

CONCLUSIONS

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Abstract

We and our colleagues have previously reported on the nature conservation, landscape and recreation values of the proposed conservation reserve at Lesueur. This report should be read in conjunction with that earlier one. The ERMP for the Hill River Project does not adequately comply with the EPA's guidelines in significant respects. We conclude that vegetation, flora and fauna of the proposed Lesueur conservation reserve is of world significance and its values are not repeated elsewhere. It is clear that the proposed mines and power station would impact significantly on the nature conservation, landscape and recreation values of the proposed reserve. Further, the ERMP has not demonstrated that the proponents rehabilitation aims can be met and there are serious doubts that anything but a simple vegetation can be established on the overburden dumps. The landforms of the area will be greatly modified and will not be returned to their original contours. The risk of introduction of plant diseases during the 30 year time frame of the project is high. Over 90% of the vegetation in the eastern end of the proposed conservation reserve at Lesueur is rated as high or medium hazard to *Phytophthora* and, if introduced, *Phytophthora* would have a high impact on the vegetation, causing local extinctions of many plant species, as well as reducing success of rehabilitation. We conclude that, from a nature conservation, landscape and recreation point of view, the project is environmentally unacceptable.

8.1 INTRODUCTION

We and our colleagues have previously reported on the nature conservation, landscape and recreation values of the proposed conservation reserve at Lesueur (Burbidge *et al.* 1990). This report should be read in conjunction with EPA Bulletin 424.

Chapters 2 to 4 in this publication assess the information provided and the commitments made in the Environmental Review and Management Program (ERMP) for the Hill River Project, both in the light of the guidelines provided to the proponents by the Environmental Protection Authority (EPA) and in the light of our knowledge of the nature conservation values of the proposed conservation reserve at Lesueur. Chapter 5 provides relevant information on the biology and management of dieback and other fungal diseases and comments on the information presented and commitments made in the ERMP in this regard while Chapter 6 assesses landscape and recreation information and impacts. Finally, Chapter 7 comments on the ERMP in relation to its rehabilitation objectives and in the light of current knowledge of rehabilitation of nearby mine sites.

8.2 THE ERMP IN RELATION TO THE EPA'S GUIDELINES

The ERMP does not adequately comply with the EPA's guidelines in significant respects. In addition, some conclusions are not supported by available data. These points are discussed in detail in the preceding chapters; some examples are:

- In relation to the proposed conservation reserve, the ERMP has only assessed impact on vegetation, flora and fauna for the area that will actually be cleared of native vegetation. This is less than the actual impact, since there will be many effects outside this area over the proposed 30 year life of the project. Edge effects, for example, degrade vegetation and faunal habitat adjacent to cleared areas. Some impacts, such as those resulting from stack emissions, will extend even further and groundwater drawdown may also have more extensive effects;
- Vegetation is discussed in very general terms in the ERMP, which lists "seven basic vegetation types" (ERMP p. 4-17). This is inadequate to assess properly the impact of this proposal on the species-rich, complex mosaic of vegetation types occurring in the Lesueur area;

- No breakdown was given of the proportion of each of the 38 vegetation types in the project area that would be directly affected by the proposal;
- From our analysis of digitised data it is clear that at least nine vegetation types, which are not known from outside the project area and its immediate environs, will be severely affected by the proposed project. In addition the impact of the project on the area's limited wandoo woodlands is of serious concern;
- The proponent's analysis of the regional significance of vegetation of the project area was very superficial. The proponents state in the ERMP that "it was not practical ... to carry out detailed quantitative studies of any vegetation on the regional reserves because of the large areas involved" (ERMP p. 4-15). The area surveyed, of some 50 000 ha, was very much smaller than that studied by Griffin *et al.* (1983) in their regional survey of the vegetation of the lateritic uplands, which included the Lesueur area. It is much smaller than any of the normal quadrat-based regional surveys undertaken by CALM (e.g. the Nullarbor and the kwongan of the wheatbelt);
- The proponents' statement that the vegetation types defined in the Lesueur area are widespread in the region is clearly not correct. The statement is based on their attempt to simplify the complex vegetation of the Lesueur area by amalgamating many of the basic vegetation types that are present there into only seven "basic" types;
- The proponents have failed to provide a detailed assessment of the conservation status of the area's vegetation as requested by the EPA. Further they have not been able to demonstrate that there are alternative areas which could be reserved to protect the plant communities found in the Lesueur area;
- The limited amount of data available suggests that SO₂ exposure over the life of the mine will result in changes in species composition and abundance. The degree to which this will occur is not possible to determine from the available data. Given the high biological significance of the area the possibility of retrogressive succession occurring in the area is of considerable concern;
- The section in the ERMP dealing with ash emissions is both contradictory and incomplete. Of primary concern is the possible toxicity of the ash. The proponents state that, based on their analysis, the ash is non-toxic and contains many elements beneficial to plant growth. Examination of the data provided in ERMP's Appendix E indicates that four trace elements (beryllium, boron, selenium and antimony) in the coal have not been analysed in their leachate studies. Of these omissions the absence of data on boron is of particular concern;
- The disposal of water collected in the mining pits is inadequately dealt with in the ERMP. The proponents expect to deal with up to 1.5 million litres of waste water per pit per day and the suggested disposal method is to pump to lined surface holding ponds where it will either be treated to adjust pH and then discharged to sedimentation ponds or left to evaporate. The sedimentation ponds will be un-lined and will be discharged into the natural drainage lines. Acid mine drainage is recognized as a major water pollution problem elsewhere and it could be a problem at Lesueur with the high levels of sulphur in the coal and the presence of iron pyrites;
- There will be two major sources of groundwater drawdown if this project proceeds, that surrounding the mine pits and that resulting from the bore field operations. The ERMP gives no indication of the possible area affected by water drawdown around the mine pits but does comment "Drawdowns as a result of dewatering and depressurisation are expected to be limited to a distance of 2-3 km down dip of each pit, and should not adversely impact on the xerophyte vegetation (heath or agriculture) ..." (ERMP p. 5-8). The assumption that the native vegetation will not be impacted by radical changes in the water table by virtue of the xeromorphic anatomy of many species is not born out by published research data. The degree of connection between the deeper aquifer to be utilised by the bore field and the surface aquifers is not clear, so an assessment of the effects of bore field drawdown on local vegetation can not be made;
- Although the conservation status of Declared Rare Flora is briefly reviewed there is no reference to their security on existing or proposed reserves and there are insufficient data relating to the numbers of populations and individuals that are known to exist. The ERMP lists 48 "vulnerable taxa" (ERMP Table 4.7) which occur in the Lesueur area. These taxa, however, were not surveyed and consequently their distribution and conservation status, and impact of the project on them, has not been determined. There are a further 56 regional endemic taxa occurring in the project area that require some assessment of their conservation status;
- There is some discordance between the proponents' and CALM's assessment of the impact of the project on numbers of individuals of Declared Rare Flora, particularly for *Asterolasia drummondii* and *Hakea megalosperma*;
- The proponents make a number of statements in the ERMP in relation to the conservation status of Declared Rare Flora which require clarification or are inaccurate;
- Populations of plant taxa at the limit of their range and relictual species have not been treated in the

ERMP although they represent a genetic resource unique to the Lesueur area;

- Cryptogamic plants have not been considered in the ERMP.
- The terrestrial fauna surveys were limited with respect to species, area and season. No similar surveys were made of the remainder of the proposed conservation reserve at Lesueur, nor of nearby existing or proposed conservation reserves. No attempt was made to compare the species present in the study area with those known to be present in the remainder of the proposed conservation reserve, nor did the proponents assess the conservation status of the Lesueur fauna in nearby conservation reserves;
- The proponents commissioned no surveys of terrestrial invertebrates. They gave reasons for not studying invertebrates but we do not agree with them;
- Throughout the consultant's report on fauna surveys, and in most of the ERMP, the word fauna is used synonymously with vertebrates. For instance, the section under ERMP sub-heading "4.2.2.2 Faunal Communities" does not mention invertebrates. The proponents focus their arguments concerning fauna on local endemism, yet, at the scale of the study area, only the invertebrates are likely to show the patterns of local endemism seen in the flora. In the ERMP's section on invertebrates (which is most superficial), the examples chosen are large, mobile species (cockroaches, jewel beetles) rather than the less mobile spiders, snails, worms and litter arthropods. Both scientifically and in the Wildlife Conservation Act, the definition of fauna includes invertebrates;
- The survey of the aquatic fauna of the Gairdner Range Creeks was conducted at an inappropriate time (October) when most creeks were drying; all creeks in the Cockleshell Gully Catchment were dry and therefore were not sampled. An August survey is required, as was recommended by the proponents' consultants. Similarly, the survey of the aquatic fauna of the Hill River was conducted in May; another survey should have been carried out in August/September when the River was flowing strongly;
- The ERMP fails to recognise the importance of the whole Lesueur - Coomaloo region for the survival of Carnaby's Black-Cockatoo or recognise that the Cockatoo is important because it is implicated in the survival of *Banksia tricuspis*, a Declared Rare Flora species. It does not mention the possible effects of SO₂ on wandoo, which provide tree hollows for nesting, not the cockatoos' need for fresh water sources (which must have shady trees around them), nor the possible effects of mining and water extraction in this context, although the Hill River and the Hill River Spring are highlighted as areas most likely to suffer from the water table drawdown;
- The ERMP fails to identify and/or evaluate the full range of potential impacts that the project is likely to have on landscape values, and on nature-based recreation and tourism. In particular, the ERMP does not adequately address how and to what extent the project would impact upon visitors to the region's inland parks and reserves, including the proposed conservation reserve at Lesueur. The assessment techniques employed by the project consultants to evaluate these key issues have not generated sufficient information on which to reach soundly-based conclusions;
- The viewscape study does not constitute a thorough assessment of visual impact. While the study methodology provides a quite detailed statement on what project elements will be visible from major travel routes and other selected vantage points, it gives no firm indication as to the nature and relative significance of the landscape values (i.e. visual quality values) which would be affected by the project. Consequently the study fails to establish or measure "pre-project" landscape values in other than superficial terms and does not fully comply with the EPA guidelines;
- The ERMP fails to adequately address issues relating to dieback diseases caused by introduced and native fungi. It considers the potential impact of *Phytophthora* in very general terms only. This is despite statements in the ERMP about the susceptibility and sensitivity of the flora within the Lesueur area and despite recognition of the potential for the spread of this disease. This lack of a suitable treatment for the plant disease issue conflicts with it being identified by the EPA as a key issue which should be addressed. The short section on disease management fails to provide specific details on how effective monitoring and control can be accomplished, particularly in relation to the size and duration of the proposed project;
- The ERMP places considerable reliance on CALM to provide the necessary information on monitoring and disease control. The proponents fail to realise that the procedures developed by CALM are specifically for native communities exposed to minimal disturbance and cannot be simply adapted to the massive scale of disturbance proposed for the Lesueur area. New disease management procedures will need to be developed specifically for the operations proposed if they proceed;
- The stated preferred end land-use of the mines and power station area involves a return to native vegetation with a view to maximising conservation

values (ERMP Section 5.2.5). Another long-term objective is to rehabilitate the full range of vegetation units disturbed during mining (and presumably by associated developments) (ERMP Section 6.8.2). In its guidelines for the preparation of the ERMP the EPA stated "It is important that sufficient information is contained in the ERMP to allow an assessment of the likely success of rehabilitation and other management proposals" (ERMP Attachment 1, p. 7). The proponents have not seriously addressed this requirement; instead they have sought to defer debate on this important issue by proposing to produce a rehabilitation management plan at some future date prior to the commencement of mining.

- Commitments made by the proponents concerning rehabilitation are not consistent with the stated rehabilitation objectives as outlined in the ERMP;
- The proponents suggest that the experiences already gained in the Lesueur area and at Eneabba provide the basis for successful reconstruction/reclamation programs. At Lesueur, work in the project area to date is very limited and mainly involves revegetating drill pads. These are areas that have been scraped and compacted by vehicles, not areas subjected to massive disturbance. At Eneabba, an adequate level of rehabilitation has not yet been achieved after 14 years of mining, even though values set for rehabilitation are only between 40 and 50% of those recorded for pristine vegetation. Many species, particularly those in the Restionaceae, Cyperaceae, Orchidaceae and Epacridaceae, have failed to regenerate at all in mining-affected areas at Eneabba.

8.3 OUR CONCLUSIONS

Our conclusions in relation to the major effects of the project, if it is approved, on the nature conservation, landscape, recreation and education values of the proposed conservation reserve at Lesueur are:

1. The proposed conservation reserve at Lesueur is of world, national, State and regional significance (Hopper and Burbidge 1990) and its values are not repeated elsewhere. The proposed mines and power station will greatly affect the nature conservation values of parts of this proposed reserve, including parts that are not repeated in the remainder or elsewhere;
2. The vegetation and flora of the proposed conservation reserve at Lesueur is considered to be of the highest conservation significance. The conservation significance of this area stems from both the high species richness of the area (averaging 76 spp/100m²) and a very fine scale mosaic of vegetation types. The proposed mines and power station would significantly damage the vegetation of the proposed reserve. The

proponents were not able to find the same vegetation elsewhere in the region for the great majority of the vegetation units identified in the project area;

3. The proposed conservation reserve at Lesueur has a known flora of 821 taxa of vascular plants, representing approximately 10% of the State's known vascular flora and a third of the taxa found in the Irwin Botanical District. Moreover, the area contains 111 of the 259 northern kwongan regional endemics, including seven species of Declared Rare Flora (DRF) and 48 poorly known taxa considered to be threatened or vulnerable. Also occurring within the area are 81 taxa at their northern or southern distributional limits. The numbers of DRF, endemics and taxa at the edge of their geographical ranges are the highest of any area in the Irwin Botanical District. The proposed Lesueur conservation reserve ranks as one of the three most important areas for flora conservation in southern Western Australia (Griffin *et al.* 1990);
4. There are 22 populations of six species of Declared Rare Flora in the area to be cleared or in the 100 m buffer zone; destruction or degradation of these would have unknown long term consequences on the conservation of these species;
5. The proposed conservation reserve at Lesueur has a very rich vertebrate fauna. For example, 132 species of birds are known from Lesueur, more than are known from any conservation reserve in the south west of Western Australia except the much larger Kalbarri, Fitzgerald River and Cape Arid National Parks (all of which include coastal habitats) and Yanchep National Park (which includes wetlands). The number of reptile species known from Lesueur is 49, more than are known from any conservation reserve in the south west, except the much larger Kalbarri National Park. The scant data that are available on invertebrates suggest that Lesueur has a very rich invertebrate fauna as well, possibly including endemic species;
6. No plant or animal species are known to occur only in the area to be cleared for the mines and power station; however, the ERMP does not provide adequate data on invertebrates or non-vascular plants;
7. The risk of introduction of plant diseases during the 30 year time frame of the project is high. Over 90% of the vegetation in the eastern end of the proposed conservation reserve at Lesueur is rated as high or medium hazard to *Phytophthora*. Therefore, if introduced, *Phytophthora* species would have a high impact on the vegetation,

causing local extinctions of many plant species and massive changes in vegetation composition;

8. The possibility of retrogressive vegetation successions occurring over a large area as a result of the stack emissions is of serious concern. No adequate data are available to assess the degree to which this could take place;
9. It is clear that the proposed mining operations and power station would impact significantly upon the visual quality of the proposed conservation reserve at Lesueur and the Lesueur area as a whole. The natural character and scenic beauty of what are some of the most attractive landscapes within the northern kwongan would be severely degraded should this project proceed. As a result, those recreational activities and human experiences that are dependent on the quality and integrity of the visual environment would suffer significantly. Landscape rehabilitation efforts, however well planned and executed, will not be able to restore the integrity and scenic beauty of this area once disturbed. Such impacts can not be dismissed lightly;
10. The ERMP has not demonstrated that its own rehabilitation aims can be met and there are serious doubts that anything but a simple vegetation can be established on the overburden dumps. The landforms of the area will be greatly modified and will not be returned to their original contours;
11. From the rehabilitation perspective, mining for coal in the Lesueur area will pose much greater problems than the sand mining at Eneabba. The post-mining substrates (overburden dumps) will be quite different from the present environments and the overburden is likely to be toxic to plant growth. A major problem for rehabilitation after mining that is only now coming to light at

Eneabba is that associated with infection by species of *Phytophthora*. If *Phytophthora* was introduced to Lesueur as well it would lead to major difficulties with rehabilitation;

12. The proponents have not proposed an end land use and have not outlined the rehabilitation objectives for the mined-out pits, which will have steep batters and which will contain saline, and most likely acidic, waters. The uses proposed do not complement the stated end land use for the project area as outlined in the ERMP.

As detailed above, and in earlier Chapters, the ERMP for the Hill River Project has significant shortcomings. Some of these could be overcome if further studies were made or if parts of the ERMP were re-written. However, we believe that, even if major shortcomings were overcome, the proposed project would still have significant detrimental effects on the nature conservation, landscape and recreation values of the proposed conservation reserve at Lesueur.

Given the nature of its charter, CALM is likely to conclude that many mining developments within existing or proposed conservation reserves would be environmentally unacceptable. There are also occasions when environmental and aesthetic values may not be unduly disturbed by mining. In such cases CALM may not oppose the project. However, in the case of the Hill River Project, CALM concludes there will be major impacts on an area of the very highest conservation values. If the project goes ahead, it would be to the significant detriment of nature conservation and of the proposed conservation reserve.

We conclude that, from a nature conservation, landscape and recreation point of view, the project is environmentally unacceptable.