such events, and the on-going dam embankments monitoring programme which will be in place.

#### **QI02**

**SURFACE WATERS: Q. What management plans will be put in place to control surface waters and turbidity?**

Management of surface waters and turbidity will be controlled differently in the dry mill and mining areas.

#### **DRY MILL AREA**

Drainage paths and catchment boundaries are shown on Figure 1. The dry mill site will be effectively divided into two drainage zones. The northern drainage zone encompasses the bulk of the dry mill site, including the administration and support buildings, the dry mill itself, the product load-out area and the temporary construction camp. The southern drainage zone includes the concentrate dump station, dump area and slimes dams. Existing drainage lines traverse the site from south-east to north-west approximately as indicated on the Site Drainage Plan.



1. Northern Drainage Zone: - Run-off from the bulk of this area will be free of abnormal suspended solids or other contaminants. This includes run-off from the construction camp area, the administration and laboratory area, nursery, car park and stores. Drainage paths from these areas will be designed to discharge directly into the existing watercourse to the north.

Discharge from the remaining areas (i.e. workshops, ablution block, load-out station and dry mill) will be subject to potential contaminants due to spilt slimes, and wash-down water.

Drainage paths will therefore be directed to a silt trap/holding dam between the construction camp and the dry mill site. The proponent will comply with the standards set under the EPA discharge licence.

An existing drainage channel at the site of the reclaim pond will be diverted to the north to contain suspended solids or slimes.

2. Southern Drainage Zone: - All areas within the southern drainage zone have the potential to produce turbid discharges. It is therefore proposed to direct all surface water run-off from the southern drainage zone to a holding dam near the south-western boundary of the dry mill site. An existing drainage channel near the dump area will be diverted to the east as shown.

Drainage lines including both piped underground drainage and open channel drains are shown on Figure 1.

As noted above, discharge from the administrative areas of the northern drainage zone will be discharged directly into the water course to the north, whilst that from the working areas will be directed to the northern holding dam. All discharge from the southern drainage zone will be directed to the southern holding dam.

Discharge locations for piped drainage will be provided with energy dissipaters to minimize scour at the outlets. All open channels will be designed to be non-scouring and will be protected against erosion where necessary. Drop structures will be provided where necessary.

Two main silt traps or holding dams are proposed for the dry mill site as shown on Figure 1. The northern holding dam is located between the construction camp and dry mill, whilst the southern holding dam is to be located at the south-west boundary of the site. These dams are provided to capture and settle out excess sand and silt and contain any contaminants which may result from the work areas of the dry mill site. Physical details of each dam are described in the answer to question Q110.

The dam overflow spillways will be designed to minimize scour downstream.

Turbidity levels in existing waterways are currently being monitored and the proponent will ensure normal turbidity levels in streams downstream of the dry mill site are not exceeded.

Information on particle sizes to be trapped and settling velocities are not yet available. Similarly, estimates of total silt output are not available, although these are not expected to be significantly higher than existing silt loads.

This data will be incorporated into a comprehensive drainage management plan to be prepared to the satisfaction of the EPA prior to plant construction.

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As part of the on-going environmental monitoring program for the project, the water level and quality of water in the silt traps will be monitored and these dams will be dug out when required.

## **MINE SITE DRAINAGE MANAGEMENT**

The general plan for management of surface water within the mine site is indicated on Figure 2. It can be summarized as follows: -

1. All surface water which would naturally flow into the "active" mining area from external catchments will be diverted around the site by two major diversion channels. These channels will be located around the edge of the active mining area, and will be constructed prior to the commencement of mining operations. The channels will be constructed on an as needs basis.

It is anticipated that the south-eastern channels will be constructed first and as the mine area moves north, the channels will follow. The channels will be constructed on the buffer boundary between the mining area and the neighbouring farms and/or National Park. These channels will be shallow spooned structures which will all feed into nearby silt traps as shown in Figure 2.

They will be designed for non-scouring velocities and will be located to ensure discharge to downstream areas only occurs within existing watercourses. Drop structures and energy dissipaters may be required to ensure non-scouring velocities are maintained for the design flows.

2. Surface water resulting from rainfall within the "active" mining area will be directed into the dredge pond and contained there.
3. All other surface waters outside the "active" mine area, will continue to drain off the site via current drainage lines.

A surface water management study is currently being undertaken to size the various water storage and management structures described above. This plan will be developed to the satisfaction of the EPA.

### **QI03**

**SURFACE WATERS: Q. What rainfall and flood return periods will be used in the design of water holding and management structures?**

#### Design criteria for water storage and management structures

1. General

The choice of design criteria for water storage structures (e.g. dams) and management structures (e.g. diversion channels), will be based on an assessment of the consequences of failure. A structure which could cause significant environmental damage in the event of failure will be designed for a high Average Recurrence Interval (ARI) of rainfall commensurate with such high impact potential. The following design ARI rainfalls will be adopted.

**Potential Impact Design ARI  
(yrs)**

High	100
Medium	20
Low	5

The above impact potential ratings refer to level of economic or environmental losses only. Different criteria would be adopted if any potential for loss of life existed as a consequence of failure.

2. Water Holding Structures

These structures include:-

- . slimes dams
- . silt traps

Slimes dams will be constructed without any appreciable catchment other than their own water surface areas. A high impact potential has been used for design of these structures, but it is unlikely that it will be necessary.

Silt traps are considered to warrant a medium impact potential classification.

3. Water Management Structures

These include:-

- . bunds for isolation or diversion
- . major mine site diversion channels
- . active mining area diversion channels
- . any drop structures, culverts or energy dissipaters associated with the above diversion channels

The major mine site diversions will be assigned a high impact potential, whilst the active mine area diversions are considered to have a medium impact potential. Other works will be assigned the appropriate impact potential at the detail design stage. The design of all water storage structures will comply with the Department of Mines requirements.

**QI04**

**SURFACE WATERS: Q. What contingency plans will be put in place for situations which may exceed the design parameters and where would surface water end up if there was a system failure?**

If the design parameters were exceeded and there was a failure due to an event in excess of a 1 in 100 year rainfall, the amount of water discharge from these structures compared to the amount of run-off in the whole area of the Blackwood and Scott Rivers, would be a small percentage. Any such major flood event would tend to carry a high level of solids in run-off, resulting in a general turbidity of the flood waters.

As part of the on-going operations on the mining site earth-moving equipment will be readily available for use in situations where the design events for water holding and management structures are exceeded. This equipment can be used for constructing levees, repairing embankments and digging temporary diversions as required. Disaster planning beyond this is not considered warranted due to the relatively low probability of such events.

#### **QI05**

**SURFACE WATERS: Q. What effect would such a failure have on which river or wetland systems?**

There are three factors which could influence the possible effects of a systems failure. Assuming that such a failure were to occur, in spite of the engineering controls that would be in place to prevent such an occurrence, the effect, if any, on the nearby river or wetland systems would depend on:

- . the position of the mining operation at the time
- . the time of the year and surface water conditions
- . the volume of contaminated water released.

Figure IV-1 (Appendix IV) from the ERMP, and Figure 2 attached, shows that three main drainage systems traverse the proposed mine site at present:

- . A drainage system in the north and north-west leaves the proposed mine site and drains across private land to the west, then through a narrow section of the Scott National Park before entering the Blackwood River.
- . The central and north-west drainage system drains across private land to the west and then across a narrow section of the Scott National Park before entering the Scott River.
- . The south-eastern drainage system drains across private land to the south before entering the Scott River.

In the south-western area, there are also small drainage channels which drain in a southerly direction across the Scott National Park to the Scott River.

A basic requirement of the proposed mining operation will be total containment of any contaminated water generated by the operations within the boundaries of the proposed mine site, with the release of only clean waters outside that area. Silt traps will be installed on all drainage lines where they leave the proposed mine site and also at other strategic locations within the site. The worst situation for such a failure to occur, would be when the mining operation is near the south-west corner, where the boundary of the proposed mine site is contiguous with the Scott National Park. Additional precautions, including diversion drains, will be taken along this boundary to prevent any contaminated waters leaving the proposed mining area. The current mine plan, results in at least 10 years mining before this area is mined, so containment practices will be well demonstrated.

If such a failure were to occur when the mining operation is in other parts of the proposed mine site, contaminated water would have to move across the remainder of the proposed mine site before entering adjacent private farming land and would become diluted.

In most cases the drainage lines extend for considerable distances before entering the Scott National Park and thence the river systems, so provide for dilution and velocity reduction to occur before entering the Park. The 100 m buffer between the mine area and the National Park will also assist in velocity reduction.

Refer also to QI01.

#### **QI06**

**SURFACE WATERS: Q. What changes in pH and concentrations of ions of iron, sulphur or other elements might be expected to occur due to oxidation or other effects due to opening up of the dredge pond?**

Experience at other mining operations in Western Australia and New South Wales, have shown that major changes to the pH and concentration of ions is not expected to occur due to the opening up of the dredge pond. The greatest potential for a decrease in pH would be related to the oxidation of pyrite. However, pyrite will not be exposed for significant periods of time before being recycled back below the water table in the tailings. It is therefore not expected to change the pH significantly. It is anticipated that iron will oxidize to produce  $Fe_2O_3$  from  $FeO$ , but due to the relatively low quantities of iron in the water, it is not expected to significantly change the pH. Test work using pyrite and local water is underway and will be provided to the EPA before dredge pond construction.

#### **QI07**

**SURFACE WATERS: Q. Will such effects have significant environmental impacts and why?**

It is anticipated that there will be no significant environmental impacts due to changes of the pH and iron content of the water. The water quality is already excellent and past experience shows that the pH is unlikely to change significantly in a dredging environment. As mentioned in QI06, test work is underway and results will be provided to the EPA prior to dredge pond construction.

#### **QI08**

**SURFACE WATERS: Q. What effects would controlled and uncontrolled releases of dredge pond water be likely to have on fish stocks or other biota in Hardy Inlet or the rivers?**

##### Uncontrolled release

There will be no uncontrolled release of water as water will not be released from the dredge pond. Dredge pond waters are recycled as normal mining practice.

##### Controlled release

There will be no requirements for controlled discharge of water from the dredge pond in the mining process. As a precaution a silt trap will be constructed downstream of the pond. The method of mining is a non-chemical process and has no significant chemical effect on the water quality. There will be no effects on fish stocks or other biota in the Hardy inlet or the rivers.

Due to the natural fluctuations in the water table in summer, the level in the dredge pond will decrease. No releases of water will result. As the water level of the pond will be around 2 m to 5 m below ground level, overflow will not occur. During the winter months where precipitation is high and groundwater inflow increases into the dredge pond, the level will rise to the level it was preceding summer, but again the probability of overflow is highly unlikely.

**QI09**

**SURFACE WATERS: Q. What effect may be expected from an increase in boat commuters across Hardy Inlet?**

The main access to the Beenup mine will be via Scott River Road entering from the Brockman Highway. Mineral Deposits Limited has no intention of providing access to the area via the Hardy Inlet.

An increase in pleasure craft (i.e. fishing boats and other similar vessels), could result from the increase of workers in the area. This would have less effect than tourists normally attracted to the area.

**QI10**

**SURFACE WATERS: Q. Given the difficulty in constructing farm dams in the area, what design will be used to ensure the integrity of dam walls for the dredge pond and other similar structures?**

A. Mine Site

Because the dredge pond is below ground level no embankment will be required.

B. Dry Mill Site

(See also response to Question QI01, part 3). The locations of the slimes dams within the southern drainage zone are shown on Figure 1.

These dams will be unlined and constructed above ground by the formation of perimeter embankments. Slimes will be discharged into the dam at the southern end and supernatant water allowed to overflow into the reclaim pond at the northern end. Preliminary details of the overflow decant facilities are shown on Figure 3.

The dams will have an overflow spillway as shown, which will be designed to cater for extreme rainfall events. Overflow will be directed to the southern holding dam.

The dams are located above an extensive lateritic caprock which is located between depths of 1.5m to 3.0m below surface and has a thickness varying from 1.0 to 1.5m. A typical dam embankment profile is given on Figure 3 and shows how an impermeable membrane will be located within the embankment and extended into this caprock. This will effectively seal the slimes dams and minimize seepage into the surrounding water table as currently occurs in local farm dams. The outside slope will be stabilized by grassing to prevent the formation of scour rills.

The delivery of the slimes from the dry mill to the dams will be via polyethylene pipe laid above ground for ease of maintenance. The actual discharge location point will be variable within a defined area as shown and will be determined and adjusted as necessary to suit operational requirements.

### Slimes Dam Details

- . capacity - 80,000 m<sup>3</sup> (40,000 m<sup>3</sup> each dam)
- . surface area - 4.0 Ha (2.0 Ha each dam)
- . freeboard against 'failure to contain' - 0.5 m i.e. 20,000 m<sup>3</sup>
- . slimes discharge rate - 620 m<sup>3</sup>/hr at approx. 0.05% solids by weight
- . average detention time - 2.7 days (using 1 dam)
- . design spillway freeboard against overtopping - 0.5 m

Note that the freeboard against 'failure to contain' is in excess of the 4.0 hour Probable Maximum Precipitation (PMP) for the region as defined in the following reference: - (Bulletin 51 - The Estimation of Probable Maximum Precipitation in Australia for Short Durations and Small Areas, by Bureau of Meteorology, August, 1984). All dams and ponds will be designed to current Australian Engineering and Design standards, and any requirements set by the Department of Mines and WAWA.

## **GREENHOUSE/OZONE DAMAGING GASES**

**QJ01**

**GREENHOUSE/OZONE DAMAGING GASES: Q. What quantities of greenhouse gases will be attributable to the mining, milling and transport aspects of the proposal?**

SECWA has advised the Company that for each tonne of coal burnt by SECWA 1.87 tonnes of CO<sub>2</sub> are produced. They have also advised us that they estimate the project will contribute 101.8 kilo tonnes of CO<sub>2</sub> to the atmosphere each year, based on the revised power requirements. This represents 1.7% of the CO<sub>2</sub> emitted by the power generated by SECWA. This should be put into perspective by the following figures sourced from "ERMP: Proposed Collie Power Station, SECWA March 1990": -

Source	CO <sub>2</sub> emissions (million tonnes)
Total Worldwide	28,300
Worldwide Power Industry	4,900
Australian Power Industry	100
West Australian Power Industry	6
Beenup	0.102

As shown in Figure 4.4 on Page 64 of the ERMP, it can be seen that the plant size chosen for the Beenup project produces almost optimal efficiency for the power requirement per tonne processed.

Two tonnes per hour of coal will be burnt in the fluid bed dryers at the dry mill. Emissions from these dryers are shown below: -

. Maximum Chimney Stack Height	25 m
. Volumetric Flow Rate	
84 t/h dryer	45500 Nm <sup>3</sup> /h
6 t/h dryer	2750 Nm <sup>3</sup> /h
. Exhaust Stack Temperature	65° C
. Exhaust Gas Composition	
	61.9% N <sub>2</sub>
	7.8% CO <sub>2</sub>
	12.7% O <sub>2</sub>
	17.6% H <sub>2</sub> O
	0.034% SO <sub>2</sub>
. Proposed Outlet Velocity	15 m/sec



Humidity

100%

The transport of product to Bunbury by truck will produce approximately 3,525 tonnes of CO<sub>2</sub> per year (3.525 kilo tonnes).

#### **QJ02**

**GREENHOUSE/OZONE DAMAGING GASES: Q. How does the level of greenhouse gas emissions from road transport compare with rail transport for this size of transport task?**

The amount of greenhouse gases produced by truck and rail haulage is difficult to quantify exactly due to the complex combustion chemistry and individual engine efficiencies. As a rule, heavy duty diesel truck haulage produces 91% of the greenhouse gases per litre of fuel burnt than does train haulage. However, the number of tonnes hauled per kilometre per litre of diesel, is much higher by train than by truck.

If the Beenup ore could be economically hauled the entire way to Bunbury by train, the greenhouse gases produced would be about 25% of those produced by exclusive truck haulage. Since the proposed rail/road link includes 60 km of road and 120 km of rail transport, the greenhouse gas advantages are not as marked. Calculations show that the road/rail link represents about 63% of the road haulage greenhouse gas emissions.

The most efficient fuel, as far as CO<sub>2</sub> production is concerned, is natural gas (43% less CO<sub>2</sub> produced per tonne hauled compared to diesel). There are currently major advances being made in using natural gas in trucks, and the Company is investigating the possibility of using natural gas in its ore haulage. Major improvements in truck fuel efficiencies have occurred over the past 10 years. Improvements have occurred in the use of radial tyres instead of cross-ply, engine efficiency ergonomics such as wind deflectors and load covers and in the fuel itself. These have resulted in improvements of 34 to 39% in fuel efficiency. It is expected that further improvements in fuel efficiency will occur before the trucks used on this project are ordered.

It appears that 100 litres of fuel will be used per truck trip from mine site to Bunbury and return. This represents approximately 7.05 kg CO<sub>2</sub> produced per tonne of product hauled by road (or 3,525 tonnes of CO<sub>2</sub> annually). Cartage by road/rail via Nannup would result in approximately 2,290 tonnes of CO<sub>2</sub> being produced annually.

#### **QJ03**

**GREENHOUSE/OZONE DAMAGING GASES: Q. What management actions will be taken to limit the output of greenhouse gases (eg tree planting, engine performance management etc)?**

With fuel costs being a high portion of the operating costs of Beenup, there will be great economic incentive to have the most efficient usage of power and fuel available to the project. As indicated on Page 64 of the ERMP a major consumer of fuel will be the diesel powered trucks that transport the mineral product to Bunbury (approximately 1.33 million litres/yr). The Company has since held further discussions with potential haulage contractors and they have all indicated that on-board computers are the most likely method used to monitor truck performance. The contracting companies find that this has a major influence on fuel consumption as well as ongoing maintenance of engine efficiency. The Company anticipates that this will enable the fuel efficiency of the truck fleet to be maximized and therefore the emissions of greenhouse gases to be minimized as stated in the ERMP. Other management measures are outlined on Page 65 of the ERMP.

Tree planting will commence in the Autumn/Winter of 1991 (assuming government approval has been received by this stage) at various locations around the dry mill site and for screening purposes at various other parts of the project.

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**QJ04**

**GREENHOUSE/OZONE DAMAGING GASES: Q. A tree planting program should be implemented to at least partially affect greenhouse gas generation by the proposal.**

Tree planting will commence in Autumn-Winter 1991 (assuming project approval has been received by this stage) to effect both the screening and greenhouse gas off-set. The final number of trees planted will also be related to long term buffer zones around the National Park and planting of trees in drainage lines as the mine develops. The final land use study showed that in effect the majority of the land should however be returned to pasture to prevent further reduction in the available agricultural land in the shire.

**QJ05**

**GREENHOUSE/OZONE DAMAGING GASES: Q. What progress has been made by the proponent to limit the use or loss of CFC's in fire extinguishers, as refrigerants and elsewhere on the project?**

As outlined in BHP's submission to the enquiry by the Senate Standing Commission on Industry Science and Technology, in reducing the impact of the greenhouse effect, BHP has banned CFC based aerosols and has embarked on a programme of eliminating CFC's from existing and future operations. As stated on Page 65 of the ERMP, gases extracted from air-conditioning units during the maintenance or repair will be recovered in suitable receptacles for recycling and every effort will be made to purchase CFC free products where they are available.

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## ***DOWNSTREAM PROCESSING***

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### **QK01**

**DOWNSTREAM PROCESSING: Q. The proponent should guarantee that downstream processing will not occur on the site.**

Further processing of the mineral can only take place in appropriately designated industrial areas. The proposed mine site does not represent one of those industrial areas, nor does it fall within a Shire industrial zoning, therefore further downstream processing is not proposed for the site.

### **QK02**

**DOWNSTREAM PROCESSING: Q. What controls exist on allowing downstream processing on the site?**

The further processing of the mineral is restricted to areas designated as industrial areas by the State Government. It would therefore be under the control of the State Government to nominate an area suitable for any downstream processing. Any proposal for downstream processing anywhere in W.A. would have to go through a normal EPA approval process and the public would have a full chance to comment upon such a proposal.

### **QK03**

**DOWNSTREAM PROCESSING: Q. The dry plant should be off-site.**

The Company is not aware of any environmental condition that exists that would necessitate the dry plant being located off-site. In fact there are distinct advantages associated with the dry plant being located adjacent to the mining operation, in particular: -

- a. It is then possible to efficiently return any reject material from the dry mill separation process to the dredge pond for disposal
- b. There is reduced haulage of tonnage of waste material to an alternative site thereby reducing the energy requirement for haulage of that material
- c. The dry plant does not have any alteration effects on the natural minerals but only electrostatically and magnetically separates the constituent minerals, therefore it can not be classified as processing or altering of the existing mineral.
- d. In terms of labour, energy requirements and economic considerations, it is more viable to have the dry plant adjacent to the dredging and wet plant operation.

### **QK04**

**DOWNSTREAM PROCESSING: Q. This development will be a precedent for industrial developments in this area.**

The proponent believes that the development will allow for diversification within the Shire which is much needed for the economic health of the area.

The proponent believes that the type of industry being proposed will not have significant impact on the environment and will provide significant economic benefit to the area.

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For general industrial development, it is essential that certain criteria are met. In particular any industrial development would require a source of energy, a good transport system, a skilled labour force from which to draw its labour, and availability of raw materials. Given the adequate availability of energy, transport and skilled labour at Bunbury and Kwinana, immediately north of the Shire, it is unlikely that general industrial development within the Shire will take place as a result of the Beenup project being approved. Controls imposed by both the State Government and the local Shire, can limit the industrial development that can take place.

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## ***LAND USE***

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### **QL01**

**LAND USE: Q. A new campsite should be provided to replace that existing at Sues Bridge.**

Discussions with CALM have indicated that they do not support the development of a new campsite at Sues Bridge. The Company therefore does not propose to provide any additional campsite facilities to replace those existing at Sues Bridge.

### **QL02**

**LAND USE: Q. What impacts will transport have on Sues Bridge camping area? How will these be mitigated?**

The sealing of Sues Road will improve the access to the Sues Bridge camping area and make it more available to people wishing to use it. This will cause some crowding and some extra usage of the area. Since the transport of product will not occur over weekends the noise associated with the truck movements will be limited. Other impacts will include the access to the camping area from the main road, and these will be mitigated by improving the turn-off from Sues Road into the camping area.

### **QL03**

**LAND USE: Q. Will the bridge require reconstruction or replacement to accommodate heavy haulage?**

It is possible that Sues Bridge will require widening, but this could be done on a cantilever construction basis, that will not require a new set of bridge piles to be put in. The bridge itself will require a cement top and this will be completed prior to use by any of the heavy haulage vehicles.

### **QL04**

**LAND USE: Q. What impacts will the project have on other existing or future land uses such as tourism, viticulture, horticulture, orcharding or other agricultural pursuits?**

The proponent believes that tourism will benefit from the project because of the reduction in heavy haulage traffic on the main tourist routes. The proponent also believes that some tourists will be attracted to the mining operation in its own right, as has happened at its east coast mining operations.

In addition, enquiries received by the Company regarding construction of additional tourism facilities to accommodate personnel during the construction phase, later to service the tourist industry, indicate that there may be a general improvement in tourist facilities occurring over the next 2-3 years. In terms of viticulture, horticulture orcharding and other agricultural pursuits it is not seen that the project will have any effect on these activities.

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## ***WORKFORCE IMPACTS ON THE NATURAL ENVIRONMENT***

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### **QM01**

**WORKFORCE IMPACTS ON THE NATURAL ENVIRONMENT: Q. What steps will be taken to control increased pressure on the natural environment such as the Scott National Park and the coast, due to the increased population attracted by the project and improved access to the area?**

The proponent will provide its employees and contractors with an induction programme which will highlight sensitive local issues. In addition to current residents and visitors to the Shire, employees will also be required to abide by all the usual rules and laws established by the relevant statutory authorities.

### **QM02**

**WORKFORCE IMPACTS ON THE NATURAL ENVIRONMENT: Q. What steps will be taken to control impacts on the natural environment due to the introduction of pets or firearms?**

No pets or firearms will be allowed on the mining site. The introduction of pets and firearms within the other areas of the Shire by members of the general public, is not something that the Company can control other than to provide a code of ethics for its employees.

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## ***REGIONAL ASSESSMENT/CSIRO SURVEY***

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### **QN01**

**REGIONAL ASSESSMENT/CSIRO SURVEY: Q. The regional strategy produced by the State Government is inadequate.**

The State Government, as elected representatives, are responsible for the content of the strategy. They have produced the strategy to provide the community with an understanding of the framework in which developments such as Beenup may take place. The proponent feels the project complies with the strategy as set out by the Government in its regional strategy.

### **QN02**

**REGIONAL ASSESSMENT/CSIRO SURVEY: Q. The Environment Protection Authority should not assess the Beenup proposal until an adequate regional strategy with public input is produced.**

Refer to QN01.

### **QN03**

**REGIONAL ASSESSMENT/CSIRO SURVEY: Q. The CSIRO survey of social issues should have been publicly available for an adequate period before the close of the public submission period.**

The CSIRO survey was conducted by the Shire, and it was originally hoped that a period of 4 weeks would be available for public input before public submissions closed. Due to the far greater response from the local people than originally anticipated, this public submission period was reduced to 2 weeks. However, the report was immediately made available to the public and rapid dissemination of the information was carried out.

### **QN04**

**REGIONAL ASSESSMENT/CSIRO SURVEY: Q. The results of the CSIRO survey can be reinterpreted to indicate that the majority of people would not support the project.**

The CSIRO itself stated that the majority of people were willing to support the project so long as the environmental concerns of the EPA and people were met. The proponent does not believe that a reinterpretation to indicate that the majority do not support the project is correct.

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## **ARCHAEOLOGY/ETHNOGRAPHY**

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**Q001**

**ARCHAEOLOGY/ETHNOGRAPHY: Q. Any occurrences of limestone platforms should be reported to the WA Museum because of their likely archaeological importance.**

The proponent undertakes to report any occurrences of limestone platforms to the WA Museum.

**Q002**

**ARCHAEOLOGY/ETHNOGRAPHY: Q. Any Aboriginal sites detected during operations should be reported and permission sought from the relevant authorities prior to further disturbance.**

The proponent undertakes this commitment as stated in 6.2.7 of the ERMP document.



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## **LANDSCAPE**

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### **QP01**

**LANDSCAPE: Q. No analysis of landscape impacts of the proposal has been performed.**

During the planning stages of locating the dry mill site, a detailed analysis was made of the local landscape.

As the maximum height of any structure associated with the project is 25 metres and the only elevated position likely to have direct line of site vision to the structure would be Augusta some 15-17 kilometres away, it is not anticipated that visual impact will be significant. In fact it would require optical assistance to identify any structures associated with the project. However, to minimize any potential visual impact, the Company proposes to clad site buildings with appropriately coloured green colourbond, thereby minimizing the visual difference with the surrounding land. In addition the dry mill site will be screened using existing trees and trees planted specifically for screening. There will be some impacts on the landscape around the wet mill and dredge pond, as this area will have periods where land behind the mine site has not yet been rehabilitated.

Relative heights of buildings at the dry mill site are indicated diagrammatically on Figure 4. During night time, lighting associated with the plants may be visible from Augusta, however for effective use of the lighting and to minimize any impact, these will be directional lighting primarily facing downwards to assist in the operation.

During initial development of the dredge pond, mounds of material from the pond will be developed. These will be covered with grasses as soon as practicable, and will be designed to minimize noise and light interference to the surrounding area. These development mounds will be visible to people traversing the mine area via Scott River Road.

### **QP02**

**LANDSCAPE: Q. What elements of the proposal will be visible from Augusta, Molloy Island and nearest neighbours properties?**

As stated in the answer to the previous question (QP01), structures associated with the project may be visible from Augusta with optical assistance or on extremely clear days in summer. The structures will not be visible from Molloy Island or from neighbouring residential properties, due to screening trees and the lack of line of sight opportunities. During night time, lights associated with the project's structures will be visible from Augusta, however as previously stated the lighting will be directional and concentrating on the areas of the mining rather than dispersed to the surrounding areas. This light will not be directly visible either from Molloy Island or nearby residential neighbours.

Under some circumstances the steam plume from the dry mill may be visible. This is detailed further in the answer to QP04.

### QP03

#### **LANDSCAPE: Q. What landscape management will be undertaken to mitigate any effects?**

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Screen trees will be planted in Autumn-Winter of 1991 (assuming that project approval has been granted), between Scott River Road and the dry mill site. At the dredge site every effort will be made using appropriate soil covers such that the development mounds created around the dredge pond will be covered with vegetation at development, to minimize the impact. The buildings of the dry mill and all other permanent structures will be clad in a manner that will blend in with the environment. Appropriately coloured BHP Colourbond steel will be used for the main dry mill cladding and other building materials for amenities will be designed to blend in with the area.

### QP04

#### **LANDSCAPE: Q. Will the dry mill or dryer steam plume be visible from Augusta, Molloy Island or elsewhere?**

On clear days, in summer, parts of the dry mill may be weakly visible from Augusta. The dryer steam plume will be very similar to the Cable Sands dryer at the north shore of Bunbury which is rarely visible even from less than a kilometre. In extremely moist/cold conditions in mid-Winter, some steam may be visible from the dry mill dryer. Low cloud may obstruct vision of steam under these conditions.

The steam exhausted from the dry mill dryer will not be super-heated steam. It will be exhausted at a temperature of 65°C, a temperature similar to steam from a boiling kettle of water. As with a kettle the visibility of the steam will be dependant on the humidity and temperature of the ambient air, which determines the amount of differential specific energy that must be absorbed by the surrounding air to bring the steam to ambient temperature.

The visibility of the plume results from the extent of condensation and the final height. It is therefore totally dependant on the prevailing ambient air temperature and humidity which determines condensation conditions and the wind speed which influences the plume height.

Analysis shows that the highest plume is expected under cold, calm, high humidity conditions. When climatic conditions are hot with low humidity, short plumes result. It is anticipated that plumes in the morning will be higher than those in the afternoon. Plumes will also be higher in winter than in summer.

In order to appreciate the frequency of plume height, it is necessary to examine local climatic data. The wind analysis for Augusta show that winds in excess of 10 meters per second (m/s) can be expected to occur 84% of the time. Winds of less than 10 m/s occur for 15% of the time, with calm conditions for only 1%.

This indicates that the most frequent plume heights are those that occur with the 10 m/s criteria. It should be noted that the plume height decreases with increasing wind speed.

Table 2 summarizes the calculated plume heights for various seasons, times of day and wind speed combinations.

**TABLE 2.**

SEASON	TIME OF DAY	PLUME HEIGHTS (m) for wind speed		
		calm	3 m/s	10 m/s
SUMMER	9:00 am	24	21	12
	3:00 pm	15	13	7
AUTUMN	9:00 am	29	26	14
	3:00 pm	16	14	8
WINTER	9:00 am	60	54	29
	3:00 pm	33	30	16
SPRING	9:00 am	41	37	20
	3:00 pm	27	24	13

To assess the visibility of the plume from the two locations specified (i.e. Molloy Island and Augusta) the total plume height has been reduced at the site to a comparable and appreciable value for an observer at these locations.

The comparisons are: -

- a) Equivalent full moon diameters. This compares the height of the plume (including the stack) to the visible, apparent diameter of a full moon.
- b) Apparent heights at 600 mm from observer. This height, expressed in millimetres, is the apparent height of the plume (including the stack) at approximately arms length from the observer.

The values for these comparisons given below in Table 3 are for a totally flat terrain with no obstructions. It does not consider any obstructions in the line of sight from undulations in the ground and trees.

**TABLE 3.**

<b>LOCATION</b>	<b>WIND SPEED</b>	<b>EQUIVALENT FULL MOON DIAMETERS</b>	<b>APPARENT HEIGHT AT 600 mm FROM OBSERVER</b>
MOLLOY ISLAND	10 m/s	2/3	4 mm
	3 m/s	1	6 mm
	calm	1	6 mm
AUGUSTA	10 m/s	1/4	2 mm
	3 m/s	1/3	2 mm
	calm	1/3	2 mm

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## ***SOCIAL IMPACT***

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### **QR01**

**SOCIAL IMPACT-EDUCATION: Q. What arrangements will be put in place to monitor the attendance increase for schools in the surrounding areas, and the subsequent impacts on the existing educational facilities?**

Following discussions with the Education Department, it appears that the Department itself will be monitoring attendance at schools, and it is their responsibility to ensure that adequate classroom and teaching facilities are provided. The proponent will attempt to predict the impact on schools more closely as further information is obtained on potential employees and it will provide this data to the Education Department prior to the new academic years so that planning can take place. The Company is also undertaking to employ as many locals as possible to reduce the impact of the project upon the schooling in the short term.

### **QR02**

**SOCIAL IMPACT-ROADS: Q. How will the proponent address the impact of the noise and vibrations caused by heavy haulage traffic to the camping ground at Sues Bridge?**

As stated in the answer to question QL02, transportation of the product will not occur over weekends, so that the noise associated with the truck movements will be limited over the peak occupation times of the camping ground. The bridge construction will be altered to a cement surface so that vibration noises on the bridge will be minimized.

### **QR03**

**SOCIAL IMPACT-ROADS: Local road systems may experience increased pressure during the construction and operation of the project. The impact of the opening of Sues Road on the use of 'feeder' roads in the northern section of the route. Q. How will the proponent address this concern before the commencement of operations?**

Negotiations have taken place with the Augusta-Margaret River Shire on anticipating the increase in use of feeder roads to Sues Road. The contribution the Company is making to the Shire funds will be designed to supplement the Shire's maintenance of these roads.

### **QR04**

**SOCIAL IMPACT-ROADS: Impact of increased traffic on the routes taken by company personnel to the mine site. Q. How will the proponent address this concern before the commencement of operations?**

Although 60% of the workforce will be on day shift (7am-3pm) the afternoon and night shift will change at 3pm and 11pm respectively. This will ensure minimal disturbance to residence along the local transport corridor, as there will only be 8 people working on the evening and night shifts.

**QR05**

**SOCIAL IMPACT-ROADS: Proposed realignment of the Scott River road and the impacts and alternatives. Q. How will the proponent address this concern before the commencement of operations?**

Discussions have been held with the Augusta-Margaret River Shire on 3 alternatives to retaining access to East Augusta. It has been decided that the Scott River Road will be retained for as long as possible and sealed so that the realignment will not be necessary in the first 5-10 years of operation. Once a road realignment is necessary, it will be conducted by going through land that has already been mined and the road alignment will be re-established in its current position at the end of mining.

**QR06**

**SOCIAL IMPACT-ROADS: Possibility of royalty payments for the ongoing maintenance of haul roads based on Eastern States models of cost-per-cubic-metre transported. Q. How will the proponent address this concern before the commencement of operations?**

Royalty payments to shires are illegal by legislation, however a levy for on-going maintenance of haul roads has been negotiated with the Augusta-Margaret River Shire. An agreement is being finalized on the adequate provision for haul road maintenance within the total package negotiated with the Shire.

**QR07**

**SOCIAL IMPACT-ROADS: Proposed transport routes during construction. Q. How will the proponent address this concern before the commencement of construction phase?**

All construction equipment and heavy vehicles will use Scott River Road to get to site. This road will be sealed as soon as possible after approval is given. This will enable Courtney Road to be avoided. Wherever possible heavy construction equipment will be transported by Sues Road but if this route is not available in the early phases of the construction period, public roads will need to be used. All normal permits to use these roads will be obtained before transportation.

**QR08**

**SOCIAL IMPACT-ROADS: Q. What commitments will the proponent make about contributing to the cost of upgrading and maintaining the chosen product transport route before the commencement of the construction phase?**

Because the haul road will be vital to the long term viability of the project, the proponent has made commitments to, and reached agreement in principle with the Shires involved, to contribute to the maintenance and the upgrading of the product transport route.

**QR09**

**SOCIAL IMPACT-ROADS: Q(a). What arrangements will be put in place to monitor conflicts between tourist traffic and heavy haulage vehicles? Q(b). What arrangements for mitigation will be put in place if a conflict is identified?**

The Company is required by the Government to combine with Cable Sands to construct, fund and maintain the haulage route from the mine to Vasse Highway. If the Government also wants other users on the road, it is the Government's responsibility to manage the conflict.

The main haul route using Sues Road will be clearly designated as a heavy haulage route. However, the road will be sealed and engineered in accordance with the latest Austroads standards.

The Brockman Highway between Sues Road and Scott River Road will be widened to a 7 metre seal to reduce interference with traffic. The Company is prepared to listen to any difficulties that are identified by the Shire, in relation to conflicts between public traffic and heavy haulage.

**QR10**

**SOCIAL IMPACT-ROADS: Q. What arrangements have been made to monitor and mitigate any increased traffic hazards along the chosen transport route?**

The road will be constructed in accordance with Austroad standards and this will ensure that there are no unforeseen traffic hazards. However, it is important to the Company that traffic operates in a safe and legal manner and therefore feedback will be received from the transport company and steps will be taken to mitigate any traffic hazards along the transport route. It does not make any economic or safety sense for the Company not to remove traffic hazards on the transport route.

**QR11**

**SOCIAL IMPACT-ROADS: Q. What responsibility will the proponent accept for the management of the Vasse Highway to Capel part of the transport route?**

The responsibility for the management of this part of the route rests with the Government. The Company has been told by the Government that this is a major public road, and therefore should be part of the Governments long-term transport strategy. However, the Company has accepted partial funding responsibility for this road, as the route has been brought forward by the project.

**QR12**

**SOCIAL IMPACT-INFRASTRUCTURE: Q. What arrangements will be made to monitor and mitigate the effect of the incoming population on the Shire's supply of reticulated water and sewerage?**

The WA Water Authority has been informed of the project and projected increase in population of the Shire. The Company has been informed that, with the plans already afoot on a natural increase in population of the Shire, the water and sewerage facilities available will be able to cope. The Company is finalizing a package with the Shire to help them mitigate these types of requirements from the Shire's expenditure point of view. Royalties and State and Federal taxes paid by the Company will be available to Government to cover any increase in Government expenditure in these areas.

**QR13**

**SOCIAL IMPACT-SERVICES: Q. What investigation has taken place on the impact of the incoming population to the existing bus services?**

Sufficient capacity has been identified in existing school bus services to accommodate the anticipated population distribution demands and school locations.

**QR14**

**SOCIAL IMPACT-POPULATION: Q. What facilities would need to be augmented by the Shire to cater for the incoming population and how would the proponent contribute?**

A total funding package acceptable to the Shire is being finalized to enable them to cater for the incoming population.

**QR15**

**SOCIAL IMPACT-WASTE DISPOSAL: Q. What will the volume and nature of rubbish disposal be, and how will the proponent arrange for the disposal of rubbish?**

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It is anticipated that less than 250 kilograms per week of food scraps and rubbish will need to be collected and disposed of. Discussions are being held with the Shire's Health Officer, to determine the most suitable disposal site. The Company is proposing to dispose of this rubbish on its own site. The disposal of sewerage has already been covered in the answer to question QD05 as has the disposal of excessive grease and oils.

**QR16**

**SOCIAL IMPACT-INFRASTRUCTURE: Q. What commitment will the proponent make in regard to potential costs to the Shire?**

As stated in previous answers the proponent has made a series of commitments to the Shire, and is currently finalizing the last details of a mutually acceptable package to ensure the Shire is not financially disadvantaged.

**QR17**

**SOCIAL IMPACT-SOUND LEVELS: Q. What arrangements will the proponent put in place to monitor and mitigate the nuisance effects of the impacts of noise created by crushing local ironstone for the upgrading of road surfaces.**

At the time of the preparation of the ERMP the need to crush gravel during construction had not been established. It now appears that sources of gravel will be available that may not need rock crushing and every effort is being made to use such supplies. If such activities are required the proponent will install the rock crushing facilities in an area where sound buffers will be constructed if necessary.

**QR18**

**SOCIAL IMPACT-SOUND LEVELS: Q. What arrangements will the proponent put in place to monitor and mitigate the nuisance effects of noise from the trucks moving wet sand to the dry mill.**

The trucks used to haul the material from the wet mill to the dry mill, will be the most modern and will be energy efficient. This will ensure that engine noise is kept to a minimum. The road between the wet mill and the dry mill will be completely sealed, to ensure that road vibration is kept to a minimum. Loading and unloading facilities will be arranged so the need to reverse is minimized and therefore reversing horn noise will be restricted.

Since it is difficult to predict the total noise levels that will arise, the Company undertakes to continue to discuss with any locals affected, and to reach arrangements that will mitigate any unacceptable effects due to noise levels. At all times the Company will operate within the statutory requirements for noise.



**QR19**

**SOCIAL IMPACT-SOUND LEVELS: Q. What arrangements will the proponent put in place to monitor and mitigate the nuisance effects of noise to those people living along the worker and product transport routes.**

There are only 2 houses within close proximity of the transport route, between the mine site and the end of Sues Road, these being at the intersection of Scott River Road and the Brockman Highway. Studies are currently underway to determine whether the intersection needs to be diverted. If necessary a sound barrier will be constructed to reduce the noise impact upon these residents.

It is difficult to predict the affect of noise of people going to work at the site, but it is expected that worker vehicles will operate in a 3 shift basis. These shifts are anticipated to be 7am-3pm; 3pm-11pm and 11pm-7am. This means that during the most sensitive times of midnight to dawn, there will be no worker vehicles on the road. Workers will be required to satisfy all normal legal requirements for noise control on their vehicles. The afternoon and night shifts will only involve 8 workers. It is not possible to determine the number of people who will be living along the haul route from the northern end of Sues Road to Capel, until the final route is recommended by BSD. However, one of the criteria BSD have used to select a recommended route is the proximity to, and number of, local residents along the routes.

**QR20**

**SOCIAL IMPACT-SOUND LEVELS: Q. What arrangements will the proponent put in place to monitor and mitigate the nuisance effects of noise to those adjacent to the site.**

The EPA has recently completed a continuous noise monitoring programme for 2 weeks at the nearest neighbour's location. These numbers will be used to establish the current noise level so that the potential impact can be assessed. Should there be noise restrictions applied to the Licensing conditions for the project by the EPA, the proponent will comply with these at all times. Noise monitoring will be undertaken during the time periods as directed by the EPA Pollution Control Branch.

Discussions have been held with the EPA and two, two week continuous noise surveys will be carried out on the project area. The first of these was conducted in late August and the second will be in mid-summer. These will provide comprehensive background noise data for more accurate predictions of noise impact.

**QR21**

**SOCIAL IMPACT-SOUND LEVELS: Q. What arrangements will the proponent put in place to monitor and mitigate the nuisance effects of 24 hours of continuous noise from both the operation at the mine site and the transportation of the product.**

The proponent has agreed that transportation of the product will be limited to 5 days a week. Noise monitoring, on a continual basis over a period of 2 weeks, was undertaken by the EPA in late August. Predictions of approximate sound levels generated by mining and associated activities at the Beenup residential sites were based and modelled on similar mining activities found at Cataby and Capel. Existing ambient sound levels were initially measured during a two day survey period at an existing residence and other relevant locations at Beenup.

The actual mining operations, the transport of wet concentrate from the wet mill to dry mill and other environmental conditions could produce, at times, different sound levels at the residence to those predicted in the ERMP.

If the actual sound levels do exceed the acceptable outdoor assigned levels specified by the regulations, then appropriate steps will have to be taken to remedy the situation. Refer QH03 (d).

As mentioned in the ERMP, if necessary, it will construct sound buffers on Scott River Road at the junction with Brockman Highway to mitigate the effects of trucks at that intersection. Techniques to reduce noise, used by the proponent at its dredging operations and dry mill site in NSW, will also be applied at Beenup.

#### **QR22**

**SOCIAL IMPACT-NEAREST NEIGHBOUR EFFECTS: Q. Compensation should be paid to nearest neighbours for the affects of noise, increased traffic and dust.**

The Company does not consider that this is a requirement, if its operations are conducted within statutory limits established by regulating bodies, such as the EPA. However, should a nearby resident have a concern regarding an aspect of the operation, the Company is willing to discuss possible methods of mitigating the effect. The Company wishes to establish and maintain a responsible good neighbour attitude during the life of the operation.

#### **QR23**

**SOCIAL IMPACT-NEAREST NEIGHBOUR EFFECTS: Q. How will the mines nearest neighbours be effected by the realignment of Scott River Road.**

It is not anticipated that the realignment of Scott River Road will be necessary in the first 5-10 years of operation, however when this occurs the Company will undertake to consult with local residents to ensure that their concerns regarding access via Scott River Road are taken into account.

#### **QR24**

**SOCIAL IMPACT-NEAREST NEIGHBOUR EFFECTS: Q. What will be the effects on traffic safety for the nearest neighbours of the increased traffic.**

As Scott River Road, which is the main haul road, will be sealed and widened, it is anticipated that traffic safety will not be compromised, but improved. During the construction of Scott River Road adequate turn-offs and entrances from the road to neighbour's properties will be constructed so that adequate vision and pavement will be in place.

#### **QR25**

**SOCIAL IMPACT-NEAREST NEIGHBOUR EFFECTS: Q. What impacts are anticipated of the increased noise on farm animals i.e. stress for the animals.**

The answer to question QE04 is partially appropriate for this because conclusions reached about domestic animals will be similar to those of native fauna. It is therefore anticipated that increased noise will have no detrimental effects on domestic animals or farm animals. It should be remembered that highly productive farms are located on high density highways throughout the country.

#### **QR26**

**SOCIAL IMPACT-NEAREST NEIGHBOUR EFFECTS: Q. What will be the impact on the use of minor roads in the mining area for stock transfer.**

It is anticipated that there will be no significant impact on the use of minor roads for stock transfer, as the only major road affected will be Scott River Road.

If major stock transfer is necessary along Scott River Road, consultation with the mine manager will enable a suitable time to delay or cease trucking operations while stock transfer occurs.

#### **QR27**

**SOCIAL IMPACT-NEAREST NEIGHBOUR EFFECTS: Q. What will be the impacts on fence boundaries of increased activity in the area.**

The Company does not anticipate any major detrimental impact on fence boundaries in the local area. Where its own boundaries are involved, the Company will ensure that normal neighbour fencing arrangements are maintained.

#### **QR28**

**SOCIAL IMPACT-NEAREST NEIGHBOUR EFFECTS: Q. It is proposed that there will be a decrease in property value due to the mine.**

From previous experience in other mining operations, the Company does not anticipate a decrease in property value due to the mining activity, since most of the area is farmed by non-resident owners. The property value of the area being mined is likely to increase due to improved soil conditions and pasture following rehabilitation.

#### **QR29**

**SOCIAL IMPACT-HOUSING: Q. What arrangement will the proponent put in place to monitor and mitigate impacts of the incoming workforce on land, housing and rental supply and values in Augusta and Margaret River?**

The Company is proposing to employ as many people as possible from the local area. To date there have been 80 applications for employment and 75% of these have come from people already living in the Shire. Forty-two percent of the 80 applications indicate that the Company could expect no effect on housing or education as these people are either living in the Shire but working outside, students, farmers who are working their property and could handle working on the mine at the same time or are currently unemployed.

It appears that even by employing within the Shire, the Company will have some influence on the local workforce as some of the employees that it takes from the current workforce will need to be replaced by their current employers. However, the impact will be spread over an extended period of time, hence limiting the impact on housing and rental supply. The Company has also held discussions with a number of the developers who are keen to invest housing both from a rental and purchasing point of view in Augusta and Margaret River.

Through feedback from its employees, the Company will monitor housing and rental prices. It will be disadvantaged in attracting good employees to the area if housing prices rise to unacceptable levels.

#### **QR30**

**SOCIAL IMPACT-CONSTRUCTION PHASE: Q. What methods will the proponent employ to address community concerns about the impact of the construction camp workers on local bars and entertainment outlets?**

Contractors will be required to induct their workers on appropriate codes of conduct. Enquiries by the Beenup Consultative Group to the Shires of Dandaragan and Chittering (regarding construction workforce behaviour), showed minimal impact within these Shires during recent mineral sands construction work. These replies are attached to the end of this document.

The Company is proposing that its single persons quarters be located on-site and that a wet mess be located in this area. Following discussions with the Shire and local business groups, it is proposed that the married accommodation be supplied within Augusta in the Flinders Bay Caravan Park. This would enable families of the construction workforce to integrate with the local community and bring some benefits, from an economic point of view, back into the Augusta township.

**QR31**

**SOCIAL IMPACT-CONSTRUCTION PHASE: Q. How does the proponent intend to address concerns about property and safety of farmers living in the Scott River area?**

The proponent itself will be a major land holder within the area and will therefore be doing everything it can to ensure that property and personal safety of local residents is not compromised by this project. It will not have any permanent employees living on-site and it therefore anticipates that there will not be significant influences on property safety. It is anticipated that company personnel will quickly integrate into the local farming community and it becomes obvious very quickly when strangers are wandering around the area. It is believed that Company personnel will be alert to possible intruders and will assist local land owners in protecting their property.

**QR32**

**SOCIAL IMPACT-LOCAL EMPLOYMENT: Q. What measures will the proponent employ to monitor its local employment policy and what steps will the proponent take to mitigate the effects of its local employment policy on local businesses?**

The Company employment policy will be to employ as many locals as possible to lower the effect on housing and education facilities. However, it does recognize that it may have a negative effect upon the employment on local businesses. Informal discussions have taken place with a number of local business people on the current employment situation. Indications are that there is a high level of part-time and casual employment within local businesses. It is therefore believed that by giving reasonable notice in the employment of its people, the effect of employing locals from local businesses can be minimized. The Company does not intend to take its full 135 employees at one time. It will be done on a gradual basis, so that a large exodus of employees from the local workforce will not occur.

**QR33**

**SOCIAL IMPACT-WORKFORCE: A discrepancy in the figures provided for workforce numbers in the ERMP was identified by the Shire Council. The Shire also raised the concern that the extent and location of depot facilities for transport, vehicles, manpower, etc could affect the predicted population. Q. How will the proponent address these concerns about the operational workforce outlined by the Shire?**

The discrepancy referred to in the above comment is that the 45 people involved in the transport industry has not been included in the figures presented in the ERMP. This was excluded because at the time it had not been established whether the transport workforce would be located on-site, in Bunbury or Capel. It appears unlikely at this stage that the full 45 transport workers will be located at the Beenup site and it is more likely that any contractor would have half of their workforce located in Bunbury and half located in the south. This would enable efficient shift changes and keep trucks moving on a regular basis throughout the week. However, until the cartage contractor is appointed, the employee numbers to be located within the Shire are unknown. The Company is willing to address these concerns with the Shire if a significant impact is likely to occur.

**QR34**

**SOCIAL IMPACT-COMMUNITY CHARACTER: Q. What measures will the proponent employ to monitor and mitigate the effect of the project on the community character of the Shire of Augusta-Margaret River?**

The proponent believes that people who are seeking employment on this particular project will be keen to maintain the community character of the Shire of Augusta-Margaret River as many of them already own property in the area, and are looking for an opportunity to obtain full-time work in an area in which they want to live. The fact that they will be attracted to the area by the mine is enhanced by the lifestyle already there. It is anticipated that they will become part of the community and character of the Shire in a very rapid time, and therefore would not be detrimental to the community character.

**QR35**

**SOCIAL IMPACT-TOURISM: Q. What steps will the proponent take to monitor and mitigate effects the project may have on the tourism value of the area?**

The proponent believes that the project will have only positive effects on tourism value of the area as it will decrease the traffic on the Bussell Highway. It is believed that the project will have tourism benefits in its own right as many people find mining operations a tourist attraction in themselves.

**QR36**

**SOCIAL IMPACT-POLICING: Q. What steps has the proponent taken to ensure that the necessary policing arrangements are made to cater for both the construction and operation phases?**

The proponent has made the State Government and local police force aware of the project and it feels that it is the responsibility of the Commissioner of Police to provide policing arrangements in the area. During the construction phase, the mine site itself will be under security guard and during operational phases the site itself will have adequate security. As suggested in the answer to question QR31, the fact that there will be company employees on-site at all times during the operational phase will ensure that strangers will be identified and observed. Reports from the Shires of Dandaragan and Chittering, on the behaviour of contract employees, is included at the end of this document.

**QR37**

**SOCIAL IMPACT-FACILITIES: Q(a). What steps has the proponent taken to ensure that hospital, first aid and ambulance facilities are adequate to cater for the predicted increase in population? Q(b). How will this situation be monitored?**

Discussions have been held with the Busselton Hospital and the Health Department and the Company has been informed that there is adequate capacity within both the Augusta and Margaret River hospitals, however extra staff may be required at Augusta. First aid facilities will be provided on-site. Mineral Deposits Limited has achieved a 3 star safety record at its mining operations in New South Wales. This programme will be installed at the Beenup operation. The monitoring of hospital facilities is carried out by the Health Department and the proponent believes that this is their responsibility.

**QR38**

**SOCIAL IMPACT-WIND-DOWN PHASE: Q. What commitment will the proponent give to ensure that the social impacts of the eventual wind-down of the project are taken into account?**

The proponent believes that since the project mine life is in excess of 20 years, it is more appropriate that the social impacts of the eventual wind-down of the project are taken into account closer to that time, as any provision made at this stage would be inadequate. However the proponent does undertake that it will ensure that the social impacts are taken into account at this stage.

**QR39**

**SOCIAL IMPACT-GRAVEL SUPPLY: Q. What arrangements will the proponent put in place to monitor and mitigate the effects of potential conflict between the Shire Council and the proponent over limited local gravel supplies, before the commencement of the construction phase?**

The proponent has made arrangements with local commercially available gravel suppliers and has investigated its own gravel supplies located on its own land, to ensure that conflict will not exist between the Shire requirements and the proponent. The Company will maintain detailed discussions with the local Shire Engineer on matters of gravel supply.

**QR40**

**SOCIAL IMPACT-BUSH FIRES: Q. What arrangements will the proponent put in place to monitor and mitigate the effects of increased risk of bushfires, before the commencement of the construction phase?**

The proponent does not believe that its mining activities will increase the risk of bushfires, however, fire-fighting equipment will be available on-site for use both on the mine site, and in local properties if requested, and adequate fire protection will be part of the mining operation. Fire protection is further discussed in the answer to QH07. The proponent will meet its obligations under the Bush Fire Act as a responsible member of the local community.

**QR41**

**SOCIAL IMPACT-FLOODING: Q. What arrangements will the proponent put in place to monitor and mitigate the effect of flooding and extreme weather conditions on the proponent's plans for emergency situations, before the commencement of the construction phase?**

Please refer to the answers given to questions QI01, QI03 and QI04.

**QR42**

**SOCIAL IMPACT-SCOTT NATIONAL PARK: Q. What arrangements will the proponent put in place to monitor and mitigate the effect of the need for extra park rangers for the protection of the Scott River National Park, before the commencement of the constructions phase?**

The proponent has held discussions with CALM regarding the Park Ranger situation in the Scott River National Park, and it has indicated to CALM that a management plan for the Scott River National Park is needed. The proponent believes that this is a CALM matter. National parks are available to all members of the public. During normal induction to the workforce, Company employees will be made aware of the importance of the National Park and methods the Company will use for its protection.

**QR43**

**SOCIAL IMPACT-DOWNSTREAM PROCESSING: Q. What arrangements will the proponent put in place to monitor and mitigate the effect of the possibility of downstream processing at a later date, before the commencement of the constructions phase?**

The proponent believes there is no need to monitor or mitigate the effects of downstream processing because the proponent does not propose any such activity in the Shire. This is also covered in answers to questions QK01 and QK02. This ERMP is only seeking approval for mining, dry mill mineral separation and product transport. It does not seek approval for downstream processing.

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## SUPPLEMENTARY QUESTIONS

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### QS01

**GROUND AND SURFACE WATERS: Q. Water Authority licences will be required for production bores on-site and for the Caravan Park supply, prior to their installation.**

The proponent will obtain Water Authority licences for production bores on the dry mill site and the wet plant site. However, now that the proponent will not be constructing a new caravan park, this licence will not be required.

### QS02

**GROUND AND SURFACE WATERS: Q. Baseline studies prior to bore installation and on-going monitoring of:**

- . groundwater quality and in situ quantity
- . groundwater abstraction rates, and
- . surface water quality and discharge rates

are required to the satisfaction of the Water Authority.

The proponent is currently undertaking studies to obtain all of the relevant information needed for bore installation in these areas and will also have a monitoring programme in place.

### QS03

**GROUND AND SURFACE WATERS: Q. Provisions for waste water disposal from the Caravan Park should ensure water quality in the Blackwood River is protected to the satisfaction of the Water Authority.**

As the caravan park proposal is no longer required, this question does not apply.

### QS04

**GROUND AND SURFACE WATERS: Q. Approximately  $9 \times 10^6 \text{ m}^3$  of additional make-up water will be required to augment in situ groundwater on first filling of the dredge pond. About what proportions are expected to come from surface run-off and the Lesueur aquifer respectively?**

The actual size of the dredge pond will not be full size at the commencement of construction. A proposed size of pond to start construction will only be about  $0.45 \times 10^6 \text{ m}^3$  and as mining starts this will increase. Of the  $0.45 \times 10^6 \text{ m}^3$  excavated prior to start-up 44% by volume (20.7% by weight) of the excavated material will be groundwater that returns directly to the pond. As this pond will be constructed approximately 12 months prior to the commencement of operations adequate time will be available for the pond to re-establish the level of the water table by infiltration of groundwater and surface water.



At the commencement of operations the make-up water will come from three (3) sources: -

- a) Surface Water
- b) Infiltration of groundwater from the dredge pond walls
- c) Lesueur Aquifer water

Use of surface water will be maximized by the following planning methods: -

1. Commissioning is due to commence in 1992 during the wet season.
2. During the first six (6) months of operations the production rate will be below full production, as the mining equipment is commissioned and fine tuned.
3. The initial dredge pond width will be less than the 250 metres. The pond will initially be 70 to 100 metres wide, dependant on final dredge selection. Development of the pond to the full width of 250 metres takes 2 to 3 years, by which time, all tailings material will be returning to previously mined dredge ponds.

Based on initial dredge pond dimensions of 100 metres width at the base, 20 metres depth below the water table and 750 metres total length (including the  $0.45 \times 10^6 \text{ m}^3$  construction pond excavated the previous year), the volume of water required to return the pond to the initial level of the water table would be  $0.672 \times 10^6 \text{ m}^3$ .

During the commissioning/start-up stage it is estimated that it will take 3 months to excavate the initial pond. At this low rate of dredging only 0.307 Ml/hr make-up water will be required to maintain the water table level. Based on "mean regional rainfall" approximately 0.05 Ml/hr will be contributed via direct rainfall and a catchment area of approximately 100 Ha would provide adequate surface water to meet the remaining total make-up water requirements.

Given a "normal" wet season, all make-up water requirements will be met by returning surface water contained by adjacent drainage silt traps to the dredge pond.

In the event of unseasonally dry weather conditions, make-up water would be obtained via infiltration of groundwater from the pond walls and the use of bores within the Lesueur Aquifer.

#### **QS05**

**GROUND AND SURFACE WATERS: Q. What annual abstraction rate is likely to be required from the Lesueur aquifer?**

The annual rate of water required for the dry mill is  $0.48 \times 10^6 \text{ m}^3/\text{year}$ . At the dredge pond to keep the water table constant through the summer months in the neighbouring properties, the annual rate needed will be  $0.12 \times 10^6 \text{ m}^3/\text{year}$ .

**QS06**

**GROUND AND SURFACE WATERS: Q. What standard of turbidity does the proponent propose to meet for water discharged from the site?**

The proponent is designing to meet the values of turbidity set by WAWA using the results obtained from the water monitoring programme currently in place. (Refer QH03)

**QS07**

**GROUND AND SURFACE WATERS: Q. What method of turbidity control is proposed given that silt traps will only remove sand and silt but not suspended clay size particles?**

Silt traps have been specifically designed to incorporate provisions supporting effective removal of both sediment and suspended solids. In recognition of the uncertain nature of sediment/silt yield from the mining area the design includes both management, monitoring and structural consideration.

- . the traps have been sized to fully detain expected run-off from a design 20 year ARI storm;
- . outflow from the traps will be via a controlled slow release decanting system, thus releasing the clearest water possible;
- . it is envisaged that retention time will be 1 to 2 days, which should be sufficient time to settle suspended particles;
- . monitoring of the outflows will be undertaken and if an unacceptable solids concentration is identified the operation of the silt trap will be adjusted;
- . alternative means of adjusting silt trap operation include: varying the release time; varying the decant intake depth; and the addition of flocculating agents to the detained run-off water.

The total silt trap storage comprises two zones:

- . a detention storage for run-off; and
- . a retention storage for accumulating silt.

Retention (silt) storage cannot be released from the silt trap and will be emptied from time to time as necessary.

**QS08**

**GROUND AND SURFACE WATERS: Q. More detailed analyses of the likely effects of draw-down on water levels, and hence the biota, are required for situations when the dredge pond is adjacent to the National Park or Lot 5264.**

As explained on p57 of the ERMP, and in the answer to QD12, there will be little influence from a downstream water plume or an upstream draw-down from the dredge pond on adjacent National Park or neighbouring properties. However, since it is not planned to commence mining adjacent to the National Park until at least 5-10 years time, the Company will have time to establish the actual effects of downstream plume effects and to modify its mode of operation if such effects occur.

**QS09**

**GROUND AND SURFACE WATERS: Q. A drainage diversion plan should provide for effective stabilization of all structures, evaluate the consequences of a system failure on the National Park or adjacent rivers and provide contingency plans to the satisfaction of the Environmental Protection Authority prior to mine site construction.**

This question is answered in the surface water questions (QI), however, a surface water management plan is in preparation which will address these questions.

**QS10**

**POLLUTION CONTROL: Q. What quantities of fuel will be used and CO<sub>2</sub> released as a consequence of trucking the product to Bunbury and how does this compare with the quantities likely for a realistic rail option?**

CO<sub>2</sub> emissions are detailed in QJ02. However, with the usage of trucks, a figure of 3,525 tonnes of CO<sub>2</sub> will be produced annually. If the road/rail option was viable via Nannup, 2,290 tonnes of CO<sub>2</sub> would be produced per annum.

**QS11**

**POLLUTION CONTROL: Q. Provision should be made for suitable product stockpile management by containment and/or dust suppression to the satisfaction of the Environmental Protection Authority prior to plant commissioning.**

The proponent has made provision in design and operations for containment and dust suppression. Questions QG14, QG16, QG17 and QG19 give the outlines to these procedures.

**QS12**

**POLLUTION CONTROL: Q. Provision should be made for dust suppression and monitoring in the dry plant to conform with the requirements of the Mines Regulation Act.**

Again, this is covered in QG14, QG16, QG17 and QG19. The proponent will conform to requirements of the Mines Regulation Act.

**QS13**

**POLLUTION CONTROL: Q. Provision should be made for radionuclide monitoring to confirm the predictions on radiation levels in the ERMP, consistent with the requirements of the Mines Department.**

This question is answered comprehensively in QG05.

**QS14**

**POLLUTION CONTROL: Q. Provision should be made for the prevention and clean-up of any hydrocarbon spills from fixed or mobile equipment to the satisfaction of the Environmental Protection Authority.**

In accordance with legislative requirements both liquid and solid hydrocarbons storage will be contained within bunded areas, with provision to collect and contain any spills.

To minimize the potential of spills from mobile equipment, the mobile equipment will be refueled adjacent to the fixed storage areas with drainage designed to collect any spills. Provision has been made for the collection of fuels, oil and grease at the workshop facility.

In the event of a significant spill of liquid hydrocarbons, earth-moving equipment will be used to clean-up the spill and dispose of in a method considered appropriate by the Pollution Control Branch of the Environmental Protection Authority.

**QS15**

**DIEBACK CONTROL: Q. Provision should be made for comprehensive dieback surveys and management plan preparation prior to construction work, on-site, along haul routes or at the sources of construction materials for earthworks, to the satisfaction of the Environmental Protection Authority with advice from Department of Conservation and Land Management.**

Dieback management plans and surveys of areas mentioned in the question are well underway and will meet the requirements of CALM and EPA.

**QS16**

**CONSERVATION: Q. Provision should be made to undertake regional surveys for rare/restricted/special interest species which occur on the area to be mined, to establish if other populations occur in secure conservation reserves or areas which may be able to be reserved or otherwise protected. This work should occur prior to disturbance of populations on the mine site to the satisfaction of the Environmental Protection Authority with advice from Department of Conservation and Land Management. (Note that approval from the Minister for Conservation and Land Management is required before gazetted rare flora may be disturbed).**

Mineral Deposits Limited has already undertaken studies within the mine site area and adjoining properties. The Company is also currently conducting studies within the Scott National Park and along the proposed transportation route.

The Company has taken the necessary steps to protect the rare and restricted species located on the eastern portion of Location 4264.

The Company does not plan to undertake any further regional studies other than those mentioned above, but will continue to consult with the relevant Government departments regarding preservation of rare/restricted/special interest species.

**QS17**

**CONSERVATION: Q. Distribution maps of all rare/restricted species on the area to be mined should be prepared prior to the commencement of mining and submitted to the Department of Conservation and Land Management.**

This question is answered in QE17.

**QS18**

**CONSERVATION: Q. Provision of an on-site officer, prior to construction, responsible for environmental performance during construction and mine development, would assist in attaining the required standard of environmental control.**

A civil engineer has been employed by the proponent to work in these areas and co-ordinate studies, monitoring and reports to achieve the environmental standard and control required.

**QS19**

**REHABILITATION: Q. Provision should be made to progressively fence areas rehabilitated with native vegetation.**

As the total mining area is already fenced, the proponent feels this is unnecessary. Restricted access will be given to certain personnel in these areas. The use of fences and barriers could be used in these areas to aid rehabilitation due to the wind velocities in the area. If it appears that rabbits will do unacceptable damage to areas of native rehabilitation, methods to control their access to these areas will be investigated.

**QS20**

**REHABILITATION: Q. Provision should be made for the progressive development throughout the project life, and periodic updating of measurable completion criteria for rehabilitation to the satisfaction of the Environmental Protection Authority with advice from the Department of Conservation and Land Management, the Department of Agriculture and the Mines Department as appropriate.**

Question QF02 already gives information on this question, however, the proponent will consult the relevant Government departments in these areas.

**QS21**

**SAFETY: Q. Provision should be made to ensure that pedestrian and traffic safety aspects are taken into account where the haul road intersects with other public routes, especially the entrance to Sues Bridge camp site, prior to construction.**

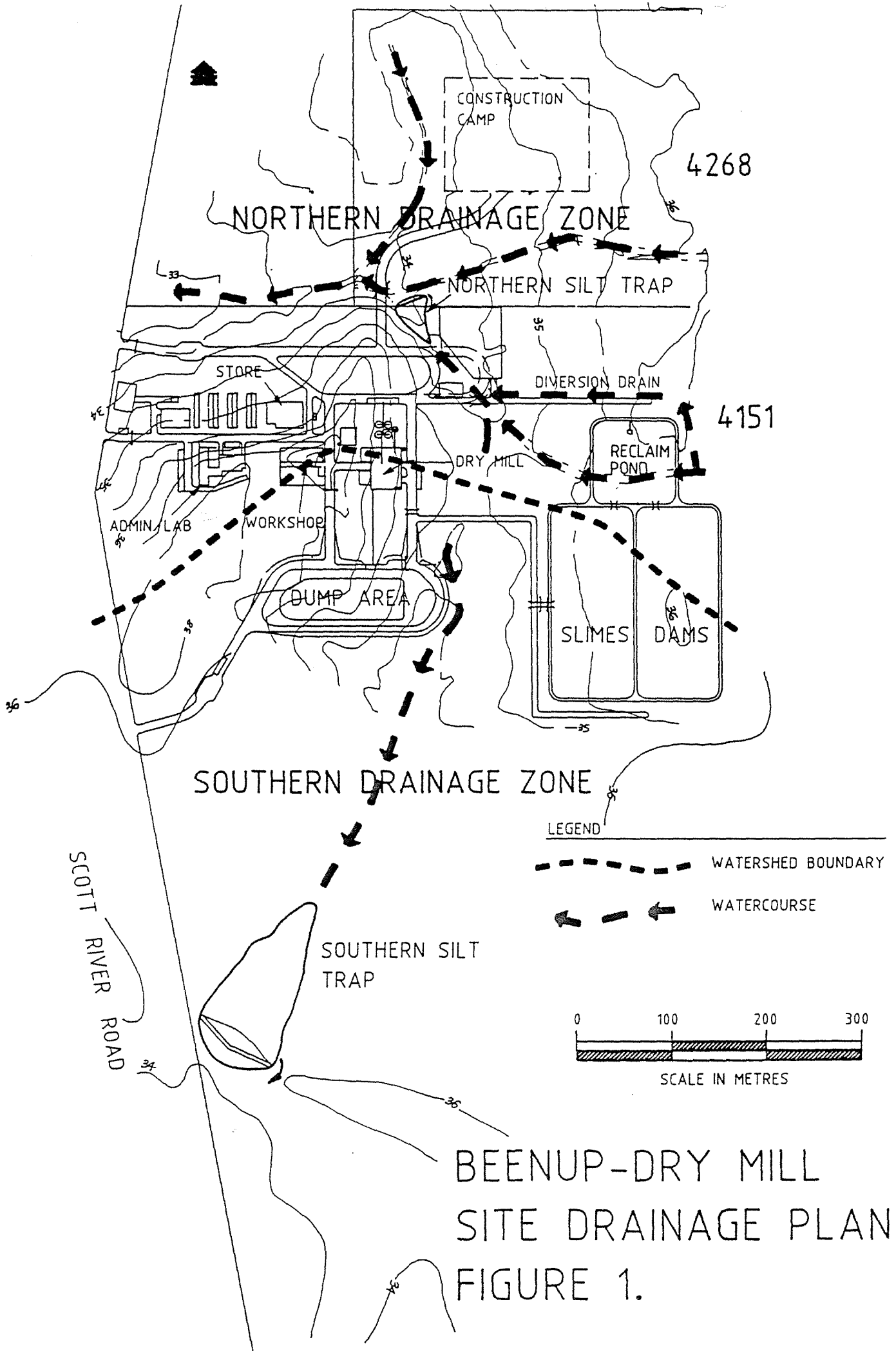
Safety is a very important issue with the proponent. The Company will incorporate into its design the Austroad standards for safety, relating to both pedestrian and traffic users of the road systems in the area.

**QS22**

**SAFETY: Q. Provision should be made to develop a bushfire protection plan satisfactory to the Department of Conservation and Land Management and the Bushfires Board prior to mine site construction commencing.**

Please refer to QH07, as this gives an outline of the management plan in this area.

## FIGURES



BEENU P-DRY MILL  
 SITE DRAINAGE PLAN  
 FIGURE 1.

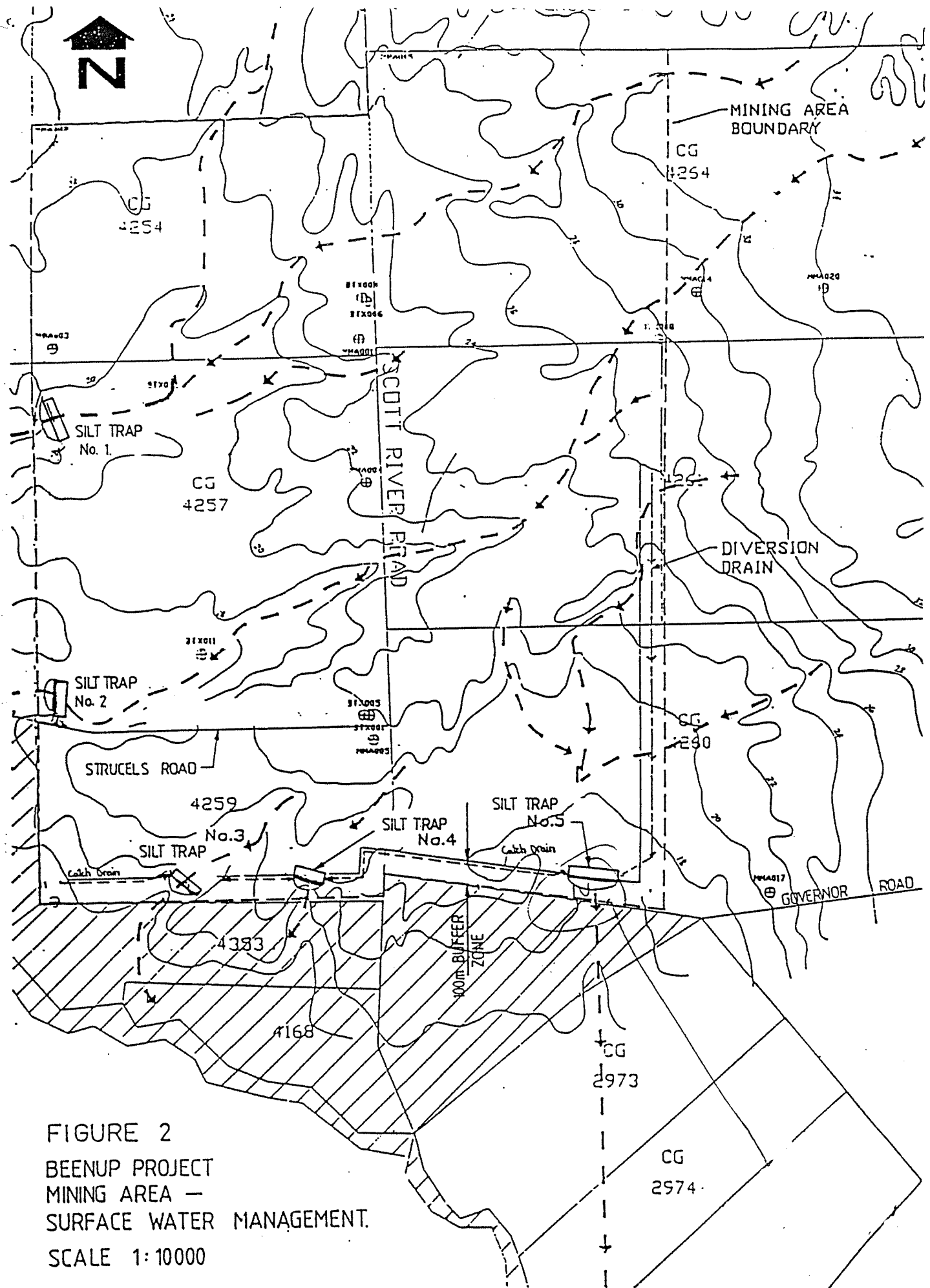
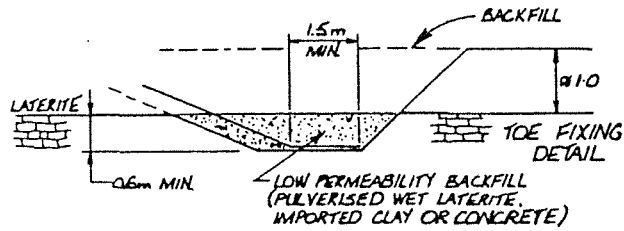
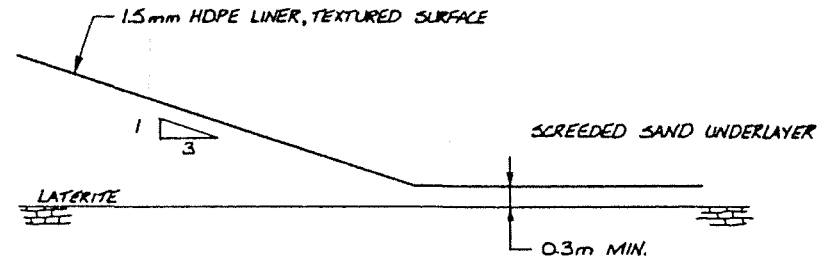


FIGURE 2  
 BEENUP PROJECT  
 MINING AREA —  
 SURFACE WATER MANAGEMENT.  
 SCALE 1:10000

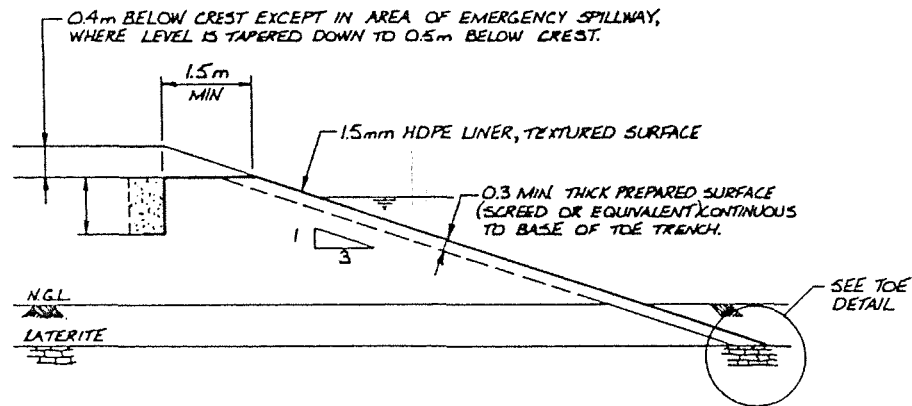




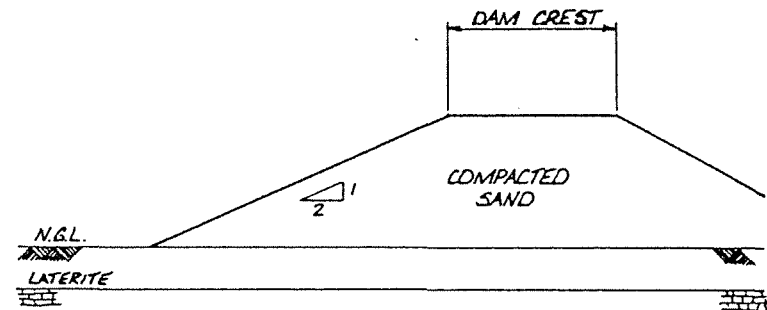
TOE DETAIL - SLIMES DAM



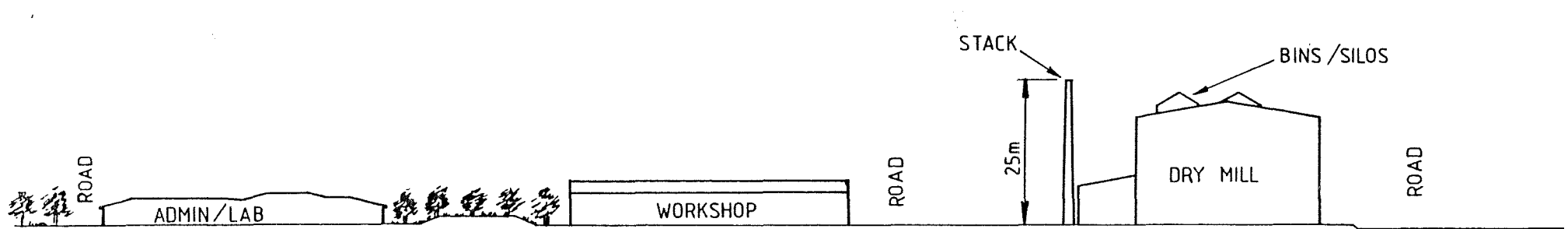
RECLAIM POND & BASE LINER  
UPSTREAM FACE



RECLAIM POND & SLIMES DAMS LINER  
UPSTREAM FACE



RECLAIM POND & SLIMES DAMS  
DOWNSTREAM FACE



SCALE 1:1000

EAST-WEST SECTION ADMIN/LAB TO DRY MILL

FIGURE 4

## **Appendix C**

**Letter from the  
Water Authority of Western Australia - 18 June 1990**

32



WATER  
AUTHORITY  
of Western Australia

Your Ref  
Our Ref  
Enquiries  
Tele Direct

6-00-310.054  
P BUCKLEY  
(097) 910453

61 VICTORIA STREET  
BUNBURY W.A.  
Postal Address: P.O. Box 305 Bunbury  
Western Australia 6230  
Telephone: (097) 91 0400 Fax: (097) 91 0432

The Chairman  
Environmental Protection Authority  
1 Mount Street  
Perth 6000.  
Attn: Warren Tacey

38/80/ WT

**ENVIRONMENTAL REVIEW AND MANAGEMENT PROGRAMME  
PROPOSED HEAVY MINERALS MINE BEENUP (BHP - UTAH)**

The above ERMP has been examined by the Water Authority of Western Australia with respect to water supply development and water resource management issues.

The project as described is unlikely to have any significant long term impacts on the local groundwater or surface water systems however a number of issues need to be addressed prior to the project proceeding.

**1. TOWN WATER SUPPLIES AUGUSTA / MARGARET RIVER**

Section 3.4.3 of the report states that the anticipated growth rate in Augusta and Margaret River could result in water supply problems.

As stated planning is already underway to increase supplies to these towns but the timing may now need to be brought forward.

Expansion of the Margaret River water supply is based on a proposal to dam 10 Mile Brook which is currently before the Environmental Protection Authority.

Should this not gain environmental clearance then expansion of the water supply will be delayed.

All proposals to expand town water supplies are subject to securing the required funding. As this expansion is far above the projected growth rate for the area the proponent will be required to negotiate a timetable and funding arrangements with the Water Authority of Western Australia.

**2. SEWERAGE AUGUSTA / MARGARET RIVER**

Comments in section 3.4.3 relating to sewerage are largely correct however there is no provision for backlog sewerage works to be done in Margaret River.

Again due to the increased rate of expansion due to the project the proponent will be required to discuss the expansion of services with the Authority.

37291 INFO

### 3. GROUNDWATER

No mention is made of the fact that the project area lies within the Blackwood Groundwater Area and all groundwater extraction needs to be licensed by the Water Authority prior to the construction of any bores.

The proponent makes no estimate of the total water requirement to be drawn from the Lesueur Formation for the project and it is difficult to comment precisely on the effects of the abstraction without this detail.

There is however a large volume of artesian groundwater available in the area and the requirements are not expected to cause any adverse affects to the aquifers.

The initial excavation of the dredge pit to it's final size of 390m by 1000m (surface area) by 50m deep will require the removal of approximately 15 million cubic metres of material.

To fill the excavation approximately 9 million cubic metres of additional water will be required. Some of this water will be shallow groundwater, some surface runoff directed into the pit and some groundwater from the deep bores.

The likely proportions from each source have not been adequately addressed making it impossible to determine the likely impact on the superficial groundwater levels.

It is vital that the proponent develop and impliment a groundwater monitoring programme to the satisfaction of the Water Authority and submit annual reports to the Authority on the performance of the aquifers.

The monitoring should commence immediately the project gets environmental approval, should this occur, and be most detailed during the first year's operation.

### 4. SURFACE WATER

Mining as described is unlikely to significantly affect surface water quality providing the release of turbid waters are controlled.

Streams should be monitored where they leave the proponent's property to ensure acceptable levels are maintained.

Monitoring of the Blackwood River is pointless as it would be impossible to obtain representative samples due to the tidal influence and incomplete mixing within the river.

Storage dams would need to be carefully designed and constructed to guarantee their integrity. They will probably need to be lined to prevent excessive water loss through the typically sandy material.

5. CARAVAN PARK - ALEXANDRA BRIDGE

The proposed caravan park will require a separate groundwater licence from the Water Authority prior to the construction of any bores.

The Water Authority is concerned about nutrient enrichment of the Hardy Inlet and wish to be consulted as to the proposed waste disposal methods planned for the carravan park once design details are known.

6. CONCLUSION

Based on the understanding that the water level in the dredge pond will be maintained at a relatively constant level corresponding to the level of the surrounding groundwater there should be minimul impact on the environment.

It is vital to closely monitor groundwater levels in both aquifers particularly during the first year of operation to ensure that no substantial drop in levels occur.

Arrangements will have to be made with the Water Authority to ensure that water and sewerage schemes for Augusta and Margaret River are able to cope with the increased demand.

The EPA may quote from this submission in its assessment report should it wish to do so.



C ELLIOTT  
REGIONAL MANAGER  
SOUTH WEST REGION  
JUNE 18, 1990.

## **Appendix D**

**Letter from the Water Authority of Western Australia  
and the Geological Survey - 25 September 1990**

Your Ref 38/89  
Our Ref A22953  
Enquiries R Hammond  
Tele Direct 420 2922

629 NEWCASTLE STREET  
LEEDERVILLE W.A.  
Postal Address: P.O. Box 100 Leederville  
Western Australia 6007  
Telephone: (09) 420 2420 Telex: AA 95140  
Facsimile: (09) 328 2619

The Chairman  
Environmental Protection Authority  
1 Mount Street  
PERTH WA 6000

ENVIRONMENTAL PROTECTION AUTHORITY

Att: Warren Tacey

27 000 0000

BEENUP HEAVY MINERALS PROPOSAL

File No.

38/89

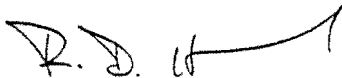
WT ✓

As requested I have asked the various experts within the Water Authority and the Geological Survey to comment on the points you raised.

I have enclosed the comments of Mr Commander of the Geological Survey. The Water Authority supports these and believes there is unlikely to be any significant groundwater changes caused by the development.

We believe that turbid water may find its way from the site during construction. Control structures would need to be implemented to prevent this. Soil conservation specialists, like the Department of Agriculture, may need to be consulted to advise on appropriate structures.

The delay in responding to your request is regretted.



K J TAYLOR  
A/MANAGER, GROUNDWATER

25 September 1990 KB

Encl

RH392

40581 INFO



## BEENYUP MINERAL SANDS PROPOSAL

### COMMENTS ON SUBMISSIONS TO THE EPA REGARDING THE ERMP

There are not likely to be any significant impacts on the quantity and quality of groundwater in the Lesueur Sandstone. The proposal is to pump a quantity of water from the formation which appears to be relatively small in relation to the size of the aquifer. The mining operation will not affect the aquifer.

The overlying Cretaceous sediments are not an important aquifer in this area. The few bores drawing water from these sediments are not likely to be affected. Some change in groundwater quality in these sediments is likely to occur downstream from the dredge pond.

Specific comments are made below:

#### SUBMISSION ON ERMP BY SCOTT RIVER REGION STUDY GROUP

##### 1.d Water supply:

There are ample groundwater resources in the Perth Basin that could be utilized for Margaret River and Augusta.

##### 2.a Bore Licensing:

All bores other than those used for domestic and stock supply do require a licence. As part of the licensing provisions, monitoring of abstraction and water levels is usually necessary. At present no groundwater users in WA pay for water they pump themselves.

##### 2.b Groundwater Resources:

The groundwater resources of the area are currently being assessed by the Geological Survey. The quantity of groundwater likely to be used is small in relation to the size of the aquifer, and no quality change will result from this pumping. There are no other users of the Lesueur Sandstone. Vegetation is unlikely to be affected by abstraction from the Lesueur Formation as the aquifer is separated from the water table by relatively impermeable Cretaceous sediments.

2.d The main aquifer in the area is believed to be the Lesueur Sandstone: the Yarragadee Formation occurs in the subsurface to the east of Beenyup.

#### KH MORGAN REPORT (FOR SRSG)

The shortcomings in the geological description of the ERMP were previously commented on and the criticism by KHM is supported.

The effect of the backfilling of the dredge pond on the hydrogeology of the Cretaceous sediments is not covered in the ERMP.

There is a possibility of encountering highly permeable layers in the dredge pond, and these will alter the water balance calculations. It is unlikely that water inflows could be accurately predicted until excavation commences.

Groundwater quality changes are likely to take place downstream from the dredge pond. A monitoring strategy is necessary to determine the extent of these changes

D P Commander  
Senior Geologist

18 July 1990

## **Appendix E**

### **Example noise pollution control conditions**

## NOISE POLLUTION CONTROL CONDITIONS

### N1 NOISE LIMIT

- (a) The premises shall be managed and operated such that the noise emissions from the premises does not cause or contribute to noise levels in excess of:
- (i) 50 dB(A) Slow between 0700 hours and 1900 hours Monday to Saturday;
  - (ii) 45 dB(A) Slow between 1900 hours and 2200 hours Monday to Saturday;
  - (iii) 45 dB(A) Slow between 0700 hours and 2200 hours Sundays and Public Holidays; and
  - (iv) 40 dB(A) Slow between 2200 hours and 0700 hours always;
- when measured:
- (i) at any point on or adjacent to other premises not occupied by the licensee and used for residential or other noise sensitive purposes; and
  - (ii) at a height between 1.2 metres and 1.5 metres above ground level and greater than 3.5 metres from any reflecting surface other than the ground.
- (b) Where the combined level of the noise emissions from the premises and the normal ambient noise exceeds the levels specified in part (a) of this condition, this condition shall be considered to be contravened only when the following criteria are also met at the measurement point:
- (i) the noise emissions from the premises are audible to an Inspector; and
  - (ii) the noise emissions from the premises are identifiable by an Inspector as emanating from the premises.
- (c) Noise emissions shall not cause unacceptable annoyance due to tonal or impulsive components. Those characteristics shall be assessed by an Inspector.
- (d) Exemption may be granted from parts (a) and (c) of this condition in respect of any premises used for residential purposes by the negotiation of a written agreement with the occupier(s) of that premises. Such agreement to be acceptable to the Director, Pollution Control Division.
- (e) For the purposes of this condition an Inspector means a person appointed as an Inspector under Section 88 of the Environmental Protection Act.

### N2 NOISE - MAINTENANCE OF PLANT

Plant components likely to influence noise emissions, including mufflers on mobile plant, audible warning devices and public address facilities shall be maintained in a manner so as to minimise the generation of noise to the reasonable requirements of the Director, Pollution Control Division.

## **Appendix F**

**List of people and organisations making written submissions**

No	TITLE	INITIAL	OFFICER NAME	POSITION	NAME OR ORGANISATION	TOWN
1	Mr/Ms	P H			Sherrif	MARGARET RIVER
2	Mr	J			Harrison	MARGARET RIVER
3	Mr	T	Dennis	President	Karridale P & C Association	KARRIDALE
4	Mr	B K	Masters	Principal Consultant	Masters and Associates	CAPEL
5	Mr	F A			Mouritz	BUSSELTON
6	Mr & Mrs	B & G			Wright	MARGARET RIVER
7	Masters	B D & J			Wright	MARGARET RIVER
8	Mr	J	Hill	President	Augusta/Margaret River Districts Football Cl	MARGARET RIVER
9	Mr	N E			Rodgers	MARGARET RIVER
10	Mr & Mrs	E G & M K			Stephenson	AUGUSTA
11	Mr/Ms	J			Garett	MARGARET RIVER
12	Mrs	E B			Watterson	AUGUSTA
13	Ms	D			Banyard	MARGARET RIVER
14				The Secretary	Karridale Pre-School P & C Assoc.	KARRIDALE
15	Mr	J			Sharp	PEMBERTON
16	Mrs	J			Meagher	AUGUSTA
17	Ms	J			Meikle	MARGARET RIVER
18	Mr & Mrs	R D			Clark	MARGARET RIVER
19	Mr	P	Jones	Principal	Augusta Primary School	AUGUSTA
20	Mr/Ms	J			Brown	KARRIDALE
21	Dr	P	Veth	Centre for Prehistory	Department of Archaeology	NEDLANDS
22	Mr/Ms	P L D			Wood	WANNEROO
23	Mr	J A			Whitesmith	BASSENDEN
24	Ms	K M			Newman	MARGARET RIVER
25	Mrs	K M			Warren	AUGUSTA
26	Mrs	J F			Russell	CITY BEACH
27	Ms	S			Akerman	AUGUSTA
28	Mr	M			West	COWARAMUP
29	Mr/Ms	D			White	BUSSELTON
30	Ms	R			Hart	FREMANTLE
31	Mrs	M P			Edmonds	EAST AUGUSTA

No	TITLE	INITIAL	OFFICER NAME	POSITION	NAME OR ORGANISATION	TOWN
32	Ms	S			Cullen	COWARAMUP
33	Mr	L			Bligh	SOUTH PERTH
34	Ms	S			Smith	AUGUSTA
35	Mr	P R			Akerman	AUGUSTA
36	Mr	C N			Warren	AUGUSTA
37	Mr	P			Betzold	AUGUSTA
38	Mr/Ms	M J	Lintern		Perth Bushwalkers	MT HAWTHORN
39	Mrs	D F			Robinson	AUGUSTA
40	Ms	D			Barber	FOREST GROVE
41	Mr	J			Hindle	MARGARET RIVER
42	Mr	D			Taylor	MARGARET RIVER
43	Mr	P H			Davies	GLEN IRIS
44	Mr	R G			McKay	YALLINGUP
45	Ms	B			Dunnet	NANNUP
46	Mrs	J A D			Keall	AUGUSTA
47	Mrs	I	Devoy		Busselton Environmental Coalition	BUSSELTON
48	Mr	W F	Watterson	Hon. Secretary	St John Ambulance Augusta	AUGUSTA
49	Ms	J H			Reitze	AUGUSTA
50	Ms	G			Wright	MARGARET RIVER
51	Mr/Ms	S			Dierks	BICTON
52	Dr	P	Jennings	President	Conservation Council of W A Inc.	PERTH
53	Mr	S S			Haines	BUNBURY
54	Mr	L	Ranford	A/Assistant Director	Department of Mines	
55	Mr	K H	Morgan		K H Morgan and Associates	VICTORIA PARK
56	Mr	B A			Roberts	AUGUSTA
57	Mr & Ms	D	Gulland		David Gulland Pty Ltd	WEST PERTH
58	Ms	S			Wise	COTTESLOE
59	Mr/Ms	G D & H J			Nind	KARRIDALE
60	Mr	L	Storer		Herring Storer Acoustics	
61	Mr/Ms	G B			Whitfield	MT PLEASANT
62	Mr	G			Mawson	FLOREAT

No	TITLE	INITIAL	OFFICER NAME	POSITION	NAME OR ORGANISATION	TOWN
63	Ms	J			Boniface	NANNUP
64	Mr/Ms	J & G			Broadhurst	MARGARET RIVER
65	Mr	B			Meikljohn	MARGARET RIVER
66	Mr	C	Garnett-Botfield		Garnett-Botfield	ROSA BROOK
67	Mr	M			Border	VIA AUGUSTA
68	Mr/Ms	L F			Toussaint	SHELLY
69	Mr	K R			Layfield	NANNUP
70	Ms	K	Griffiths	Hon. Secretary	Augusta P & C Association (Inc)	AUGUSTA
71	Mr	D J			Allen	AUGUSTA
72	Ms	J	Cary	Environment Policy	The Greens (WA)	PERTH
73	Mr	P			Warrilow	KARRIDALE
74	Mr	J T			Monaghan	MARGARET RIVER
75	Ms	A			Klupal	FOREST GROVE
76	Professor	S D			Bradshaw	CRAWLEY
77	Ms	V			Hart	AUGUSTA
78	Mr & Mrs	J & M			Williams	NANNUP
79	Ms	A			Lebel	MAHOGANY CREEK
80	Ms	A			Pemberton	MARGARET RIVER
81	Mr	R	Fimister	Hon. Secretary	Augusta Business Association	AUGUSTA
82	Mr	G			West	MARGARET RIVER
83				Conservation Commit	Western Australian Wildflower Society (Inc)	NEDLANDS
84	Mr	J	Turton		Mining Action Group	COWARAMUP
85	Mr	K			Hutchings	DENMARK
86	Ms	C			Sherriff	MARGARET RIVER
87	Mr	J			McBain	WITCHCLIFFE
88	Senator	J	Vallentine		Parliament of Australia - The Senate	WEST PERTH
89	Hon	P		Member for Warren	Omodei MLA	MANJIMUP
90	Mr	P J	Coulson	Shire Engineer	Shire of Busselton	BUSSELTON
91	Mr	A R	Tebbit	Administrator	Busselton District Hospital	BUSSELTON
92	Mr	A A			Standing	COWARAMUP
93	Mr	P	Buckley	Regional Manager, So	Water Authority of Western Australia	BUNBURY



No	TITLE	INITIAL	OFFICER NAME	POSITION	NAME OR ORGANISATION	TOWN
94	Mr	M	Ellis	Hon Secretary	Scott River Region Study Group	KARRIDALE
95	Mr	J	Morhall	Co-ordinator	Department of Resources Development	PERTH
96	Ms	H	Allen	President	Blackwood Protection Group	AUGUSTA
97	Ms	S			Hohnen	MARGARET RIVER
98	Dr	B M	Hartley	Physicist in Charge	Health Department of Western Australia	PERTH
99	Mr/Ms	B	Gale		White Australia	MARGARET RIVER
100	Mr	J	Morhall	Co-ordinator	Department of Resources Development	
101	Mr	P	Warrilow	Hon Secretary	Leeuwin Conservation Group (Inc)	MARGARET RIVER
102	Mr	R			Maley	NANNUP
103	Mr	K			Childs	AUGUSTA
104	Mr	P	Hutton		Residents and Ratepayers Assoc.	AUGUSTA
105	Ms	B A			Thompson	KARRIDALE
106	Mr	R			Stewart	WITCHCLIFFE
107	Ms	L			Fenty	MARGARET RIVER
108	Mr	W L			Reynolds	MARGARET RIVER
109	Mr	J	Dell	President	Western Australian Naturalists' Club (Inc)	NEDLANDS
110	Mr	N	Halse	Chairman	National Parks and Nature Conservation Auth	COMO
111	Messrs	P F & M B			Hartridge	KARRIDALE
112	Messrs	B J & R L			O'Dea	KARRIDALE
113	Mr	D R			Gascoine	PERTH
114	Ms	J E			Gascoine	PEPPERMINT GROVE
115				Shire Clerk	Shire of Augusta - Margaret River	MARGARET RIVER
116	Ms	C	Johnson		Busselton Peace and Environment Group (Inc)	BUSSELTON
117	Mr	I P			Wilkinson	FERNDALE
118	Mr	P	Robinson	WA Campaign Officer	The Wilderness Society WA Inc	STIRLING STREET
119	Mrs	B			Anderson	MARGARET RIVER
120	Mrs	WJ			McDermott	WEST SWAN
121	Mr	C J			Robinson	KARRIDALE
122	Mr	P	White	Principal	Margaret River Primary School	MARGARET RIVER
123	Mr	V C			Roberts	AUGUSTA
124	Mr	K H			Titelius	HOVEA