Yakabindie Nickel Project

Dominion Mining Limited

Report and Recommendations
of the
Environmental Protection Authority

Environmental Protection Authority
Bulletin 444
August 1990

Yakabindie Nickel Project

Dominion Mining Limited

Report and Recommendations
of the
Environmental Protection Authority

ISSN 1030-0120
ISBN 0 7309 34969

Contents

Appendices

Figures

Table

Summary and recommendations

Dominion Mining Limited has submitted a proposal for the mining and processing of nickel ore at Yakabindie near Leinster in the Northern Goldfields region. The total project will cover some 5000 hectares of land.

The low grade nickel sulphide orebody is located on the Yakabindie pastoral lease approximately 65 kilometres north of the Leinster townsite (Figure 1).

The proposal was referred to the Environmental Protection Authority in February of 1990 and the level of assessment was set at Consultative Environmental Review owing to the proximity of the site to the Wanjarri Nature Reserve and the potential for cumulative environmental impacts such as transport and water supply associated with the nearby Mount Keith Nickel Project, some 40 kilometres to the north.

It is proposed to develop an open pit to mine approximately 90 million tonnes of ore at a rate of 6 million tonnes per annum for the fifteen year life of the operation. The ore will be treated at a processing plant on-site to form a nickel concentrate at a production rate of approximately 120 000 tonnes per year. A final port destination for export of the the product has not as yet been decided, however, the options are by road to Geraldton, or by road to Leonora then by rail to Esperance.

Mining will utilise conventional large-capacity diesel powered earth moving equipment for stripping of overburden and mining of ore. Overburden and waste generated from the mining operation will be stored in 40 metre high dumps located to the north and east of the open pit (Figure 2). Waste from ore processing in the form of tailings will be stored in a 300 hectare impoundment located to the south west of the open pit.

A workforce of approximately 260 people will be accommodated on-site within a village facility. The majority of the workforce will be employed on a fly in / fly out basis requiring the construction of a new airstrip at the site.

The project area encompasses landform and vegetation associations which are widely distributed in the Northern Goldfields region. The area is characterised by the north-south greenstone belt, the granite hill complex to the west and the Jones Creek drainage system. Vegetation is dominated by low open *Acacia* woodland and shrublands with a severely degraded understorey.

The open pit is to be located across the Jones Creek drainage line requiring diversion of the main creek and its western tributary, either side of the pit.

The project area lies adjacent to the south western corner of the Wanjarri Nature Reserve.This Reserve is of significance being the only conservation area within the Northern Goldfields Region. The region is ecologically diverse, encompassing plant and animal communities which do not occur elsewhere and is an overlap zone between arid northern and moderately moist southern elements of both flora and fauna. Recognition of the biological importance of Wanjarri led to the EPA endorsement of Wanjarri as an A Class Nature Reserve in 1975. The endorsement was supported by State Cabinet.

A number of environmental issues were identified by the Environmental Protection Authority from its own assessment and as a result of submissions. The major environmental issues considered during the assessment of the proposal were:

- location of the facilities such as waste dumps, processing plant and the tailings dam;
- the environmental impact on the Jones Creek System;
- impacts on the Wanjarri Nature Reserve;
- rehabilitation of the operation and the pit itself as a permanent feature;
- the impact of utilising groundwater for processing; and
- cumulative impacts such as transport and water supply associated with the proposed Mount Keith Nickel Project.

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

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 adequate environmental management programmes are adopted for the project.

Recommendation 1

The Environmental Protection Authority concludes that the proposal to mine nickel at Yakabindie, as modified during the process of interaction between the proponent, the Environmental Protection Authority, the public and the government agencies that were consulted, is environmentally acceptable.

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

- **location of the northern waste dump, processing plant and tailings dam in an area of breakaway that forms the upper catchment to Jones Creek;**
- **the long term integrity of the Jones Creek diversion structures to ensure water flows in this major drainage line are not significantly affected;**
- **impacts on the Wanjarri Nature Reserve;**
- **rehabilitation of the operation both during and at the end of mine life;**
- **potential effects on local groundwater users from groundwater drawdown associated with the project's processing water requirements; and**
- **cumulative impacts associated with the proposed Mount Keith Nickel Project.**

The Environmental Protection Authority notes that the environmental factors mentioned above have been addressed adequately by either environmental management commitments given by the proponent or by the Environmental Protection Authority's recommendations in this report.

Accordingly, the Environmental Protection Authority recommends that the proposal as described in the Consultative Environmental review could proceed subject to:

- **the Environmental Protection Authority's recommendations in this Assessment Report; and**
- **the proponent's commitments to environmental management (Appendix 1)**

The Authority notes that during the detailed implementation of proposals, it is often necessary or desirable to make minor and non-substantial changes to the designs and specifications which have been examined as part of the Authority's assessment. The Authority believes that subsequent statutory approvals for this proposal could make provision for such changes, where it can be shown that the changes are not likely to have a significant effect on the environment.

The management of drainage, including run-off and leachates from waste dumps, ore stockpiles, the plant and the tailings dam requires careful consideration to ensure such drainage does not degrade the surrounding environment. Such drainage is required to be managed both during mine life and after the project has ceased operations. The Environmental Protection Authority regards stability of the site in the long term as being the responsibility of the proponent.

Recommendation 2

The Environmental Protection Authority recommends that the proponent ensure there be no unacceptable detrimental effects from drainage of waste dumps, ore stockpiles, processing plant and the tailings dam on vegetation at the site and its environs nor water quality in Jones Creek. Accordingly, prior to the commencement of productive mining, the proponent should prepare and implement a drainage management programme for these facilities to the satisfaction of the Environmental Protection Authority.

This programme should ensure long term management of drainage taking into account the situation after mine closure.

Recommendation 3

The Environmental Protection Authority recommends that within six months of project commissioning, the proponent prepare and implement ongoing rehabilitation plans for the operation to the satisfaction of the Environmental Protection Authority upon advice from the Department of Mines. These plans should be reviewed on a three yearly basis by the Environmental Protection Authority.

Recommendation 4

The Environmental Protection Authority recommends that the proponent should be responsible for final decommissioning and removal of the plant and installations and rehabilitating the site and its environs. Accordingly, at least twelve months prior to final decommissioning the proponent should prepare and subsequently implement, a decommissioning and rehabilitation plan to the satisfaction of the Environmental Protection Authority upon advice from the Department of Mines.

The Authority considers 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 only occur following a new referral to the Authority.

1. Introduction

The Environmental Protection Authority has assessed a proposal by Dominion Mining Limited to develop a mining and processing operation for nickel ore at Yakabindie approximately 65 kilometres north of the Leinster township in the Northern goldfields region of Western Australia (Figure 1). A processed nickel concentrate would be transported to either Geraldton or Esperance for export.

The proposal was referred to the Environmental Protection Authority in February 1990. The level of assessment was set at Consultative Environmental Review owing to a number of factors including; the proximity of the Wanjarri Nature Reserve, the imposition on the Jones Creek drainage system, and the cumulative impacts associated with the proximity of the Mount Keith Nickel Project, of similar size and duration, located some 40 kilometres to the north.

2. Project description

The proposed Yakabindie minesite is located within the lease area of the Yakabindie Pastoral Station approximately 5 kilometres east of the main Leinster to Wiluna road.

An open cut mine is proposed to be developed at the site to produce approximately, 6 million tonnes of low grade nickel sulphide ore per annum and 25 million tonnes of waste rock per annum. Mining will be carried out using conventional large-capacity diesel powered earthmoving equipment such as excavators, haul trucks and bulldozers.

The site of the pit is located across the Jones Creek drainage system which is the major drainage system in the area (Figure 2). During the pre-production period a bundwall and spillway diversion will be constructed on the eastern side of the pit to contain and divert run-off in Jones Creek around the pit. Water behind the bundwall will drain through a channel cut to re-enter a tributary of Jones Creek a distance of some 200 metres downstream of the pit.

A tributary of Jones Creek on the western side of the pit will also require diversion. A bundwall will be constructed from waste rock to ensure that flows in this creek do not enter the pit, a spillway cut is also planned for this tributary.

The design of the creek diversions has been based on a recent flood event (January 1990) at the site which has an average recurrence interval of more than 100 years (probability of occurrence in any year of less than 1%).

Waste material from the mining operation will be stored in two waste dumps located to the north and east of the open pit (Figure 2). The total dump capacity required for the current pit design is approximately 175 million cubic metres. Initially waste rock will be utilised to construct the creek diversion bundwalls and tailings dam embankments. Following this, waste rock will be trucked to the northern and eastern dump sites. The walls of the tailings dam will be raised by upstream construction methods using waste rock, with dumping of waste rock over the consolidated tailings towards the close of the mining operations.

The maximum design height of the waste dumps is currently 40 metres, constructed in 10 metre high lifts, with each lift having a 5 metre wide berm for rehabilitation purposes. Due consideration has been given to line of sight from the main road for design of the waste dumps. The final batters will be constructed to a 20 degree overall slope. Capacity of the eastern dump can be increased by further lifts.

Ore from the open pit will be treated at a processing plant to be located on the granite hill to the west of the pit. Processing will include crushing, grinding, conditioning and flotation to produce a nickel rich concentrate. The concentrate will be stockpiled and transported to either Geraldton or Esperance for export.

Waste material from the processing plant in the form of tailings will be pumped to a dam located approximately 300 metres south of the proposed plant site (Figure 2). Embankments of the tailings dam will partially enclose a system of valleys within the granite outcrops to the south west of the pit. The main embankment will runs parallel to Jones Creek in a north south direction.

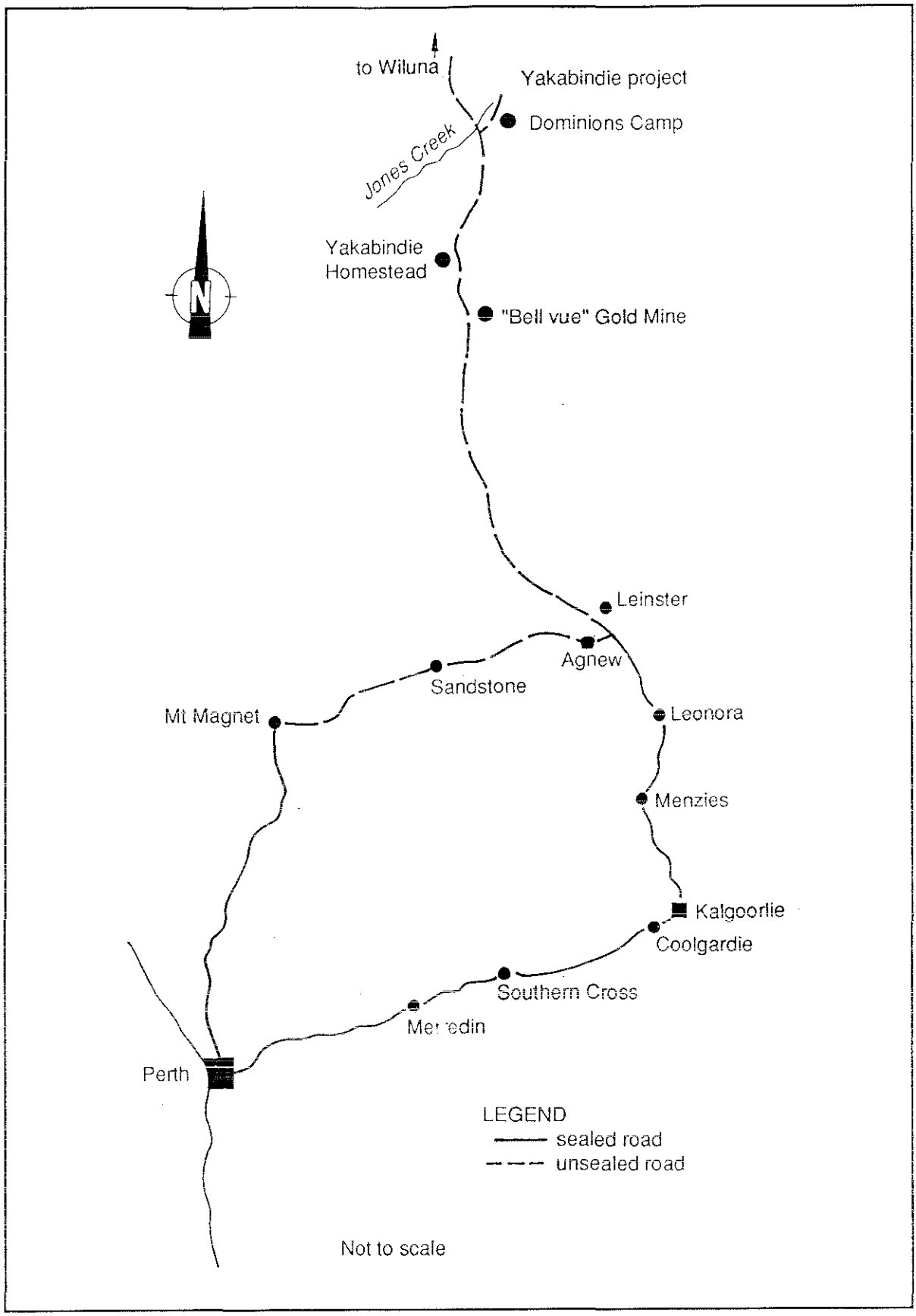

Figure 1: Location Plan

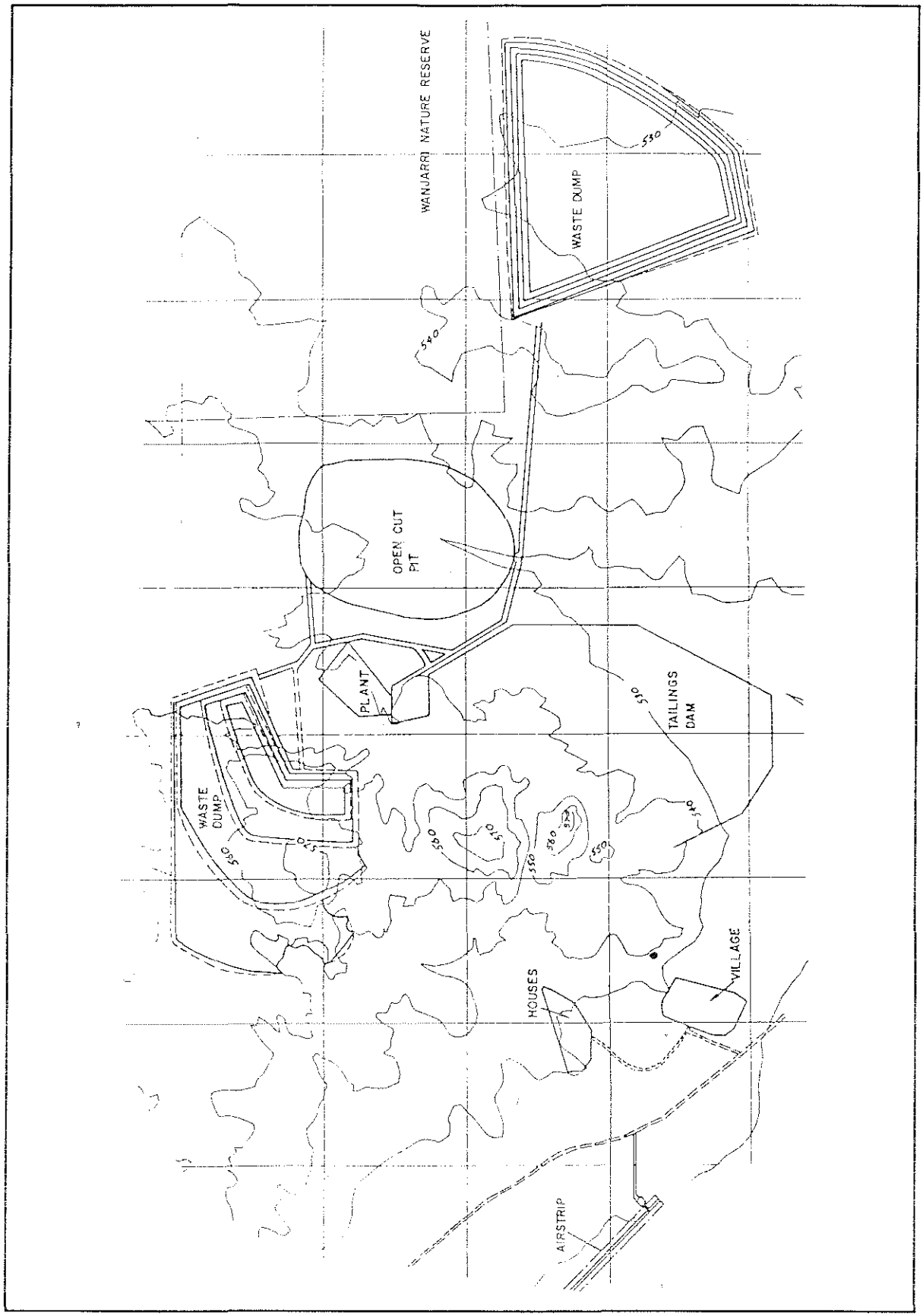

Figure 2: Proposed developments for the Yakabindie Nickel Project

The tailings dam will have a storage capacity of approximately 80 million cubic metres with a predicted storage life of 15 years. The maximum height of the dam walls will be 39 metres, the area occupied by the dam is approximately 310 hectares.

Two borefields to provide the saline process water supply of 6 million cubic metres per year are proposed to be constructed some 30 kilometres to the south of the open pit.

A workforce of 260 people is proposed utilising a fly in/fly out arrangement of some 80 movements per week to Geraldton and Perth. The proposed accommodation facilities for the workforce are based on 10-12 pre-fabricated and site assembled houses for senior staff and families living permanently on site and nearby, a single persons' camp comprising some 60, four-person motel type units, clustered around a central recreation and messing facility.

Rehabilitation of the site and its environs will be carried out on a progressive basis during the life of the operation. The overall objective of the rehabilitation is to return the land to the current pastoral land use. The revegetation programme will be aimed at establishing plant cover including a range of species which are self-sustaining and similar to that in surrounding areas.

Rehabilitation of waste dumps and the tailings dam will be commenced as soon as practical and carried out progressively over the life of the project. On completion of ore processing operations the tailings dam will be covered with a layer of waste rock. The surface of the tailings will have a gentle slope towards the decant structure to facilitate drainage. The decant system will be left open to ensure that water cannot pond on the tailings surface and is drained away. The tailings will gradually drain with time to an increasingly more stable material.

The plant site, accommodation sites, roads and the airstrip shall be rehabilitated on completion of mining, with all structures (including power transmission lines and water pipelines) and equipment removed to ground level; all pipes, pits, holes etc, sealed and the ground at each site ripped and seeded for regeneration.

Diversion bunds and channels will be left with slopes reduced to 20 degrees, and seeded for regeneration. These diversion structures will be a permanent feature on the landscape without them Jones Creek would empty into the abandoned open cut pit, with major effects on the aquatic environment downstream and downstream use of the creek.

The rehabilitation of the open cut pit is not economically feasible during the operation of this pit as the ore body is open at depth. However, should mining operations continue on other adjacent pits, this main pit would be used as a waste rock dump. In any event on completion of mining the pit would be left in accordance with the details as laid out in the Department of Mines' interim guidelines on safety bund walls around abandoned open pits.

3. Existing environment

The project area encompasses landforms and vegetation associations which are widely distributed in the Northern Goldfields region. Vegetation is largely *Acacia* and chenopod woodlands and shrublands dominated by Mulga (*Acacia aneura*.) Historical land use practices have resulted in a severe environmental impact with almost complete degradation of the understorey. However, the representation of the project area landform habitats, within conservation areas in the region is limited.

Within the project area the five landform habitats which are present contain distinct vegetation associations.

Breakaways - principally low shrubs of *Dodonea*, *Eremophila*, *Cassia* and chenopods on the slopes with *Callitris* around the upper edges of the bluff.

Granite hills - taller shrub layer of *Acacia* with lower understorey of *Eremophila* species and ephemerals.

Drainage lines - the most distinctive association, tall Red River Gum eucalypt woodland with dense shrub understorey of *Acacia* species.

Undulating plain - low open *Acacia* woodland with several *Hakea* species and various chenopods.

Broad valleys - low open shrublands dominated by smaller species of *Eremophila* and *Cassia* with very sparse larger *Hakea* and *Acacia* shrubs.

The proponent commissioned a flora and fauna survey over the project area.

This survey demonstrated that by far the most common species in the area was Mulga, which was present at all but five sites. No plant species listed in the 1989 Department of Conservation and Land Management Declared Rare Flora Schedule were recorded from the project area.

Faunal habitats are closely aligned with landform - vegetation associations. The drainage line habitat produced the richest faunal assemblages. The Jones Creek system provides a centre for resources for many nomadic and resident bird species. The tall River Red Gums contain numerous hollows for nesting and the upper storey is utilised for foraging by birds and bats. The dense understorey vegetation and aquatic environment provides niches for many species of invertebrate, frog, reptile and small mammal.

A distinctive faunal assemblage occurs in the granite hill area with rock inhabiting geckos, Euros and Echidnas. The small caves and overhangs provide refuge for Euros, Echidnas, bats, cave crickets and goats. The widely occurring low open *Acacia* woodland and shrublands are dominated by a highly mobile avian community and arboreal lizards.

Within the project area three species are gazetted as rare or otherwise in need of special protection. They are the Lesser Stick-nest Rat *Leporillus apicalis* , the Peregrine Falcon *Falco peregrinus* and the Alexandra Parrot *Polytelis alexandrae.* The project is not expected to have an adverse impact on these mobile species.

The adjacent Wanjarri Nature Reserve is of significance, being the only conservation area within the Northern Goldfields Region. This region is ecologically diverse, encompassing biotic assemblages which do not occur elsewhere and is an overlap zone between arid northern and mesic southern elements of both flora and fauna. The reserve was gazetted as an A Class Nature Reserve (A30897) for the purpose of Conservation of Flora and Fauna on 18 July 1971 and vested in the National Parks and Nature Conservation Authority. Currently the reserve is administered and managed by CALM. Recognition of the biological importance of Wanjarri led to the EPA endorsement of Wanjarri as an A Class Nature Reserve in 1975. This endorsement was upheld by State Cabinet.

4. Environmental issues raised in submissions

There were 10 submissions made on the Consultative Environmental Review of the Yakabindie Nickel Project

A summary of the issues raised is provided in table 1.

Issue	Number of Submissions
Impact on Adjacent Land users	4
Impacts on Wanjarri Nature Reserve	3
Interaction With Mount Keith	2
Location of Village Site	3
Location of Airstrip	2
Jones Creek Diversions	4
Groundwater Abstraction	2
Location of Waste Dumps	5
Location of Tailings Dam	4
Control of Vermin	2
Control of Dust	2
Natural Environment	4
Aboriginal Sites	1
Drainage management	2
Transport Route	1

Table 1: Summary of submissions

The predominant issues of concern raised in the submissions were related to; location of facilities, diversion of Jones Creek and the impact on adjacent land users. The specific issues together with the proponent's responses are set out in Appendix 2 of this report.

After reviewing submissions received and the proponent's response, the Environmental Protection Authority considered that the environmental issues raised could be adequately managed. Accordingly, those environmental issues have been covered by a recommendation in this Assessment Report or have been addressed by a commitment by the proponent.

5. Environmental impacts and their management

5.1 General

Following consideration of the Consultative Environmental Review, submissions from the public and government agencies' and the proponent's response to them, the Environmental Protection Authority has determined that the proponent has addressed the relevant issues associated with the proposed mine satisfactorily and that the consequent impacts can be managed. This environmental management can be achieved by a combination of the proponent's original and supplementary commitments and the Authority's recommendations.

Recommendation 1

The Environmental Protection Authority concludes that the proposal to mine nickel at Yakabindie, as modified during the process of interaction between the proponent, the Environmental Protection Authority, the public and the government agencies that were consulted, is environmentally acceptable.

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

- **location of the northern waste dump, processing plant and tailings dam in an area of breakaway that forms the upper catchment to Jones Creek;**
- **the long term integrity of the Jones Creek diversion structures to ensure water flows in this major drainage line are not significantly affected;**
- **impacts on Wanjarri Nature Reserve;**
- **rehabilitation of the operation both during and at the end of mine life;**
- **potential effects on local groundwater users from groundwater drawdown associated with the project's processing water requirements; and**
- **cumulative impacts associated with the proposed Mount Keith Nickel Project.**

The Environmental Protection Authority notes that the environmental factors mentioned above have been addressed adequately by either environmental management committments given by the proponent or by the Environmental Protection Authority's recommendations in this report.

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

- **the Environmental Protection Authority's recommendations in this Assessment Report; and**
- **the proponent's commitments to environmental management (Appendix 1)**

The Authority notes that during the detailed implementation of proposals, it is often necessary or desirable to make minor and non-substantial changes to the designs and specifications which have been examined as part of the Authority's assessment. The Authority believes that subsequent

statutory approvals for this proposal could make provision for such changes, where it can be shown that the changes are not likely to have a significant effect on the environment.

The Environmental Protection Authority considers 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 only occur following a new referral to the Authority.

5.2 Interaction with Mount Keith project

The Mount Keith Nickel Project was referred to the Environmental Protection Authority in September 1989 and the level of assessment was set at informal review with public advice. The Environmental Protection Authority's advice on environmental matters was sent to the Department of Mines who will take it into consideration during the setting of conditions to be applied to the operation of the Mount Keith Project.

With the referral of the Yakabindie Nickel Project it was recognised that the cumulative environmental impacts of two large mining projects could be significant and this, together with factors already mentioned, led the Environmental Protection Authority to formally assess the Yakabindie proposal. In hindsight it would have been preferable to assess both projects to allow a joint consideration of the cumulative environmental impacts of the two proposals.

In terms of cumulative impacts the areas of concern were groundwater usage, Wanjarri Nature Reserve, transport and infrastructure.

There will be no significant cumulative environmental impact on groundwater resources as each project utilises a separate groundwater aquifer for process water requirements, which is of a quality unsuitable for stock.

It is understood that each of the companies recognises the importance of Wanjarri Nature Reserve and will work with the Department of Conservation and Land Management to protect the area from potential disturbance associated with the mining projects.

The Environmental Protection Authority would have preferred the sharing of infrastructure between the two projects. However, it is recognised that there are other considerations that make such an arrangement difficult to put into practice.

5.3 Creek diversions

The diversions proposed for Jones Creek and its western tributary will need to be permanent features of the landscape to prevent the creeks flowing back into the open pit at some time in the future and cutting off water flow downstream. Therefore, it is important that they are constructed in such a manner that they will withstand periodic flood events. The design of the structures was based upon a recent flood event in January 1990 which from local records is estimated to have been a 1 in 100 year event.

The Environmental Protection Authority is satisfied that the design objective of these structures is sufficient to ensure that downstream water flows are maintained in the long term.

5.4 Drainage

The location of the northern waste dump, processing plant and tailings dam in the upper catchment of Jones Creek, where run off is rapid from the areas of exposed rock in the granite hills, is a cause for some concern. This concern is directed towards the potential for degradation of the vegetation and water quality in the Jones Creek system from saline material being eroded or leaching from these facilities. Similarly, the northern waste dump is located upstream of the Wanjarri Nature Reserve giving rise to potential impacts within the Reserve should pollutants enter the Jones Creek system from the waste dump.

It is acknowledged that there is a commitment by the proponent to manage the drainage at the site during the life of the operation. However, as the waste and tailings facilities will be permanent features

of the landscape, appropriate measures are required to ensure they will be non-polluting in the long term.

Accordingly, the Environmental Protection Authority makes the following recommendation.

Recommendation 2

The Environmental Protection Authority recommends that the proponent ensure there be no unacceptable detrimental effects from drainage of waste dumps, ore stockpiles, processing plant and the tailings dam on vegetation at the site and its environs, including Wanjarri Nature Reserve, nor on water quality in Jones Creek. Accordingly, prior to the commencement of productive mining, the proponent should prepare and implement a drainage management programme for these facilities to the satisfaction of the Environmental Protection Authority.

This programme should ensure long term management of drainage taking into account the situation after mine closure.

5.5 Wanjarri Nature Reserve

Wanjarri Nature Reserve is of major importance as a conservation area being the only reserve for the conservation of flora and fauna in the Northern Goldfields Region. A number of submissions were concerned with the potential damage to the reserve given the proximity of the mining operation.

The major environmental impacts on the reserve associated with the mining operation are; erosional run off, dust, and increased visitation by the public. Run off from the eastern waste dump should not constitute a problem as the ground slopes to the south taking flow away from the nature reserve. However, construction of the dump would need to ensure that storm waters cannot pond in front of the dump causing local flooding in the reserve, and also run off from the northern waste dump would need to be managed in the long term as alluded to in Section 5.2 above.

There is the potential for dust generation during the operation from general mining activity and, particularly in relation to the reserve, dumping of waste adjacent to the southern boundary of the reserve. The proponent has committed to minimise the potential for dust generation (commitment 2.3.3.1 (viii) (Appendix 1) using a range of measures including; staging of clearing work, watering roads, progressive rehabilitation of disturbed areas, and sheeting the side slopes and upper surface of the waste dumps with fresh rock to prevent wind erosion and dust formation.

To manage the increase in public visitation to the reserve, which is likely to occur through the presence of the operation and its associated workforce, the proponent's on-site Environmental Officer will act as an honorary warden for the Wanjarri Nature reserve. This officer will also institute an educational programme for the protection of the reserve as part of employee induction.

The proponent has made a commitment to prohibit domestic animals from the project and not allow recreational pursuits such as off-road driving, hunting etc.

The Environmental Protection Authority considers that the proponent's commitments together with the recommendations made in this report will adequately manage those environmental impacts on the Reserve associated with the mining operation.

5.6 Rehabilitation

An important aspect of the mining operation is the progressive and final rehabilitation of the site to ensure long term stability and minimise the potential for erosion that will contribute to degradation of the local environment.

The proponent has outlined general methods of rehabilitating the site with a commitment to design and implement rehabilitation programmes at the site including associated research. Rehabilitation is made more difficult by the location of the site in a fragile, arid environment which recovers slowly from disturbance. Therefore rehabilitation of the area will require careful planning.

The Environmental Protection Authority considers that the proponent's general outline of the proposed rehabilitation methods are satisfactory. However, a well designed, site specific programme will be required.

Recommendation 3

The Environmental Protection Authority recommends that within six months of project commissioning, the proponent prepare and implement ongoing rehabilitation plans for the operation to the satisfaction of the Environmental Protection Authority upon advice from the Department of Mines. These plans should be reviewed on a three yearly basis by the Environmental Protection Authority.

Recommendation 4

The Environmental Protection Authority recommends that the proponent should be responsible for final decommissioning and removal of the plant and installations and rehabilitating the site and its environs. Accordingly, at least twelve months prior to final decommissioning the proponent should prepare and subsequently implement, a decommissioning and rehabilitation plan to the satisfaction of the Environmental Protection Authority upon advice from the Department of Mines.

5.7 Adjacent land uses

Some submissions were concerned at the potential environmental impacts of the mining operation on the existing pastoral land use. These concerns were generally related to the siting of facilities and the impact on stock water supplies from groundwater pumping.

Issues related to the siting of facilities have been discussed earlier in this report or are the subject of commitments by the proponent.

Groundwater is presently used for stock watering. Several bores and wells tap both the shallow calcrete in the east-west drainage and alluvium/weathered bedrock elsewhere in the basin. The waters are suitable for stock, ie less than about 8,000 mg/l. It is noted that the pastoralist's wells/bores in the east-west drainage, supply stock-quality water because they tap only the top of the aquifer; there is saltier water at greater depths. Bores drilled in the east-west drainage as part of the present investigation extended deeper into the aquifer and yielded higher salinity water than the stock bores. Salinities of about 20,000 mg/l TDS are understood to be suitable for processing purposes.

Groundwater for processing purposes will be sourced from the deeper more saline aquifers and should not reduce the local pastoralists supply. If supplies are reduced the proponent has committed to providing alternative sources for stock watering requirements.

The Environmental Protection Authority has considered these concerns and is satisfied that the information provided by the proponent including commitments to environmental management, and the recommendations made in this report will limit the impact on adjacent land users to an acceptable level.

6. Conclusion

Following assessment of the of the Dominion Mining Limited proposal for the Yakabindie Nickel Project the Environmental Protection Authority has concluded that the proposal is environmentally acceptable subject to the operation being carried out in accordance with the commitments in the Consultative Environmental Review, the proponent's additional commitments and the recommendations of the Environmental Protection Authority.

Appendix 1

Summary of proponent's commitments

Commitments for Yakabindie Nickel Project

1. Introduction

Reference should be made to the Consultative Environmental Review document for a detailed understanding of project and the environmental monitoring and management programmes planned by the proponents.

2. Commitments

Dominion undertakes to fulfil the following commitments to protect the environment and public during the life of the Yakabindie Project from committment to proceed with the project to decommissioning following the completion of mining, and while ever Dominion holds the leases on which project activities have been undertaken.

2.1 Government acts and regulations

- Comply with the requirements of all applicable Acts and Regulations.

2.2 Environmental Officer

- Appoint a Project Environmental Officer prior to the commencement of construction whose duties include:

(i) environmental impact assessment and monitoring of project activities;

(ii) design and implementation of the progressive rehabilitation programmes including research activities associated;

(iii) establish fauna monitoring programmes in consultation with CALM;

(iv) establish feral animal eradication programmes in consultation with CALM and the APB;

(v) liaise and report to Government Departments as required in relation to environmental matters;

(vi) act as an honorary warden for the Wanjarri Nature Reserve;

(vii) set up an educational programme as part of the site induction of employees for the protection of the Wanjarri Nature Reserve and areas surrounding the project;

(viii) obtain the appropriate licence from CALM for seed collection activities associated with rehabilitation.

2.3 Environmental management programme

2.3.1 Baseline studies

- Carry out a baseline survey of Jones Creek aquatic biology and water quality as soon as possible prior to commencement of construction;
- Carry out a baseline groundwater quality survey as soon as possible prior to the commencement of construction downstream of the tailings dam and in the borefield areas.

2.3.2 Monitoring and inspection programmes

- Monitor groundwater levels and groundwater quality immediately downstream of the tailings dam on a regular weekly basis;
- Carry out daily inspections of the tailings dam;

- Monitor water quality of Jones Creek during the life of the project;
- Monitor groundwater resources (water quality and water levels) in the borefields and pastoral wells at Miranda, Paddy's Knob, Townsend and Henry Wells and pit dewatering, and evaluate extent and depth of drawdowns;
- Carry out regular inspections of the water pipeline from the borefields;
- Monitor noise levels to ensure compliance with Government Acts and Regulations.

2.3.3 Operational management procedures

2.3.3.1 Dust control

- Establish dust suppression programmes to comply with Mines Department Regulations and minimise dust pollution of the project area and adjacent nature reserve through the following procedures:

(i) minimise clearing of land by staging clearing works and keeping clearing to the minimum for essential use consistent with safe and efficient operations;

(ii) fencing off areas not to be disturbed by the project;

(iii) limiting development of tracks and roads to essential requirements;

(iv) damping haul roads and plant roads with low salinity water when available;

(v) carry out trails with dust suppressant materials (enzymes) mixed with water to assist with dust suppression;

(vi) progressive rehabilitation of tailings dam and waste dumps;

(vii) cover the side slopes and upper surfaces of the tailings dam and waste dumps with rock to prevent wind erosion and dust formation.

(viii) - Dominion will control dust on roads to the tip face using water carts (similar to elsewhere on the lease)

- The northern and easterly faces of each dump lift will be rehabilitated early in the life of the Eastern Waste dump, and paddock dumping will occur in a southerly direction to reduce the chance of dust impact further.

2.3.3.2 Noise

- Where possible, minimise blast noise impact by schedulling blasting during optimal meteorological conditions.

2.3.3.3 Rehabilitation and decommissioning

- Carry out progressive rehabilitation of the waste dumps and tailings dam embankments and rehabilitate the project area to the level of the existing land use in accordance with the rehabilitation programme. This programme will be planned and carefully implemented form the commencement of mining to ensure it becomes part of the operational procedures of the project ensuring its cost effectiveness. Developments in rehabilitation techniques will be incorporated into the rehabilitation programme as appropriate.

(i) Vegetation and topsoil salvage

- in areas to be disturbed, all vegetation litter and topsoil (where present) will be salvaged by progressive removal in front of advancing waste dumps and immediately redeployed, where possible, to conform to natural thickness.
- Where redeployment is not possible, material will be stockpiled in areas specifically reserved for this purpose adjacent to redeployment areas for short term storage, these stockpiles will be surface ripped, seeded and fertilised.

(iv) Waste dumps

- are designed and will be constructed to blend into the existing topography such that visual impact from the main roads is minimised.
- will be constructed with overall 20 degrees overall slopes, in 10 metre high lifts, with a 5 metre wide berm for rehabilitation access separating each lift, with dumping to commence from the outside of the dumps and each lift built to full height before dumping in the centre is commenced.
- Tops of the dumps will be sloped towards the centre of the dump, will be ripped on completion of construction and windows constructed at the edge of each terrace.
- Outer faces will be moonscaped and covered with fresh rock.
- The tailings lines will be located on the rebated upstream side of the embankment, and a downstream bund will be constructed to contain spills from water return lines which will be fitted with pressure transducers for automatic shut off and one way valves to limit drainage of these lines.
- Bunds will be constructed between the plant and downstream toe drain to contain any pipeline breakages between the plant and tailings dam.
- Decant systems will be left open on completion of mining to assist drainage, with any toxic leachates neutralised by passive methods or directed by pipeline into the abandoned open pit.
- In the event of adverse groundwater quality changes detected by groundwater monitoring, a recovery bore or seepage trench system will be installed, alternative tailings disposal techniques investigated or an alternative tailings disposal site will be considered.

(iv) Support facilities

- establishment and re-introduction of local native flora will be carried out and co-ordinated by the environmental officer in the village area.
- sewage disposal will be carried out in a purpose built treatment plant for the main village and by septic tank and leach drain as appropriate for the houses and main offices.
- all domestic waste will be buried within the waste dump.
- to minimise clearing requirements powerlines, water lines and associated access roads will be constructed in one corridor.
- on completion of mining all buildings and equipment including water pipelines and power transmission lines will be removed. All pipes and boreholes will be capped, costeans backfilled and the ground ripped and seeded. All sites will be left clean and tidy.

2.3.3.4 Surface water

- Install silt traps to collect run-off from roads, waste dumps and tailings dam and prevent sediment from entering the drainage channels in accordance with the management plan for drainage to be provided to the Mines Department prior to commencement of construction;
- Disruption of overland water flow will be minimised by placing the maintenance road adjacent to the pipeline on the same level as the existing ground and raising the pipeline as appropriate to the topography and at least every 50 metres to permit free passage of run-off.
- In the unlikely event that the existing design of the eastern waste dump has not fully obviated the chance of ponding of water during an extraordinary rainfall event leading to flooding of part of the southern areas of the reserve, further suitable earthworks would be performed at that time to overcome such a problem.

2.3.3.5 Groundwater

- A groundwater management programme will be adopted to balance project requirements from the borefields with the quantities of water recovered from the tailings dam and mine dewatering;
- Pipelines from the borefields will be fitted with a series of one way valves at strategic locations to limit draining of pipes in the event of pipeline failure or for maintenance requirements.

2.3.3.6 Hazardous substances

- Transportation, storage and handling of hazardous substances will be in accordance with the appropriate regulations.
- Waste oils will be combined with fuel for the power station. Waste grease will be collected and transported off site for recycling.

2.3.3.7 Nature reserve

- Provide new access to the Wanjarri Nature Reserve complete with gate and appropriate fencing.
- Institute education programmes as part of the site induction of employees for the Wanjarri Nature Reserve.

2.3.3.8 Pastoral activities

- Erect fencing as agreed with relevant parties around some or all parts of the development.
- Provide additional stock watering points where wells are affected by project dewatering.

2.3.3.9 Fire control

- Maintain strict fire control procedures.

2.3.3.10 Access to the project

- Restrict human and non avian faunal access to potentially hazardous areas by fencing if required.
- Signs, fences and gates will be installed where necessary to prohibit public access to the mine site and village.

2.3.3.11 Aboriginal interests

- Submit an application to the WA Museum for Aboriginal artefact sites which are to be disturbed.

2.3.3.12 Conditions of employment

- Recreational activities such as off road driving, hunting, etc, will not be permitted by employees.
- Keeping of domestic animals (dog, cats, etc) will be prohibited on the project.

2.4 Environmental management reports

- Submit an annual report of environmental management and monitoring programmes to an agreed format and content with State Authorities.

Appendix 2

Proponent's response to submissions

Comments on Consultative Environmental Review - Yakabindie Nickel Project

1.0 EXISTING ENVIRONMENT

1.1 Comment

'A number of submissions felt the emphasis placed on Wanjarri Nature Reserve reduced the perceived importance of the area outside the reserve which suffered direct impacts from the project. The study should consider the whole area in terms of impact upon:

(a) faunal habitats;

(b) movement of fauna in and out of the reserve especially for water from the breakaway and creek systems'.

Response

(a) The reader is referred to Sections 3.5.3 and 5.2 which address the ecological significance of the faunal habitats within the project area and the predicted impacts to these habitats by the proposed development.

(b) The only fauna which may move between the project area and Wanjarri Nature Reserve are large mobile species of macropods and birds. The Jones Creek drainage system passes through the western end of the reserve and to the south of the project area. Additionally, no permanent water holes, which would be of significance during periods of water limitation such as droughts and summer, exist within the area of the Jones Creek to be impacted by the project development. It is considered that access to the creek system by large mobile fauna would not be limited by the proposed development.

1.2 Comment

"Given the importance of Jones Creek as a habitat and breeding area for fauna, disturbance to this system should be minimised. Therefore, the possibility of relocating the northern waste dump to the east, out of the catchment for the main creek line and into the catchment for the smaller western tributary, may be advantageous. Alternatively, the northern waste dump could be consolidated with the eastern waste dump, therefore ensuring the waste dumps are away from the creek".

Response

The location of the waste dump directly affects approximately 3% of the catchment area of Jones Creek upstream of the project site (including the western tributary) and a much smaller percentage of the total Jones Creek catchment downstream of the site. The siting of the northern and eastern dumps were selected on environmental, aesthetic and economic considerations. Consolidation with the eastern waste dump would result in a significant aesthetic impact since the dump would need to be much higher than planned and occupy a much larger area than planned and would add significantly to the overall cost of mining operations.

1.3 Comment

"Some submissions pointed out the value of the granite hills and breakaways and the lack of such habitats in Wanjarri Nature Reserve. Consequently, any development which has a detrimental impact upon the areas should be relocated elsewhere".

Response

The granite hill and breakaway habitats within the project area which will be impacted by the proposed development represent less than 5% of these habitats in the Northern Goldfields Region.

2.0 PROJECT DESCRIPTION

2.1 Comment

"It is mentioned in the CER that the first 70 metres of material will be stockpiled and if of sufficient grade will be processed. If they are not processed, what will be the fate of these stockpiles ?".

Response

The first 70 metres of material will be stockpiled within the waste dumps such that it can easily be recovered. In event of processing the area affected will be rehabilitated in accordance with the overall plan.

2.2 Comment

"Gravel will be used for surfacing of roads for the project. Where will the gravel be sourced and how will such sites be rehabilitated ?".

Response

Gravels suitable for access roads, airstrip, haul roads etc., have been located within the area of the proposed open pit. These materials are a resource which will be stockpiled (in the waste dump areas) for construction and maintenance use as required. Materials remaining at completion of the project will be rehabilitated within the waste dump rehabilitation programme.

Aggregates for concrete will be sourced from waste materials of the Bellevue Mine.

2.3 Comment

"Submissions were concerned at the siting of the tailings dam alongside Jones Creek from the point of view of:-

(a) potential for runoff into Jones Creek both during and post mine life;
(b) potential for erosion of embankments and release of tailings of at some future time after the mine has closed.

Similarly, the plant would be better sited to the south east of the pit out of the breakaway country".

Response

(a) Runoff during mining will drain to the return water sump and be used in mineral processing. The details of proposed runoff management following mining are given in Section 5.9.2.2 page 81.

(b) The tailings dam has been located sufficiently far away from Jones Creek so as not to be affected by the 1 in 100 year flood event. The potential for erosion is limited since the slope of the tailings dam embankment will be covered with waste rock which will be relatively fresh and not oxidised. Benches will be sloped into the dam to reduce runoff from the face of the tailings dam.

The plant location is also based on environmental aesthetic and economic considerations. If the plant site were relocated to the south east of the pit it would be easily visible from the Wiluna - Leinster Road.

2.4 Comment

"Two submissions felt the workforce could be located at the Bellevue mining village, which would save the cost of building a completely new accommodation facility and an airstrip.

The location of the airstrip is across a drainage line that is prone to flooding. It is felt the area is already well served with airstrips with existing ones at Bellevue, Yakabindie Homestead, Albion Downs, Mt Keith and Leinster".

Response

- **Accommodation Facilities**

The facilities at Bellevue are not capable of accommodating the workforce for this project, since they are set up to accommodate their own requirements.

Bellevue is an underground mining operation and as such does not operate on a fly in/fly out basis.

Additional facilities would have to be provided at Bellevue and the facilities proposed by Dominion are of a much higher standard than those provided at Bellevue.

The issue of joint facilities and the logistics problems associated with joint facilities was addressed in regard to the Mt Keith Project (see Section 1.1.2 page 2, Section 4.5 page 45 to 46, Section 5.7.4 page 74). Many of the arguements put forward in these sections are also valid for consideration in relation to Bellevue.

- **Airstrip**

The alignment of the airstrip is to be reviewed following drainage management studies.

The issue of other airstrips in the area (Bellevue, Yakabindie, Albion Downs, Mt Keith and Leinster) is addressed in Section 1.1.2 part (v) page 2 and Section 4.5.4 pages 48 and 49. Safety aspects of having an airstrip close to the mine site must again be highlighted.

Dominion has assessed other airstrips in the area and all these airstrips with the exception of Leinster would need significant upgrading to meet Department of Transport and Communications requirements for the type of aircraft proposed. The Bellevue airstrip which is currently on a salt lake would need to be relocated. The airstrip at Leinster would involve considerable road travel time in the event of an emergency.

3.0 ENVIRONMENTAL IMPACT AND MANAGEMENT

3.1 Comment

"Some submissions felt the educational role of the Environmental Officer should be broadened to encompass an educational programme for the protection of the environment of the whole area not just Wanjarri Nature Reserve".

Response

As part of the staff induction, the Environmental Officer can broaden the educational programme for the protection of the environment of the areas under mining lease and surrounding pastoral areas.

3.2 Comment

"Concern expressed at the lack of provision for maintenance of structures such as silt traps, stilling basin, tailings dam, etc, after project completion. There is a need for some form of management to ensure these structures continue to operate effectively in the long term".

Response

A drainage management plan is to be prepared for the project, see Section 5.3.3 page 66, Section 5.9.1.1 pages 77 and 78 and Section 7.2.2 page 96. This drainage management plan will incorporate operational and post operational procedures.

3.3 Comment

"One submission commented upon the lack of consultation with local pastoralists with regard to utilising local knowledge in siting of facilities to minimise environmental impact. Also, concern was expressed at carrying out an eradication programme for feral animals without consulting with the pastoralist".

Response

- **Consultation with the Pastoralist**

Dominion have maintained regular contact with the pastoralist on Yakabindie Station (the pastoral area directly affected by the development) on a regular weekly basis via the site based Senior Geologist Mr Mark Palmer. Dominion regard their relationship with the pastoralist as being on a sound footing. For your information the history of contact by senior management from Dominion over and above this site contact is outlined below:-

DATE	HISTORY
23.02.90	Meeting arranged on site with Mr David Adamson, unfortunately Mr Adamson was unable to attend. Dominion personnel present included Gavin Becker, Peter Wright, Tony Poustie and Pat Spinner. A message and appropriate business cards were left at Yakabindie Homestead that if any problems arose or any information regarding the project was required Mr Adamson could call Dominion in Perth reverse charges and speak to any of the personnel listed above.
06.04.90	Discussions regarding the project were held on site with Mr David Adamson. Dominion personnel present included Tony Poustie, Mark Palmer and Gavin Becker. Mr Adamson was shown plans of the project at that meeting.
18.04.90	Gavin Becker spoke (by phone) to Mr Adamson to see if he had any problems with the planned project. Gavin Becker stressed that Dominion were keen to maintain good relations with the owners of Yakabindie Station.

- **Feral Animal Eradication Programme**

Comments with regard to the feral eradication programme may be inappropriate since Dominion would propose that the leases for the project would be excised from the pastoral lease, with appropriate compensation paid to the owners of Yakabindie Station, in line with current practice eg. Bellevue.

The eradication programmes would be devised and carried out in consultation with CALM and APB, see Section 5.9.3 page 88 and Section 7.2.1 page 95.

4.0 COMMITMENTS

A separate list of detailed commitments will be provided as requested.

5.0 RESPONSE TO COMMENTS FROM GOVERNMENT DEPARTMENTS

5.1 Department of Resources Development

(a) Interaction with the Mt Keith Project (1.1.2).
No response required. Discussions with the appropriate government instrumentalities will continue.

(b) Surface Water (3.3.1).
No response required.

(c) Shipment of Concentrate (4.7.2).
Dominion will be having discussions with Mt Keith and the MRD. The preferred route at present for concentrate shipment and fuel is via Wiluna-Meekatharra, to or from Geraldton as appropriate.

5.2 Water Authority

(a) Project Water Requirements.
From new knowledge derived through recent metallurgical test work some additional water will be required for the project for mineral processing particularly in the first four months of plant operation until return water from the tailings dam is available. Dominion will be making an application to cover this additional groundwater requirement, when final technical assessment is complete.

5.3 Western Australian Museum

1(a) No response required.

1(b) Comment

"The review contains little on-site sampling to determine the species present. Appendix C (listing those species likely to occur in the region) is therefore based principally on a literature survey and on Museum holdings. An actual survey might reveal other species".

Response

This statement is incorrect. An intensive survey was carried out in the project area during the period 4-9 February 1990, as detailed in Appendix C5. An additional four species were added to the fauna inventory of the area. One bird, the Pied Honeyeater Certhionyx variegatus, one amphibian Limnodynastes spenceri, and two reptiles Diplodactlyus squarrosus and Varanus tristis had previously been unrecorded in the area.

1(c) Comment

"The list provided in Appendix C contains a number of bird species that are unlikely on current knowledge to occur in the area. These are indicated on the supplied copy of the report (pp 56-57) (copy attached)".

Response

Two of the species indicated in WAM submission were recorded by Moriarty (1972), the Red Browed Pardalote Pardalotus rubricatus and Banded White-face Aphelocephala nigricincta and are

currently listed by CALM (A. Chapman, CALM Kalgoorlie, pers comm) as occuring in the area. The common name of the Purple-gaped Honeyeater Lichenostomus cratitius was incorrectly listed in Appendix C5 as the White-gaped Honeyeater, however the species does occur in the area. The two races of the Western Magpie Gymnorhina tibicen tibicen and Black-backed Magpie Gymnorhina t. dorsalis do not constitute separate species but are subspecies both of which may occur in the project area and have been recorded in Wanjarri by Moriarty (1972) and CALM (McKenzie et al). As correctly stated the Spinfexbird Eremiornis carteri is unlikely to occur in the project area and should not have been included in Appendix D of the Ecologia report. This species has been recorded in Wanjarri Nature Reserve spinifex habitat.

1(d) Comment

"Location of the eastern waste dump within a drainage area leading into Wanjarri Nature Reserve is of concern. Page 63 recognises that there are several potential impacts to this reserve. Waste dumps should not be located within drainage areas into such an important reserve".

Response

An examination of the contours, on drawing no. W1292-00/G-004 titled Yakabindie Nickel Project Locality Plan clearly shows drainage from the eastern waste dump does not flow towards the Wanjarri Nature Reserve but infact flows away to the south, and south east. Section 4.1.5 page 37 provides information on the construction of the eastern waste dump, whilst section 5.1.1 page 56, relates to issues of drainage from the area of the eastern waste dump.

1(e) Comment

"The lack of information on invertebrate fauna in the proposed development area was also noted".

Response

It is acknowledged that data on the terrestrial invertebrate fauna is essential for a comprehensive fauna data base for monitoring environmental impact of the proposed development. However for the purposes of the CER as outlined within the guidelines issued to the proponent by the EPA (Appendix A), the detailed long term survey and taxonomic analysis, which is required to obtain meaningful invertebrate data, is outside the requirements of the CER. In addition, no invertebrate species is currently gazetted under the Wildlife Conservation Act 1950 as rare, endangered or in need of special protection (R. Coleman, CALM Como, pers comm) in the project area.

2(a) No response required.

2(b) No response required.

2(c) Comments

"There are two problems remaining:-

(i) There are a number of areas that do not appear to have examined to date. These include the proposed village, houses area, access roads and airstrip. These should be inspected together with any other areas likely to be impacted.

(ii) The latest maps seen by the Department show that the waste dump will extend further west than indicated in the original brief to the consultants. On the original plans the ethnographic site, W0510, was well outside any development area and so only notional boundaries were proposed. In view of the proximity of the waste dump as now planned the company should arrange for an anthropologist to define the sites boundaries more precisely and ensure that it is not impacted".

Response

Dominion have received from the Western Australian Museum and the Minister for Aboriginal Affairs clearance for the Yakabinde Project to proceed. Copies of this correspondence is attached.

(i) It was Dominion's understanding from discussions with the consultant involved with this work that this issue had been resolved. However, Dominion is arranging for the consultant concerned to visit these additional sites to carry out the inspections required.

(ii) Again Dominion had understood this matter was settled. The consultant concerned will be asked to either visit the site or clarify the details of the area concerned.

5.4 Western Australian Department of Agriculture

1(a) Comment

- **Location of the Aerodrome**

"The aerodrome cuts across well developed drainage lines below the breakaways. The earthworks associated with the aerodrome will redistribute runoff such that the natural surface hydrology downstream of the aerodrome will be altered to the detriment of

the plant communities in the affected area. Plant communities in rangelands are very sensitive to altered surface hydrology regimes. Examples of the adverse consequences of poorly sited earthworks are common in the Western Australian rangeland. The problem with the proposed aerodrome could be avoided by relocating that facility further to the west onto the spinifex sandplain. Apart from the environmental consequences of an aerodrome located as suggested in the proposal the aerodrome would be vulnerable to surface damage and waterlogging thus affecting the utility of that facility".

Response

The alignment of the airstrip is to be reviewed following drainage management studies. Preliminary indications at this stage are that reorientation of the runway such that it will be parallel to drainage lines will be adequate. Site investigation of the proposed runway area indicates the soils to be predominantly sands with the percentage of fines (materials less than 75 microns) constituting less than 26% of the soil. These soils are also relatively shallow, generally less than 750mm. The adoption of design details and construction considerations provided as part of this investigation will ensure a high service availability of the runway.

2(a) Comments

- **Location of the Village and Townsite**

"The soils at the sites proposed for the village and townsite are not well suited to residential development. At these sites the soils are shallow over granite or hardpan. The proposed domestic water supplies for these communities will be drawn from local aquifers and these waters contain significant levels of dissolved salts. In the Yakabindie environment where annual evaporation exceeds 3 metres attempts to cultivate trees and gardens on these shallow soils using the local groundwater will cause soil salinization with attendant adverse consequences for plant growth. These problems would be avoided on the deep freely-draining sandy soils which presently support either perennial grass or spinifex. Such suitable soil types occur west of the planned village and townsite.

In addition to the adverse environmental consequences of residential development on shallow soils I imagine excavation costs for drainage on the proposed sites would be significant. Excavation on the deep sand soils would be easier and hence less expensive".

11/

Response

Site investigations at the proposed location of the village and houses indicates the depth of sandy soils to vary from 400mm to 1200mm with an average depth of 740mm for the areas investigated.

At this stage no problems with regard to excavation for services are anticipated with the exception of installation of septic tanks within the housing complex. In the event sufficient depth of soil to bury the tanks is not available, rock breakers will be used to excavate a hole to the required depth, or the septic tank would be relocated to a nearby area with sufficient depth of soil.

With regard to water, it is proposed that the village and house complex will be serviced by fresh water from the reverse osmosis facility within the mine plant, and no build up of salt is envisaged.

Furthermore it is proposed to encourage the re-introduction of local native flora in the village to avoid problems associated with the importation of undesirable plants to the project area and minimise water useage, see Section 5.2 page 64.

3(a) Comment

- **Diversion Structures Jones Creek**

"The construction of diversion bunds to divert the Jones Creek headwaters around the proposed mine pit should not have an adverse impact on the distributary fan below the mine site. However, if the diversion bunds fail after pit excavation is completed there would be significant adverse environmental consequences of bund failure after the six mile ore body is exhausted needs to be recognised by the design criteria for the diversion bunds".

Response

Dominion recognises that the diversions are to be a permanent feature of the landscape. The Jones Creek diversion site investigation revealed the presence of highly weathered rock materials along the proposed diversion routes which will require sealing and protection by revetment mattresses to prevent erosion of the diversions, both during and after the mining operations. The construction of these diversion channels will incorporate these recommendations.

5.5 Department of Mines Western Australia

1.0 Comment

"At page 23, the proponents state that the borefield will be located on Exploration Licence E36/136 and a further licence is under application for Area 2. The tenement holders will be required to apply for Miscellaneous Licences for the borefield and pipeline/powerline wherever the facilities are not located on a granted Mining Lease".

Response

The proposed borefield is covered by an Exploration Licence and when the project proceeds Dominion will apply for the Miscellaneous Licences as appropriate.

2.0 Comment

"I express concern over the proposal to slope the top of the waste dumps towards the centre of the dumps (Section 5.3.3 page 66). I appreciate that enhanced water infiltration will occur that will be of benefit to the revegetation programme. However, I raise the potential for adverse quality waste dump drainage by oxidisation of sulphiditic and other materials within the core of the dump.

Response

In Section 4.1.5 page 37 the issues of drainage and leachates are addressed. In the unlikely event that the further test work proposed indicates the leachates from the waste dumps have unacceptable levels of toxic materials, the proposed waste dump rehabilitation details will be changed to shed water off the upper surface of the dumps.

3.0 No response required.

4.0 No response required.

5.0 No response required.

6.0 Comment

"It is recommended strongly that all area of vegetation not to be disturbed at this site during the construction and operation phases, be fenced out with a light, durable single or double plain wire fence to prevent inadvertent damage by earthmoving operators (and others)."

Response

Dominion will fence off areas not to be disturbed. These areas can be used as reference areas for judging the effectiveness of rehabilitation works, as well as for monitoring of fauna near the project.

5.6 Department of Conservation and Land Management

1.2 Comment

"The proponents have indicated that a potential impact on the biota of Wanjarri Nature Reserve is "minor erosional runoff from the eastern waste dump". The proximity of this waste dump to the Reserve boundary (approximately 60 metres) would indicate that this is a very likely event. Damage caused by erosional or leachate runoff within the Reserve is not acceptable under any circumstances.

The possibility exists, due to the disruption of overland sheet flow and drainage lines, that localised flooding upslope of the eastern waste dump (within the Reserve) may occur in the event of intense localised rainstorms. This has the potential to severely impact upon the flora in these areas.

To alleviate both impacts, it may be necessary to construct contour drains leading to silt traps upstream as well as downstream of the waste to channel sheetflow and erosional runoff away from the Reserve".

Response

The issue of drainage is addressed in the following areas of the CER:

Section 4.1.5	page 37
Section 5.1.1	page 56
Section 5.3.3	page 66
Section 5.9.1.1	pages 77 and 78
Section 7.2.2	page 96

Leachates are addressed in Section 4.1.5 page 37.

1.3 (i) Comment

"The proponents have indicated that the Environmental Officer will "set up in conjunction with CALM an education programme for all project employees for the protection of Wanjarri Nature Reserve". It is important that an education programme for the construction crew is put in place prior to the commencement of construction. The potential for adverse impact on the Reserve is likely to be greatest at the construction state (Peak construction workforce of 220 people for 12 months - Section 4.9.2).

It would be necessary for the Environmental Officer to be on-site during the construction phase and to supervise clearing, earthworks, education and liaison".

Response

These issues are addressed in Section 6.3.2.1 page 92 and Section 7.2.1 page 95.

1.3 (vii) Comment

"This office would welcome the setting up of a dust monitoring sampler within the Reserve, however the use of a single sampler is of little value in a dust monitoring programme. A number of samplers would be required to determine background dust, sources and peak levels of dust".

Response

The issue of dust samplers was discussed by Mr Chris Lane (SRE) and Mr Geoff Cowie (Minproc) with the officers of CALM, Ian Kealley and Rob Thomas on 12th April 1990. During the discussion the CALM officers indicated that the cost of dust samplers was around $6,000 and that these were stand alone units. It was indicated during that meeting that one unit would be installed by Dominion prior to construction to establish background levels for comparison purposes. Subsequent enquiries with suppliers indicate the cost of a unit is infact $7,000 and would require a power source (portable generator), fuel storage facilities plus regular maintenance.

The total estimated capital costs for each sampler would therefore be approximately $10,000 with substantial annual running costs. Whilst these costs are minor in terms of the overall project the value of the data obtained must be questioned. There will be disturbance when the sampler is set up, disturbance from vehicle movements for routine maintenance plus the noise produced by the generator, running during mine operations 24 hours per day. Better value may be obtained by investment of these funds into environmental management around the project in terms of dust suppression and rehabilitation.

The location of the sampler within the Wanjarri Nature Reserve would have to be agreed with CALM officers, in view of additional traffic movements and disturbances in the area of the sampler.

It should be noted that dust management procedures are outlined in Section 4.2.2 page 39, Section 5.5 pages 70 and 71 and Section 7.2.2 pages 96 and 97.

3.2 Comment

"The proponents have indicated additional resources at the Goliath North Prospect. Development of this resource has the potential to further impact on Wanjarri Nature Reserve through extending the life of the project and increasing waste dump capacity. A formal staged assessment would be necessary to evaluate these impacts should these resources be developed".

Response

The issue of the Goliath North Prospect and its impact would be addressed prior to its development. One of the options for waste rock disposal may be to backfill the pit excavated for the Six Mile Prospect.

3.5.1 Comment

"Further consultation and field surveys for the Declared Rare Flora Grevillea inconspicua should be undertaken by the proponents, as suggested by Ecologia (Appendix C5), prior to the commencement of the pit".

Response

Grevillea inconspicua appears on the CALM reserve rare and endangered species listing.

An intensive survey of the Six Mile Well area was carried out during 12-13 March 1990. A second survey was carried out on 4th May 1990 after further consultation with Mr Ray Cranfield CALM Herbarium, the collector of the original specimens from this locality. On neither occasion were specimens of this species found, and therefore no further survey work is proposed.

3.5.2 Comment

"The adequacy of the fauna survey is questionable due to:

(i) No survey sites existed for the proposed eastern waste dump;

(ii) The time of the year the survey was undertaken; and

(iii) The duration of the survey.

To adequately assess vertebrate fauna, three one week surveys are required, one each in summer, winter and spring. Reference data to support this is available".

Response

(i) Adequacy of Survey:-
Eastern Waste Dump:

Knowledge of the biota of the project area was gained from the initial survey in the main development area, the 30 year assessment of the birds of Wanjarri by Moriarty (1972) and the CALM biological survey of Wanjarri for the Eastern Goldfields Survey (McKenzie, et al, CALM Report). It is considered that coupled with data collected on the vegetation and landforms of the eastern dump, the data existed to enable prediction of the fauna in this area and the impacts of the waste dump development on the fauna.

(ii) Survey timing and (iii) duration:
It is acknowledged that the current data base is inadequate for detailed assessment of species population status and monitoring of impacts on the project area environment. However, it is considered that the knowledge of the fauna is adequate at the CER level to assess the faunal assemblages present and impacts on the fauna from the proposed development (R. Griffiths, EPA, pers comm).

Data from the survey undertaken by Ecologia, Moriaty (1972) and McKenzie et al coupled with known fauna habitat requirements, vegetation and landform data, from the project area, has enabled determination of the major faunal habitats in the project area. Longer term investigations in summer, winter and spring as suggested will certainly increase the species inventory of the area. However, no further species gazetted as rare, endangered or in need of special protection are known from the Northern Goldfields Region other than those detailed in Section 3.5.2 and no further work is proposed.

3.5.3 Comment

"The proponents have indicated that no aquatic invertebrate survey was undertaken within the Jones Creek system, yet recognises its importance as a refuge for aquatic species during summer. It is essential that this baseline information is obtained prior to disturbance to adequately assess the impacts of the project and proposed diversion on the creek system".

Response

Dominion is committed to carrying out the appropriate surveys of Jones Creek prior to commencement of construction, see Section 7.2.2 page 96.

Appendix C1

Comment

"The aerial photograph overlay and maps should indicate the location of the proposed creek diversion with respect to the pit and Reserve boundary. With the dimensions of the diversion channel proposed by the proponents (estimated approximately 100 metres wide), there appears little distance between the channel, the pit and the Reserve.

Response

The design of the diversions was completed after the preparation of the aerial photography overlay and the preparation of drawing no. W1292-00/C-004.

However, a fully documentated design including calculations and drawings numbered, W1292-00/C-007, W1292-00/C-008, 108-1, 108-2 was provided in Appendix D2. These drawings clearly show the dimensions of the diversions. The diversions have been designed with a clearance of approximately 200m from the eastern side of the proposed pit and approximately 100m from the western side of the proposed pit.

Appendix C3

No response required.

General Comments

No response is required. However, Dominion wish to be kept informed of any changes which may impact on the Yakabindie Project.

5.7 Main Roads Department

Comments

(Note the placing of these comments in point form has been carried out to assist in the preparation response).

(i) The Department does not believe either route could provide a satisfactory level of service to the mine or its associated townsite in the long term. It is not unusual for the road to be closed periodically as a result of seasonal heavy rain in the region.

(ii) The implications of this project and others proposed on the section of road between Leinster and Wiluna requires careful consideration. The Department is aware of two other proposals currently having final feasibility established. If development of these projects proceeds, the upgrading and strategic location of the Kalgoorlie-Meekatharra Road from Leinster to Wiluna will need to be revised. This may results in the need to provide a sealed road to connect with the existing sealed road at Leinster in order to service the requirements of the region. Cost sharing arrangements for the cost of relocation and upgrading of the route will need to be discussed with each of the developers of the proposals.

(iii) In the CER for the Yakabindie Project no commitment is made by the proponent to finance the upgrading of either transport route.

(iv) There is also no provision of data on the road transport configurations intended for use in the CER. If out of dimension transport configurations were to be used by the proponent or his subcontractors, the vehicle configurations need to be agreed by the Main Roads Department and cost of recovery for increased road damage may need to be resolved.

(v) The Department would appreciate the opportunity to discuss the financial cost of upgrading the route to Yakabindie with the proponent prior to commencement of work.

Response

(i) Dominion is aware that the main road north of Leinster is subject to periodic closure due to flooding, and this has been taken into account with regard to on-site storage capacity for fuels stores and nickel concentrate.

(ii) An assessment of the route options has been made and although some areas do require upgrade, the general condition of the roads as at 16 and 17 May 1990 appeared to satisfy the proposed mine requirements.

(iii) As for (ii) above.

(iv) The proposed road transport configurations have been discussed with officers of the MRD.

(v) Refer to (ii) and (iii) above.

6.0 CLOSURE

We trust these response provided are sufficient. Should you require clarification of any information or further details, please do not hesitate to contact the undersigned.

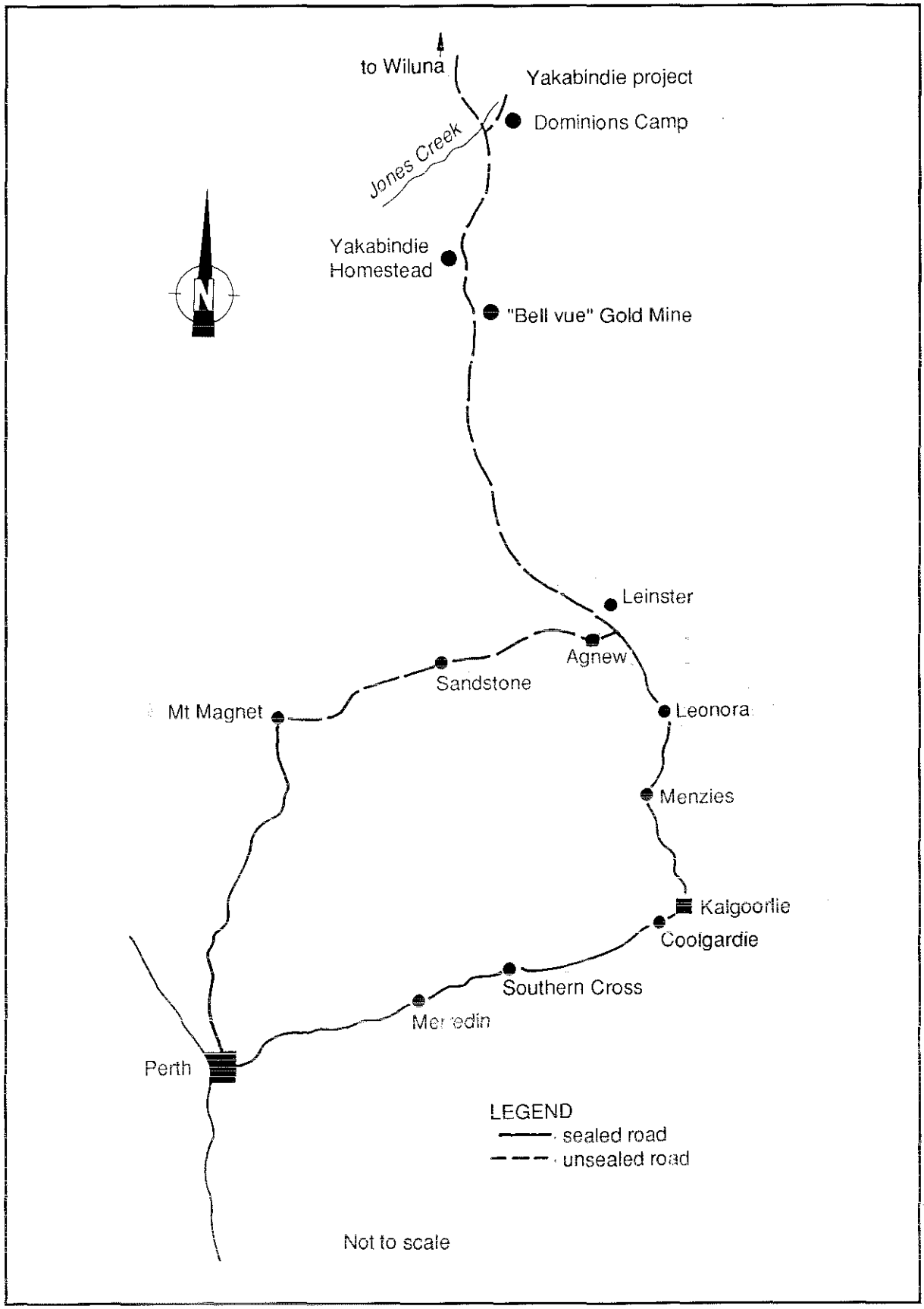

Figure 1: Location Plan

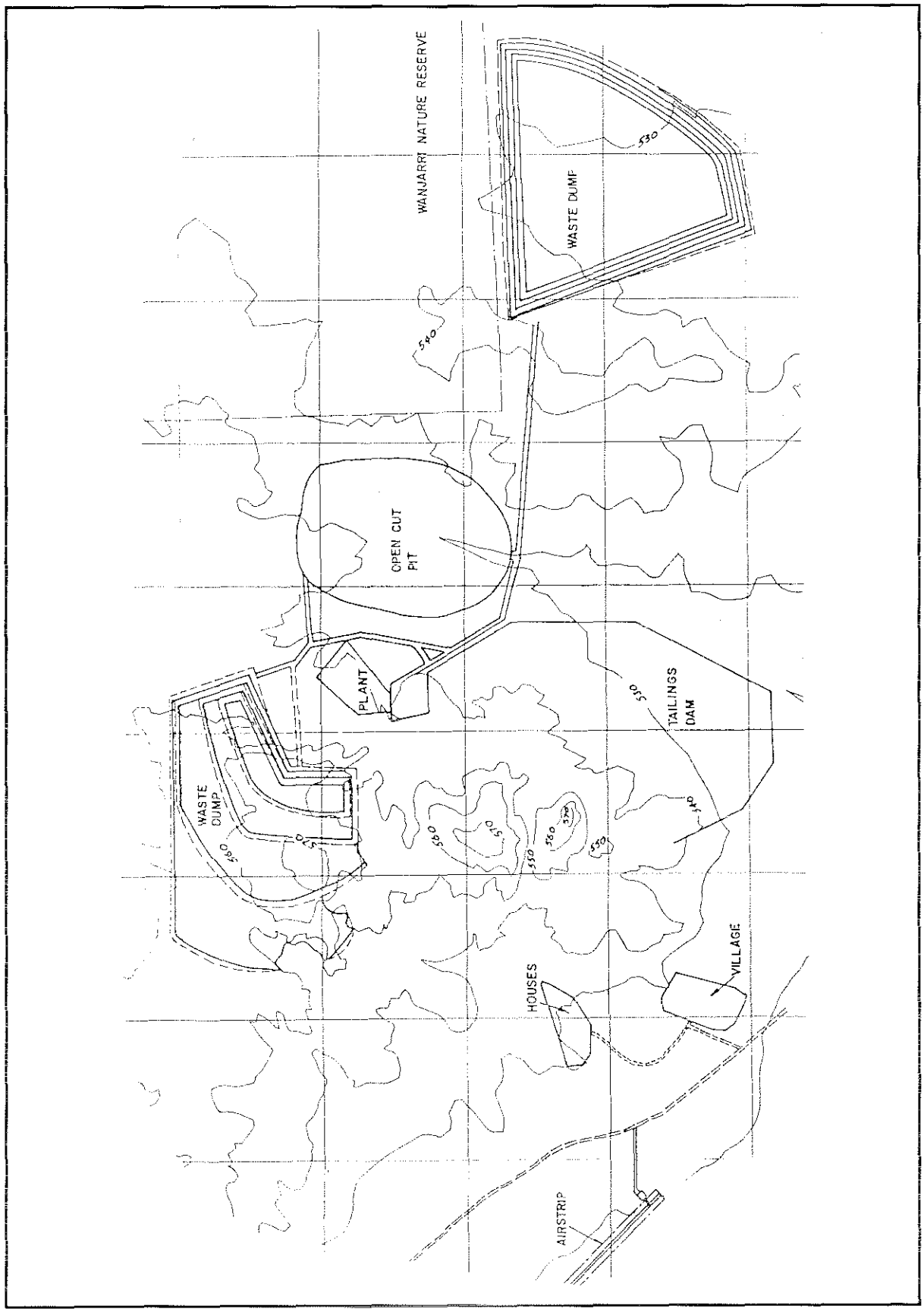

Figure 2: Proposed developments for the Yakabindie Nickel Project