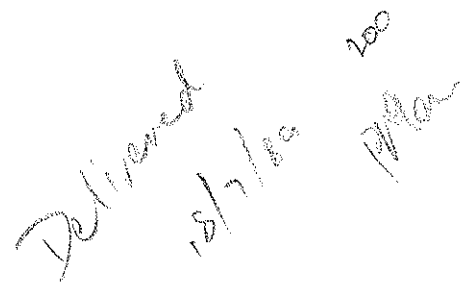
THREE MILE HILL GOLD PROJECT
COOLGARDIE

Goldfan Ltd

Report and Recommendations
of the
Environmental Protection Authority



Environmental Protection Authority
Perth Western Australia
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GOLDFAN LTD

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i SUMMARY AND RECOMMENDATIONS

Goldfan Ltd proposes to mine gold from an open cut mine at Three Mile Hill, approximately 5 km northeast of Coolgardie, adjacent to the Great Eastern Highway. Mining will be in three stages down to a maximum pit depth of 170 m (Figure 1).

The processing will include crushing, concentrating and final gold recovery in a plant located on site. A production rate of 800,000 tonnes per annum of gold bearing ore ranging from approximately 2-3 grams per tonne of gold is expected.

Tailings from the process will be stored in two dams, one to contain the tailings from gold recovering and the other to contain the tailings from the flotation concentration process.

Saline process water will be piped from a borefield 12 km to the north at Roger Spring. The project workforce will be approximately 56 people who will be housed in Coolgardie.

The proposal requires realigning a 1200 m section of the Great Eastern Highway and a shorter section of the Goldfields Water Supply pipeline to divert them around the open pit.

The Environmental Protection Authority decided that assessment under Part IV of the Environmental Protection Act 1986 was required and the level of assessment was set at a Notice of Intent with invited local input. In this case the Coolgardie Shire Council was asked to comment on the project.

The Notice of Intent has been assessed and the proposal is considered to be environmentally acceptable subject to the following recommendations.

RECOMMENDATION 1

The Environmental Protection Authority has concluded that this project is environmentally acceptable and could proceed subject to the Environmental Protection Authority's Recommendations in this Report and the environmental commitments made by the proponent in the Notice of Intent (consolidated in Appendix A to this Report).

RECOMMENDATION 2

The Environmental Protection Authority recommends that monitoring of the tailings dams for leakage of process water containing cyanide be extended for a suitable period after the project's completion by the proponent and the results submitted to the Mines Department. Any remedial action required as a result of this monitoring should be carried out by the proponent to the satisfaction of the Mines Department and the Environmental Protection Authority.

RECOMMENDATION 3

The Environmental Protection Authority recommends that the proponent undertake dust control in consultation with the Shire of Coolgardie to the satisfaction of the Environmental Protection Authority, to ensure that traffic on the Great Eastern Highway is not adversely affected by dust from the minesite.

RECOMMENDATION 4

The Environmental Protection Authority recommends that the proponent investigate the potential for locating additional overburden stockpiles at a greater distance from the pit, thus decreasing the face angles and improving the conditions for rehabilitation, and that this be reported to the Authority prior to the commencement of stockpiling.

RECOMMENDATION 5

The Environmental Protection Authority recommends that the proponent undertake rehabilitation of the minesite to the satisfaction of the Mines Department and the Environmental Protection Authority, and prepare a report annually on the rehabilitation programme for submission to both organisations. Any remedial action required is to be completed to the satisfaction of the Mines Department and the Environmental Protection Authority.

RECOMMENDATION 6

The Environmental Protection Authority recommends that the proponent ensure that runoff from the site does not have any adverse effects on local drainage systems.

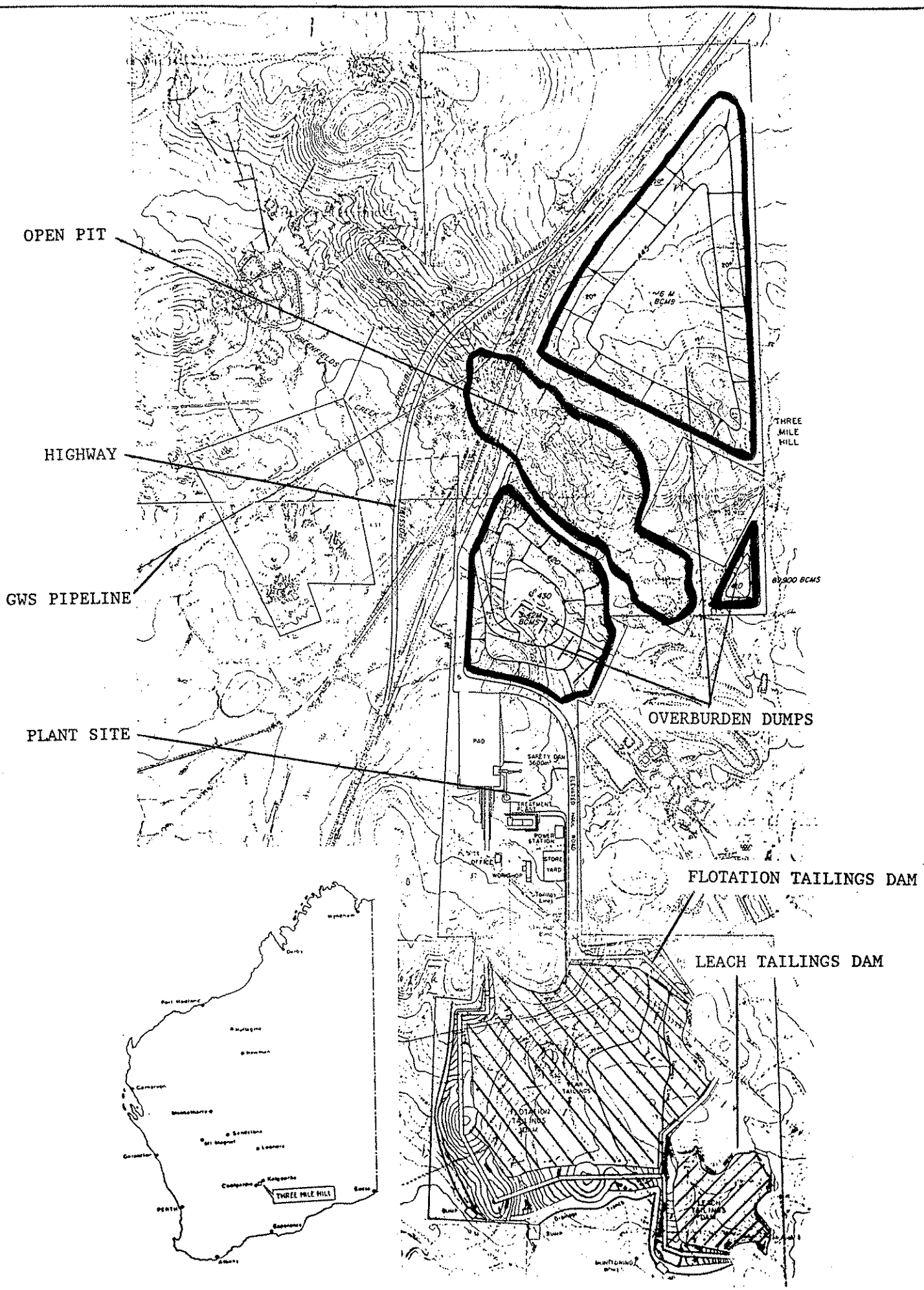

Figure 1. Mine Location and Site Layout (from NOI Goldfan Ltd)

1. BACKGROUND

Gold mining commenced at the Three Mile Hill area in 1897 on the principal lease called "The Caledonia". Production was from small open cuts and shallowly dipping open stopes. The maximum depth attained was approximately 10 m on individual quartz veins and stockwork zones within a mineralized metagabbro unit, referred to by the proponent as the Caledonia Trend.

Bulk sampling was carried out in 1947 from a small open cut by New Consolidated Goldfields (Australia) Pty Ltd (NCG). NCG reacquired the ground in 1965, and in the period up to 1968 mapped and carried out geochemical and geophysical surveying. The area was relinquished due to the economic situation at the time.

Some larger scale alluvial and elluvial workings were carried out in the late 1970s by prospectors but the mining was unsuccessful.

A group of mining leases was consolidated by Goldfan Ltd in 1985, and exploration activities including drilling, surface mapping and geophysical and geochemical surveying were carried out up to the present time. As a result a 1200 m long mineralized trend in metagabbro has been delineated.

The Environmental Protection Authority determined that assessment under Part IV of the Environmental Protection Act 1986 was required and the level of assessment was set at a Notice of Intent with invited local input.

2. PROJECT DESCRIPTION

The proposal is to mine a mineral deposit using conventional open pit technology with a decline to access the lower portions of the pit. Production during the six year life of the project is expected to be approximately 1.5 million bank cubic metres (BCMs) of ore with a further 8 million BCMs of waste. The decline will access approximately 1 million BCMs in the lower regions of the pit. Under current plans the maximum dimensions of the pit will be in the vicinity of 850 m long x 280 m wide x 170 m deep and the decline will have approximate dimensions of 6 m wide x 6 m high. Overburden from the pit will initially be used for on-site construction projects and then will be stockpiled around the pit.

Processing will be carried out on-site and will include three stage crushing followed by fine grinding and pre-concentration by gravity and flotation. The concentrate will then pass through a conventional carbon in pulp circuit after which the process will go into the final stage in the "gold room". The capacity of the plant is expected to be approximately 800,000 tonnes of ore per annum.

The process will produce two types of tailings from different stages and these will be pumped to two tailings dams. The first tailings dam (TD1) will have a capacity of approximately 2,000,000 cubic metres and will contain a slurry of finely ground rock and saline process water. Process water recovery will be undertaken using a decant tower in the dam. The dam wall of TD1 will be constructed of overburden.

The second tailings dam (TD2) will have a capacity of approximately 200,000 cubic metres and will contain the material resulting from cyanide leaching of the flotation concentrate. The dam wall of TD2 will be constructed of a clay core with an overburden covering due to the deleterious nature of the tailings.

It is anticipated that process water will be derived from a borefield in the Roger Spring area, approximately 12 km north of the minesite. The water, which ranges from 45,000 - 70,000 mg/L total dissolved solids (TDS), will be piped directly to the project site. Anticipated water usage is 1,000,000 kL per annum.

There are two options for power supply to the project. These are a supply from SECWA, or alternatively a diesel powered generating unit would be located on-site. The project workforce will be accommodated in Coolgardie in an existing motel/camp which has already been purchased.

3. EXISTING ENVIRONMENT

The Three Mile Hill area is located in the Coolgardie region which experiences a semi-arid warm continental climate with evaporation exceeding precipitation in all months of the year. Rainfall is distributed relatively evenly throughout the year with slightly higher levels recorded during the winter months and an average annual figure of 260 mm.

The topography of the area is moderately undulating with a maximum relief of 60 m over the lease areas. Several ridges cross the area, generally in a northwest-southeast direction and these are interspersed with the consequent drainage channels. The area eventually drains into the Brown Lake salina approximately 8 km away to the east-south-east. The project area has been heavily disturbed due to previous mining activities.

The process water pipeline route, proceeding north, crosses a divide and enters an area of low relief and north flowing drainage. The borefield area is generally flat with a transecting ridge, and the consequent drainage base appears to be the Kurrawang Lake salina.

Groundwater reserves at the minesite are also brackish, and appear to be limited due to the geology of the area.

The project area is situated on the eastern flank of the granite cored "Coolgardie Dome". The deposit to be mined is a metagabbroid complex approximately 1200 m long and 300 m wide, striking in a northwest-southeast direction. The northwestern tip is bisected by the Great Eastern Highway and the Goldfields Water Supply pipeline (GWS), thus creating the need for their re-alignment.

The vegetation off the area consists of varyingly dense Eucalyptus woodlands on the ridges and slopes while the pediments and alluvial areas have more understorey species. The actual metagabbro unit that will be mined is dominated by Acacia species with occasional groves of Eucalyptus spp. Some areas of the unit are denuded of vegetation. The Eucalyptus species present include E. torquata, E. clelandii and E. campaspe. Acacias present include A. graffiana and A. kempeana. Understorey vegetation includes numerous species of Eremophila (shrubs) and grasses, both indigenous and exotic.

According to the survey undertaken by the Australian Revegetation Corporation for Goldfan Ltd, the presence of mammalian and reptilian fauna is limited and in fact no species of mammals or reptiles were recorded. Numerous species of birds were recorded such as honeyeaters (2 species), the Striated Pardalote and the Grey Currawong. A diverse range of invertebrates such as centipedes, ants and spiders was recorded.

A comprehensive ethnographic study was undertaken and no archaeological sites were located on or near the intended workings.

4. ENVIRONMENTAL IMPACTS

After assessment by the Environmental protection Authority, the following issues are seen to be of the most importance:

- tailings dams;
- dust control;
- water supply;
- rehabilitation; and
- other issues:

    - loss of flora and fauna;
    - transport;
    - sodium cyanide;
    - diesel;
    - aesthetics;
    - site drainage; and
    - blasting noise.

4.1 TAILING DAMS

Tailings Dam 1 will contain a large salt store from the hypersaline groundwater being used in the process. The dam wall is not expected to be impermeable due to the lack of suitable material (ie clay) and the nature of the overburden to be utilised. This means there is a possibility of saline water seeping through the wall and entering the local drainage system. A catch drain is planned to return any seepage to the dam during the project life but it is possible that in post-project years, saline leachate may leave the dam. This is not likely to be environmentally significant due to the absence off usable water below the site.

Tailings Dam 2 will contain sodium cyanide (NaCN), arsenic compounds and again a store of salt from the process water. This dam is constructed with a clay core in the wall to prevent leachate escape. A catch drain is also planned for this dam as well as monitoring bores downslope.

RECOMMENDATION 2

The Environmental Protection Authority recommends that monitoring of the tailings dams for leakage of process water containing cyanide be extended for a suitable period after the project's completion by the proponent and the results submitted to the Mines Department. Any remedial action required as a result of this monitoring should be carried out by the proponent to the satisfaction of the Mines Department and the Environmental Protection Authority.

4.2 DUST CONTROL

It is recognised that dust control on-site is extremely important. However, due to the saline nature of the water being used, and the high evaporation rates in the region, it is quite likely that salt build-up on watered surfaces will occur during the project life. This should not be a problem in the actual mine as any salt transport will tend to be towards the bottom of the pit. Haulage roads on the surface and any other areas that require dampening to control dust will be extremely difficult to rehabilitate if salt is present in levels deleterious to vegetation.

The proponent intends to locate the initial topsoil dumps near the Great Eastern Highway as a visual buffer, but it is possible that during severe easterly wind events, dust blowing from these bunds may be a road hazard. Thus it is suggested that the topsoil be located elsewhere and temporarily rehabilitated. A bund of overburden covered with a layer of topsoil to encourage revegetation should be used instead.

Using saline water on these dumps for dust control should be avoided wherever possible.

Dust originating from overburden dumps should not be a problem due to the nature of the material but the situation should be constantly monitored.

RECOMMENDATION 3

The Environmental Protection Authority recommends that the proponent undertake dust control in consultation with the Shire of Coolgardie to the satisfaction of the Environmental Protection Authority, to ensure that traffic on the Great Eastern Highway is not adversely affected by dust from the minesite.

4.3 WATER SUPPLY

The groundwater in the extraction area is extremely saline and thus unsuitable for most other uses such as stock water or human consumption. The 12 km pipeline will be buried underground to a depth of 850 mm so there will be no visual intrusion or wildlife movement restriction. The fate of the pipeline at the completion of the project is unknown at this stage, as it may be left in position or removed for use elsewhere. Leaving the pipeline in place should not result in any environmental impacts. However, removing the pipeline would result in the route being disturbed again.

The proponent must abide by any conditions set by the Water Authority of Western Australia during the development and utilisation of the groundwater supply.

4.4 REHABILITATION

The waste dumps will consist of a vertical rise of 5 m at a 30 degree face angle and then a 4 m wide berm, resulting in an overall slope of 20 degrees. The face angles are 10 degrees steeper than Mines Department guidelines suggest, but this is due to the lack of space for overburden stockpiling adjacent to the mine. The proponent should investigate the potential for additional stockpiles to be located further away from the open pit to lessen the face angles and thus improve the conditions for rehabilitation.

It is proposed in the Notice of Intent that only the berms will be rehabilitated, but this is not considered acceptable to the Environmental Protection Authority or the Mines Department, and thus the whole dump surface should be rehabilitated as soon as possible after the overburden is stockpiled. Lower face angles will assist such rehabilitation.

The verge of the main haul road along the western edge of the lease area will be revegetated as soon as possible after its completion. This will help to screen the process plant from the highway. At the completion of the project the haul roads will be deep ripped to encourage revegetation. The possibility of salt build-up on roads as discussed in Section 4.2 (Dust Control) should be noted and measures to ameliorate it undertaken.

Due to the siting of the tailings dams in a gully drainage system, stabilisation of the tailings through rehabilitation is essential. The outer face of the dam walls will be susceptible to erosion after rainfall events due to the lack of ground cover. Erosion of the dam will lead to problems downstream as well as possibly weakening the dam wall and reducing it's effectiveness in containing the tailings. Therefore, as the dam walls are increased in height, immediate retopsoiling and revegetation should take place.

Rehabilitation of the tailings dam surface should occur as soon as possible after production ceases. It is proposed to cover the dams with 500 mm of waste material and then topdress them with a substantial layer of topsoil which will subsequently be seeded with local varieties of shrubs and grasses tolerant of the conditions.

General rehabilitation of the millsite will include removing all transportable buildings, removing poly pipe that is lying on the surface and removing or burying any general waste material and/or equipment.

RECOMMENDATION 4

The Environmental Protection Authority recommends that the proponent investigate the potential for locating additional overburden stockpiles at a greater distance from the pit, thus decreasing the face angles and improving the conditions for rehabilitation, and that this be reported to the Authority prior to the commencement of stockpiling.

RECOMMENDATION 5

The Environmental Protection Authority recommends that the proponent undertake rehabilitation of the minesite to the satisfaction of the Mines Department and the Environmental Protection Authority, and prepare a report annually on the rehabilitation programme for submission to both organisations. Any remedial action required is to be completed to the satisfaction of the Mines Department and the Environmental Protection Authority.

4.5 OTHER ISSUES

4.5.1 LOSS OF FLORA AND FAUNA

Although the area is already heavily disturbed, some loss of flora and fauna will occur. Of particular concern are the species Eucalyptus campaspe and Eucalyptus clelandii which occur throughout the leases. The species are restricted to the Coolgardie System and are not abundant.

The Environmental Protection Authority notes that the proponent is committed to preserve natural woodland wherever possible, but considers that areas containing the species Eucalyptus campaspe (Silver Topped Gimlet) and Eucalyptus clelandii (Cleland's Blackbutt), should be especially protected within this context.

Only a cursory faunal survey was undertaken for the project. After consultation with the Department of Conservation and Land Management (CALM) at Kalgoorlie, it was considered unlikely that any rare species exist on the leases due to the disturbed nature of the site.

4.5.2 TRANSPORT

There will be an increase in heavy transport on the Great Eastern Highway as a result of the project. This will include the transport of sodium cyanide and diesel fuel if the power station is to be built on-site. Due to the amount of heavy transport present on the Highway already, this increase is not considered to be environmentally significant.

4.5.3 SODIUM CYANIDE

Approximately 576 tonnes of NaCN will be used per annum, and at any one time a maximum of 144 tonnes (ie 3 month's supply) will be stored on-site. The NaCN will be in solid form and will be stored in a locked, fenced compound adjacent to the processing plant.

4.5.4 DIESEL

If the diesel fueled power station option is taken, then on-site storage of 200 kl of diesel is planned. This will be contained in four equal sized tanks which will be surrounded by a bund wall capable of containing the entire stored fuel capacity.

4.5.5 AESTHETICS

The presence of such a large pit and processing plant adjacent to the highway creates a large visual impact. However, due to current similar land uses in the area and the proponents undertaking to create a visual buffer zone, this visual impact can be managed.

4.5.6 SITE DRAINAGE

Controlling drainage off the minesite during rainfall events to reduce erosion and sediment transport to local drainage systems is extremely important. Runoff from areas such as the overburden dumps and the plant buildings should be directed to a sediment trap to reduce the velocity of the water and remove sediment. The plant safety dam could be utilised as a stormwater surge pond in cases of severe rainfall events.

RECOMMENDATION 6

The Environmental Protection Authority recommends that the proponent ensure that runoff from the site does not have any adverse effects on local drainage systems.

4.5.7 BLASTING NOISE

It is predicted that noise from blasting, while being audible in Coolgardie, will not adversely affect the residents. However, should adverse impacts be experienced, appropriate controls on this activity would be addressed through the Environmental Protection Authority's Works Approval and Licensing mechanisms.

5. CONCLUSION

The Environmental Protection Authority has concluded that although the physical impact of the mine will be intensive, due to the disturbed nature of the site and the similar pattern of land use in the area, the environmental impacts are acceptable and manageable.

RECOMMENDATION 1

The Environmental Protection Authority has concluded that this project is environmentally acceptable and could proceed subject to the Environmental Protection Authority's Recommendations in this Report and the environmental commitments made by the proponent in the Notice of Intent (consolidated in Appendix A to this Report).

6. SUBMISSIONS

As the level of assessment was set at a Notice of Intent with managed local input, the Coolgardie Shire Council was asked to comment on the project.

Their main interest was in the blasting program and the road relocation aspects of the project. However, there were no objections to the project proceeding.

APPENDIX A

ENVIRONMENTAL COMMITMENTS

Goldfan Ltd has made the following commitments in it's Notice of Intent to minimise environmental impacts arising from the establishment and operation of the Three Mile Hill project.

Water Supply

- bore pumps designed to shut down in case of blockage or spillage.
- water pipe from Roger Spring buried 850 mm underground.
- hydrology study of minesite to be carried out in case dewatering becomes necessary.

Dust Control

- watering of haulage ways for dust suppression.
- roadways metalled with crushed overburden to minimise dust and need for watering.
- crushers and other equipment fitted with dust suppression devices.

Public Safety

- blasting managed to minimized flyrock, main highway to be shut 700 m either side of pit during blasting.
- safety bund 2 m high around final pit perimeter.
- hearing protection areas defined around the plant.
- sodium cyanide stored in locked compound.

Tailings Management

- construction of TD2 walls to minimise seepage.
- sumps to collect seepage from both tailings dams.
- tailings pipelines fitted with pressure alarms.
- process water recovery from TD1.
- 24 hour plant output capacity safety dam.

Rehabilitation

- removal and stockpile of all topsoil including vegetative matter.
- topdress and revegetate waste dump berms.
- progressive reduction in the face angle of dam walls (to 20 degrees), followed by topdressing and revegetation.
- cover, topdress and reseed tailings dams.
- deep rip roads to allow revegetation.
- revegetate verge of main haul road as soon as possible as a visual buffer.
- remove or bury all rubbish at completion of project.

General

- where possible natural woodland will be preserved.
- topsoil stacked near highway as a visual buffer.
- diesel tanks (if needed) will be surrounded by a bund to contain any accidental spillage.