Extension of existing quarry South West Highway, Byford

Pioneer Concrete (WA) Pty Ltd

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 602
December 1991

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 recommendations.

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 assessment report 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
18th Floor, Allendale Square
77 St George's Terrace
PERTH WA 6000
CLOSING DATE

Your appeal (with the $10 fee) must reach the Minister's office no later than 5.00 p.m. on 20 December 1991

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Summary and recommendations

The Environmental Protection Authority has assessed a proposal by Pioneer Concrete (WA) Pty Ltd to extend its existing hard rock quarry, located 3 kilometres south west of Byford, onto an adjoining lot (Lot 2279, Figure 1). The existing facilities would be retained and the rates of extraction would not be expected to change significantly.

The proposal was referred to the Environmental Protection Authority in November 1990. The level of assessment was set at Consultative Environmental Review owing to a number of factors including the location of the proposal in a region of forest covering the western edge of the Darling Scarp providing aesthetic and recreational land uses and its proximity to expanding urban population areas.

Work in the proposed extension would not begin until approximately the year 2000 when working of the existing quarry is expected to be completed. The quarry would then progressively move southwards in stages of about five hectares every ten years. This would give the quarry an expected life of 100 years based on similar rates of extraction to that currently operating.

Hard rock products are transported from the site by truck and trailer combinations. Access to the quarry is via South West Highway. An access road runs up the hill from the highway to the quarry. There are no residences along the access road.

Water used in the pit and the processing areas is drawn from two sources, runoff collected in a small dam and a sump. No other water source is used on site.

It is intended that by extending the quarry operations south east the impacts on rural areas from dust, noise and visual amenity would be reduced for both existing and future rural and residential development.

The Consultative Environmental Review document was submitted for the proposal and has undergone a four week public review period, which finished 21 September, 1991. No submissions were received.

Several issues were raised by the public, the proponent and the Environmental Protection Authority in response to the proposal and these have been addressed either by the proponent or the Authority. The major environmental issues considered during the assessment of the proposal have been addressed as follows:

- **Noise**

  Noise from blasting and background noise from normal quarry operations and transport can be disruptive to nearby residents. There are three dwellings, including the caretaker's house, within 900 metres of the operations. The Environmental Protection Authority notes that the proponent's commitments 9.2.1-9.2.9 to mitigate impacts from noise are satisfactory (Appendix 1). The Environmental Protection Authority has recommended noise limits (Recommendation 2) and will set details of the measurement of noise levels including blasting overpressure as conditions of works approval and licence.

- **Dust**

  Dust emitted from materials handling operations, stockpiles, open areas and transport activities is a key issue. Dust emissions are particularly significant during summer when strong easterly winds occur. The Environmental Protection Authority notes that the proponent's commitments 9.3.1-9.3.6 would adequately control dust levels (Appendix 1). The Environmental Protection Authority will also set air quality conditions in its works approval and licence requirements.

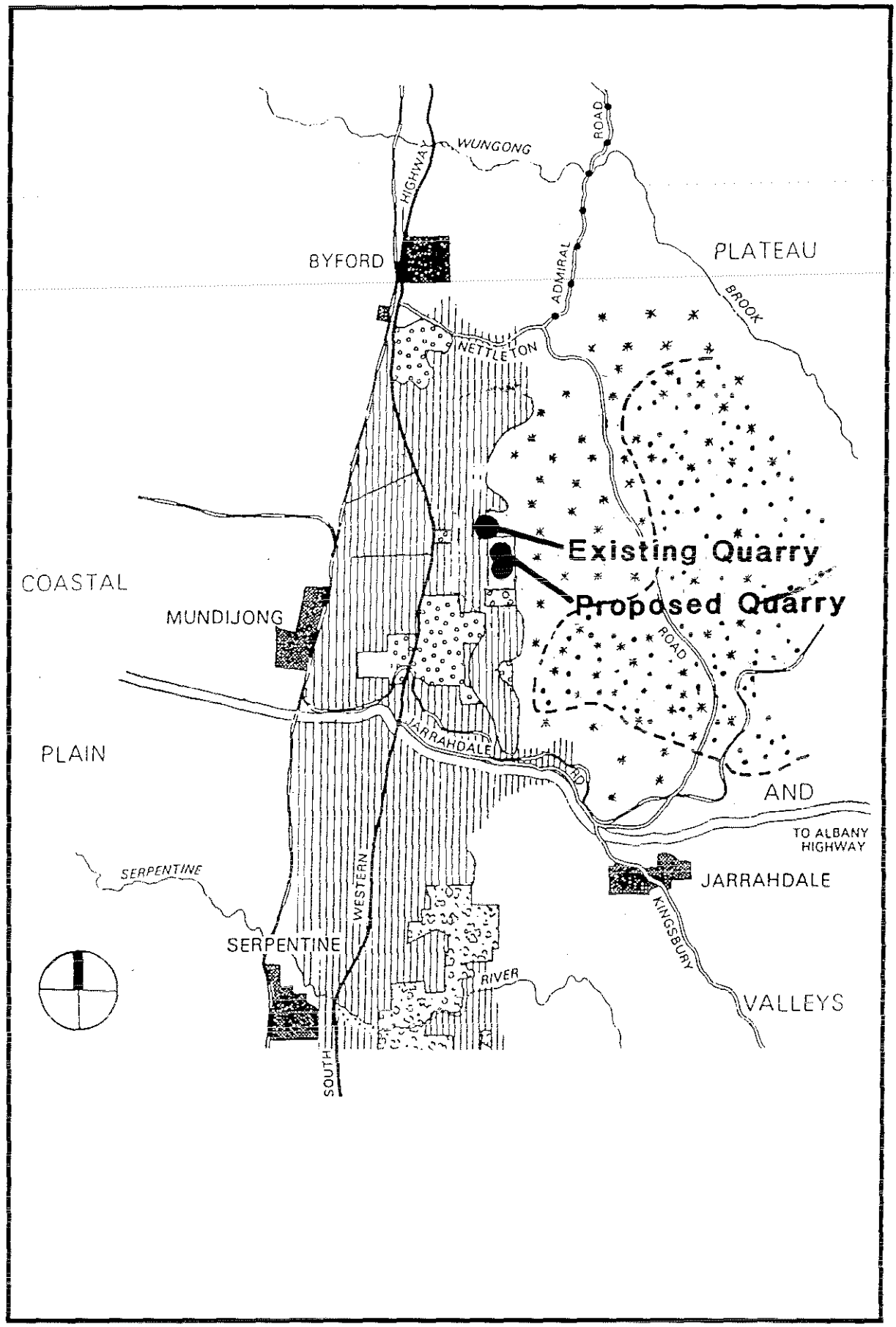

Figure 1. Location of existing and proposed Wonnerup mineral sands mine

- **Aesthetics**

  The visual impact of the quarry is a main issue due to its location on the western edge of the Darling Scarp. The proposed extension would extend southwards behind the scarp so the quarry's working faces would not be readily visible. The Environmental Protection Authority is satisfied that the proponent's commitments 9.1.1-9.1.4 adequately address the issue of aesthetics (Appendix 1).

- **Rehabilitation**

  The proposed quarry's rehabilitation program is a key issue and is tied to the end use of the quarry. The Environmental Protection Authority has recommended a rehabilitation program be implemented (Recommendation 3) and feels the proponent's commitments 9.14.1-9.14.3 sufficiently incorporate the elements of a rolling rehabilitation program (Appendix 1). Based on the recommendation and the commitments, the quarry would be progressively rehabilitated in a manner consistent with several possible future land uses of an essentially recreational nature.

- **Water quality**

  The water quality of surface water and groundwater in the quarry area is a concern as the potential for sedimentation from quarry operations exists. Water used in the pit and the processing areas is drawn from two sources — runoff collected in a small dam in the base of the pit and a sump located on a natural spring east of the existing quarry. The Environmental Protection Authority is satisfied that the proponent's commitments 9.4.1-9.4.9 describing a water quality management program ensures that water is free from sediments before being released (Appendix 1).

- **Flora and fauna**

  The impacts on flora and fauna of the proposed extension need to be considered. No rare and endangered species were found during the flora and fauna surveys. The quarry's progressive working and subsequent rehabilitation should permit any animals that are present to avoid the operations. The Environmental Protection Authority is satisfied that the proponent's commitments 10.1-9.11.1 sufficiently address the issue (Appendix 1).

In its assessment of the proposal the Authority carefully considered these potential impacts with respect to long and short term effects and final stability at the proposed quarry site.

The proponent's commitments and the Environmental Protection Authority's recommendations address the major environmental issues. They are summarised as follows:

- impacts associated with dust and noise;
- rehabilitation of the entire quarrying operation, including the existing quarry;
- drainage management to prevent sedimentation of streams; and
- conservation value of the area of the proposed extension.

This report addresses the various environmental issues raised during the assessment of the proposal as well as a number of other recommendations that have been made to ensure that an adequate environmental management program is adopted for the project .

Emissions of dust, noise and vibration from the proposed quarry extension would be required to conform to the parameters as specified in licences issued under the Environmental Protection Act.

Upon consideration of the Consultative Environmental Review document, the issues raised in submissions and the proponent's response to those issues the Environmental Protection Authority has concluded that the proposal would be environmentally acceptable subject to the following recommendations:

Recommendation 1

The Environmental Protection Authority concludes that the proposal by Pioneer (WA) Pty Ltd to extend the existing hard rock quarry onto Lot 2779 as described in the Consultative Environmental Review is environmentally acceptable.

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

- impacts associated with dust and noise;
- rehabilitation of the entire quarrying operation, including the existing quarry;
- drainage management to prevent sedimentation of streams; and
- conservation value of the area of the proposed extension.

Accordingly, the Environmental Protection Authority recommends that the proposal could proceed subject to:

- the Environmental Protection Authority's recommendations in this report; and
- the proponent's commitments which appear in Appendix 1.

Recommendation 2

The Environmental Protection Authority recommends that the proponent be required to ensure that the introduced noise from the project does not cause the noise in the surrounding residential areas to exceed:

- 50dB(A) from 7am to 7pm Monday to Saturday;
- 45dB(A) on Sunday and from 7pm to 10pm Monday to Saturday; and
- 40dB(A) from 10pm to 7am every day.

These levels should not be viewed as normal operating levels for the project. They are the upper limits above which action will be taken by the Environmental Protection Authority. The Environmental Protection Authority considers that noise below these levels is not unreasonable provided it does not include tonal components, impulses or other intrusive characteristics.

Recommendation 3

The Environmental Protection Authority recommends that prior to commencing operations, the proponent should develop and subsequently implement a rolling rehabilitation plan in order to progressively rehabilitate the land to an environmentally stable condition to the satisfaction of the Environmental Protection Authority in consultation with the Shire of Serpentine-Jarrahdale. This plan should be reviewed every five years by the Environmental Protection Authority in consultation with the Shire of Serpentine-Jarrahdale.

Recommendation 4

The Environmental Protection Authority recommends that as work in the proposed extension is not expected to begin until approximately the year 2000 any approval given by the Environmental Protection Authority should be reviewed by the Environmental Protection Authority 15 years after work begins in the extension in order to ensure practices are still commensurate with environmental and land use planning practices of the time.

1. Introduction

The Environmental Protection Authority has assessed a proposal by Pioneer Concrete (WA) Pty Ltd to extend the existing hard rock quarry, located 3 kilometres south west of Byford, onto Lot 2279 (Figure 1). The existing facilities would be retained and the rates of extraction would not be expected to change significantly.

The proposal was referred to the Environmental Protection Authority in November 1990. The level of assessment was set at Consultative Environmental Review owing to a number of factors including the location of the proposal in a region of forest covering the western edge of the Darling Scarp providing aesthetic and recreational land uses and its proximity to expanding urban population areas.

The Consultative Environmental Review document was submitted for the proposal and has undergone a four week public review period, which finished 21 September, 1991.

The proposal

Pioneer Concrete (WA) Pty Ltd proposes to continue current quarrying operations at Byford. The existing facilities would be retained and the rates of extraction would not be expected to change significantly.

The current quarry commenced operation in 1976 and has been progressively developed over the intervening years. Work in the proposed extension would not begin until approximately the year 2000 when working of the existing quarry is expected to be completed.

The existing crushing and screening plant would continue operating in their present location. The rate of extraction would remain similar to the existing rate of 250 000 tonnes per annum.

The existing methods and equipment would continue to be used, although new technology would be implemented as it became available.

The expansion of the quarry would be staged into lots of approximately 5 hectares. The vegetation, topsoil and overburden would be removed from the area under development and stockpiled or used immediately in rehabilitation as appropriate. A series of benches, flat platforms, approximately 20 metres high and 10 to 20 metres wide would be constructed on the faces of the quarry. The hard rock would be fragmented by blasting and drilling. The hard rock would then be loaded at the face with front end loaders and transported in 35 tonne dump trucks to the crusher along the benches and the haul roads.

Following mining the benches would be rehabilitated.

Stationary primary, secondary and tertiary crushers together with screens, associated conveyor belts and stockpiles are located to the north west of the existing quarry. A site office/weighbridge and service facilities are located at the end of the access road just west of the crushing plant.

Residual soil and overburden recovered from the primary crusher would be used as road base or for rehabilitation, provided it is not from a dieback affected area. During crushing, oversize material would be returned for recrushing. Undersize and fines would pass to the final screens together with the product screen for final sizing and stockpiling.

All crushers, screens and stockpiles would be constantly sprayed with water to reduce the emission of dust from all parts of the crushing plant. Where possible the plant would be enclosed to further reduce dust emissions.

With the current rate of extraction at approximately 250 00 tonnes annually, it is not expected that the expansion would begin until approximately the year 2000. The quarry would then progressively move southwards in stages of about 5 hectares every ten years. This would give

the quarry an expected life of 100 years based on similar rates of extraction to that currently operating.

As each stage is opened the preceding stage would be rehabilitated, apart from access roads left in place on the floor and on certain benches.

The eastern part of the proposed extension would be opened first as this would provide maximum visual screening of the working area. By the time the western part is opened the top benches in the completed part of the quarry would be revegetated.

The hours of operation would remain the same as those currently operating, 7am to 4pm Monday to Friday. Saturday is not currently used as a day of normal production but there may be occasions when this would be necessary, such as when there is a large demand for hardrock products.

Access to the quarry is via South West Highway. From the highway, a sealed bitumen access road runs east up the hill then deviates round the slope to the weighbridge. The access road services the quarry operations only, there are no residences involved.

Hard rock products are transported from the site by 33 tonne total capacity truck and trailer combinations. Normally there are 40 to 45 laden truck movements per standard working day.

The machinery and equipment on site would be similar to that currently in use. No changes to the rate of production are presently foreseen.

Water used in the pit and the processing areas is drawn from two sources — runoff collected in a small dam in the base of the pit and a sump located on a natural spring east of the existing quarry. Water from the sump is drawn off to the processing plant and to the farmhouse on the property. No other water source is used on site.

3. Existing environment

The proposed quarry extension lies on the eastern edge of the Swan Coastal Plain, on the west facing Darling Scarp. Within the quarry area the land rises from 100 metres at South West Highway to 300 metres in the proposed quarry extension.

The area has a typically Mediterranean climate with hot, dry summers and cool, wet winters.

In summer the prevailing winds are on average stronger and the dominant direction is more distinct than in winter. Of particular significance is the strong easterly air flows often occurring on summer mornings. These winds have the potential to carry noise further and to increase the dust problem.

Temperature inversions occur during still conditions when the warm and cool air layers do not mix. This results in restricted dispersal of airborne pollutants and the possibility of the sound being reflected and thus carrying for a greater horizontal distance. Temperature inversions are least likely to occur in summer when the sea breezes and strong winds mix the air.

The proposed quarry extension consists of banded granitic rock covered by deeply weathered soils capped by laterite, a dark brown gravel-like rock.

The dominant drainage line, an ephemeral stream, is used by stock on properties down stream and ultimately contributes to the ground water reserves of the Swan Coastal Plain.

Within the stockpile and crushing plant area the streams have been piped through a series of sumps and pipes. Piping the streams was undertaken to reduce the quarry's visual impacts and the risk of potential pollutants entering the streams.

Water is supplied to the quarry operation from an onsite storage dam.

The vegetation of the existing works area consists mainly of pasture grasses between scattered eucalypts. On the higher ground to the east the vegetation is similar to Jarrah/Marri Forest. Around the works areas and screen banks a variety of eucalypts and other species are planted.

The vegetation of the proposed quarry site includes areas of partly degraded Jarrah/Marri Forest and Jarrah/Banksia/Sheoak Woodland. It has been logged in the past and is partially affected by Jarrah dieback (Phytophthora spp), particularly in the eastern section.

No Gazetted Rare or Endangered Flora were identified, nor were there any species from the Reserved Flora list recorded.

No rare or endangered fauna were recorded during the faunal survey however a number of rare or endangered fauna were identified as being possibly present.

No Aboriginal or European heritage sites have been identified on the proposed quarry site. A survey was conducted for unrecorded Aboriginal sites. However none was found.

The existing land uses of the area surrounding the quarry are mainly rural grazing purposes with forest to the east. Within the Shire of Serpentine-Jarrahdale generally there is an increasing trend towards small rural "hobby type" farms.

The current quarrying operations are bordered to the west by grazing land held by the Government, a motor cross track and a clay pit. To the north west and south west is privately held grazing land and to the east partially degraded forest.

Bordering the proposed extension is State Forest in the east, Crown land to the south and private grazing land to the west. There is a claypit and associated brick manufacturing plant, an entertainment complex, a deer park, a saw mill, and a Scouting centre within 2.5 kilometres of the proposed extension. The proponent owns the proposed extension area, Lot 2779.

The proposed extension area has been logged in the past for Jarrah but is mainly now used for aesthetic and recreational land uses as it provides part of a region of forest covering the western edge of the Darling Scarp.

Future land use of the area west of the proposed quarry will continue to be rural with lots sizes of greater than 20 hectares.

There are three dwellings, including the caretaker's house, within 900 metres of the operations. As the quarry is extended, the distances from the residences would increase.

4. Environmental impacts and their management

Following a review of the environmental aspects of the proposal and taking into account comments from the public and government agencies, the Environmental Protection Authority concludes that the proposal would be environmentally acceptable, subject to a number of conditions as discussed in the following sections of this report.

Recommendation 1

The Environmental Protection Authority concludes that the proposal by Pioneer (WA) Pty Ltd to extend the existing hard rock quarry onto Lot 2779 as described in the Consultative Environmental Review is environmentally acceptable.

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

- **impacts associated with dust and noise;**
- **rehabilitation of the entire quarrying operation, including the existing quarry;**
- **conservation value of the area of the proposed extension; and**
- **drainage management to prevent sedimentation of streams.**

Accordingly, the Environmental Protection Authority recommends that the proposal could proceed subject to:

- **the Environmental Protection Authority's recommendations in this report;**
- **the proponent's commitments which appear in Appendix 1; and**
- **works approval and licensing of the operation under the Environmental Protection Act.**

4.1 Noise

Noise from quarry operations would be produced by blasting, onsite equipment and transport activities which may have different impacts on the surrounding areas. The location of the quarry behind the scarp would tend to reduce the lateral propagation of blasting and general noise.

Blasting would occur 2-3 times each month and would have the potential to impact on both the workers and neighbouring properties. Blasting produces both ground vibration and air blast shock waves. Sequential firing of shots slightly extends the duration of the blast but reduces the pressure and thus the impacts.

On-site equipment, such as the crushing and screening plants, generates noise when functioning. Noise levels produced by the proponent's operations are within the licence condition's limits and are not expected to increase as similar equipment is planned for future operations. The location of the crushing and screening plants within a small valley would help to reduce noise emissions from the operation.

Trucks used in the transport of hard rock form the quarry make between 40-45 laden movements per day. The nature of the access roads and the method of transport assist in noise reduction. Truck and trailer combinations produce less noise for the tonnage carried when compared to trucks alone. When laden the trucks roll down the hill to South West Highway and on return, when empty, climb the hill to the quarry site. There are no residences along the access road.

Overall there is not expected to be any increase in noise associated with the proposed extension to the quarry.

The proponent has made several commitments to ensure that operational noise levels would be minimised. They include:

- All blasts conducted would have millisecond delays fitted to produce sequential firing of shots;
- Blasting would generally only be conducted during the afternoon on days when there is no temperature inversion or other unsuitable weather condition;
- All blasts would be monitored for both ground vibration and airblast noise;
- A mobile hydraulic rock breaker would be used to break large rocks, reducing the need for small intermittent blasts;
- Efficient noise reduction screens and mufflers would be maintained on all equipment and plant;
- Truck and trailer combinations would be used;
- Workers would be educated to methods of reducing noise and minimising the impact of noise on themselves. All necessary noise protection equipment would be supplied to workers;
- Machinery generated noise would continue to be monitored and where necessary steps would be taken to reduce noise levels which fail to meet statutory requirements; and

- All blasts would be monitoring for airblast overpressure and ground vibration at the nearest properties.

The Environmental Protection Authority has not received complaints about the existing operations, however concern has been expressed about the noise from blasting. The proponent has subsequently incorporated these concerns into the existing monitoring program. The Environmental Protection Authority endorses the proponent's invitation for people to directly report to the proponent any effect of the quarrying operation as soon as possible.

The Environmental Protection Authority notes that the proponent's commitments 9.2.1-9.2.9 to mitigate background and blasting noise impacts from the proposed quarry operations are satisfactory (Appendix 1). The Environmental Protection Authority would also impose details of measuring and monitoring sound levels and appropriate controls on blasting noise limits in its works approvals and licence requirements.

Recommendation 2

The Environmental Protection Authority recommends that the proponent be required to ensure that the introduced noise from the project does not cause the noise in the surrounding residential areas to exceed:

- **50dB(A) from 7am to 7pm Monday to Saturday;**
- **45dB(A) on Sunday and from 7pm to 10pm Monday to Saturday; and**
- **40dB(A) from 10pm to 7am every day.**

These levels should not be viewed as normal operating levels for the project. They are the upper limits above which action will be taken by the Environmental Protection Authority. The Environmental Protection Authority considers that noise below these levels is not unreasonable provided it does not include tonal components, impulses or other intrusive characteristics.

4.2 Dust

Dust has the potential to be generated during most phases of the quarrying and crushing operation. Dust would be generated during most blasting, transport, crushing and screening, drilling, blowing from the dumps and stockpiles and removing and installing overburden and topsoil.

Dust can be a nuisance to people and can reduce the vigour of both native and exotic vegetation. It also has the potential to be visually intrusive. Dust emissions are particularly significant during summer when strong easterly winds occur. In winter, frequent rain may greatly reduce the potential dust emissions.

The levels of dust generated would be managed by the following operations:

- Blasting would generally be conducted on days with westerly wind patterns most likely to take any dust away from the nearby houses;
- Dust suppression sprays are installed throughout the crushing and screening plants. All stock piles would be sprayed to keep them moist. Other sections of the crushing and screening plants and conveyor belts would be enclosed where necessary;
- All haul roads and some access roads are unsealed. Dust generated from the roads would be suppressed by dampening the roads as required. The main access road from South West Highway is sealed bitumen;
- Loaded trucks would pass under a water spray just prior to leaving the site;
- The stripping of overburden and topsoil and their subsequent use in rehabilitation would be undertaken during the wetter months to reduce the generation of dust.

- Air quality would be monitored at several locations around the quarry and processing plant using continuous static (deposit) and directional dust gauges.

The Environmental Protection Authority controls dust levels of the existing quarry under its current licence conditions and has received no complaints about dust levels. The Environmental Protection Authority feels that dust levels would be adequately controlled by the proponent's commitments 9.3.1-9.3.6 (Appendix 1). The Environmental Protection Authority would also set air quality conditions for the proposed extension in its works approvals and licence requirements.

4.3 Aesthetics

The Byford Quarry lies in an area identified by the Basic Raw Materials Committee (State Planning Commission 1986) as being of landscape value. The proposed extension to the south east on Lot 2779 is the alternative that reduced the visual impact of the proposal most effectively.

The quarry lies behind a natural hillside bank and is being worked southwards parallel to this bank. The crushing and screening operation is conducted in a natural valley behind a constructed landscape bank.

The existing quarry is not easily visible from South West Highway at any location because it is hidden by the natural screening hillside or constructed landscape banks. The top of the existing crushing plant is visible from a point on South West Highway. The present landscape screening banks are in the process of being extended and revegetated. These banks would have approximately eight years of growth before the proposed extension would open.

The working faces of the proposed quarry extension would not be readily visible as the proposed quarry and infra-structure would be hidden from view behind the existing scarp face. The overburden face, however, would be visible from limited locations on the coastal plain.

In order to minimise any visual impacts, the eastern part of the proposed extension would be excavated first and the overburden face would be revegetated before exposure. This would ensure that by the time the overburden and the first bench faces would become visible, the upper levels of the quarry would have been rehabilitated for at least 20 years and would blend into the existing landscape. Therefore only revegetated slopes of the proposed quarry would be visible.

The proponent has made the following commitments:

- The proposed quarry would extend southwards behind the scarp;
- The proposed extension would be worked along the eastern side first;
- All buildings and processing facilities visible from outside the property would continue to be painted grey-green;
- The present landscape banks currently being extended would be revegetated during 1991-1992. Where required further banks would be constructed to hide the operations of the quarry and processing plant; and
- The visibility of the quarry and the processing plant from South West Highway would be monitored regularly and an annual photographic record maintained.

The Environmental Protection Authority is satisfied that the plans to mitigate visual impacts of the proposed extension would be adequate.

4.4 Rehabilitation

The rehabilitation program is an integral part of the excavation management program and is tied to the end use of the quarry. The end use of the quarry can not be defined absolutely as excavation completion would not be expected for about 100 years. In the working life of the

quarry, excavation methods may change and the development of the surrounding land can only be estimated. The South-East Corridor Plan envisages that the area east from South West Highway will be rural lots of greater than 20 hectares and open space for recreation or special use for public purposes.

The quarry would be rehabilitated in a manner consistent with several possible future land uses of an essentially recreational nature.

The planned rehabilitation program would aim to produce a landscape visually similar to the existing rural and indigenous vegetation landscapes. This would involve the use of slopes consistent with current slopes and a cover of vegetation ranging from a mix of pasture species and indigenous trees and shrubs. The result would be an overall appearance of a steep slope broken by rocky outcrops similar to those seen on the Darling Scarp in other locations.

The steps in rehabilitation of the completed sections of the quarry are listed below:

- Surface Restoration
  - Compacted surfaces would be deep ripped;
  - Overburden would be used to fill in the benches;
  - Top soil would be spread over the overburden; and
  - Channels, furrows or small banks would be constructed to conduct precipitation.
- Revegetation
  - Direct seeding with indigenous tree and understorey species;
  - Planting small tube trees with seeding of pasture species and/or indigenous understorey species;
  - The rehabilitation program would be assessed each Autumn and further seeding and/or planting would be carried out as required to obtain satisfactory vegetation cover.

Rehabilitation of the quarry workings is regarded by the Environmental Protection Authority as an extremely important facet of the quarry operation and it is pleasing to note the proponent's commitments 9.14.1-9.14.3 to ongoing rehabilitation (Appendix 1). Based on these commitments, the quarry would be progressively rehabilitated in a manner consistent with several possible future land uses of an essentially recreational nature.

Excavation of the proposed extension would be expected to begin in the year 2000 and to be completed by approximately the year 2100. During the interim, the rolling rehabilitation program should adapt according to changing environmental and land use demands and be reviewed by the relevant authorities.

Recommendation 3

The Environmental Protection Authority recommends that prior to commencing operations, the proponent should develop and subsequently implement a rolling rehabilitation plan in order to progressively rehabilitate the land to an environmentally stable condition to the satisfaction of the Environmental Protection Authority in consultation with the Shire of Serpentine-Jarrahdale. This plan should be reviewed every five years by the Environmental Protection Authority in consultation with the Shire of Serpentine-Jarrahdale.

Recommendation 4

The Environmental Protection Authority recommends that as work in the proposed extension is not expected to begin until approximately the year 2000 any approval given by the Environmental Protection Authority should be

reviewed by the Environmental Protection Authority 15 years after work begins in the extension in order to ensure practices are still commensurate with environmental and land use planning practices of the time.

4.5 Water quality

The streams in the quarry area flow onto adjoining properties and the area forms a boundary of the catchment for the Jandakot Groundwater Mound. The water in the streams ultimately percolates into the sediments of the Swan Coastal Plain and contributes to the ground water system. The quarry location is not a priority area for the catchment and the proposed quarry's impacts on the catchment would be negligible due to its distance.

The greatest risk of pollution lies in fine sediments being washed into the ephemeral streams which flow through the area and then into adjoining properties.

The only water used on site is drawn from the sump east of the existing quarry.

Water quality would be protected by the following actions:

- Ephemeral streams within the works area would be pass through a series of sumps and pipes;
- Surface water would be fed through the pipe system then fed through a small concrete sediment settlement dam before being released;
- Water used in the quarry and the crushing and screening plants would be recycled through small sediment settlement dams for reuse where possible;
- Quarry platforms, benches and roads would be designed to drain water through drains and gutters before being fed through a sump into the pipe system;
- Banks would be built and revegetated to avoid erosion;
- Water released from the sediment settlement dam would be frequently monitored.

The Environmental Protection Authority is satisfied that the proponent's commitments 9.4.1-9.4.9 manage the issue of water quality (Appendix 1).

4.6 Dieback disease

Dieback disease (Phytophthora spp) is present in the eastern half of the proposed extension where much of the understorey has died. It has the potential to spread further, particularly within the wetter sites.

The internal drainage of the proposed quarry extension with its exit to the north west down the current drainage system would tend to restrict any spread of the fungus. If some spread of the fungus did occur it would be downstream away from the forest areas to the east, including the bordering State Forest, and behind the vegetation of the scarp to the west. This would take the fungus into areas of cleared farm land. However care must be taken to prevent spread of the fungus during surface and overburden clearing and rehabilitation.

The proponent is committed to implementing the following management procedures in order to reduce the risk of spreading dieback disease:

- Topsoil from infected and non infected areas would be stored separately;
- Infected topsoil would be be used for rehabilitating dieback infected areas only and only in drier sites where the rate of spread of dieback would be reduced. Where possible top soil from the infected areas would be buried beneath overburden;
- The final form of the quarry with runoff draining inwards into the existing stream channel would ensure that dieback is not washed into other stream systems;

- Vehicles used in clearing and removing topsoil would be washed down before moving into non-infected areas;
- Only species known to be resistant to dieback disease would be planted in areas that may be infected;
- Dieback disease free waste from the crushing operation would be used for road construction; and
- The possible spread of dieback disease would be visually monitored, particularly along the stream line, areas of revegetation and the adjoining forest.

The Environmental Protection Authority is satisfied that the proponent's commitment 9.12.1 adequately manages dieback disease in the quarry operations (Appendix 1).

4.7 Flora and fauna

Clearing of the proposed quarry site would be undertaken in sections of about 5 hectares every 10 years. Although not detected, three Rare or Endangered Species of fauna may be affected by the proposed quarry if they are present, but as the site would be cleared in sections they should be able to survive by moving to an uncleared area.

The flora on the extension would be destroyed by the proposed quarry, although some of the species present could be used in the rehabilitation process. No Rare or Endangered Species are present in the extension area, therefore none of the species present in the extension area are in any immediate threat of extinction.

The impact on flora and fauna would be minimised by the following actions:

- Land would be cleared in lots of about 5 hectares every 10 years;
- The area open to quarrying at any particular time would be minimised due to the ongoing rehabilitation program;
- New habitats would be provided by the completed land form which would be similar to other land surfaces in the area with steep slopes and occasional protruding boulders;
- The completed faces would be revegetated with a variety of indigenous plant species. In general these would be species resistant to dieback disease;
- Top soil would be spread directly where possible to maximise the chances of indigenous species germinating from seed contained in the soil;
- The introduction of weeds would be controlled; and
- Policies would be put in place to control the spread of dieback disease.

The Environmental Protection Authority is satisfied that the proponent's commitments 10.1-9.11.1 sufficiently address the issue of flora and fauna (Appendix 1).

4.8 Public consultation and submissions

The proponent undertook a public consultation program to inform nearby residents and landowners of the proposed extension. In general, the residents and landowners accepted the proposed extension subject to a number of conditions which the proponent has incorporated.

No submissions were received.

5. Conclusion

Upon assessment of the Pioneer Concrete (WA) Pty Ltd proposal, the Environmental Protection Authority has concluded that the proposed Byford quarry extension would be environmentally acceptable subject to the operation being carried out in accordance with the proposal detailed in the Consultative Environmental Review and the Environmental Protection Authority's recommendations in this Assessment Report.

Appendix 1

Proponent's commitments

9.0 COMMITMENTS

9.1 AESTHETICS

9.1.1 All buildings likely to be visible from outside the area owned by Pioneer will be painted grey - green to blend in with the existing landscape.

9.1.2 Present landscape screening banks immediately west of the existing quarry will be extended and revegetated.

9.1.3 The eastern part of Lot 2779 will be opened first to enable the overburden banks and highest bench to be revegetated for at least 20 years before they become visible from positions distant from the quarry.

9.1.4 All buildings and equipment will be removed from the site on completion of the project and all roads will be deep ripped and revegetated.

9.2 NOISE

9.2.1 All blasts conducted at the Byford Quarry will have millisecond delays fitted to produce sequential firing of shots.

9.2.2. All blasts will be monitored for both ground vibration and air-blast over pressure.

9.2.3 A mobile hydraulic rock breaker will be used to break large rocks, reducing the need for small intermittent blasts.

9.2.4 Warning signs will be maintained near noisy equipment.

9.2.5 Efficient noise reduction screens and mufflers will be maintained on all equipment and plant.

9.2.6 Blasting will only be conducted during the afternoon on days when there is no temperature inversion or other unsuitable weather condition.

9.2.7 All blasts will continue to be monitored and all regulations complied with.

9.2.8 Machinery generated noise will continue to be monitored and where necessary steps will be taken to reduce noise levels which fail to meet statutory requirements.

9.2.9 Workers will be educated to methods of reducing noise and minimising the impact of noise on themselves. All necessary noise protection equipment will be supplied to workers.

9.3 DUST LEVELS

9.3.1 Where possible blasting will be conducted on days with westerly wind patterns.

9.3.2 Dust suppression sprays will be maintained throughout the crushing and screening plants and equipment enclosed where practicable.

9.3.3 All unsealed roads will be watered when necessary to suppress dust.

9.3.4 Where possible the stripping of overburden and topsoil will be undertaken during the wetter months to reduce the generation of dust.

9.3.5 Pioneer will conform to the requirements of the Mines Regulation Act and Amendments 1946 - 1991 and the Environmental Protection Act and Amendments 1986 - 1989.

9.3.6 A regular dust monitoring program will be maintained.

9.4 WATER QUALITY

9.4.1. The existing pipe and sump system will be maintained and extended if necessary in order to protect the quality of the stream running through the area.

9.4.2 Silt traps will be cleaned at regular intervals to ensure they are operable. The fines recovered will be used in the rehabilitation program. All water leaving the site will pass through a sediment settlement dam.

9.4.3 Lips will be constructed on the outer edges of all platforms, benches and roads, forcing the water to drain back towards the wall, where it will collect in drains and gutters before being fed through a sump into the pipe system.

9.4.4 All banks including those used in rehabilitation will have a proportion of larger material in their construction to reduce the erosion of their surfaces by surface water and any tendency to slumping.

9.4.5 Small along contour banks channels or furrows will be formed on reconstructed banks as required to assist the penetration of precipitation and reduce runoff.

9.4.6 Landscape banks and rehabilitated slopes will be revegetated as soon as practicable after construction to minimise erosion.

9.4.7 A septic toilet system will be maintained on site to prevent contamination of the groundwater system.

9.4.8 No chemicals or liquids will be disposed of on site. Oils and other lubricants recovered from vehicles during servicing will be stored before being taken to an oil recycling plant. Vehicle washdown areas will be equipped with fuel, oil and detergent traps.

9.4.9 Oil and fuel handling areas will have impervious bases and any spillages will be contained by bunds.

9.5 WASTE DISPOSAL

9.5.1 Materials of a recyclable nature including oils recovered from servicing and metal goods will be stored on site until there is sufficient to warrant removal to a recycling plant.

9.5.2 All other wastes will be taken weekly to an approved waste disposal site.

9.6 SAFETY

9.6.1 Pioneer will operate the under the Mines Regulation Act and Amendments 1946 - 1991 and the Environmental Protection Act and Amendments 1986 - 1989.

9.6.2 The property will continue to be fenced and the access roads fitted with a gate which is locked at all times other than normal working hours.

9.6.3 A caretaker will live in the house located on the property.

COMMITMENTS

9.7 FIRE CONTROL

9.7.1 The work area and quarry act as a firebreak. Other firebreaks will continue to be maintained around all property boundaries.

9.7.2 The 20 000 litre water tanker will be used to provide a portable water source which can be used in the event of fire.

9.8 GREENHOUSE EFFECTS

9.8.1 Pioneer will continue to seek ways to reduce the amount of fossil fuels used as new technologies become available.

9.9 ABORIGINAL SITES

9.9.1 Should any evidence of possible early aboriginal occupation be uncovered during the development of the proposed extension to the quarry, development will be stopped pending an assessment by a recognised consultant.

9.9.2 Pioneer will comply with the provisions of the Aboriginal Heritage Act 1972 - 1980 and Amendments.

9.10 FAUNA

9.10.1 Pioneer will open the proposed extension in stages of approximately 5 hectares every 10 years. This will minimise impact on the indigenous fauna.

COMMITMENTS

9.11 FLORA

9.11.1 Where possible species indigenous to the area will be used in the rehabilitation of Lot 2779. Species susceptible to Jarrah Dieback will not be used.

9.12 DIEBACK

9.12.1 Pioneer will implement the management procedures outlined in section 7.13 Dieback in order to reduce the risk of spreading Jarrah Dieback.

9.13 WEED CONTROL

9.13.1 The introduction of weeds will be monitored and should they prove a problem, steps such as removal, burial or spraying with a non residual herbicide such as "Roundup" will be undertaken to eliminate them.

9.14 REHABILITATION

9.14.1 Pioneer will be responsible for the rehabilitation of the quarry and processing area on an progressive, ongoing basis.

9.14.2 The methods outlined under 7.15 Rehabilitation will be used unless other methods prove to be more successful in field trials.

9.14.3 Site inspections will be made by Pioneer staff from time to time to assess the success of the revegetation and any action which may be required as outlined under 7.15.2 Revegetation.

9.15 MONITORING PROGRAM

9.15.1 Pioneer will maintain a comprehensive monitoring program of all facets of the environmental impact of the Byford Quarry as outlined under section 8.0 Monitoring Program.

9.16 PUBLIC OPINION

9.16.1 A record will be kept of any public comments and/or complaints regarding the operation of the Byford Quarry.

9.16.2 These public comments will be investigated and if found to be valid, Pioneer will take steps to modify its extraction and processing methods to minimise any problem identified.