MAJOR PROJECT ASSESSMENT:
Dargues Reef Gold Project
(10_0054)

Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979

May 2011

Cover Photos: Main Photo: View to the north along Spring Creek drainage line.
Small Photo: View to the south from the ridgeline north of the proposed Tailings Storage Facility.

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EXECUTIVE SUMMARY

Big Island Mining Pty Ltd (BIM), a wholly owned subsidiary of Cortona Resources Limited (Cortona), proposes to establish an underground gold mine in Majors Creek, approximately 13 kilometres south of Braidwood within the Southern Tablelands of NSW.

The project - known as the Dargues Reef Gold Project - includes the development of a new underground gold mine and associated infrastructure at a site within the Majors Creek and Araluen Goldfield that has been subject to historical mining-related activities. The mine would produce up to 355,000 tonnes of ore a year, for a period of up to 7 years.

The project has a capital investment value of $42 million, and would generate 100 jobs during site establishment and 80 jobs during operation.

The Department exhibited the Environmental Assessment (EA) of the project between 29 September and 1 November 2010. The Department received 1,171 submissions on the project, including 8 from public authorities, 12 from special interest groups and 1,151 from the general public (including 1,064 form letters). None of the public authorities objected to the project. A total of 20 of the submissions from the general public supported the project based on its potential to stimulate the local economy. The remaining submissions objected to the project based on potential adverse impacts on water resources, biodiversity, noise, traffic, Aboriginal heritage, air quality, vibration, and visual amenity.

The Department has carried out a detailed assessment of the merits of the project, in accordance with the requirements of the EP&A Act.

This assessment has found that, despite the residents of Majors Creek being in relatively close proximity to the mine, the project would not result in significant noise, traffic, dust or visual amenity impacts. However, the project would require the clearing of 27.3 hectares (ha) of land and may impact on local ground and surface water resources.

The Department has recommended a range of conditions to ensure that these impacts are suitably mitigated, managed and/or offset. These conditions include requirements for BIM to:

- offset any loss of baseflow to the surrounding watercourses;
- implement additional measures to minimise the dust, noise, blasting and visual impacts of the project;
- develop and implement a biodiversity offset to ensure the project maintains and potentially improves the biodiversity values of the region in the medium to long term;
- conserve the proposed biodiversity offset area in perpetuity;
- progressively rehabilitate the site;
- pay Palerang Council $997,000 for road upgrade works and community infrastructure improvements and an additional $78,000 per annum for road maintenance works;
- monitor and regularly report on its environmental performance; and
- commission independent audits of its operations, to ensure that it is complying with its conditions of approval and implementing best practice on site.

Finally, the Department's assessment has found that the project would provide economic and social benefits to both the region and NSW, including:

- employment for up to 100 employees (during site establishment) and 80 employees (during operation);
- a capital investment of $42 million; and
- royalties and payroll taxes for the State Government.

On balance, the Department believes that the project's benefits sufficiently outweigh its residual costs and that it is in the public interest and should therefore be approved subject to strict conditions.

1 BACKGROUND

Big Island Mining Pty Ltd (BIM), a wholly owned subsidiary of Cortona Resources Limited, is proposing to develop an underground gold mine in Majors Creek, approximately 13 kilometres south of Braidwood within the Southern Tablelands of NSW (see **Figure 1**).

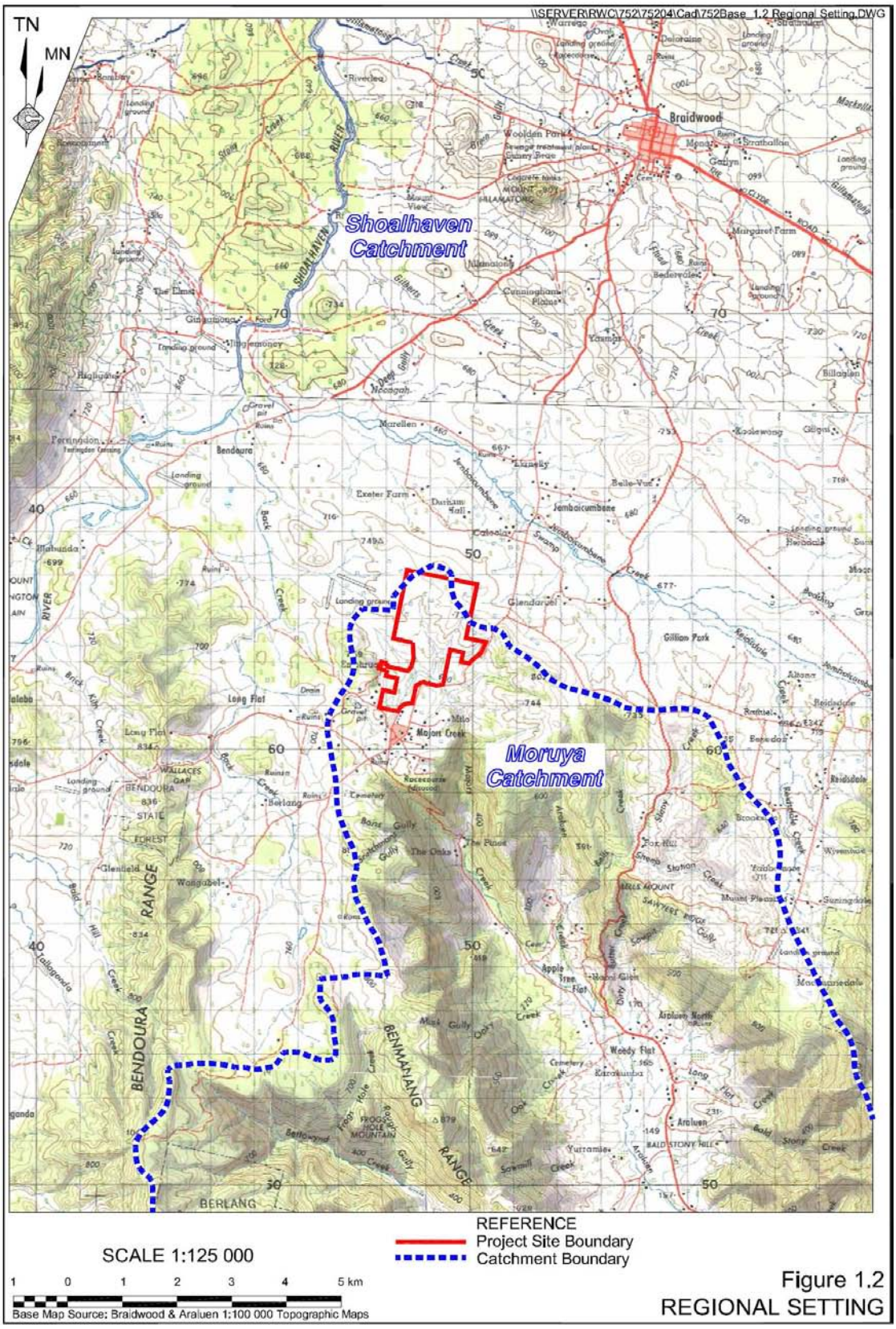

Figure 1: *Regional Context*

1.1 Project Setting

The project site, which covers an area of 403 ha, is located within the Majors Creek and Araluen Goldfield, which is the largest alluvial goldfield in NSW.

Previous mining-related activities have altered the natural landscape of the project site. Underground workings associated with the Snobs, Stewart & Mertons and United Miners workings are located in the southern portion of the site. The channels associated with Spring and Majors Creeks, which flow through the centre of the project site, have also been disturbed by previous mining-related activities, with the alluvial sediments being subjected to sluicing and dredging. The extent and location of previous mining-related activities are shown on **Figure 2**.

Large areas of the site, particularly in the north, have been cleared and are utilised for agricultural purposes, principally grazing. However, well-vegetated areas exist along drainage and creek lines and in some of the southern portions of the site.

The majority of the project site is situated within the Moruya Catchment, which drains south to Spring and Majors Creeks, before flowing to Araluen Creek and the Deua River further downstream. Small areas to the north of the project site lie within the Shoalhaven catchment (**Figure 1**).

With the exception of a small parcel of land in the south-west of the site, the entire project site is owned by BIM. Other land uses in the surrounding area are comprised of agricultural, nature conservation and forestry and rural residential landholdings.

The small village of Majors Creek, which has a population of about 200 residents, is located immediately to the south of the project site while the larger township of Braidwood is located about 13 km to the north (see **Figure 1**). The Araluen Valley, which supports rural enterprise such as orchid and cattle production, is situated approximately 10 km to the south east of the project site.

The road network in the vicinity of the site is dominated by Majors Creek Road, which runs along the eastern boundary of the site between Majors Creek Village and Braidwood.

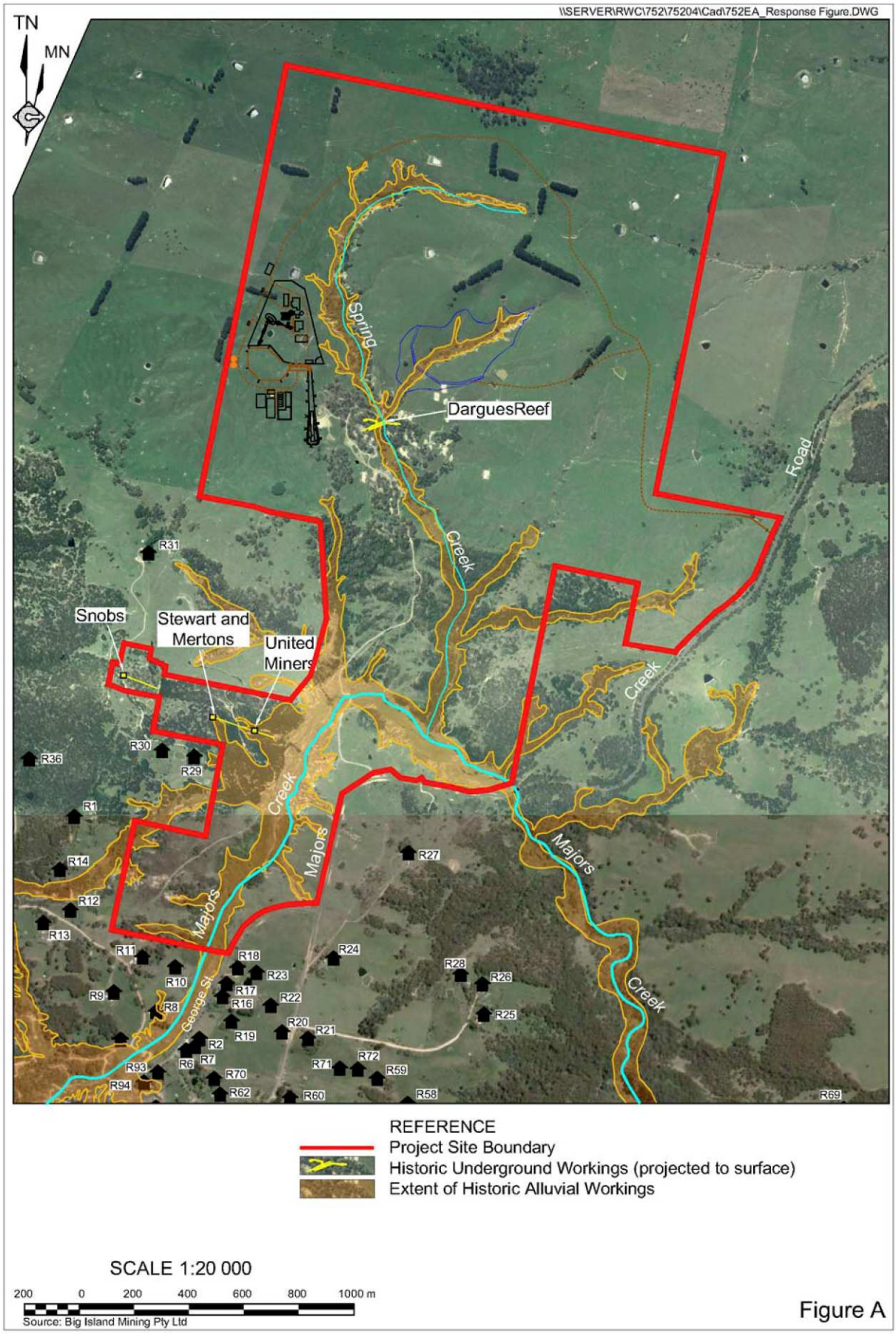

Figure 2: *Location of Historical Mining Related-Activities*

2 PROPOSED PROJECT

BIM proposes to develop a new underground gold mine at Majors Creek. The proposal is known as the Dargues Reef Gold Project (the project).

The key components of the project are summarised in **Table 1** and depicted in **Figures 3** and **4**. The project is described in detail in BIM's Environmental Assessment (EA), which is attached as **Appendix A**.

Table 1: *Key Components of the Dargues Reef Gold Project*

Aspect	Summary	
Project Summary	• **construction and operation of an underground gold mine, including ancillary infrastructure;** • **extraction and processing of up to 355,000 tonnes of gold ore per annum (tpa) for up to 7 years;** • **transportation of the processed ore from the site via road; and** • **progressive rehabilitation of the site.**	
Project Area	403 ha	
Mining and Reserves	Extraction of approximately 1.7 million tonnes (Mt) (approximately 1.2 Mt ore and 0.46 Mt waste rock) using an underground, sublevel open stope mining method.	
Ore Production and Processing	Up to 355 000 tpa to be processed via a two-stage crushing and screening circuit and gravity and floatation methods.	
Project Life	9 years (5-7 years for mining operations and 2 years for rehabilitation)	
Proposed Surface Infrastructure	The project would require construction of the following surface infrastructure: • a box cut, portal and decline, fuel store, ventilation rise, power and water supply; • a processing plant and office area which would include an integrated run-of-mine (ROM) pad/temporary waste rock emplacement, crushing, grinding, gravity and floatation circuits, site offices, workshop, laydown area, ablutions facilities, car parking, and associated infrastructure; • a tailings storage facility; • a water management system, including 8 dams and an associated water reticulation system; • a site access road and intersection to allow site access from Majors Creek Road; and • ancillary infrastructure, including soil stockpiles, core yards, internal roads and tracks and surface water management structures.	
Water Demand and Supply	The maximum predicted project-related water requirement is 215 mega litres per year (ML/year). This includes water required for processing operations (130 ML/year), dust suppression (19 ML/year) and compensatory baseflow to Spring and Majors Creek (66 ML/year). This water would be sourced from: • groundwater inflow into underground operations – 126 ML/year; • surface water from harvestable rights dams – 33 ML/year; and • groundwater from historic Snobs, Stewart & Mertons and United Miners workings – 79 ML/year.	
Tailings Management	Approximately 800 000 m² of tailings material would be produced during the life of the project. The tailings would be stored in a tailings storage facility that covers an area of 9.3 ha within a valley in the centre of the site.	
Waste Rock Management	Approximately 510 375 m^3 of waste rock would be generated during the life of the project. The vast majority of waste rock (ie. 445 675 m^3) would be used in the construction of surface infrastructure or placed within the temporary waste rock emplacement. The remainder (ie. 64 700 m^3) would be used during stope backfilling operations.	
Hours of Operation	Vegetation clearing, topsoil stripping, construction of the box cut and rehabilitation	7am-6pm Monday to Saturday, 8am-6pm Sundays and Public Holidays
	Remainder of construction operations, mining, maintenance and processing operations	24 hours a day, 7 days a week
	Crushing operations (including the operation of the front-end loader)	7am-7pm, 7 days a week
	Transportation	7am-10pm Monday to Saturday, 8am-10pm Sundays and Public Holidays
Employment	100 employees (site establishment), 80 employees (operation)	
Product Transport	The gold concentrate would be transported from the project site via an internal haul road and a newly constructed intersection onto Majors Creek Road. From there product trucks would travel onto Araluen Road, Captains Flat Road, Wallace Street, Coghill Street and finally the King's Highway to the north of Braidwood.	
Biodiversity Offset	The project would result in the removal of 27.3 ha of predominantly native-dominated pasture land. To compensate for this loss, BIM has committed to offsetting a 272 ha area within the northern portion of the site. The Biodiversity Offset Strategy would also involve fencing of Ribbon Gum Forest and creek line areas, ameliorative planting, stabilisation of eroding creek banks, and management of weeds and feral animals.	
Rehabilitation and Final Landform	The project disturbance areas would be progressively rehabilitated to be similar to the existing landform (ie. Class IV and V land capability to support grazing activities).	
Capital Investment Value	$42 million	

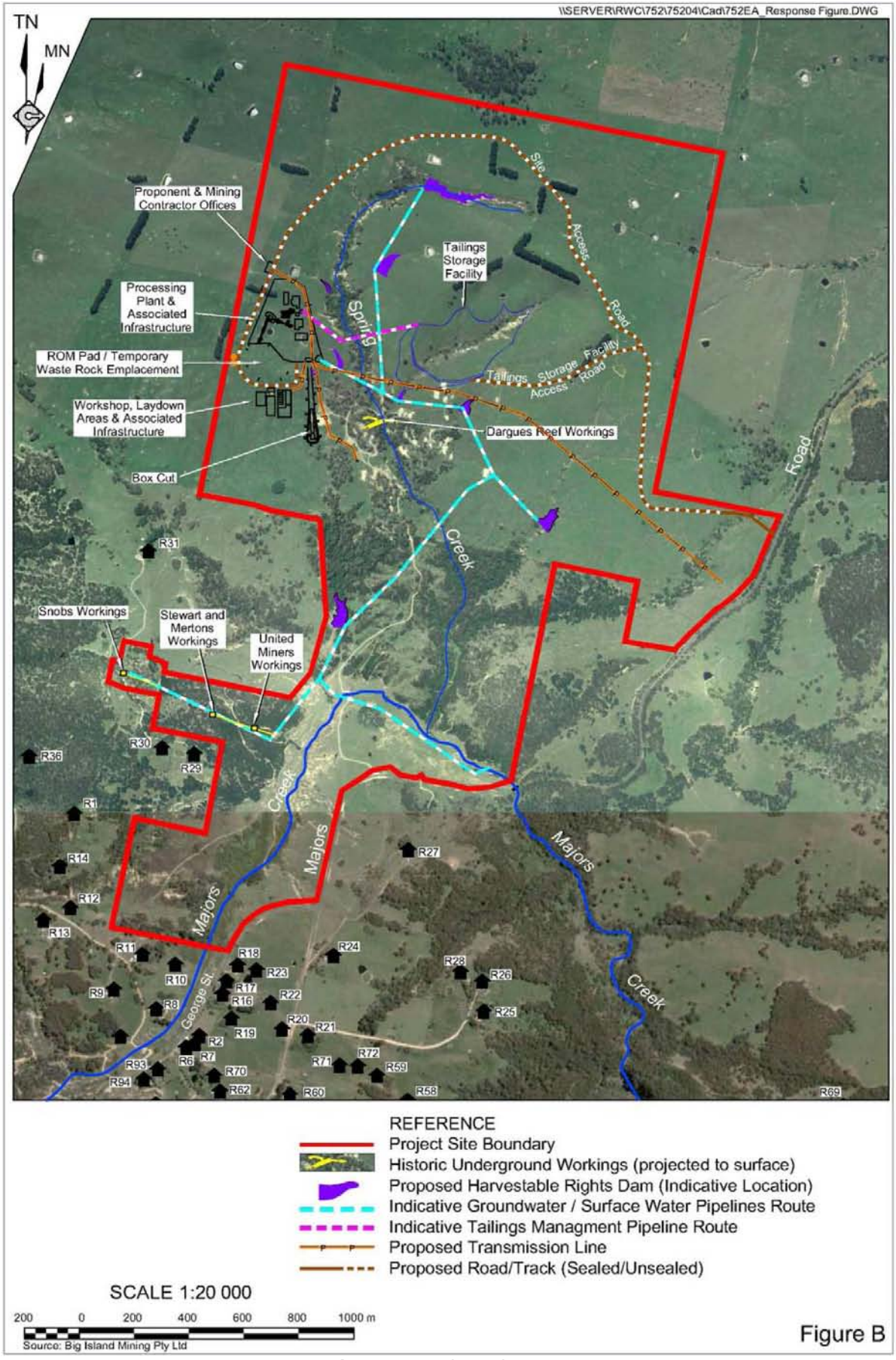

Figure 3: *Project Site Layout*

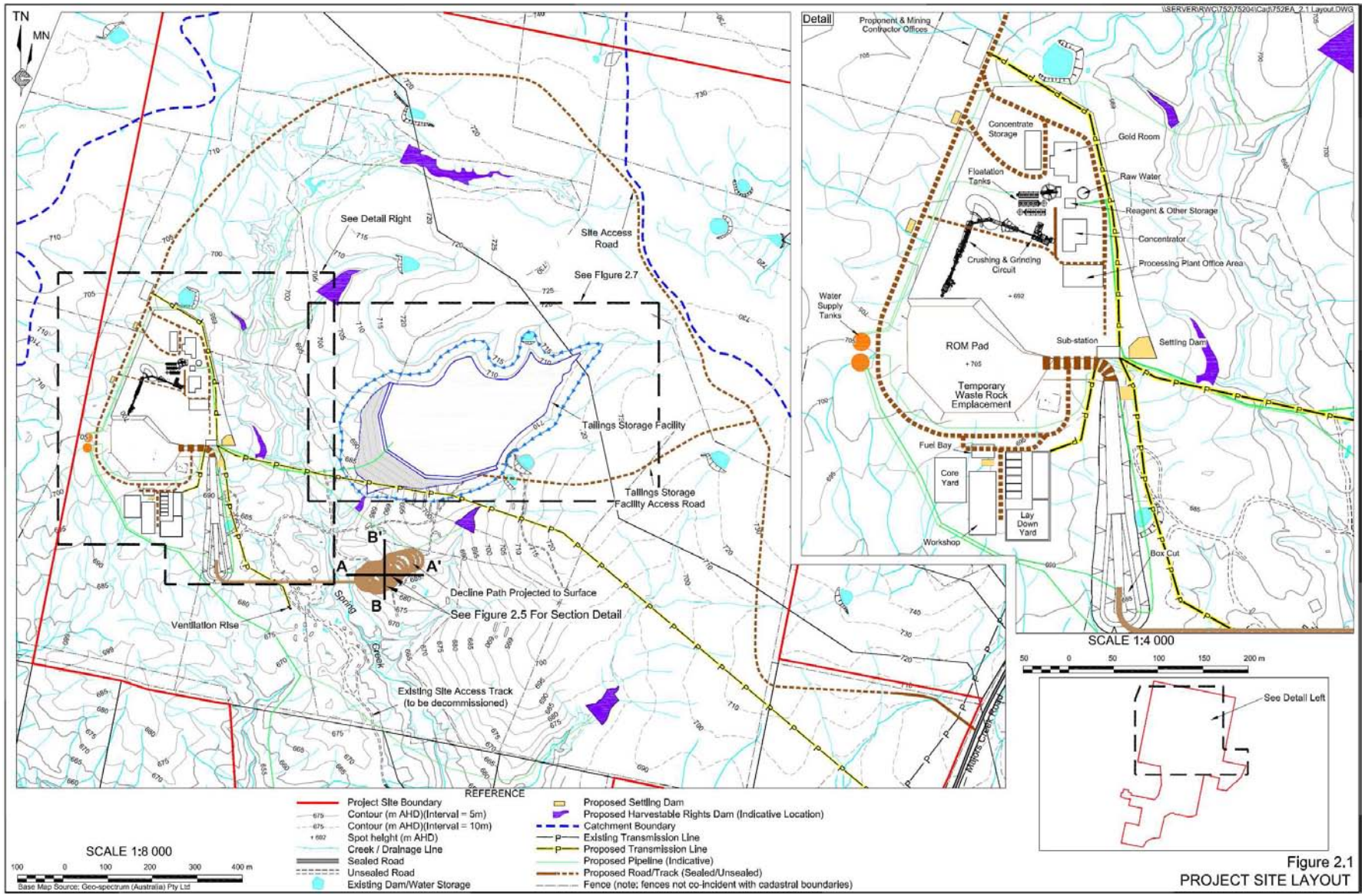

Figure 4: *Infrastructure Area Layout*

3 STATUTORY CONTEXT

3.1 Major Project

The proposal is classified as a major project under Part 3A of the *Environmental Planning & Assessment Act 1979* (EP&A Act) because it constitutes development for the purpose of mining with a capital investment value of over $30 million, and therefore meets the criteria in Clause 5 of Schedule 1 of *State Environmental Planning Policy (Major Development) 2005.*

Consequently, the Minister is the approval authority for the proposal. However, under delegation the Planning Assessment Commission may determine the application on the Minister's behalf.

3.2 Permissibility

The land is permissible with consent under the *Tallaganda Local Environmental Plan 1991* and *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.

Consequently, the Minister or his delegate may approve the carrying out of the project.

3.3 Other Approvals

Under Section 75U of the EP&A Act, a number of other approvals have been integrated into the Part 3A approval process and are not required to be separately obtained for the project. These include:

- heritage-related approvals under the *Heritage Act 1977* and *National Parks and Wildlife Act 1974*; and
- some water-related approvals under the *Rivers and Foreshores Improvement Act 1948* and *Water Management Act 2000.*

Under Section 75V of the EP&A Act, a number of further approvals are required to be obtained, but must be approved in a manner that is consistent with any Part 3A approval for the project. These include:

- a mining lease under the *Mining Act 1992*; and
- an environment protection licence under the *Protection of the Environment Operations Act 1997*.

The Department has consulted with the relevant government authorities responsible for these other approvals (see Section 4.1), and considered the relevant issues relating to these approvals in its assessment of the project (see Section 5). None of these authorities object to the project on grounds related to these other approvals.

3.4 Exhibition and Notification

Under Section 75H(3) of the EP&A Act, the Director-General is required to make the Environmental Assessment (EA) for the project publicly available for at least 30 days.

After accepting the EA for the project, the Department:

- made the EA publicly available from 29 September until 1 November 2010:
  - on the Department's website; and
  - at the Department's Information Centre, Palerang Council's office and at the office of Nature Conservation Council's office;
- notified relevant State government authorities and Palerang Council by letter; and
- advertised the exhibition in the Braidwood Times newspaper.

This satisfies the requirements of Section 75H(3) of the EP&A Act.

During the assessment process the Department also made a number of documents available for viewing or download on its website. These documents included the:

- project application;
- Director-General's environmental assessment requirements;
- EA; and
- BIM's response to the issues raised in submissions.

3.5 Environmental Planning Instruments

Under Section 75I of the EP&A Act, the Director-General's report is required to include a copy of, or reference to, the provisions of environmental planning instruments that substantially govern the carrying out of the project.

The Department has considered the project against the relevant provisions of several *State Environmental Planning Policies* (SEPPs) (see **Appendix B**) as well as BIM's consideration of these issues (see section 3.2.3 of the EA), and is satisfied that none of these instruments substantially govern the carrying out of the project.

3.6 Objects of the EP&A Act

The Minister should consider the objects of the EP&A Act when making decisions under the Act. The objects of most relevance to the Minister's decision on whether or not to approve the project are found in Section 5(a)(i), (ii), (vi) and (vii). They are:

To encourage:

(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,

(ii) the promotion and co-ordination of the orderly and economic use and development of land,

(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats; and

(vii) ecologically sustainable development.

The Department is satisfied that the project encourages the proper use of resources (Object 5(a)(i)) and the promotion of orderly and economic use of land (Object 5(a)(ii)), particularly as the majority of the subject ore resources are located within an existing mining lease in an area that has been subject to mining for over a century.

The encouragement of environmental protection (Object 5(a)(vi)) is considered in detail in Section 5 of this report. Based on this consideration, the Department is satisfied that the impacts of the project can be mitigated, managed and/or offset to ensure an acceptable level of environmental performance, and that the project would maintain and potentially improve the biodiversity values of the locality in the medium to long term with the provision of appropriate offsets.

Finally, the Department has fully considered the encouragement of ecologically sustainable development (ESD) (Object 5(a)(vii)) throughout its assessment of the merits of the project application, and sought to integrate all significant economic and environmental considerations and avoid any serious or irreversible damage to the environment, based on an assessment of risk-weighted consequences. Based on this consideration, the Department is satisfied that the project can be carried out in a manner that is consistent with the principles of ESD.

3.7 Statement of Compliance

Under Section 75I of the EP&A Act, the Director-General's report is required to include a statement relating to compliance with the environmental assessment requirements issued for the project.

The Department is satisfied that the environmental assessment requirements of the project have been complied with.

4 CONSULTATION

The Department exhibited the EA for the project between 29 September and 1 November 2010. The Department received 1,170 submissions on the project, including:

- 8 from public authorities;
- 11 from special interest groups (Araluen Progress Association, Australian Wildlife Protection Council Inc, Braidwood Greens, Coastwatchers Association, Conondale Range Committee, Country Energy, Friends of the Mongarlowe River, Majors Creek Community Liaison Committee, Permaculture Sydney North, South East Forest Rescue, and South East Region Conservation Alliance); and
- 1,151 from the general public, including 1,064 form letters.

In addition to the above, the Department received a late submission from a special interest group - Araluen Valley Producers and Protectors of the Eco-System Coalition (AVPPEC). AVPPEC claimed to have additional information that was critical for the assessment of the project. The Department subsequently met with AVPPEC and asked for the information to be provided in writing. AVPPEC provided this information in early April 2011.

A full copy of the submissions is attached in **Appendix C**. BIM has subsequently provided formal responses to the issues raised in these submissions, including the additional information provided by AVPPEC (see **Appendix D**).

A summary of the issues raised during the consultation process is provided below.

4.1 Public Authorities

The **Office of Environment & Heritage** (OEH) (formerly the Department of Environment, Climate Change and Water) raised concerns in relation to potential noise impacts (especially at night), impacts on surface water and streamflow and impacts on Endangered Ecological Communities, Aboriginal cultural heritage and air quality. Additional information provided by BIM has addressed these concerns and the OEH has subsequently indicated that it is able to support the project, subject to the adoption of a range of recommendations in relation to air quality, Aboriginal heritage and biodiversity.

The **Department of Primary Industries'** (DPI) (formerly the NSW Office of Water, now part of DPI) initial submission raised concerns in relation to the adequacy of the groundwater model, the use of water from the proposed harvestable right dams and the potential adverse impacts of the project on downstream water users and the environment. Based on its assessment of additional information provided by BIM, DPI subsequently indicated its support for the project subject to the imposition of conditions in relation to on-going verification of the groundwater model, monitoring and reporting.

The **Department of Trade & Investment, Regional Infrastructure & Services** (DTIRIS) (formerly the Department of Industry and Investment) did not object to the project but indicated that the box-cut should be rehabilitated and not retained in the final landform, and that suitable mitigation measures should be implemented if acid leachate is detected in the waste rock.

The **Southern Rivers Catchment Management Authority** (SRCMA) expressed concerns that the proposed harvestable right dams would lead to a loss of surface water flows, and that the discharge of any water from the old mine workings would represent a risk to downstream water quality and users. SRCMA requested the imposition of conditions to minimise these potential impacts.

The **Sydney Catchment Authority** (SCA) did not object to the project but advised that it should be constructed and operated in a manner that does not affect the quality of ground and surface water in the Shoalhaven River catchment.

The **Roads & Traffic Authority** (RTA) did not object to the project, and indicated that the proposal would be unlikely to have a significant impact on the classified road network.

Palerang Council did not object to the project but raised concerns in relation to the reduction in environmental flows and the potential impacts of the tailings storage facility on downstream ground and surface water. Council recommended a range of conditions in relation to the planning agreement, roadworks, operating hours, landscape buffers and rainwater harvesting. The Department has considered these matters in its assessment of the project, and BIM has amended its Statement of Commitments in consideration of Council's recommendations. The Department has also included appropriate conditions to address these issues.

Eurobodalla Shire Council did not object to the application but raised concerns in relation to the potential impacts of the proposal on Eurobodalla's water supply, specifically water availability and contamination.

4.2 Community and Interest Groups

A total of 1,162 submissions (including 1,064 form letters) were received from the community and special interest groups. Of these, 1,142 objected to the project and 20 supported the project. The main grounds for support were due to the positive social and economic impacts of the project.

The main grounds for objection (in decreasing order of mention) were:

- potential impacts on ground and surface water, including:
  - the extent of groundwater impacts;
  - impacts on Spring and Majors Creek water levels;
  - impacts on downstream water users; and
  - water contamination and quality;
- concerns about the project's impact on the social fabric of Majors Creek and surrounding communities, due to:
  - the potential reduction to the area's amenity associated with environmental impacts, and
  - subsequent devaluation of properties in the area;
- noise impacts from 24 hour operations, traffic and blasting;
- impact on flora and fauna; and
- concerns over the potential increases in traffic using the local road network.

Additional concerns raised by the AVPPEC were in relation to the:

- local geology;
- previous refusals of the project by the Land & Environment Court;
- rainfall data; and
- use of chemicals (ie. xanthate) in the ore processing operations.

All of the issues raised by the community and interest groups have been considered during the Department's assessment of the project.

The Department notes that Council approved a development application for an underground mine on the site in 1984, which was appealed. The Land and Environment Court ruled the consent was invalid on procedural grounds, and therefore did not consider the merits of the case.

5 ASSESSMENT

5.1 Water

Issue

The majority of the submissions objecting to the project raised concerns about impacts of the project on water resources, including:

- the quality of water to be discharged to Spring Creek and Majors Creek and ultimately Araluen Creek, Deua River and Moruya River;
- reduction in ground and surface water flows to Spring Creek and Majors Creek; and
- impacts on downstream water users and the environment.

Consideration

The EA includes specialist ground and surface water impact assessments, undertaken by Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) and Strategic Environmental Engineering Consulting (SEEC) respectively (refer to Parts 3 and 4 of the Compendium to the EA).

The assessments included analysis of baseline information on ground and surface water resources in the surrounding area, including information on water flows/levels and quality, and assessed the potential impacts of the project on these water resources.

DPI and one public interest group (ie. AVPPEC) expressed concerns that the groundwater assessment was based on an inadequate level of supporting data. In its response, BIM noted that the groundwater model was based on comprehensive local and regional geological mapping and information gathered from extensive local drilling programs (ie. up to 350 holes). BIM undertook a sensitivity analysis on specific yield in order to account for the fact that there was a lack of long-term groundwater data.

The Department notes that the level of long-term data was typical for a "greenfield" site and is satisfied that the model incorporated appropriately conservative assumptions. However, to address any uncertainties, DPI recommended that the model be refined throughout the project to verify the predictions and inform ongoing mitigation and management measures. The Department accepts DPI's recommendation and has included a condition to ensure ongoing monitoring and verification of the groundwater model is undertaken throughout the life of the project.

In its submission, AVPPEC claimed that the rock underlying the site is not homogeneous granite, as stated in the EA, but rather contains various anomalies, including fractured sandstone bands, which would render the groundwater assessment invalid. The Department notes that no data was provided by AVPPEC to substantiate this claim and is satisfied that the geological information used in the groundwater assessment is sound.

Water Balance

A predictive water balance model was undertaken for the period from the commencement of mining operations until 5 years after the cessation of mining. The modelling was undertaken using variable climatic conditions and was revised during the course of the assessment in response to issues raised in relation to the validity of the meteorological input data. The revised predicted worst case (ie. dry years) water balance for the project is shown in **Table 2**.

Table 2: *Predicted Mine Water Balance (Worst-Case)*

Water Sources	Volume (ML/year)	Total Volume (ML/year)
Groundwater inflows into mine	126	238
Historic mine workings (ie. Snobs, Stewart & Mertons and United Miners workings)	79	
Harvestable rights dams	33	
Water Requirements		
Processing	130	215
Compensatory environmental flows	66	
Dust Suppression	19	

The water balance indicates that there would be sufficient water available to meet the project's water requirements. BIM has committed to adjusting extraction rates from the historic workings to ensure that there is no oversupply of water that would need to be discharged.

The Department is satisfied that the water balance model has incorporated the most complete and conservative rainfall data set and that the water balance predictions are robust.

Surface Water

The vast majority of the project site is situated within the uppermost reaches of the Moruya Catchment. Two small parcels of land to the north of the site lie within the Shoalhaven catchment (**Figure 5**). These parcels would not be disturbed during the project.

Spring Creek and its tributaries are located within the northern portion of the project site and merge with Majors Creek in the south of the site (**Figure 5**). Majors Creek flows from west to east across the project site, before flowing into Araluen Creek approximately 8 km to the southeast and eventually into the Deua River.

The total area of Moruya Catchment is approximately 1,490 square kilometres (km^2). The project area covers approximately 4.03 km^2, of which only 0.27 km^2 would be disturbed during the project. The project would therefore result in a very small reduction of catchment area (less than 0.02%). It is important to note that all of this land would be progressively rehabilitated, and ultimately returned to the catchment upon the completion of mining operations.

Several public submitters expressed concerns that the water proposed to be sourced from the harvestable rights dams would result in a significant increase in the volume of runoff removed from within the site. In its response, BIM indicated that the total capacity of the eight proposed dams would be within its harvestable rights under the *Water Management Act 2000*, and by definition would not represent a significant amount of "water take" from the catchment. In fact, as the current landowner of the site, it is entitled to take this water now without obtaining a water licence. BIM also indicated that most of the water under its harvestable rights would be returned to Majors Creek to compensate for the baseflow impacts of the project, and ensure that downstream water users and the environment are not adversely affected by the project.

Both DPI and the Department accepted this response and are satisfied that the project would not have a significant impact on surface water availability in the locality, and that the water supply from the harvestable rights dams is able to be managed in a manner that is consistent with the requirements of the *Water Management Act 2000.*

Numerous submitters also expressed concerns about potential adverse water quality impacts associated with the project, specifically in relation to:

- contaminated surface water runoff from the site entering the local creeks; and
- water contamination from a leak or failure of the tailings storage facility (TSF).

The proponent has indicated that the project would result in the disturbance of a relatively small portion of the site (ie. 27.3 ha) and has committed to implementing a range of standard best practice management measures to capture and treat runoff from these areas. In addition, the EA details comprehensive clean and dirty water management systems, which would be implemented during the life of the project.

The Department is satisfied that, subject to the implementation of these measures, the project can be managed in a manner that would not adversely affect local or regional water quality. The Department has recommended conditions requiring BIM to prepare a detailed Water Management Plan for the project, which would include an Erosion and Sediment Control Plan and Surface Water Monitoring Plan for the site.

OEH, AVPPEC and numerous public submitters expressed concerns about potential water contamination associated with leakage or failure of the TSF. In its response, BIM provided additional information about the acid generation potential and chemical composition of the tailings and the supernatant water quality. This information indicated that any leakage from the TSF would not present a risk to the environment or human health. However, BIM committed to implementing a monitoring program to test for leakage and constructing surface and subsurface structures to capture and return any leakage from the facility.

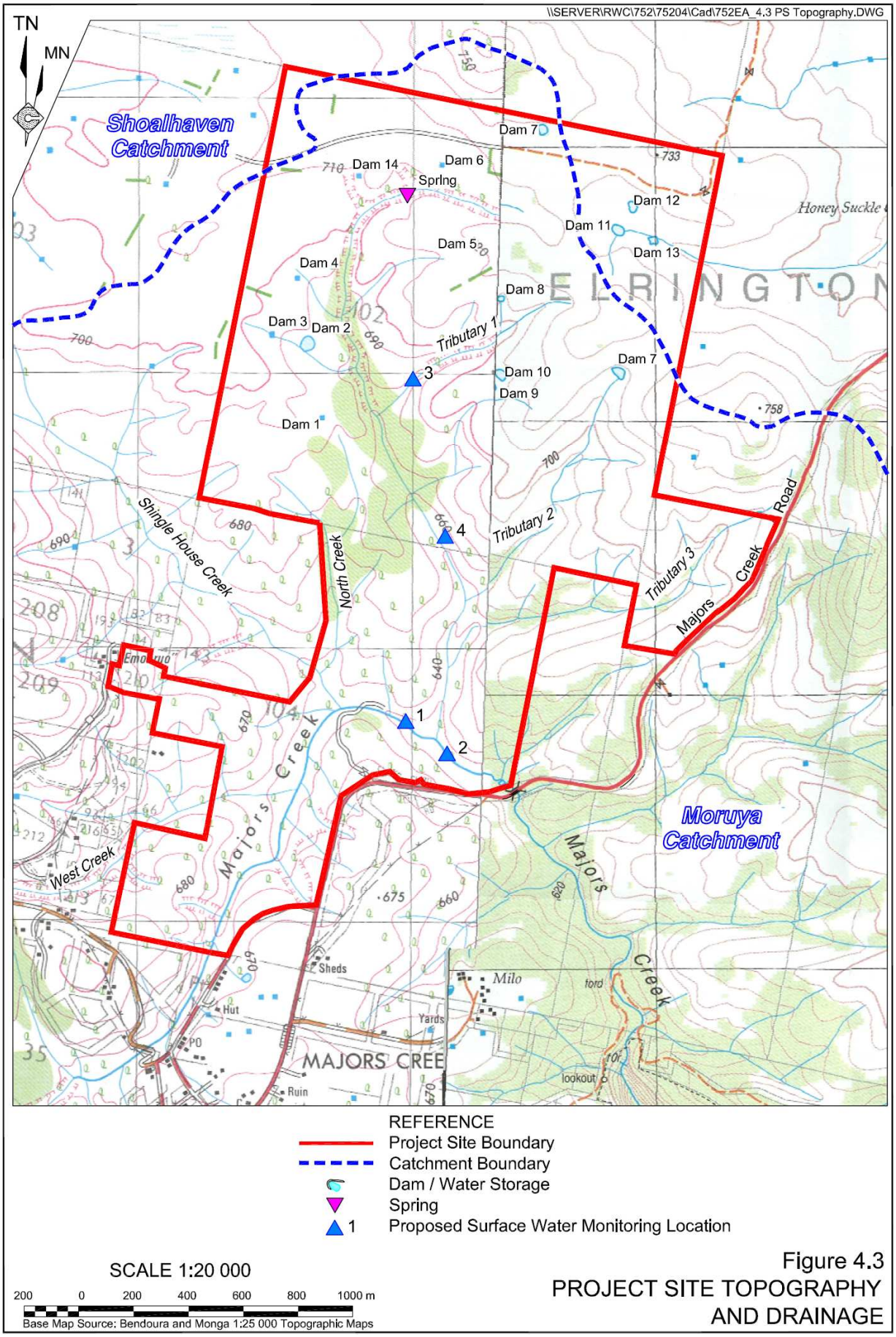

Figure 5: *Site Drainage*

To ensure the TSF has sufficient capacity and is structurally sound, OEH required that it be designed to meet the requirements of the *Environmental Guidelines – Management of Tailings Storage Facilities* (VIC DPI, 2004) and that the containment layers of the walls, floor and final capping be designed to be equivalent to 600 mm clay permeability 1 x 10^{-8} m/s. The Department has recommended a condition reflecting these standards, but has noted that an alternative permeability standard may be acceptable following the completion of a comprehensive risk assessment. In addition, the Department notes that BIM will need to comply with the dam safety requirements of the Dam Safety Committee under the *Dams Safety Act, 1978.*

Groundwater

As illustrated in **Figure 6**, the hydrogeological regime of the project site consists of a shallow alluvial aquifer along Majors Creek, a regolith aquifer extending to approximately 15 m depth and a fractured granodiorite aquifer characterised by "tight" massive granodiorite and localised permeable fracture systems.

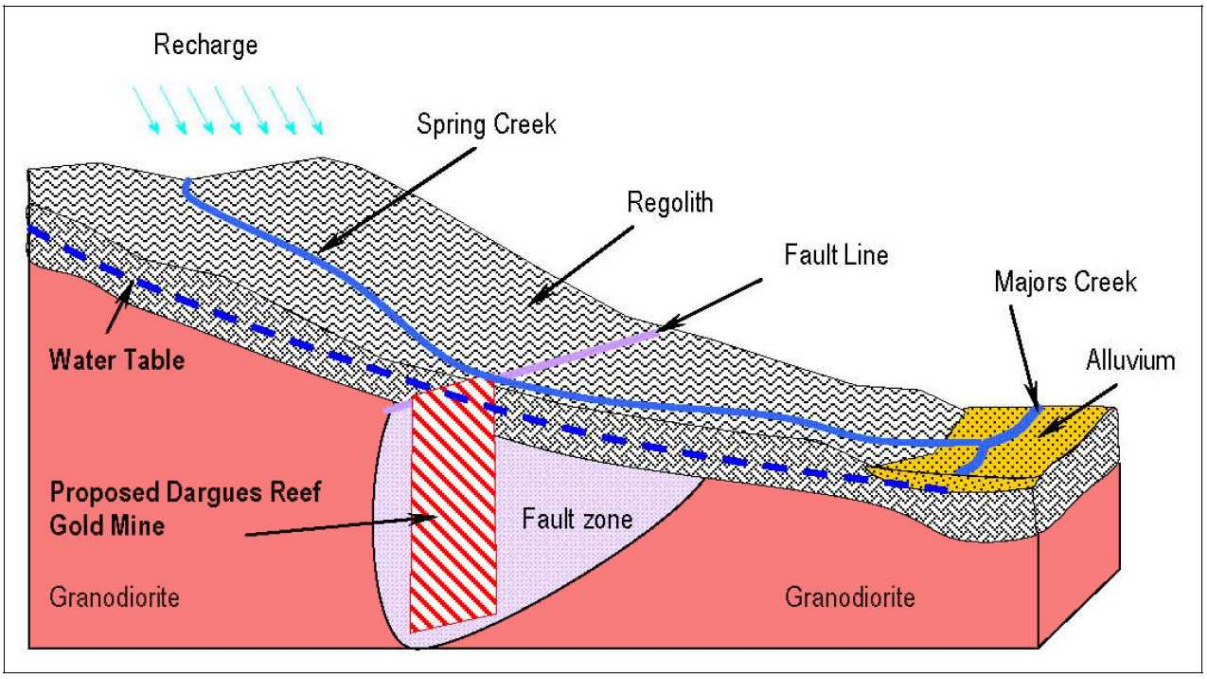

Figure 6: *Conceptual Groundwater Model*

Groundwater flow direction within the site is typically from north to south with groundwater discharge dominantly towards Majors Creek and the associated alluvium.

Groundwater within the project site also exists within historic workings associated with Snobs, Stewart & Mertons and United Miners mines which are located in the southern portion of the project site (**Figure 2**).

The groundwater model indicates that the extraction of groundwater inflow into the proposed mine and pumping of groundwater from the historic workings would result in a groundwater drawdown of 1 m extending approximately 2.5 km from the mine, including an extension of up to 1.4 km into the Shoalhaven Catchment (see **Figure 7**).

The groundwater assessment indicated that two privately owned bores are located within the predicted 1 m drawdown contour. The standing water levels and yields from these bores are predicted to decrease as a result of the project. An additional 5 bores are located within the vicinity of the 1 m drawdown contour and may be impacted.

Modelling indicates that groundwater levels are expected to be fully recovered within 5 years of the completion of mining.

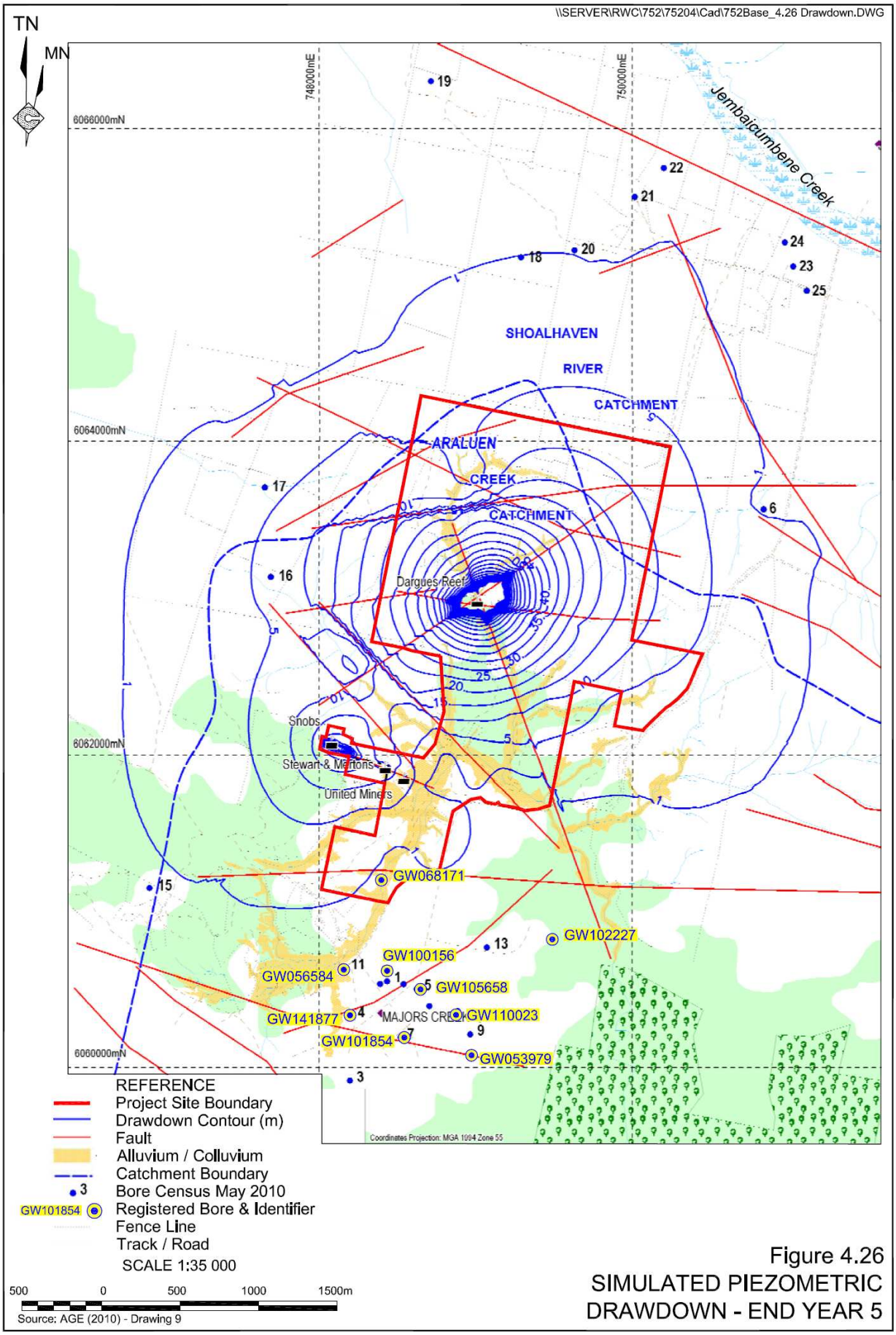

Figure 7: *Predicted Groundwater Drawdown at the end of Mining*

BIM has committed to provide compensatory water supplies to any landowner whose water entitlements are adversely affected by the project. The Department supports this commitment, and has recommended conditions to ensure this occurs.

AVPPEC and several public submitters expressed concerns in relation to adverse impacts on groundwater dependent ecosystems (GDEs) and downstream groundwater users in the vicinity of Araluen Village. In its response, BIM indicated that the extent of anticipated groundwater drawdown would not impact on the Araluen escarpment or potential springs or GDEs downstream of that escarpment (see **Figure 8**).

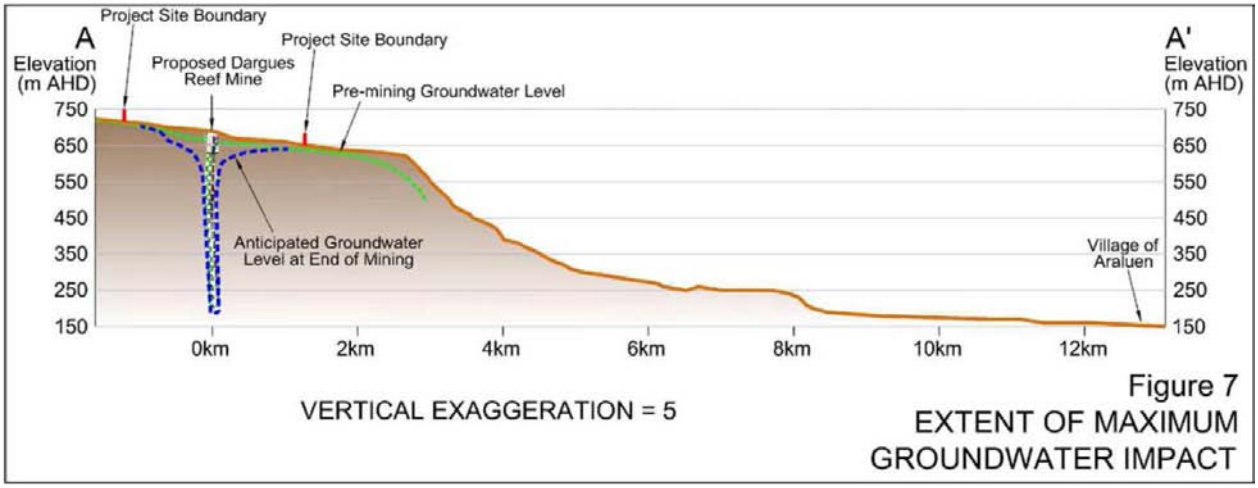

Figure 8: *Extent of Maximum Groundwater Impact*

DPI and the Department are satisfied that the extent of groundwater drawdown associated with the project is limited and would not result in regional impacts.

Groundwater modelling also indicated that the project would reduce the groundwater discharges (ie. baseflow) to local creeks, including a:

- maximum reduction of 1.7 L/sec (Litres per second) (ie. 38%) in baseflow to Majors Creek at the completion of mining;
- total loss (ie. 0.3 L/sec) in baseflow to Spring Creek during the life of the mining operations; and
- maximum reduction of 0.1 L/sec (ie. 10%) in baseflow to the granodiorite aquifer during the life of the mining operations.

BIM has committed to compensating for this loss of baseflow by ensuring a maximum of 2.1 L/sec (ie. 66 ML/year) of water is released at the confluence of Majors and Spring Creeks from the commencement of mining operations until 2 years after the completion of dewatering operations, or once baseflow losses are <1 L/sec. This is considered the level at which anticipated impacts would be neither measureable nor significant.

DPI has indicated its support for this approach and believe it will adequately mitigate the predicted impact of reduced baseflows to the local surface water system as a result of the project.

The Department is satisfied that the predicted baseflow losses would be small and licensable, and has recommended a condition requiring BIM to offset any loss of baseflow to the surrounding watercourses via the retirement of adequate water entitlements.

BIM has indicated that the compensatory water would be sourced principally from the harvestable rights dams, which it predicts could provide sufficient water on 97% of all days during a 100-year modelling period. During worst-case situations (ie. equivalent to the driest year on record), a portion of compensatory water (ie. 33 ML) would need to be supplied from the historic Snobs, United Miners or Stuart & Mertons workings (refer to **Table 2**). The water balance shows that there would be sufficient capacity from historic workings to meet that demand even at maximum production. As previously indicated, the Department is satisfied that there is sufficient water available to compensate for baseflow losses.

Numerous public submitters expressed concerns about the quality of the water proposed to be used to compensate for the loss of baseflows. In its response, BIM noted that the water in the harvestable rights dams would contain clean surface water runoff. Water quality in the Snobs, United Miners and Stuart & Mertons workings is variable, but is equivalent to the quality of the water that it is designed to replace (ie. baseflows to Spring and Majors Creek).

The Department accepts this response and notes that, irrespective of the water source, the quality of the compensatory water would need to comply with discharge water quality criteria stipulated in the Environmental Protection Licence (EPL). The criteria would be developed taking into consideration the background water quality of the receiving water body and Australian and New Zealand Environment Conservation Council (ANZECC) Guidelines.

Conclusion
While the Department is satisfied that the project can be suitably managed to ensure there are no significant impacts on the region's surface or groundwater resources, it believes that BIM should be required to:

- keep an accurate water balance for the project;
- provide suitable compensation or compensatory measures to the owners of any privately-owned land whose water supply is adversely affected by the project;
- offset any loss of baseflow to Spring and Majors Creeks caused by the project;
- ensure any surface water discharges, including compensatory flows, from the site comply with the limits in its environment protection licence; and
- develop a comprehensive Water Management Plan for the mine in consultation with OEH, DPI and DTIRIS.

5.2 Flora and Fauna

Issue
The project would result in the clearing of 27.3 ha of primarily native-dominated pasture vegetation and disturbance to potential habitat for a number of vulnerable fauna species.

Consideration
BIM engaged Gaia Research Pty Ltd (Gaia) to undertake an ecological assessment, including flora and fauna assessments, of the project (refer to Part 2 of the Compendium to the EA). The assessment included database searches and comprehensive field surveys.

Flora
As identified in **Table 3** and illustrated in **Figure 9**, Gaia identified 9 vegetation communities and disturbed lands within the project site. The vast majority of the site (ie. 71%) is covered with native-dominated pasture species.

Table 3: *Areas of Vegetation Communities to be Cleared (ha)*

Community Type	Total Within the Project Site	Area to be Cleared Within the Project Site
Ribbon Gum Forest*	28.2	nil
Fragmented Ribbon Gum Forest*	7.1	nil
Woody weeds shrubland	30.1	0.4
Regenerating wattles	18.5	0.2
Exotic vegetation	5.6	0.2
Natural Temperate Grassland**	0.2	0.2
Native – dominated pasture	280.1	24.0
Exotic pasture	2.5	nil
Largely disturbed land	23.1	2.3
River Peppermint Open Forest	1.3	nil
TOTAL	**396.7**	**27.3**

***** Listed as an Endangered Ecological Community (EEC) under the *Threatened Species Conservation Act, 1995* (TSC Act);
** Listed as an EEC under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act).

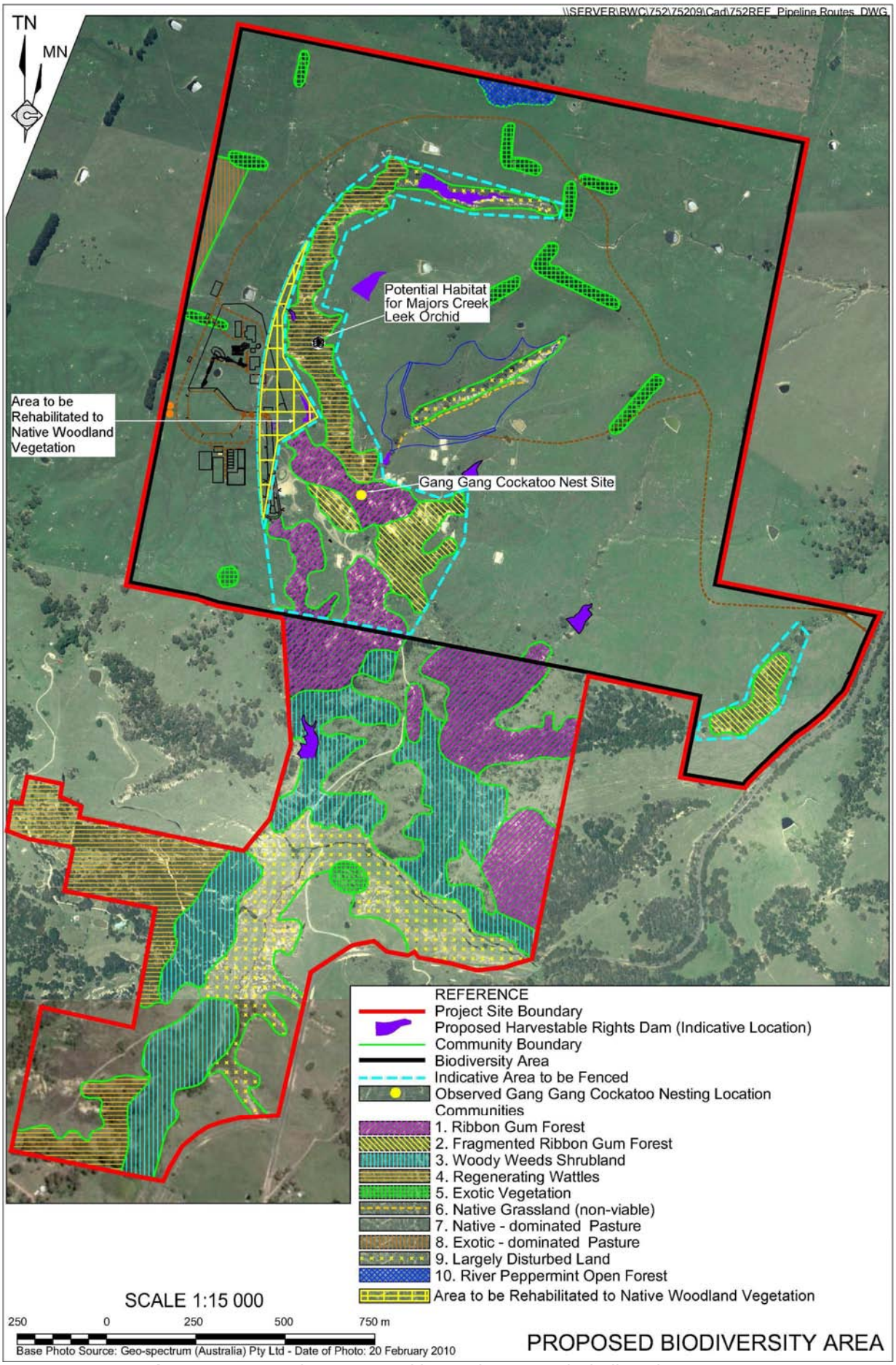

Figure 9: *Vegetation Communities and Proposed Biodiversity Area*

The project would result in the clearing of a total of 27.3 ha of the site, including 2.3 ha of largely disturbed land, 24 ha of native-dominated pasture species and 1 ha of exotic species, woody weeds shrubland and regenerating wattles. The flora assessment indicated the level of direct impact on native vegetation would be minimal and that the vegetation communities proposed to be disturbed have limited ecological value.

However, the proposal would require the clearing of a small area (ie. 0.2 ha) of Natural Temperate Grassland which is listed as an Endangered Ecological Community (EEC) under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act).

The assessment indicated that this community is non-viable because of its location adjacent to an eroding stream bank and the narrow extent of the community (ie. less than 5 m). To compensate for the loss of the Natural Temperate Grassland community, BIM has committed to regeneration of the community within the northern section of the project site as a component of the Biodiversity Offset Area (discussed below). OEH and the Department are satisfied with this approach.

BIM has also committed to avoiding any impacts to the small area of habitat along Majors Creek that was considered suitable for the Majors Creek Leek Orchid, which is listed as a Critically Endangered Ecological Community (CEEC) under the *Threatened Species Conservation Act, 1995* (TSC Act). BIM has committed to fencing the suitable habitat to ensure it is not disturbed and including the area within the Biodiversity Offset Area. OEH and the Department are satisfied with this approach.

In response to issues raised by several general public submitters and the SRCMA, the project footprint was revised to avoid any direct surface disturbance to the Ribbon Gum Forest or the Fragmented Ribbon Gum Forest communities, which were listed as Tableland Basalt Forest EEC[1] under the TSC Act.

However, DPI, OEH and the SRCMA remained concerned that the predicted groundwater drawdown associated with the project could indirectly impact on this EEC community. In its response, BIM indicated that it is unlikely that vegetation would be able to penetrate sufficiently deeply through the existing weathered granodiorite to reach groundwater and that, irrespective, the Ribbon Gum Forest vegetation species typically have roots that penetrate to between 1 to 2 m below the surface. As a result, BIM considered it unlikely that this vegetation would be reliant on groundwater and would therefore not be adversely impacted by the predicted groundwater drawdown associated with the project.

OEH has indicated that it does not agree with BIM's assessment of the potential impact on Ribbon Gum Forest communities, citing reference to several studies that state the consequences of groundwater abstraction on groundwater dependent (phreatophytic) vegetation, such as tree decline and mortality. OEH recommended that BIM should be required to prepare a Groundwater Dependent Ecosystem Management Plan prior to construction. Similarly, DPI recommended that BIM investigate the reliance on groundwater by terrestrial vegetation within the zone of drawdown prior to the commencement of mining activities.

Gaia provided additional information in relation to the significance of impact if the 35.3 ha of Tableland Basalt Forest EEC that is located within the project area is compromised by groundwater drawdown (refer to **Appendix E**). In summary, Gaia indicated that the most likely result would be stress and potential death of only the component of the tree canopy that might be reliant on the groundwater for survival. The remainder of the community would be unlikely to be affected and the dominant species (*Eucalyptus viminalis*) would readily regenerate when favourable conditions returned. Furthermore, Gaia indicated that the area of this EEC within the project area is very small when compared to its mapped extant area (ie. represents 0.33% of the mapped area).

The Department acknowledges that there is a low risk that the Tableland Basalt Forest EEC would be impacted as a result of the project and notes that BIM has committed to conserving approximately 16 ha of the EEC in the biodiversity offset (see below).

[1] Following finalisation of the EA, a broader classification of the Tableland Basalt Forest EEC was made. This re-classification incorporates several vegetation types, including Ribbon Gum Forest and the Fragmented Ribbon Gum Forest.

However, in order to address concerns raised by OEH and DPI, the Department has recommended a Biodiversity Management Plan be prepared prior to construction, which must include an assessment of the potential impacts of groundwater drawdown on groundwater dependent (phreatophytic) vegetation, including the Tableland Basalt Forest EEC and mitigation and/or offsetting measures if adverse impacts on phreatophytic vegetation are predicted.

It should be noted that on 24 January 2011, the project was determined to be a "controlled action" under the EPBC Act, requiring a separate assessment and approval by the Commonwealth Environment Minister. This determination was made based on the fact that the project would involve the alteration of ground and surface water flows to Majors Creek, which has the potential to modify the downstream habitat for the vulnerable Araluen Gum (*Eucalyptus kartzoffiana*). The Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) has subsequently visited the site and surrounding areas. While SEWPaC has not considered its assessment of the "controlled action", its preliminary assessment is consistent with the findings of the Department's assessment that the project is unlikely to have an adverse impact on the Araluen Gum community because the community is widespread in the area and situated well-outside any potential ground and surface water impacts associated with the project.

Fauna

A total of 151 vertebrate fauna species were recorded during surveys of the project area, including 2 species of fish, 7 frogs, 7 reptiles, 18 mammals and 117 species of birds. Of these species, 4 are listed as vulnerable under the TSC Act (Flame Robin, Gang-gang Cockatoo, Little Eagle and Scarlet Robin) and 2 species are listed as migratory under the EPBC Act (Black-faced Monarch and White-throated Needletail).

As indicated above, BIM has committed to avoiding clearing as much vegetation and fauna habitat as possible. This includes avoiding direct impacts on the Ribbon Gum Forest, which provides habitat for vulnerable species such as the Gang-gang Cockatoo and the Little Eagle.

In addition, to further minimise impacts on fauna, BIM propose to implement a range of reasonable and feasible amelioration measures. These include retaining fallen and dead standing timber to preserve fauna habitat within the project site and preparing a management plan to ensure wombats and other species within the proposed areas of disturbance are not harmed during site establishment operations. The Department is satisfied with these proposed mitigation and management measures.

The fauna assessment concluded that, with the implementation of these measures, the project would be unlikely to have a significant impact on any threatened species listed under the TSC Act or the EPBC Act.

Biodiversity Offset

The EA included a biodiversity offset to compensate for the clearing of 27.3 ha of land and the disturbance of a range of habitat for fauna species. A summary of the overall biodiversity offset package for the project is provided in **Table 4** and illustrated in **Figure 9**.

The offset area is located in the northern portion of the site. The total area of the offset (including the areas that would be disturbed and subsequently largely rehabilitated) is 272.1 ha which includes 245.5 ha that would not be impacted. The majority of the area is covered by native-dominated pasture.

BIM has agreed with OEH and DTIRIS that the land within the offset would continue to be predominantly used for agricultural purposes, principally grazing, however these activities would be managed in a manner that would ensure the regeneration of native grassland is consistent with the Natural Temperate Grassland EEC. This will be achieved by:

- refraining from the use of phosphate-based fertiliser;
- managing the times of the year during which grazing is permitted;
- maintaining a minimum biomass at all times; and
- collecting and spreading seed as appropriate.

Table 4: *Biodiversity Offset (ha)*

Community Type	Total Within the Biodiversity Offset Area	Area to be Cleared and Subsequently Largely Rehabilitated Within the Biodiversity Offset Area
Ribbon Gum Forest*	8.7	nil
Fragmented Ribbon Gum Forest*	7.1	nil
Woody Weeds Shrubland	nil	nil
Regenerating wattles	7.6	0.1
Exotic vegetation	5.1	0.2
Natural Temperate Grassland**	0.2	0.2
Native – dominated pasture	235.7	23.9
Exotic pasture	2.5	nil
Largely disturbed land	3.9	2.2
River Peppermint Open Forest	1.3	nil
TOTAL	**272.1**	**26.6**

***** Listed as an EEC under the TSC Act
** Listed as an EEC under the EPBC Act

BIM has also committed to fencing areas of Ribbon Gum Forest, Fragmented River Gum Forest and areas along Spring Creek (indicated as a light-blue dashed line in **Figure 9**). These areas would be subject to additional regenerative works, including:

- ameliorative plantings to re-establish the groundcover and understory vegetation within areas of Ribbon Gum Forest;
- stabilisation of eroding creek banks;
- soil stabilisation works; and
- re-establishment of vegetation within disturbed areas.

OEH, DTIRIS and DPI are satisfied that that the proposed offset strategy would adequately compensate for the flora and fauna impacts of the project. The Department has recommended conditions that require BIM to prepare a Biodiversity Offset Strategy and to make suitable arrangements to provide appropriate long-term security for the offset.

Rehabilitation

BIM has committed to progressively rehabilitating disturbed areas within the project site to provide a stable landform.

The disturbed areas would be rehabilitated to be similar to the existing landform (i.e. Class IV and V land), which would be capable of supporting grazing activities. OEH and DTIRIS are satisfied with this approach.

However, in order to provide a more substantial and sustainable area of Ribbon Gum Forest community, the Department has recommended a condition requiring a larger area to the west of the existing Spring Creek vegetation corridor to be rehabilitated to EEC quality vegetation (indicated as a yellow hashed area in **Figure 9**). The Department believes this would result in better long-term outcomes by improving the visual amenity of the project site and enhancing the habitat value of the site.

OEH raised concerns about potential seepage from the TSF post-mining and recommended that the TSF be capped during final rehabilitation to prevent surface water infiltration into the post-mining landform. In its response, BIM agreed to construct a suitable capping on the TSF. The Department agrees that the TSF should be capped and has recommended a condition to ensure this is implemented.

In addition, in order to address issues raised by DTIRIS in relation to the rehabilitation of the box cut, the Department has recommended a condition requiring BIM to rehabilitate the box cut to a landform that is generally consistent with the final landform.

Furthermore, the Department has recommended conditions requiring BIM to prepare a comprehensive Rehabilitation Management Plan. It is recommended that the Plan be prepared in consultation with the Department, OEH, DPI and the Community Consultative Committee, and to the satisfaction of the Director-General of DTIRIS. The Plan is required to include detailed rehabilitation performance and completion criteria for the progressive revegetation and re-habitation of the site.

Conclusion
The Department is satisfied that BIM has considered the potential flora and fauna impacts of the project. In order to address uncertainties about potential impacts of groundwater drawdown on groundwater dependent vegetation, the Department has recommended that BIM be required to prepare a Biodiversity Management Plan which must include an assessment of the potential impacts of groundwater drawdown on groundwater dependent (phreatophytic) vegetation.

The Department supports the implementation of a biodiversity offset and is satisfied that the offset, coupled with the proposed rehabilitation would provide a net biodiversity benefit to the area in the medium to long term.

In addition, to ensure that the offset areas are established to the satisfaction of the Director-General, the Department recommends that BIM be required to lodge a conservation bond with the Department. The size of the bond would be sufficient to cover the full cost of implementing the biodiversity offset, and would be independently verified by a suitably qualified expert.

5.3 Noise

Issue
The project has the potential to generate operational and road traffic noise impacts.

Consideration
BIM engaged specialist acoustic consultants Spectrum Acoustics Pty Limited (Spectrum) to undertake a noise assessment of the project in accordance with applicable guidelines, including the *NSW Industrial Noise Policy* (INP), OEH's *Environmental Criteria for Road Traffic Noise* (ECRTN) and *Interim Construction Noise Guideline* (ICNG) (refer to Part 1 of the Compendium to the EA).

The assessment included background noise monitoring and predictive modelling of the project's potential noise impacts.

The noise assessment is based on the adoption of a number of design and operational safeguards, including:
- placing and operating the processing plant crusher within an enclosure engineered to achieve a noise reduction of at least 12 dB;
- rubber lining the grinding circuit;
- placing and operating the ventilation fan at least 10 m below ground level;
- constructing a noise bund (at least 5 m in height) along the southern and western edges of the ROM pad; and
- limiting bulk earthworks to standard construction hours (ie. 7am to 6pm).

The Department and OEH are satisfied that these measures are reasonable and feasible and that the predictions of the noise assessment are robust, and suitably conservative.

Operational Noise
The noise assessment modelled noise generated during both the site establishment and operational phases of the project which would involve:
- construction of surface infrastructure;
- operation of a front-end loader and campaign operation of a rock breaker on the ROM Pad and temporary waste rock emplacement;
- movement of haul trucks between the box cut and the ROM pad/temporary waste rock emplacement;
- processing operations; and
- transportation of gold concentrate from the processing area to Majors Creek Road (via semi-trailer).

The noise modelling indicated that under worst-case conditions, predicted daytime and night-time site establishment noise would be below the applicable noise criteria at all residential locations with the exception of one residence (Residence R31 – P. & L. Matthias) where the noise levels would be equivalent to the criteria.

Worst-case noise levels predicted to be emitted from the site during mining operations would be below the project specific noise criteria at all residential locations. Similarly, predicted sleep disturbance (maximum) noise levels under worst case night-time conditions are predicted to be below the applicable criterion.

A significant number of submissions from the community surrounding the site identified noise-related impacts, particularly during the evening and night-time periods, as an issue of concern. In recognition of the level of concern, in its response, BIM committed to restricting crushing operations (including the operation of the associated front-end loader) to 7am to 7pm, 7 days per week (with the exception of 20 days per year). The Department supports this commitment and has recommended a condition to ensure it is adhered to.

Road Noise

The noise assessment predicted that a contribution of 10 heavy vehicle movements per hour would provide for a $L_{Aeq(1\ hour)}$ traffic noise contribution of 50 dB(A). This is 5 dB below the day-time traffic noise criterion and equivalent to the evening criterion. However, the Department notes that BIM has committed to allowing a maximum of 4 heavy vehicle movements to exit the site per hour (6 fewer than modelled). As a result, the project is not predicted to result in unacceptable traffic noise levels at residences along the transport route.

Conclusion

The Department and OEH are satisfied that BIM has assessed the potential noise impacts of the project in accordance with relevant OEH guidelines, and appropriately considered reasonable and feasible noise mitigation measures.

The Department is satisfied that, with the implementation of mitigation measures, the project would comply with the applicable noise criteria.

In order to further minimise noise impacts associated with the project, the Department believes that BIM should also be required to:

- comply with relevant operational and traffic noise criteria;
- undertake additional noise mitigation measures where monitoring indicates an exceedance of the noise limits; and
- prepare and implement a Noise Management Plan for the Project detailing noise mitigation measures and including a noise monitoring program.

5.4 Blasting and Vibration

Issue

The project has the potential to result in blasting impacts (ie. noise and vibration) to nearby residences.

Consideration

BIM engaged Spectrum Acoustics Pty Limited (Spectrum) to undertake a blasting assessment for the project (refer to Part 1 of the Compendium to the EA). The assessment included predictive modelling of peak overpressure and vibration levels from blasts associated with the proposed mine.

Blasting noise and vibration has the potential to affect residents and private property in two main ways:

- structural damage to homes, buildings and property improvements; and/or
- annoyance and discomfort, or 'amenity impact'.

In order to ensure that blasting operations associated with the project comply with both damage and amenity impact criteria at all residences in the vicinity of the mine, BIM has committed to ensuring that:

- all blasts are designed by a suitably qualified and experienced blasting engineer; and
- the Maximum Instantaneous Charge (MIC) of each blast is limited to 105 kg.

Construction of the box cut requires surface blasting, which has the potential to produce both air blast overpressure (ie. noise) and ground vibration. Once the box cut has been formed, all blasting would be undertaken underground and air blast overpressure impacts would not be generated. The assessment undertaken by Spectrum indicated that a MIC of 105 kg within the box cut would result in an air blast overpressure of 115dB(A) (equal to the standard air blast criteria) and a ground vibration of 0.5mm/sec (significantly less than the standard day-time criterion of 5mm/sec) at the nearest privately owned residence. The instantaneous charge required for underground operations is significantly less than for surface blasting. Therefore, Spectrum concluded that the ground vibration from underground blasting would be several orders of magnitude less than 0.5mm/sec.

The Department is therefore satisfied that both surface and underground blasting can be undertaken within standard blast criteria.

BIM proposes to undertake surface blasting between 9am and 5pm Monday to Saturday, and underground blasting 24 hours per day, 7 days per week. However, OEH has recommended all blasting be restricted to between 9am and 5pm Monday to Friday.

The Department agrees with OEH that all surface blasting should be restricted to standard hours and has recommended a condition to ensure this occurs. However, since vibration associated with underground mining is predicted to be well below the strict night-time criteria of 1mm/sec, the Department is satisfied that underground blasting can be undertaken 24 hours per day, 7 days per week without adversely affecting the amenity of surrounding landowners, the nearest of which is located 750 metres from the site.

Furthermore, the Department has recommended conditions to ensure that the owners of privately owned land in the vicinity of the project can request property inspections prior to the commencement of blasting and, in the unlikely event of any blast-related damage occurring, BIM must repair this damage.

Conclusion
The Department accepts that blasting operations can feasibly be managed to meet the applicable criteria by reducing MICs and applying other blast management techniques. The Department is therefore satisfied that any blasting would not significantly affect surrounding landowners. The Department has recommended conditions requiring BIM to:

- manage blasting operations to comply with all relevant criteria at private properties;
- limit surface blasting to between 9am and 5pm, Monday to Friday;
- provide for structural property inspections and investigations upon request; and
- prepare and implement a detailed Blast Management Plan for the project.

5.5 Air Quality

Issue
The project would generate dust from site establishment, processing and transportation activities.

Consideration
BIM engaged PAEHolmes to undertake an air quality assessment for the project in accordance with OEH's *Approved Methods for the assessment of air pollution sources using dispersion models* (refer to Part 7 of the Compendium to the EA).

This assessment modelled the total suspended particulates (TSP), particulate matter (PM_{10}) and dust deposition for year 3 of the project (ie. the year of greatest material movement and production) when operating in isolation and as well as with background dust levels considered.

The results of this modelling are based on the assumption that BIM would implement a range of measures to control dust generation, including:

- disturbing only the minimum area necessary for site operations;
- watering all disturbed areas, ore handling areas and roads;
- using the largest size truck practical to minimise the number of movements for ore transport;
- contouring the final landform shape in a way that reduces wind turbulence; and
- rehabilitating disturbed areas as soon as practical.

A summary of the predicted worst-case modelled air quality emissions is provided in **Table 5**.

Table 5: *Predicted Maximum Air Quality Emissions*

	OEH Criterion	Maximum Predicted Air Quality Emission at a Privately Owned Residence	
		Project Only	Cumulative Emissions
Annual average dust deposition (g/m^2/month)	4	0.11	2.5
Maximum 24-hour average PM_{10} ($\mu g/m^3$)	50	8	-
Maximum annual average PM_{10} ($\mu g/m^3$)	30	1.1	22
Maximum annual average TSP (($\mu g/m^3$)	90	1.3	54

The air quality modelling predicted that dust emissions generated by the project would comply with all relevant dust criteria at privately owned residences when it is considered in isolation and when its emissions are added to existing background air quality levels.

During the assessment process, OEH was concerned that the air quality impact assessment did not consider the potential emissions of the gold smelting process, in accordance with the requirements and standards in the *Approved Methods for Modelling and Assessment of Air Pollutants in New South Wales 2005* guideline.

In response, BIM provided a detailed description of the smelting process and indicated that it would generate small amounts of sulphur dioxide (approximately 0.3% of emissions), and oxides of nitrogen. It also committed to install suitable controls to ensure the project complies with the relevant limits for these pollutants in the *Protection of the Environment (Clean Air) Regulation 2010.*

The Department is satisfied that the environmental risk of the smelting process generating unacceptable impacts is very small, and that suitable mitigation measures can be implemented to ensure compliance with the relative limits. Nevertheless, it has recommended that BIM be required to prepare a detailed assessment of the potential emissions of the smelting process, and demonstrate that the emissions would comply with the relevant limits in the *Protection of the Environment (Clean Air) Regulation 2010* prior to the commencement of any construction on site.

Conclusion
While the Department is satisfied that the project can be suitably managed to ensure there are no significant air quality impacts on surrounding privately owned residences, it believes that BIM should be required to:

- comply with contemporary air quality criteria;
- implement best practice air quality management on site; and
- prepare and implement a detailed Air Quality & Greenhouse Gas Management Plan for the project.

5.6 Transport

Issue
The project would increase the level of traffic on the local road network.

Consideration
The EA includes a transport impact assessment of the project, carried out by Transport and Urban Planning (TUP) (see Part 6 of the Compendium to the EA). The assessment considered potential site establishment and operational road traffic impacts.

During site establishment, the project would generate an average of 36 vehicle movements (to and from the site) per day, including 30 light vehicles and 6 heavy vehicles. During operation, the project would generate an average of 38 traffic movements per day, including 20 light vehicles and 18 heavy vehicles.

The additional traffic volumes associated with the project represent an increase of between 3.1% and 5.6% on all roads, with the exception of Majors Creek Road where the traffic volumes would increase by 11.3%. This is equivalent to 10 vehicles per hour, primarily during shift changes. The proportion of heavy vehicles using the road network would increase by 1%, with the proportional increase on Majors Creek Road being comparatively larger at 5%.

The traffic assessment concluded that these increases in traffic volumes are small and would have a very minor impact on existing traffic conditions on the local road network. The assessment confirmed that all affected roads would continue to operate at a good level of service (Level of Service A).

Numerous public submissions and Council raised concerns about project-related heavy vehicles and potential conflicts with local school bus operations. In its response, BIM committed to:

- operating a bus to take shift mine workers to and from work each day;
- restricting all heavy vehicle movements to or from the site between 7am - 8.30am and 3pm - 5pm on school days to avoid any potential conflict with the local school bus services; and
- restricting proponent-controlled heavy vehicle movements to between the hours of 7am to 10pm.

The Department and Council support these commitments and the Department has recommended conditions to ensure they occur.

In addition, BIM has reached an agreement with Council for the provision of funding for ongoing road maintenance works. Council is satisfied with the details of the agreement and the Department has recommended a condition to ensure the agreement is formalised.

The project includes the construction of an intersection between a new site access road and Majors Creek Road, approximately 9.3 km south of Araluen Road. BIM has committed to design and construct the intersection to RTA standards for a Basic Rural intersection with sight distances that would exceed the minimum safe intersection sight distance requirements for the posted speed limit of 100km/hour. Council requested that the intersection be upgraded to include provision of AUR/AUL treatments and an acceleration lane from the intersection uphill towards Braidwood.

In its response, BIM noted that, in light of the small traffic volumes on Majors Creek Road and the small future traffic volumes attributed to the project, these intersection treatments are unwarranted. BIM indicated that the maximum hourly traffic generated by the mine would be 20 light vehicles during shift change over times (ie. 1 vehicle every 3 minutes) and 1 heavy vehicle per hour. In order to justify the RTA's standard for an AUR/AUL treatment on rural roads, BIM indicate that these traffic volumes would need to be in the order of 10 times greater (ie. between 180 to 300 vehicles per hour).

Council also indicted that the intersection should be upgraded due to the intersection being on a 6% grade and the potential delays to motorists travelling behind trucks. BIM indicated that the delay for motorists travelling the 500 metres from the project site to the top of the hill on Majors Creek Road is between 23 to 47 seconds.

The Department agrees that the proposed intersection is likely to be adequate given the low existing and proposed future traffic volumes. However, in order to ensure the intersection operates adequately and that local traffic is not adversely affected by project-related traffic, the Department has recommend that BIM prepare and implement a Traffic Management Plan to monitor traffic movements and implement additional management measures if motorists are being unreasonably delayed.

Conclusion

The Department is satisfied that with the implementation of the above measures, the project is unlikely to have a significant impact on the safety or capacity of the surrounding road network.

To ensure this is the case, the Department has recommended conditions requiring BIM to:

- prepare a Traffic Management Plan;
- operate a bus to take shift mine workers to and from work each day;
- restrict all heavy vehicle movements to or from the project site to outside of school bus hours;
- limit the dispatch of concentrate from the site to the hours between 7am to 10pm Monday to Saturday and 8am-10pm Sundays and Public Holidays; and
- ensure reasonable and feasible measures are implemented to minimise the project's contribution to the traffic on affected roads.

5.7 Visual

Issue

The project has the potential to impact on the visual amenity of the locality.

Consideration

The project site is visible from residences to the south-east, south and south-west and from the users of Majors Creek Road. To mitigate the project's visual impacts to sensitive receivers, BIM proposes to:

- construct and vegetate a 5 m high bund around the southern and western edge of the ROM pad;
- progressively reshape and rehabilitate areas of the site that are no longer required for mining purposes;
- continue the existing tree planting program;
- construct site infrastructure from non-reflective, neutral-coloured materials; and
- position and direct lighting to minimise excessive night glow.

Council and several community and special interest group submissions raised concerns about the reduction in visual amenity as a result of the project. In its response, BIM committed to implement additional visual mitigation measures (such as landscaping treatments or vegetation screens) at the residences which would have direct views of any mining operations. The Department accepts this approach and has recommended a condition to ensure that it is implemented.

Conclusion

The Department is satisfied that impacts associated with the project would be short-term (ie. 5-7 years) and that, with the implementation of appropriate mitigation measures, the visual impacts associated with the project would not be significant.

5.8 Other Issues

The assessment raised several other key issues that are addressed in **Table 6** below.

Table 6: *Assessment of Other Key Issues*

Issue	Consideration	Conclusion
Socio-economic	The project would result in the employment of 100 people during site establishment and 80 during operation. It would inject an annual economic contribution of $3-$7 million to the regional economy, $10-$31 million to the State and national economies, and $1-$8 million per year to the local, State and national economies through taxes, royalties and rates. In addition, BIM has agreed to pay Council $997,000 for road upgrade works and community infrastructure improvements and an additional $78,000 per annum for road maintenance works. Several public submitters and interest groups raised concerns that the project would decrease property values in the surrounding area. In its response, BIM reiterated the economic benefits to the local community associated with the project and indicated that impacts to the community would be minimised to the greatest extent practicable and are unlikely to adversely affect property prices. The Department notes that there is no evidence to support the view that the project would result in decreased property values and believes that if property values are affected, impacts would be short-term (ie. 5-7 years).	The Department is satisfied that the project would result in socio-economic benefits to the local and regional community.
Aboriginal Heritage	The EA contains an Aboriginal Heritage Assessment undertaken by Archaeological Survey & Reports Pty Ltd (ASR) (refer to Part 5a of the Compendium to the EA). The assessment identified five Aboriginal heritage sites within the project area, including 3 open scatters and 2 isolated artefact finds. ASR indicated that none of the sites are of local, State or national significance. BIM committed to slightly redesigning the TSF to avoid direct impact on one of the sites. None of the other sites would be impacted by the project, however one site is located in relatively close proximity to the proposed transmission line. BIM committed to implementing management and mitigation measures to minimise future impacts on this and the other sites, including erecting a fence around the 2 sites in the vicinity of infrastructure and limiting activities in the vicinity of the other identified sites. OEH requested that all identified sites be fenced to avoid inadvertent access and disturbance to any of the sites. The Department has accepted OEH's advice and has recommended a condition to ensure it is implemented.	The Department is satisfied with the level of assessment undertaken in relation to Aboriginal heritage and the mitigation measures and management procedures proposed. Nevertheless, the Department has recommended a condition requiring BIM to fence the identified sites and prepare and implement an Aboriginal Heritage Management Plan in consultation with OEH and the Aboriginal Community.

Issue	Consideration	Conclusion
Heritage	The EA contains a Non- Aboriginal Heritage Assessment undertaken by ASR (refer to Part 5b of the Compendium to the EA). The assessment identified a number of heritage items within the project site that are representative of previous mining activities. These include ceramic fragments, dredge shelves, puddling holes, magazines and water races. The assessment found that all identified items have no heritage significance and, with the exception of the water races, none would be disturbed. The water races are not considered to be significant, and extensive examples of such races remain within the project site.	The Department is satisfied with the level of assessment undertaken in relation to heritage and is satisfied that the project would not have any adverse impacts on items of heritage significance.
Greenhouse Gases	The EA contains a Greenhouse Gas (GHG) Assessment undertaken by PAEHolmes (refer to Part 7 of the Compendium to the EA). The assessment predicts that a total of 240,752 tonnes carbon dioxide equivalent (tCO_2-e) would be generated over the life of the project. The maximum annual increase of emissions would be in year 3 of the project and would represent an approximate annual contribution of 0.03% to baseline 2007 NSW emissions. The vast majority of the project-related emissions are attributed to Scope 2 emissions associated with the consumption of purchased electricity. The assessment concludes that, on a comparative basis, the total GHG emissions from the project represent a very small proportion of the current and global GHG emissions, and when considered in isolation, the project would have a negligible contribution to global warming/climate change.	The Department accepts that the GHG emissions predicted to be generated by the project are minor. However, the Department has recommended conditions requiring BIM to implement measures to minimise the release of GHG and to prepare and implement an Air Quality & Greenhouse Gas Management Plan.
Bushfire Hazard	The project site contains and is surrounded by woodland and open forest vegetation which is categorised as 'high' bushfire risk. Therefore the threat of bushfire within the project site and on adjacent lands would be high if appropriate management measures are not adopted. BIM committed to the implementation of fire controls and safeguards, including: • undertaking refuelling within cleared areas of the site; • enforcing a no smoking policy in designated areas; • maintaining fire extinguishers within site vehicles and refuelling areas; and • providing the NSW Rural Fire Service with access to all site water storages in the event of a bushfire threatening the project site.	The Department is satisfied that the implementation of the proposed safeguards and controls would mitigate bushfire risk to an acceptable level. To ensure these measures are implemented, the Department has recommended a condition requiring BIM to prepare and implement a Bushfire Management Plan in consultation with the Rural Fire Service.
Waste	Waste rock generated during the life of the project would be utilised for construction of site roads, the ROM pad and the TSF. There would be no waste rock surplus. Approximately 52 tonnes of general non-production waste material would be generated as a result of the project per year. In response to issues raised by Council in relation to limited landfill space at the Majors Creek waste facility, BIM committed to disposing all project-related non-production waste at an alternative approved waste facility.	The Department has recommended conditions requiring BIM to minimise and manage the waste generated by the project. In addition, the Department has recommended that BIM be required to prepare and implement a Waste Management Plan for the project.

6 RECOMMENDED CONDITIONS

The Department has prepared recommended conditions of approval for the project (see **Appendix F**).

These conditions are required to:
- prevent, minimise, and/or offset adverse impacts of the project;
- set standards and performance measures for acceptable environmental performance;
- ensure regular monitoring and reporting; and
- provide for the ongoing environmental management of the project.

BIM has considered and accepted both the proposed format of the approval instrument and the conditions as recommended.

7 CONCLUSION

The Department has carried out a detailed assessment of the merits of the project, in accordance with the requirements of the *Environmental Planning & Assessment Act 1979* (EP&A Act).

This assessment has found that, despite the residents of Majors Creek being in relatively close proximity to the mine, the project would not result in significant noise, traffic, dust or visual amenity impacts. However, the project would require the clearing of 27.3 ha of land and may impact on local ground and surface water resources.

The Department has recommended a range of conditions to ensure that these impacts are suitably mitigated, managed and/or offset. These conditions include requirements for BIM to:
- offset any loss of any baseflow to the surrounding watercourses;
- implement additional measures to minimise the dust, noise, blasting and visual impacts of the project;
- develop and implement a biodiversity offset to ensure the project maintains and potentially improves the biodiversity values of the region in the medium to long term;
- conserve the proposed offset biodiversity area in perpetuity;
- progressively rehabilitate the site;
- pay Council $997,000 for road upgrade works and community infrastructure improvements and an additional $78,000 per annum for road maintenance works;
- monitor and regularly report on its environmental performance; and
- commission independent audits of its operations, to ensure that it is complying with its conditions of approval and implementing best practice on site.

The Department's assessment has also found that the project would provide economic and social benefits to both the region and NSW, including:
- employment for up to 100 employees (during site establishment) and 80 employees (during operation);
- a capital investment of $42 million; and
- royalties and payroll taxes for the State Government.

On balance, the Department believes that the project's benefits sufficiently outweigh its residual costs and that it is in the public interest and should therefore be approved subject to strict conditions.

8 RECOMMENDATION

It is RECOMMENDED that the Planning Assessment Commission:

- **consider** the findings and recommendations of this report;
- **approve** the project application, subject to conditions; and
- **sign** the attached instrument of project approval (see **Appendix F**).

10/5/11

David Kitto
Director

15. 5. 11

Chris Wilson
Executive Director

20/5/11

Richard Pearson
Deputy Director-General

Sam Haddad
Director-General

7/6/2011

APPENDIX A – ENVIRONMENTAL ASSESSMENT

See attached CD-ROM entitled *Dargues Reef Gold Project: Environmental Assessment and Specialist Consultant Studies Compendium.*

APPENDIX B – ENVIRONMENTAL PLANNING INSTRUMENTS

State Environmental Planning Policy (Major Development) 2005
See discussion in Section 3.1.

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP)
Part 3 of the Mining SEPP lists a number of matters that a consent authority must consider before determining an application for consent for development for the purposes of mining, including:

- compatibility with other land uses;
- natural resource management and environmental management;
- resource recovery;
- transport; and
- rehabilitation.

These matters do not have to be considered when determining major projects. However, the Department has considered all of these matters in its assessment report, where appropriate. Based on this assessment, the Department is satisfied that the project is able to be managed in a manner that is generally consistent with the aims, objectives and provisions of the Mining SEPP.

State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP)
Under clause 45 of the Infrastructure SEPP, development in the vicinity of an electricity supply easement is required to be referred to the electricity supply authority for comment. Country Energy made a submission on the project, identifying that the project is not expected to result in any significant impacts to electricity supply infrastructure.

In accordance with clause 104 of the SEPP, the application was referred to the RTA, which subsequently confirmed that it does not object to the project (see assessment report).

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33)
The Department is satisfied that the project is not potentially hazardous or offensive, and that the proposal is generally consistent with the aims, objectives and provisions of SEPP 33.

State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44)
The EA states that the project site contains potential Koala habitat (as defined by SEPP 44), however, no evidence of Koala activity, either direct observation or indirect evidence (such as scats or scratches on tree trunks) was recorded within the project site. The EA also states that as a result of previous clearing within the project site, Koala are unlikely to occur and as such, SEPP 44 does not apply to the project. The Department accepts that the project site contains potential Koala habitat and is satisfied that the proposal is generally consistent with the aims, objectives, and requirements of SEPP 44. As such, the Department is satisfied that the project would be unlikely to impact on Koalas.

State Environmental Planning Policy* No.55 – Remediation of Land *(SEPP 55)
SEPP 55 is concerned with the remediation of contaminated land. It sets out matters relating to contaminated land that a consent authority must consider in determining an application for development consent. BIM indicated that it is not aware of cyanide or mercury being used during previous mining operations and that as a result, disturbance or ongoing management of contaminated material as a result of the project is not anticipated.The Department has considered the matters in SEPP 55 and the information in the EA and is satisfied that the land can be used for mining purposes.

Tallaganda Local Environmental Plan 1991
The land subject to the application is zoned 1(a) (General Rural) under the *Tallaganda Local Environmental Plan 1991*. Mining is permissible in this zone with consent.

APPENDIX C – SUBMISSIONS

See attached CD-ROM entitled *Dargues Reef Gold Project: Submissions.*

APPENDIX D – RESPONSE TO SUBMISSIONS

See attached CD-ROM entitled *Dargues Reef Gold Project: Response to Submissions.*

APPENDIX E – ADDITIONAL INFORMATION

See attached CD-ROM entitled *Dargues Reef Gold Project: Additional Information.*

APPENDIX F –RECOMMENDED CONDITIONS OF APPROVAL

APPENDIX G – SUMMARY OF CONDITIONS OF APPROVAL

Aspect	*Condition*	*Requirement*
Schedule 2: Administrative Conditions		
Minimising Harm	1	Obligation to minimise harm to the environment
Limits on Approval	5	Approval for mining restricted to March 2018
	6	Restriction on production to 355,000 tonnes of ore per year, and 1.2 million tonnes of over the life of the project
Planning Agreement	11	Requirement to enter into planning agreement with Council
Schedule 3: Environmental Performance Conditions		
Noise	1	Noise impact assessment criteria
	2	Traffic noise impact assessment criteria
	3	Operating hours
	4	Noise related operating conditions
	5	Noise Management Plan
Blasting	6	Blast impact assessment criteria
	7	Restriction on blasting hours
	8-9	Rights for structural property inspections for properties potentially affected by blasting
	10	Blast related operating conditions
	11	Blast Management Plan
Air Quality and Greenhouse Gas	12-13	Requirement to minimise odour and greenhouse gas emissions
	14-15	Air quality impact assessment criteria
	16	Air quality operating conditions
	17	Air Quality and Greenhouse Gas Management Plan, and meteorological monitoring
Meteorological Monitoring	18	Requirement to operate a meteorological station
Soil and Water	19	Requirement to obtain all water licences for the project
	20-22	Requirement to secure offsets for the loss of baseflow in creeks and water discharge compliance
	23	Provision of compensatory water supplies to properties impacted by project-related drawdown
	24-25	Requirements for the permeability of onsite storages
	26-31	Water Management Plan
Biodiversity	32-34	Requirement to implement the offset strategy, and to arrange for long term security of the offset area
	35	Biodiversity Management Plan
	36	Requirement to lodge a Conservation Bond
Heritage	37	Aboriginal Heritage Management Plan
Transport	38-39	Requirement to construct roads and intersections
	40	Requirement to monitor concentrate transport
	41-42	Transport operating conditions
	43	Traffic Management Plan
Visual	44-46	Requirement to undertake visual screening on affected properties, and to minimise project's visual and lighting impacts
Waste	47	Requirement to minimise and manage waste
	48	Waste Management Plan
Bushfire Management	49	Bushfire emergency requirements
	50	Bushfire Management Plan
Rehabilitation	51	Rehabilitation objectives
	52	Requirement to progressively rehabilitate the site
	53	Rehabilitation Management Plan
Schedule 4: Additional Procedures		
Notification of Landowners	1-2	Requirement to notify landowners of entitlements, exceedances of criteria during monitoring, and potential health and amenity impacts associated with exposure to fine particulates

Independent Review	3-4	Procedures for independent review if landowners believe the project to be exceeding relevant impact assessment criteria
Schedule 5: Environmental Management, Reporting and Auditing		
Environmental Management Strategy	1	Environmental Management Strategy
Management Plan Requirements	2	Requirements for management plans
Annual Review	3	Annual Review
Revision of Strategies, Plans and Programs	4	Requirement to revise strategies, plans and programs
CCC	5	Requirement for Community Consultative Committee
Incident Reporting	6-7	Requirement to report incidents
Auditing	8-9	Requirement to undertake regular independent environmental audits
Access to Information	10	Requirement to publicly report environmental information