Executive Summary

INTRODUCTION

This *Environmental Assessment* has been prepared by R.W. Corkery & Co. Pty. Limited to accompany an application for project approval by Big Island Mining Pty Ltd ("the Proponent") to construct and operate the Dargues Reef Gold Project ("the Project"). The Project would comprise an underground gold mine, a run-of-mine (ROM) Pad, temporary waste rock emplacement, processing plant, tailings storage facility and associated infrastructure and ancillary activities.

The application area for the Project ("the Project Site") comprises an area of approximately 403ha and incorporates nine separate freehold land titles, eight of which are owned by a company associated with the Proponent. A total of 26.5ha of land would be disturbed throughout the life of the Project. The Project Site is located on the western slopes of the Great Dividing Range, approximately 60km southeast of Canberra, 13km south of Braidwood and immediately north of the village of Majors Creek (see **Figure A**).

The Project is classified as a "Major Project" in accordance with Paragraph 5, Schedule 1 of *State Environmental Planning Policy (Major Development) 2005* and consequently the Minister for Planning is the approval authority. As a Major Project, it will be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This *Environmental Assessment* has been prepared in accordance with the requirements of Section 75H of Part 3A of the EP&A Act.

This summary introduces the Proponent, provides relevant background to the Project, and presents an overview of the Project design, operational safeguards and predicted Project-related impacts on the surrounding environment.

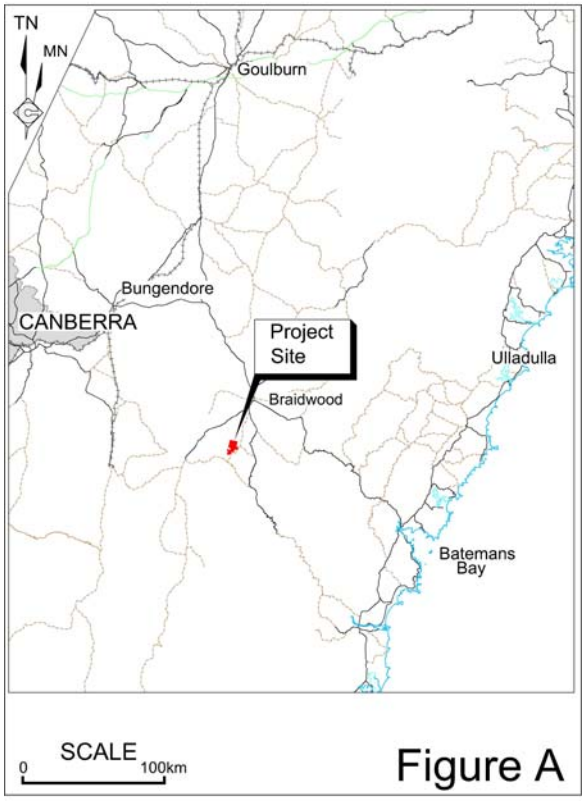

Figure A

THE PROPONENT

The Proponent is a wholly owned subsidiary of Cortona Resources Limited (Cortona). Cortona is an Australian listed public gold mining and exploration company which has been in existence since 2006. Cortona has a portfolio of gold projects in NSW and Western Australia. Its principal focus is on the continued expansion of its gold resource inventory with the primary objective of becoming a successful and profitable gold producer.

Cortona is controlled by a board of four individuals with a combined experience in mining-related industries of more than 90 years.

PLANNING CONTEXT

The application is made possible by virtue of the fact that mining is a permissible land use with consent within the relevant zone (Zone 1(a) (General Rural)) of the prevailing *Tallaganda Local Environment Plan 1991*.

The Project would be developed and operated in accordance with a number of State and regional planning instruments, namely:

- *State Environmental Planning Policy (Major Development) 2005;*
- *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007;*
- *State Environmental Planning Policies 33 and 44; and*
- *Drinking Water Catchments Regional Environmental Plan No 1.*

In addition to project approval, the Proponent anticipates that the following approvals would be required.

- An Environment Protection Licence from the Department of Environment, Climate Change and Water.
- A Mining Lease from Industry and Investment NSW.
- One or more Water Access Licences from the NSW Office of Water.
- A Section 138 Permit or deed from Palerang Council.
- A Dam Safety Approval from the NSW Dam Safety Committee.
- An Explosives Storage and Use Licence from WorkCover Authority NSW.
- A High Voltage Connection Agreement from County Energy.

BACKGROUND

The Project Site is located within the Majors Creek and the Araluen Goldfields, the largest alluvial goldfield in NSW. Since the first alluvial gold was discovered in 1851, records indicate that more than 40t of gold has been produced from alluvial deposits in the Braidwood-Araluen area. An estimated 98% of gold produced has been from alluvial workings, with the remainder from lode gold workings.

The Dargues Reef ore body was discovered in the 1870s by James Dargues, leading to the development of a small open cut mine and the sinking of a shaft. Following initial mining activities, further shafts were excavated between 1870 and 1891 and then again between 1914 and 1916. Historic production from the Dargues Reef ore body was minimal, with approximately 2 000t at a grade of approximately14g/t gold being produced.

The Proponent and its predecessors have controlled exploration licences over the Project Site since 2002 with the aim of identifying additional hard rock gold resources. In 2004, a drilling program was commenced at Dargues Reef, consisting of a number of deeper drill holes to test for depth extensions of the known mineralisation and to explore for additional lodes. That drilling program established that the lodes could occur up to 60m north of the contact with the 'footwall' diorite dyke. Since 2004, approximately 220 holes have been drilled at Dargues Reef.

The identified resources and reserves within the Project Site have been assessed as approximately 1.4Mt @ 6.2g/t to ultimately produce 286,000oz of gold. Based on these identified resources and reserves, a feasibility study was completed. The study concluded that the Project represents a viable underground mine development.

PROJECT OBJECTIVES

The Proponent's objectives in constructing and operating the Project are as follows.

- To safely mine the identified gold reserves.
- To operate the Project in a manner that would minimise surface disturb-ance and impacts on surrounding residents and the local environment.
- To implement a level of management control and mitigation measures that would ensure compliance with appropriate environmental criteria and reasonable community expectations.
- To develop and operate the Project in compliance with all relevant statutory requirements.
- To create a final landform that is suitable for a post-mining land use of agriculture and nature conservation.
- To continue to maintain an open and honest relationship with the surround-ing community.
- To establish a facility that can process additional mineral resources that may be identified within or in the vicinity of the Project Site.
- To achieve the above objectives in a cost-effective manner in order to ensure security of employment and the continued economic viability of the Proponent.

PROJECT DESCRIPTION

Figure B displays the principal components of the Project which include the following.

- Extraction of waste rock and ore material from the Dargues Reef deposit using underground sublevel open stope mining methods with a suitable crown pillar to prevent surface subsidence.
- Construction and use of surface infrastructure required for the underground mine, including a box cut, portal and decline, magazines, fuel store, ventilation rise, power and water supply.
- Construction and use of a processing plant and office area which would include an integrated ROM pad/temporary waste rock emplacement, crushing, grinding, gravity and floatation circuits, site offices, workshop, laydown area, ablutions facilities, stores, car parking, and associated infrastructure.
- Construction and use of a tailings storage facility.
- Construction and use of a water management system, including eight dams and associated water reticulation system to enable the harvesting and supply of water for environmental flows. It is noted that the proposed water harvesting operations would be consistent with the Proponent's rights to harvest water under Section 53 of the *Water Management Act 2000*.
- Construction and use of a site access road and intersection to allow site access from Majors Creek Road.
- Transportation of gold concentrate from the Project Site to the Proponent's customers via public roads surrounding the Project Site using covered semi-trailers.
- Construction and use of ancillary infrastructure, including soil stockpiles, core yards, internal roads and tracks and surface water management structures.
- Construction and rehabilitation of a final landform that would be geotechnically stable and suitable for a final land use of agriculture and/or nature conservation.

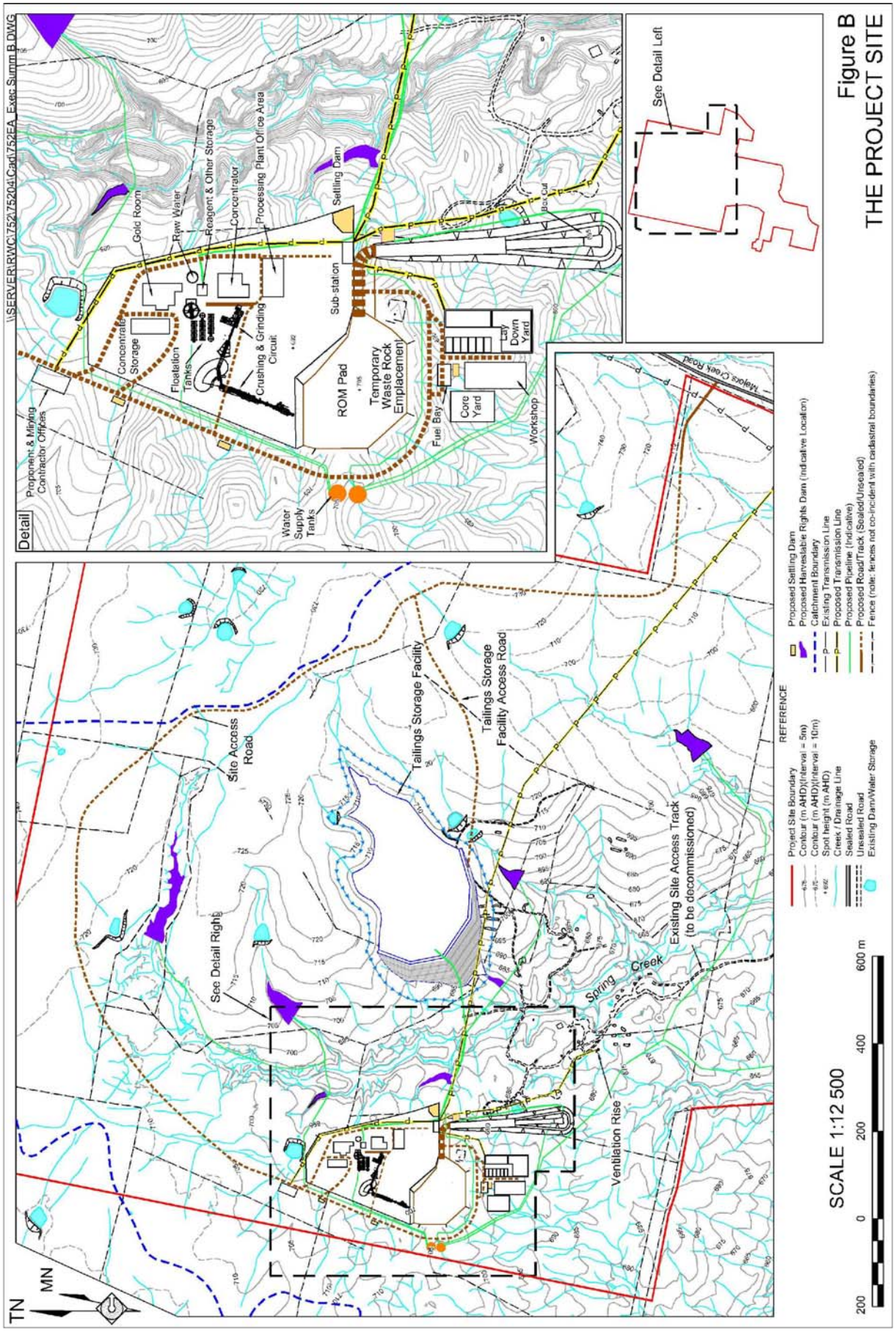
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Figure B
THE PROJECT SITE
See Detail Left
Detail
Proponent & Mining Contractor Offices
Concentrate Storage
Gold Room
Floatation Tanks
Raw Water
Reagent & Other Storage
Concentrator
Crushing & Grinding Circuit
Processing Plant Office Area
Sub station
Settling Dam
Box Cut
ROM Pad
Temporary Waste Rock Emplacement
Lay Down Yard
Core Yard
Fuel Bay
Workshop
Water Supply Tanks
Site Access Road
Tailings Storage Facility
Tailings Storage Facility Access Road
See Detail Right
Existing Site Access Track (to be decommissioned)
Spring Creek
Ventilation Rise
Proposed Settling Dam
Proposed Harvestable Rights Dam (Indicative Location)
Catchment Boundary
Existing Transmission Line
Proposed Transmission Line
Proposed Pipeline (Indicative)
Proposed Road/Track (Sealed/Unsealed)
Fence (note: fences not co-incident with cadastral boundaries)
REFERENCE
Project Site Boundary
Contour (m AHD)(Interval = 5m)
Contour (m AHD)(Interval = 10m)
Spot Height (m AHD)
Creek / Drainage Line
Sealed Road
Unsealed Road
Existing Dam/Water Storage
SCALE 1:12 500
200 0 200 400 600 m
TN
MN

The following provides an outline of the proposed Project operations.

Site Establishment and Construction

The first four to five months of the Project would involve a number of site establishment and construction activities. The principal activities would include:

1. the establishment of a 22kV electricity transmission line, substation and distribution network;
2. the construction of a site access road and intersection with Majors Creek Road;
3. the development of a box cut, portal and decline to the underground mine;
4. the construction of a ROM pad, temporary waste rock emplacement and processing infrastructure;
5. the construction of a tailings storage facility; and
6. the establishment of surface water and groundwater harvesting infrastructure.

During the design stage of the Project the Proponent would ensure, to the greatest extent practicable, that all surface disturbance would be undertaken in sections of the Project Site that have been cleared of the majority of overstorey vegetation by previous agricultural activities.

During vegetation clearing operations, larger vegetation would be removed using a bulldozer with its blade positioned just above the surface. Groundcover vegetation would be removed with the topsoil to maximise the retention of the seed bank and nutrients within the soil, as well as to minimise opportunities for erosion and dust lift-off between removal of the larger vegetation and soil stripping.

All available soil material would be recovered from areas to be disturbed using bulldozers or scrapers. The soil would either be transferred directly to other areas of the Project Site for respreading, e.g. the outer face of the tailings storage facility embankment, or placed in stockpiles, to a height no greater than 2m (topsoil) and 3m (subsoil).

Mining Operations

Development of the Box Cut and Portal

The box cut would be developed as an elongate excavation that would permit access to the portal and decline via a haul road. The box cut would initially be excavated by conventional load and haul methods using an excavator or front-end-loader and haul trucks. Where required, a bulldozer may be used to rip material that cannot be extracted using an excavator or front-end loader. Once extraction has progressed to a point where material cannot be extracted using an excavator, front-end loader or bulldozer, the material would be fragmented using drill and blast techniques.

Once the box cut has been excavated to the required dimensions and material of suitable competency for a portal has been exposed, the wall above the portal entrance would be stabilised using a combination of rock bolts, cable bolts and shotcrete. Infrastructure required for underground mining operations would then be installed.

Underground Development

Once the portal has been established and the required infrastructure installed, under-ground development would commence. Initially this would require development of the decline using a single heading. However, once decline development reaches the initial extraction level, development on multiple headings would be undertaken.

The decline, headings and ore drives would be developed using underground drill and blast techniques. A jumbo, or underground drill rig, would drill a pattern of holes, which would be loaded with pre-packaged and bulk explosives, and blasted to fragment the in situ material.

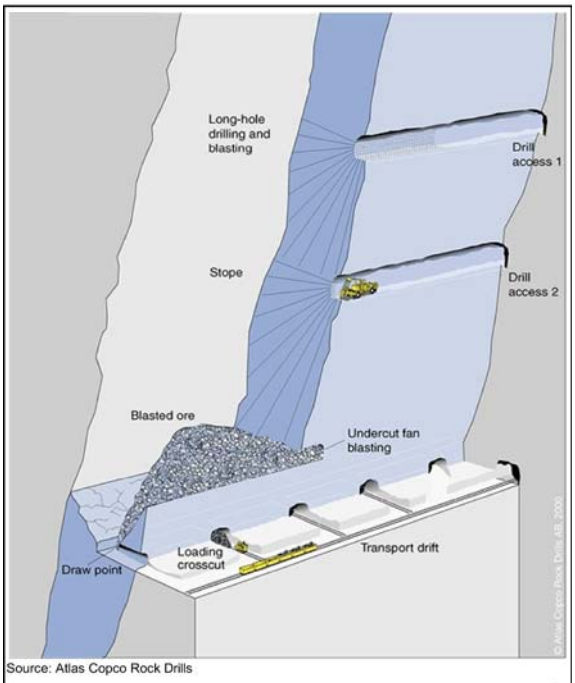
The fragmented material would then be extracted using an underground loader. Waste rock would either be transported to the temporary waste rock emplacement on the surface or used for stope backfilling operations underground. Ore would be transported to and stockpiled on the ROM pad.

Initially, ventilation would be provided using an initial ventilation fan located at the portal. As the decline progresses, the ventilation infrastructure would be advanced to ensure adequate ventilation in all sections of the advancing decline. Once the decline has been advanced to approximately 35m below the surface, a ventilation drive would be established and a ventilation rise to the surface constructed using raise-bore techniques. The ventilation shaft would have a ventilation fan installed at least 10m underground.

Underground Stoping Operations

Underground mining of ore material would be undertaken using a sublevel open stoping mining method. This mining method is particularly well suited to relatively narrow, near vertical ore bodies. **Figure C** presents a schematic overview of this mining method which is summarised as follows.

- A number of development drives would be established at 25m vertical intervals within the ore zone.
- A series of holes would then be drilled in rings downwards from each drive. These rings would be sequentially loaded with explosives and the ore material blasted.
- The fragmented material would then be removed from the stope or open void and loaded into haul trucks for transportation from the underground mine.
- Between stopes, pillars (vertical) and sills (horizontal) of un-mined material would be left to provide support and prevent ground subsidence and collapse.



Source: Atlas Copco Rock Drills

Figure C
SCHEMATIC SUBLEVEL OPEN STOPING MINING METHOD

Stope Backfilling Operations

In order to ensure stability of sections of the proposed underground mine, selected mined-out stopes would be backfilled using waste rock material. This material would be transported to the top of the stope, stockpiled in the drive and then pushed or tipped into the stope using an underground loader.

Mining Rate

The mining rate would increase progressively as the mine is developed, reaching a maximum of approximately 354 000t in Year 4. The mining rate would then decrease towards the end of the life of the Project as stopes are progressively completed.

Waste Rock Management

Material that has insufficient gold to justify processing would be extracted and either transported to the surface for use in the construction of surface infrastructure, placed within the temporary waste rock emplacement (see **Figure B**) or retained underground for stope backfilling operations. Notably, samples of waste rock

material that have been analysed for net acid generation potential all returned a negative acid generation potential, indicating that the waste rock would not be likely to generate an acidic leachate once exposed to the air.

Approximately 446 000m^3 of waste rock would be used in the construction of surface infrastructure or placed within the temporary waste rock emplacement. Surface placement of this material would continue from the commencement of the box cut until commencement of stope backfilling operations, approximately 12 months after commencement of the box cut. After this, waste rock material would preferentially be placed within completed stopes and would not be transported to the surface.

Processing Operations

Ore material would be crushed, ground and concentrated to produce a combination of gold dore (a semi-purified gold bar), a gold and silver-bearing sulphide concentrate and tailings material. No cyanide would be used within the Project Site. The following provides an overview of this process.

- Ore material, stockpiled according to the material's characteristics, would be blended as required and loaded into the ROM bin. Oversized material would be stockpiled separately and be periodically broken using a hydraulic rock breaker.
- From the ROM bin, the ore would pass to a two stage crushing and screening circuit to reduce the size of the ore.
- The crushed ore would be transferred to a primary ball mill for grinding where the material would be passed through a centrifugal concentrator to produce a gravity concentrate. This would then be dried before being smelted to produce gold dore. The gold dore would be stored for periodic secure shipment to a suitable gold refinery.
- From the primary gravity circuit, the remaining ground ore would be directed to flotation circuit where concentrate and tail streams would be separated by the addition of flotation reagents and low pressure air. Gold-bearing sulphide minerals would preferentially adhere to the bubbles, float to the surface and be skimmed from the surface. The concentrate would have most of the water removed and would then be stockpiled for subsequent transportation to the Proponent's customers.

Makeup water for processing and other mining operations would be sourced, in order of priority from the following.

1. Dewatering of the proposed mine.
2. The proposed harvestable rights dams.
3. The flooded Snobs, Stewart and Mertons and United Miners workings.

Tailings Management

At the completion of processing of the ground ore (from which the gold and associated sulphides have been removed), the remaining material, namely tailings, would be transferred to a thickener to recover process water for reuse. The thickened slurry would then be pumped to the tailings storage facility (see **Figure B**).

The tailings would comprise ground granodiorite and diorite material, which is not known to contain any components that pose environmental or health risks. It would be relatively coarse grained, i.e. free draining. The chemical characteristics of the tailings have been analysed and indicate a negative acid generation potential, i.e. when exposed to oxygen, the tailings would be unlikely to oxidise to form an acidic leachate.

The tailings storage facility would be constructed in the upper section of an un-named valley to the east of the processing plant (see **Figure B**). The facility would comprise a single cell and would be constructed in accordance with the requirements of the NSW Dams Safety Committee. The following provides the indicative design criteria for the facility.

1. Maximum area of disturbance - approximately 9.3ha.
2. Maximum embankment height – approximately 25m above the natural surface.
3. Slope of outer face of the embank-ment – approximately1:3 (V:H).

The floor, walls and internal face of the embankment would achieve a permeability of 1 x 10^{-9}m/s through the lining of the internal surfaces with a compacted clay or HDPE liner. The embankment would indicatively be constructed in three lifts using waste rock from the underground development or material extracted from the tailings storage facility footprint.

Tailings material would be pumped from the processing plant as thickened slurry and discharged to the facility from a series of spigots or outlets along the embankment. The tailings solids would settle from the slurry and a proportion of the water would flow to a decant tower where it would be collected and returned to the processing plant for reuse. It is anticipated that during the life of the Project, approximately 800 000m^3 of tailings material would be produced.

Finally, the Proponent is investigating options for using tailings material, mixed with cement, to backfill completed stopes within the proposed mine. This would have the advantage of significantly reducing the size of the tailings storage facility. Preliminary characterisation of the tailings/cement mix indicates that the material would not result in adverse environmental impacts.

Transportation

The gold concentrate would be despatched from the Project Site by road, via Majors Creek Road, Araluen Road, Captains Flat Road, Wallace Street, Coghill Street and finally the King's Highway to the north of Braidwood.

The average traffic levels that would be generated during the construction and operational phases of the Project are as follows.

Project Phase	Light Vehicles	Heavy Vehicles	Total Vehicles
Construction	30	6	36
Operations	20	18	38

Project Life and Hours of Operation

The Proponent anticipates that the life of the Project would be approximately 9 years. Operating 7 days per week, the proposed hours of operation would indicatively be as follows.

Activity	Hours
Vegetation clearing and topsoil stripping	Daylight hours
Construction operations – Box cut	Daylight hours
Construction operations – Remainder	24 hours per day
Underground mining operations	24 hours per day
Maintenance operations	24 hours per day
Processing operations	24 hours per day
Transportation operations	7:00am to 10.00pm
Rehabilitation operations	7:00am to 10.00pm

Employment

The Proponent estimates that the Project would provide approximately 100 full-time equivalent positions during site establishment phase and up to 80 full-time equivalent positions during the operational phase. This would be divided approxim-ately equally between employees of the Proponent and the mining contractor.

Site Rehabilitation and Decommissioning

The Proponent would adopt a progressive approach to the rehabilitation of disturbed areas within the Project Site to ensure that, where practicable, areas where mining-related activities are completed are quickly shaped and revegetated to provide a stable landform. The progressive formation of the post-mining landform and the establishment of a vegetative cover would also minimise the potential Project-related visual amenity and air quality impacts.

The post-mining landform would include the following components.

- A bunded and fenced box cut with the portal sealed in a manner that it may be re-opened in the event that mining operations re-commence in the future.
- An appropriately sealed ventilation rise.
- An appropriately shaped and covered, free draining tailings storage facility with appropriate surface water management structures and embankment slopes of approximately 1:3 (V:H) or less.
- A shaped, covered and vegetated processing plant and office area with all infrastructure removed.

The proposed harvestable rights dams, water supply tanks, electricity transmission line and site access road would indicatively remain following completion of the Project.

Rehabilitation operations would be undertaken in accordance with a *Rehabilitation and Environmental Management Plan* to be prepared for the Project following project approval.

ISSUE IDENTIFICATION AND PRIORITISATION

In order to undertake a comprehensive *Environmental Assessment* of the Project, appropriate emphasis needs to be placed on those issues likely to be of greatest significance to the local environment, neighbouring landowners and the wider community. These issues (and their potential impacts) were identified through a program of community and government consultation, preliminary environmental studies and literature review. This was followed by an analysis of the risk posed by each potential impact in order to prioritise the assessment of the identified environmental issues within the *Environmental Assessment*.

Consultation

Consultation with the local community involved:

- individual discussions with the landowners / residents of properties surrounding the Project Site and in Majors Creek;
- community meetings, including an information session held over two days; and
- regular meetings with the Majors Creek Community Liaison Committee.

The Proponent and its consultants also regularly consulted with various government agencies and authorities throughout the planning phase of the Project.

Issue Prioritisation

Considering the environmental issues raised throughout the consultation process, an analysis of environmental risk for each potential environmental issue in the absence of any mitigation measures was then completed. Through a review of the allocated risk ratings and the frequency with which each issue was identified, the relative priority of each issue was determined, with this priority used to provide an order of assessment and depth of coverage within the *Environmental Assessment*.

Based on the issues identified and the risk ratings allocated to the potential environmental impacts of these, the following order of priority of environmental issues has been determined.

1. Noise and blasting
2. Ecology
3. Groundwater
4. Surface water
5. Aboriginal heritage
6. Non-Aboriginal heritage
7. Bushfire
8. Traffic and Transportation
9. Air quality
10. Visual amenity
12. Soil and Land Capability
13. Socio-economic Climate

ENVIRONMENTAL SAFEGUARDS AND IMPACTS

The components and features of the existing environment within and surrounding the Project Site have been studied in detail and the Project designed to avoid or minimise impacts on that environment. A brief overview of the main components of the surrounding environment, the proposed safeguards and the assessed level of impact are set out below.

Noise and Blasting

The sources of noise around the Project Site are typical of a rural environment with contributions from farming activities, insect noise, livestock, wind through vegetation and vehicles on local roads. In addition, the Proponent's exploration operations also contribute in a limited manner to the noise environment surrounding the Project Site.

Noise monitoring undertaken in March 2010 confirmed background noise levels (L_{A90}[1]) that are below 30dB(A) at all residences during day, evening and night time periods.

The criteria for noise and blasting generated by the project have been established as follows.

- Site establishment and mine operations – 35dB(A) ($L_{Aeq(15min)}$).
- night-time sleep disturbance – 45dB(A) (L_{Amax}).
- road traffic noise - 55dB(A) (daytime) and 50dB(A) (night-tine) ($L_{Aeq(1hr)}$).
- Air blast overpressure - 115dB(L).
- Ground vibration - 5mm/s Peak Vector Sum (PVS).

The Proponent would implement the following control measures for noise.

- Enclosing the crusher and rubber lining of the grinding circuit.
- Construction of 5m high noise bunds around the western and southern perimeter of the ROM pad.
- Installation of the ventilation fan at least 10m below ground level.

The noise assessment determined that noise levels would comply with the nominated site establishment, operational, sleep disturbance and road traffic noise criteria at all residences under calm conditions and temperature inversions.

In addition, by applying accepted formulae for predicting air overpressure and ground vibration generated by blasting, the Proponent would be able to initiate a blast at surface with a maximum instantaneous charge of 105kg without exceeding the air overpressure or peak ground vibration criteria at the closest residence.

Ecology

An ecology assessment for the Project identified 10 vegetation communities within the Project Site (**Figure D**).

Notably, the remnant native vegetation represented by Ribbon Gum Forest, Fragmented Ribbon Gum Forest, Regenerating Wattles and River Peppermint Open Forest, would remain undisturbed.

[1] The noise level which is exceeded for 90% of the time at a given location.

No threatened flora species listed under the *Threatened Species Conservation Act 1995* (TSC Act) or *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) were identified, however a small area of habitat suitable for the threatened Majors Creek Leek Orchid was identified. This habitat would be protected and a detailed impact assessment determined that there would be no significant impact on that species. A small strip of Native Grassland was also identified. However, due to the narrowness of the strip (<5m) and location adjacent to an eroding stream bank, the community was determined not to be viable.

A total of 151 fauna species were identified, of which four, namely the Little Eagle, Gang-gang Cockatoo, Scarlet Robin and Flame Robin, are listed under the TSC Act or EPBC Act. A detailed impact assessment determined that the Project would not have a significant impact such that viable local populations of these or any other listed fauna species are likely to be placed at risk of extinction.

Notwithstanding the minimal impact, the Proponent has committed to establishing a Biodiversity Strategy for the Project. In addition, the Proponent would:

- undertake annual monitoring of suitable habitat for the Majors Creek Leek Orchid;
- monitoring of rehabilitation on a six monthly basis; and
- establishing a set of photographic reference points to document activities within the Project Site.

Groundwater

Three classes of aquifers exist within and surrounding the Project Site as follows.

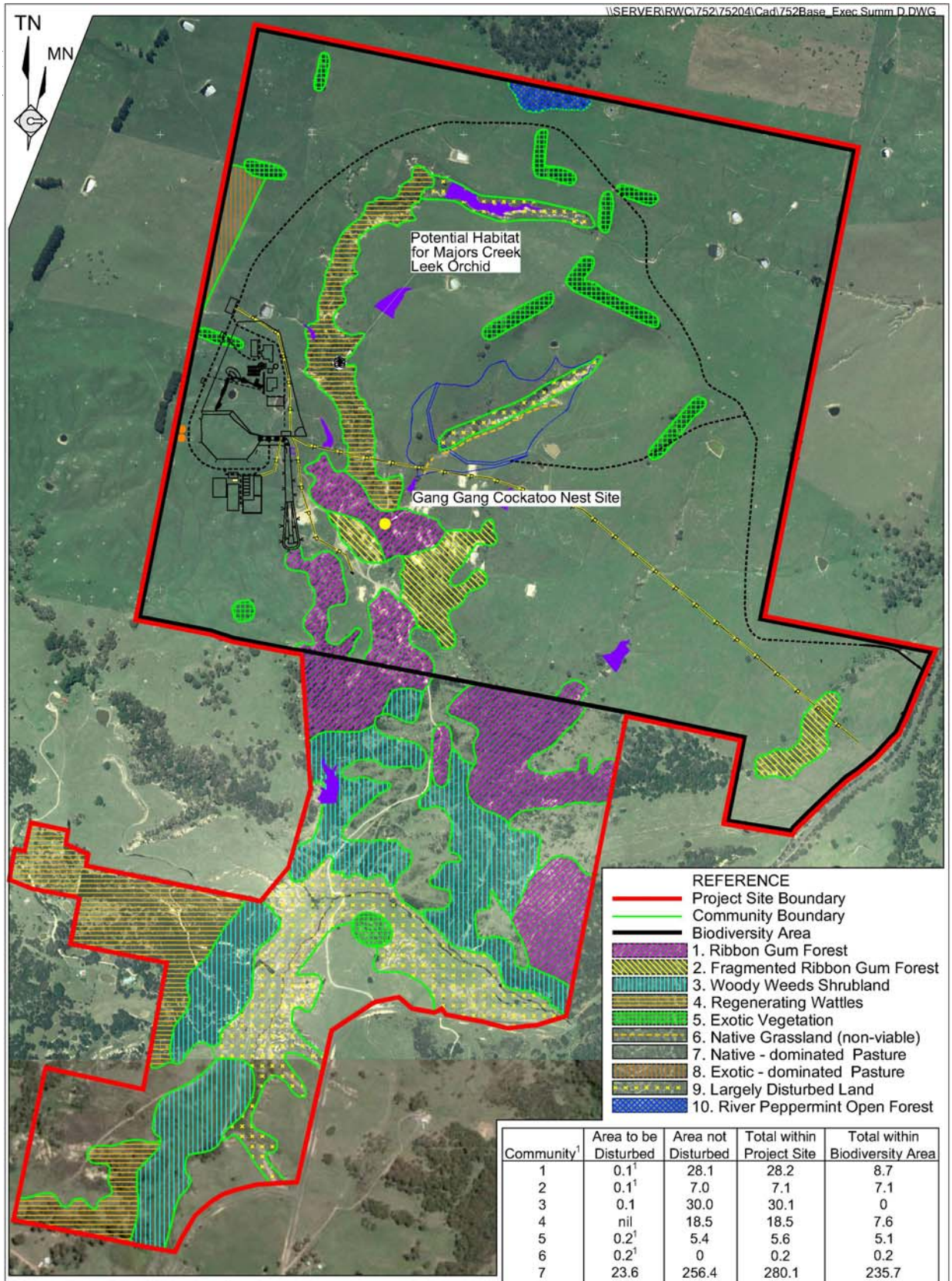
(i) *Fracture-controlled, granodiorite-hosted aquifer*. A hydraulically "tight" massive granodiorite with little or no primary permeability and localised fracture or fault systems which may be open and transmit groundwater flow. This aquifer occurs across the entire Project Site and surrounding catchments.

(ii) *A regolith aquifer (a shallow, weathered aquifer overlying the granodiorite)*. This aquifer is hosted by weathered granodiorite material which typically occurs to a depth of approximately 15m.

(iii) *A shallow alluvial aquifer (associated with the Majors Creek alluvial deposits)*. This aquifer comprises of sand and clay with boulders adjacent to and within Majors Creek.

The Project would result in the following groundwater-related impacts.

- Inflow to the Dargues Reef Mine of between approximately 7.2L/s and 10.0L/s or approximately 227ML/ year to 315ML/year.
- Reduced groundwater discharge to Spring Creek of up to approximately 0.3L/s or 9.4ML/year.
- Reduced net groundwater discharge to Majors Creek of up to approximately 1.8L/s or 56.8ML/ year.
- Reduced groundwater discharge to the Shoalhaven Catchment of approximately 14.5ML/year.
- The standing water level in two bores would be lowered by up to 7.5m. Four other bores would be at the anticipated limit of groundwater drawdown and would be monitored.



Community[1]	Area to be Disturbed	Area not Disturbed	Total within Project Site	Total within Biodiversity Area
1	0.1[1]	28.1	28.2	8.7
2	0.1[1]	7.0	7.1	7.1
3	0.1	30.0	30.1	0
4	nil	18.5	18.5	7.6
5	0.2[1]	5.4	5.6	5.1
6	0.2[1]	0	0.2	0.2
7	23.6	256.4	280.1	235.7
8	nil	2.5	2.5	2.5
9	2.2	20.9	23.1	3.9
10	nil	1.3	1.3	1.3
Total	**26.5**	**370.1**	**396.6**	**272.1**

Note [1]: Area nominal only

SCALE 1:15 000

250 0 250 500 750 m

Source: Modified after Gaia (2010) - Figure 6

Figure D
VEGETATION COMMUNITIES

- Groundwater levels would largely recover within 2 years of the end of mining operations and would completely recover within 5 years.
- There would be no impact on existing water supply at Araluen, approximately 20km downstream of the Project Site, as the reduced surface water flows would be compensated through release of a equivalent volume of water to Majors Creek.
- There would be no impact on existing water supply at the village of Majors Creek because the village is upstream of all water-related impacts.

To compensate for the proposed loss of groundwater flows within Majors and Spring Creeks, the Proponent would ensure that approximately 2.1L/s would be discharged at the confluence of Majors and Spring Creeks from the commencement of mining operations until 2 years after the cessation of dewatering operations. That water would be preferentially sourced from the proposed harvestable rights dams to ensure that the quality of water released meets the requirements of the relevant guidelines.

In addition, appropriate negotiated arrangements would be implemented in relation to the bores that may be impacted by the Project. As a result, The Project would not result in any significant groundwater-related impacts.

Surface Water

The southern section of the Project Site occurs within the Moruya Catchment, with surface waters draining to Majors Creek, either directly or via Spring Creek. Surface waters within the northern-most section of the Project Site flow generally northwards, merging with the Shoalhaven River, either directly or via Jembaicumbene or Back Creeks. All surface disturbing activities would be undertaken within the Moruya Catchment.

A site water balance was undertaken using 100 years of daily rainfall data. That assessment concluded that the proposed harvestable rights dams could provide water required for the proposed environmental flows on 97% of days modelled. On those days when water would not be available from the harvestable rights dams, water for environmental flows would be sourced from the historic workings.

Modelling was undertaken to predict the likely impacts of the Project on local surface water quantity and quality. The results of the modelling have also been assessed against the *Moruya River Water Quality and River Flow Objectives*.

The modelling results indicate that the volume of water discharged from the Project Site to the Majors Creek catchment would not vary significantly from current flows. No more than the Proponent's harvestable right would be captured as surface runoff, with the predicted reduction in base flows associated with groundwater discharge to Spring and Majors Creeks (maximum 2.1L/s combined) to be replaced by water released at the confluence of Spring and Majors Creeks from the commencement of mining operations until two years after the cessation of mine dewatering operations.

The modelling also indicates that as a result of the proposed water management controls, the quality of water discharged from the Project Site would be improved. Furthermore, the proposed design and management of the tailings storage facility would ensure that no leachate permeates through the walls or floor of the structure and enters surface water drainage.

Assuming the construction and maintenance of the proposed water control structures, the Project would not have any significant adverse impact on local water quality or quantity.

Aboriginal Heritage

The Project has the potential to impact on Aboriginal sites as a consequence of surface disturbing activities. Following consultation with registered Aboriginal community stakeholders, a field survey to identify the type and distribution of Aboriginal sites was undertaken.

Five Aboriginal heritage sites were identified within the Project Site. One site was identified in the vicinity of the embankment of the tailings storage facility. As a result, the facility was redesigned slightly to ensure a minimum 20m buffer. In addition, another site was identified in the vicinity of the proposed transmission line.

In order to ensure in situ protection of these sites, the Proponent would erect an appropriate fence around each site to prevent damage.

The proposed management of these sites has been presented to the registered Aboriginal community stakeholders. Three organisations responded indicating their support for the results and recommendations included in the Aboriginal heritage report.

Non-Aboriginal Heritage

A non-Aboriginal survey was undertaken concurrently with the Aboriginal heritage field survey. A number of artefacts of were identified during the survey. The majority of these reflect prior mining operations within and surrounding Project Site.

While the Project Site does have clear evidence of historic mine workings, that evidence has been extensively disrupted and overprinted by prior and subsequent mining-related activities. As a result, the identified artefacts could not be clearly associated with any particular activity or time period and as such, do not have the attributes that warrant an assessment of heritage significance.

Notwithstanding this, and with the exception of a number of water races within the footprint of the tailings storage facility and the processing area, the proposed activities would not disturb any identified historic artefacts.

Bushfire

A bushfire hazard assessment, which accounts for vegetation type and slope, was undertaken for the Project Site and surrounds. A number of safeguards and operational controls have been proposed by the Proponent to reduce the risk of fire within the Project Site. Based on the implementation of these, the Project would:

- minimise the risk of a fire being initiated on the Project Site; and
- reduce the risk associated with a bushfire event to people and assets on the Project Site.

Transportation

The Proponent proposes to construct a new intersection between the site access road and Majors Creek Road. This would incorporate basic left turn (BAL) and basic right turn (BAR) treatments into the Project Site. The intersection would provide for safe intersection sight distance requirements for the posted speed limit of 100km/h. These would be maintained through clearing of vegetation as necessary.

A comparison of measured traffic volumes with the predicted traffic levels illustrates the following.

- The Project would result in an increase in traffic levels of between 3.1% and 5.6% on all roads except Majors Creek Road which would be increased by 11.3%.
- The Project would result in an increase in heavy vehicles using the road network by approximately 1% on all roads except Majors Creek Road where the increase in heavy vehicles use would be 5%.

- The maximum proposed increase in hourly traffic movements of 10 vehicles per hour would not have any measurable impact on intersection capacity and or vehicle delay.

Project-related heavy vehicle movements may contribute to pavement deterioration on parts of the local road network. As a result, the Proponent has committed to undertaking a range of works prior to commencing mining operations and to fund ongoing road maintenance through the establishment of ongoing Section 94 contributions to Palerang Council.

Air Quality

Dust generating activities associated with the Project have been identified and quantified. The modelling indicates that the potential impact on air quality at surrounding residences would be minor and would not exceed the recommended air quality goals.

For the life of the Project, it has been estimated that approximately 0.24Mt CO_2-e would be released annually, corresponding to an approximate annual contribution of <0.03% against baseline 2007 NSW greenhouse gas emissions.

Visual Amenity

The existing visual amenity surrounding the Project Site is typical of rural areas with views of native vegetation, cleared areas, agricultural operations and surrounding buildings.

The Proponent would implement the following measures to minimise potential visual amenity-related impacts.

- Construction and revegetation of a 5m high bund on the southern and western margins of the temporary waste rock emplacement.
- Construction of plant and infrastructure from non-reflective, neutral-coloured material.
- Appropriate installation and placement of lights.

The visual amenity assessment determined that those sections of the Project Site that would be disturbed by the Project would only be visible from the south and southeast of the Project Site and that only distant views would be possible. As a result, there would be no significant visual amenity-related impacts associated with the Project.

Soils and Land Capability

Two soil landscape units (SMU) have been identified, namely:

- the Braidwood Soil Landscape; and
- the Bush Hill Soil Landscape.

The physical and chemical properties of both SMUs indicate that they are generally stable, have variable erodibility and dispersibility, are non-saline and are moderately to strongly acidic.

The use of appropriate soil stripping, handling and stockpiling procedures, together with appropriate erosion controls would result in a minimal impact to soils within the Project Site.

The soils assessment also concluded that the final landform should be able to achieve land capabilities similar to the existing landform.

Socio-economic Setting

The Project would provide several economic benefits to the local and regional socio-economic setting, including the following.

- Direct full-time employment for approximately 100 full-time equivalent positions during the site establishment and approximately 80 full-time equivalent positions during the operational phase of the Project.
- Employees would preferably be sourced from within the Palerang local government area (LGA) and even if drawn from further afield, would be encouraged to reside locally.

Increased employment opportunities associated with the Project would have additional flow-on benefits including:

- the provision of new employment would provide an impetus to other local businesses;
- contribution of $3 million to $7 million per year to the local and regional economy through wages and purchases of local goods and services; and
- support of local community services and projects.

The Project would provide for the continued diversification of development / industry in the LGA which would lead to increased training and employment opportunities for the residents of the LGA.

The socio-economic benefits of the Project would also flow through to the economies of NSW and Australia. It is anticipated that the Project would contribute:

- approximately $10 million to $31 million per year to the State and national economy through purchases of goods and services within NSW and Australia; and
- approximately $1 million to $8 million per year to the local, State and national governments through the payment of rates, taxes and royalties.

It is acknowledged that while impacts on the biophysical environment have been assessed as complying with nominated criteria or meeting accepted environmental standards, the cumulative effect of these minor impacts may have some adverse effect on the socio-economic setting. This is often expressed as a reduction in the amenity of the local area.

An objective assessment of this impact on local amenity is difficult as what one person may consider as acceptable, may not be acceptable to another person (and vice versa). However, based on experience obtained from the assessment of similar mining developments, it is noted that the perceived impact of a project on local amenity is generally far greater than the actual impact. With respect to the Project, where all biophysical impacts are assessed as complying with nominated criteria or standards, it is considered unlikely for impacts on local amenity to be unacceptable to a reasonable person.

It is further noted that the Proponent remains accountable for managing the Project in a manner that complies with the nominated environmental criteria and meets reasonable community expectations. A comprehensive monitoring program would be established to demonstrate compliance with environmental criteria and liaison with both official and unofficial community representation would continue to address community concerns as they arise.

PROJECT EVALUATION AND JUSTIFICATION

The Dargues Reef Gold Project has been evaluated and justified principally through consideration of its potential impacts on the environment and potential benefits to the local and wider community.

An evaluation of the Project has been undertaken by firstly re-assessing the risks posed to the local environment by Project-related activities following the implementation of all operational controls, safeguards and/or mitigation measures, and secondly through consideration of the principles of ecologically sustainable development. This evaluation has found that, with the implementation of the proposed operational controls, safeguards and/or mitigation measures, the residual risk posed by each possible environmental incident or impact has been reduced from its original level. With limited exceptions,

the residual risk was classified as either moderate or low, and therefore acceptable. Further, the design of the Project has addressed each of the sustainable development principles, and on balance, it is concluded that the Project achieves a sustainable outcome for the local and wider environment.

The Project and associated activities have been assessed in terms of a wide range of biophysical, social and economic issues. Potential residual impacts can be justified in terms of the positive economic and social benefits to Majors Creek, Braidwood, the Palerang LGA, NSW and Australia, the market opportunities for gold exports and the principles of ecologically sustainable development.

CONCLUSION

The Project has been, to the extent feasible, designed to address all issues raised by the local community and all levels of government, as well as the principles of ecologically sustainable development. The Project provides for the mining, production, sale and despatch of gold dore and concentrate which would be significant in generating further employment opportunities and maintaining stimulus to the local economies of Majors Creek, Braidwood and the Palerang LGA. The post-mining landform would also provide for the re-establishment of agricultural land.

In light of the conclusions included throughout the *Environmental Assessment*, it is assessed that the Project could be constructed and operated in a manner that would satisfy all relevant statutory goals and criteria, environmental objectives and reasonable community expectations.

The *Environmental Assessment* supported by the range of specialist consultant studies has established that if the Project proceeds, it would:

1. satisfy sustainable development principles;
2. operate with risks to the local environment minimised to the greatest extent practicable through Project design and implementation of a range of environmental controls and safeguards;
3. have a minimal and manageable adverse impact on the biophysical environment;
4. have a substantial positive impact on the local and wider regional and NSW socio-economic environment;
5. contribute to the continued economic activity of the Palerang LGA; and
6. provide a site suitable for future agricultural activities incorporating areas for long term nature conservation.

Key Statistics

Project Details	
Project Life	9 years
Maximum Rate of Production	Approximately 354 000t/year of ore
Project Site	403ha
Area owned by Proponent	Approximately 396ha
Number of employees	Approximately 100 (site establishment)
	Approximately 80 (operation)
Project capital cost	Approximately $42 million
Economic contribution	$3 million to $7 million per year (local and regional)
	$10 million to $31 million per year (State and national)
Taxes, royalties and rates	$1 million to $8 million per year (local, State and national)

Vegetation Communities and Biodiversity Strategy (ha)				
	To be disturbed	**Area not to be disturbed**	**Total within Project Site**	**Total within Biodiversity Area**
Ribbon Gum Forest	0.1	28.1	28.2	8.7
Fragmented Ribbon Gum Forest	0.1	7.0	7.1	7.1
Woody weeds Shrubland	0.1	30.0	30.1	nil
Regenerating wattles	nil	18.5	18.5	7.6
Exotic vegetation	0.2	5.4	5.6	5.1
Native grassland (non-viable)	0.2	nil	0.2	0.2
Native-dominated pasture	23.6	256.4	280.1	235.7
Exotic pasture	nil	2.5	2.5	2.5
Largely disturbed land	2.2	20.9	23.1	3.9
River Peppermint Open Forest	nil	1.3	1.3	1.3
TOTAL	**26.5**	**370.1**	**396.6**	**272.1**

Soil Resources					
	Area to be disturbed (ha)	**Topsoil**		**Subsoil**	
		Stripping Depth (mm)	**Volume (m^3)**	**Stripping Depth (mm)**	**Volume (m^3)**
Braidwood Soil Landscape	13	350	45 500	350 to 1400	136 000
Brushy Hill Soil Landscape	13.5	300	40 500	300 to 1100	148 000
TOTAL	**26.5**		**86 000**		**285 000**