Section 2
Description of the Project

PREAMBLE

This section describes the proposed Dargues Reef Gold Project including:

- *the objectives of the Project;*
- *an overview of the Project and the approvals required;*
- *the infrastructure that would be established for the Project;*
- *the site preparation that would be undertaken;*
- *the proposed mining and processing operations and management of waste rock and processing tailings;*
- *ancillary activities that would be undertaken; and*
- *the proposed Biodiversity Strategy and rehabilitation of areas that would be disturbed by the Project.*

The Project is described in sufficient detail to provide the reader with an overall understanding of the nature and extent of the activities proposed, how the various activities would be undertaken and to enable an assessment of the potential impacts on the surrounding environment. The boundaries of the various components described throughout this section and dimensional information are indicative only.

The section concludes with a description of alternative feasible development options that were considered and rejected during the planning stages for the Project.

Details of the management and mitigation measures that the Proponent proposes to implement to minimise or negate the potential impacts on components of the local environment are provided in Section 4 of this document.

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2.1 INTRODUCTION

2.1.1 Project Objectives

The Proponent's objectives in constructing and operating the Dargues Reef Gold Project would be as follows.

- To safely mine the identified gold reserves.
- To operate the Project in a manner that would minimise surface disturbance and impacts on surrounding residents and the local environment.
- To implement a level of management control and mitigation measures that ensures 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 that would be determined in consultation with the local community and may include a mixture of agriculture and/or nature conservation.
- To continue to maintain an open and honest relationship with the surrounding 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 to ensure security of employment and the continued economic viability of the Proponent.

2.1.2 Project Overview and Proposed Site Layout

The Project would include the following components (**Figure 2.1**).

- 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 and power and water supply.
- Construction and use of a processing plant and office area which would include an integrated Run-of-Mine (ROM) pad/temporary waste rock emplacement, crushing and grinding, gravity separation and floatation circuits, Proponent and mining contractor 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 construction and use of 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 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 sulphide 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 sediment and erosion 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.

It is noted that during the life of the Project, the Proponent proposes to undertake additional exploration drilling to further define the identified mineralisation and identify any additional resources. Extraction of additional mineralisation does not form a part of this application. As a result, a subsequent application for approval to extract any identified mineralisation may be prepared once sufficient information is available to adequately identify the proposed activities.

2.1.3 Approvals Required

The Proponent anticipates that the following approvals will be required for the Dargues Reef Gold Project.

- Project Approval – Minister for Planning.

  Project approval will be required from the Minister for Planning for the Project under Part 3A of the *Environmental Planning and Assessment Act 1979*.
- Environment Protection Licence – Department of Environment, Climate Change and Water.

  An Environment Protection Licence for underground mining operations, mineral processing operations and use of the tailings storage facility will be required. It is anticipated that the licence will also identify licensed discharge points and discharge limits and concentrations.
- Mining Lease – Industry and Investment NSW.

  The Proponent currently holds EL6003 and ML103 over the Project Site (see Section 1.4.2). A new mining lease would be required for those sections of the Project Site not covered by ML103. In addition, any surface or depth restrictions associated with ML103 may be required to be amended or covered by the new lease.

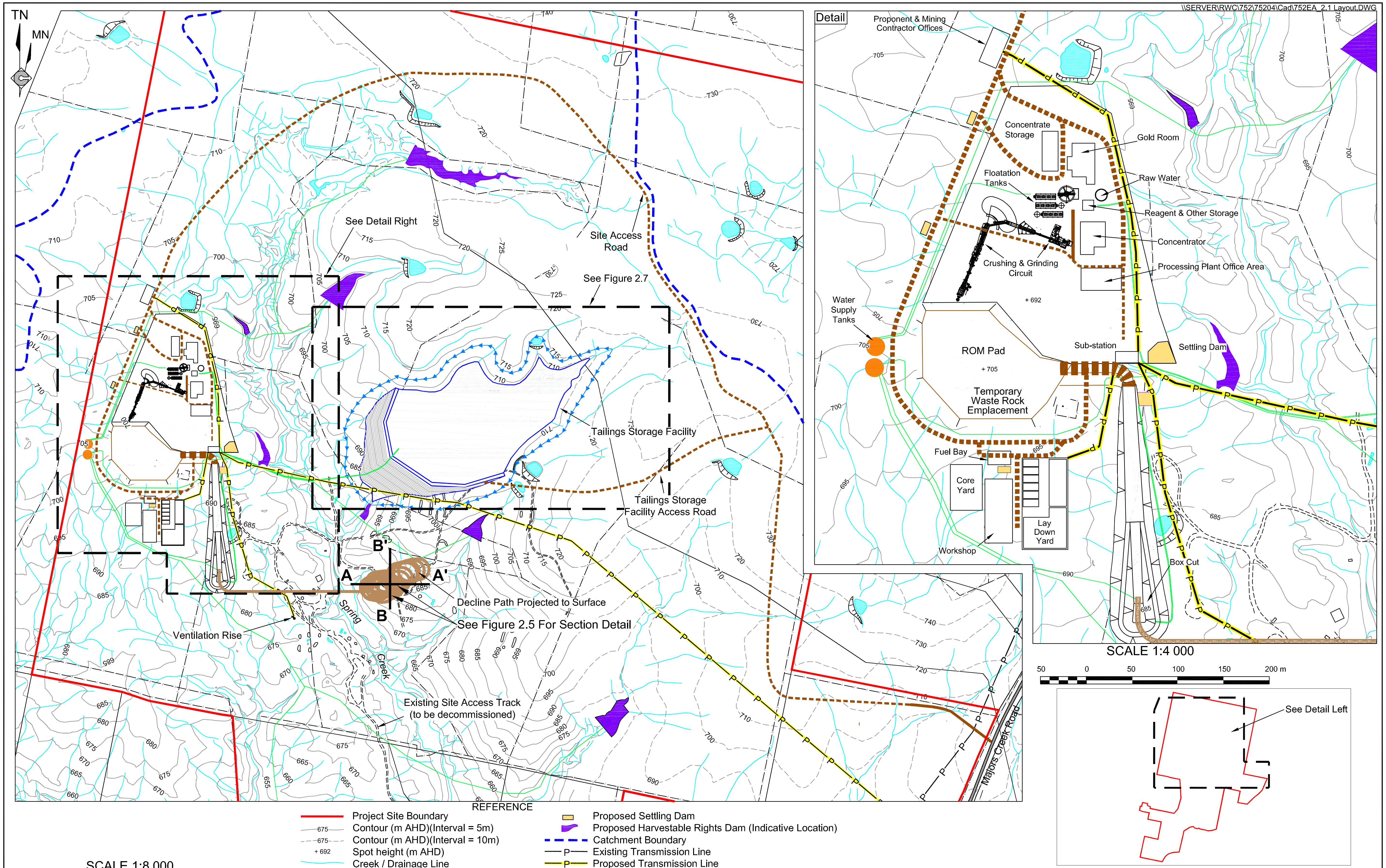

Figure 2.1
PROJECT SITE LAYOUT

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- Water Licence/Water Access Licences - Department of Environment, Climate Change and Water – Office of Water.

  A licence under the Water Act 1912 or a Water Access Licence under the *Water Management Act 2000* will be required to permit dewatering of the proposed underground mining operation. In addition, one or more additional Water Access Licences will also be required to permit extraction of water from the historic Snobs, Stewart and Mertons and United Miners workings in the southern sections of the Project Site.

- A Section 138 Permit – Palerang Council.

  A permit or deed under Section 138 of the *Roads Act 1993* would be required for the construction of the intersection of the site access road and Majors Creek Road.

- Dam Safety Approval – Dam Safety Committee.

  An approval from the NSW Dams Safety Committee will be required for the design and construction of the tailings storage facility.

- Explosives Storage and Use Licence – WorkCover Authority NSW.

  A licence issued by the WorkCover Authority of NSW for the storage and use of explosives. It is noted that such a licence will be granted only when Industry and Investment NSW approves a Security Plan for the storage and handling of explosives (including explosive precursors).

- High Voltage Connection Agreement - County Energy.

  A high voltage connection agreement will be required to permit connection of the proposed electricity transmission line to the existing transmission grid from Country Energy which holds an electricity distributor's licence under the *Electricity Supply Act 1995*.

In addition, if project approval is granted, subsequent approvals would be required in accordance with the *Rehabilitation and Environmental Management Plan* requirements of the *Mining Act 1992* and mining lease conditions.

The Proponent understands that further approval will not be required for the harvesting of surface water within the Project Site as the Proponent would ensure that the total volume of surface water storage is less than or equal to the Proponent's harvestable right (see Section 2.2.5).

2.2 INFRASTRUCTURE ESTABLISHMENT

2.2.1 Introduction

This sub-section provides an overview of the infrastructure that would be required to be constructed during the establishment phase of the Project. This would include the following.

- A 22kV electricity transmission line, substation and distribution network.
- A site access road and intersection with Majors Creek Road.
- Surface water and groundwater harvesting structures.

In addition, Proponent would also construct a box cut, decline, underground mine, temporary waste rock emplacement, processing plant, tailings storage facility and associated infrastructure. The design, construction and operation of these components is described in Sections 2.4 to 2.7.

2.2.2 Electricity Transmission Line, Substation Distribution Network

A 22kV electricity transmission line would be constructed to provide power for the processing plant, underground mine, offices, workshop and other sections of the Project Site (**Figure 2.1**). The transmission line would be connected to the existing 22kV transmission line owned and operated by Country Energy in the eastern section of the Project Site.

The transmission line would be constructed during the site establishment phase of the Project and would be constructed entirely on land owned by the Proponent. It is expected that the transmission line would be located on land currently subject to Mining Lease Application MLA 355 and will therefore be subject to NSW mining regulations for power line construction and maintenance. Where the line is constructed on land not subject to a mining lease the line would be constructed in accordance with Country Energy's *High Voltage Connection Requirements* (CEPG8079 Issue 2). Maintenance and ownership of the transmission line would remain with the Proponent.

The transmission line would comprise approximately 16 treated timber power poles, as per Country Energy's identified preference, spaced approximately 150m apart with line conductors approximately 6m to 7.3m above the natural ground surface.

In addition, the Proponent would construct and operate a 22kV to 11kV substation and transformer (**Figure 2.1**). The substation and transformer would comply with Australian Standard AS 2067 - *Switch Gear Assemblies and Ancillary Equipment for Alternating Voltages above 1kV* and would be enclosed within a 2.5m high security fence and appropriate signage would be installed.

Power would be distributed to the processing plant, offices, workshops and other areas by a combination of overhead and underground power lines (see Section 2.10.2.2).

The Proponent would also construct additional transformers within the Project Site to further reduce the voltage to 1 000V, 415V and 240V for use within various sections of the Project Site.

Finally, it is noted that during construction operations, until such time as the transmission network is commissioned, silenced diesel generators may be used to provide the required power for site operations.

2.2.3 Site Access Road and Intersection

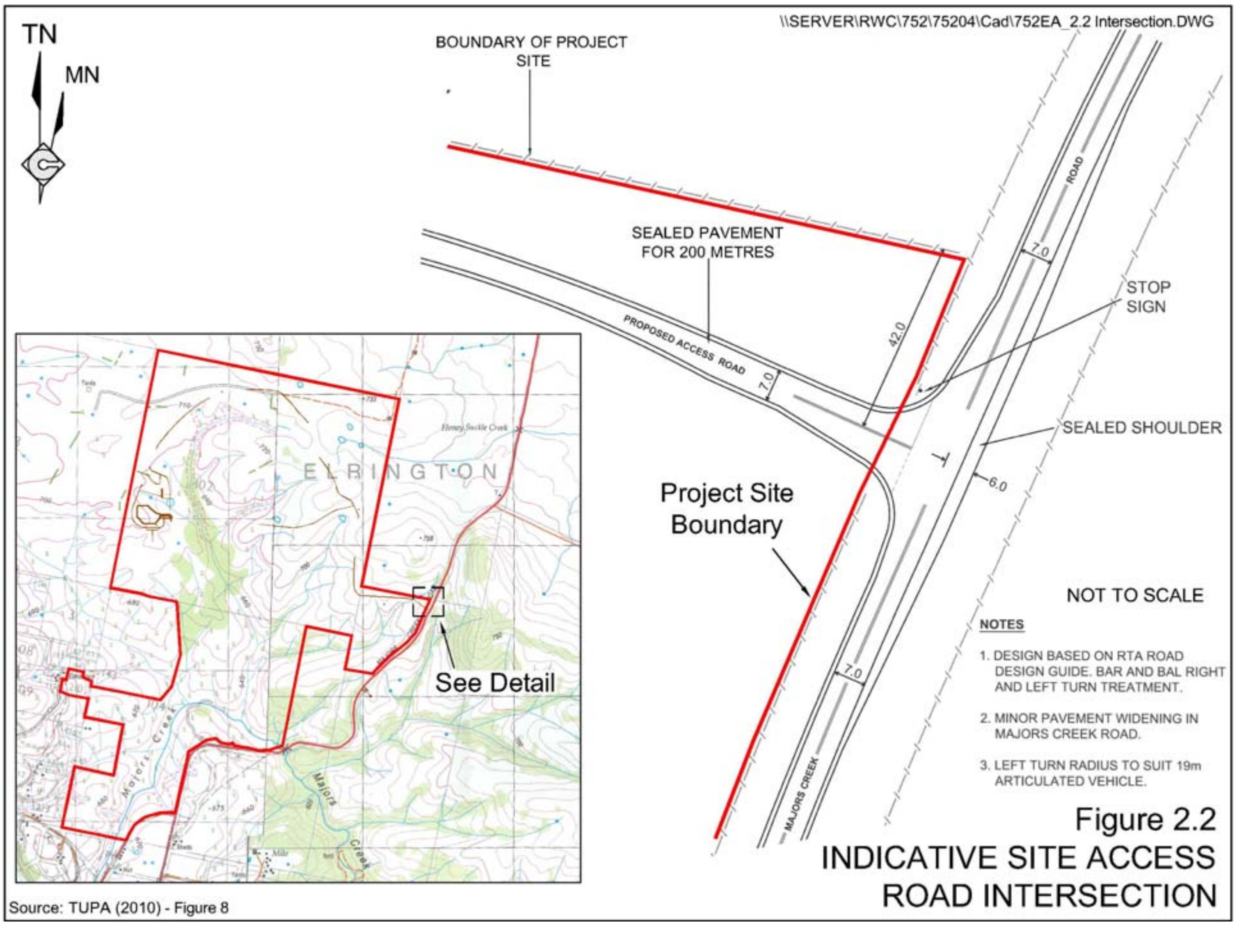
The Proponent would construct a site access road to permit light and heavy vehicles to access the Project Site. The road would require construction of an intersection between the site access road and Majors Creek Road (**Figure 2.1**).

The site access road would be an all-weather, unsealed two lane road suitable for use by light and heavy vehicles and sufficiently wide that two loaded semitrailer trucks could pass safely. Notably, the initial 200m of the road (from Majors Creek Road) would be constructed with a 7.0m wide sealed pavement and sealed shoulder. This would prevent tracking of material from the site access road onto Majors Creek Road.

The site access road would be located entirely within the Araluen Catchment and appropriate road-side drainage would be installed in accordance with the requirements of *Managing Urban Stormwater – Soils and Construction – Volume 2C Unsealed Roads* published by the then Department of Environment and Climate Change in 2008.

The site access road would cross two ephemeral drainage lines. These crossings would be designed and constructed accordance with the guideline *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterways Crossings* published by the then Department of Primary Industries in 2003.

The site access road intersection with Majors Creek Road would be located approximately 40m from the junction of the northern boundary of the Project Site with Majors Creek Road. The intersection would be designed and constructed, in consultation with Palerang Council, to RTA standards for a Basic Rural intersection incorporating basic right turn (BAR) and left turn (BAL) treatments for the left turn and right turn into the Project Site (**Figure 2.2)**. The intersection would be able to accommodate articulated vehicles turning right into and left out of the Project Site.



Source: TUPA (2010) - Figure 8

Figure 2.2
INDICATIVE SITE ACCESS ROAD INTERSECTION

Figure 2.2 presents the proposed layout. The BAL and BAR treatments for the left and right turning vehicles at the intersection are based on RTA's warrants for Rural Turn Lanes (as defined by the RTA *Road Design Guide*) and the traffic volumes that would use the intersection.

The location of the proposed intersection would provide sight distances that would exceed the the minimum safe intersection sight distance (SISD) requirements for the posted speed limit of 100km/h.[1] Notwithstanding this, the Proponent would undertake regular clearing of long grass and bushes that grow within the Majors Creek Road reserve to ensure that the SISD is maintained.

Finally, the existing site access road and intersection with Majors Creek Road (**Figure 2.1**) would be decommissioned and would be used for emergency access only.

2.2.4 Surface Water Harvesting Structures

The Proponent would construct eight surface water harvesting dams ("harvestable right dams") and associated infrastructure during the initial stages of the Project (**Figure 2.3**). Water harvested within the harvestable right dams would be used within the Project Site for environmental releases to Majors Creek. These dams would be constructed in accordance with the Proponent's rights under Section 53 of the *Water Management Act 2000*. Under the terms of that Section and the associated orders, the Proponent as landholder is permitted to capture or harvest and use a proportion of the total runoff from their land without requiring a licence. The harvestable right allows construction of dams up to the capacity identified under Section 53 of the *Water Management Act 2000*. That capacity is determined based on the property's geographical location and the size of the property. The dams are required to be either "off-line" from natural watercourses or positioned on first- or second-order streams only. Water captured within the harvestable rights dams may be used for any purpose, including mining-related purposes.

It is noted that dams or basins constructed for the purposes of maintaining water quality such as sediment basins are exempt from the harvestable right calculation assuming that water detained in these structures is released to downstream waters once of acceptable quality. If water within such structures is used for mining-related purposes, then the Proponent would ensure that the volume of those structures is included in the total capacity of the harvestable rights dams.

Table 2.1 presents the indicative size of the eight harvestable right dams within the Project Site. It is noted that the sizes of the dams may be adjusted depending on which existing farm dams are decommissioned and whether sediment control basins are incorporated into the Proponent's harvestable rights.

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[1] It is noted that the recorded 85th percentile vehicle speed was 97km/h, or 3km/h lower than the posed speed limit., That is, 85% of vehicles travel at 97km/h or less.

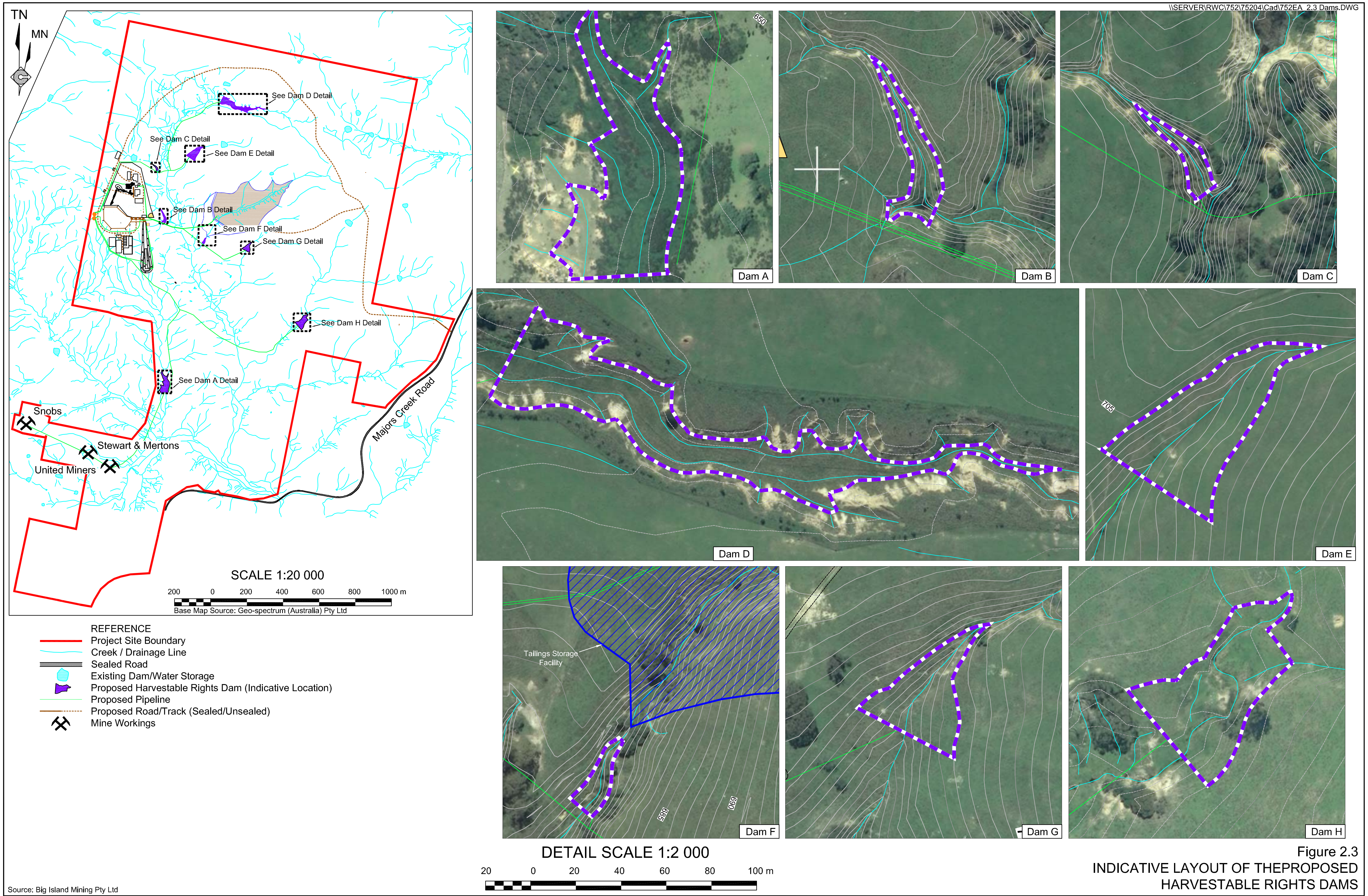

Figure 2.3
INDICATIVE LAYOUT OF THEPROPOSED HARVESTABLE RIGHTS DAMS

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The dams would be constructed with appropriate spillways capable of withstanding a 1 in 100 year annual recurrence interval (ARI) rainfall event without significant erosion. If required, the dams would be lined to prevent excessive leakage. The dams would also be fitted with appropriate water reticulation equipment, including pumps and pipelines to permit transfer of water from the harvestable rights dams to the water supply tanks (**Figure 2.1**).

Table 2.1
Proposed Harvestable Rights Dams

Dam Identifier	Anticipated Volume (ML)
A	7.5
B	1.9
C	4.1
D	4.8
E	2.3
F	3.1
G	2.2
H	8.6
Total	34.5
Source: Big Island Mining Pty Ltd.	

2.2.5 Groundwater Harvesting Infrastructure

The Project would require a maximum of approximately 870ML of water per year for mining-related purposes, principally for processing operations. Other mining-related water uses would include underground operations, equipment wash down, etc. Of the required 870ML, the Proponent estimates that approximately 740ML would be recovered through the thickener within the Processing Plant or from the tailings storage facility. As a result, the Project would require a maximum of approximately 130ML per year of 'new' or makeup water.

In addition, SEEC (2010a) estimated that 18.4ML/year of water would be required for dust suppression purposes. As a result, the maximum water requirement for mining and dust suppression-related activities would be approximately 148.4ML per year

That water would be sourced from the following sources, in priority order.

1. Groundwater that would be removed from the proposed Dargues Reef Mine during mining operations.
2. Groundwater from the historic Snobs, Stewart and Mertons and United Miners workings (**Figure 2.3**).

AGE (2010) undertook detailed groundwater modelling for the Project (see Section 4.4.5.1). That modelling conservatively indicated that a minimum of 4L/s or 126ML/year could be obtained from dewatering operations within the Dargues Reef Mine. As a result, a maximum of approximately 22ML/year of additional water for mining-related purposes would be required.

In addition, AGE (2010) determined that the Project would result in reduced groundwater flows to Majors Creek. These reduced flows are estimated to increase from 33.1ML/year in Year 1 to 66.2ML/year in Year 5 before decreasing to 28.3ML/year in Year 7 (see Section 4.4.5.4). The Proponent proposes to release an equivalent volume of water from the harvestable right dams to Majors Creek. SEEC (2010a) undertook an assessment of the ability of the proposed dams to supply the water required for environmental releases based on the maximum required rate of release, namely 66.2ML/year, and 100 years of daily rainfall data. That assessment concluded that the proposed harvestable rights dams could supply the required water for environmental releases on 97% of the modelled days and that during the driest year on record, approximately 33ML of additional water would be required. That water would be sourced from the historic workings. As a result, the maximum amount of water that would be drawn from the historic workings is expected to be 55ML/year.

In order to ensure sufficient water for environmental releases, the Proponent seeks approval to extract a maximum of 79ML of water per year from the historic workings as follows. This proposed rate of extraction has been included in the Groundwater Assessment (see Section 4.4)

- Snobs workings – approximately 39ML/year.
- Stewart and Mertons workings – approximately 16ML/year.
- United Miners workings – approximately 24ML.

As a result, the Proponent would install pumps into the shafts of each of the historic working or, alternatively, construct and equip bores that would intersect the workings. Those pumps or bores would pump water to the mine water tanks via the pipes constructed in conjunction with pipes constructed for the harvestable right dams. Water from the harvestable rights dams and the historic workings would not be mixed.

Finally, it is noted that the Snobs workings are located within Lot 210, DP 755934 which owned by B and C James. The only activities proposed within that parcel of land would be construction and operation of the bore that would extract water from the Snobs workings. The Proponent has commenced negotiations with the owners of that land and would ensure that an appropriate agreement is in place before any construction or pumping operations commence.

2.3 SITE PREPARATION

2.3.1 Introduction

This sub-section describes the activities that would be undertaken in preparation for mining operations, namely, removal of vegetation and soil stripping and stockpiling operations.

2.3.2 Vegetation Clearing

Those sections of the Project Site that would be disturbed by the Project have largely been previously cleared. Gaia (2010) (see Section 4.3 and Part 2 of the *Specialist Consultant Studies Compendium*) has determined that the following vegetation communities would be disturbed by the Project.

- 0.1ha of Ribbon Gum – Snow Gum grassy open forest.
- 0.1ha of fragmented Ribbon Gum – Snow Gum grassy open forest.

- 0.1ha of woody weeds.
- 0.2ha of exotic vegetation comprising planted wind breaks.
- 0.2ha of native grassland.
- 23.7ha of native-dominated pasture.

In addition, a further 2.2ha of land largely disturbed by historic mining operations would be disturbed.

During vegetation clearing operations, larger trees within the planted wind breaks would be removed using a bulldozer. Tree trunks would be mulched for use during rehabilitation activities. No native vegetation more than 3m in height would be removed and no hollow-bearing trees would be disturbed.

Ground cover 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.

2.3.3 Soil Stripping

2.3.3.1 Introduction

Soil materials within those sections of the Project Site that would be disturbed have been assessed by SEEC (2010) (see Section 4.12 and Part 8 of the *Specialist Consultant Studies Compendium*). This sub-section briefly describes the soil categories identified within the Project Site, the recommended maximum stripping depths and the volumes of soil that would be available for use during rehabilitation. Detailed soil management measures that would be implemented are presented in Section 4.12.4.

2.3.3.2 Soil Units, Stripping Depths and Inventory

Two soil landscapes have been identified within and surrounding the Project Site, namely the Braidwood Soil Landscape which occupies the northern section of the Project Site and the Brushy Hill Soil Landscape which occupies the central and southern section of the Project Site (**Figure 2.4**).

The Braidwood Soil Landscape typically comprises a dark brown, grading to greyish brown, pedal loam to sandy loam to a depth of approximately 350mm. This is underlain by a yellowish-brown moderately to strongly pedal, sandy clay, grading to clayey sand with depth.

The Brushy Hill Soil Landscape typically comprises a dark brown, weakly pedal loam to sandy loam to approximately 300m. This is underlain by a yellowish-brown moderately pedal sandy clay.

Table 2.2 presents the stripping depths and approximate volumes of each soil unit that would be available for rehabilitation operations based on recommendations provided in SEEC (2010).

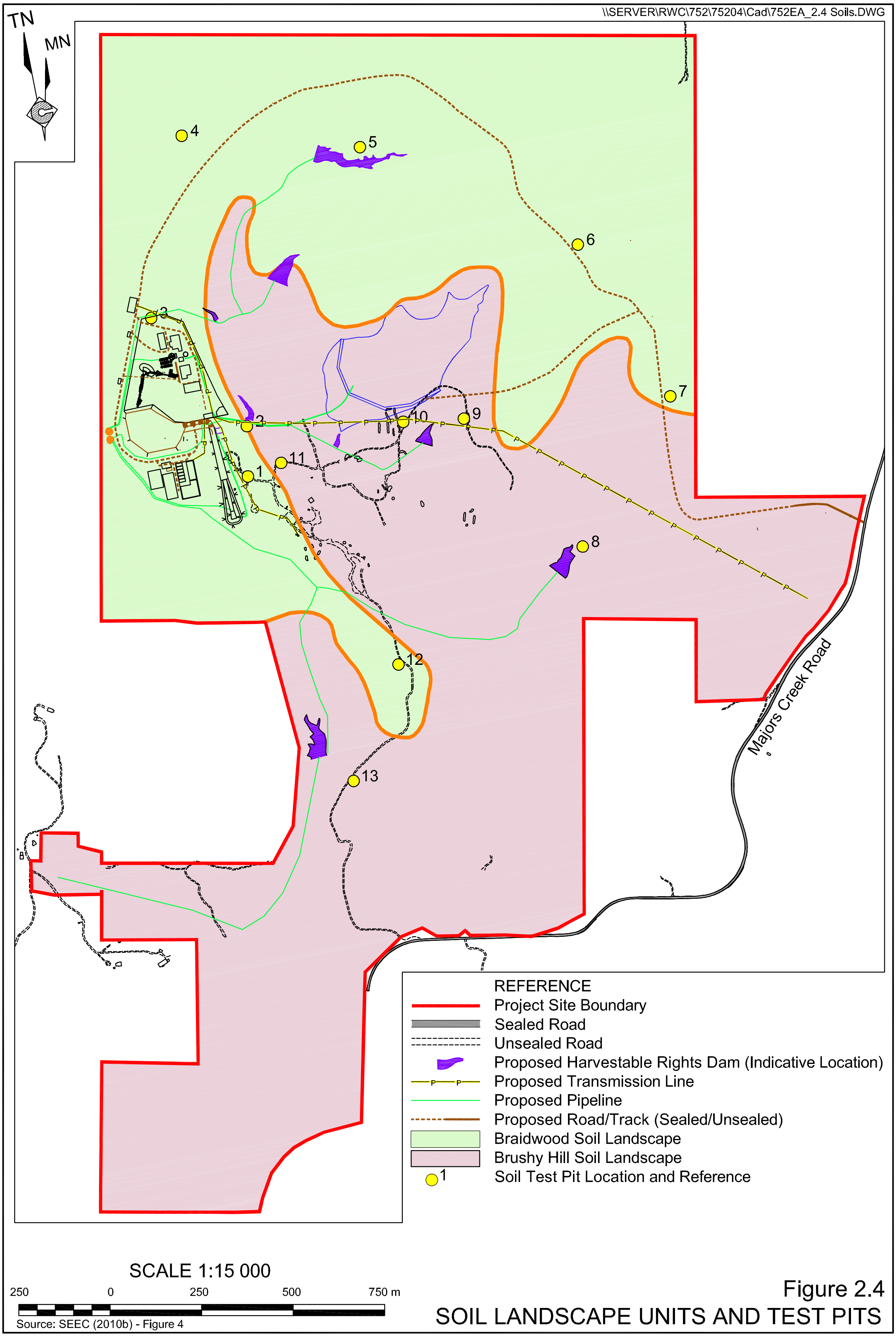

Figure 2.4
SOIL LANDSCAPE UNITS AND TEST PITS

2.4 MINING OPERATIONS

2.4.1 Introduction

Project approval is sought for the extraction of ore and waste rock from within the proposed Dargues Reef Mine and associated box cut. This sub-section provides an overview of the construction of the box cut and portal, underground development and stoping operations, stope backfilling and the proposed mining rate and sequence.

Table 2.2
Soil Stripping Depths and Inventory

Soil Landscape	Area to be disturbed (ha)	Topsoil		Subsoil	
		Stripping Depth (mm)	Volume (m^3)	Stripping Depth (mm)[1]	Volume (m^3)
Braidwood Soil Landscape	13.0	350	45 500	350mm to 1 400mm	136 500
Brushy Hill Soil Landscape	13.5	300	40 500	300mm to 1100mm	148 500
Total	**26.5**		**86 000**		**285 000**

Note 1: Below base of topsoil.
Note 2: Maximum stripping depth determined by presence of mottling.
Source: SEEC (2010b)

2.4.2 Construction of the Box Cut and Portal

2.4.2.1 Introduction

A box cut would be required to enable exposure of material with sufficient geotechnical competency to permit establishment of the portal. This sub-section provides an overview of the construction of the box cut and portal establishment prior to commencement of underground development.

2.4.2.2 Layout of the Box Cut

Figure 2.1 presents an overview of the layout of the box cut. In summary, the box cut would be an elongate excavation that would permit access to the portal and decline via a haul road. The box cut would have the following indicative design parameters. These parameters have been provided by the Proponent's geotechnical advisers.

- Length – 286m.
- Maximum width – 64m.
- Maximum depth – 29m.
- Gradient of haul road – 1:7 (V:H).
- Slopes of walls – average of approximately 55°.
- Vertical spacing of benches – 15m.

The box cut would be constructed in a manner that would ensure that no vegetation more than 3m high would be removed. In addition, the box cut has been designed to face away from the closest residences to minimise the potential for noise and other mining-related impacts.

2.4.2.3 Construction of the Box Cut

The footprint of the box cut and any associated infrastructure would initially be marked on the ground to ensure that only the minimum area required is disturbed.

Once vegetation and soil material have been removed as described in Section 2.3 and surface water management structures have been constructed, the box cut would initially be excavated using 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. This would require drilling of holes using a hydraulic drill rig, loading of those holes with either pre-packaged or bulk explosives, boosters and detonators and fragmentation of the in situ material. Detailed blasting parameters cannot be provided at this stage because blasting would largely be undertaken within the transition zone from friable/weathered material to competent rock. However, all blasts would be designed, supervised and initiated by a suitably licensed and experienced blasting engineer or shot firer. Each blast would be designed to achieve the following.

- Compliance with all blasting criteria at all surrounding residences.
- Suitable fragmentation.
- Preparation of suitable surfaces for the box cut walls, possibly including the use of pre-split blasting.

Fragmented material would be removed using load and haul techniques described previously.

2.4.2.4 Formation of the Portal and Underground Infrastructure

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

Once stabilised, the portal and subsequently the decline would be constructed using methods similar to those described in Section 2.4.3. Additional roof and wall support, would be required in the near surface sections of the decline. This may include rock bolts, cable bolts, shotcrete or steel arch structures.

Once the portal is established, infrastructure required for underground mining operations would be installed. This would indicatively include the following.

- Underground power, including a transformer to reduce the voltage of the distributed electricity to 1 000V, suitable for use underground.
- Temporary ventilation, including one or more vent fans located within the box cut.
- Mine water supply to provide water for underground mining operations.

- A settling pond close to the box cut to allow water pumped from underground, as well as water collected within the box cut, to be removed.
- A tag board and associated surface safety and communication equipment and infrastructure.
- One or more silenced air compressors.

2.4.3 Underground Development

2.4.3.1 Introduction

Once the portal has been established and the required infrastructure installed, underground 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. This sub-section provides an overview of the proposed drill, blast, load and haul operations that would be undertaken, as well as the ventilation and emergency egress infrastructure that would be established.

2.4.3.2 Decline and Development Design

Figure 2.5 presents an overview of indicative decline development at the end of the life of the Project. In summary, the decline would have the following indicative design parameters.

- Height - approximately 5.5m
- Width – approximately 5.0m.
- Gradient – approximately 1:7 (V:H).
- Final design length – approximately 3 640m.
- Maximum depth of development – approximately 520m below surface.

Development headings and ore drives, namely those drives that would permit access to individual mining areas, would have the following indicative design parameters.

- Height - approximately 5m.
- Width – approximately 5m.

2.4.3.3 Drill and Blast Operations

The decline, development headings and ore drives would be developed using drill and blast techniques. A jumbo, or underground drill rig, would drill a pattern of holes, the spacing and length of which would be determined by the mining contractor. Once drilling has been completed, these holes would be loaded with pre-packaged and bulk explosives, and detonators and the in situ material fragmented.

Blasting would only be undertaken once the proposed mine has been evacuated, typically at meal breaks or shift change.

2.4.3.4 Load and Haul Operations

Fragmented material would be extracted using an underground loader. The loader would be used to load underground haul trucks. Alternatively, the loader may be used to transport material to a loading bay for later reclamation. If required, the loader may be remotely operated.

Once loaded into haul trucks, fragmented waste rock would be transported to the temporary waste rock emplacement on the surface (see Section 2.5) or used for stope backfilling operations (see Section 2.4.5). Fragmented ore material would be transported to the Run-of-Mine (ROM) pad (see Section 2.6.3).

2.4.3.5 Ventilation and Emergency Egress

Once the portal is established, suitable ventilation would be required. Initially this would be provided using a temporary ventilation fan located at the portal which would pump air to the decline face using air bags. Return air would flow back up the decline. As the decline progresses, the temporary 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 surface, a ventilation drive (vent drive) would be established (**Figure 2.5**). This would be an approximately 4.5m x 4.5m horizontal drive.

A shaft to the surface (**Figure 2.1**) would be constructed using a raise bore technique. This would involve a drill rig on surface which would drill an initial pilot hole down. The pilot hole would then be progressively widened from the bottom up, with the drill cuttings permitted to fall to the bottom of the hole where they would be collected from the vent drive.

The ventilation shaft would have a ventilation fan installed at least 10m below surface. The vent fan would be used to extract exhaust air out of the mine with an indicative capacity of approximately $150m^3$/second. The main decline would be the only air intake for the mine.

Once the shaft has been commissioned for ventilation, and the decline has progressed in depth another 25m vertically, a second vent drive would be established and a 4.5m diameter, sub-vertical ventilation rise will be developed using a longhole development method. As development of the mine progresses, additional ventilation drives and rises would be constructed approximately every 25m vertically.

In addition, the vent rise and shaft would be fitted with appropriate emergency egress infrastructure, including ladder ways and platforms. Other mine services such as power and water may also be installed within the vent rise.

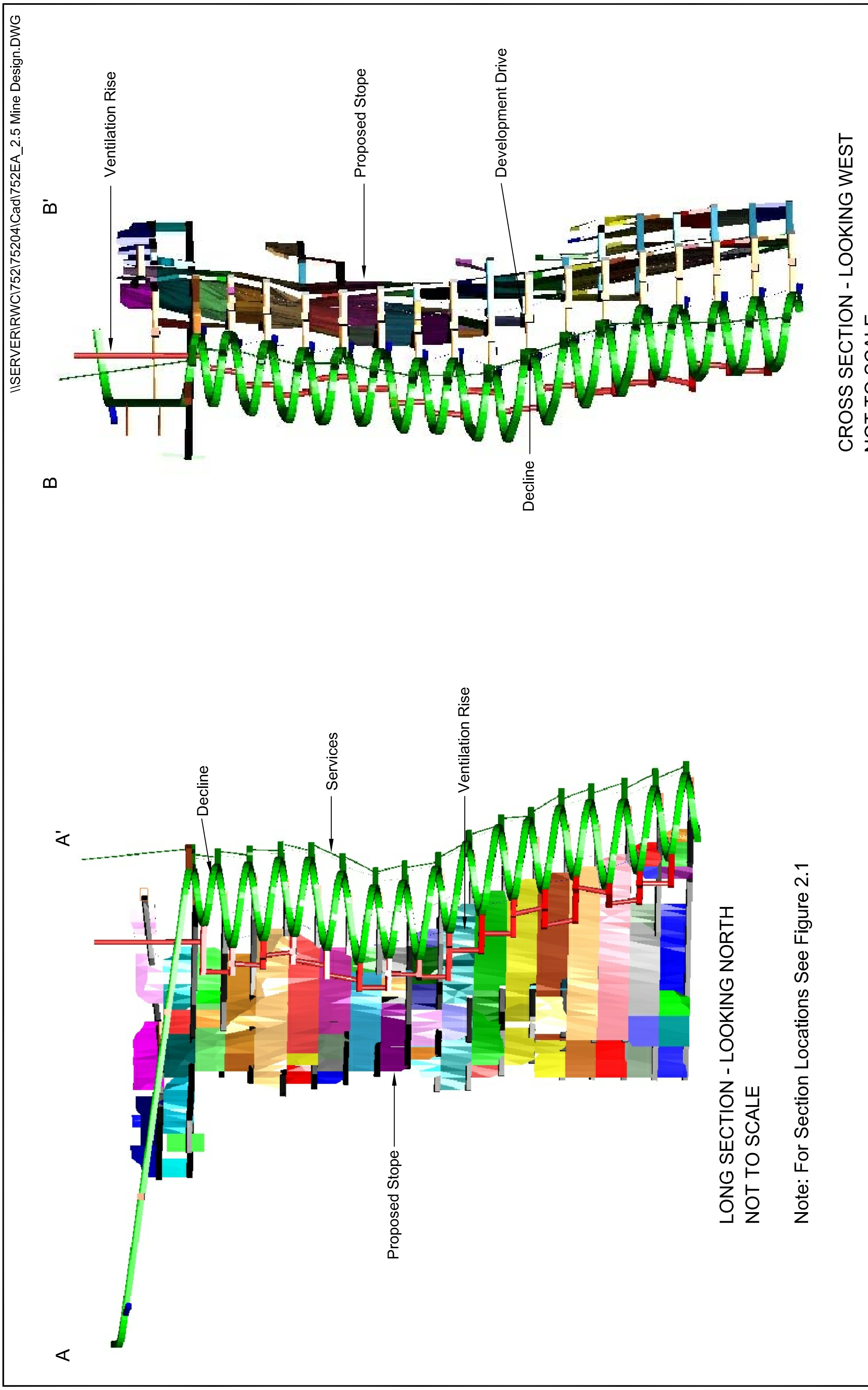

Figure 2.5
INDICATIVE MINE DESIGN

Source: Mining Plus

2.4.4 Underground Stoping Operations

2.4.4.1 Mining Method

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 2.6** presents a schematic overview of this mining method and the following provides a brief description.

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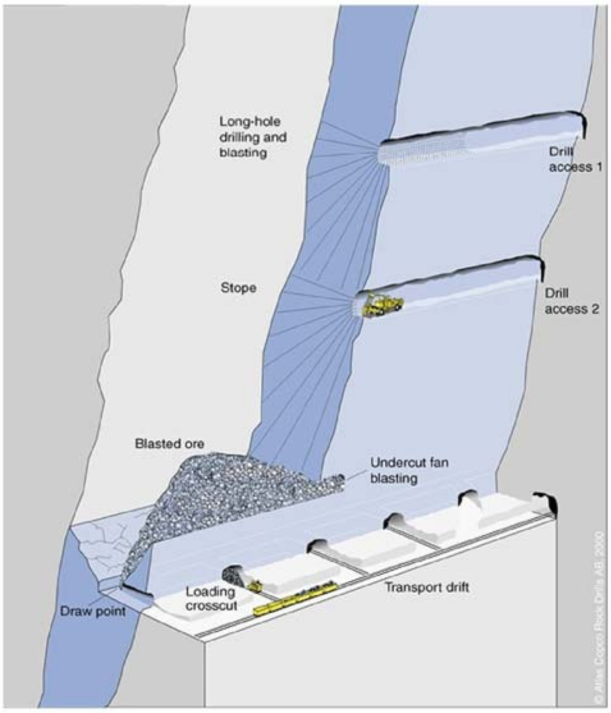


NOT TO SCALE

Figure 2.6
SCHEMATIC SUBLEVEL OPEN STOPING MINING METHOD

Source: Atlas Copco Rock Drills

During mining operations, 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 then be sequentially loaded with explosives and the ore material blasted. The fragmented material would then removed from the stope or open void using an underground loader, operated remotely where required, and loaded into haul trucks for transportation to the ROM pad/temporary waste rock emplacement. Between stopes, pillars (vertical) and sills (horizontal) of unmined material are left to provide support and prevent ground collapse.

2.4.4.2 Stope Design

The Proponent would develop a range of stopes to permit extraction of the ore material. The detailed design of each stope would be determined following completion of additional drilling during development operations to better define the boundary between classes of material. The mine design would be developed to ensure that there would be no surface subsidence within the Project Site.

2.4.5 Stope Backfilling Operations

In order to ensure stability of sections of the proposed underground mine once mining operations have been completed in those sections, mined-out stopes would be backfilled using waste rock material sourced preferentially from concurrent underground development, with additional waste rock material transported from the temporary waste rock emplacement on the surface, as required.

This material would be transported to a drive in the vicinity of the top of the stope using an underground haul truck. The material would be stockpiled in the drive and then pushed or tipped into the stope using an underground loader. During such operations, the loader may, where required, be operated remotely.

2.4.6 Mining Rate

Table 2.3 presents the proposed mining rate for the life of the Project. In summary, the maximum mining rate would be approximately 462 000t per year, comprising approximately 331 000t of ore material and 131 000t of waste rock. However, this production rate would vary depending on the number of stopes available at any one time. As a result, the mining rate would increase progressively as the mine is developed and would decrease towards the end of the life of the Project as stopes are progressively completed.

Table 2.3
Indicative Mining Rate

Year	Ore (t)	Waste Rock(t)	Total (t)
1	160 760	165 877	**326 637**
2	217 824	142 377	**360 200**
3	330 809	131 672	**462 482**
4	354 350	17 395	**371 745**
5	108 408	0	**108 408**
Total	**1 172 151**	**457 320**	**1 629 471**

Source: Big Island Mining Pty Ltd

2.5 WASTE ROCK MANAGEMENT

2.5.1 Introduction

During underground development operations, material that has insufficient gold to justify processing would be extracted and either transported to the surface and placed within the ROM pad/temporary waste rock emplacement (**Figure 2.1**) or, once underground mining has progressed sufficiently, used directly during stope backfilling operations (see Section 2.4.5). This sub-section provides an overview of the characteristics of the waste rock material, the design of the ROM pad/temporary waste rock emplacement and the procedures that would be implemented during placement operations.

2.5.2 Waste Rock Characteristics

Rock materials that contain small amounts of naturally-occurring sulphide minerals when exposed to the air have the potential to oxidise. This oxidising reaction produces products that, when mixed with surface water or groundwater, may result in leachate with a lowered pH. Such acidic leachate may, however, be neutralised by other minerals within the rock such as carbonates. As a result, it is important to determine the net acid generation potential, namely the potential to produce acid leachate balanced against the potential to neutralise that leachate, of all materials that would be exposed to the air. It is noted that while mineralisation associated with the Dargues Reef deposit is associated with sulphide minerals, limited sulphides occur within the waste rock surrounding the ore material. Section 2.7.4 provides an overview of the characteristics of tailings material that would be placed within the tailings storage facility.

Seven samples of waste rock material from drill holes in the vicinity of the Dargues Reef deposit were analysed for net acid generation potential by ALS Laboratory Group. The Proponent notes that this material would be representative of waste rock material that would be extracted during underground development operations. Each of the samples returned a negative acid generation potential, indicating that the waste rock would not be likely to generate any acidic leachate once exposed to the air.

2.5.3 Waste Rock Emplacement Design

Prior to commencement of stope backfilling operations, waste rock material would be transported to and placed within the ROM pad/temporary waste rock emplacement (**Figure 2.1**). This would include material extracted during construction of the box cut and material extracted during decline construction and initial underground development.

The Proponent estimates that approximately 206 000m^3 and 215 000m^3 of waste rock would be placed within the ROM pad/temporary waste rock emplacement and the embankment of the tailings storage facility respectively. Surface placement of this material would continue from the commencement of construction 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.

The ROM pad/temporary waste rock emplacement would be constructed immediately to the south of the processing plant. Indicatively, this structure would be a level area with the following design parameters.

- Maximum elevation - approximately 706m AHD (up to approximately 8m above the existing surface).
- Area - up to approximately 1.37ha .
- Side slopes - approximately 1:1 (V:H) or approximately 45º. These slopes would be reduced to no more than 1:3 (V:H) of approximately 18º during decommissioning and rehabilitation of the Project Site.

The northern section of the ROM pad/temporary waste rock emplacement would principally be used for stockpiling of ore material, while the southern section would principally be used for temporary stockpiling of waste rock.

2.5.4 Waste Rock Emplacement, Processing and Reclamation Procedures

Waste rock material from either the box cut or underground development would be transported to the ROM pad/temporary waste rock emplacement by haul truck and 'paddock dumped.' This material would then be levelled using a bulldozer to create a suitable level working area. Additional waste rock material would then be used to construct one or more ramps. Further waste rock material would then be 'face dumped' from the top of the ramp(s). Where practicable, weathered and unweathered material would be stockpiled separately to facilitate subsequent use of that material.

Where appropriate, waste rock material may be transported directly to other sections of the Project Site for use during infrastructure establishment, principally for construction of the tailings storage facility embankment and the ROM pad. Placement procedures would be similar to those described previously.

In addition, waste rock material may be used during construction of other infrastructure during the life of the Project, including the site access road, other tracks and roads and the hardstand areas. Waste rock material not used to establish surface infrastructure would be reclaimed and transported underground using an excavator or front-end loader and underground haul trucks. This material would be transported underground as back loads during ore transportation operations and would be placed within completed mining stopes as described in Section 2.4.5.

Once waste rock material has been removed from sections of the ROM pad/temporary waste rock emplacement, the disturbed area would be rehabilitated as described in Section 2.14.

2.5.5 Waste Rock Balance

Table 2.4 presents the waste rock balance during the life of the Project. In summary, the Proponent anticipates that approximately 510 375m^3 of waste rock would be generated during the life of the Project. Approximately 445 675m^3 of waste rock material would be used during site establishment operations with a further 64 700m^3 of waste rock used during stope backfilling operations. As a result, there would be no waste rock surplus during the life of the Project.

Table 2.4
Waste Rock Balance

Item	Volume(m^3)	
	Source	**Sink**
Boxcut	202 275	
Laydown	26 650	
Site Road		24 475
ROM		206 800
TSF		214 400
UG Waste	281 450	
Stope back fill		64 700
Total	**510 375**	**510 375**
Source: Big Island Mining Pty Ltd		

2.6 PROCESSING OPERATIONS

2.6.1 Introduction

Ore material is processed within the processing plant to produce a combination of gold dor'e (a semi-purified gold bar), a gold and silver bearing sulphide concentrate and tailings material. This sub-section provides a brief description of the layout of the processing plant, together with the ROM stockpiling, crushing and grinding, gravity separation, flotation, concentrate management and reagent management processes.

2.6.2 Processing Plant Layout

Figure 2.1 presents the proposed layout of the processing plant area. In summary, the processing plant comprises the following components.

- ROM pad/temporary waste rock emplacement.
- Crushing and grinding area.
- Processing plant area.
- Concentrate dewatering and storage area.
- Water supply tanks, workshops, hardstand areas, laboratory, ablutions and other ancillary infrastructure.

2.6.3 ROM Stockpiling, Crushing and Grinding Operations

Ore material would be transported to the ROM pad/temporary waste rock emplacement by underground haul trucks. This material would be stockpiled according to the material's characteristics. A front-end loader would then be used to manage the stockpiles, blend the ore material and deliver it to the ROM bin. Oversize material would be stockpiled separately and broken up on a campaign basis using a hydraulic rock breaker. Rock breaking campaigns are anticipated to be infrequent and limited in duration.

Ore material would be fed into a ROM bin from where it would pass to a two-stage crushing and screening circuit. Product screen undersize material (nominal <14 mm) would then be transferred to an enclosed fine ore bin. Material from the fine ore bin would be reclaimed using one or more feeders. Reclaimed material would be directed to a primary ball mill for grinding to a nominal P_{80} (80% passing) size of 212µm with process water.

The crushing component of the processing plant would be enclosed within a structure that would be designed to minimise, to the greatest extent possible, noise emissions from the crushing equipment. Indicatively, this structure would be constructed of colourbond steel, with the inside of the structure lined with cement fibre panels and the upper half of the building also lined with appropriate acoustic lining. In addition, where openings are required for conveyors, the openings would be as small as possible. Doorways would be fitted with doors which would be kept closed, whenever possible. The grinding component of the processing plant would be rubber lined and would not generate significant noise.

2.6.4 Gravity and Flotation Circuit

The primary grinding area would include a primary gravity gold recovery section comprising a feed screen and centrifugal concentrator. A high grade primary concentrate would be produced from the gravity concentrator and periodically transferred to a holding tank within the secure gold room area. Approximately 20% of the mill feed gold would be recovered via the primary gravity system.

From the primary gravity circuit, the ground ore would be directed to a rougher flotation circuit where rougher flotation concentrate and tail streams are separated by the addition of flotation reagents and low pressure air. The rougher concentrate would be directed to the re-grind circuit whilst the rougher tail would be dewatered via a thickener prior to transfer to the tailings storage facility as described in Section 2.7.

Rougher concentrate would be ground within a re-grind ball milling circuit to a nominal P_{80} size of 75 µm. The re-grind circuit would include a re-grind gravity gold recovery circuit incorporating a smaller centrifugal concentrator. Gravity concentrate would also be periodically directed to a holding tank within the secure gold room.

Re-ground rougher concentrate would then be transferred to the cleaner flotation circuit where further floatation would produce the final concentrate. The tail from the cleaner flotation circuit would be transferred back to the rougher circuit feed stream.

Within the secure gold room, the combined primary and re-grind gravity gold concentrates would be further processed using a shaking table or similar to produce final gravity concentrate. The tailings from this process would also be returned to the rougher floatation circuit. The final gravity concentrate would be dried before being smelted with suitable fluxes to produce gold dor'e and slag. The slag would also be returned to the primary milling circuit. Gold dor'e would be stored for periodic secure shipment to a suitable gold refinery.

2.6.5 Concentrate Management

Cleaner flotation concentrate would be dewatered via a thickener and filter to approximately 10% moisture content. This final concentrate is expected to be produced at an average annual rate of approximately 30 000 dry tonnes per annum (dry t/a) and contain approximately 30g/t gold and approximately 99% sulphides.

As this material may have the potential to form acid leachate, it would be stored under cover and on a concrete-sealed surface. All water draining from the concentrate stockpiles would be directed to a sump and returned to the process water system. No processing area water would be permitted to flow to the sediment and erosion control system or natural drainage.

Concentrate material would be loaded into covered transport trucks. Concentrate transportation operations are described in Section 2.9.3.

2.6.6 Reagent Management

During processing operations, reagents and other chemicals would be used. **Table 2.5** presents the anticipated reagents and other chemicals that would be used during the life of the Project.

Table 2.5
Processing Reagents and Chemicals

Reagent/Chemical	Purpose	Delivery Method	Reagent Form	Hazardous?
Copper Sulphate Pentahydrate	Flotation Activator	25 kg Bags	Blue Crystals or Powder	No
Potassium Amyl Xanthate	Flotation Collector	25kg Bags	Yellow Powder	Requires management
IF6500	Flotation Frother	Integrated Bulk Container (nominally 1 000L capacity)	Yellow Liquid	No
MF351	Flocculant	25kg Bags	White powder	No
Nitric Acid	Concentrate filter cleaning	Integrated Bulk Container (nominally 1 000L capacity)	Liquid	Requires management
LPG	Gold room furnace	Bulk 2.3t tank	Liquefied gas	Requires management

Source: Big Island Mining Pty Ltd

No cyanide would be used or stored within the Project Site.

The following measures would be implemented to prevent adverse environmental impacts associated with reagent storage and use.

- All reagents would be stored and used in accordance with the manufacturer's instructions and the relevent Material Safety Data Sheets.
- All liquid reagents would be stored within a bunded area with a capacity of at least 110% of the capacity of the largest container.
- Reagents would not be stored with incompatible chemicals or chemicals that may cause a reaction in the event of a reagent spill.
- Only the minimum volume of reagents required for the ongoing operation of the Project would be stored within the Project Site.
- Material Safety Data Sheets and appropriate spill management equipment would be available in the vicinity of all reagent storage areas.
- A *Hydrocarbon, Chemical and Reagent Management Plan*, including emergency management procedures, would be developed and implemented throughout the life of the Project.

2.7 TAILINGS MANAGEMENT

2.7.1 Introduction

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 within the processing plant. The thickened slurry would be pumped to the tailings storage facility (TSF). This sub-section provides an overview of the proposed design and operation of the TSF, the volume of tailings to be produced and the characteristics of the tailings material.

2.7.2 Tailings Storage Facility

2.7.2.1 Geotechnical Considerations and Design

The Proponent engaged Knight Piesold Pty Ltd to assist with the geotechnical assessment and design of the TSF. The resulting reports are entitled "Geotechnical Investigation Final Report - ref PE801-00139/2" and "tailings storage facility Design - ref PE801-00139/3" and are referred to hereafter as Knight Piesold (2010a) and Knight Piesold (2010b). The following geotechnical test work was undertaken to determine the suitability of the proposed TSF site and the work that would be required to ensure that the floor and walls of the TSF achieve the required level of seepage control.

- Three cored boreholes, each to approximately 30m depth. Two were located in the vicinity of drainage line approximately where the TSF embankment would be constructed and one in the area of the final decant /pond.
- Nine packer tests, three in each borehole at nominal depths of 5m, 10m and 25m.
- Test pits along the proposed embankment alignment at approximately 50m centres.

- Test pits across the footprint of the TSF and downstream of the embankment alignment at a grid spacing of approximately 100m.
- Laboratory testing of samples collected.

The testwork concluded the following.

- Weathered "granite" was intersected to a depth of between 12m to 20m, overlying competent rock.
- Permeability testing using packer tests indicated an in situ permeability of 1.5 x 10^{-7}m/s to 2.3 x 10^{-6}m/s.
- The soil materials are suitable for a foundation for the proposed TSF embankment.

2.7.2.2 Design and Construction

Figure 2.7 presents the layout of the TSF. The facility would be constructed in the upper section of an un-named valley to the east of the processing plant. The facility would comprise a single cell with a decant tower and would be constructed in accordance with the requirements of the NSW Dams Safety Committee. The Proponent anticipates that the TSF would be a "prescribed" dam and would be listed in Schedule 1 of the *Dams Safety Act 1978*.

The following provides the indicative design criteria for the tailings storage facility.

- Maximum area of disturbance - approximately 9.3ha.
- Maximum embankment height – approximately 25m above the natural surface.
- Slope of outer face of the embankment – 1:3.5 V:H.

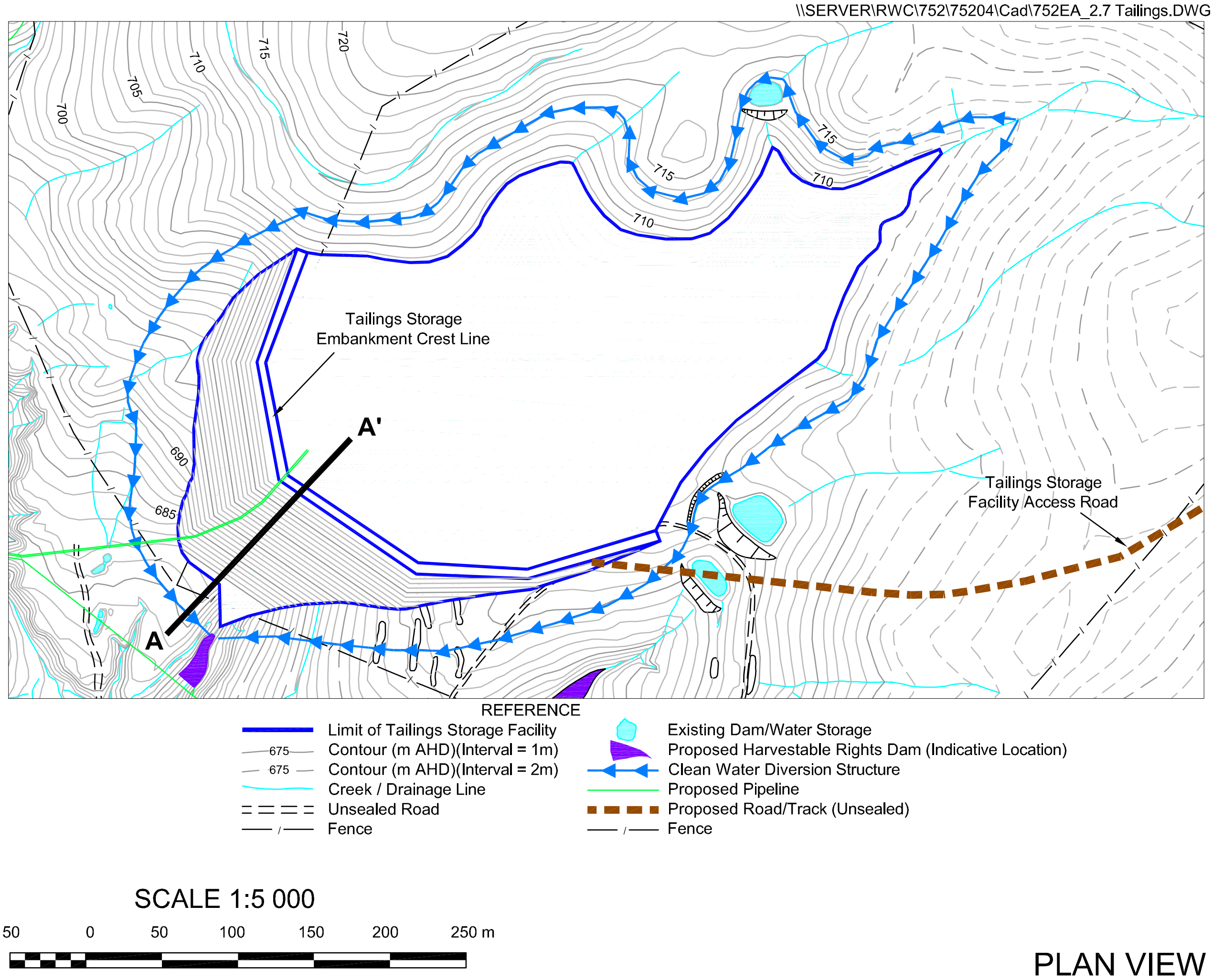
The area in the vicinity of the existing drainage line would be excavated and the walls laid back to form a 1:3.5 (V:H) slope. That area would then be lined with an HDPE liner to achieve the required permeability. The remaining section of the TSF footprint would be scarified, moisture conditioned and compacted using in situ soils.

The TSF embankment would be constructed with a low permeability, upstream layer, supported by a downstream structural layer. The upstream low permeability would be constructed using clay sourced within the footprint of the TSF or from another source within the Project Site or other approved source. Alternatively, a HDPE plastic liner may be used to achieve the required permeability across all or part of the TSF footprint. The embankment would indicatively be constructed in three lifts using waste rock from underground development or material extracted from the footprint of the facility.

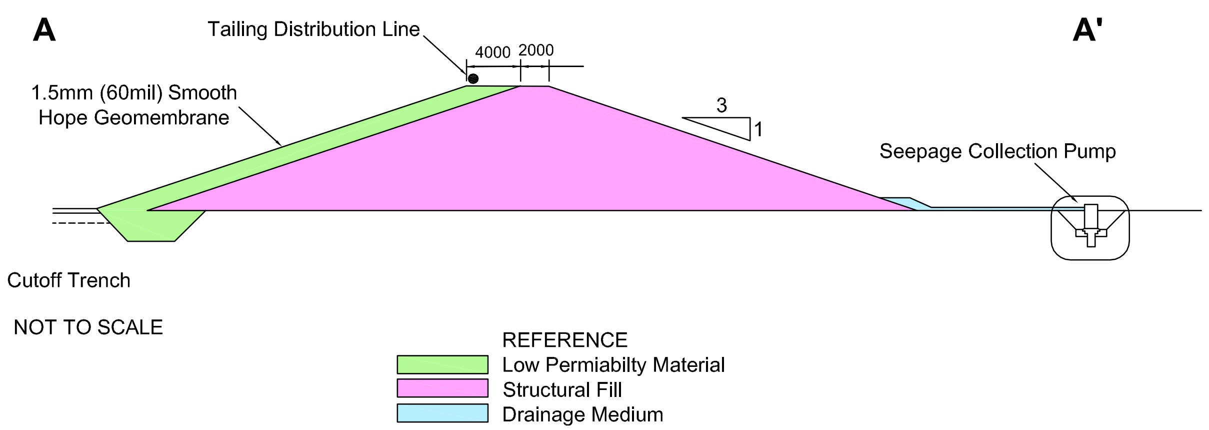
The Proponent would ensure that the TSF achieved the required permeability and that risks associated with seepage of leachate material is, to the greatest extent practicable, minimised through the following.

- Installation of HDPE liners along the existing drainage line, once the floor of the TSF has been reshaped.
- Compaction of the remainder of the floor of the TSF to achieve the required permeability.

\\SERVER\RWC\752\75204\Cad\752EA_2.7 Tailings.DWG



PLAN VIEW



SECTION VIEW

Figure 2.7
TAILINGS STORAGE FACILITY LAYOUT

Base Map Source: Geo-spectrum (Australia) Pty Ltd

- Installation of a low permeability (clay or HDPE liner) layer on the upstream face of the TSF embankment.
- Construction of a cut-off trench downstream of the TSF embankment.
- Construction of a collection pond that would be lined with an HDPE liner. Any water accumulating within the collection pond would be automatically pumped back to the TSF.
- Construction of a number of monitoring piezometers downstream of the cut-off trench and collection pond to determine if any groundwater contamination has occurred.

Clean water diversions capable of diverting surface water flows up to a 1 in 100 year rainfall event would be constructed up slope of the facility to ensure that clean water is not permitted to flow onto the tailings storage area. In addition, the tailings pipeline and water return line would be constructed within a bunded easement and would be equipped with a pressure drop cut-off to ensure that tailings or return water are contained in the event of a pipeline failure.

2.7.2.3 Operations

Tailings material would be pumped from the processing plant as thickened slurry and discharged to the TSF 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 from where it would be collected and returned to the processing plant for reuse.

This sub-aerial placement procedure would produce a TSF with an internally draining surface and allows the beach, or settled tailings material, to be kept moist by varying the tailings discharge point, thereby minimising the potential for wind erosion of dust. This placement procedure also allows for an appropriate tailings density to be established, ensuring the ongoing stability of the TSF.

2.7.3 Tailings Volume

It is anticipated that throughout the life of the Project approximately 800 000m^3 of tailings material would be produced. The proposed TSF would have a capacity to store approximately 900 000m^3 of material. As a result, the proposed facility would cater for all tailings material produced during the life of the Project.

2.7.4 Tailings Characteristics

Tailings material would comprise ground granodiorite and diorite material with the majority of gold/bearing minerals removed. As indicated in Section 2.6, the ore material would be ground to a nominal P_{80} (80% passing) size of either 212µm (rougher tail) or 75µm (floatation or cleaner tail). As a result, the tailings material would be relatively coarse grained and, as a result, free draining.

Two samples of tailings material were tested by independent Metallurgical Operations Pty Ltd for net acid generating potential. Both samples returned a strongly negative acid generation potential. That test work indicates that the tailings material, when exposed to oxygen within the TSF, would be unlikely to oxidise to form an acidic leachate.

Finally, **Table 2.6** presents an analysis of composition of three samples of the tailings parent material, namely the Braidwood Granodiorite. These results are in line with expected whole rock composition of granodiorite material and there are no elements with the potential to cause significant adverse environmental harm with elevated concentrations. In addition, there is no evidence that the Braidwood Granodiorite releases any elements or leachate with the potential to cause environmental harm in either an unweathered or weathered state. As a result, the tailings material that would be produce through crushing and grinding of the Braidwood Granodiorite would also not be expected to result in the release of any elements or leachate with the potential to cause environmental harm.

2.7.5 Paste Fill Operations

It is noted that the Proponent is currently investigating alternative measures for managing the tailings that would be produced by the Project. This may include using tailings, mixed with cement, to backfill completed stopes within the proposed mine using a process referred to as "paste fill." This process would have the advantage of reducing the amount of tailings that would be required to be placed within the TSF and assisting to stabilise the completed stopes.

Table 2.7 presents the results of initial paste characteristic test work. In addition, **Table 2.7** presents waste classification criteria presented in the document *Landfill Waste Classification and Waste Definitions* published by the Western Australian Department of Environment in 1996. The test work indicates that the paste fill material would comply with Class 1 or 2 material under the those guidelines, namely material for which further leach testing is not required. As a result, the Proponent does not anticipate an significant adverse environmental impacts associated with use of paste fill within the Dargues Reef Mine.

2.8 NON-PRODUCTION WASTE MANAGEMENT

Table 2.8 presents an estimate of the non-production wastes that would be generated during the life of the Project and briefly describes how these wastes would be stored and subsequently removed from the Project Site.

It is noted that during the Planning Focus Meeting held on 18 February 2010, representatives of Palerang Council raised concerns in relation to the volume of non-production waste that would be generated by the Project and the fact that such waste could potentially overwhelm Council's waste management facility in Majors Creek (see Section 3.2.2.2. The Proponent estimates that the Project would result in approximately 52t of general waste material per year. This would predominantly comprise food scraps and other non-recyclable material. This material would be removed from site by a suitably licenced contractor and would be taken to an approved facility other than the Majors Creek waste facility.

The Proponent would ensure that all recyclable material, including cardboard, paper, hydrocarbons, plastics, tyres and metal would be recycled and that the minimum amount possible would be placed within Council's waste facilities.

Table 2.6
Whole Rock Composition - Braidwood Granodiorite

Element	Units	MC1111	MC1116	MC958	Elements	Units	MC1111	MC1116	MC958
Major Elements									
Al2O3	%	14.2	14.05	14.9	MgO	%	2.08	1.96	1.68
BaO	%	0.105	0.067	0.082	MnO	%	0.084	0.09	0.095
CaO	%	3.87	4.07	4.41	Na2O	%	2.35	2.43	2.15
Cr2O3	%	0.003	-0.001	-0.001	P2O5	%	0.154	0.148	0.134
Fe2O3	%	5.16	5.16	5.59	SiO2	%	64	63.7	66.8
K2O	%	3.2	2.81	2.75	TiO2	%	0.61	0.57	0.56
Trace Elements									
Ag	ppm	-1	-1	-1	Sn	ppm	3	3	4
Au	ppm	0.031	0.021	0.004	Sr	ppm	334	338	358
Ba	ppm	864	616	733	Ta	ppm	0.7	0.7	0.7
Ce	ppm	57.8	73.9	78.8	Tb	ppm	1	0.98	0.97
Co	ppm	12.3	11.9	10.5	Th	ppm	12.75	13.75	12.65
Cr	ppm	20	30	20	Tl	ppm	0.5	-0.5	-0.5
Cs	ppm	5.87	3.78	4.19	Tm	ppm	0.5	0.48	0.43
Cu	ppm	21	18	11	U	ppm	3.73	3.36	3.15
Dy	ppm	5.35	5.22	4.98	V	ppm	121	113	133
Er	ppm	3.51	3.39	2.98	W	ppm	-1	-1	5
Eu	ppm	1.51	1.46	1.36	Y	ppm	34.6	32.1	30.2
Ga	ppm	20.6	20.9	18.3	Yb	ppm	3.14	3.06	3.01
Gd	ppm	5.83	5.95	6.24	Zn	ppm	52	56	55
Hf	ppm	6.4	5.6	5.1	Zr	ppm	242	199	213
Ho	ppm	1.17	1.11	0.99	Ag	ppm	0.08	0.06	0.04
La	ppm	28.3	37.6	43.2	As	ppm	0.7	1.1	1.9
Lu	ppm	0.48	0.47	0.43	Bi	ppm	1.82	0.16	0.15
Mo	ppm	6	3	-2	Hg	ppm	-0.005	-0.005	-0.005
Nb	ppm	10.9	10	8.5	Mo	ppm	0.61	1.31	0.52
Nd	ppm	25.7	29.6	31.1	Sb	ppm	0.27	0.15	0.12
Ni	ppm	8	9	11	Se	ppm	0.3	0.2	0.5
Pb	ppm	13	12	18	Te	ppm	0.06	0.04	0.01
Pr	ppm	6.78	8.36	8.37	C	%	0.12	0.05	0.01
Rb	ppm	152.5	130.5	132	S	%	0.02	0.05	-0.01
Sm	ppm	5.83	5.78	6.04					

Note 1: Negative values indicate concentrations below the detection limit.
Note 2: ppm = parts per million
Source: Big Island Mining Pty Ltd

Table 2.7
Paste Fill Characteristics

Element/ Compound	Unit	Concentration	Table 4 DEC disposal Criteria		
			Class 1 or 2	Class 3	Class 4
Ag	mg/kg	<0.2	180	1800	7200
Al	mg/kg	32000	50000	50000	50000
As	mg/kg	25	500	5000	20000
B	mg/kg	6	50000	50000	50000
Ba	mg/kg	210	50000	50000	50000
Be	mg/kg	1.3	100	1000	4000
Cd	mg/kg	0.7	100	1000	4000
Co	mg/kg	1.8	50000	50000	50000
Cr total	mg/kg	150	N/A	N/A	N/A
CrVI	mg/kg	<1	500	500	2000
Cu	mg/kg	58	50000	50000	50000
H_2O[1]	%	0.2	N/A	N/A	N/A
Hg_total	mg/kg	0.04	75	750	3000
Mn	mg/kg	880	50000	50000	50000
Mo	mg/kg	13	1000	10000	40000
Ni	mg/kg	77	3000	30000	120000
Pb	mg/kg	13	1500	15000	60000
Se	mg/kg	<1	50	500	2000
V	mg/kg	32	50000	50000	50000
Zn	mg/kg	45	50000	50000	50000
Ag	mg/L	<0.005	1	10	100
As	mg/L	<0.05	0.5	0.7	7
Be	mg/L	0.001	0.1	1	10
Cd	mg/L	0.026	0.1	0.2	2
CrVI	mg/L	<0.005	0.5	5	50
Hg	mg/L	<0.0001	0.01	0.1	1
Mo	mg/L	<0.02	0.5	5	50
Ni	mg/L	0.05	0.2	2	20
Pb	mg/L	<0.02	0.1	1	10
pH		5.9			
Se	mg/L	<0.05	1	10	100

Note 1: That water within the paste that can be driven off at a temperature of 105ºC.
Source: Big Island Mining Pty Ltd

Table 2.8
Non-Production Waste Management

Waste Type	**Storage**	**Removal**
General waste (including food scraps)	Covered bins located within lunch rooms, offices and elsewhere as required. Where these bins would be located in open areas, they would be fitted with animal-proof lids.	Collected on a regular basis by licensed waste contractor and transported to a licensed waste disposal facility within the Palerang Local Government Area. This material, however, would not be placed within the Majors Creek waste transfer station.
Waste oils and greases	Placed within bunded tank(s) within the workshop area.	Collected on a regular basis by a licensed waste contractor and transported to an appropriately licensed facility for recycling or reuse.
Batteries and tyres	Batteries would be placed within a covered and marked used battery storage area until removed from site. Tyres would be placed within a marked used tyre storage area until removed from site or used for another purpose.	Batteries would be collected on a regular basis by a licensed disposal contractor and recycled at an appropriate facility. Tyres would be reused on site for construction of retaining walls, erosion protection, traffic control or would be removed from site for reuse elsewhere or recycling at an appropriate facility.
Scrap Steel/Metal	Stored in a specified areas within the workshop area or elsewhere as required.	Collected on a regular basis by a scrap metal recycler and recycled at an appropriate facility.
General Recyclables	Covered bins located within lunch rooms, offices and elsewhere as required. Where these bins are located outside a closed building they would be fitted with animal-proof lids.	Collected on a regular basis by a licensed recycling contractor and transported to an appropriate recycling facility within the Palerang Local Government Area. This material, however, would not be placed within the Majors Creek waste management facility.
Used Reagent and Chemical Containers	All containers would be stored in a bunded area until cleaned or removed from site. Where appropriate, containers would be rinsed with water in accordance with the manufactures directions or industry best practice. Rinse water would be returned to the processing circuit. Clean containers would be recycled, where appropriate, or disposed of as general waste. Where onsite rinsing/cleaning is not appropriate, used containers would be removed from site for appropriate treatment off site or would be returned to the manufacturer for refilling and reuse.	
Waste water	Waste water from ablutions facilities would be treated within one or more ‘biocycle’ treatment facilities and the treated water used for irrigation of garden areas or areas undergoing rehabilitation within the Project Site. Separate approval will be required from Palerang Council prior to installation of the proposed waste water treatment facility.	

2.9 TRANSPORTATION

2.9.1 Introduction

This sub-section describes the proposed transportation both within and surrounding the Project Site. The Proponent would prepare a *Transportation Management Plan*, incorporating management measures to minimise the risk of potential safety- and environmental-related impacts associated with transportation prior to commencing mining operations.

2.9.2 Mine Site Transportation

2.9.2.1 Site Access

Construction of the proposed site access road and intersection with Majors Creek Road is described in Section 2.2.3.

All vehicles would normally access the Project Site via Majors Creek Road and the site access road. However, the Proponent notes that the existing site access track (**Figure 2.1**) would remain in place. However, the Proponent would ensure that the gate at the intersection of the existing site access track and Majors Creek Road would be locked and access would be permitted only during emergencies or when the site access road is blocked.

The Proponent would maintain security gates at the site access road in the vicinity of the Proponent's offices. In addition, lockable gates would also be maintained in the vicinity of the intersection between the site access road and Majors Creek Road. Both these sets of gates would be locked when the Project is not operating.

2.9.2.2 Internal Haul Road Network

The Proponent would establish a haul road from the entrance to the box cut to the ROM pad/temporary waste rock emplacement. This road would be designed and constructed in accordance with the following parameters.

- The width of the haul road would be a minimum of three times the width of the largest vehicle likely to travel the road, namely approximately 10m.
- A safety bund, a minimum of half the wheel height of the largest vehicle likely to travel the road, would be constructed on the downslope side of the haul road where the haul road is located adjacent to steep slopes.
- The haul road surface would be sheeted with suitable materials in order to maintain all weather access.
- The haul road would be routinely maintained and watered to suppress the generation of dust.
- The haul road would be constructed to avoid excessive erosion during rain events.
- Appropriate roadside drainage would be installed adjacent to all roads, including the site access road and light vehicle roads, in accordance with the requirements of *Managing Urban Stormwater – Volume 2C Unsealed Roads* published by the then Department of Environment and Climate Change in January 2008.

2.9.2.3 Light Vehicle Road Network

In addition to the site access road and the haul road, a range of light vehicle tracks would be required. These would include the tailings storage facility access road and a range of tracks to permit access to the harvestable rights dams and other locations within the Project Site.

The tracks would be unsealed and would be constructed and maintained in accordance with their intended purpose. The maximum speed limit within the Project Site would be 40km/h.

2.9.2.4 Separation of Mine and Non-mine Traffic

The Proponent would ensure adequate separation of all mine and non-mine traffic through the use of a security gate in the vicinity of the Proponent's offices. All non-mine traffic would be required to stop at the security gate and register with the Proponent. Access to active sections of the Project Site would be restricted to approved heavy and light vehicles and approved drivers. Where non-approved vehicles or drivers require access to the Project Site, they would be escorted.

2.9.3 External Transportation

2.9.3.1 External Road Network

Transport and Urban Planning undertook the traffic assessment for the Project. A copy of that report, referred to hereafter as TUP (2010), is presented as Part 6 of the *Specialist Consultants Studies Compendium* and a summary is presented in Section 4.9. TUP (2010) notes that the principal local roads that would potentially be impacted by the Project are Majors Creek Road, Araluen Road and Captains Flat Road (see **Figure 2.9**). The following provides a brief overview of these roads.

Majors Creek Road

- Average sealed width – 5.8m.
- Average shoulder width – 1m to 1.5m gravel/grass.
- Signposted speed limit – 100km/h.
- Existing traffic management – white guideposts and reflectors, sections of centreline marking (generally where overtaking is not permitted) and advisory signs.

Araluen Road

- Average sealed width – 6.2m.
- Average shoulder width – 1.5m to 2.0m gravel/grass.
- Signposted speed limit – 100km/h.
- Existing traffic management – white guideposts and reflectors, centreline marking and advisory signs. Directional signage is provided at the intersection with Captains Flat Road.

Captains Flat Road

- Average sealed width – 7.0m.
- Average shoulder width – variable gravel.
- Signposted speed limit – 80km/h.
- Existing traffic management – white guideposts and reflectors, centreline marking and advisory signs. Street lighting and directional signage is provided at the intersection with Coghill Street in Braidwood.

2.9.3.2 Transportation Routes

The Proponent anticipates that there would be two principal transportation routes to access the Project Site as follows (**Figure 2.9**).

- From the north or east via Araluen Road and Majors Creek Road.
- From the south via Majors Creek Road.

It is noted that limited numbers of vehicles may approach the Project Site from the east via Araluen Road, Monga Lane and Majors Creek Road (**Figure 2.9**). However, the Proponent anticipates that the number of vehicles that would use this route would be very limited.

In addition, the Proponent anticipates that with the exception of any local contractors who may at times undertake work within the Project Site, all heavy vehicle traffic would access the Project Site from the north. No Project-related heavy vehicles would access the Project Site via Monga Lane.

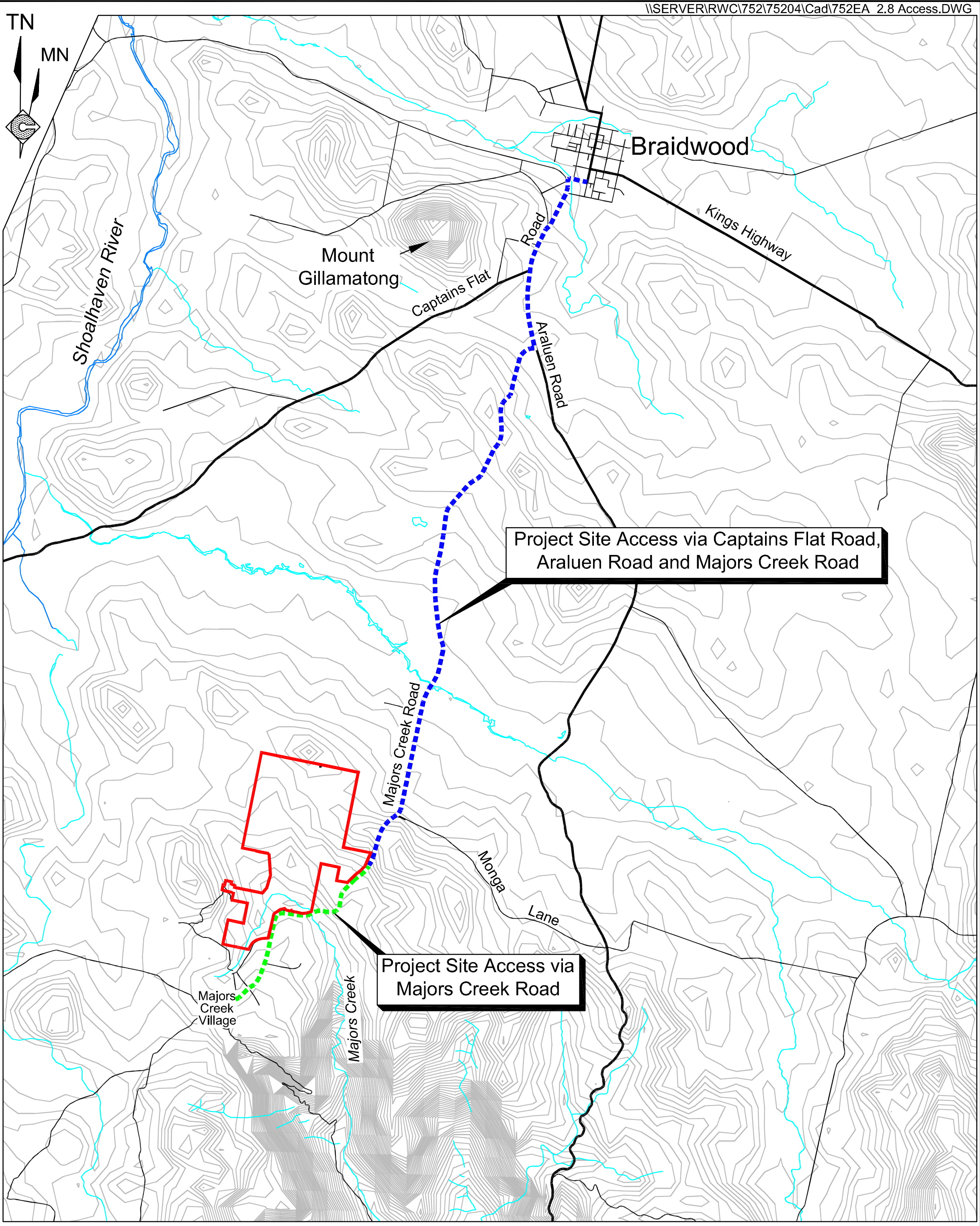
It is noted that most vehicles would travel from and to the Project Site from local population centres such as Majors Creek or Braidwood. However, a number of vehicles may travel from further afield. In particular, consumables such as diesel and processing consumables would likely be sourced from Canberra, Queanbeyan, Sydney or elsewhere. In addition, gold concentrate would be transported to the Proponent’s customers or to port for export. It is noted that the Proponent would expect all drivers of heavy vehicles who would travel through and beyond Braidwood to use identified heavy vehicle routes and avoid, wherever practicable, local roads.

2.9.3.3 Traffic Types and Levels

Traffic types associated with the Project would include the following.

- Light vehicles – including passenger vehicles and light trucks and small buses, principally transporting employees, contractors and visitors to the Project Site.
- Heavy vehicles – including small buses for transportation of Project employees, rigid trucks, and semi-trailers delivering consumables and supplies and transporting concentrate from the Project Site to the Proponent’s customers. It is noted that all concentrate trucks would be covered and no concentrate would be permitted to blow or fall from the truck during transportation.
- Oversize and overweight vehicles – delivering components of the processing plant and mobile fleet. The Proponent would ensure that all oversize and overweight vehicles would have the appropriate permits and approvals and would be appropriately escorted, when required.

\\SERVER\RWC\752\75204\Cad\752EA 2.8 Access.DWG



REFERENCE
- Project Site Boundary
- Contour (Interval = 10m)
- Major Road
- Minor Road
- Creek / River / Drainage Line

SCALE 1:100 000

1 0 1 2 3 4 5 km

Source: Big Island Mining Pty Ltd

Figure 2.8
ROAD TRANSPORTATION ROUTES

Table 2.9 presents the anticipated Project-related traffic levels for each of the principal transportation routes identified in Section 2.9.3.2 during site establishment and operation of the Project.

Table 2.9
Anticipated Operational Daily Traffic Movements[1]

Transportation Rate	Daily Traffic Movements (Average)		
	Light Vehicles	Heavy Vehicles	Total Vehicles
Site Establishment			
Majors Creek Road – North of Site Entrance	24	6	30
Majors Creek Road – South of Site Entrance	6	0	6
Total	**30**	**6**	**36**
Project Operation			
Majors Creek Road – North of Site Entrance	20	18[1]	38
Majors Creek Road – South of Site Entrance	6	0	6
Total	**26**	**18**	**44**
Note 1: Including 4 bus movements.			
Source: Mining Plus Pty Ltd			

2.10 FACILITIES AND SERVICES

2.10.1 Facilities

2.10.1.1 Introduction

The Proponent would establish the following facilities within the Project Site to support the proposed mining and processing operations. This sub-section describes each of these components.

- The office area and car park.
- A workshop, hardstand and laydown area.
- A drill core storage and processing facility.
- An explosives storage area.

2.10.1.2 Office Area and Car Park

The office area and car park would cater for both the Proponent and the mining contractor and would be constructed during the initial stage of the Project and would comprise the following components (**Figure 2.1**).

- A series of demountable buildings that would comprise the Proponent's site office, ablution facilities, first aid room, security and meeting rooms.
- An unsealed car park area.

The Proponent's office area would be located adjacent to the site access road and all visitors would be required to stop at the security gate and register with the Proponent prior to being permitted to access the active sections of the Project Site.

2.10.1.3 Workshop, Hardstand and Laydown Area

The Proponent would establish a workshop hardstand and laydown area to the south of the ROM pad/temporary waste rock emplacement comprising the following components (**Figure 2.1**).

- One or more workshop buildings, each including a concrete sealed floor and vehicle inspection bays. In addition, a concrete-sealed apron would be constructed in front of each service bay. A small bund or containment structure around the perimeter of the building would contain potentially contaminated runoff and all surface water flows would be directed to an oil/water separator.
- A stores facility.
- A vehicle wash down bay.
- A hardstand and laydown area comprising an unsealed area for storage of excess equipment awaiting use or removal from site, or parking of mobile equipment.
- A fuel bay and refuelling area incorporating a covered concrete bunded storage area containing fuel tanks, unused oil and grease, waste oil tank and a concrete sealed refuelling area. The capacity of the bunded area would be 110% of the volume of the largest tank. All potentially contaminated surface water runoff within the refuelling area would be directed to an oil/water separator.

2.10.1.4 Drill Core Storage and Processing Facility

The Proponent would construct a drill core storage and processing facility (**Figure 2.1**) comprising the following components.

- A hardstand core storage area, possibly with core storage racks.
- An unsealed hardstand layout area to allow logging of drill core.
- A core processing facility comprising a small enclosed area with one or more core saws.

2.10.1.5 Explosives Storage Area

The Proponent would construct an explosives storage area or magazine within the Project Site. The explosives magazines would be transportable structures and would comply with all required standards and guidelines. The explosives magazines would be surrounded by a 2.45m high security fence that would also comply with all required standards and guidelines.

It is noted that safety and security issues associated with the proposed explosives storage area are discussed in Section 2.13.2.

2.10.2 Services

2.10.2.1 Introduction

The Proponent would establish the following services within the Project Site to support the proposed mining and processing operations. This sub-section describes each of these components.

- An electricity supply.
- Communications infrastructure.
- Hydrocarbon storage infrastructure.
- Potable and operational water infrastructure.

In addition, this sub-section provides an overview of the proposed operational water harvesting, storage, use and recycling procedures.

2.10.2.2 Electricity Supply

Construction of the proposed electricity transmission line, substations and transformers is described in Section 2.2.2. This sub-section describes the services that would be required to distribute power within the Project Site.

Power for the processing plant and the various buildings within the Project Site would be provided by a distribution system from the proposed substation (**Figure 2.1**).

Power for underground infrastructure, including dewatering pumps, ventilation fans and communication would be provided by an underground distribution system that would be managed by an appropriately qualified, licensed and experienced electrical engineer.

Power for surface water pumps and other infrastructure not located within the main processing plant / office area may be provided by either overhead power lines or by diesel generators.

2.10.2.3 Communications

The Proponent's office, processing plant, underground mine and mining contractor's office would be serviced by telephone and data lines. In addition, surface communications within the remainder of the Project Site would be via two-way radio and/or mobile phone.

2.10.2.4 Hydrocarbons

All diesel fuel for mobile equipment would be stored in tanks with a total indicative capacity of 50 000L within a bunded fuel bay (**Figure 2.1**). Bunding would be sized to meet the relevant containment requirements and Australian Standard AS 1940:2004, namely the bunded areas would have a capacity of 110% of the volume of the largest tank.

A sealed refuelling area would be located adjacent to the fuel bay with all drainage directed to an oil/water separator. All haul trucks and other mobile equipment that would regularly access the surface would utilise the refuelling area while the jumbos, underground loaders, pumps and other less mobile equipment would be refuelled at their work site using a mobile fuel tanker or tray-mounted fuel tanks.

Any bulk oils, greases and waste oils would be stored within the fuel bay or a similarly bunded area. In addition, smaller bunded areas would be maintained within the workshop areas for the storage of hydrocarbons or waste oils to be used or generated during servicing operations.

Appropriate hydrocarbon spill kits would be located in the vicinity of all hydrocarbon storage areas and the Proponent would ensure that all contractors and employees are appropriately trained in their use.

2.10.2.5 Potable Water

Potable water would be transported to site as required in bulk or in 20L containers. Water for ablutions purposes would be sourced from the harvestable rights dams.

2.10.2.6 Operational Water

The Project would require a maximum of approximately 885ML of water per year for processing operations. Of the required 885ML, the Proponent estimates that approximately 755ML would be recovered through the thickener within the Processing Plant or from the tailings storage facility. As a result, the Project would require approximately 130ML per year of ‘new’ or makeup water.

As identified in Section 2.4.6, however, the proposed maximum production rate would not be achieved until Year 4, with a gradual increase in production to that point as additional mining areas become available and a gradual decrease in production after Year 4 as mining areas are completed. As a result, the makeup water requirements during most years would be significantly less than 130ML.

In addition to the above makeup water requirements, the Proponent would require water for dust suppression operations. SEEC (2010a) estimates that based on an assumed 3ha of exposed, unsealed surfaces and a watering requirement of $4mm/m^2/day$, that approximately 0.12ML/day of water would be required for dust suppression purposes. Taking into account the fact that dust suppression is only required on non-rainy days, SEEC (2010a) estimate that approximately 18.4ML /year would be required for dust suppression purposes.

Finally, **Table 2.10** presents the estimated Project-related reduction in discharge of groundwater into Majors and Spring Creeks from the commencement of mining operations until 5 years after the cessation of those operations. Further details in relation to the Groundwater Assessment are presented in Section 4.4.

Table 2.10
Estimated Project-Related Reduction in Groundwater Discharge

From	To	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Moruya Catchment (L/s)							←End of mining operations				
Granodiorite aquifer	Spring Creek	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Granodiorite aquifer	Majors Creek	0.7	1.2	1.5	1.6	1.7	1.2	0.6	0.3	0.1	0.05
Alluvial aquifer	Granodiorite aquifer	0.05	0.1	0.1	0.1	0.1	0	0	0	0	0
Total	**L/s**	**1.05**	**1.6**	**1.9**	**2.0**	**2.1**	**1.5**	**0.9**	**0.6**	**0.4**	**0.35**
	ML/year	**33.1**	**50.4**	**59.9**	**63.0**	**66.2**	**47.3**	**28.3**	**18.9**	**12.6**	**11.0**
Proposed Environmental Release (ML/year)		**33.1**	**50.4**	**59.9**	**63.0**	**66.2**	**47.3**	**28.3**	**-**	**-**	**-**
Shoalhaven Catchment (L/s)											
Granodiorite aquifer	Shoalhaven Catchment	0	0.1	0.2	0.31	0.42	0.42	0.4	0.32	0.22	0.1
Source: AGE (2010) - After Table 10											

The groundwater assessment determined that the Project would result in reduced groundwater discharge to Majors and Spring Creeks. The estimated reduced discharge would vary from approximately 1L/s (33.1ML/year) in the first year of mining operations, to a maximum of approximately 2.1L/s (66.2ML/year) in the final year of mining operations. Following the cessation of mining operations, groundwater discharge rates are expected to gradually return to pre-mining levels.

In order to compensate for the anticipated reduction in base flows in Majors and Spring Creeks, the Proponent would release water to Majors Creek downstream of the anticipated area of groundwater drawdown. The volume to be release annually would vary in line with the anticipated reduction in groundwater discharge to Majors and Spring Creeks. The Proponent would cease to release water to Majors Creek when the estimated reduction in groundwater discharge falls below 0.75L/s. As a result, the anticipated rate of release would vary from approximately 33.1ML/year in Year 1 to 66.2ML/year in Year 5 before reducing to 28.3ML/year in Year 7.

As a result, the Proponent would ensure that the existing baseflow within Majors Creek is maintained during the life of the Project and for the period following until groundwater discharge rates have recovered to an acceptable level.

The Proponent would, where practicable, ensure that that the quality of water released to Majors Creek conforms with the following water quality criteria identified in the Australian and New Zealand Environment and Conservation Council guidelines (ANZECC, 2000) for aquatic ecosystems associated with upland rivers in south-east Australia.

- pH - 6.5 to 7.5.
- Electrical conductivity (a measure of salinity) - <350µS/cm.

- Nitrate as N - 0.7mg/L.
- Total Phosphorus - 0.02mg/L.

This would be achieved through preferential use of water within the harvestable rights dams release to Majors Creek. Testing of water released to Majors Creek to ensure compliance with the above requirements would be undertaken as described in Section 4.5.7.

As a result, the anticipated maximum Project-related water requirement would be approximately 215ML/year.

The required operational and environmental water would be obtained from the following sources, in priority order.

- Groundwater that would be removed from the proposed Dargues Reef Mine during mining operations (for processing operations).
- Surface water from the proposed harvestable rights dams (for the proposed environmental releases).
- Groundwater from the historic Snobs, Stewart and Mertons and United Miners workings (for processing operations). It is noted that the Snobs workings are located on land not owned by the Proponent. The Proponent has commenced negotiations with the owners of that land and no water would be extracted from those workings until a suitable arrangement has been agreed to by both parties.

The Groundwater Assessment (AGE, 2010) determined that between 9L/s and 10L/s of groundwater would initially flow into the proposed Dargues Reef Mine, reducing to approximately 7L/s throughout the life of the Project (see Section 4.4.5.1). However, the Proponent anticipates that water losses associated with circulation of mine ventilation air and removal of broken rock from the mine would account for approximately 1L/s of that water. In addition, further water losses are expected as a result of water retention within the proposed mine. As a result, for the purposes of this assessment, the Proponent has conservatively assumed that 4L/s, or 126ML/year, of water would be required to be removed from the proposed mine. This water would be pumped to a small structure on surface and then to the mine water tanks.

As a result, additional water for processing operations would be required from other sources. The Proponent anticipates that this water would preferentially be drawn from the historic Snobs, Stewart and Mertons and United Miners workings (**Figure 2.3**). A maximum of 79ML/year of water would be extracted from the historic workings.

In addition, the Proponent would preferentially extract water for environmental release from each of the harvestable rights dams in a manner that would draw each down at approximately the same rate.

SEEC (2010a) has undertaken an analysis of the surface water supply and use requirements for the Project based on:

- the above operational procedures;
- 100 years of rainfall data;

- an operational water requirement of 148.4ML per year; and
- an environmental release water requirement of 66.2ML per year.

An overview of that water balance is presented in Section 4.5.5 and is summarised below.

- The Groundwater Assessment for the Project conservatively indicated that a minimum of 4L/s or 126ML/year could be obtained from dewatering operations within the Dargues Reef Mine (see Section 4.4.5.1). As a result, a maximum of approximately 22ML/year of additional water for mining-related purposes would be required. That water would be sourced from the historic workings.
- The proposed harvestable rights dams could supply the required water for environmental releases on 97% of the modelled days and that during the driest year on record, approximately 33ML of additional water would be required. That water would be sourced from the historic workings.
- As a result, the maximum amount of water that would be drawn from the historic workings is expected to be 55ML/year. It is noted that the Groundwater Assessment assumed a rate of groundwater extraction of 79ML/year.

2.11 PROJECT LIFE AND HOURS OF OPERATION

2.11.1 Project Life

The Proponent anticipates that mining operations would be completed within approximately five years. However, in the event that the proposed rate of mining is lower than anticipated or more ore material is identified, up to an additional two years may be required. In addition, following completion of mining operations, site decommissioning and rehabilitation operations may take up to two years. As a result, the proposed Project life would be nine years.

Throughout the life of the mine, the Proponent plans to explore for possible extensions to the known mineralisation and for new areas of mineralisation within its mining tenements. Further ore reserves indicated by this program may extend the Project life. Separate applications for approval to extract those ore reserves would be made at that time.

2.11.2 Hours of Operation

Table 2.11 presents the proposed hours of operation for each of the relevant components of the Project.

Table 2.11
Proposed Hours of Operation

Activity	Proposed Days of Operation	Proposed Hours of Operation[1]
Vegetation clearing and topsoil stripping	7 days a week, during each campaign	Daylight hours
Construction operations – Box cut	7 days a week	Daylight hours
Construction operations – Remainder	7 days a week	24 hours per day
Underground mining operations	7 days a week	24 hours per day
Maintenance operations	7 days a week	24 hours per day
Processing operations	7 days a week	24 hours per day
Transportation operations[1]	7 days a week	7:00am to 10.00pm
Rehabilitation operations	7 days a week	7:00am to 10.00pm
Source: Big Island Mining Pty Ltd		
Note 1: Transportation using heavy vehicles may occasionally occur between 10:00pm and 7:00am for operational or other emergencies.		

2.12 EMPLOYMENT, CAPITAL COST AND ECONOMIC CONTRIBUTIONS

The Proponent estimates that the Project would make the following employment and economic contributions to the surrounding communities.

- Approximately 100 full-time equivalent positions during the construction phase of the Project.
- Up to approximately 80 full-time equivalent positions during the operational phase. This would be divided approximately equally between employees of the Proponent and the mining contractor.
- The capital cost of the Project is anticipated to be approximately $42 million.
- The Project would contribute approximately $3 million to $7 million per year to the local and regional economy through wages and purchases of local goods and services.
- 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.
- The Project would contribute approximately $1 million to $8 million per year to the local, State and national governments through the payment of rates, taxes and royalties.

2.13 SAFETY AND SECURITY

2.13.1 Public and Employee Safety

The Proponent recognises that the proximity of the Project Site to the village of Majors Creek and Majors Creek Road would necessitate the implementation of procedures and controls to protect the safety of the public. In addition, measures would be implemented to ensure the safety of visitors to the Project Site, contractors and employees as well as ensuring the security of facilities and equipment from unauthorised access.

It is the Proponent's policy that each person employed on, or visiting the Project Site would be provided with a safe and healthy working environment. In order to achieve this, the Proponent would implement a recruitment, induction and training program to achieve the following objectives.

- Compliance with statutory regulations and maintain constant awareness of new and changing regulations.
- Eliminate or control safety and health hazards in the working environment in order to achieve the highest possible standards for occupational safety in the mining industry.
- Ensure the suitability of prospective employees through a structured recruitment procedure.
- Provide relevant occupational health and safety information and training to all personnel.
- Develop and constantly review safe working practices and job training.
- Conduct regular safety meetings and provide an open forum for input from all employees.
- Provide effective emergency arrangements for all employees, visitors and general public protection.
- Maintain good morale and safety awareness through regular employee assessment and counselling.
- Ensure all contractors adopt and maintain Proponent's policy objectives and safety standards at all times.

Central to all aspects of site public and employee safety would be the following.

- Adoption of a pro-active approach to employee and public safety.
- Strict compliance at all times with the requirements of the following.
  - Mine Health and Safety Act 2004.
  - Mine Health and Safety Regulation 2007.
  - General Rule 2000.
  - Occupational Health and Safety Act 2000.

- Occupational Health and Safety Regulation 2001.
- Occupational Health and Safety (Dangerous Goods) Act 2003.
- Explosives Act 2003.
- Explosives Regulation 2005.
- Dams Safety Act 1978.
- All other relevant legislation and Australian Standards.

- Preparation of an *Occupational Health and Safety Policy* to cover all component activities at the mine.

Specifically, the following safety and security measures would be implemented.

- A *Mine Safety Management Plan*, including a Contractor Safety Management Plan, would be prepared in accordance with the requirements of the *Mines Health and Safety Act 2004*.
- The existing rural boundary fence around the Project Site would be maintained and signage erected to prevent inadvertent assess to the Project Site. In addition, additional fences, including security fences, would be erected around the operational sections of the Project Site, as required.
- A safety bund approximately 2m high would be constructed around the perimeter of the box cut. This bund would remain in place following completion of mining-related activities.
- An automated vehicle gate operated by swipe card would be installed in the vicinity of the office area. This would be the only vehicular access point to the operational sections of the Project Site. Non-Project related vehicles would be required to report to the site office before being permitted to enter the operational sections of the Project Site.
- Security/warning signs would be positioned at strategic locations around or within the Project Site indicating the presence of earthmoving and mining equipment, deep excavations and steep slopes. The positioning of signs would depend on the location of the mining activities at any one time.
- Signs identifying blasting procedures and times would also be installed adjacent to the approached to the Box Cut.
- Employee and contractor inductions would include safe working practices and regular follow-up safety meetings and reviews.
- Toolbox meetings would be held regularly and would include a review of safety-related matters.
- Regular drug and alcohol testing would be undertaken in accordance with the Proponent's Drug and Alcohol Policy.

- Where internal roads are adjacent to steep slopes, windrows along the down-slope margins of those haul roads would be constructed to a minimum of half the wheel height of the largest item of mobile equipment on-site.
- Appropriate controls with respect to the use of explosives such as an *Explosives Safety and Security Plan* for storage and handling of explosives would be implemented to ensure compliance with statutory requirements at all times.
- The blasting engineer or shotfirer would use appropriate blasting procedures to contain all fly rock within the design blast envelope and minimise the generation of excessive ground and air vibrations.
- All earthmoving equipment would fitted with appropriate safety equipment in accordance with the *Guideline for Mobile and Transportable Equipment for Use in Mines* (MDG 15) published by the Department of Primary Industries – Mineral Resources.

2.13.2 Explosive Storage

Detonators, boosters, packaged and bulk explosives would be stored within magazines within a dedicated explosives storage area. This area would be secured by a 2.45m high security fence that would extend into the ground and would be topped with barbed wire and a lockable gate. In addition, the explosives storage area would be the subject of regular inspection by security personnel working for or contracted to the Proponent. The magazines would likely be transportable structures, which would be constructed, secured, maintained and permitted in accordance with the relevant guidelines.

2.14 SITE REHABILITATION AND DECOMISSIONING

2.14.1 Introduction

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 vegetated 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 following sub-sections describe the Proponent's rehabilitation objectives and the proposed final landform on completion of all proposed mining and associated disturbance. The procedures to be applied to each component of the mine, the water management structures and other areas of disturbance associated with the mining activities are also outlined. Refinements to these procedures, if required, would be undertaken on the basis of operational experience gained by the Proponent, or by others at similar operations. These refinements would be reported in the relevant Annual Environmental Management Report (AEMR) and/or any amended Rehabilitation and Environmental Management Plan(s) produced by the Proponent throughout the life of the Project.

2.14.2 Rehabilitation Objectives

The Proponent's rehabilitation objectives for all areas of mine-related disturbance within the Project Site can be defined in the short term and long term as follows.

Short Term Objectives

- Stabilise all disturbed areas no longer required for Project-related activities. This would help minimise erosion and dust generation, as well as reducing the visual impact of the proposed operation upon surrounding residents. This would be achieved through progressive reshaping, spreading of topsoil and seeding of areas no longer required for operational purposes.
- Reduce the visual impact for surrounding residents by early establishment of vegetation in areas where mining-related operations have been completed or in other areas of the Project Site.

Long Term Objectives

- Provide a low maintenance, geotechnically stable, non-polluting and safe landform which blends with surrounding landforms and provides land suitable for the final land use of nature conservation and/or agriculture.

2.14.3 Final Landform and Land Use

2.14.3.1 Final Landform and Rehabilitation Domains

Figure 2.9 presents the proposed final landform. In summary, the final landform would include the following components.

- A bunded and fenced box cut with the portal sealed and backfilled 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.
- An appropriately rehabilitated site access track. A suitable light vehicle track would remain to permit access to the areas under rehabilitation.

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

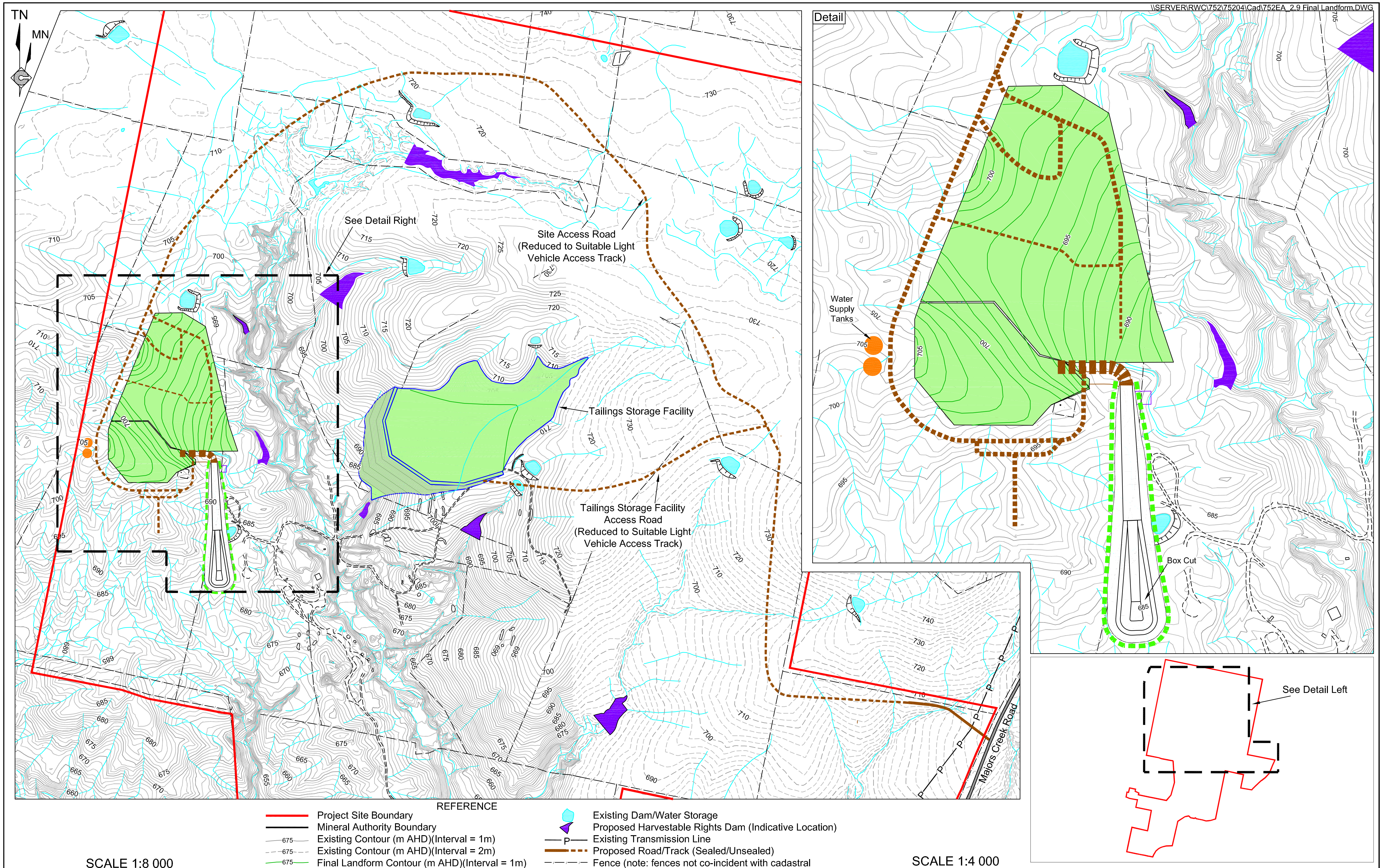


Figure 2.9
INDICATIVE FINAL LANDFORM

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2.14.3.2 Final Land Use

As indicated in Section 2.15, the Proponent would, in consultation with DECCW, prepare a *Property Vegetation Plan* under the *Native Vegetation Act 2003* over the northern section of the Project Site. That plan would operate in perpetuity and would identify that areas of existing Ribbon Gum woodland would be fenced and used for nature conservation in perpetuity. In addition, areas of existing pasture and grassland would be used for managed agricultural operations, namely grazing. Such operations would be undertaken in a manner that would be consistent with regeneration of native grass species.

The southern section of the Project Site would continue to be managed in a manner that would be consistent with a landholder's obligations, including to manage weeds, feral pests and erosion. The southern section of the Project Site would be used for agricultural purposes.

Alternative land uses considered by the Proponent and rejected include the following.

- Industrial land uses - The Proponent notes that the processing plant and office areas may be suitable for a number of industrial uses, particularly taking into account the fact that power, water and site access will be in place. However, it is further noted that no development approval exists for such uses and amendments may be required to the Tallaganda LEP or subsequent documents to permit such uses. As a result, such was rejected by the Proponent.
- Nature conservation - The Proponent considered revegetating the entire northern section of the Project Site with species representative of the Ribbon Gum - Snow Gum grassy open forest. However, during consultation with DECCW, it was indicated that that Department would not support such a final land use and that preservation of t he grassland habitat was the Department's preferred option

2.14.4 Progressive Rehabilitation

Limited areas of proposed disturbance would be available for progressive rehabilitation during active mining operations. However, the Proponent would undertake progressive rehabilitation, including spreading of topsoil and revegetation as described in Section 2.14.10, in those sections of the Project Site that would no longer be required for mining-related purposes. These would include the following.

- The downstream face of the TSF.
- The footprint of the temporary waste rock emplacement, once waste rock material has been transported back underground.
- Exploration sites that would no longer be required for ongoing exploration-related operations.

2.14.5 Decommissioning of Infrastructure and Services

Following completion of mining-related operations, and assuming that no further mining operations are proposed, the Proponent would remove infrastructure and services specifically established to service the mining operation that would no longer be required. This would include the processing plant and associated infrastructure. Other items of infrastructure would remain provided that a subsequent use can be identified. Indicatively, this may include the following.

- Water reticulation system, including the water supply tanks.
- Electricity transmission line, substation and transformer.
- Site buildings, including the office and workshops.
- Site access road.

All concrete footings and foundations of buildings or structures to be dismantled or demolished, if any, would be broken up and removed from site and used within the Project Site during rehabilitation operations and all areas to be rehabilitated would be re-profiled to near pre-mining levels. Previously stockpiled soil material would be re-spread over all areas to be rehabilitated and the areas would be revegetated as described in Section 2.14.10.

2.14.6 Box Cut, Portal and Ventilation Rise

The box cut, portal and ventilation rise would remain following completion of the Project. A bund and security fence would be constructed around the box cut during the life of the Project and these would be extended to prevent inadvertent access once mining operations have been completed. In addition, the portal would be sealed in accordance with the relevant guidelines applicable at the time. The method of sealing would permit re-opening of the portal if required.

The ventilation rise would similarly be fenced during the life of the Project. Once decommissioned, the rise would be sealed in accordance with the relevant guidelines applicable at the time.

2.14.7 ROM Pad/Temporary Waste Rock Emplacement

The ROM pad/Temporary Waste Rock Emplacement would be partially removed during the life of the Project as waste rock material is transported back underground for use during stope backfilling operations.

The ROM pad would be constructed of either low grade material, namely material with insufficient gold to justify processing at the time it is mined, or waste rock material. Once mining operations have been completed, low grade material, if present, may be processed within the processing plant. Alternatively, low grade material, together with waste rock material, and/or broken/crushed concrete would be transported to and placed within the box cut to seal the portal or used during rehabilitation of other sections of the Project Site, including the TSF.

Once complete, previously stockpiled soil material would be re-spread over all areas to be rehabilitated and the areas would be revegetated as described in Section 2.14.10.

2.14.8 Tailings Storage Facility

The TSF would, following completion of mining-related operations, be allowed to dry out and settle. Once complete, the facility would be shaped to form a free draining landform, capped with suitable material, revegetated and appropriate surface water control structures installed. The capping material would include subsoil and topsoil material stripped during the site establishment phase. A clay capping would not be used to prevent problems with waterlogging of the final landform. Infiltration of surface water would, to the greatest extent practicable, be limited through the establishment of a suitable vegetation cover and associated evaoptranspiration of water within the upper sections of the soil profile.

Figure 2.10 presents an indicative layout of the reshaped TSF. Further details would be provided in the Rehabilitation and Environmental Management Plan that would be prepared prior to the commencement of mining operations, assuming that project approval is granted.

Once shaping operations are complete, previously stockpiled soil material would be re-spread over all areas to be rehabilitated and the areas would be revegetated as described in Section 2.14.10.

2.14.9 Other Areas of Disturbance

On completion of all mining-related and associated activities, the Proponent would:

- remove and rip all remaining internal roads tracks, with the exception of the site access road, spread subsoil and revegetate;
- remove buildings and rip or scrape the compacted floor of hardstand areas not required for subsequent land uses, spread subsoil and topsoil and revegetate; and
- install appropriate drainage controls.

2.14.10 Spreading of Soil and Revegetation

The MOP that would be prepared prior to commencement of mining operations would provide detailed descriptions of soil spreading and revegetation operations. In addition, the *Biodiversity Management Plan* would include a detailed list of species that would be used during rehabilitation operations and where and how particular species would be planted, including within areas to be rehabilitated. In summary, however the Proponent would only use species endemic to the local area and all seed or tube stock, where practicable, would be sourced within or surrounding the Project Site. In addition, areas that are currently grassland or pasture would, where practicable, be returned to native grassland.

In summary, the following procedures would be implemented during soil spreading and revegetation operations. **Figure 2.10** presents the vegetation types that would be established within the Project Site.

- Soil materials would be placed in the order in which they were removed, namely subsoil first with topsoil on top.

- Soil materials would be placed broadly in the same thickness as they were stripped, namely topsoil between 300mm and 350mm thick and subsoil between 1 100mm and 1 400mm thick. It is noted, however, that these thicknesses may vary depending on the amount of soil stockpiled and the area remaining to be rehabilitated.
- Soil materials would be treated appropriately to remediate any factors that may limit the success of the revegetation program. Expert advice would be sought at the time; however, in general, disturbed areas would typically be revegetated to native grassland, superphosphate- based fertilisers would not be used.
- Areas to be revegetated to native grassland would indicatively be spread with an appropriate seed mix and track rolled. These would include all areas of proposed disturbance, with the exception of the box cut area.
- Areas to be revegetated to Ribbon Gum Woodland would be planted with a mixture of appropriate species of tube stock, with direct seeding used between tube stock plantings. These would primarily include areas of existing disturbance within the fragmented Ribbon Gum Woodland
- If required, a sterile cover crop may be planted to limit the potential for erosion and sedimentations until the native species have become established.
- Areas of revegetation would be fenced to manage grazing pressure until the revegetated area becomes self sustaining. It is noted that the Biodiversity Offset Strategy would permit grazing for biodiversity purposes and that stock would not be excluded from the Project Site.

2.14.11 Rehabilitation Management and Monitoring

The Proponent’s commitment to effective rehabilitation would involve an ongoing monitoring and maintenance program following completion of mining-related operations. Areas being rehabilitated would be regularly inspected and the following would be noted.

- Evidence of any erosion or sedimentation from areas with establishing vegetation cover.
- Success of initial cover crop or grass cover establishment.
- Success of tree and shrub plantings.
- Natural regeneration of native species.
- Adequacy of drainage controls.
- General stability of the rehabilitated areas.

Post-mining rehabilitation remediation and enhancement activities would include but not be limited to the following.

- Where rehabilitation success appears limited, maintenance activities would be initiated. These may include re-seeding and where necessary, re-topsoiling and/or the application of specialised treatments.

- If drainage controls are found to be inadequate for their intended purpose, or compromised by wildlife or native vegetation, these would be replaced.
- Temporary fences would be installed to exclude native fauna, if grazing appears to be excessive.
- In the event areas of excessive erosion and sedimentation are identified, remedial works such as importation of additional fill, subsoil or topsoil material, or redesigning of water management structures would be undertaken.
- Appropriate noxious weed control or eradication methods and programs would be undertaken in consultation with I&I NSW (Agriculture) and / or the local Noxious Weeds Inspector.

No time limit has been placed on post-mining rehabilitation monitoring and maintenance. Rather, maintenance would continue until such time as the objectives outlined in Section 2.14.2 are achieved to the satisfaction of the relevant government agencies.

2.15 BIODIVERSITY OFFSET STRATEGY

2.15.1 Introduction

The DGRs issued on 23 April 2010 require that the Proponent provide a:

> *"detailed description of the measures that would be implemented to maintain or improve the regional biodiversity values in the medium to long term."*

Section 2.14 provides a description of the proposed rehabilitation operations. This sub-section provides an indicative description of the proposed Biodiversity Offset Strategy, the consultation that was undertaken during preparation of the strategy and a description of how the strategy would be secured in the long term.

It is noted that the Proponent would, following further consultation with relevant stakeholders, including DECCW, DoP, Southern Rivers Catchment Management Authority (Southern Rivers CMA) and the surrounding community, prepare a detailed *Biodiversity Offset Plan* that would provide further details on the implementation of the strategy. It is envisaged that the strategy would be prepared within 12 months of receipt of project approval.

As indicated in Section 2.3.2, it is noted that the Project would result in disturbance to the following vegetation communities.

- 0.1ha of Ribbon Gum – Snow Gum grassy open forest.
- 0.1ha of fragmented Ribbon Gum – Snow Gum grassy open forest.
- 0.1ha of woody weeds.
- 0.2ha of exotic vegetation comprising planted wind breaks.
- 0.2ha of native grassland.
- 23.7ha of native-dominated pasture.

A further 2.2ha of land that has been largely disturbed by historic mining operations would also be disturbed.

The Biodiversity Offset Strategy would seek to compensate for this disturbance and ensure that the Project resulted in a net improvement in biodiversity over time.

2.15.2 Consultation

During preparation of this document, the Proponent consulted with Dr Sandie Jones and Ms Erin Papps of DECCW in relation to the results of the Ecology Assessment and the proposed Biodiversity Offset Strategy. This culminated in a meeting between Dr Jones, Ms Papps, Mr Garry Daley of Gaia Research (ecological consultant), Mr Greg Cozens of Cortona Resources and Mr Mitchell Bland of RWC on 7 May 2010. At that meeting, it was agreed that the majority of area that would be disturbed as a result of the Project is grassland or pasture and that it would not be appropriate to re-establish woodland in areas of existing grassland or pasture as part of any Biodiversity Offset Strategy. In addition, it was agreed that continued use of any identified Biodiversity Area for agricultural purposes would be appropriate, provided that use was in accordance with agreed management principles and that those principles were consistent with management of the land for biodiversity purposes.

2.15.3 Proposed Biodiversity Area

The proposed Biodiversity Area is presented in **Figure 2.10** and comprises Lot 102 DP755934 and Lot 1021 DP1127185. The entire Biodiversity Area is owned by the Proponent and is approximately 272ha in size. The Biodiversity Area includes the majority of those areas that would be disturbed and subsequently rehabilitated during the life of the Project.

2.15.4 Proposed Strategy

The proposed Biodiversity Offset Strategy would indicatively include the following.

- Identification and fencing, where required, of areas of Ribbon Gum Grassy Open Forest, including areas of fragmented Ribbon Gum Grassy Open Forest, creek bank stabilisation, active mining and ongoing rehabilitation.
- Ameliorative planting of locally endemic tree and shrub species within areas of Ribbon Gum Grassy Open Forest to provide further habitat for threatened and other native species.
- Continued soil stabilisation works, including planting of suitable species, adjacent to existing drainage lines to limit further gully development and stabilise those drainage lines in the long term.
- Continued grazing of areas of grassland / pasture. Such grazing would be undertaken strictly in accordance with *Biodiversity Strategy Plan* that would ensure that the biodiversity value of those grasslands / pastures is improved over time. This may involve limiting the times of year in which grazing is permitted and ensuring that an appropriate biomass levels are maintained.

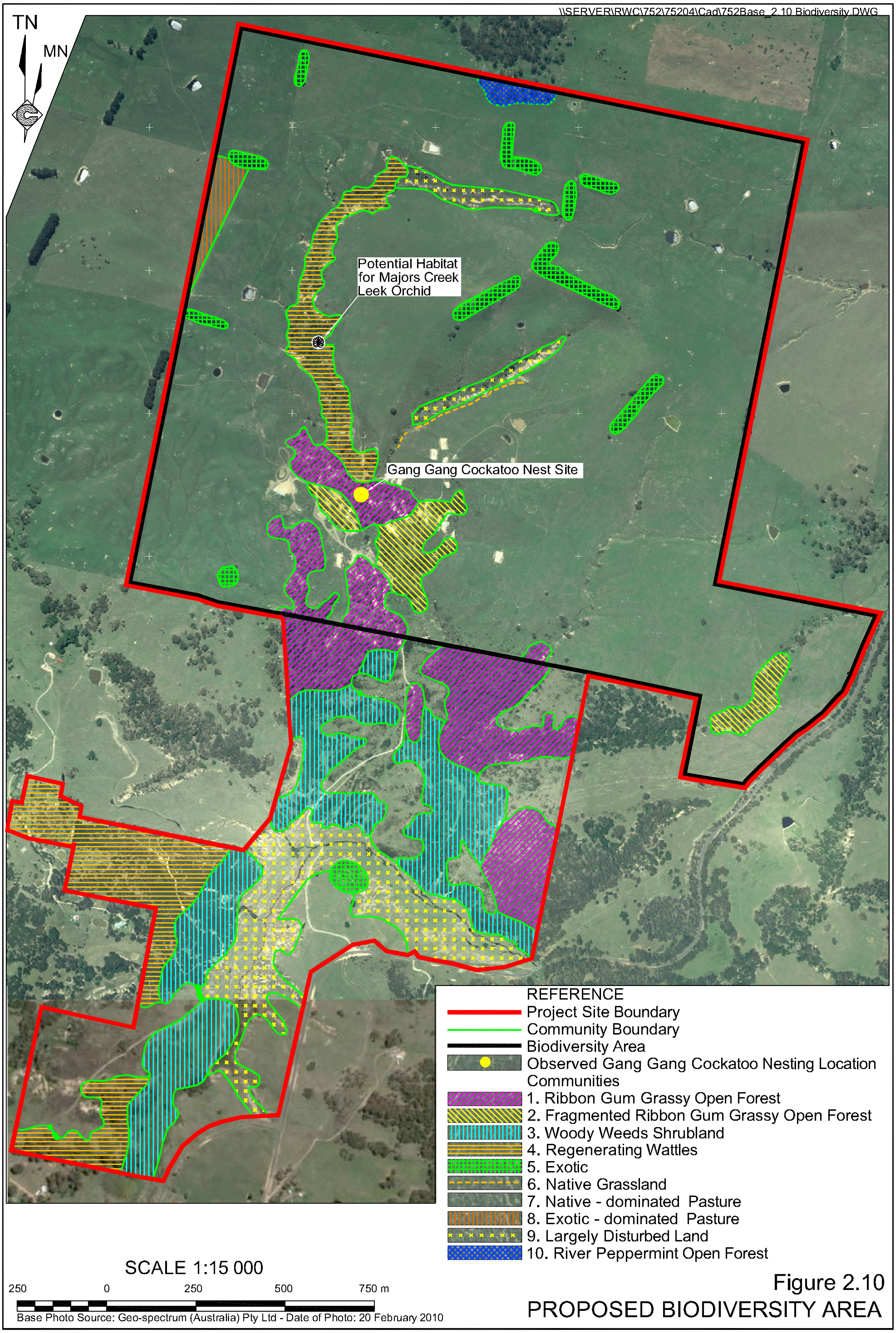

Figure 2.10
PROPOSED BIODIVERSITY AREA

- Ensure that all other agricultural activities are consistent with increased biodiversity value of the grassland / pasture areas, including refraining from the use of inappropriate fertilisers or tilling of the ground.
- Collect and spread the seed of suitable native grass species within grassland areas.
- Manage weeds and feral animals within the Biodiversity Area and elsewhere within the Project Site through annual weed and pest inspection and eradication programs.

2.15.5 Proposed Method of Securing the Strategy

The Proponent acknowledges that the proposed Biodiversity Strategy will be required to be secured in the perpetuity. As a result, the Proponent would, following further consultation with the above government agencies, prepare the *Biodiversity Offset Plan* in accordance with the requirements for a Property Vegetation Plan under Part 4 of the *Native Vegetation Act 2003* (NV Act). That plan would be placed on a register under the *Real Property Act 1900* in accordance with Section 31(2)(b) of the NV Act and would, as a result, be secured in perpetuity.

2.16 ALTERNATIVES CONSIDERED

2.16.1 Introduction

The Director-General's requirements issued on 23 April 2010 required that the *Environmental Assessment* include a description of the *alternatives considered, including a detailed justification for the proposed mine plan*. This sub-section identifies the feasible alternative Project design options considered and rejected during the design and planning phase of the Project, identifies the potential benefits of each alternative and the reason why each was rejected. The alternatives considered include:

- use of open cut mining methods;
- use of cyanide;
- hours of construction;
- box cut and temporary waste rock emplacement location;
- ventilation fan location;
- plant location;
- crusher housing;
- tailings storage facility location; and
- site access road location.

The alternative of not developing the proposed open cut is considered in Section 6.2.5.

2.16.2 Use of Open Cut Mining Methods

The Proponent initially considered extracting the identified gold-bearing ore using an open cut mining method. The proposed sublevel open stope mining method requires that pillars and sills of ore material be left at the completion of mining operations to ensure the stability of the surrounding rock mass. Open cut mining would, however, have allowed for the complete extraction of all ore material, potentially in a reduced time period.

This alternative would, however, have resulted in the following.

- A much larger waste rock emplacement that would have been a feature of the final landform.
- Use of more and larger plant to move the larger amounts of material that would have been required to be moved, resulting in increased noise, dust and visual amenity impacts.
- Disturbance of a area of Ribbon Gum Forest, with numerous hollow-bearing trees and habitat for a number of threatened species, including the Gang-gang Cockatoo.

Finally, as indicated in Section 3.2.2.1, the community during initial consultation indicated strongly that they would prefer to see underground rather than open cut mining operations. As a result of this and for the reasons outlined above, this alternative was rejected.

2.16.3 Use of Cyanide

The Proponent considered the use of cyanide to recover gold during processing operations. This alternative would have allowed for the complete recovery of gold on site, negating the need for transporting of a gold concentrate from the Project Site and maximising the level of value adding that the Proponent could undertake. However, the use of cyanide may have resulted in the generation of cyanide-contaminated leachate from the tailings storage facility. In addition, as indicated in Section 3.2.2.1, the community during initial consultation indicated strongly that they would prefer not to see cyanide used within the Project Site. This was particularly strongly expressed by those who rely on water within Majors Creek and Araluen Creek and their associated aquifers, for their water supply. As a result, the Proponent provided a commitment that cyanide would not be used within the Project Site.

2.16.4 Hours of Construction

The Proponent initially proposed to undertake all construction operations 24 hours per day. This would have allowed for the most efficient use of resources and minimise the time required to complete site establishment operations. This would, however, have resulted in noise emissions that would have exceeded the relevant noise criteria identified in *NSW Industrial Noise Policy* (EPA, 2000) at a number of surrounding residences. As a result, the Proponent amended the Project to limit bulk earthworks to the period 7:00am to 6:00pm.

2.16.5 Box Cut and Waste Rock Emplacement Location

The Proponent initially considered locating the box cut and temporary waste rock emplacement further to the south of the proposed locations. **Figure 2.11** presents the original location of the box cut and waste rock emplacement.

This would have resulted in reduced material movements to establish the portal because the box cut would have cut into a small hill and the depth to weathering would have been slightly less than for the area currently proposed. However, this alternative box cut location would have required the disturbance of an area of Ribbon Gum Forest, including a number of hollow-bearing trees and habitat for threatened species, including Gang-gang Cockatoo. As a result, the Proponent re-designed the box cut to ensure that no hollow-bearing trees would be disturbed. As a result of this amendment, the location of the temporary waste rock emplacement was also modified.

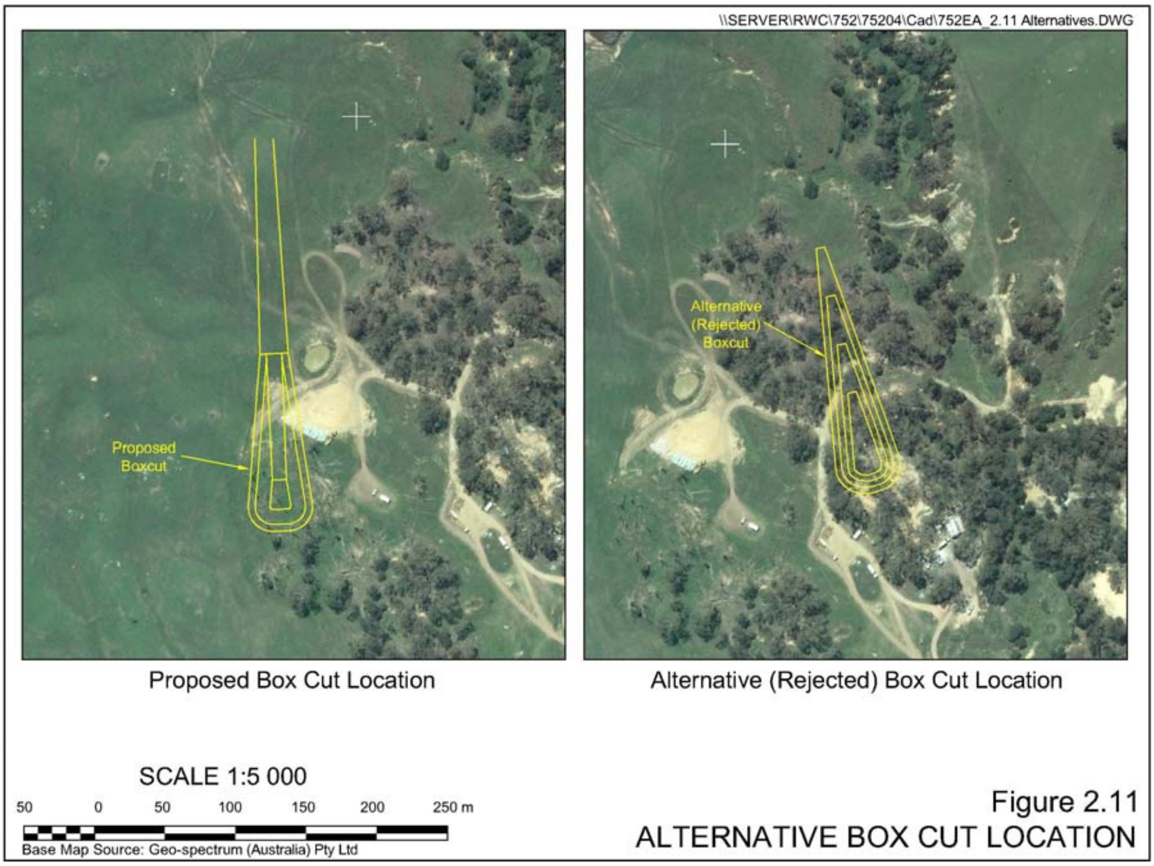

Figure 2.11
ALTERNATIVE BOX CUT LOCATION

2.16.6 Ventilation Fan Location

The Proponent initially proposed to locate the final ventilation fan at the surface. This would have permitted ready access to the fan for maintenance and servicing, as well as simpler installation. This alterative would, however, have resulted in additional noise impacts at surrounding residences. In addition, this noise would be constant and may potentially result in a perception by surrounding residents that noise from the Project Site never stops, with the associated aggravation that this may cause. As a result, the Proponent has committed to install the final ventilation fan at least 10m below the surface. This would result in the ventilation fan being inaudible at surrounding residences.

The Proponent would be required to install an interim ventilation fan within the box cut until such time as the initial ventilation drive and rise have been completed and the final ventilation fan has been installed and commissioned. The interim fan would be silenced and would be replaced with the final ventilation as soon as practicable.

2.16.7 Crusher Housing

The Proponent initially proposed to construct the primary and secondary crusher without a housing structure or within a light structure with limited noise attenuation. This would have limited the construction costs and enable easy access to the equipment for servicing and replacement of wear parts. However, this would have also resulted in significant noise-related impacts at surrounding residences, particularly under temperature inversion conditions. As a result, the Proponent has committed to construct the crushing circuit within a noise attenuation structure that would have a design noise mitigation level of approximately 12dB(A).

2.16.8 Tailings Storage Facility Location

The Proponent initially proposed to construct the tailings storage facility downstream of the proposed location. However, the Aboriginal heritage survey identified a site of Aboriginal heritage significance in the vicinity of the originally proposed tailings storage facility embankment (GT-OS1 – see Section 4.6.5). As a result, the Proponent redesigned the tailings storage facility embankment to ensure that the embankment would not encroach on a 20m buffer around the identified site.

2.16.9 Site Access Road Location

The Proponent initially designed the site assess road further to the north of the proposed road location. This would have enabled more cost effective construction and a smoother road profile. However, the original location of the proposed road was in the Shoalhaven Catchment. In order to ensure that all Project-related disturbance was restricted to a single catchment, the Proponent re-designed the site access road in a manner that ensured that the entire length of the proposed road was within the Moruya Catchment.

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