

**Poseidon Bow River Diamond Mines  
proposal to extend mining into Beefwood Creek  
(M80/109) and portion of mining lease M80/288,  
East Kimberleys**

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

Environmental Protection Authority  
Perth, Western Australia  
Bulletin No.700  
August 1993

#### 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 16 September, 1993.

### **Environmental Impact Assessment (EIA) Process Timelines**

<b>Date</b>	<b>Timeline commences after receipt of full details of proposal from the proponent</b>	<b>Time</b>
21/6/93	Proponent Document Released for Public Comment	3 months
19/7/93	Public Comment Period Closed	4 weeks
27/7/93	Issues Raised During Public Comment Period Summarised by EPA and Forwarded to the Proponent	8 days
3/8/93	Proponent response to the issues raised received	8 days
30/8/93	EPA reported to the Minister for the Environment	27 days

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## Summary and recommendation

Poseidon Bow River Diamond Mine Limited (Poseidon) operates an alluvial diamond mine on Lissadell Station, at the southern end of Lake Argyle in the Kimberleys. Since 1988, when mining commenced, an area of about 515 hectares has been disturbed, of which some 420ha are under rehabilitation. This assessment report deals with a new proposal to incorporate a small reserve of recently delineated alluvial diamonds into the mining programme. Mining and rehabilitation methods would essentially be the same as those at existing operations.

Exploration activity has identified two areas totalling 48 hectares which contain about 530,000 tonnes of ore, immediately to the north and north east of current operations. One of the deposits lies on Beefwood Creek which drains into Lake Argyle. It is proposed to mine this area and reconstruct the creek profile in one season prior to the onset of the rains. The current relatively low level of the lake provides the opportunity to mine both of these areas before they are possibly inundated again. Because the mining operation is progressive and continuous only a relatively small area is open at any time before being covered by material from the active mine face and rehabilitated.

The proposed operations are sited on black soil plains supporting a mixed vegetation suite including dense *Eucalyptus* woodland, dampland and flat, treeless grasslands. Along Beefwood Creek there is a distinct suite of riverine vegetation which acts as a habitat and shade corridor in otherwise open grassland.

Two submissions were received during the four week public review period, both of which were from Government agencies. The key environmental issues are environmental management and rehabilitation, erosion control, groundwater levels and decommissioning. Other issues include riverine habitat, weed control and the final height of the coarse rejects dump.

As defined in the Environmental Protection Authority's assessment of the proposal to expand the scope of the mining operation in 1990, the rehabilitation strategy is to restore the land to its pre-mining condition with regard to landform stability and vegetative cover, so that pastoral activity can resume. Clearly the system also needs to be self-sustaining. A stable system appears to be developing on previously rehabilitated areas, which augers well for ongoing management and rehabilitation practices.

This is the first time that a creek section would be mined at Poseidon's operation (although mining of alluvials at Argyle Diamond Mine's Smoke Creek deposits has been practised for some years after assessment by the Authority and approval by Government). Unlike the current, internally draining systems of mined pits it is intended that the creek continues to communicate with external drainage. Hence the potential for erosion and sedimentation must be carefully considered. Susceptible areas elsewhere on the mine have been repaired and stabilised by rock armouring and this technique, together with careful attention to ground levels, would be employed wherever appropriate.

As the proposed mining areas are close to the water level of Lake Argyle, dewatering of the pits may be necessary. If so, any sediment-laden fraction would be pumped to mined hollows to infiltrate the groundwater system, while clean water would be directed to existing watercourses. Adjacent vegetation is not expected to be significantly affected because of the short duration of the mining front in any one position.

With decommissioning of the mining operation 1<sup>1</sup>/<sub>2</sub>-2 years away on present indications, Poseidon has prepared and submitted a rehabilitation strategy plan to Government. Final details of decommissioning, including completion criteria and the fate of the mine infrastructure have yet to be addressed. Other issues, such as riverine habitat along Beefwood Creek, noxious weed control and the height of the coarse rejects dump have been satisfactorily addressed by the proponent, as discussed in the text of the assessment.

The current mining operation is regulated by Licence and environmental conditions and commitments set under the Environmental Protection Act (1986) and mining lease conditions set under the Mining Act.

This proposal raises some new issues which have been recognised by the proponent in the proposed commitments. These are:

- mining along a creek;
- reinstating the creek to receive and export water as part of an externally draining system; and
- rehabilitating wooded areas to a standard comparable with the original.

Recent favourable field inspections of previously mined and rehabilitated areas, together with the proponent's commitments for this proposal, lead the Authority to believe that the extensions to mining could be carried out with minimal environmental impact and that the mined areas could be left in a sustainable form for future pastoral use.

The Authority concludes that some details of environmental management can best be addressed by changes to lease conditions imposed by the Department of Minerals and Energy. These are contained in Appendix 2 to this report. The Authority proposes that these be implemented under Recommended Environmental Conditions through a procedure (see Procedure 3).

Subject therefore, to the mining lease conditions being changed appropriately and the proponent's commitments being implemented, the Authority finds the proposal environmentally acceptable.

### **Recommendation 1**

**The Environmental Protection Authority has concluded that the proposal by Poseidon to mine recently delineated alluvial diamond areas, as modified by the process of interaction between the proponent, the Environmental Protection Authority and Government agencies consulted, is environmentally acceptable.**

**In reaching this conclusion, the Environmental Protection Authority identified the main environmental factors requiring detailed consideration as:**

- **environmental management and rehabilitation for future sustainable land use;**
- **erosion control;**
- **management of groundwater levels; and**
- **decommissioning.**

**The Environmental Protection Authority notes that these environmental factors have been addressed adequately by either the proponent's environmental management commitments or the additions or modifications to the lease conditions proposed by the Department of Minerals and Energy. Accordingly, the Authority recommends that the proposed mining expansion could be approved subject to:**

- **the proponent's commitments (Appendix 1); and**
- **the lease conditions proposed to be modified or added by the Department of Minerals and Energy (Appendix 2).**

# 1. Background

Within its existing mining tenements Poseidon Bow River Diamond Mine Limited (Poseidon) proposes to extend its alluvial diamond mining operation into areas where ongoing exploration has defined economically viable alluvial reserves of diamonds. The mine and tenements are located at the southern end of Lake Argyle on Lissadell Station about 205km from Kununurra by road (Figure 1).

The original mining proposal was not assessed under Part IV of the Environmental Protection Act, 1986, but environmental conditions were set under several Works Approvals and Licences under the provisions of Part V of the Act. It was approved by the then Department of Mines in 1987 for Freeport Bow River Properties Ltd. (Freeport) which subsequently sold the project to Poseidon. Mining commenced in 1988.

As the water level of Lake Argyle subsided, exploration in low lying areas along Limestone Creek identified extensions of the ore body. Poseidon developed a proposal to mine this area and submitted a Consultative Environmental Review in May 1990. Environmental approval for that operation was granted in October 1990.

The current proposal seeks to extend mining in a north easterly direction parallel to the drainage into Lake Argyle. The size of the area involved is 48 hectares (Figure 2). After referral of the proposal in March 1993 the Environmental Protection Authority issued guidelines for the preparation of the Consultative Environmental Review in April. The report was received from Poseidon in June and was sent out to members of the community and Government for public review for four weeks until 19th July. The table below lists groups to which the CER was sent.

**Table 1: Distribution list for CER**

Shire of Wyndham-East Kimberley
Shire of Halls Creek
Department of Agriculture
Department of Minerals and Energy
Argyle Diamond Mines Pty Ltd
Water Authority of WA
Lissadell Station Management
Australian Conservation Foundation
Conservation Council of WA Inc.
The Wilderness Society
Kimberley Land Council
Dilduwam Majangdaburru Aboriginal Corp.
Balangarri Aboriginal Corp.
Mandangala Aboriginal Corp.
Waringarri Aboriginal Corp

Two submissions were received, from the Water Authority of WA and the Department of Minerals and Energy. These are discussed in Section 4: Assessment and Recommendations. The Authority received Poseidon's response to these on July 30th; it is included in Appendix 1.

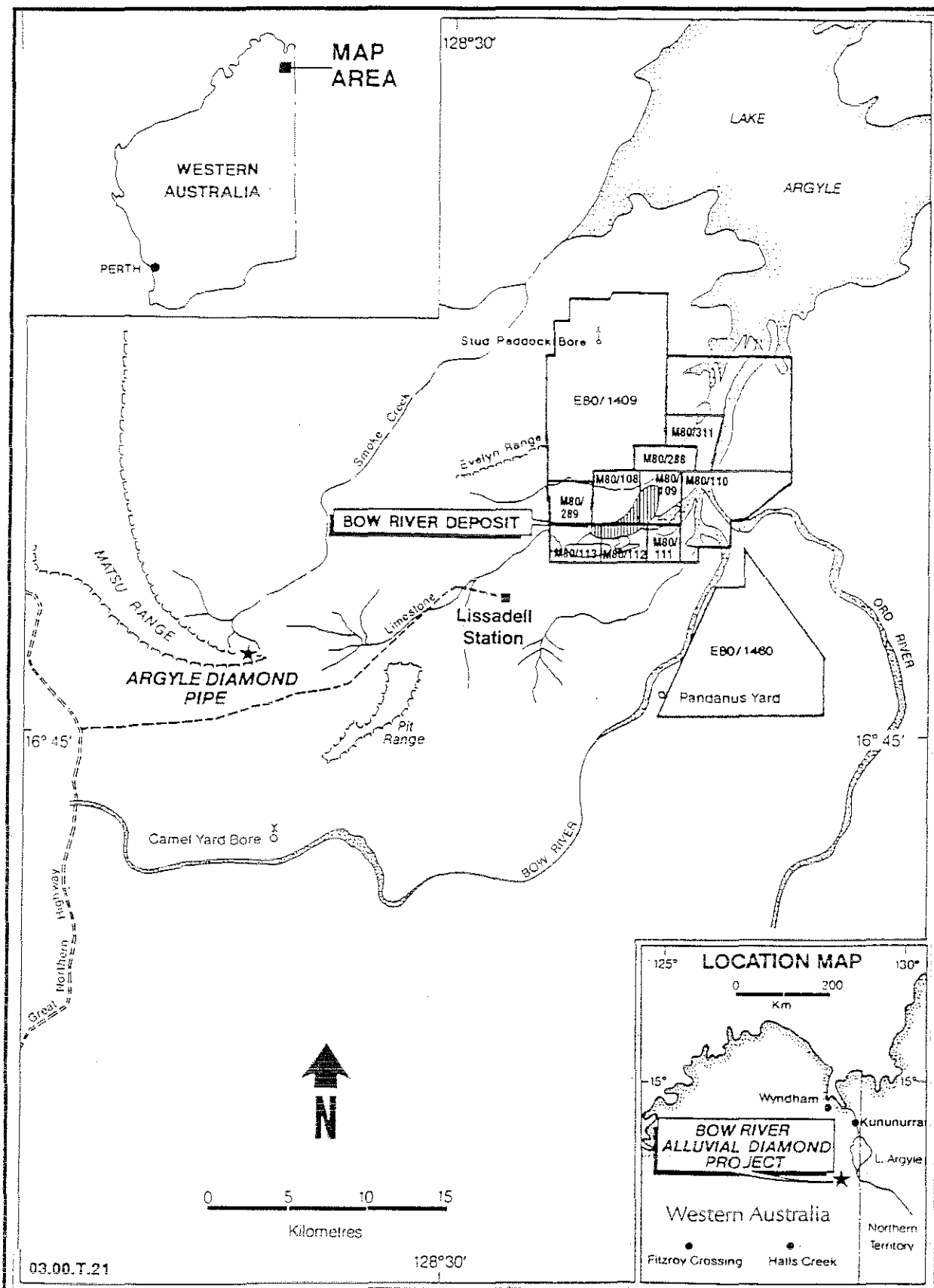


Figure 1. Regional location map

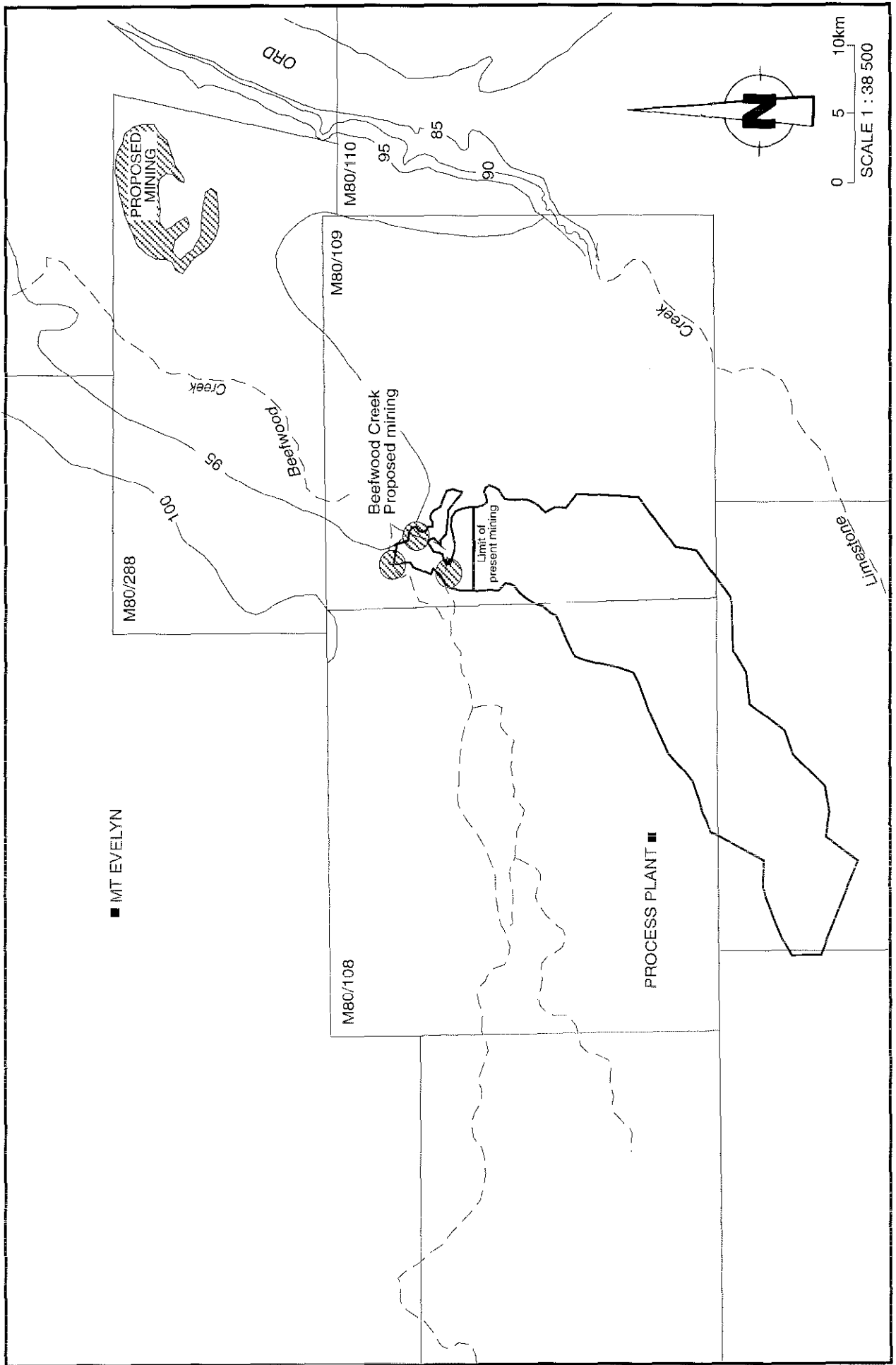


Figure 2. Proposed mining areas



## 2. The proposal

Poseidon proposes to mine diamondiferous alluvial gravels from two different areas. A newly outlined resource on mining lease M80/288 contains approximately 500,000 tonnes of ore in an area of about 40ha, whilst a smaller deposit of 30,000 tonnes along an 8ha, 530 metre long section of Beefwood Creek is expected to close off the present mining envelope in M80/109.

The mining method would be similar to that currently used. First the topsoil, then the overburden is stripped, for spreading over previously mined areas, then the diamondiferous gravels are removed. The overburden and the topsoil are placed onto the adjacent, previously mined strip which has been shaped during the stripping stage in readiness to receive the material from the next mining strip. The diamondiferous gravels are then trucked to the mill for treatment using a process of mechanical sorting and screening followed by hydraulic concentration. No chemicals are used in the water. Erosion control and rehabilitation procedures are implemented as the mining pit, which is maintained as an internally draining structure, moves across the orebody.

It is proposed to mine Beefwood Creek in one dry season if possible whilst still allowing time for full reconstruction of the creek section prior to the onset of the wet season. During this rebuilding, the creek bed would be used as the haul road to aid compaction. In the event that the operation is incomplete before heavy rains begin, most water flowing down the creek from upstream would be diverted down the other channel of the creek, which is braided in this area. The runoff from the immediate area would flow into the mined sections adjacent to the creek bed, which would act as sumps and sediment traps as they are below normal creek level and hence prevent heavily silted water from escaping down the creek to Lake Argyle.

As the reserve in M80/288 is larger, mining would be likely to take place over two dry seasons and through the intervening wet season, as in the areas currently being mined. Prior to the rainy season, bunds are normally put into place around the lip of pits to prevent water from running into them. At the mine face rains may flood the pit for a while. Areas already mined have the topsoil re-spread and are thus prepared for the onset of rain to germinate the contained seed stocks.

Removal of many trees would be required in both mining areas. The stockpiled debris would later be spread over rehabilitated areas as fauna habitat and extra seed sources. By using existing roads wherever possible, minimal environmental impact would be caused by the haul roads. All haul roads would be rehabilitated once no longer required.

No increase in mining rate, processing capacity, the workforce, or power and water consumption is involved.

## 3. Existing environment

The area has a tropical monsoonal climate with distinct wet and dry seasons. The mining tenements cover about 8800ha of the Ord Sedimentary Basin and the soils are predominantly grey and brown cracking clays commonly termed "black soil plains".

At the proposed mining area on M80/288, red sands cover 4-8m of red alluvial clay, of which the bottom 1-2m section is ore bearing. The water table level in the area is dependent on water levels in Lake Argyle. Because the land surface is close to lake level, dewatering of the mine pit may be necessary. Lease M80/288 has a diverse suite of flora varying from medium to high density *Eucalyptus* woodland through dampland containing *Eucalyptus* trees, grasses and sedges, to flat, treeless grassland. Some areas are dominated by *Mimosa* shrubs.

On lease M80/109 (Beefwood Creek area) up to 1m of black, cracking clays overlie red clays which in turn cover the alluvial gravels. The actual creek bed is relatively small, being about 1m deep and up to 5m wide. In this area, upper storey vegetation is sparse except for along the edge of the creek where Wild Plum, *Bauhinia* and Boab trees are most common. Ground cover is a mixture of grasses with a few herbs. All species recorded during vegetation surveys in the proposed areas are common and widespread. There are no declared rare flora in either of the areas.

There are unlikely to be any specific faunal types significantly affected by the mining operation apart from the marsupial Ingram's Planigale, *Planigale ingrami*. Once considered to be rare but

now found to be moderately common as a result of more recent faunal surveys, its preferred habitat is the cracking clay soils, where it is widely distributed throughout the Kimberleys.

There are three Aboriginal sites, on limestone ridges, registered with the Western Australian Museum, and twenty archaeological sites known within the northern part of the mining tenement. None of these sites would be affected by the mining operation.

## **4. Assessment**

There were two submissions received during the public review period. The issues raised were:

- the need to revegetate the mined areas to an assemblage structurally and floristically similar to the pre-mining condition; and
- the need to armour the reinstated Beefwood Creek channel and ensure that this work is completed in good time before the onset of the wet season.

The key issues associated with this proposal are essentially the same as for the previous assessments. They are: environmental management and rehabilitation, erosion control, groundwater management and decommissioning. Secondary issues include the potential loss of riverine vegetation, with its inherent soil stabilisation value and as habitat and shelter for birds and station stock along the course of Beefwood Creek. Weed control, and the height of the coarse rejects dump are also secondary issues.

### **4.1 Environmental management and rehabilitation**

An environmental management programme for a mining operation requires a clear mining and rehabilitation strategy, developed in liaison with the various involved agencies, appropriate implementation of the strategy, and documentation of progress in annual reports to Government.

The rehabilitation strategy for this operation is to restore land to its pre-mining condition with regard to landform stability and vegetative cover, so that pastoral activity can resume. Prior to mining, the former landform was under a cattle stocking regime which led to accelerated soil loss rates. Clearly this is not the goal of this rehabilitation, where a stable and self-sustaining ecosystem is the desired end point. A near-natural plant assemblage is also seen as desirable. When comparing earlier mined areas to these new ones, which have greater variability and potential for erosion, it is important to ensure that adequate resources are committed to detailed planning and implementation of the rehabilitation strategy.

Rehabilitation of the mined areas has in the past produced varied results due to a combination of below average wet seasons, insufficient water retention/infiltration on slopes, and instability of some areas. With the passage of time since monitoring began, a sustainable system appears to be developing. It should be well advanced in many of the former mine pits by the time the mining programme concludes in 1995. This process owes much of its success to the use of fencing to keep cattle out of rehabilitating areas.

The proponent's recent annual reports have documented progress and the encouraging trends have been verified in the field by inspections from officers of the Department of Minerals and Energy, the Department of Agriculture and the Environmental Protection Authority. The Authority is confident that current rehabilitation and stock control practices implemented in the proposed mining areas, combined with reasonable rains in coming wet seasons, should ensure successful rehabilitation.

### **4.2 Erosion control**

This is the first time that a creek section would be mined at Poseidon's operation (although mining of alluvials by Argyle Diamond Mines at their Smoke Creek deposits has been practised for some years now after assessment by the Authority and approval by Government). However Poseidon sought and were given approval to mine a section of Limestone Creek in their last CER, although to date this has not been found necessary. Normally, little sediment escapes from the mine sites because of the internally draining structure of the pits. In the case of Beefwood creek, however,

the system would not be internally draining. Mining along the creek would require careful attention to levels so that reconstruction of the creek bed would allow flow regimes similar to those which currently exist. If the gradient of the new bed is too steep it will encourage erosion of the bed and banks, leading to increased sedimentation of Lake Argyle. Poseidon is aware of the potential for increased erosion and has committed to fully armour susceptible mined sections of Beefwood Creek with rocks >100mm in size.

The Water Authority of Western Australia submitted that timing of creek reconstruction prior to the onset of the wet season was a critical factor and that December 1st should be the latest date each year that it would be safe to complete this work. If this could be achieved it would not then be necessary to install silt monitoring devices and to monitor silt flows. Poseidon has recognised the importance of timing and has committed to the suggested December 1st date (response to submissions in Appendix 1).

There remains a need to be alert to the possibility of erosion occurring on the inwardly draining slopes of the mined pits, especially in the more easily erodible red soils. Normally any areas which have shown a susceptibility to form gutters have been repaired and lined with coarse rock armouring after each wet season. The Authority expects that this practice would continue but sought a specific commitment from the proponent that this was the intention. Poseidon has responded to this enquiry (see Point 3 of letter in Appendix 1) and the Authority believes this matter would be appropriately managed.

### **4.3 Management of groundwater levels**

The water table level in the area is largely dependent on Lake Argyle water levels. Because the land surface on M80/288 is close to lake level dewatering of the mine pit may be necessary. The clean water fraction would be pumped directly to existing watercourses to drain into the lake. Water containing high sediment loads would be pumped to hollows created by former mining, from where it would soak back into the groundwater. As the active mining front moves onwards quickly, it is unlikely that dewatering in the pit would have a significant negative impact on adjacent vegetation.

After mining, the floor of some of the pits may at times be lower than water levels in the lake, creating the likelihood of semi-permanent pools. Thought needed to be given to what vegetation species might be best suited for rehabilitation of this environment and the requirement for cattle to be fenced out so as not to trample the edges of these pools. These matters were described in the Rehabilitation Strategy Plan (the relevant parts of which were included in the proponent's CER) and Poseidon's fourth annual report.

### **4.4 Decommissioning**

The Environmental Protection Authority, in its last assessment report on Poseidon's proposed extensions (Bulletin 445, August 1990), recommended that a decommissioning and rehabilitation plan be prepared at least one year prior to the cessation of mining and processing operations. In January 1993 a rehabilitation strategy plan was submitted to the Authority (as mentioned in the paragraph above). The report serves as the basis for ongoing monitoring and discussions between the proponent and involved Government agencies on the final prescription for decommissioning. The details of completion criteria, such as plant height, health, cover and species diversity still need to be addressed. In addition, the fate of existing infrastructure remains to be decided with the pastoralist.

### **4.5 Other issues**

#### **4.5.1 Riverine habitat along Beefwood Creek**

Although the creek is not large it provides a shade corridor along its banks where trees have been able to utilise the increased availability of water to grow. These trees also stabilise the banks of the creek against erosion. It is important to acknowledge the role of this riverine vegetation and to plan to replant similar trees along the reconstructed banks of the creek. The Environmental Protection Authority endorses Poseidon's commitment to carry out this site specific rehabilitation.

#### **4.5.2 Weed control**

Wherever ground is cleared there is potential for weeds and other colonising species to take over. Some introduced grasses such as Couch and Buffel are widespread in the area and have some pastoral value. Couch grass is able to spread quickly and stabilise soil against erosion. The issue of competition between quick-spreading grasses such as Couch and other planted shrubs and trees is of some concern. The Department of Minerals and Energy has specified in its recommended conditions for the mining leases (Appendix 2) that young trees should be kept free of excessive competition from introduced cover crop species and the Authority endorses this requirement.

In addition there are several recognised pest plant species which are of concern in the area and which should be controlled for as long as possible, to give slower growing native plants time to establish. Poseidon has committed to monitoring and controlling any infestations arising from or associated with mining or rehabilitation activities (see commitment 4 in letter in Appendix 1).

#### **4.5.3 Height of the coarse rejects dump**

The waste or coarse rejects dump as described in the original (1987) Notice of Intent was predicted to be about 650m by 650m by 10m in height. Since then more ore has been delineated and more coarse rejects have been generated. In order to limit the size of its footprint and leave more land for pastoral use, the proponent has sought and obtained approval to extend the height to 40m. This has required the footprint dimensions to increase slightly to 700m by 700m, but not as much as would have been necessary if the height was still restricted to 10m. The design has incorporated engineering criteria for the long term stability of the structure as determined by the Department of Minerals and Energy.

## **5. Conclusion**

The Environmental Protection Authority concludes that the proposal to mine is environmentally acceptable provided that the proponent's commitments and the Department of Minerals and Energy's recommended conditions in this report are implemented. These provisions are concerned specifically with control of erosion, rehabilitation strategy and decommissioning.

### **Recommendation 1**

**The Environmental Protection Authority has concluded that the proposal by Poseidon to mine recently delineated alluvial diamond areas, as modified by the process of interaction between the proponent, the Environmental Protection Authority and Government agencies consulted, is environmentally acceptable.**

**In reaching this conclusion, the Environmental Protection Authority identified the main environmental factors requiring detailed consideration as:**

- **environmental management and rehabilitation for future sustainable land use;**
- **erosion control;**
- **management of groundwater levels; and**
- **decommissioning.**

**The Environmental Protection Authority notes that these environmental factors have been addressed adequately by either the proponent's environmental management commitments or the additions or modifications to the lease conditions proposed by the Department of Minerals and Energy. Accordingly, the Authority recommends that the proposed mining expansion could be approved subject to:**

- **the proponent's commitments (Appendix 1); and**
- **the lease conditions proposed to be modified or added by the Department of Minerals and Energy (Appendix 2).**

The Authority's experience is that it is common for details of a proposal to alter. In many cases alterations are not environmentally significant or have a positive effect on the environmental performance of the project. The Authority believes that such non-substantial changes, and especially those which improve environmental performance and protection, should be provided for.

Notwithstanding the proponent's present intention to progress mining as soon as possible the Authority believes that any approval for the proposal based on this assessment should be limited to five years. Accordingly, if the proposal has not been substantially commenced within five years of the date of this report, then such approval should lapse. After that time, further consideration of the proposal should occur only following a new referral to the Authority.

## **6. Recommended environmental conditions**

Based on its assessment of this proposal and the recommendation in this report, the Protection Authority considers that the following Recommended Environmental Conditions are appropriate:

### **1 Proponent Commitments**

The proponent has made a number of environmental management commitments in order to protect the environment.

- 1-1 In implementing the proposal, the proponent shall fulfil the commitments (which are not inconsistent with the conditions or procedures contained in this statement) made in the Consultative Environmental Review and in response to issues raised following public submissions. These commitments are consolidated in Environmental Protection Authority Bulletin 700 as Appendix 1. (A copy of the commitments is attached.)

### **2 Implementation**

Changes to the proposal which are not substantial may be carried out with the approval of the Minister for the Environment.

- 2-1 Subject to these conditions, the manner of detailed implementation of the proposal shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority with the proposal. Where, in the course of that detailed implementation, the proponent seeks to change those designs, specifications, plans or other technical material in any way that the Minister for the Environment determines on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

### **3 Decommissioning**

The satisfactory decommissioning of the project, removal of the plant and installations and rehabilitation of the site and its environs is the responsibility of the proponent.

- 3-1 At least six months prior to decommissioning, the proponent shall prepare a final decommissioning and rehabilitation plan.

- 3-2 The proponent shall implement the plan required by condition 3-1.

### **4 Proponent**

These conditions legally apply to the nominated proponent.

- 4-1 No transfer of ownership, control or management of the project which would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

**5 Time Limit on Approval**

The environmental approval for the proposal is limited.

- 5-1 If the proponent has not substantially commenced the project within five years of the date of this statement, then the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project has been substantially commenced. Any application to extend the period of five years referred to in this condition shall be made before the expiration of that period, to the Minister for the Environment by way of a request for a change in the condition under Section 46 of the Environmental Protection Act. (On expiration of the five year period, further consideration of the proposal can only occur following a new referral to the Environmental Protection Authority.)

**6 Compliance Auditing**

In order to ensure that environmental conditions and commitments are met, an audit system is required.

- 6-1 The proponent shall prepare periodic "Progress and Compliance Reports", to help verify the environmental performance of this project, in consultation with the Environmental Protection Authority.

**Procedure**

- 1 The Environmental Protection Authority is responsible for verifying compliance with the conditions contained in this statement, with the exception of conditions stating that the proponent shall meet the requirements of either the Minister for the Environment or any other government agency.
- 2 If the Environmental Protection Authority, other government agency or proponent is in dispute concerning compliance with the conditions contained in this statement, that dispute will be determined by the Minister for the Environment.
- 3 The detailed implementation of this project shall be controlled via the attached list of conditions (as detailed in Appendix 2) to be imposed by the Minister for Mines under the Mines Act .

# **Appendix 1**

## **Proponent's environmental commitments**

## Commitments

Poseidon Bow River Diamond Mine Pty Ltd makes the following specific commitments regarding environmental protection and rehabilitation.

1. Mining would occur only in those areas identified in this report and in the areas previously approved. It is expected that mining operations in the proposed area would be complete by 1994-95.
2. Mining and rehabilitation would be progressive, with topsoil and overburden being used immediately, where possible, to rehabilitate mined-out pits.
3. The occurrence of pest species, including *Parkinsonia aculeata*, would be monitored and appropriate measures taken to control any serious infestations resulting from, or associated with, mining or rehabilitation activities.
4. At the end of the Project all equipment would be removed, all disturbed areas rehabilitated, and the area left clean and tidy.
5. The proponent intends to comply with all provisions of all relevant Acts including the Mining Act 1978-81 and Regulations, the Environmental Protection Act 1986 and the Aboriginal Heritage Act 1972-1980.
6. Rehabilitation procedures would be as follows:

### Lease M80/288 Mining Area

- 6.1 After the diamondiferous ore has been mined, the pit would be partly backfilled with waste. The waste would be shaped to approximately flat, with hollows left to act as sediment traps for local drainage. The shaping would make these areas drain internally, so that any carried sediment would not be transported into the Lake Argyle system.
- 6.2 Vegetation debris and topsoil which was previously removed and stockpiled would be respread over the waste. While it is planned to revegetate the mined area with species similar to those originally present, it might be necessary to plant an initial cover crop to stabilise the area as quickly as possible.
- 6.3 The area would be revegetated so as to allow pastoral activities to continue on the less heavily wooded areas after mining has ceased. As the original vegetation on lease M80/288 is trees and pasture, BRD would restore the land to the same mixture of vegetation. Stock exclusion fences would be erected to prevent cattle damage to immature growth.



### Areas of Disturbance Along Beefwood Creek

The main rehabilitation involved in this area would be the re-establishment of a stable drainage bed.

- 6.4 After ore has been removed the area would be backfilled with waste. The creek bed would be reconstructed as near as possible to the original position. The original bed levels would be re-established so as to minimise flow disruption.
- 6.5 Where original slopes were steep, an effort would be made to reconstruct the channel with shallow sides to reduce erosion and to provide a wider cross-section for lower flow rates. The sides of the creek would be armoured with +100mm waste rock in these areas.
- 6.6 Attention would be paid to sections where the reinstated channel meets the undisturbed channel. The "meeting" points would blend gradually from one stage to the next, with adequate armouring being provided. Efforts would be made to ensure that no erosion problems are caused due to sudden changes in bed profile which would in turn cause changes in water flow velocity.
- 6.7 In order to prevent runoff scouring the new banks, small "bunds" or windrows would be established on the channel margins to contain water.
- 6.8 The area would be revegetated with similar trees as originally occurred in the area, e.g. Boab (*Adansonia gregorii*), Bauhinia (*Lysiphyllum cunninghamii*) and Wild Plum (*Terminalia platyphylla*). Couch grass (*Cynodon dactylon*) would also be used due to its good soil stabilisation characteristics.
7. BRD would undertake all the work involved in the above commitments. The Department of Minerals and Energy and the Environmental Protection Authority together, with advice from the Department of Agriculture would evaluate when rehabilitation has been achieved to a satisfactory level to allow pastoral activity to recommence.



**NORMANDY  
POSEIDON**

**POSEIDON BOW RIVER DIAMOND MINE LIMITED**

A.C.N. 006 285 203

A Member of the Normandy Poseidon Group

MINE SITE:  
Lissadell Station, via KUNUNURRA  
Western Australia

Telephone : (09) 480 0522  
Facsimile : (09) 480 0511

PMB No 7, Post Office, Kununurra, WA 6743

Our Ref: 1.27/MM:TP/188  
Your Ref: 113/87

30 July 1993

Environmental Protection Authority  
Westralia Square  
141 St Georges Terrace  
PERTH WA 6000

ATTN: Mr D Betts

ENVIRONMENTAL PROTECTION AUTHORITY	
- 3 AUG 1993	
File No	113/87/1 Initials DEE

Dear Sir

PROPOSAL : APPLICATION TO EXTEND BOW RIVER DIAMOND  
MINE ON M80/109 AND M80/288. (794)  
LOCATION : BOW RIVER  
PROPONENT: POSEIDON BOW RIVER DIAMOND MINE LTD  
SUBJECT : PUBLIC SUBMISSIONS

With reference to specific points raised by the Water Authority of Western Australia and the Department of Minerals & Energy, Poseidon Bow River Diamond Mine makes the following replies.

1. It is Poseidon Bow River Diamond Mine's intention to armour the restored Beefwood creek channel with + 100mm rock on the sides and the floor. It is agreed that armouing of the floor is equally important as the sides.

Commitment 6.5 should therefore be amended to read:-

"Where original slopes were steep an effort would be made to reconstruct the channel with shallow sides to reduce erosion and to provide a wider cross section for lower flow rates. The sides and floor of the creek would be armoured with + 100mm waste rock in these areas".

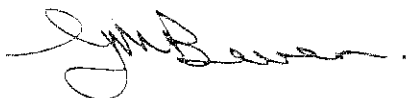
2. It is intended that no disturbance of Beefwood creek occur during the wet season and disturbed areas would be restored and armoured prior to the commencement of the wet season.

68220

As such Poseidon Bow River Diamond Mines will make the additional commitment:-

- 6.9: "No mining will occur in the channel of Beefwood creek during the wet season. Mining in the channel will cease, and mined areas of the channel will be reinstated and armoured before the 1st December each year.
3. Additional further conditions for mining leases M80/109 & M80/228, as recommended by Department of Minerals & Energy are accepted by Poseidon Bow River Diamond Mine.

Yours Faithfully



GRAEME BEVEN  
REGISTERED MANAGER

## **Appendix 2**

**Department of Minerals and Energy  
proposed schedule of conditions**



**NORMANDY  
POSEIDON**

# POSEIDON BOW RIVER DIAMOND MINE LIMITED

A.C.N. 006 285 203

A Member of the Normandy Poseidon Group

MINE SITE :  
Lissadell Station, via KUNUNURRA  
Western Australia

PMB No 7, Post Office, Kununurra, WA 6743

Ref: 1.27/MM:TP/196

Telephone : (09) 480 0522  
 Facsimile : (09) 480 0511  
 ENVIRONMENTAL PROTECTION AUTHORITY

27 AUG 1993

File No 113/87/1 Initials DBE

25th August 1993

Environmental Protection Authority  
141 St Georges Tce  
PERTH WA 6000

ATTN:- Doug Betts

Dear Doug

With reference to your fax message dated 24th August 1993, I make the following comments in reference to assessment of mining extention M80/228 and M80/109.

1. Mining at Bow River is expected to conclude late 1994 or early 1995 based on present reserve details. This may however be extended due to present exploration efforts at extending ore reserves.
2. The current approved height of the coarse rejects dump is 40m. This was approved by Department of Minerals & Energy personnel in January 1992. There were no specified horizontal dimension discussed.
3. Poseidon Bow River Diamond Mine makes the following committment:-  
  
"Areas suseptible to scouring due to water movement, within the renabilitation, will be repaired with rock amouring or other method to reduce the damage".
4. The word "serious" may be deleted from the committment refering to weed infestation. We will endeavour to control any infestation - before it becomes serious.
5. The tonnage involved in mining/disturbing Beefwood Creek is in the order of 30,000 tonnes.

Yours faithfully

68855 1/10

MIKE McCracken  
MINE SUPERINTENDENT

RECOMMENDED FURTHER CONDITIONS - MINING LEASE 80/288

Conditions on the schedule should be amended to read;

13. The construction and operation of the project and measures to protect the environment being carried out generally in accordance with the documents titled;
  - a) "Bow River Alluvial Diamond Project Notice of Intent" dated September 1987,
  - b) "Poseidon Bow River Diamond Mine, Proposal for a New Tailings Dam", submitted September 1989,
  - c) "Consultative Environmental Review, Bow River Alluvial Diamond Project Expansion" dated May 1990,

and

- d) "Consultative Environmental Review. Proposal to extend mining operations into Beefwood Creek M80/109, and portion of mining lease M80/288 Bow River Diamond Mine " dated June 1993.

Documents retained on Department of Minerals and Energy File 281/88, 393/88 and 7/93.

Where a difference exists between the above document(s) and the following conditions, then the following conditions shall prevail.

14. The development and operation of the project being carried out in such a manner so as to create the minimum practicable disturbance to the existing vegetation and natural landform.
15. All topsoil being removed ahead of all mining operations from sites such as pit areas, waste disposal areas, ore stockpile areas, pipeline, haul roads and new access roads and being stockpiled for later respreading or immediately respread as rehabilitation progresses.
16. At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the State Mining Engineer.
17. All rubbish and scrap being progressively disposed of in a suitable manner.
18. At the completion of operations, or progressively where possible, all access roads and other disturbed areas being covered with topsoil, deep ripped and revegetated with local native grasses, shrubs and trees to the satisfaction of the State Mining Engineer.

19. Any alteration or expansion of operations within the lease boundaries beyond that outlined in the above document(s) not commencing until a plan of operations and a programme to safeguard the environment are submitted to the State Mining Engineer for his assessment and until his written approval to proceed has been obtained.

The bond Condition should be included as follows;

20. The lessee providing an Unconditional Performance Bond guaranteed by a Bank or other approved financial institution in favour of the Minister of Mines in the sum of \$120,000 for due compliance with the environmental conditions of the lease.
21. The lessee submitting to the State Mining Engineer in May of each year, a brief annual report outlining the project operations, minesite environmental management and rehabilitation work undertaken in the previous 12 months and the proposed operations, environmental management plans and rehabilitation programmes for the next 12 months.
22. The mining area will be revegetated to open Eucalyptus woodland, structurally and floristically similar to the pre-mining plant communities. Young trees will be kept free of excessive competition with introduced cover crop species.

RECOMMENDED AMENDED OR FURTHER CONDITIONS ON M80/109

Condition 17 on the schedule should be amended to read;

The construction and operation of the project and measures to protect the environment to be carried out generally in accordance with the documents titled;

- a) "Bow River Alluvial Diamond Project Notice of Intent" dated September 1987,
- b) "Poseidon Bow River Diamond Mine, Proposal for a New Tailings Dam", submitted September 1989,
- c) "Consultative Environmental Review, Bow River Alluvial Diamond Project Expansion" dated May 1990.

and

- d) "Consultative Environmental Review. Proposal to extend mining operations into Beefwood Creek M80/109, and portion of mining lease M80/288. Bow River Diamond Mine" dated June 1993.

Documents retained on Department of Minerals and Energy Files 281/88, 393/88 and .../93.

Condition 18 on the schedule should be amended to read;

Prior to the commencement of operations within Beefwood Creek the lessee will provide an Unconditional Performance Bond (guaranteed by a Bank or other approved financial institution) in favour of the Minister for Mines in the sum of \$85,000 for due compliance with the environmental conditions on the lease.

A further recommended Condition should read;

- 19) Indigenous creekline tree species shall be re-established at densities which approximate the pre-mining situation. Young trees will be kept free of excessive competition with introduced cover crop species.