Mining of gypsum from Chinocup A Class Nature Reserve, Pingrup

Mr P G Patterson

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 737
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THE PURPOSE OF THIS REPORT

This report contains the Environmental Protection Authority's environmental assessment and recommendations to the Minister for the Environment on the environmental acceptability of the proposal.

Immediately following the release of the report there is a 14-day period when anyone may appeal to the Minister against the Environmental Protection Authority's report.

After the appeal period, and determination of any appeals, the Minister consults with the other relevant ministers and agencies and then issues his decision about whether the proposal may or may not proceed. The Minister also announces the legally binding environmental conditions which might apply to any approval.

APPEALS

If you disagree with any of the contents of the assessment report or recommendations you may appeal in writing to the Minister for the Environment outlining the environmental reasons for your concern and enclosing the appeal fee of $10.

It is important that you clearly indicate the part of the report you disagree with and the reasons for your concern so that the grounds of your appeal can be properly considered by the Minister for the Environment.

ADDRESS

Hon Minister for the Environment
12th Floor, Dumas House
2 Havelock Street
WEST PERTH WA 6005

CLOSING DATE

Your appeal (with the $10 fee) must reach the Minister's office no later than 5.00 pm on 28 April 1994.

Environmental Impact Assessment (EIA)

Process Timelines in weeks

Date	EIA commences from receipt of full details of proposal by proponent	Time (weeks)
2 December 1993	Proponent Document Released for Public Comment	8
25 January 1994	Public Comment Period Closed	
28 January 1994	Issues Summarised by EPA and Forwarded to the Proponent	2
15 February 1994	Proponent's response to issues raised in submissions received	2
14 April 1994	EPA reported to the Minister for the Environment	8

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Summary and recommendations

Mr P G Patterson proposes to mine gypsum sand from the dunes along the southern edge of Lake Chinocup, within the Chinocup A Class Nature Reserve. Lake Chinocup is 25km east of Nyabing, the local government centre for the Shire of Kent, and 10km west of Pingrup, the nearest town.

Gypsum is used for improving the productivity of certain types of agricultural land; it is a low value commodity and the transport costs are the major factor in its potential use when comparing different sources. The nearest existing supply for the farmers of the Nyabing-Pingrup area is about 100km to the east at Lake Cobham. The gypsum deposit at Lake Chinocup is a large, good quality deposit but it is in a very important nature reserve in the Wheatbelt region. Two previous applications to mine the deposit have been unsuccessful because of the high conservation values of the plant and animal species and the wetlands protected within the reserve.

The approvals process for mining within A Class nature reserves involves, amongst other things, environmental assessment by the Environmental Protection Authority, approval by the Minister for the Environment for mining within the conservation estate and approval by both houses of State Parliament. In recognition of this process and the acknowledged high conservation values, the proponent carried out biological and other studies and prepared a comprehensive report describing the mining and rehabilitation plan for the proposal. The proponent concluded that the proposal could be carried out with a low and temporary impact on the conservation values of the reserve and that compensation for the impacts of mining could be arranged by the addition of land from the adjoining Chinocup Townsite Reserve into the conservation estate.

The Environmental Protection Authority (EPA) evaluated the environmental issues and the evidence for the proponent's conclusions and considered that the key environmental issues were:

- the principle of mining in A Class nature reserves;
- the protection of rare and priority flora;
- the conservation of the vegetation association of the dunes; and
- the likely success of rehabilitation.

Principle of mining in A Class nature reserves

Chinocup Nature Reserve is vested with the National Parks and Nature Conservation Authority (NPNCA) as an A Class nature reserve for the conservation of flora and fauna. A Class nature reserves are the highest category of reserves for nature conservation values in the state. The NPNCA has a policy about mining in national parks and nature reserves which states that it is likely to recommend against a proposal to mine unless:

- there is a strategic need for the mineral; or
- the mineral resource is rare, is of high value, and its exploitation would be of significant material benefit to the state; or
- the mineral resource is not available on other tenures of land.

The present proposal does not meet any of these criteria and the NPNCA has recommended against the government approving it.

The NPNCA's policy position is supported by the policies, principles and recommendations of various government agencies, government advisory bodies and parliamentary committees as detailed in the main body of this report. In particular, the Soil and Land Conservation Council of W. A. has a stated policy that reserves of high conservation value should not be considered for mining. **The Environmental Protection Authority concludes that the proposal is clearly inconsistent with the current principles, policies and recommendations of government and associated agencies concerning mining in A Class nature reserves and, in principle, is not environmentally acceptable.**

The proponent believes that the impacts would be low and temporary and that the proposed addition of land to the conservation estate should be considered as adequate compensation. This position is considered in the following discussion of the other key environmental issues.

Protection of rare and priority flora

Eleven species of rare and priority flora, plus a geographically restricted plant, were identified during the CER studies in the area of the proposal and would potentially be impacted to some extent by mining. One additional rare species has previously been recorded from the area. The main impact would be on a declared rare plant, *Adenanthos pungens* ssp. *pungens*, of which the last known population of about 1500 plants occurs on the gypsum dunes and surroundings. The proponent designed a mining plan which would avoid as many plants as possible and has predicted that about 100 plants would be destroyed in the initial mining phase. The proponent would abandon further mining if it was found that the plant could not be successfully propagated as part of the rehabilitation plan.

The EPA received advice that the rare plant is currently known to be very difficult to propagate and that a research programme extending over at least three years would be required to investigate methods of propagation; the likely success of developing a method of propagation is unknown.

The EPA concludes that the loss of 100 plants of the last known population of 1500 plants is a significant impact upon the plant and, in the absence of proven propagation methods, would pose a significant impact on the population. The mining proposal has potential impacts upon other rare and priority flora which, in conjunction with the potential impact on *Adenanthos pungens* ssp. *pungens*, are regarded as significant by the EPA with regard to the protection of the nature conservation values of the Chinocup Nature Reserve.

The Environmental Protection Authority concludes that the potential impact of the mining proposal on the nature conservation values of the nature reserve, particularly the rare plant, *Adenanthos pungens* ssp. *pungens*, would be significant.

Conservation of the vegetation association of the dunes

The proponent's vegetation mapping recorded that the high gypsum dunes in the proposed mining area support a Mallee over Scrub vegetation association. This vegetation association was only mapped on the gypsum dunes along the southern edge of Lake Chinocup; similar dunal landforms on the east of Lake Chinocup and Lake Grace had a different vegetation association.

The total area of the dunes covered by the Mallee over Scrub association is about 100ha, of which a total of about 70ha is proposed for mining following the initial mining phase of 20ha. Hence, between 20-70% of the vegetation association would be directly impacted by the mining proposal and there could be further indirect impacts from the disturbance to root systems and the dune's water supply and the possible introduction of dieback disease.

The Environmental Protection Authority concludes that the potential impact of the mining proposal on the Mallee over Scrub vegetation association would be significant with regard to the conservation of biodiversity. The EPA's conclusions with regard to the protection of flora and the vegetation association conflicts with the proponent's conclusion that the impact would be low, perhaps because of different perceptions and value systems with regard to the conservation of biodiversity.

Likely success of rehabilitation

The proponent concluded that the impact of the mining proposal on the nature reserve would be temporary because of the likely success of the rehabilitation programme which would be implemented. Completion criteria for measuring the success of rehabilitation were suggested by the proponent. Four examples of the revegetation of dunal landforms in the Wheatbelt region were quoted with the most relevant example being the rehabilitation at Kondinin Salt Marsh Nature Reserve, following a similar gypsum mining operation.

The EPA assessed the rehabilitation performance at Kondinin with regard to the suggested rehabilitation completion criteria for the Lake Chinocup mining proposal; the monitoring data are discussed in the body of this report. In summary, the data indicate that the suggested rehabilitation completion criteria for the Lake Chinocup proposal could not be achieved, certainly in the short time frame which would allow the disturbance to be regarded as temporary. **The EPA concludes that, whilst a diverse range of plants can be established following mining, the vegetation association is markedly different from the original species composition and reflects a severely disturbed habitat, often dominated by a limited number of plant species, including an increased number of weeds.**

In summary, the EPA concludes that the loss of substantial numbers of declared rare plants, the degradation of the geographically restricted vegetation association on the dunes, the degradation of the dunal landform and the lack of demonstrated rehabilitation success would result in significant and long-term impacts on the nature conservation values of the Chinocup Nature Reserve.

The EPA notes Australia's international obligations with regard to the conservation of biodiversity and concludes that the potential impact of the proposed mining operation on the three declared rare flora taxa and other nature conservation values would be significant.

In conjunction with the previous conclusion that the proposal is clearly inconsistent with the current principles, policies and recommendations of government and associated agencies concerning mining in A Class nature reserves, the Environmental Protection Authority recommends:

Recommendation 1

The Environmental Protection Authority recommends that the proposal to mine gypsum in Chinocup Nature Reserve is not environmentally acceptable because of the potentially significant, long-term impacts on the high nature conservation values protected within the reserve.

The EPA is aware of other similar proposals awaiting the outcome of the assessment of this proposal. In order to minimise the expenditure of resources by both the potential proponents of these proposals and the government, the EPA recommends:

Recommendation 2

The Environmental Protection Authority supports the relevant policies of the National Parks and Nature Conservation Authority and the Soil and Land Conservation Council of Western Australia and recommends that they are taken into account by potential proponents of mining proposals within the conservation estate.

The EPA recognises that gypsum has a role to play in agricultural land management and notes that there are existing sources of gypsum servicing the farmers in the Nyabing-Pingrup region. The EPA considers that it is important that the government agencies involved in the provision of gypsum in the Wheatbelt region, in conjunction with the farming community, develop a long term strategy. The EPA recommends:

Recommendation 3

The Environmental Protection Authority recognises that gypsum can play a role in efforts by the rural community to implement sustainable agricultural land use

practices and recommends that the Departments of Minerals and Energy, Agriculture and Conservation and Land Management conduct a strategic review of gypsum resources in southwest Western Australia to rationalise its availability and use.

To ensure the surrounding land use practices do not jeopardise the long term viability of the conservation reserves in the Lake Chinocup area and to assist the farming community to implement sustainable agricultural land use practices, the EPA recommends:

Recommendation 4

The Environmental Protection Authority recommends that an integrated catchment management plan for the Lake Chinocup sub-catchment be prepared by relevant community and government agencies.

1. Introduction

Mr Philip Garry Patterson, the proponent, plans to mine gypsum from dunes along the southern edge of Lake Chinocup, which is 80 kilometres east of Katanning and 10km west of Pingrup. Lake Chinocup is within the Chinocup Nature Reserve which is an A Class nature reserve vested with the National Parks and Nature Conservation Authority (NPNCA) and managed by the Department of Conservation and Land Management (CALM) for the purpose of conservation of flora and fauna.

Two previous attempts to obtain permission to mine at Lake Chinocup have been made, but were unsuccessful and discouraged by the Departments of Mines (now Minerals and Energy) and Fisheries and Wildlife (now CALM) because of the high conservation values of the nature reserve. Current government policy is to consider allowing mining in national parks and A Class nature reserves dependent on the outcome of an approvals process involving, amongst other things, an environmental assessment by the Environmental Protection Authority, approval by the Minister for the Environment of mining within the conservation estate and approval by both houses of State Parliament.

The proponent, in conjunction with Mr Paul Shiner, has applied for a Mining Lease over the gypsum dunes and submitted a Notice of Intent to the Department of Minerals and Energy (DOME) on 3 August 1993. DOME referred the proposal to mine the gypsum dunes at Lake Chinocup to the Environmental Protection Authority (EPA) on 9 August 1993.

1.1 Assessment process

The EPA set a level of assessment of Consultative Environmental Review (CER) in August 1993. The proponent was nominated on 21 September 1993. The proponent submitted a Consultative Environmental Review which was released for public comment from 2 December 1993 to 25 January 1994 (CER, 1993).

The issues raised in the submissions were summarised and forwarded to the proponent for a response, with the exception of the submissions by CALM and the NPNCA which were provided in full. The documentation on the proposal was considered by the EPA on 24 February, 10 March and 7 April 1994. The Chairman of the EPA visited the site on 15 March and officers of the Department of Environmental Protection (DEP) visited the site twice to discuss the proposal first hand with the proponent and other government agencies.

The EPA considers that, overall, the proponent adequately informed the public and relevant government agencies about the proposal during the assessment process. This Bulletin presents the EPA's conclusions and recommendations to the Minister for the Environment.

1.2 Environmental setting

Chinocup Nature Reserve (A28395) is an A Class nature reserve which covers about 19,821 hectares of which about 12,500ha consists of salt lakes. It was named in 1984 and is vested with the NPNCA for the purpose of conservation of flora and fauna. It is 80km east of Katanning, which is the main regional service centre, 25km east of Nyabing, the local government centre for the Shire of Kent, and 10km west of Pingrup, which is the nearest town (Figure 1).

Chinocup Nature Reserve extends north-south including Lake Chinocup and several adjacent salt lakes at the southern end of the Lake Grace wetland system, which is a remnant of an ancient drainage system. The lakes are of major importance to waterfowl for feeding, loafing and breeding (McKenzie and Youngson, 1975). The Lake Grace wetland system, including Chinocup Nature Reserve and Chinocup Townsite Reserve, is on the Register of the National Estate because of its nature conservation and wetland values.

Chinocup Dam Nature Reserve (A18803; vested with the Minister for Water Resources) is a few kilometres to the west and the Willoughby Nature Reserves (31603, A27289; vested with the NPNCA) are a few kilometres to the south of Chinocup Nature Reserve (Figure 2).

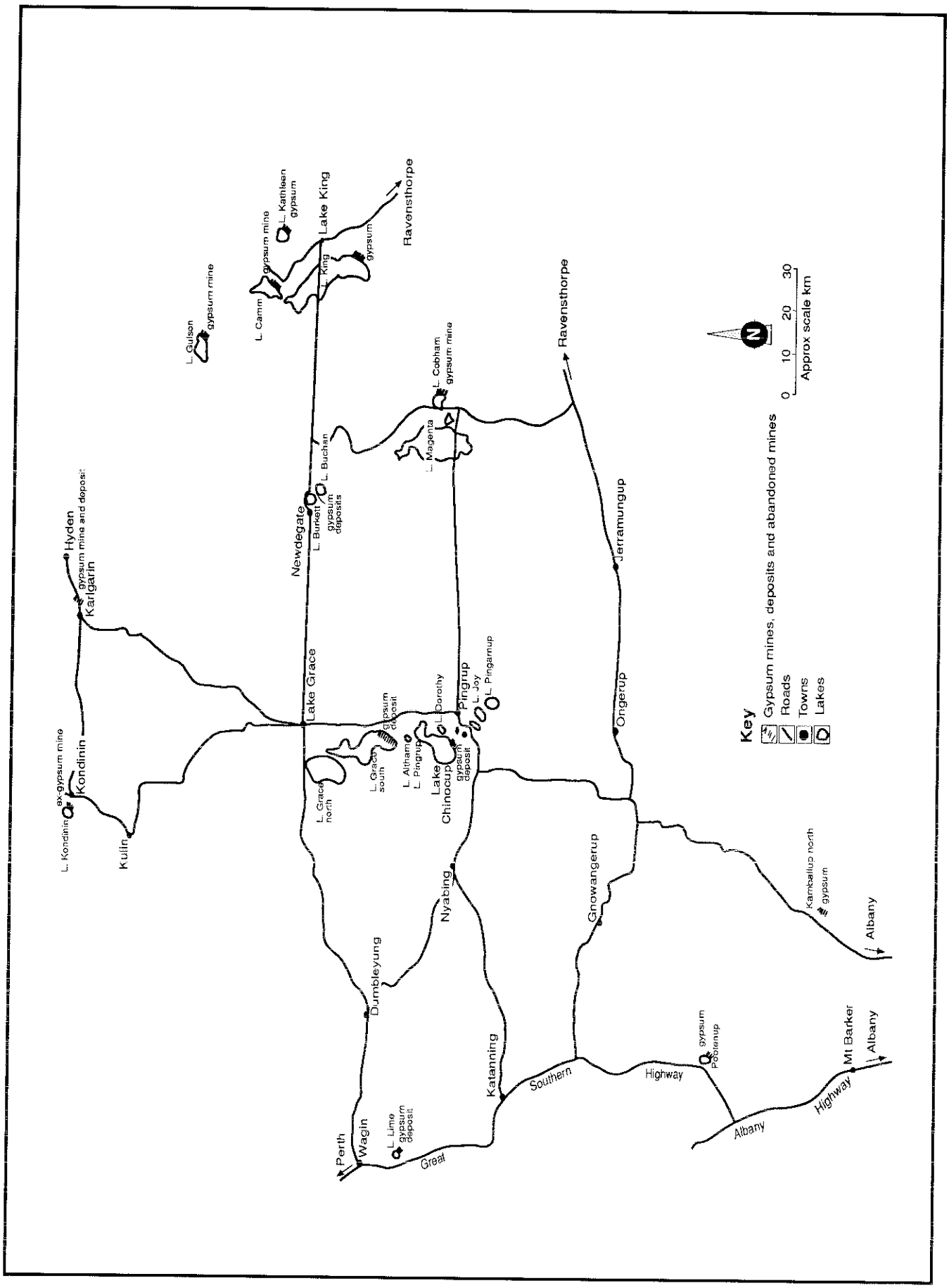

Figure 1. Regional location

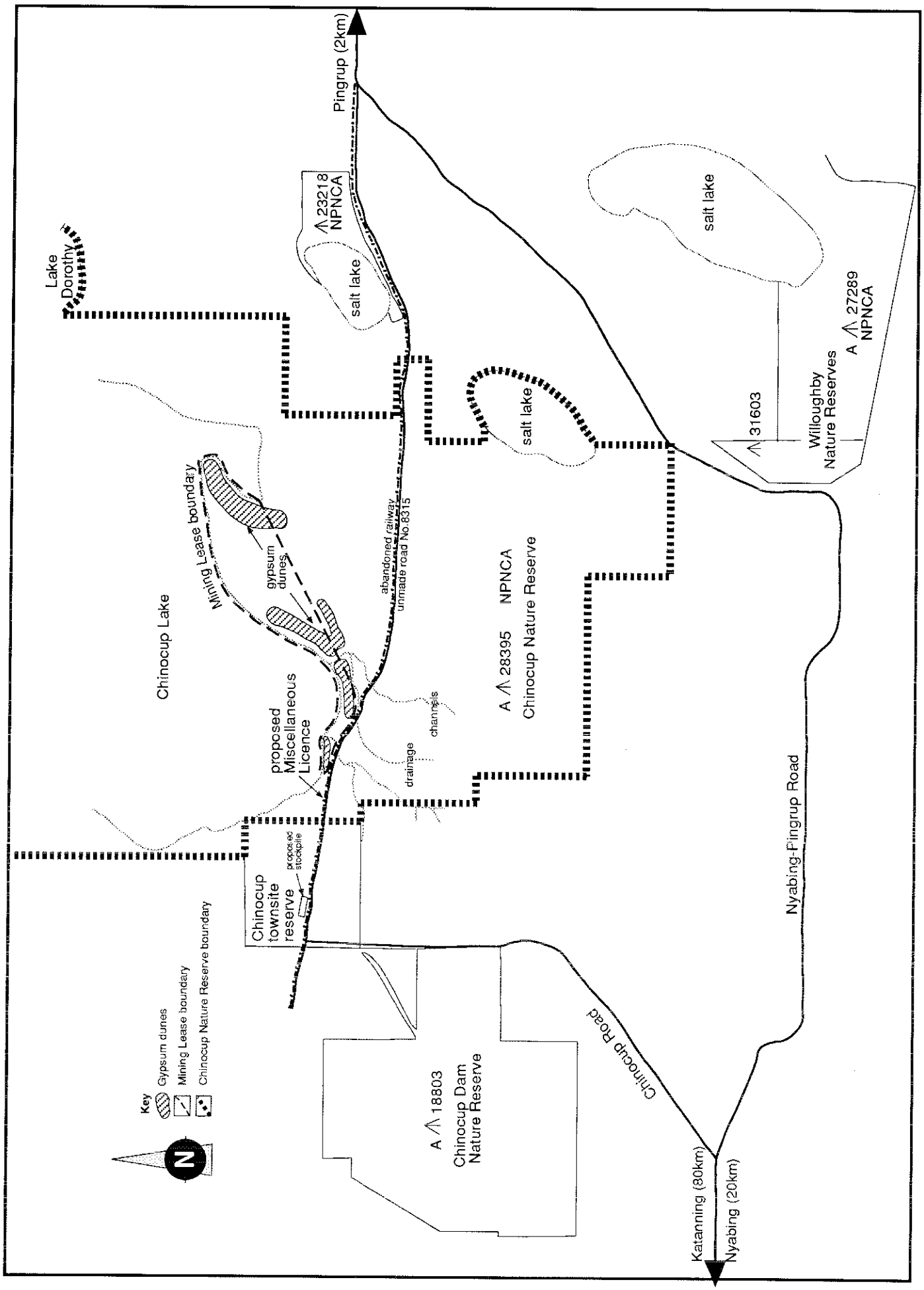

Figure 2. Proposal location

Chinocup Townsite Reserve (vested with the Shire of Kent) is adjacent to the west of Chinocup Nature Reserve and is largely uncleared crown land. An abandoned railway line runs through both the Nature Reserve and the Townsite Reserve along unmade Road No.8315; a partly cleared area remains at the site of the former railway station within the Townsite Reserve. The Townsite Reserve is currently recommended for addition to the Chinocup Nature Reserve (EPA, 1975 - Red Book Recommendation 4.8.7), but the recommendation has previously not been supported by the local government authority.

The Lake Chinocup area lies within Natural Resource Zone 68 which is in the Roe Botanical District, the Avon River Drainage division and has an annual rainfall of less than 500mm (EPA, 1993a). This report records that, in general, less than 12% of the native vegetation is left on private land in Zone 68; in the adjoining Zone 71 to the west, which is more typical of the amount of clearing in the area surrounding the Chinocup Nature Reserve, less than 5% of the native vegetation is left. The Wheatbelt region has lost most of its native vegetation and currently only 6.7% of the region is in secure conservation reserves. This compares poorly with the area of about 15% which is protected in conservation reserves for the South Coast and South West Forest regions (EPA, 1993a).

2. The proposal

The proposal is described in detail in the proponent's report (Consultative Environmental Review, 1993) and a brief description is presented below. The proponent and his associate, Mr William Paul Shiner, have applied for a Mining Lease covering the high and low gypsum dunes along the southern edge of Lake Chinocup (Figure 2).

The proposal is for a strip-mining operation to mine selected parts of the higher gypsum dunes on the southern edge of Lake Chinocup and transport the gypsum to a nearby loading area in the Townsite Reserve for transfer onto trucks. The access road between the loading and mining areas would be along unmade Road No.8315 until it reaches the mining lease; the access road would be within a Miscellaneous Licence granted under the Mining Act.

Mineable gypsum sand is believed to occur within about 70 hectares of the high gypsum dunes. The proposal is to initially mine 20ha of these dunes and, following demonstration of the successful regeneration of the declared rare plant which occurs on the dunes, *Adenanthos pungens* ssp. *pungens*, mine a total of about 70ha. Prior to mining, detailed mapping of the declared rare flora and other species of conservation interest would occur to enable selection of a mining path which would avoid as many of these plants as possible. The net effect would be a meandering mine path with islands of vegetation throughout the remaining dunal landform.

Mining would involve: stripping and stockpiling the vegetation cover, stripping and stockpiling the topsoil, excavating the gypsum with a front-end loader to within 30cm of the lake bed level, loading it onto a truck and transporting it to the stockpile area. The stockpile area is an existing cleared area in the adjacent Chinocup Townsite Reserve and farmers trucks would be loaded from there.

Rehabilitation would involve: recontouring the mined area to stable batter slopes, spreading topsoil and vegetation, planting of seed and/or seedlings and implementation of weed and feral animal controls. Monitoring of rehabilitation would determine if remedial action was necessary until rehabilitation completion criteria were achieved.

The mining procedure involves a lot of surveying, planning and site control to minimise the number of rare plants which would be destroyed. Alternative, simpler methods of mining were considered by the proponent but would destroy more of the rare plants. The rehabilitation procedure involves intensive, though standard, techniques to increase the likely success of the regeneration of the vegetation association on the dunes.

The CER report states that "the proponents believe that the principle of "no mining in nature reserves" is not supportable if it can be shown that mining is both temporary and of low

impact". The proponent believes that rehabilitation would restore at least 75% of the existing species, including rare and priority species, within a time frame such that the impact of the mining operation could be regarded as temporary. The proponent has stated that, if necessary, the Shire of Kent has agreed to the addition of up to half the Chinocup Townsite Reserve to the Chinocup Nature Reserve as a form of compensation for the potential impact of the mining proposal on the nature conservation values.

As a possible alternative to mining this deposit, the proponent investigated possible gypsum deposits within 50km of Lake Chinocup, as identified by officers of the Geological Survey of Western Australia. The proponent stated that there were none of the size and quality of the Lake Chinocup gypsum deposit. Existing gypsum mines and potentially mineable deposits of gypsum are shown on Figure 1, with the deposit at Lake Cobham (referred to as Lake Magenta in the CER), about 100km east of Pingrup, being the nearest operating mine. Gypsum is a low value commodity (price about $10 per tonne) which is beneficial for responsive soils where the soil structure is limiting plant growth. Transport costs are usually the greatest expense in the total cost of gypsum application when comparing different sources of gypsum.

The Environmental Protection Authority considers that the proponent has put together a professional and comprehensive submission on the mining proposal in recognition of the previous history of unsuccessful applications to mine the deposit and the sensitivity of mining in an A Class Nature Reserve.

2.1 Existing environment

Most of the information on the existing environment of the Chinocup Nature Reserve and surrounding areas has been obtained from the Department of Conservation and Land Management and the proponent's CER report.

Landform

The gypsum dunes at Lake Chinocup are geologically young landforms comprising both high and low dunal forms. The high dunes probably have an age of the order of hundreds to a few thousands of years. The proponent states that the dunes are still actively growing today but the stability of the vegetation association and apparent age of the trees on the high dunes indicates that no significant growth of the high dunes is occurring at present.

The low dunes may still be actively growing where the vegetation cover consists of samphire. Scrub/thicket through to a low woodland association characterises the vegetation of the dunes which are higher above the lake bed (CER, 1993).

Flora

The CER states that a total of 227 plant species were identified on the dunes, the proposed access route and adjacent areas in a survey carried out over the months of November, December and January; more species would be expected if further survey work was carried out at other times of the year. Only five exotic plant species (weeds) were identified, which indicates that there is presently a very low level of habitat disturbance.

Flora of high conservation value, which were recorded by the proponent's consultant in the proposed mining and access areas, include the only known populations of two declared rare taxa, two priority 1 taxa, two priority 2 taxa, two priority 3 species, a rare plant proposed for priority status, two rare hybrids and a geographically restricted species as set out in Table 1.

Table 1. Flora of high conservation value recorded during CER studies

Taxa	Conservation code
Adenanthos pungens ssp. *pungens*	declared rare flora
Adenanthos cuneatus x *pungens*	rare hybrid
Astartea clavifolia	proposed priority species
Dicrastylis glauca	priority 3 species (poorly known taxa; several populations, some of which are not believed to be under immediate threat; in need of further survey)
Drakaea isolata (ms)	declared rare flora
Drosera salina (ms)	priority 1 species (poorly known taxa; less than 5 populations; under immediate threat; in need of further survey urgently)
Eucalyptus angustissima ssp. *quaerenda*	priority 2 species (poorly known taxa; less than 5 populations, some of which are not under immediate threat; urgent need for further survey)
Eucalyptus phaenophylla x aff. *incrassata*	rare hybrid
Eucalyptus sparsicoma	geographically restricted species; includes type specimen
Fitzwillia axilliflora	priority 2 species
Melaleuca polycephala	priority 3 species
Verticordia brevifolia ssp. *brevifolia*	priority 1 species

Vegetation

The vegetation associations on the dunes bordering the saline flats of Lake Chinocup have been mapped as: *Melaleuca brevifolia* Scrub on the lowest dunes and Mallee over Scrub with *Eucalyptus* aff. *incrassata* forming an open upper stratum on the high dunes; there is a small area of *Casuarina obesa* Low Woodland, which grades into Mallee over Scrub, occuring on a high dune in the southeastern corner of Lake Chinocup.

The Mallee over Scrub vegetation association only occurs on the high dunes. It was previously mapped as Low Forest, Woodland and Open Woodland by McKenzie and Youngson (1975). However, in the latest survey the tree form of *Eucalyptus kondininensis* was only recorded on a gypsum dune at a site near the southwestern edge of Lake Chinocup; mallee form (multiple stemmed) trees predominate on the dunes. The discrepancy in interpretation is believed to have come about because of the different scales and techniques of mapping.

Fauna

A fauna survey was not carried out for the CER and, hence, little is known of the vertebrate or invertebrate fauna of the proposed mining and access road areas. The CER report states that previous surveys apparently did not sample the gypsum dunes (Appendix 4 in the CER). CALM Officers report that there are indications that some rare fauna, the Western Mouse, Tammar Wallaby and Western Whipbird, may utilise the dunes and adjacent areas (M. Graham, CALM, *pers. comm.*).

General

The nature conservation values of the Chinocup Townsite Reserve have not been comprehensively assessed as the proponent's botanical survey only covered the proposed access route along unmade Road No.8315. The survey found that six of the twelve taxa of high conservation value in Table 1 occur in the Townsite Reserve. The vegetation associations which have been mapped on the Townsite Reserve do not include the Mallee over Scrub association of the gypsum dunes, nor the rare plant *Adenanthos pungens* ssp. *pungens* and the dunal landform is not present on the Townsite Reserve.

CALM has stated that the southern half of the Shire of Kent is within the known dieback risk area. However, the CER states that no evidence for the presence of dieback disease is known within the proposed mining and access areas and that the area is considered to have a low chance of sustaining a dieback infection, that is, a low hazard, because of the high calcium content of the soils and the climatic conditions.

More detailed information on these and other aspects of the environment (climate, soils, hydrology, dieback status, cultural values) is included in the CER report. Both the proponent and the NPNCA conclude that the nature conservation values of the Chinocup Nature Reserve are high.

3. Public submissions

The issues raised in public and government agency submissions were summarised and were responded to by the proponent (Appendix 1). Seventy-six submissions were received; 61 submissions were photocopied form-letters from local farmers in support of the proposal and a further four letters from local farmers and the Shire of Kent also supported the proposal. The Department of Agriculture provided a technical submission with advice about the beneficial uses of gypsum on some soils. Support for the proposal was based mainly on the belief that a local supply of gypsum would be better quality and cheaper than from existing sources and that the impacts on the nature reserve would be low and temporary.

The Department of Conservation and Land Management, the National Parks and Nature Conservation Authority and the WA National Parks and Reserves Association Inc. all oppose the proposal, along with other non-government organisations and individuals, making a total of ten submissions. Opposition was based mainly on the belief that the environmental impacts on the high conservation values of the Nature Reserve would be significant and long-term and that there are existing sources of gypsum currently available, some of which are not currently being mined.

The Environmental Protection Authority understands the concerns and motives of the local farmers in the Nyabing-Pingrup area who support the proposal, as land restoration is a critical issue for the Wheatbelt region. The Department of Agriculture state that the improvement to soil structure from the application of gypsum to certain soils can be beneficial to the growth of both agricultural and native plants.

4. Assessment of environmental issues

The Environmental Protection Authority considered that there were four key environmental issues and that the conclusions about these issues would greatly influence the environmental acceptability of the proposal. The key issues were:

- the principle of mining in A Class nature reserves;
- the protection of rare and priority flora;
- the conservation of the vegetation association of the dunes; and
- the likely success of rehabilitation.

4.1 Principle of mining in A Class nature reserves

The Environmental Protection Authority has previously established a principle that the integrity of conservation reserves should be maintained and that decisions on proposals that have the potential to reduce the conservation values should err on the side of caution and give priority to conservation (EPA, 1992). The highest category of nature conservation areas in the state are A Class nature reserves.

The National Parks and Nature Conservation Authority is opposed to mining in national parks and nature reserves because mining is not compatible with the purposes for which such land is vested in the Authority (Appendix 2). It is the NPNCA's view that rehabilitation should not be regarded as a replacement for the pre-existing conservation values. According to its published policy, the NPNCA is likely to recommend against a proposal to mine unless:

- there is a strategic need for the mineral;
- or the mineral resource is rare, is of high value, and its exploitation would be of significant material benefit to the state; or
- the mineral resource is not available on other tenures of land.

The present proposal does not meet any of these criteria and the NPNCA has recommended against the government approving it.

According to its published policy, the Soil and Land Conservation Council of W.A. has stated that reserves of high conservation value should not be considered for the mining of gypsum and lime (Appendix 3). The conservation values of the Chinocup Nature Reserve are acknowledged as being high. Hence, the proposal is contrary to the policy of the Soil and Land Conservation Council of W.A.

The Select Committee into Land Conservation recommended that - "ecologically sustainable development in the primary sector means using and conserving the ecosystem's resources in such a way that yields an economic return on a continuing basis while maintaining the health of the ecosystem and ecoregion". The Select Committee recommends that quarrying activities and detrimental practices be excluded from remnants of native vegetation (Select Committee into Land Conservation, 1991; Part 1.3.12 (d)). The proposal conflicts with this recommendation.

The Environmental Protection Authority concludes that the proposal is clearly inconsistent with the above principles, policies and recommendations and, in principle, is not environmentally acceptable.

The proponent believes, however, that the impacts would be low and temporary and that the proposed addition to the conservation estate should be considered as adequate compensation. This position is considered in the following discussion of the other key environmental issues.

4.2 Protection of rare and priority flora

The flora with high conservation values which would or may be impacted by the proposed mining operation includes individuals of the twelve rare, priority and geographically restricted taxa listed on Table 1 plus a declared rare species, *Acacia leptalea*, which has been recorded from the area but was not found during the latest botanical survey (Appendix 2 in CER). The proponent proposes that a botanical survey would be carried out to locate the individual plants of these taxa and then a mining plan would be developed to avoid as many of them as possible.

The main impact from the mining of the gypsum dunes would be upon the rare plant, *Adenanthos pungens* ssp. *pungens*. The proponent estimates that the losses of this rare plant would amount to about 100 individuals from the initial mining area of 20ha. A total population of over 1500 plants is currently known, of which 600 occur outside the mining lease. Ministerial consent is required for the taking (including destruction) of rare plants, with severe penalties for unauthorised destruction under the Wildlife Conservation Act, 1950. The proponent would seek this consent at the appropriate stage.

Adenanthos pungens ssp. *pungens* is currently only known from the dunal landforms at the southern end of Lake Chinocup. A previously known population in the Stirling Ranges is believed to have been lost to dieback disease, to which the plant is reportedly highly susceptible (CER, 1993).

Dr Kingsley Dixon from the Kings Park Board provided the following advice about *Adenthanos*: research to develop methods to propagate the species would be required as it is known to be very difficult to grow from seed; no work has been done to understand fertilisation and seed dispersal and transplanting is difficult with a low success rate in the past due to its extensive, fine roots which extend to great depths to obtain water. The EPA concludes that an extensive research programme would be required to provide confidence that the plant could be successfully propagated as part of the proponent's rehabilitation programme at Lake Chinocup.

The Environmental Protection Authority considers that the taking of 100 plants of the last known population of 1500 individuals, in the absence of evidence that it can be propagated, poses a significant risk. Together with the potential for adverse indirect impacts on the population during initial mining (for example, by root disturbance), and further direct impacts from future mining which would lead to the taking of up to 250 more plants, the EPA considers that the mining proposal would pose a significant impact on the population.

The impact of the mining proposal, including the access road, on other declared rare plants is difficult to judge in the absence of detailed information about their distribution. However, it appears that a number of plants of the rare species, *Drakaea isolata* (ms), may be destroyed by the construction and use of the access road. The population has been estimated at about 500 over an area of 0.1ha along unmade Road No.8315 in the Townsite Reserve, which is the proposed access route. Another declared rare plant, *Acacia leptalea*, has been recorded from the proposed mining and access areas but was not found by the proponent's consultant, possibly because it was not flowering during the period of the survey (Appendix 2 in the CER). Hence, there are three declared rare flora taxa which would require detailed mapping to enable the design of the mining proposal to avoid as many plants as possible and, subsequently, would require Ministerial consent to destroy.

The Environmental Protection Authority concludes that, considering Australia's international obligations with regard to the conservation of biodiversity, the potential impact of the proposed mining operation on the three declared rare flora taxa, particularly *Adenanthos pungens* ssp. *pungens*, would be significant.

The impact on other flora with high conservation value is difficult to judge in the absence of detailed information about their distribution. The priority 1, 2 and 3 species, the proposed priority species, *Astartea clavifolia*, and the type specimen of a geographically restricted species, *Eucalyptus sparsicoma*, occur within or adjacent to the proposed access route. Individuals of these species are likely to be impacted either directly or indirectly by the mining proposal.

The Environmental Protection Authority concludes that the potential impact of the mining proposal upon the flora conservation values of the Chinocup Nature Reserve would be significant. This conclusion conflicts with the proponent's conclusion that the impact would be low, perhaps because of different perceptions and value systems with regard to the conservation of biodiversity.

4.3 Conservation of the vegetation association of the dunes

The proponent's vegetation mapping recorded that the high dunes in the proposed mining area mainly support a Mallee over Scrub vegetation association and the low dunes have a *Melaleuca* Scrub vegetation association; a small area of *Casuarina obesa* Low Woodland occurs on part of a high dune at the eastern end of the proposed mining area. The vegetation association, Mallee over Scrub, was only mapped on the dunes of the southern part of Lake Chinocup; similar

dunal landforms on the east of Lake Chinocup and Lake Grace had a different vegetation association.

Dunes thoughout the rest of the Lake Grace wetland system are generally covered with a Low Woodland of *Eucalyptus kondininensis* and *Eucalyptus loxophleba* or other Eucalypts, with associated species different from those in the Mallee over Scrub association. Hence, the Mallee over Scrub association appears to be confined to the gypsum dunes proposed for mining and is considered different to the Woodland associations which appear to be more typical of other dunes throughout the region.

The vegetation association on the gypsum dunes on the southern shore of Lake Chinocup is not known from elsewhere in the Wheatbelt region and, hence, can be considered unique and geographically restricted. The total area of the dunes covered by the Mallee over Scrub association is about 100ha of which about 70ha is proposed for mining following the initial mining phase of 20ha. Hence, between 20-70% of the vegetation association would be directly impacted by the mining proposal and there could be further impacts from the disturbance to root systems and the dune's water supply and the possible introduction of dieback disease.

The Environmental Protection Authority concludes that the potential impact of the mining proposal on the Mallee over Scrub vegetation association would be significant with regard to the conservation of biodiversity. As before, this conclusion conflicts with the proponent's conclusion that the impact would be low, perhaps because of different perceptions and value systems with regard to the conservation of biodiversity.

4.4 Likely success of rehabilitation

The proponent concluded that the impact of the mining proposal would be temporary because of a comprehensive rehabilitation programme and the high growth rate of the dunes leading to the rapid return of the landform. The proponent suggested that the rehabilitation programme should include the following completion criteria:

- at least 75% of the pre-existing natural species diversity should be established and growing on site for at least three years after rehabilitation has been initiated;
- vegetative cover should exceed 20% of the dune surface within five years of mining having ceased on a particular area; and
- bare patches of more than 200 square metres which develop within five years of the cessation of mining should be subject to further rehabilitation.

The CER referred to four examples of "successful" rehabilitation, two near Pingrup, one near Yelbeni and one in the Kondinin Salt Marsh Nature Reserve. The most relevant example is from Kondinin where similar gypsum dunes exist, the pre-existing vegetation was mapped, a similar mining and rehabilitation plan was implemented and the rehabilitation programme was monitored. Four separate pods were mined between four and seven years ago. A discussion of the rehabilitation success at Kondinin, with regard to the suggested completion criteria for Lake Chinocup, is presented below.

Table 2 shows that the pre-mining survey in 1983 recorded 54 species in a transect from the edge of the salt lake, across the dunes and into the adjacent bushland; 20 of those species occurred on the dunal landform (Porter and Dunlop, 1984). The 1992 survey recorded 59 species from the rehabilitated mining pods within the dunal landform; however, only 8 species are from the 1983 pre-mining list of 20 species (Maddocks, 1992). This gives a similarity rating of 40% with the original natural species diversity over a period of 4-7 years since rehabilitation began; considerably less than the 75% target suggested for the Lake Chinocup mining proposal.

Table 2. Species numbers at Kondinin

Location and date	Native species	Weeds	Total
Pre-mining			
Dec 1983; whole transect	51	3	54
Dec 1983; dunes section	19	1	20
Post-mining			
1992; mine areas (pods 1-4)	42	17	59

For the four mining pods, Table 3 shows that the average vegetative cover is 23%, which is above the suggested rehabilitation completion criterion of 20%; however, two of the pods were below the criterion and two were above. One species, *Kippistia suaedifolia*, dominates the vegetative cover on two of the pods, including the pod with the highest cover; this species was not present in the dunes or adjacent area prior to mining. Hence, the suggested rehabilitation completion criterion of a cover of 20% was not achieved on every pod and, in the pod with highest cover, it was achieved mainly because of the dominance of a species which was not present prior to mining.

Table 3. Vegetation cover at Kondinin

Mining pods	% cover	% dominance by *Kippistia suaedifolia*
1	16.6	87
2	37.5	32.6
3	22.9	9.2
4	14.5	1.4

The number of weed species at the Kondinin minesite markedly increased from one in the dunes before mining to 17 on the rehabilitated dunal landform after mining. This is a reflection of severe habitat disturbance brought about by mining and the ability of weeds, especially those with windblown seeds, to colonise disturbed sites, in contrast to areas supporting undisturbed native vegetation.

The evidence from the rehabilitation programme at the Kondinin Salt Marsh Nature Reserve indicates that the suggested rehabilitation completion criteria for the Lake Chinocup gypsum mining proposal could not be achieved, certainly in the short time frame which would allow the disturbance to be regarded as temporary. **The Environmental Protection Authority concludes that the evidence from the Kondinin mining operation indicates that, whilst a diverse range of plants can be established following mining, the vegetation association is markedly different from the original species composition and reflects a severely disturbed habitat, often dominated by a limited number of plant species, including an increased number of weeds.**

With regard to the proponent's interpretation of a high growth rate for the dunal landform, which is based on an interpretation of vegetation mapping from aerial photographs taken 30 years apart, the EPA notes that there is evidence of increased vegetative growth over 30 years on some low dunes adjacent to the salt flats at the eastern end of the dune system. This area is recorded as patchily distributed *Melaleuca brevifolia* Scrub in the latest mapping in the CER, in contrast to the previous mapping in 1975, done mainly from aerial photography, which mapped the area as salt flats. Whilst the vegetation cover has increased on these low dunes, no clear evidence of the rapid growth of the dunal landform, particularly the high dunes proposed for mining, has been provided.

The Environmental Protection Authority concludes that the likely success of rehabilitation of the gypsum dunes and the ecosystem, in a timeframe whereby the disturbance could be regarded as temporary and in the absence of a much more intensive rehabilitation programme than that proposed, is very low.

4.5 Other issues

The public submissions raised numerous questions about the environmental and other issues concerning the proposal. Officers of DEP compiled a list of questions from the submissions, or provided the full submission, to the proponent. Apart from the key environmental issues discussed above, the questions raised other issues concerning, for example, fauna conservation, introduction of dieback disease, compensation to the conservation estate, introduction of weeds, alternative mining methods, alternative gypsum sources, drainage impacts and land degradation. The EPA considers that the proponent provided a satisfactory response to these and the other issues (see Appendix 1). Five of these additional issues were of particular interest to the EPA and are discussed below.

Fauna conservation

The proponent did not carry out a fauna survey in the nature reserve and it is therefore difficult to assess the potential impacts of the mining proposal. The EPA notes that the loss of faunal biodiversity Australia-wide is severe and is particularly severe in Western Australia (Remnant Vegetation Steering Committee, 1991). The Wheatbelt region of Western Australia is one of the worst affected areas because of the massive loss of native vegetation and, hence, habitat for fauna species.

The Environmental Protection Authority considers that it cannot assess the potential impact of the mining proposal on the fauna of the nature reserve because of the absence of survey data. A faunal survey would be required to determine if rare or other fauna use the dunal habitat.

Dieback disease

According to CALM, the southern half of the Shire of Kent falls within the known dieback risk area. The proposed mining area is considered to have a low risk and hazard of dieback infection and spread because of the high calcium content of the soils and climatic conditions unsuitable for the spread of the disease. Other areas of the Chinocup Nature Reserve and Townsite Reserve which have different soils may have a slightly higher risk and hazard.

The consequence of a dieback infection in the nature reserve on the full suite of flora has not been fully assessed, but it is known that the rare plant, *Adenanthos pungens* ssp. *pungens*, is highly susceptible (Appendix 2 in the CER). The proponent has committed to the implementation of dieback hygiene procedures for all the farmers trucks which would be coming to the stockpile area, but the procedures cannot guarantee that the disease would not be introduced.

While acknowledging the low risk of dieback disease introduction, the Environmental Protection Authority is concerned about the potentially significant consequences of the introduction of dieback disease because of the high susceptibility of *Adenanthos pungens* ssp. *pungens* and the difficulties of maintaining dieback hygiene for the large numbers of trucks proposed to be used from the surrounding region.

Compensation to the conservation estate

The proponent has stated that an agreement has been reached with the Shire of Kent for up to half of the Chinocup Townsite Reserve to be added to the Chinocup Nature Reserve if the mining proposal is approved (Appendix 5 in the CER). This form of compensation to the conservation estate has been accepted before by decision makers, primarily on the basis that equivalent flora and/or vegetation associations are conserved. However, in this case, whilst the nature conservation values of the Chinocup Townsite Reserve appear significant, the values do not include the vegetation association on the gypsum dunes, Mallee over Scrub, nor the declared rare plant, *Adenanthos pungens* ssp. *pungens*, which are most at risk from the proposal.

The Environmental Protection Authority has previously recommended that the Townsite Reserve be added to the Chinocup Nature Reserve (EPA, 1993b) and restates its recommendation that the area be vested in the NPNCA to allow the

area to be managed for its own nature conservation values. Protection of the Townsite Reserve would not, however, protect the rare plants or vegetation association most at risk from this proposal.

Weeds

Within the Nature Reserve at present, there is a low level of habitat disturbance, as reflected by the lack of weeds. The proposed mining activity would significantly increase the risk of further introduction of weeds, as evidenced by the Kondinin mining operation. **The Environmental Protection Authority is concerned about the habitat disturbance by the proposed mining operation and the potential effect on the nature conservation values of the reserve.**

Alternative mining methods

Alternative methods of mining gypsum are currently being investigated by officers of the Geological Survey of WA. The methods involve mining lake bed gypsum and stockpiling it for several wet seasons to allow the rain to wash out the salt. A recent trial at Lake Campion by officers of the Geological Survey of WA has shown that the lake bed gypsum can be upgraded by rainfall over 1 or 2 winters to levels of less than 1% salt so that it can be used for agricultural purposes (M. Freeman, DOME, *pers. comm.*).

The proponent has considered the potential application of these methods both at Lake Chinocup and elsewhere and concluded that they appear to be more expensive and less practical than the current mining proposal. The EPA understands that the Geological Survey will be reporting the results of trials of alternative methods of producing agricultural gypsum shortly.

Alternative gypsum sources

A number of other potential deposits of gypsum within about 50km of Lake Chinocup were investigated by the proponent and reported to the Department of Minerals and Energy under the conditions of a Geoscientific Survey Permit. The proponent supplied a copy of the survey report to the Department of Environmental Protection as part of the response to issues raised in submissions. The proponent has reported that none of the sites identified contained gypsum in the quantity and quality of the Lake Chinocup deposit. A site which has gypsum was located during the survey but the proponent reported that it was unsuitable to mine commercially.

An officer of the Department of Minerals and Energy investigated this site, which occurs in the northern part of Chinocup Nature Reserve, and reported it to be a deposit with a gypsum content of about 90% and a salt content of about 1% from which gypsum had been previously removed (M. Freeman, DOME, *pers. comm.*). The EPA notes that further investigations of this and other potential deposits of gypsum are continuing.

Officers of the Geological Survey of WA have been compiling a report on the gypsum resources of southwest Western Australia for some time. The release of the report should greatly assist in the rationalisation of the future use of gypsum.

Alternative sources of gypsum already exist for the farmers of the Nyabing-Pingrup region. The nearest current alternative source is Lake Cobham (called Lake Magenta in the CER) which is about 100km from Pingrup. If the Lake Chinocup deposit is mined, the proponent quotes cost savings to a farmer in the Nyabing-Pingrup area from the shorter transport distance would be up to 70%, assuming the cost of the gypsum is the same (CER, 1993). This figure is based on $40/ha for a 20 km haul instead of $68/ha for a 100 km haul distance (CER, Appendix 1, 1993). The cost of producing gypsum at Lake Chinocup would also need to include the cost of possible research on the propagation of the declared rare flora, detailed flora and fauna surveys and the extensive rehabilitation programme as part of the overall environmental management costs.

In its submission on the proposal, the NPNCA stated its concern that the cost effectiveness of developing a gypsum source in the Chinocup Nature Reserve (compared with using the existing source of gypsum) would be outweighed by the long-term damage and increased costs of managing the conservation estate. **The EPA concurs with this position and recommends that government agencies involved in defining the availability of gypsum in southwest Western Australia should co-ordinate their efforts to assist the farming community to rationalise the availability and use of gypsum.**

Land degradation

The potential benefit of applying gypsum to the soils, particularly clay soils, and the subsequent soil improvement, water retention and reduced runoff to streams was raised by the proponent and local Nyabing-Pingrup community members in discussions with the Chairman of the EPA. The EPA acknowledges the benefits of gypsum application. The EPA sought advice from the Department of Agriculture about the regional effect on the groundwater and lake levels of widespread gypsum use in the Nyabing-Pingrup region. The Department of Agriculture advised that gypsum use is unlikely to have a major effect on reducing groundwater recharge to the water table (G, Hamilton, Dept of Agriculture, *pers. comm.*).

Groundwater recharge occurs via two mechanisms; "trickle" drainage where unsaturated moisture contents in soil are unused by plants and "episodic" drainage events where saturated soil conditions lead to drainage to the water table. There is evidence to suggest that both drainage mechanisms occur, but that the major mechanism contributing to the water table is saturated episodic drainage under prolonged wet conditions. The absence of deep-rooted perennial vegetation means that deep drainage is not used in the dry months. Based on this conjecture, gypsum additions to the surface soil will not have a major effect. Gypsum is likely, on responsive soils, to affect trickle recharge through increased crop production, and hence water use, in the wet months.

The EPA is concerned about the potential effect upon the lakes and surrounding nature reserves of a rising groundwater table and associated salinisation of low lying land. The advice from the Department of Agriculture indicates that the application of gypsum has a role in improved farm productivity and a minor influence on groundwater recharge but that strategic planting of deep-rooted plants and trees in hydrologically sensitive recharge and discharge areas is likely to be required to address the broader hydrological problems of the Wheatbelt region (G, Hamilton, Dept of Agriculture, *pers. comm.*).

The proponent and other farmers in the Nyabing-Pingrup region expressed their concern to the Chairman of the EPA about land degradation in the region and particularly about the importance of gypsum application to certain soils to prevent further land degradation. The EPA received advice from the Department of Agriculture that gypsum by itself is not a "cure-all" and that long term improvements are understood to result from better farming practices that involve greater organic matter retention and reduced and more timely cultivations. The EPA understands from this advice that, whilst gypsum has a beneficial role in land use management, its importance should not be overstated (G, Hamilton, Dept of Agriculture, *pers. comm.*).

The EPA will continue to support the efforts of all agencies which are addressing the problem of land degradation. The EPA notes the efforts of the Land Conservation District Committees in developing farm plans which, in conjunction with the implementation of integrated catchment management strategies, would be a key part in the restoration of land in the Wheatbelt region.

The EPA considers that the development of an integrated catchment management plan for the Lake Chinocup sub-catchment would be a positive outcome from the assessment of the Lake Chinocup gypsum mining proposal. It would bring the various interest groups together to manage the land and drainage systems in an integrated manner for the benefit of both the Chinocup Nature Reserve and sustainable agricultural productivity.

In order to ensure that surrounding land use practices do not jeopardise the long term viability of the conservation reserve, the EPA recommends that government and community agencies develop an integrated catchment management plan. Furthermore, this general principle, once established should be applicable to other nature reserves which are important "islands" within agricultural land.

5. Conclusions and recommendations

In the assessment of the Lake Chinocup gypsum mining proposal, the Environmental Protection Authority took particular note of the strategies, recommendations and policies of the National Parks and Nature Conservation Authority, the Soil and Land Conservation Council of Western Australia, the Select Committee into Land Conservation and the Remnant Vegetation Steering Committee. The reports and policy statements of these agencies take a broad perspective of the issue of land degradation and associated environmental impacts such as salinisation and loss of biodiversity.

The reports conclude that land degradation, due mainly to overclearing of native vegetation, is quite pronounced in the Wheatbelt region as evidenced by the salinisation of lower lying areas and poor soil structure. The EPA understands that the preservation of remaining remnant vegetation along with massive revegetation (of up to 30% of the area) with deep-rooted native plants is of the highest priority to stabilise the land, drainage systems and groundwater of the Wheatbelt region.

The nature conservation reserves and viable stands of remnant vegetation in the agricultural region play a significant role in providing deep-rooted vegetation and in the conservation of the remaining biodiversity. Less than half of the plant and animal species that are currently gazetted as rare and endangered are afforded some degree of protection by being in conservation reserves. The reality is that biological surveys have not been able to establish the status of all flora and fauna species, particularly invertebrate fauna and lower plants. Therefore, because of our lack of detailed knowledge, the protection of the remaining habitat in the Wheatbelt region is critically important to retain biodiversity (Remnant Vegetation Steering Committee, 1991).

In conclusion, the Environmental Protection Authority finds that the Lake Chinocup gypsum mining proposal is not supported by the principles, policies and recommendations of the international Convention on Biological Diversity, the National Parks and Nature Conservation Authority's position on Mining in National Parks and Nature Reserves, the Select Committee report into Land Conservation, the Soil and Land Conservation Council of Western Australia's policy on Mining for Gypsum and Lime, the Remnant Vegetation Steering Committee's report on Issues in remnant vegetation protection in Western Australia and the Environmental Protection Authority's principles for the conservation of the natural environment.

The EPA also finds that the proponent's conclusion that the mining proposal would result in temporary and low impacts on the nature conservation values of the Chinocup Nature Reserve is not supported by the documentation and evidence available to the EPA.

The Environmental Protection Authority concludes that the loss of substantial numbers of declared rare flora, the degradation of the geographically restricted vegetation association of the dunes, the degradation of the dunal landform and the lack of demonstrated rehabilitation success would result in significant and long-term impacts on the nature conservation values of the Chinocup Nature Reserve. The EPA notes Australia's international obligations with regard to the conservation of biodiversity and considers that the potential impact of the proposed mining operation on the three declared rare flora taxa and other nature conservation values would be significant.

Accordingly, the Environmental Protection Authority recommends:

Recommendation 1

The Environmental Protection Authority recommends that the proposal to mine gypsum in Chinocup Nature Reserve is not environmentally acceptable because of the potentially significant, long-term impacts on the high nature conservation values protected within the reserve.

The EPA is aware of other similar proposals awaiting the outcome of the assessment of this proposal. In order to minimise the expenditure of resources by both the potential proponents of these proposals and the government, the EPA recommends:

Recommendation 2

The Environmental Protection Authority supports the relevant policies of the National Parks and Nature Conservation Authority and the Soil and Land Conservation Council of Western Australia and recommends that they are taken into account by potential proponents of mining proposals within the conservation estate.

The EPA recognises that gypsum has a role to play in agricultural land management and notes that there are existing sources of gypsum servicing the farmers in the Nyabing-Pingrup region. The EPA considers that it is important that the government agencies involved in the provision of gypsum in the Wheatbelt region, in conjunction with the farming community, develop a long term strategy. The EPA recommends:

Recommendation 3

The Environmental Protection Authority recognises that gypsum can play a role in efforts by the rural community to implement sustainable agricultural land use practices and recommends that the Departments of Minerals and Energy, Agriculture and Conservation and Land Management conduct a strategic review of gypsum resources in southwest Western Australia to rationalise its availability and use.

To ensure the surrounding land use practices do not jeopardise the long term viability of the conservation reserves in the Lake Chinocup area and to assist the farming community to implement sustainable agricultural land use practices, the EPA recommends:

Recommendation 4

The Environmental Protection Authority recommends that an integrated catchment management plan for the Lake Chinocup sub-catchment be prepared by relevant community and government agencies.

6. References

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Appendix 1

Proponent's response to issues raised in submissions

SUBMISSION FROM THE DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT (CALM)

1. Nature Conservation Values of Lake Chinocup Nature Reserve

ISSUE 1: The mining lease area has an undisturbed flora which supplies good quality habitat to a variety of vertebrate and invertebrate species.

RESPONSE: The low vegetation density (see photos 3 and 4 in the CER) and lower plant species diversity (as shown in Appendix 2 of the consultant botanist's report, a full copy of which was supplied to CALM prior to the release of the CER) provides a very restricted and diminished range of habitats for fauna.

The poor soils and sparse, lower species diversity vegetation of the gypsum dunes have not been shown to support fauna of special or important conservation significance. Evidence to the contrary should be provided.

ISSUE 2: There are 222 native plant species in the mine lease and adjacent areas which compares favourably with areas elsewhere in the wheatbelt.

RESPONSE: Analysis of the consulting botanist's report shows that plant diversity within the proposed mining area is substantially lower than within the portions of the mining lease not affected by mining and within the remainder of the Chinocup Nature Reserve.

Most of the 222 species are common and widespread and mining will have little impact on the vast majority of their populations. Species of conservation significance that will be affected have been fully described in the CER and later in this letter.

ISSUE 3: Many of these (rare and priority plant) species are found on the south-west of the lake around the inflow area to Lake Chinocup.

RESPONSE: The impacts of mining and related activities on these species have been adequately described in the CER.

Reference to the "inflow area" seems to be implying that any disturbance will cause adverse impacts to be carried by water or gravity into down-slope areas of bush and into Lake Chinocup itself.

However, the Chinocup townsite has already been subjected to disturbance, having been partially used for grazing and habitation during the several decades that the railway line to Pingrup was in operation. In spite of this, impacts have not been reported as a result of water- or gravity-derived influences and both the Nature Reserve and townsite reserve have retained a high conservation value.

ISSUE 4: ...the Hammer Orchid *Drakea isolata*(ms) will be taken by the construction of the mine or access road.

RESPONSE: CALM have been advised that some 500 of these plants occur within an area of 1,000 square metres (Coates, 1993). The proponents have made the commitment (page 36 of the CER) that the detailed Environmental Management Plan (EMP) will fully address the construction and use of the access road, so that loss of these plants will not occur or be kept to very low numbers.

ISSUE 5: The Lake Chinocup population of *Adenanthos pungens* spp. *pungens* .... numbers 1500 specimens.

RESPONSE: Incorrect. Coates 1993 states: "**Over** 1500 plants were counted during field work. Due to time restrictions not all areas were covered in detail and **exact plant numbers would be higher than those recorded."**

ISSUE 6: The proponents suggest 10% of the *Adenanthos pungens* spp. *pungens* populations will be destroyed by the first phase mining operation.

RESPONSE: Incorrect. Page 24 of the CER states that **less than** 10% of the plants of this species will be removed, with the actual figure being 6.7% (100 divided by 1500). Since the population is greater than 1500 plants, the final loss will be even smaller.

ISSUE 7: ...while the proponents have made a commitment not to seek an extension to their mining unless successful rehabilitation of *Adenanthos pungens* spp. *pungens* is demonstrated, the rehabilitation of the species may not be possible and demand for the gypsum resource may override this commitment.

RESPONSE: Commitments made in the CER are legally binding on the proponents. Should the proponents wish to change any aspects of the commitments, they will be required by law to re-submit the changes to the proposal to the EPA for further assessment. CALM will be invited to comment on any future proposal relating to the proposal and, on this basis, the independent umpire (the EPA) will judge the new proposal on its merits.

To try and prevent a proposal from proceeding on the basis of what new proposals **might** be proposed in the future is irrelevant to this environmental assessment process, unless there is a reasonable degree of certainty associated with the possible new proposal. The irrelevance of such claims is especially so when strong safeguards exist to guarantee that new and full environmental assessments of potentially impacting proposals will occur.

ISSUE 8: The proponents have suggested that adult plants of *Adenanthos pungens* spp. *pungens* will be transplanted, but this technique has been rarely successful for similar species.

RESPONSE: CALM have not provided evidence of the lack of success of transplanting of similar species, so it is difficult to provide a specific response. However, standard rehabilitation practice in the mining industry is to remove topsoil and rootstock from an area to be disturbed and immediately place it onto mined-out ground. In this way, rooting material and soil microflora and microfauna can re-establish as quickly and easily as possible.

A refinement of this process is to use an excavator or front-end loader to dig up a large volume of soil and subsoil around a plant, including as much above and below ground plant material as possible, and to place the entire volume into an area prepared for rehabilitation. The relative lack of disturbance to soil, vegetation and other biota in what may amount to one or two cubic metres of excavated material encourages high revegetation success.

This technique is used by most home gardeners, in many research laboratories and commercially in the transplanting of palm and other large ornamental plants.

The technique has worked extremely well when creating constructed wetlands (Masters 1988). While there are many differences between wetlands and gypsum dunes, the technique of large volume transplanting is worth attempting for special plants, in spite of the higher costs involved.

ISSUE 9: Sixty percent of the *Adenanthos pungens* spp. *pungens* is growing on gypsum dunes.

RESPONSE: The implication that sixty percent of the Adenanthos plants will be lost by the proposed mining activity is rejected. The proponents have made the commitment that less than 10% of the plants will be removed in the initial phase of mining, with no further mining to take place until successful rehabilitation has been demonstrated.

ISSUE 10: *Drakea isolata* ..... will be affected by the access track.

See **RESPONSE** to **ISSUE** 4. A detailed flora survey will be undertaken prior to the commencement of ground-disturbing activities in order to avoid or minimise impact to all components of the site's vegetation, including *Drakea isolata.*

ISSUE 11: The effect (of the access track on the *Drakea isolata* population) can't be precisely determined as it is ephemeral and the individuals are only evident above ground in the winter and spring.

RESPONSE: The vegetation survey that will be undertaken to locate and protect this species will occur during the plant's period of above-ground growth in winter and/or spring.

ISSUE 12: Some of the eucalypts in this (gypsum dune) association have hollows that provide nesting sites for fauna. The dunes are one of the few areas in the Nature Reserve that provide such a resource.

RESPONSE: While no evidence has been presented to show what fauna exists in this section of the Nature Reserve and is capable of using these hollows, the proponents have made the commitment on page 31 of the CER to retain denser clumps of vegetation within the mining area. These clumps can include larger trees with hollows if the biological justification is demonstrated.

The proponents make the further commitment that all trees with hollows that are felled within the mining area will be retained on site and erected in a vertical position after mining, so that the hollows remain useable by fauna. Rehabilitation after mineral sand mining at Minninup south of Bunbury employed this technique and, while the trees in question did not have nesting hollows, they were very quickly used by birds recolonising the former mine site.

ISSUE 13: The Western Whipbird ..... and Western Mouse .... are likely to occur in the proposed mine area based on observations of CALM staff and other biologist....

RESPONSE: This claim is strongly disputed. No evidence is presented to support the claim of the Western Whipbird's possible presence, while the evidence in support of the Western Mouse amounts to the finding of several chewed *Santalum* nuts.

CALM have not stated within which vegetation association the chewed nuts were found. *Santalum acuminatum* grows within only 4 of the 10 gypsum dune sites surveyed by Coates (1993), and this species has a much greater areal distribution away from the gypsum dunes.

While unable to dispute whether the presence of chewed nuts is strong or weak evidence supporting the presence of Western Mouse within the mining lease, the fact remains that, due to the low species diversity and low vegetation cover, the gypsum dunes can only provide very marginal habitat for the Western Mouse, if at all.

The proponents do not accept that the discovery of a few chewed nuts in such marginal habitat is sufficient justification for a $10,000+ fauna survey.

The CER provides published information showing that the dunal vegetation provides very poor habitat for these species. If these species are using the gypsum dunes, the unsuitable nature of the

habitat strongly suggests that they would be rare or very infrequent users of the habitat, based upon the lack of dense sheltering cover and low amounts of potential food sources.

ISSUE 14: The construction of the minesite, access roads and associated infrastructure will destroy habitat suitable for these (Western Whipbird and Western Mouse) species.

RESPONSE: This claim is strongly rejected. The minesite is very poor habitat for these species. The access road will require virtually no removal of vegetation (see photo 2 of the CER) and will only be traversed by the proponents or their employees, should mining proceed.

Should two-way traffic be required (subject to CALM approval - see page 10 of the CER), the existing railway line some 10 to 20 metres north of the existing sand track will be used wherever possible, once again requiring the removal of little if any native vegetation.

No development activities will occur until a further detailed botanical survey has been completed, so that important plant species can be located and avoided.

ISSUE 15: The activities of heavy vehicles along the access road and in the Chinocup townsite during mining and stockpiling of the gypsum will pose a disturbance to these (rare faunal) species if they are present in the townsite.

RESPONSE: The townsite and unmade road 8315 are currently used by 4WD and other vehicles, including a motor bike club which visited in the spring of 1993. Mining and associated activities will take place for less than 3 months of the year and there is ample evidence of wildlife rapidly acclimatising to altered noise and other changes to their environmental conditions. The large numbers of birds and animals killed on high speed public roads shows that fauna readily inhabits comparatively poor habitat in the form of narrow vegetated road verges.

Any adverse reaction on the site's fauna from noise and vibration will be short-term and temporary, with the fauna likely to rapidly accommodate the small changes to their physical environment.

ISSUE 16: A mining operation would increase the dieback disease threat to the many susceptible species growing on the reserve.

RESPONSE: One of CALM's own publications (Anon., undated) shows that the Chinocup Nature Reserve is on the extreme inland edge of the dieback infection zone in Western Australia. Furthermore, Dr Frank Podger is chairing a review panel on dieback in W.A. and he has stated that dieback is mostly confined to areas of >600mm rainfall (Podger, pers. comm., 1994) whereas the proposed mine site's rainfall is about 450mm. Hence the risk of dieback surviving if introduced is minimal.

Even so, the proponents have made extensive commitments (see page 31 of the CER) to preventing dieback from entering the area.

ISSUE 17: The construction of access within the proposed mining lease, including the introduction of gravel, poses a dieback risk not fully discussed in the CER.

RESPONSE: Section 8.2 of the CER commits the proponents to adoption in full of CALM's Dieback Disease Hygiene Manual and the Department of Minerals and Energy Guidelines for Management of Dieback Disease.

If meeting CALM's own requirements for dieback disease control is insufficient to prevent its introduction, then no bush area in the southwest of the state has a future.

ISSUE 18: To expect to achieve full rehabilitation of mined sites within five years is quite unrealistic....

RESPONSE: The CER does not make the claim that rehabilitation will be completed within 5 years. The completion criteria given in section 8.5 of the CER are suggested minimum standards that are the basis for on-going human and natural rehabilitation activities. The proponents will be responsible for rehabilitation until these standards are met and the five year period stated in the CER is the time scale within which the proponents expect satisfactory rehabilitation to be demonstrated.

ISSUE 19: (On the question of rehabilitation), the formation of hollows in trees can take over 100 years.

RESPONSE: Agreed, but see **RESPONSE** to **ISSUE** 12.

ISSUE 20: ...we know of no other examples in south-west Western Australia of rehabilitation being able to restore pre-mining floristic diversity.

RESPONSE: Nowhere in the CER are the words "restore" or "restoration" used. The aim of the proponents will be to **rehabilitate** the mined-out area to a standard acceptable to government and the community. Exact restoration is impossible and, even if it were possible, the cost of returning every species that existed prior to mining could be prohibitive.

The goal of rehabilitation at every disturbed site around the world (not only in south west WA) is to return the important species and ecological functions that existed prior to mining, but without fulfilling the utopian aim of restoring **every** species and function.

2. Adequacy of the CER

ISSUE 21: .... as indicated earlier, the proposed lease area carries a diverse, patchy vegetation which supplies habitat for a wide range of animals.

RESPONSE: Although this claim has been made earlier in CALM's submission, no evidence in its support is provided. The consulting botanist's report shows in Appendix 2 that plant diversity is significantly lower in the gypsum dunes area and two site visits by the CER's author (an environmental consultant) showed very low faunal usage of, and diversity within the proposed mining area. If CALM have evidence of "a wide range of animals" using the gypsum dunes, the proponents wish to be advised accordingly.

ISSUE 22: Comments about rehabilitation of the mine site are based on examples of revegetation elsewhere, but they are not analogous to the gypsum dunes at Lake Chinocup, and it is hard to substantiate comparisons between such different ecosystems.

RESPONSE: The CER describes **three** mined and rehabilitated areas in the central wheatbelt (not two as claimed in the attachment to the CALM submission). Two are not comparable either geologically or vegetatively with the Lake Chinocup gypsum dunes, but they demonstrate that, even under relatively harsh environmental conditions (no topsoil, hot dry summers, low winter rainfall, etc), rehabilitation is readily achievable.

The third example is within gypsum dunes near Kondinin where there are major geological and vegetation similarities with Lake Chinocup. Independent rehabilitation consultants at Curtin University have concluded that vegetation recovery and ant species diversity (ants being used as indicators of ecosystem re-establishment) are progressing well (Fox and van Etten, 1987).

ISSUE 23: The gypsum dunes are very much older than stated because the vegetation maps have not been correctly interpreted.

RESPONSE: Page 3 of CALM's Attachment states that "the dune system is geologically young, having formed over a period of **a few thousand years**." Page 14 of the CER states that the dunes have formed over a period of several hundred to **a few thousand years**.

ISSUE 24: The CER has not detailed, nor described, the environmental impacts of the construction and use of the mine site, access routes, or facilities on the townsite reserve. These developments will affect rare and priority plant species and may affect animals gazetted as endangered.

RESPONSE: Activities within the minesite will have no impact on the townsite, which lies between one and 7 kilometres to the west of the gypsum dunes.

The impact of access routes on the townsite reserve will be minor. A number of tracks already exist in the western section of the reserve and these will be utilised for haulage of gypsum, thus overcoming the need to remove vegetation for new roads. Access from the stockpile area to the minesite will be along the existing sand track (see photo 2 of the CER), while two-way access, if required and subject to CALM approval, will require the second lane to be developed along the existing railway line.

Apart from the stockpile area, there are no facilities associated with the mining operation that can impact on the townsite reserve. Stockpiling will be restricted to the 0.4 hectare gravel-surfaced ares of the former railway station and parking area. This 4000 square metre site is dominated by exotic plant species and can store at least 6000 cubic metres of gypsum sand without enlargement. Mining will cease once the stockpile area is full, only recommencing once sales to farmers have reduced the stored volume.

Unless rare and endangered plant species are growing on the existing roads and the gravel-surfaced stockpile area (which is unlikely but which will be investigated prior to ground disturbance commencing), no floral conservation values will be affected within the townsite.

See also **RESPONSE** to **ISSUE 14** relating to impacts on fauna.

ISSUE 25: An Environmental Management Program, as required by the EPA, has not been submitted. Therefore much of the detail required to make an informed decision is missing.

RESPONSE: CALM seems unaware of the process that exists in W.A. to ensure environmental protection during mining. A proponent wishing to conduct mining operations must provide a Notice of Intent to the Department of Minerals and Energy (DOMEWA). If the proposal is likely to have environmental impacts, DOMEWA then refers it to the EPA who decide the level of assessment of the proposal.

If a formal level of assessment is decided, the proponents must prepare a public document for interested parties (including CALM) to consider and prepare written submissions. The purpose of the public document is to determine if the likely environmental impacts are minor or major and if their impact can be reduced or eliminated. The public document should contain sufficient information for general conclusions to be drawn.

If, after considering public submissions, the EPA and government consider that the impacts are manageable and/or acceptable, an Environmental Management Program (EMP) is prepared for DOMEWA, after consultation with CALM, EPA and other government agencies.

The EMP is the detailed blueprint which controls the day-to-day activities of the mining proposal. It is not intended to be an assessment document.

The public assessment process is used to check for omissions and oversights, calling upon the combined expertise and opinions of government officers, conservation group members and the public. If deficiencies exist in the public document, it is reasonable to hope that submittors will highlight these deficiencies and state what actions they would like the proponents to commit themselves to.

3. Management Issues Related to Small Operations

ISSUE 26: ...this type of (small) operation is expensive to supervise given the level of available expertise for mine development, operation and rehabilitation works.

RESPONSE: CALM's failure to understand the process is again regretted. Once mining is approved, the Department of Minerals and Energy are responsible for all facets of the mining operation, including rehabilitation. However, it is the proponents who must supervise the operation on a day-to-day basis at their own cost, following the details laid down in the EMP. If additional skills and expertise are required to implement some or all of the EMP requirements, the proponents must employ appropriate people.

The involvement of government agencies is generally limited to a once or twice yearly site visit after having studied the reports prepared by consultants or the proponents at the proponents' cost detailing mine and rehabilitation progress.

Should this project be approved, CALM's on-going involvement is not expected to exceed four (4) days per year. While it is understood that the proponents may have to compensate CALM for their time and other professional involvement in certain aspects of the proposal, CALM's net cost of involvement in this project will be small.

4. Precedent of Approval to Mine at Chinocup

ISSUE 27: Given ... the high cost to nature conservation values of any mining and the high cost to Government of managing mining as proposed.....

RESPONSE: Both claims are strongly rejected. Environmental impacts will be minor and CALM's net cost of involvement in the project will be
small.

ISSUE 28: It is considered very likely by CALM officers that at least two other operators will lodge similar claims on nature reserves if this present proposal is approved.

RESPONSE: The environmental assessment process operating in W.A. requires that all projects be judged on their merits. Other proposals for gypsum mining will have to go through the same process as this proposal and they will be judged on the basis of their environmental and other costs and benefits.

The proponents do not believe that arguing against a site-specific proposal on the basis of precedent is valid.

5. Alternative Sources of Gypsum

ISSUE 29: The proponents have carried out some surveys to assess the value of other local gypsum resources.

RESPONSE: If suitable gypsum resources were available on private land, it is reasonable to assume that the proponents would prefer to gain mining approval for those resources, rather than go through the time consuming, costly and public process of seeking to mine within a Nature Reserve.

If suitable gypsum resources were available on other Crown land, including Nature Reserves, it is reasonable to assume that the proponents would prefer to gain mining approval where the environmental values of the Nature Reserve were lower. However, no suitable gypsum resources on other Nature Reserves within the Pingrup-Nyabing area are known.

Since CALM is not known to have geological expertise within its organisation, it is reasonable for the Geological Survey of W.A. (who are the recognised mineral resource assessment experts within the government) to judge whether other gypsum resources exist in the Pingrup/Nyabing area and whether the proponents' survey has been sufficiently extensive.

As stated on page 20 of the CER, the Geological Survey of W.A. has agreed that the Chinocup resource is probably the only sizeable sand-sized gypsum deposit within a reasonable distance of the Pingrup/Nyabing area.

If the twenty years of exploration for gypsum resources by Paul Shiner, one of the proponents, had located other suitable deposits, it is reasonable to assume that attempts to gain mining approval over them would have been made.

ISSUE 30: This (survey) work was the subject of a document prepared by the proponents but not included in the CER, and not generally available for general information.

RESPONSE: The report (copy enclosed) was provided to the Geological Survey of W.A. (see above). It totals 5 pages, with additional pages of maps and letters from landowners stating that their properties have been surveyed without success.

If CALM or the EPA have doubts about the integrity of the survey by Paul Shiner, the proponents encourage them to contact the Geological Survey of WA for verification of the claims made in the CER.

ISSUE 31: CALM believes that a proper review of alternative sources of gypsum should be conducted.....

RESPONSE: CALM should provide evidence of the improper nature of the 20 years of surveys by Paul Shiner.

ISSUE 32: It would be desirable that any review is carried out by an independent party.

RESPONSE: It is assumed that CALM is prepared to accept that the Geological Survey of W.A. is unbiased in the way in which it has provided advice to Paul Shiner and then reviewed his report. Hence, the proponents repeat their encouragement for CALM and the EPA to liaise with the Geological Survey of W.A. to determine the Survey's satisfaction or otherwise with the resource assessment carried out by Paul Shiner.

ISSUE 33: An assessment of alternate sources should address the costs of developing a mine, including the environmental management costs.

RESPONSE: Environmental management of all mining operations is now a mandatory requirement of the Mining Act. The proposed Chinocup mine will have additional costs to bear in the form of flora surveys and dieback prevention, amongst others, but these will be relatively small in comparison with the costs of the project as a whole.

Only in the case of lake bed mining will environmental management costs be significantly lower, but these will be overwhelmed by the greatly increased mining and processing costs.

SUBMISSION FROM THE NATIONAL PARKS AND NATURE CONSERVATION AUTHORITY (NPNCA)

ISSUE 1: ... the area to be impacted includes a significant number of individuals of two rare plant species, as well as an association of restricted distribution, being confined to well-developed dunes.

RESPONSE: Less than 10% of the *Adenanthos pungens* spp. *pungens* population will be affected by mining activities. A botanical survey will be carried out in winter and/or spring to locate individuals of *Drakea isolata* so that no plants will be affected by road upgrading works.

If biologists study an area in sufficient detail, it can be guaranteed that a vegetation association with some form of restricted distribution can be found to justify the claim that a vegetation association "is confined to" a particular area under study. The loss of or damage to this association can then be claimed to be of major environmental impact.

Such arguments against a potentially impacting proposal should be recognised as having only minor scientific merit. The Federal Government is leading a campaign to protect Australia's biological diversity, with its major thrust being to conserve areas of species richness as the first priority.

The "Mallee over Scrub" is an association of impoverished species diversity and, as such, its loss or modification would be of relatively minor environmental significance when compared with the loss of almost any other vegetation association within the Chinocup Nature Reserve. However, due to commitments made by the proponents, this vegetation association will not be lost. At worst, it will be modified during the mining operation, prior to its regrowth once rehabilitation commences.

The far more important issue relates to conservation of rare or priority species that occur within it. This issue has been fully canvassed in the CER and at various parts of this letter.

ISSUE 2: .... there is no clear evidence that such rehabilitation can be effected to a satisfactory standard.

RESPONSE: The CER provides three example of rehabilitation after mining in the central wheatbelt area. Two serve only as examples of the relative ease with which revegetation occurred; the third showed that independent consultants from Curtin University assessed rehabilitation as "progressing well" on former gypsum dunes in the Kondinin Nature Reserve.

If there has been no mining over gypsum dunes of the type comprising the Chinocup deposit, it will of course be impossible to provide clear evidence that rehabilitation can be satisfactory. However, when assessing the likelihood of success, all evidence must be considered and the CER aims to show that:-

* in general terms, other rehabilitation efforts have been successful, and

* rehabilitation is a learning process, with new information and ideas being incorporated as they come to hand. Hence, the proponents are suggesting improved rehabilitation practices at Lake Chinocup (when compared with Kondinin Nature Reserve). This is in spite of the loss of some $1,000,000 worth of gypsum left behind at the base of the mining area to act as a substrate in which plants can more readily re-establish.

ISSUE 3: Insufficient attention is given in the CER to the potential impacts of stockpiling and access.

RESPONSE: Stockpiling of sand-sized gypsum on an existing gravel-covered area will not have impacts of any note within the Chinocup townsite. The area is a former railway siding which operated for many decades, part of which was subjected to grazing, firewood removal and other disturbing influences.

Access routes will use the existing railway formation and the various tracks within the townsite and Nature Reserve. Very minor removal of native vegetation will occur, being restricted to the loss of individual bushes that have regrown on the edge or in the middle of the already existing, cleared access ways.

Full dieback protection measures will be implemented if material for road upgrading is needed in addition to gravel that presently forms the railway formation.

The proponents are prepared to accept whatever reasonable safeguards or protective actions are recommended by the government agencies responsible for land management.

ISSUE 4: We understand from CALM that the costs of supervising comparable mining operations, especially by operators with very little experience in extraction and rehabilitation, can be very high.

RESPONSE: The NPNCA and CALM appear to have received inaccurate advice and they thus fail to understand the mining and environmental protection processes that operate in this state.

Once mining is approved, the Department of Minerals and Energy supervise all facets of the mining operation, including rehabilitation. However, it is the proponents who must undertake the operation on a day-to-day basis, following the details laid down in the EMP. If additional skills and expertise are required to implement some or all of the EMP requirements, the proponents at their cost must employ appropriate and suitably trained personnel.

The involvement of government agencies such as CALM is generally limited to a once or twice yearly site visit after having studied the reports prepared at the proponents' cost on mine and rehabilitation progress.

CALM's involvement in this project is not expected to exceed four (4) days per year.

As the proponents do not have skills in mine rehabilitation, they have made the commitment in the CER to employ suitable qualified and experienced consultants to plan, implement, supervise and report on the rehabilitation process.

ISSUE 5: It is not adequately established, in our view, that there are no practicable alternative sources of gypsum, even if these are somewhat more expensive.

RESPONSE: The proponents welcome approaches being made to the Geological Survey of W.A. to verify the CER's conclusion that no practicable alternative sources of gypsum occur within 80 kilometres of the Chinocup deposit.

If CALM could achieve cost savings of up to 70% in one of their operational activities and increase their income significantly, it is unlikely they would describe such savings as "somewhat" desirable. This is the situation facing farmers in the Nyabing/Pingrup area: they are aware of the cost savings that can be made by using local gypsum, with worthwhile increases in income, but they are generally unwilling to accept a cartage distance up to four times greater than for gypsum from the Chinocup deposit.

ISSUE 6: Until the cost effectiveness of locating and utilising alternative sources of gypsum have been more thoroughly investigated, it remains perfectly possible that conservation values will exceed the return from mining within the reserve.

RESPONSE: Economists have failed to produce models that are able to place a dollar values on virtually any aspect of the environment. Therefore, the argument of cost effectiveness of mining gypsum versus leaving the Nature Reserve untouched by mining can never be resolved in financial terms.

The environmental benefits from gypsum mining within the Nature Reserve include:-

* the addition of up to half of the Chinocup townsite reserve into the Nature Reserve, within which are 6 rare or priority plant species together with suitable habitat for three rare faunal species

* the opportunity for CALM to receive local support for more intensive management of the Chinocup Nature Reserve, including closure of unmade road 8315

* the gathering of additional base data about the Chinocup Nature Reserve and townsite reserve as will be produced
by the proponents' consultants; and

* improvements to water and soils on several thousands of hectares of cleared agricultural land in the Nyabing/Pingrup area.

ISSUE 7: ....what would happen once the proposed gypsum supply from Chinocup had been exhausted - might there not be just modest and short-term benefits for agriculture to weigh against long-term damage to the conservation estate?

RESPONSE: The proponents would disagree that agricultural benefits would be modest and short-term. Agriculture in Australia is going through a land care revolution at present, with over 25% of farmers being members of Land Conservation District Committees that collectively cover all of the south-west land division.

By the time that gypsum resources at Chinocup are mined out (10 to 20 years if successful rehabilitation of *Adenanthos pungens* spp. *pungens* cannot be shown, or 60 years if the entire resource is made available), it is the hope of every land care group and involved government agency that farmers will have radically changed their farming practices. In addition, there will have been widespread revegetation on up to 30% of wheatbelt farmed land, in order to protect soils and improve ground and surface water quality.

The provision of a high quality local source of gypsum is an important part of tackling these land care problems. Farmers are not enjoying prosperous times at present and a 70% higher gypsum haulage cost is a real and significant impediment to using gypsum for soil improvement. The EPA is urged to obtain comment on this issue from local Department of Agriculture officers stationed in the wheatbelt.

The proponents have concluded that, properly managed, mining of gypsum from the Chinocup Nature Reserve will cause minor environmental impacts of no short- or long-term importance to the reserve.

Gypsum availability from the Chinocup deposit is an important weapon in the land care revolution currently under way throughout the state.

ISSUES RAISED BY OTHER SUBMITTORS

(The numbering system used here is as supplied by the Department of Environmental Protection in their summary of issues raised).

ISSUE 3: What area of gypsum lunette vegetation system is on nature reserves in the Wheatbelt region, and what proportion of this remnant vegetation would be disturbed by the mining proposal? Note that this specifically refers to the gypsum lunette vegetation type, not entire nature reserves, which are a mosaic of vegetation systems.

RESPONSE: The Wheatbelt covers approximately 400,000 square kilometres and no government agency has collated data that will allow this question to be answered. It is clearly beyond the proponents' resources (and responsibility) to map all dune associations in the Wheatbelt.

However, the Geological Survey of WA has mapped the entire state and, as an example, their Dumbleyung 1:250,000 map sheet shows the presence of over 100 Recent-age dunes on the eastern sides of salt lakes, with a total dune length estimated at several hundred kilometres. The proportion of these dunes that contain gypsum is unknown, but the Geological Survey state that many are gypsiferous near playa lakes.

Data on what proportion of these dunes are within Nature Reserves are also unavailable. However, most of the eastern side of the Lake Grace wetland system is within the conservation estate and the Dumbleyung geological map shows many tens of kilometres of dunes occurring on the east sides of this wetland system

The Chinocup proposal seeks to mine approximately four (4) kilometres of gypsum dunes, although unmined remnants will be retained as stated in the CER.

ISSUE 4: The need for this proposal is not that farmers do not have access to a supply of gypsum, but that it could be a cheaper supply because of the saving in transport costs. Is this a correct summary of the justification of the proposal as presented in the CER? Has the proponent taken the probable higher cost of environmental management for this mining operation into account in estimating any net savings to local farmers? You may choose to present a summary of potential savings for a typical farmer in the area taking all the economic factors into account.

RESPONSE: It is incorrect to state that gypsum from the Chinocup deposit **could** be cheaper than elsewhere because of reduced transport costs: it **will** be cheaper. This is because of an average haulage distance of 20 to 40 kilometres, compared with 80 to 100 kilometres from the nearest supply at Lake Magenta some 130 road kilometres distant (see Farmnote 32/85 - Appendix 1 in the CER).

As required by the Mining Act, all mining operations must now be rehabilitated as a standard procedure. Based upon advice from experienced consultants, the proponents believe that rehabilitation costs will be similar or only marginally higher than normal for a mining operation of this type.

As described in **RESPONSE** to CALM's **ISSUE 26**, CALM's claim that they will incur increased supervision costs is incorrect. The proponents will be rehabilitating the mining area based upon an Environmental Management Plan prepared (at the proponents' cost) to CALM's and DOMEWA's satisfaction. CALM will then be required to visit the mining area on a once or twice yearly basis, after having reviewed the consultant's reports on rehabilitation progress.

The proposed mining operation will incur additional costs because of the need for additional flora surveys but, assuming that mining approval is granted, they will be relatively small expenses when compared with the overall mining operation's annual turnover.

As stated in the CER, farmers buying gypsum from a source such as Lake Magenta would pay up to 70% more for gypsum delivered and spread than for material mined from the Chinocup deposits.

Farmers' cost savings would be 100% or more if based upon the cost of gypsum supplied to their door but excluding spreading costs.

ISSUE 5: Concern has been raised about the potential loss of *Adenanthos pungens* spp. *pungens* as a result of the proposal, both from the operating site by direct removal and from adjacent areas by the introduction of dieback disease. How would such a loss be prevented? The CER states that the risk of dieback introduction and establishment is low. However, given the susceptibility of *Adenanthos pungens* spp. *pungens*, what are the consequences of dieback likely to be? The dunes on which *Adenanthos pungens* spp. *pungens* grow also support the Mallee over Scrub vegetation unit, which is confined to the well-developed dunes. How would this ecosystem be protected?

RESPONSE: Physical removal of the rare *Adenanthos* plants from the minesite will be limited to 100 plants, beyond which demonstration of the species' successful rehabilitation must be demonstrated to CALM's satisfaction or else mining will not be able to disturbed this plant further. The loss of 100 plants from a population exceeding 1500 will have minor impact on the population's overall genetic make-up and viability.

Dieback will be prevented from entering the site by strict adoption of CALM's Dieback Disease Hygiene Manual and the Department of Minerals and Energy Guidelines for Management of Dieback Disease. As well, the mining site's calcium-rich gypsum soils are likely to be antagonistic to the dieback fungus so that, in the unlikely event of its introduction, it is not expected to establish but to die out quickly after introduction.

Nearby quartz dunes carrying the remainder of the *Adenanthos* plants are likely to provide a more suitable substrate for the survival of the fungus, should it be introduced. However, access to these dunes is not required to allow gypsum mining to proceed, so that the dieback fungus should not be introduced by mining or related activities.

The proponents believe that, should the worst happen and dieback is introduced to the gypsum dunes, it will not mean the extinction of this subspecies since it is present on dunes that are physically separated by several hundred metres from the proposed mining area, often by highly saline soils which will kill the dieback fungus if it attempts to move to uninfected areas.

The Mallee over Scrub vegetation unit will be protected in the short term by strictly adhering to CALM's Dieback Disease Hygiene Manual and the Department of Minerals and Energy Guidelines for Management of Dieback Disease. In the medium to long term, successful rehabilitation after mining will allow the vegetation unit (or very similar vegetation) to re-establish.

ISSUE 6: The vegetation community on the gypsum dunes is probably unique because of the particular characteristics of the environment; what justification is there for disturbing and probably endangering that community, considering Australia's obligations to conserve biodiversity?

RESPONSE: The widespread distribution of Recent-age quartz and gypsum dunes has been explained above (see **RESPONSE** to **ISSUE 3** on page 16).

In addition, if biologists study any larger area in sufficient detail, it can be guaranteed that some form of "uniqueness" can be found to justify the claim that a vegetation association "is only found" in the study area. The loss of or damage to this association can then be claimed to be of major environmental impact.

Such arguments against a potentially impacting proposal should be recognised as having minor scientific merit. The Federal Government is leading a campaign to protect Australia's biological diversity, which requires that genetic information, individual species and ecosystems be protected (Bennett 1993).

Conservation of areas with high species richness is the first priority. The "Mallee over Scrub" is an association of impoverished species diversity and, as such, its loss or modification is of relatively minor environmental significance when compared with the loss of almost any other vegetation association within the Chinocup Nature Reserve.

If the above comments have accurately placed the "Mallee over Scrub" association in its true context, the next most more important issue after conservation of species-rich areas relates to conservation of rare or priority species that occur within it. This issue has been fully canvassed in the CER and at various points in this letter.

ISSUE 7: To enable the proponent to quantify the impact upon the two rare and six priority species, a detailed flora survey of the species would be required. Will a flora survey be undertaken for these species and at what stage?.

RESPONSE: Commitments to further flora surveys have been made in various parts of the CER. If mining approval is gained, surveys will be undertaken before the commencement of any ground-disturbing activities that may impact upon the site's flora.

ISSUE 8: What measures to stop weed invasion of the nature reserve would be effective?

RESPONSE: Standard procedures are similar to those employed to prevent the spread of dieback fungus, with a compulsory wash down of vehicles entering the mining area being the most important. Should weeds become established within the mining area, they will be removed by CALM-approved methods, including chemical spray, mechanical disturbance or hand weeding.

If CALM believes that the use of fertiliser during rehabilitation may encourage weed growth, fertilisers will not be used.

Weeds are already well established within the proposed stockpile area, due to several decades of prior use for railway-related purposes. Stockpiling gypsum on the weed-covered gravel area will not assist in the spread of weeds into surrounding bushland.

ISSUE 9: The proponents may have misinterpreted the rate of growth of the gypsum dunes, judging by the age of some of the Eucalypt trees (over 100 years) and CALM's interpretation of the two sets of vegetation maps which were produced 30 years apart. Is there any other evidence which can establish the dune growth rate?

RESPONSE: It is incorrect to imply that vegetation only began to grow on the gypsum dunes the day that they reached their present height! Vegetation has been growing on the dunes from the time that soil conditions became suitable to support plant growth, probably many hundreds or even several thousands of years ago. However, the dunes have continued to grow, with older trees and shrubs dying over time and younger ones having their roots and lower trunks of plants simply covered in gypsum sand. This is a common occurrence in coastal sand dunes and it should not be surprising that it happens on inland dunes as well.

A copy of the 1972 aerial photograph has not been supplied by CALM for the proponents' examination. Even so, there are too many important differences between the 1975 map of McKenzie and Youngson and that of Coates in 1993 to support the claim by CALM that there has not been rapid growth of dunes.

For example, west and east of survey point 13b (see figure 5B of the CER), Coates has mapped a 1.2 kilometre long, 100 to 200 metre wide low dune of Scrub - Open Scrub/Scrub patchy over Dwarf Scrub C over Open Dwarf Scrub D. Even allowing for a lack of detail on the part of McKenzie and Youngson, it would have been difficult to omit such a large, vegetated feature when studying aerial photographs in the early 1970s.

The lack of topsoil within the dune area and the sparse vegetation cover are further evidence of the area's geological youthfulness.

Other evidence for the geological rapid rate of dune growth should be available when mining commences, in that there could be buried vegetation and fossil soil horizons within the dunes. As well, existing trees on the dunes would be expected to have the base of their trunks a greater distance below the ground surface than normal.

ISSUE 10: During a field inspection by officers from CALM, it was noted that there was some evidence that the Western Mouse, a rare species, may inhabit the dunes land system. To determine the status of rare and other fauna which may inhabit the dunes, a fauna survey would be required. Will a fauna survey be undertaken and at what stage?

RESPONSE: The paper by Morris et al (1993) states: "The (Quandong) nuts **typically** have their kernels extracted through a small hole chewed in the hard seed casing. These collections of nuts accumulate over time and can be used to indicate the presence of **native rodent species** in the southern wheatbelt" (emphasis added).

CALM's submission only mentioned that chewed nuts of the Quandong were found and they have been used to indicate the presence of the Western Mouse elsewhere. The proponents are concerned that the statement by Morris *et al* is quite specific, stating that nuts chewed by native rodents **typically** have a small hole chewed through the hard seed casing. It is unfortunate that CALM's submission did not specify whether the chewed nuts located in the mining area had this characteristic feature or whether they were chewed in some other way.

In addition, CALM have not stated within which vegetation association the chewed nuts were found. *Santalum acuminatum* (the source of the nuts that were chewed) grows within only 4 of the 10 gypsum dune sites surveyed by Coates (1993), and this species has a much greater areal distribution away from the gypsum dunes.

While unable to dispute whether the presence of "chewed nuts" is strong or weak evidence supporting the presence of Western Mouse within the mining lease, the fact remains that, due to the low species diversity and low vegetation cover, the gypsum dunes can only provide very marginal habitat for the Western Mouse, if at all.

The proponents do not accept that "chewed nuts" in such marginal habitat is sufficient justification for a $10,000+ fauna survey.

However, mining approval could be given subject to a faunal survey being carried out prior to ground disturbance. An expensive and time consuming fauna survey required as a pre-cursor to the EPA assessment process would provide a considerable financial burden to the proponents who would still have no guarantee of project approval, even if the fauna survey failed to show the presence of rare or other important faunal species.

ISSUE 11: What would be the "barrier effect" of the proposed new road and truck movements upon the movement of fauna between the lake and surrounding habitats; particularly the Tammar Wallaby, which has been recorded from the nearby water reserve?

RESPONSE: An abandoned railway line and several sand tracks already exist within the Chinocup townsite and Nature Reserve. The barrier effect would not be significantly worsened by minor upgrading of one or two of the existing tracks.

The increased truck traffic would increase the noise and vibration levels on local roads, both within the Nature Reserve and townsite reserve and outside. However, outside roads already carry high numbers of trucks, especially in the wheat harvesting season.

Most Australian mammals, including the Tammar, are nocturnal. Gypsum mining, stockpiling and sales to farmers are planned to only occur during daylight hours.

The water reserve (which lies some one kilometre south west of the Chinocup townsite) is surrounded by cleared agricultural land which is subjected to working by large machinery at various times throughout the year. This and the open nature of cleared agricultural ground would be far more serious barriers to faunal movements than the seasonal, day time use of roads in and around the proposed minesite.

There should be minimal impact on the area's fauna due to the barrier effect and human-derived disturbance.

ISSUE 12: What is the importance of the lake and fringing dunes to waterbirds, particularly for breeding, considering the Lake Grace wetland system is known to be of major importance to waterfowl?

RESPONSE: This issue is fully discussed in the CER, with the conclusion that up to 70 hectares of mining to within 10 metres of the edge of a lake system that covers 12,500 hectares and has some 30 kilometres of lake edge will have no significant environmental impact on waterfowl.

The fringing dunes offer poor feeding, roosting and nesting habitat to waterbirds and waterbird usage of the proposed mining area is certain to be very low.

ISSUE 13: During a field inspection by officers from the Departments of Environmental Protection and CALM, the remains of many aquatic invertebrates were noted where water had dried up abutting the gypsum dunes. The importance of the lakes to waterbirds is noted in the CER. Would mining of the dunes affect these fauna? To determine the importance of aquatic invertebrates to the waterbirds, a survey would be required. Will a survey be undertaken and at what stage?

RESPONSE: Mining will not impact on the lake, its waterbirds and its invertebrate fauna, for reasons outlined in the CER. Thus, studies on the lake's aquatic fauna are not justified, neither prior to completion of the environmental assessment process nor as a condition to be imposed upon grant of the proposal. Mining will have no measurable affects on the lake's hydrology. Ground-disturbing activities will be restricted to the summer and early autumn months, when the lake is generally dry or the water's edge is several hundred metres from the lake edge and hence from the mining area.

There is little point in carrying out a study to determine the importance of invertebrates to waterbirds, since all parties will acknowledge that the importance is beyond dispute. Far more relevant is the potential impact of mining on the invertebrates and the proponents' believe that no impacts will occur because of the nature of the mining proposal.

ISSUE 14: What impact would the loss of vegetation due to mining have on the groundwater levels, considering the potential for salinisation of areas surrounding the lake due to a rising water table?

RESPONSE: Examination of topographic maps and aerial photographs shows that the area proposed for mining is almost totally surrounded by saline playas and mud flats. Should salinisation develop within the mining area, no surrounding land would be affected. Where the mining area is not surrounded by saline soils, quartz dunes are found. These dunes have a higher elevation than the gypsum dunes and it is inconceivable that a higher water table could impact on them.

More importantly, however, the gypsum dunes are sparsely vegetated and most rainfall would enter the highly porous and permeable sands to rapidly become groundwater. However, lateral

groundwater flow rates are also high and this would cause rain water to quickly flow out of the dunes and mix with surrounding saline lake water.

Underlying the dunes are clay-rich sediments, probably highly saline. However, there may be a thin freshwater layer floating on top of the saline water layer, providing some freshwater to the deeper rooted dunal vegetation over the summer and autumn. Mining will not extend into this basal clay and, by retaining a 30 centimetre of gypsum sand above the clay, infiltration by rainwater will continue.

Revegetation of the mined-out area will return the water balance of the site to its pre-mining conditions in a relatively short period of time.

At the Kondinin Nature Reserve, mining has exposed the basal clay layer. Fox and van Etten (1987) have not indicated that salinisation or other groundwater problems inhibiting rehabilitation exist.

ISSUE 15: There is evidence of water erosion of the dunes at levels up to 1.5m above the lake bed level; what role do the dunes play in controlling the hydrology of the lake, particularly the flood waters? Will a hydrological survey of the surface and groundwaters of the lake be undertaken?

RESPONSE: One small section (less than 40 metres) of the high gypsum dunes has been subjected to erosion from water within Lake Chinocup. The vegetation edge now lies at the edge of the erosion face (see enclosed PHOTO 1) and, consistent with the proponents' commitments in the CER, no mining within 10 metres of this face will occur.

Because the dune edge will be retained, along with 30 centimetres of gypsum sand left throughout the mining area together with clumps of vegetation and their underlying gypsum, a dune buffer will be left throughout the mining area.

Examination of topographic maps shows that flood waters with the lake are naturally able to move behind the proposed mining area via existing mud flats and up existing creeks. The gypsum dunes play only a minor overall role in controlling lake hydrology.

There is no evidence visible on the ground of the dunes having been breached by high floodwaters in the recent past. Erosion affects less than 50 metres of the 4000 metres of lake edge occurring within the mining lease. Flood waters 1.5 metres high would inundate the central eastern section of the mining lease where samphire flats are generally less than 1.0 metres above the lake level.

No justification for a hydrological survey being carried out has been provided by any of the submittors. The proponents encourage the EPA to seek independent advice from the hydrogeological section of the Geological Survey of W.A. and the proponents are willing to accept their recommendations.

ISSUE 16: It is reported that freshwater seeps occur at times in the dunes. What role do the dunes play in storing freshwater which may be important to flora and fauna in this saline environment.

RESPONSE: Because of the highly porous and permeable nature of the gypsum sand within the dunes, their importance in storing freshwater for plant and animal use is considered to be low.

For dunes to provide a source of seepage water over a 6 month period (summer and autumn), they should contain a large volume of sediment and this sediment should have a high porosity (water holding capacity) but only a low to moderate permeability (water flow rate). In this way, after winter rains have replenished the groundwater within the dunes, it will slowly move laterally to the edge of the dunes prior to seeping out as a spring or similar. Highly porous and permeable dunes such as those proposed for mining will provide little if any freshwater seepage at the times of the year when waterbirds and other fauna most need it, namely summer and autumn.

Lake Chinocup has a 30 kilometre lake edge and the geological map shows dunes along at least 25% of its shoreline. It is expected that many of these will have a higher clay content than the dunes within the proposed mining area and hence be better suited to providing freshwater seepages over the summer months.

See also PHOTOs 1, 2 and 3 enclosed.

ISSUE 17: Alternative mining methods (stockpiling of gypsum on the lake bed and leaching of salt) and the location of other gypsum deposits (both existing and potential) need to be more rigorously identified and discussed, as part of the justification for the need to mine this deposit. This should include an analysis of deposits on private land, not just public land. How would this be done?

RESPONSE: Paul Shiner has spent 20 years searching for gypsum deposits in the Nyabing/Pingrup area with the Lake Chinocup deposits the only ones that he is aware of. He also explored without success each of the 45 sites suggested by the Geological Survey of W.A. who agree that the Chinocup deposits are the only potentially economic deposits of gypsum in the Nyabing/Pingrup area.

If CALM or the EPA doubt the truth of the statements made by the proponents, they are encouraged to obtain independent advice from the Geological Survey of W.A.

A copy of Paul Shiner's report is enclosed.

Salt lakes in the general project area share common characteristics of high mud and salt levels, unstable surfaces, gypsum crystals requiring washing, crushing and sizing, etc.

Exploration of other lakes would produce the same conclusions as for Lake Chinocup, namely, that the cost of producing lake bed crystalline gypsum would be significantly greater than for material produced from land-based dunal mining.

The proponents understand that trials have been initiated at Lake Brown to assess whether lake bed gypsum can have salt and clay removed by rain falling onto exposed mined material.

Even if rainfall is able to remove salt and clay, the problem of gypsum grainsize remains. Typically, lake bed gypsum occurs as crystals up to 10 or 20 centimetre in size, requiring crushing and screening to produce a sand-sized product useable by farmers. Unless a lake bed deposit of suitable grain size gypsum is located, the additional costs of crushing and screening are certain to render this material more expensive than dune gypsum from a deposit such as at Lake Chinocup.

In addition, specialised equipment is needed to gain access to the surface of wheatbelt salt lake beds, increasing the capital cost of mining. Heavy winter rains flooding a salt lake earmarked for mining may prevent access for one or more years.

The Jurien Bay gypsum deposit is mined by summer excavation of material followed by winter leaching by rainfall. However, this coastal area has a much higher rainfall than the Nyabing/Pingrup area and the lake from which Jurien Bay material is extracted is dry virtually every summer because of the site's drainage characteristics.

ISSUE 18: What is the basis for the claims of up to 400% improved productivity following the application of gypsum, considering that the Department of Agriculture reports that the usual response is an improvement of between 16-38% in two out of three of the areas treated in similar areas of the Wheatbelt?

RESPONSE: The CER's claimed yield increases are based upon discussions with local farmers, the proponents' experience and advice from Department of Agriculture officers familiar with central wheatbelt gypsum-responsive soils.

The Department of Agriculture Farmnote contained in Appendix 1 of the CER claims usual productivity gains of between 30 and 50%. These are significantly higher than the above-quoted gains of 16 to 38%. The proponents suggest that local farmers and Department of Agriculture field officers be asked by the EPA to give their first-hand experience on this subject.

ISSUE 19: Two of the three examples of rehabilitation quoted in the CER are very poor examples of "successful rehabilitation" of a mining area back to a natural ecosystem; they have not demonstrated any the establishment of the vegetation type which exists on the dunes. Are there any other examples or evidence that the proposed mining area could be restored to something similar to the present ecosystem?

RESPONSE: The proponents strongly reject the claim that any of the disturbed sites quoted in the CER "very poor" examples of rehabilitation. All are successful examples of vegetation returning to grossly disturbed areas, with the illegal gypsum mining site near Pingrup having received no rehabilitation work and yet revegetation is well established within 6 months of mining.

In their submission, CALM appear to have ignored the **third** and most important example of successful rehabilitation given on page 35 of the CER. This is especially disappointing since documentation is held by CALM's Como library and the mining area is well known to several of CALM's senior staff.

The CER describes **three** mined and rehabilitated areas in the central wheatbelt . Two are not comparable either geologically or vegetatively with the Lake Chinocup gypsum dunes, but they demonstrate that, even under relatively harsh environmental conditions (no topsoil, hot dry summers, low winter rainfall, etc), rehabilitation is readily achievable.

The third example is within gypsum dunes near Kondinin where there are major geological and vegetation similarities with Lake Chinocup. Independent rehabilitation consultants at Curtin University have concluded that vegetation recovery and ant species diversity (ants are used as an indicator of ecosystem re-establishment) is progressing well (Fox and van Ethene, 1987).

ISSUE 20: The role of gypsum application in ameliorating hydrological problems with soils in the Wheatbelt needs to be discussed in more detail and placed in context with other techniques and land management practices.

RESPONSE: The CER did not set out to be a comprehensive manual on desirable land care practices in the central wheatbelt. The proponents believe that page 6 and Appendix 1 of the CER provide sufficient detail on the role of gypsum in land care and soil improvement. The EPA is encouraged to seek independent advice from the Department of Agriculture on this issue.

Gypsum use is just part of a land care package of measures, which include drainage works, tree planting, minimum soil tillage, stubble retention, soil and water testing, etc. It is an important tool with which to care for certain clay-rich, water-repelling, sodic soils, and no acceptable substitute is available.

Between 5 and 15% of the Nyabing/Pingrup soils are gypsum-responsive and the Department of Agriculture strongly supports the use of gypsum for soil and water conservation.

As stated in Deeker and Bennett (1993), it is pointless to manage vegetation remnants in isolation from each other or from the surrounding agricultural land. Problems do not stop at reserve borders. At present, agricultural land and remnant bush areas are managed separately, and they are both degrading simultaneously, while different managers pursue different goals.

The Chinocup mining proposal provides CALM with an opportunity to work with the Nyabing/Pingrup farming community to achieve common goals. As stated in the CER, the proponents are willing to encourage landowners owning bushland next to the Nature Reserve to donate or sell cheaply their land to the conservation estate.

While the failure to gain mining approval will not prevent this cooperation from occurring regardless, it must be admitted that farmer support for CALM's conservation goals would be harmed.

ISSUE 21: The Chinocup Townsite is already Crown land; hence, the proponents are not in a position to negotiate a land swap. How would the total area of the conservation estate benefit from this mining proposal, when the townsite is already in crown ownership and already proposed for conservation in EPA Red Book Recommendation 4.8.7?

RESPONSE: Chinocup townsite consists of several parcels of land, most of which are reserve 18965. Vesting is with the Shire of Kent but there is no purpose for the reserve: its classification is "Exempted from Sale" which prevents it being called Vacant Crown Land.

The mining proposal has the full and storing support of the Shire of Kent, who have been unwilling in the past to allow the Chinocup townsite to be given over to CALM's control for nature conservation purposes. The proponents have been able to convince the Shire Council that the mining proposal is sufficiently important to justify up to half of the townsite being given to CALM.

As is the case with many other EPA Red Book recommendations, little progress has been made with recommendation 4.8.7 due to a lack of support from the affected local authority. The inclusion of the Chinocup townsite reserve in the Red Book does not guarantee its inclusion in an A class Nature Reserve.

The land swap concept has been supported by various government agencies for several years, as a way of ensuring that high conservation value land outside the conservation estate comes into the estate (for example, see Anon. 1992 and Anon. 1993 - EPA reports and recommendations on other mining proposals within conservation estate land).

Strictly speaking, none of the past land swaps have benefited the conservation estate, since the high conservation status of the land offered as a land swap existed prior to the land exchange taking place.

The purpose of the land swap concept is to bring under formal control, by vesting in an appropriate government agency or by defining its purpose to include conservation, land of high conservation value. The land swap proposed for the Chinocup mining project is a valid, worthwhile and achievable proposal that deserves strong support from all parties.

ISSUE 22: The EPA has a previously stated policy that - "Areas of high conservation value and regional significance are a finite resource, and decisions that diminish those values reduce options for future generations. Decisions on proposals that conflict with or have the potential to reduce existing conservation values in these areas should err on the side of caution and give priority to conservation". How does this proposal fit with this policy?

RESPONSE: This proposal has been planned so as to fully accommodate the EPA's policy. The finite conservation resources of the state are fully appreciated, as are the finite gypsum resources of the Nyabing/Pingrup area.

Although the proposal is considered by the proponents to pose little risk to the Chinocup Nature Reserve, caution has been built in to the proposal by:-

* seeking to mine only 20 hectares of gypsum dunes, instead of the full mineralised area of 70 hectares, until satisfactory rehabilitation has been demonstrated.

* leaving behind a 30 centimetre layer of gypsum sand (foregoing some one million dollars in lost income) to form the sub-soil of the mined-out area, so as to create conditions as similar as possible to pre-mining conditions in which vegetation establishment can then take place.

* leaving a 10 metre unmined buffer along the edge of Lake Chinocup, to protect hydrological and other values, and

* retaining unmined clumps of vegetation, especially of the rare *Adenanthos pungens* spp. *pungens*, within the mining area.

ISSUE 23: Sixty-one people submitted one page, photocopied form-letters in support of the proposal (copy attached; text only). The submissions noted the benefits of gypsum application to heavy soils to improve the productivity for cereal crops in some areas, but none of the submissions raised any issues about the direct environmental impacts of the proposal on the nature reserve. However, the submissions included a statement which needs qualification - they indicated that gypsum was not available in the necessary quantity and quality in the region. What does this statement imply about the known sources of gypsum at Lake Magenta and Albany and any others?

RESPONSE: The claim that the 61 submissions did not raise issues on the possible environmental impacts of the proposal is not correct. They stated: "the mining proponents can work the mine so that it doesn't have a huge detrimental impact on the flora and fauna of the area." It is clear that these submittors perceive the impacts to be of low intensity and hence acceptable.

The statement that suitable gypsum is not available in the region means what it says: that gypsum is not available in the region. The submittors are obviously aware of other gypsum sources outside the Nyabing/Pingrup region, but all would involve much greater haulage costs.

Gypsum at Albany is derived from the manufacture of superphosphate and is understood to be contaminated with unacceptable levels of cadmium. As well, the fine grained nature of this material renders it unsuitable for use in most wheatbelt farmers' standard fertiliser spreading equipment.

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Appendix 2

National Parks and Nature Conservation Authority position on mining in national parks and nature reserves

NPNCA POSITION ON MINING IN NATIONAL

PARKS AND NATURE RESERVES

The National Parks and Nature Conservation Authority is opposed to mining in nature reserves and national parks, because mining is not compatible with the purposes for which such lands are vested in the Authority. This position is consistent with nationally and internationally accepted definitions of these areas.

The Authority has decided that the way we can best achieve our mandate to protect the conservation estate is to acknowledge the Government's prerogative to determine policy in this area, and to -

1. be involved in the process of reviewing applications for exploration, prospecting and mining;

2. identify the most important biological values and natural landscape features of the conservation estate, and seek to protect them from any detrimental impact;

3. recommend appropriate conditions and restrictions so as to minimise detrimental environmental impacts on other areas in the conservation estate.

The Authority therefore scrutinises each application to mine or explore in national parks and nature reserves, and either recommends 'no mining' [if the impact cannot be acceptably minimised] or the imposition of detailed constraints to ensure that, as far as is practicable, little permanent damage to the estate occurs. It is the Authority's view that rehabilitation should not be regarded as a replacement for the pre-existing conservation values.

Approvals for development mining are subject to EPA assessment and either Parliamentary approval or Ministerial agreement. The role of the NPNCA is to advise the Minister for the Environment on such proposals.

The Authority is mindful that mining should not be recommended unless it can be demonstrated that its value to the State clearly justifies the negation of the fundamental principle that National Park and Nature Reserve values should be conserved.

The Authority is likely to recommend against a proposal to mine unless:

a. there is strategic need for the mineral; or

b. the mineral resource is rare, is of high value, and its exploitation would be of significant material benefit to the State; or

c. the mineral resource is not available on other tenures of land, preferably those areas from which the native vegetation has been cleared.

Appendix 3

Soil and Land Conservation Council of WA policy on mining for gypsum and lime

Soil and Land Conservation Council of W.A.

MEETING REVIEW

16TH MEETING - 25 MARCH 1993
17TH MEETING - 6 MAY 1993

MINING FOR GYPSUM AND LIME

The Council addressed the subject of mining of gypsum and lime from Conservation Reserves, for use as soil conditioners on agricultural land.

Council recognised that permission to mine gypsum or lime from Conservation Reserves is managed under other agency legislation. Parliamentary approval is required for excisions or mining from National Parks and "A" class nature reserves, while "B" and "C" class reserves need Ministerial approval.

It was also recognised that the mining of gypsum on cleared private land can be a financial benefit to the landholder but that remnant vegetation on private land can have high conservation value.
Council has adopted the following policy on this issue:

- Reserves of high conservation value should not be considered for mining.
- For Reserves of low conservation value, proposals could be submitted where there is a clear net benefit to agriculture.
- For privately owned remnant vegetation of high conservation value, protection of the vegetation should be encouraged.
- Mining on cleared agricultural land is to be encouraged, recognising that this may provide additional income to farmers in these times of rural hardship.

Council considered that each proposal for mining should be evaluated on the basis of the quality of the resources, local demand and availability of alternative sites. This information should be then balanced with conservation values likely to be affected, specially since much of the Wheatbelt has now been substantially cleared.
Council requests that all persons contemplating mining of gypsum or lime, to contact their Local Government, CALM, or the Department of Minerals and Energy to clarify legislative requirements.

STATE LANDCARE PROGRAM 1993/94

Council approved the Program Guidelines for 1993/94 at the 25 March meeting. The program format has been amended to take into consideration current policy trends.

State objectives to be addressed:

- Fostering community awareness, and adoption, of sustainable land use systems, and
- Fostering the empowerment of LCDCs and other land conservation groups.

The 5 category guideline has been retained, however, within the first 3, substantial alterations have been introduced to cater for future sustainable land use requirements. 4 and 5 remain as per previous year.

1. Project category 1. Production of 'documents or products' from catchment planning activities.
2. Project category 2. Local development of alternative land management systems.
3. Project category 3. Management of feral animals and woody weeds in the rangelands.
4. Project category 4. Local and regional communication activities.
5. Project category 5. Administration grant for LCDCs.

Who can apply for funds?

Projects sponsored by Land Conservation District Committees and catchment groups within Districts are eligible for funds under the State Landcare Program. Where a project is being sponsored by a catchment group, the endorsement of the LCDC must be obtained. Where there is not an LCDC, community groups may be considered for funding, but only if they are incorporated and can demonstrate that land conservation is a primary objective of the group.