Section 2

Description of the Proposal

PREAMBLE

This section describes the Proposal including:

- *the objectives of the Proposal;*
- *an overview of the Proposal and the approvals required;*
- *the infrastructure that would be established;*
- *the site preparation that would be undertaken;*
- *the proposed mining, waste rock and ore management operations;*
- *ancillary activities that would be undertaken; and*
- *proposed rehabilitation.*

The Proposal is described in sufficient detail to provide an overall understanding of the nature and extent of the activities, how the various activities would be undertaken and to enable an assessment of the potential impacts on the surrounding environment. The level of detail provided is sufficient to enable a determination to be made as to the environmental impact of the Proposal. More detailed descriptions of the annual progression of mining, processing, waste management and rehabilitation will be presented in a Mining Operations Plan to be prepared and submitted following the determination of the application.

Details of the safeguards and management measures that the Applicant 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 Objectives

The Applicant's objectives in constructing and operating the Avoca Tank Project would be as follows.

- To safely mine the identified copper-gold-silver reserves.
- To operate the Proposal 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 Proposal in compliance with all relevant statutory requirements.
- To provide for the ongoing monitoring of local environmental parameters such as noise, water and air quality.
- To create a final landform that is suitable for a continuation of intermittent grazing post-mining.
- To achieve the above objectives in a cost-effective manner to ensure security of employment for the Applicant's workforce and the continued economic viability of the Applicant.

2.1.2 Overview of the Proposal

The Proposal would include the following, with the locations of key features identified on **Figures 2.1** and **2.2**).

- Construction and use of a boxcut, portal, decline, underground workings and two rises (one equipped as an emergency egress and the other with a ventilation fan at surface).
- Extraction of the economically recoverable copper-gold-silver resources to a depth of approximately 500m below surface using bench stoping and long hole open stope mining techniques.
- Transportation of ore material to the Tritton Copper Mine for processing using road registered road trains via a combination of a private haul road and Booramugga and Yarrandale Roads.
- Establishment of a temporary surface waste rock emplacement for storage of waste rock extracted during construction of the boxcut and initial sections of the decline and mine workings.

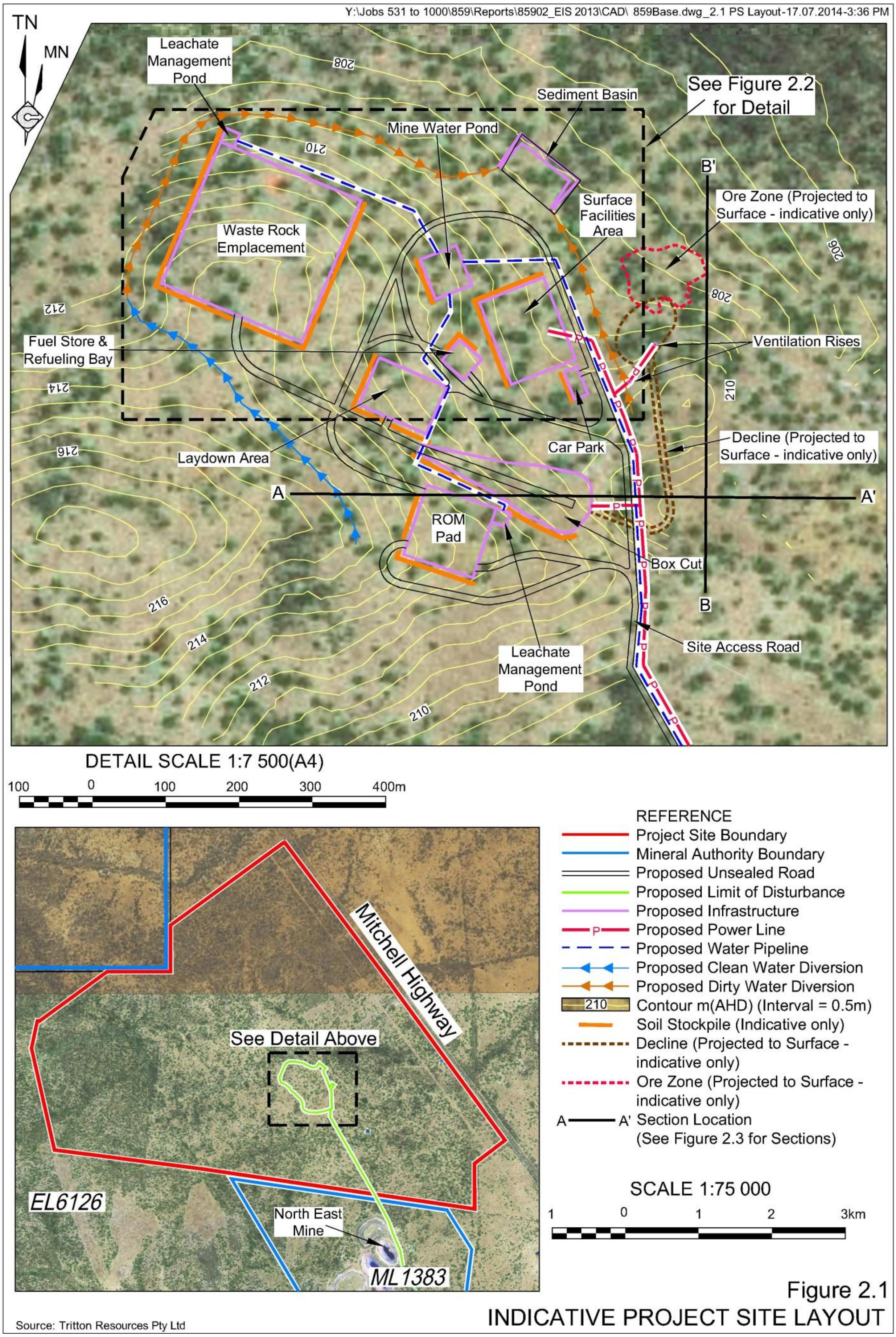

Figure 2.1
INDICATIVE PROJECT SITE LAYOUT

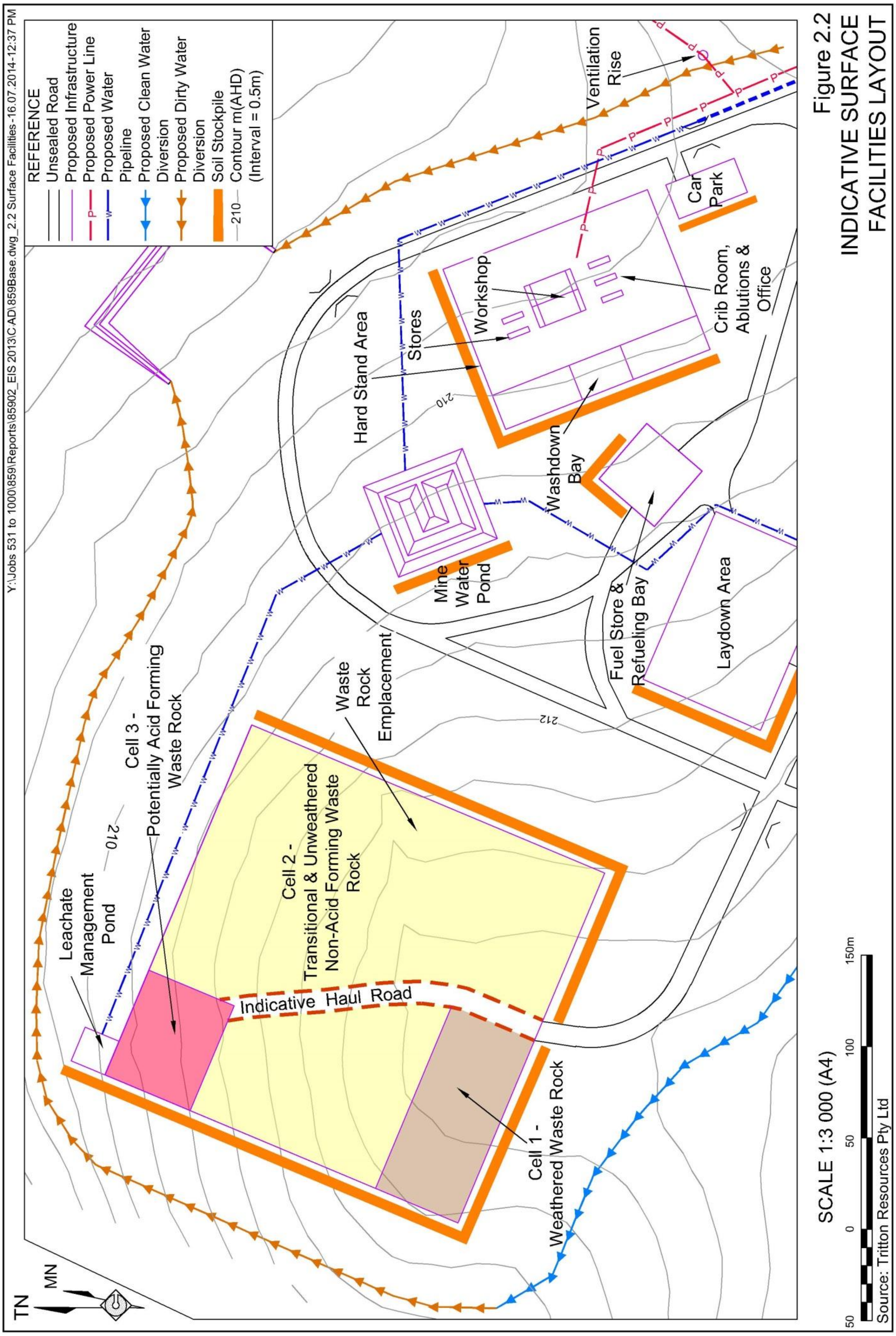

Figure 2.2
INDICATIVE SURFACE FACILITIES LAYOUT

- Establishment of surface infrastructure, including a mine water pond, ROM Pad, laydown area, fuel store and refuelling bay and a hardstand area comprising a workshop, mobile plant parking area, wash down bay and transportable offices, crib room and ablution facilities.
- Extension of infrastructure from the North East Open Cut, including a site access road, water pipeline and transmission line.
- Establishment of ancillary infrastructure.
- Construction and rehabilitation of a final landform that would be geotechnically stable and suitable for a final land use of intermittent agriculture and nature conservation.

Finally, throughout the life of the Proposal, the Applicant proposes to undertake additional exploration drilling to further define the mineralisation identified to date and to identify any additional resources, both within and in the vicinity of the Project Site. Extraction of additional mineralisation does not form a part of this application, and would be the subject of a subsequent application, if required.

2.1.3 Approvals Required

The Applicant anticipates that the following approvals will be required for the Avoca Tank Project.

- Development Consent – Joint Regional Planning Panel.

  Development consent in accordance with the provisions of the *Environmental Planning and Assessment Act 1979* (EP&A Act) will be required for the Proposal. The Proposal may be classified as follows.

  – "Local or Regional Development" because the capital investment value is less than the $30 million threshold for State Significant Development and equal to the $20 million threshold identified in Clause 3 of Schedule 4A of the EP&A Act identified in Clause 5 of Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011 (State and Regional Development SEPP)*. In accordance with Clause 21 of the *(State and Regional Development SEPP)*, the application is to be determined by the Joint Regional Planning Panel, with Bogan Shire Council to exercise its functions in relation to receipt, notification and assessment of the application and associated fees.

  – "Designated Development" because the Proposal would result in more than 4ha of disturbance as identified under Clause 25 of Schedule 3 of the *Environmental Planning and Assessment Regulations 2000*. As a result, an *Environmental Impact Statement* (EIS) will be required to accompany the application for development consent.

  – "Integrated development" under Section 91 of the EP&A Act because the following approvals will be required.

- Environment Protection Licence – Environment Protection Authority.

  An Environment Protection Licence or amendment to an existing Licence held by the Applicant issued by the Environment Protection Authority (EPA) under Section 47 of the *Protection of the Environment Operations Act 1997* will be required.

- Mining Lease – Department of Trade and Investment and Regional Infrastructure and Services – Mineral Resources Division.

  The Applicant currently holds Exploration Licence 6126 over the Project Site. A Mining Lease to be issued under the *Mining Act 1992* will be required.

- Aquifer Interference Approval – NSW Office of Water.

  An Aquifer Interference Approval will be required under Section 91 of the *Water Management Act 2000* for water intersected by the proposed underground mine. Water Supply Works and Water Use Approvals may also be required under Sections 89 and 90 of the *Water Management Act* 2000 for groundwater to be brought to surface and used for mining-related purposes.

Following receipt of development consent, the Applicant would also seek the necessary approvals from Bogan Shire Council for the construction of buildings, structures and appropriate waste water treatment systems for the Proposal.

Finally, it is noted that a separate application will be made under Section 75W of the EP&A Act to modify Development Consent 41/98 for the Tritton Copper Mine to permit importation of ore material from the Avoca Tank Project. Interaction between the development consent issued as a result of this application and Development Consent 41/98 would be as follows.

- The current Proposal would cover mining and transportation activities to the entrance of the Tritton Copper Mine.
- Development Consent 41/98 (as modified) would cover processing of all Avoca Tank ore material, tailings management and transportation of concentrate to the Applicant's customers.

2.2 SITE PREPARATION

2.2.1 Survey and Mark Out

Prior to the commencement of any ground-disturbing activities, the Applicant would survey all areas of proposed disturbance and physically mark out approved areas of disturbance using appropriately labelled survey pegs. Where appropriate, sensitive "no-go areas" such as sites of Aboriginal heritage significance would also be marked out and fenced using high visibility bunting or similar material. All site personnel would be made aware of the approved areas of disturbance and the significance of not disturbing areas outside the approved areas.

2.2.2 Vegetation Clearing

During vegetation clearing operations, larger vegetation would be removed using a bulldozer with its blade positioned just above the surface. This material would be stockpiled adjacent to the area of disturbance for later use during rehabilitation. No cleared vegetation material would be burnt or mulched.

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.

2.2.3 Soil Stripping

A description of the soils of the proposed areas of disturbance is provided in Section 4.13. In summary, the following soil stripping, stockpiling and management measures would be implemented.

During soil stripping operations, the following procedures would be implemented.

- Strip topsoil from all areas of disturbance using a bulldozer, grader or scraper to a depth of approximately 20cm.
- Strip subsoil from the impact footprints of the box cut, ROM Pad, waste rock emplacement and mine water pond using a bulldozer or similar to a depth of approximately 50cm below the base of the topsoil. Subsoil stripping would not be undertaken elsewhere.
- Push stripped topsoil and subsoil material into separate windrow stockpiles adjacent to the proposed areas of disturbance. Indicative locations are identified on **Figures 2.1** and **2.2**.
- Ensure that the topsoil and subsoil stockpiles have a maximum height of 2m and 3m respectively and side slopes of 1:2 (V:H) or shallower.
- Ensure soil is not be stripped when either excessively dry or wet to preserve soil structure.
- Prevent the operation of machinery on soil stockpiles once formed and shaped to avoid compaction.
- Establish a cover of vegetation on all soil stockpiles to be retained for more than 3 months. Alternatively, spray on polymer covers may be used until vegetation can become established.

Table 2.1 presents the indicative soil inventory for the Proposal. The Applicant anticipates that a surplus of soil material would be available for rehabilitation within the Project Site and that remaining soil material would be used for rehabilitation of the Applicant's other sites where insufficient soil material remains for rehabilitation

Table 2.1
Indicative Soil Inventory

Area	Area to be disturbed (ha)	Topsoil		Subsoil[1]	
		Stripping Depth (cm)	Volume (m^3)	Stripping Depth (cm)[1]	Volume (m^3)
Box Cut	1.2	20	2 400	50	6 000
ROM Pad	1	20	2 000	50	5 000
Waste Rock Emplacement	4.4	20	8 800	50	22 000
Mine Water Pond	0.3	20	600	50	1 500
Hardstand	1.1	20	2 200	-	-
Laydown Area	0.7	20	1 400	-	-
Fuel store	0.2	20	400	-	-
Car Park	0.1	20	200	-	-
Site access and haul roads	4.1	20	8 200	-	-
Total	**13.1**		**26 200**		**34 500**

Note 1: Below base of topsoil.
Note 2: Site access Road total length = 4.1km. Average width = 10m. Area = 4.1ha.

2.3 MINING OPERATIONS

2.3.1 Layout of the Box cut

The box cut would be an elongated excavation that would permit access to the portal and decline via a haul road (**Figure 2.1**). The box cut would have the following indicative design parameters.

- Length – 240m.
- Maximum width – 85m.
- Maximum depth – 30m.
- Gradient of haul road – 1:7 (V:H).
- Slopes of walls – surface to 20m – 45º, 20m to base of boxcut – 60º.
- Vertical spacing of benches – 10m.

2.3.2 Construction of the Box Cut and Portal

2.3.2.1 Construction of the Box Cut

Once vegetation and soil material have been removed, (see Section 2.2.3), and surface water management structures have been constructed (see Section 2.6.2), the box cut would be excavated by conventional load and haul methods using an excavator or front-end loader and haul trucks. Where required, a bulldozer may be used to rip material that cannot be extracted using an excavator or front-end loader.

When the excavation has progressed to a point where material requires blasting, a hydraulic drill rig would be used to drill blast holes which would be loaded with either pre-packaged or bulk explosives, boosters and detonators. Fragmented material would be removed using load and haul techniques. Management of waste rock material removed during construction of the box cut is described in Section 2.4.

It is anticipated that the box cut would take approximately 10 to 14 weeks to complete.

2.3.2.2 Construction 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 in the base of the box cut, the surrounding walls would be stabilised using a combination of rock bolts, cable bolts and shotcrete. The portal, or entrance to the decline, would then be constructed using methods similar to those described in Section 2.3.4.2. Additional roof and wall support, would be installed in the near surface sections of the decline. This would include combinations of rock bolts, cable bolts, shotcrete or steel arch structures.

Following the establishment of the portal, infrastructure required for underground mining operations would be installed. This would indicatively include the following.

- Underground power, including a transformer to convert the voltage of the distributed electricity to that suitable for use underground.
- Temporary ventilation, including one or more vent fans located within the box cut.
- Mine water supply for underground mining operations.
- A tag board and associated surface safety equipment and infrastructure.

Development of the portal using a single heading would be required initially. However, once portal development reaches the initial extraction level, development on multiple headings may be undertaken.

2.3.3 Underground Development

2.3.3.1 Decline and Development Design

Figure 2.3 presents a view of the proposed decline and underground stoping operations. The decline would include the following indicative design parameters.

- Height – approximately 5.5m.
- Width – approximately 5.0m.
- Gradient – approximately 1:7 (V:H).
- Final design length – approximately 3 500m.
- Maximum depth of development – approximately 500m below the surface.

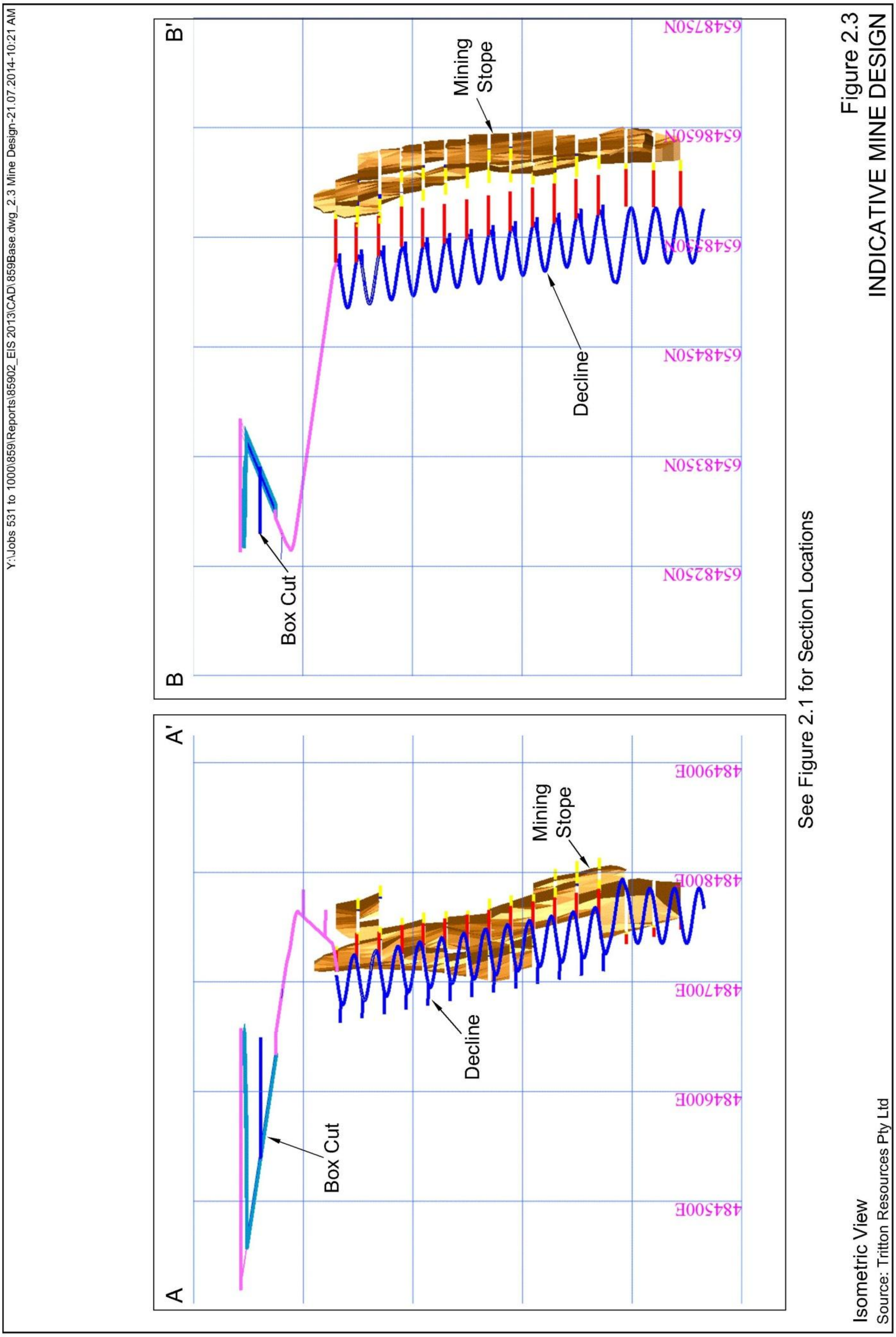

Figure 2.3
INDICATIVE MINE DESIGN

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

- Height – approximately 5.5m or 5.0m.
- Width – approximately 5.0m.

2.3.3.2 Drill and Blast Operations

The decline and development headings would be developed using conventional underground drill and blast techniques. A jumbo, or an underground drill rig, would drill a pattern of holes, the spacing and length of which would be determined by the blasting engineer or shot-firer. Once drilling has been completed, those holes would be loaded with bulk or pre-packaged explosives, boosters and detonators and the material would be fragmented *in situ* by blasting.

Drill and blast operations, including those for underground stoping operations, would be designed in a manner that would ensure compliance with the criteria identified in the Environment Protection Licence for the Proposal and described in Section 4.6.

2.3.3.3 Load and Haul Operations

Fragmented material would be extracted using an underground loader and transferred to underground haul trucks. Alternatively, the loader may transport material to a loading bay for later reclamation.

Once loaded into haul trucks, fragmented material would be transported to the waste rock emplacement area (**Figure 2.1**), or used for stope backfilling operations (see Section 2.3.4.3).

2.3.3.4 Ventilation and Emergency Egress

Initially, supply of fresh air to the workings would be provided using a ventilation fan located at the portal. Air would be pumped to the face of decline using air bags. Return air would flow back up the decline. As decline construction progresses, the ventilation infrastructure would be advanced to sub-surface levels to ensure adequate ventilation exists in all sections of the advancing decline.

When the decline has been advanced sufficiently, a ventilation rise would be installed to ensure the supply of fresh air to the underground workings (**Figure 2.1**). To facilitate construction of the rises, a horizontal drive would be established first, followed by the establishment of each rise using a long-hole raise mining technique for the return air raise and an up-hole raise boring technique for the emergency egress.

Long-hole raise mining involves drilling holes from one level to the level above, loading those holes with explosives and blasting the *in situ* rock. The return air rise would have a nominal cross sectional area of 5m x 5m.

Up-hole raise boring involves drilling a pilot hole from surface to intersect the ventilation drive. The hole is then reamed out to the required diameter from the bottom up using one or more larger diameter drill heads. The emergency egress would have a nominal diameter of 1.1m and would be equipped with a suitable ladderway to permit evacuation of personnel from the mine.

One fan with a nominal capacity of 200m^3/s would be installed on the surface. The fan would act as an exhaust fan for return air while the decline would act as the air intake into the underground mine. Other mine services such as power and water may also be installed within the rises.

2.3.4 Underground Stoping Operations

2.3.4.1 Mining Method

Ore would be extracted using conventional bench or sublevel open stoping mining techniques which are well suited to extract ore from elongate vertical lenses. **Figure 2.4** presents a schematic overview of the proposed mining method. In summary, these mining methods entail the following.

- Construction of production drives along the long the long axis of the ore body approximately every 20m vertically.
- Drilling of a series of fans of holes between the lower and upper drives.
- Loading of each fan of holes sequentially with bulk or pre-packaged explosives.
- Fragmenting the ore and allowing that material to fall into the stope from where it would be extracted and transported to the surface.
- Further fans of holes would be fired and ore extraction would progressively retreat back along the production drive.

Unmined material would left between the vertical stopes and vertical pillars and horizontal sills would provide support and prevent ground collapse. Geotechnical conditions may dictate the need to backfill stopes, and this would be done following completion of mining within each stope (see Section 2.3.4.3).

2.3.4.2 Stope Design

The Applicant would develop a range of stope designs to permit extraction of the ore. 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, as well as the geotechnical characteristics of the material to be mined. The mine design would be developed to ensure that there would be no surface subsidence within the Project Site.

2.3.4.3 Stope Backfilling Operations

Backfilling of underground stope voids with waste rock may be undertaken to provide for local mine stability and to allow extraction of higher grade resources in localised areas. The Applicant estimates that approximately 25% of the stopes that would be created would be backfilled.

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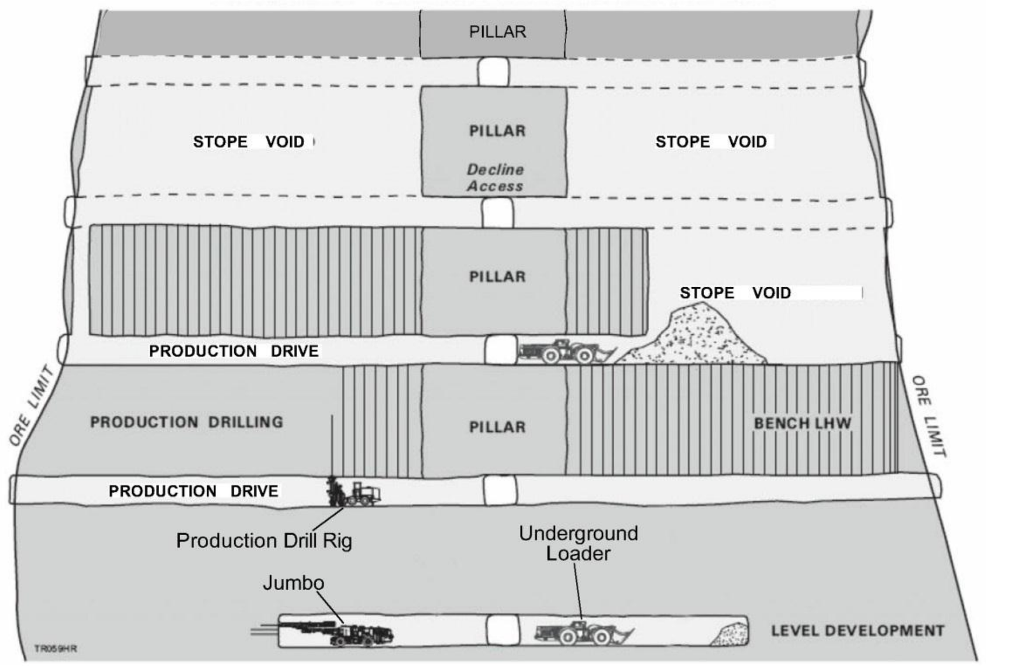

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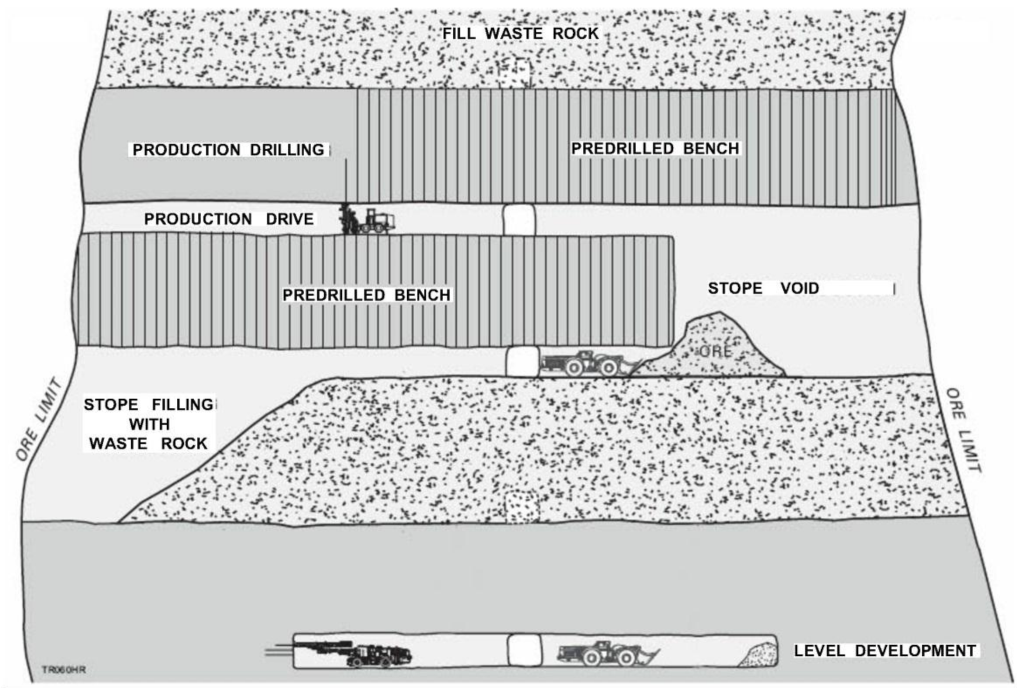
SCHEMATIC SUB-LEVEL OPEN STOPING MINING METHOD



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SCHEMATIC BENCHING AND STOPE FILLING

Figure 2.4
PROPOSED MINING METHODS

Source: Tritton Resources Pty Ltd

Figure 2.4 shows a typical schematic of stope back-filling with waste rock. The back-filling would use waste rock material sourced preferentially from concurrent underground development, with additional waste rock material transported from the waste rock emplacement on the surface, if required. Where waste rock is transported from the surface, preference would be given to removing potentially acid forming material from the surface for placement in the completed stopes (see Section 2.4.2).

The backfill material would be transported to a drive in the vicinity 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 be operated remotely. Sections of some stopes may be cement stabilised.

The advantage of backfilling the stopes would be to reduce the quantity of waste rock transported to the surface, increase the geotechnical stability of the mined stopes and maximise the recovery of ore material, resulting in reduced environmental impacts and mining costs.

2.3.5 Mining Rate

Table 2.2 provides an indicative mining rate for the life of the Proposal, and shows ore extraction would occur over four years commencing late in Year 1. The indicative maximum mining rate would be approximately 375 000t per year. The mining rate would vary depending on the number of development headings and stopes available at any one time, It is expected the mining rate would increase progressively as the mine is developed and then decrease towards the end of the mine life as stopes are gradually completed.

Table 2.2
Indicative Mining Rate

Year	Ore (t)	Waste Rock (t)	Total (t)
1	8 000	194 000	202 000
2	156 000	150 000	306 200
3	313 000	60 000	373 000
4	204 000		204 000
Total	**681 000**	**404 000**	**1 095 000**

Source: Tritton Resources Pty Ltd.

2.3.6 Mining Equipment

Table 2.3 presents the mobile mining equipment that would be required during the life of the Proposal. A number of light and heavy vehicles and ancillary equipment, such as lighting plants and service vehicles, would also be required.

Table 2.3
Proposed Mining Equipment

Indicative Equipment	Indicative Number Required	Hours of Operation
Box Cut Establishment		
Pneumatic drill and compressor.	1	7am to 10pm, 7 days per week
Excavator (Cat 336)	1	
Haul trucks (50 tonne)	2	
Site Establishment and Surface Operations		
Front-end loader (Cat 998)	1	7am to 10pm, 7 days per week
Bulldozer (Cat D10 or D8)	1	
Grader (Cat 14)	1	
Road train and haul trucks	up to 3	
Underground Mining Operations		
Jumbos drill rigs	1	24 hours per day; 7 days per week
Underground Load-Haul-Dump unit (bogger)	2	
Underground Haul trucks	2	
Tool Carrier	1	
Ventilation fan	1	
Power Generator (site establishment and initial mining operations)		
Diesel Generators 800 kVA (Cummins)	1	24 hours per day; 7 days per week
Source: Tritton Resources Pty Ltd		

2.4 WASTE ROCK MANAGEMENT

2.4.1 Introduction

During initial mining operations, material that contains insufficient metalliferous minerals to justify processing would be extracted and placed within the waste rock emplacement or, for non-acid generating material, used to establish surface infrastructure (**Figure 2.1**). Once mining operations have progressed sufficiently, waste rock material may be directly placed within completed stopes underground and may not be brought to the surface. In addition, waste rock material stockpiled within the waste rock emplacement may be transported back underground and placed within completed stopes.

This sub-section provides an overview of the characteristics of the waste rock material, the design of the waste rock emplacement and the procedures that would be implemented as part of waste rock management operations.

2.4.2 Waste Rock Characteristics

2.4.2.1 Introduction

The Applicant anticipates that approximately 404 000t of waste rock would be generated throughout the life of the Proposal. The geological setting and style of mineralisation within the Project Site is similar to that observed at both the Tritton and Girilambone Copper Mines. At each of those operations, a proportion of the waste rock generated has the potential to generate an acidic leachate. In light of this, the Applicant undertook a program to characterise the waste rock within the Project Site.

This subsection provides background information in relation to acid rock drainage generally and at the Tritton and Girilambone Copper Mines specifically, the methodology used to characterise waste rock within the Project Site and the results of that assessment.

2.4.2.2 Acid Rock Drainage

Rocks that contain elevated levels of some minerals, principally pyrite (FeS_2), once exposed to oxygen in the air and water may generate an acidic or low pH leachate as a result of the pyrite and similar minerals oxidising to release the contained sulphur. The free sulphur then combines with water to produce a leachate containing a dilute solution of sulphuric acid. The leachate, as a result of its low pH, may contain elevated concentrations of metals and, if discharged, could result in adverse environmental impacts by lowering the pH of receiving waters or increasing the concentration of dissolved metals beyond a level that is considered acceptable.

The Applicant prepared a *Waste Rock Characterisation and Management Plan* in June 2012 for the Tritton Copper Mine. That assessment identified that rocks with sulphur concentrations of less than approximately 1% <u>are unlikely</u> to be acid generating, while rocks with a sulphur contents greater that 1% <u>may</u> be acid generating.

The *Waste Rock Characterisation and Management Plan* identifies a range of management and mitigation measures for managing potentially acid forming waste rock. These have been used as the basis for the management measures identified in Section 2.4.4.

2.4.2.3 Waste Rock Characterisation Methodology

The Applicant analysed 25 samples of rock from drill holes in the vicinity of the Avoca Tank deposit. The samples were selected to be representative of all geological units likely to be extracted with a focus in particular on material that would be classified as waste rock. Ore material has been assumed, based on its mineralogy, to be acid forming. However, as this material would be removed from the Project Site shortly after it is brought to the surface and processed at the Tritton Copper Mine, management of this material is not anticipated to pose an environmental risk.

The 25 selected samples were subjected to acid base accounting analysis by ALS. Acid base accounting assesses the balance between a sample's ability to:

- produce acidic leachate through the oxidation of sulphides; and

- neutralise any acid produced through reaction with minerals, particularly carbonates, contained within the sample.

This methodology requires determination of the following.

- Maximum potential acidity – this is determined based on the total sulphur present within sulphide minerals.
- Acid neutralising capacity – this is the ability of a sample to neutralise any acidic leachate that may be produced.
- Net Acid Producing Potential (NAPP) – this is the balance between the maximum potential acidity and the acid neutralising capacity. This is typically expressed as the number of kilograms of sulphuric acid (H_2SO_4) that could be generated per tonne of sample.
- Static Net Acid Generation (NAG) – this is a direct measure of the sample's ability to produce acid through oxidation of sulphides. Samples are mixed with hydrogen peroxide to rapidly oxidise all sulphide minerals present. The pH of the resulting solution is then tested and the amount of acid produced is determined.

The acid formation potential of a sample is established by comparing the NAPP and the NAG results. **Table 2.4** presents the classification identified in the *Guidelines on Managing Acidic and Metalliferous Drainage* published by the Commonwealth Department of Industry, Tourism and Resources in February 2007.

Table 2.4
Acid Formation Potential Classification System

Acid Formation Potential	NAPP (kg H_2SO_4/t)	NAG (pH units)
Potentially Acid Forming	>10	<4.5
Potentially Acid Forming – Low Capacity	0 to 10	<4.5
Non-acid Forming	Negative	≥4.5
Acid Consuming	Less than -100	≥4.5
Uncertain	Positive	≥4.5
	Negative	<4.5

The identified classes of waste rock may be summarised as follows.

- Potentially acid forming (PAF) – these samples have the potential to produce an acidic leachate, with the NAPP result indicating how much acid could potentially be produced.
- Potentially acid forming – low capacity (PAF-LC) – these samples also have the potential to generate an acidic leachate. However, because of a limited concentration of sulphide minerals or elevated neutralising capacity, resulting in a NAPP result less than 10kg H_2S0_4/t, the amount of acid likely to be produced is limited.

- Non-acid forming (NAF) – these samples do not have the potential to produce an acidic leachate because the neutralising capacity of the sample exceeds the acid generating capacity.
- Acid consuming (AC) – these samples have the ability to neutralise acidic leachate because the neutralising capacity of the sample significantly exceeds the acid generating capacity.
- Uncertain (UC) – the ability of these samples to generate an acidic leachate is uncertain because the results of the NAPP and NAG tests are contradictory, indicating that the sample may produce an acidic leachate depending on the distribution of acid generating and neutralising minerals within the samples.

2.4.2.4 Waste Rock Characterisation Results

Table 2.5 and **Figure 2.5** present the results of the waste rock characterisation assessment. In summary, the results may be characterised as follows.

- Samples with sulphur concentrations less than 1% may typically be classified as:
  - acid consuming;
  - non-acid forming;
  - potentially acid forming – low capacity (or potentially acid forming with a NAPP capacity very close being classified as low capacity); or
  - uncertain.
- The majority of samples with a sulphur concentration of greater than 1% may be classified as potentially acid forming, with some samples demonstrating significant potential to generate acid.
- Potentially acid forming samples are associated with both the hanging wall and footwall of the ore body and may be encountered during construction of the decline and associated development drives.

These results are consistent with the results of previous characterisation test work for the Tritton Copper Mine completed during preparation of the *Waste Rock Characterisation and Management Plan.* As a result, in order to ensure consistency across each of its operations, the Applicant would ensure that waste rock within the Project Site is managed in accordance with the above plan.

Table 2.5
Waste Rock Characterisation Results

Sample No	NAPP	pH (OX)	Total Sulphur	Sample Location	Sample Classification
Units	**kg H2SO4/t**	**pH Unit**	**%**		
TRL 033696	-122	10.9	0.005	Footwall decline	AC
TRL 038758	-25.5	8.7	0.005	Between lenses	NAF
TRL 038473	-611	11.2	0.03	decline	AC
TRL 037865	-649	9.4	0.04	Hanging wall	AC
TRL 038457	-33.7	9.9	0.04	Footwall	NAF
TRL 039240	-662	10.8	0.04	Footwall decline	AC
TRL 037889	-612	10.6	0.05	Footwall	AC
TRL 038826	-30.1	8.4	0.12	Hanging wall	NAF
TRL 034993	0.25	4.1	0.32	Footwall	PAF-LC
TRL 033653	6.6	3.8	0.43	Footwall Decline	PAF-LC
TRL 038034	0.6	8.9	0.52	Hanging wall	UC
TRL 038908	8.7	3.9	0.65	Footwall	PAF-LC
TRL 038905	11.9	3.5	0.66	Footwall	PAF
TRL 038715	-222	9.2	0.69	Hanging wall	AC
TRL 038442	-561	10	0.79	Footwall	AC
TRL 034398	10.5	3.6	0.87	Footwall	PAF
TRL 034318	10	3.3	0.89	Hanging wall	PAF-LC
TRL 034320	17	3.6	0.95	Hanging wall	PAF
TRL 038827	-9	8.8	1.08	Hanging wall	NAF
TRL 037796	-395	9.1	1.57	Hanging wall	AC
TRL 038828	25.5	3.2	2.21	Hanging wall	PAF
TRL 034319	53	3.8	2.25	Hanging wall	PAF
TRL 038906	67.3	2.8	2.51	Footwall	PAF
TRL 038907	162	2.4	5.57	Footwall	PAF
TRL 033679	231	2.2	7.55	Footwall decline	PAF

Source: Tritton Resources Pty Ltd

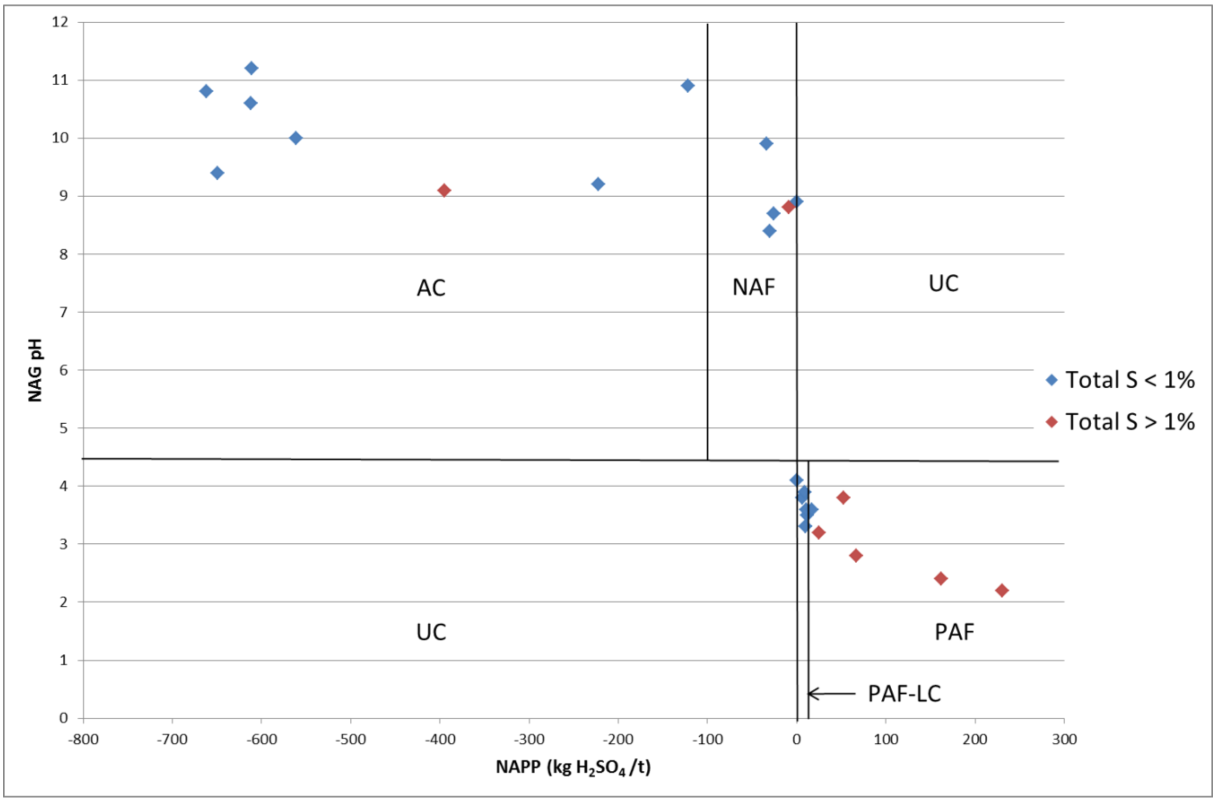

FIGURE 2.5
WASTE ROCK CHARACTERISATION RESULTS

2.4.3 Waste Rock Emplacement Layout

The location of the proposed waste rock emplacement is presented on **Figures 2.1, 2.2** and **Table 2.6** presents the design criteria for the emplacement.

Table 2.6
Waste Rock Emplacement Design Criteria

Feature	Design
Area (ha)	4.4ha
Maximum Height (m above current ground level)	10m
Final Slope (V:H)	1:3 (V:H)
Approximate Final Design Volume (m^3)	250 000
Anticipated Volume Required (m^3)	150 000
Source: Tritton Resources Pty Ltd	

All waste rock material extracted from the box cut and the underground workings would be classified into one of three categories as follows prior to extraction.

- Class 1 – Weathered, non-acid forming waste rock suitable for use during rehabilitation operations as a subsoil growth medium.

- Class 2 – Transitional and unweathered, non-acid forming waste rock with sulphur concentrations of <1%.
- Class 3 – Potentially acid forming waste rock with sulphur concentrations of >1%. This class of waste rock would also include material where the acid generation potential is classified as "uncertain", if encountered.

The Applicant anticipates that the following volumes of each class of waste rock would be generated and bought to the surface during the life of the Proposal, with a proportion of this waste rock later reclaimed and hauled back underground as backfill.

- Class 1 – 12 000m^3 or 24 000t.
- Class 2 – 143 000m^3 or 286 000t.
- Class 3 – 5 000m^3 or 10 000t.

The waste rock emplacement would be constructed in three cells, one for each of the above classes of material. These cells would be established as follows (**Figure 2.2**).

- Cells 1 and 2 – would be used to store weathered, non-acid forming waste rock and transitional and unweathered, non-acid forming waste rock respectively. These cells would be constructed in the southern or eastern section of the waste rock emplacement.
- Cell 3 – would be used to temporarily store potentially acid forming waste rock. Any leachate collected within the pond would be transferred to the Mine Water Pond for use in the underground operations.

  This cell would be constructed in the northwestern section of the waste rock emplacement closest to the Leachate Management Pond. The cell footprint would be constructed in a manner that would ensure that potentially acidic leachate is not permitted to seep into the aquifer or flow to natural drainage. Rather, all leachate would be directed to the Leachate Management Pond.

2.4.4 Waste Rock Emplacement Procedure

Class 1 or weathered, non-acid forming waste rock extracted from the upper sections of the box cut would be placed solely within Cell 1 of the waste rock emplacement. This material would be retained for use during rehabilitation either within the Project Site or elsewhere at the Applicant's other mining operations where significant shortfalls of subsoil and suitable growth medium have been identified. This material would not be transported underground for use in stope filling operations.

Class 2 or transitional and unweathered, non-acid forming waste rock would be primarily placed within Cell 2 of the waste rock emplacement. Alternatively, this material may be used to construct site infrastructure, including the Site Access Road, hardstand or laydown areas, car park or ROM Pad. This material may require crushing using a portable crusher. Such crushing programs would be undertaken on a campaign basis and would typically be of a few days to weeks only.

Class 3 or potentially acid forming waste rock brought to the surface would be managed in one of two ways.

- Initially the waste rock would be placed solely within Cell 3. Once mining operations have progressed sufficiently, that material would preferentially be transported back underground and placed into completed stopes.
- Once completed stopes become available for backfilling operations, potentially acid forming waste rock would be placed directly into completed stopes and would not be brought to the surface at all. Once placed within completed stopes, the potential for further generation of acidic leachate would be limited as a result of the limited availability of oxygen for oxidation reactions.

Potentially acid forming waste rock placed on the surface would not be encapsulated while stored at the surface because it would be stockpiled for a limited period and clay material used for encapsulation would have adverse impacts during stope backfilling operations. These impacts may include blocking up of waste passes, uneven settling and placement of waste rock within the stopes.

In order to ensure that potential for adverse impacts associated with such storage is minimised to the greatest extent practicable, the following measures would be implemented in the event that acid generation is detected prior to transportation of all potentially acid generating material back underground.

- The frequency of monitoring of leachate within the leachate management pond would be increased.
- All leachate would be removed to the Mine Water Pond as it is generated, for use for mining-related purposes.
- A management plan would be developed to facilitate prompt transportation of acid-forming material back underground.

2.4.5 Waste Rock Balance

Table 2.7 presents the waste rock balance for the Proposal. In summary, during the life of the Proposal, an estimated 319 000t of waste rock would be transported to the surface, with 98 000t returned underground. The maximum anticipated volume of waste rock to be stored at surface would be approximately 292 000t in Year 2 with the waste rock stockpile expected to decrease in size in the final years of the Proposal.

As identified in Section 3.4.3, the Applicant would use waste rock in the following priority order during stope backfilling operations.

1. Class 3 or potentially acid forming material.
2. Class 2 or non-acid forming, transitional and unweathered waste rock.

Table 2.7
Indicative Waste Rock Balance

Year	Total Waste Rock Transported to Surface (t)	Waste Rock Transported Underground (t)	Waste Rock Balance on Surface (t)
1	195 000	0	195 000
2	124 000	27 000	292 000
3	-	36 000	256 000
4	-	35 000	221 000
Source: Tritton Resources Pty Ltd			

Class 1 of weathered waste rock would not be used for stope backfilling operations because of its physical properties and because this material would be used for rehabilitation of the Project Site and at the Applicant's other mining operations.

In light of the above, the Applicant notes that the following would remain at surface following completion of mining operations.

- 197 000t of Class 2 or non-acid forming, transitional and unweathered waste rock.
- 24 000t of Class 1 or weathered waste rock.

No potentially acid forming material would remain at surface at the end of the life of the Proposal.

Class 2 waste rock would have a range of beneficial uses, including:

- manufacture of roadbase or sheeting material for the Applicant's existing operations or for use by Bogan Shire Council or other organisations and individuals; and
- rehabilitation of the Applicant's existing or proposed mining operations, including partial backfilling of the proposed boxcut and capping of the Tailings Storage Facility at the Tritton Copper Mine.

Class 1 waste rock would be preserved for use as a growth medium or capping material for use during rehabilitation of the Applicant's mining operations.

As a result, the Applicant anticipates that the waste rock remaining at surface would be used for a beneficial purpose and that at the relinquishment of any Mining Lease, no waste rock would remain. Notwithstanding this, the description of rehabilitation activities within the Project Site presented in Section 2.13.6 takes into account the possibility that a small amount of waste rock may remain at the relinquishment of the Mining Lease.

Finally, the Applicant contends that use of the waste rock for rehabilitation of the other Applicant's mining operations would be ancillary to those approved operations and, as a result, no further approvals would be required. In addition, transportation of material from the Project Site would be an approved activity should development consent be granted. As a result, the Applicant contends that no further approvals would be required for transportation for use by other individuals or organisations such as Bogan Shire Council or the NSW Roads and Maritime Service.

2.5 ORE MANAGEMENT AND TRANSPORTATION

2.5.1 ROM Pad Design and Layout

The layout of the proposed ROM Pad is presented in **Figure 2.1**. The ROM Pad would be used to temporarily stockpile ore material prior to transportation to the Tritton Copper Mine for processing. The ROM Pad would be approximately 1.4ha in size and would be sheeted with non-acid generating waste rock to ensure all weather access. The ROM Pad has been designed to be sufficiently large to permit concurrent placement of ore material, operation of a transportable jaw crusher and ore loading operations, and to ensure separation of underground and surface equipment.

The perimeter of the ROM Pad would be bunded to ensure that surface water from undisturbed sections of the Project Site is not permitted to run onto the ROM Pad and similarly, surface water within the ROM Pad would be retained within the ROM Pad footprint for transfer to the Mine Water Pond for use within the underground mine.

The Applicant does not propose to line the ROM Pad because ore material would be stored on the pad for a short period only prior to being removed from the Project Site.

Ore material would be transported from the underground mine to the ROM Pad by underground haul trucks. This material would be stockpiled within the northern section of the ROM Pad. The Applicant anticipates that ore material would generally be stored within the ROM Pad for only a few days, extending on occasion to no more than a few weeks.

2.5.2 Load and Haul Operations

Transportation of ore material to the Tritton Copper Mine would be undertaken using the same fleet of vehicles currently used to transport ore from the Girilambone Copper Mine, namely road registered, two trailer road trains with an indicative capacity of 52t.

Empty road trains would arrive at the ROM Pad and would be loaded using a front-end loader or similar. All loads would be covered prior to the road trains leaving the ROM Pad. Loaded road trains would travel to the Tritton Copper Mine via:

- the proposed Site Access Road;
- the existing private haul road between the North East and Murrawombie operations; and
- Booramugga and Yarrandale Roads (see **Figure 2.7**).

Section 2.7.2.1 provides a description of the proposed and existing road infrastructure along the proposed transportation route.

The Applicant anticipates that ore material sourced from the proposed Avoca Tank Project would replace ore currently sourced from the Girilambone Copper Mine (North East and Larsens operations) as production there falls towards the end of the life of that operation. As a result, the Applicant anticipates that the currently approved rate and hours of transportation would continue as follows.

- Rate of transportation – not limited.
- Hours of transportation – 24 hours per day, 7 days per week.

Finally, the Applicant would require all drivers of trucks carrying ore from the Project Site to abide by the existing *Traffic Management Plan*.

2.6 WATER MANAGEMENT

2.6.1 Classes of Water

The Proposal includes five principal classes of water as follows.

- Potable and ablutions water – this water would be brought to site in bulk and stored within tanks for use within the ablutions facilities and for drinking purposes.
- Make up water – this water would be transported to site via a buried poly pipe installed adjacent to the Site Access Road (see **Figure 2.1**). The water would be sourced from the Applicant's current water supply at the North East Open Cut. That water is obtained under licence from a pumping station on the Bogan River located approximately 25km to the east of the Project Site. That water would be used for dust suppression and for make up water within the Mine Water Pond.
- Clean water – this water is run off from undisturbed sections of the Project Site. This water would, as far as practicable, be diverted away from disturbed areas and would be allowed to flow to natural drainage. Clean water diversions would be constructed in accordance with the recommendations of *Managing Urban Stormwater Volumes 1, 2C and 2E* and would be removed at the end of the life of the Proposal.
- Dirty water – this water is run off from disturbed sections of the Project Site. This water would be managed in accordance with the recommendations of *Managing Urban Stormwater– Volumes 1, 2C and 2E* (Landcom, 2004; DECC, 2008a and 2008b).
- Mine water – this water is water that would be removed from the underground mine and would comprise a mixture of water pumped underground from the Mine Water Pond and groundwater that may seep into the underground workings. This class of water may contain suspended sediment, salt chemicals or hydrocarbons or may have a reduced pH. It would not be permitted to flow to natural drainage. This water would be stored in the Mine Water Pond which would be lined to achieve a permeability of 1 x 10^{-9}m/s over 900mm or equivalent.

2.6.2 Erosion and Sediment Control

A *Erosion and Sediment Control Plan* would be prepared prior to the commencement of site establishment and construction operations. The plan would be prepared in accordance with the requirements of the following documents.

- *Managing Urban Stormwater: Soils and Construction – Volume 1* (Landcom, 2004).
- *Managing Urban Stormwater: Soils and Construction – Volume 2C – unsealed roads* (DECC, 2008a).
- *Managing Urban Stormwater: Soils and Construction – Volume 2E – mines and quarries* (DECC, 2008b).

In summary, the plan would include the following components (**Figure 2.1**).

- Clean water diversions around areas of proposed disturbance.
- Dirty water containment structures that would divert all run off from disturbed areas within the Surface Facilities Area to a sediment basin. The sediment basin would be designed and operated in accordance with the ESCP, however, at this stage is proposed to be approximately at least 3.5ML capacity, sufficient for storage of run off from a 5-day 90th percentile rainfall event. Water within the sediment basin would be reused for operational purposes where possible or, following testing to demonstrate suitable water quality, discharged to natural drainage. The sediment basin volume, together with that of existing farm dams within the Project Site, would be less than the applicable Harvestable Right under Section 53 of the *Water Management Act 2000*.
- Mine water containment structures designed to separate potentially salt or hydrocarbon contaminated, or low pH water from dirty water for transfer to the Mine Water Pond. This water would be managed to ensure that it does not discharge. Mine water would be used in underground mining operations and for dust suppression.
- Road-side drainage and sediment control structures constructed in accordance with DECC (2008a).

2.6.3 Operational Site Water Balance

Table 2.8 and **Figure 2.6** presents the operational water balance for the Proposal. In summary, the Proposal includes the following water sources which would be used in the following preference order. **Table 2.8** presents two water balance scenarios, namely Scenario 1, prior to the interception of groundwater and Scenario 2, at the end of the life of the proposal when groundwater inflows are expected to be greatest.

- Mine water – including the following.
  - groundwater inflow to the underground mine – the volume of water flowing into the underground mine is expected to vary from nil at the commencement of mining operations to approximately 111ML/yr (see Section 4.4.6.1); and

Table 2.8
Indicative Operational Water Balance

Component	**Estimation Methodology**	**Anticipated Annual Volume**	
Water Sources		**Scenario 1[#1]**	**Scenario 2[#1]**
Dirty water	Volume = A x B x C ÷ 1 000 000 where A = Annual average rainfall (444mm) B = Area within dirty water catchment (approximately 160 000m^2) C = Runoff coefficient = 0.42[#2]	Up to 30ML	Up to 30ML
Groundwater inflow to workings	See Section 4.4.6.1	Nil	111ML
Makeup water	Variable based on demand	134ML	23ML
	Sub-total	**164ML**	**164ML**
Water uses or losses			
Dust suppression	Volume = A x B x C x D ÷ 1 000 000 Where A = Area requiring dust suppression (approximately 20 000m^2) B = average number of days per year with less than 1mm of rain (321 days)[#2] C = dust suppression requirements (2mm/m^2/hour)[#3] D = Average hours per day during which dust suppression is required (10 hours)	128ML	128ML
Evaporation – Mine Water Pond	Volume = A x B x C Where A = Area of pond surface (approximately 2 500m^2) B = Annual pan evaporation (2045mm) C = Pond Evaporation Correction Factor (0.5)	4ML	4ML
Evaporation – Underground ventilation and moisture contained in rock removed from the underground mine	Volume = 1L/s	32ML	32ML
	Sub-total	**164ML**	**164ML**

Note 1: Scenario 1 = prior to the interception of groundwater.
Scenario 2 = end of mine life when maximum groundwater inflows are anticipated.
Note 2: Source – Landcom (2004) - after Table F2.
Note 3: Source – Bureau of Meteorology – Nyngan Airport Automatic Weather Station.
Note 4: Source – National Pollution Inventory Handbook.

Source: Tritton Resources Pty Ltd

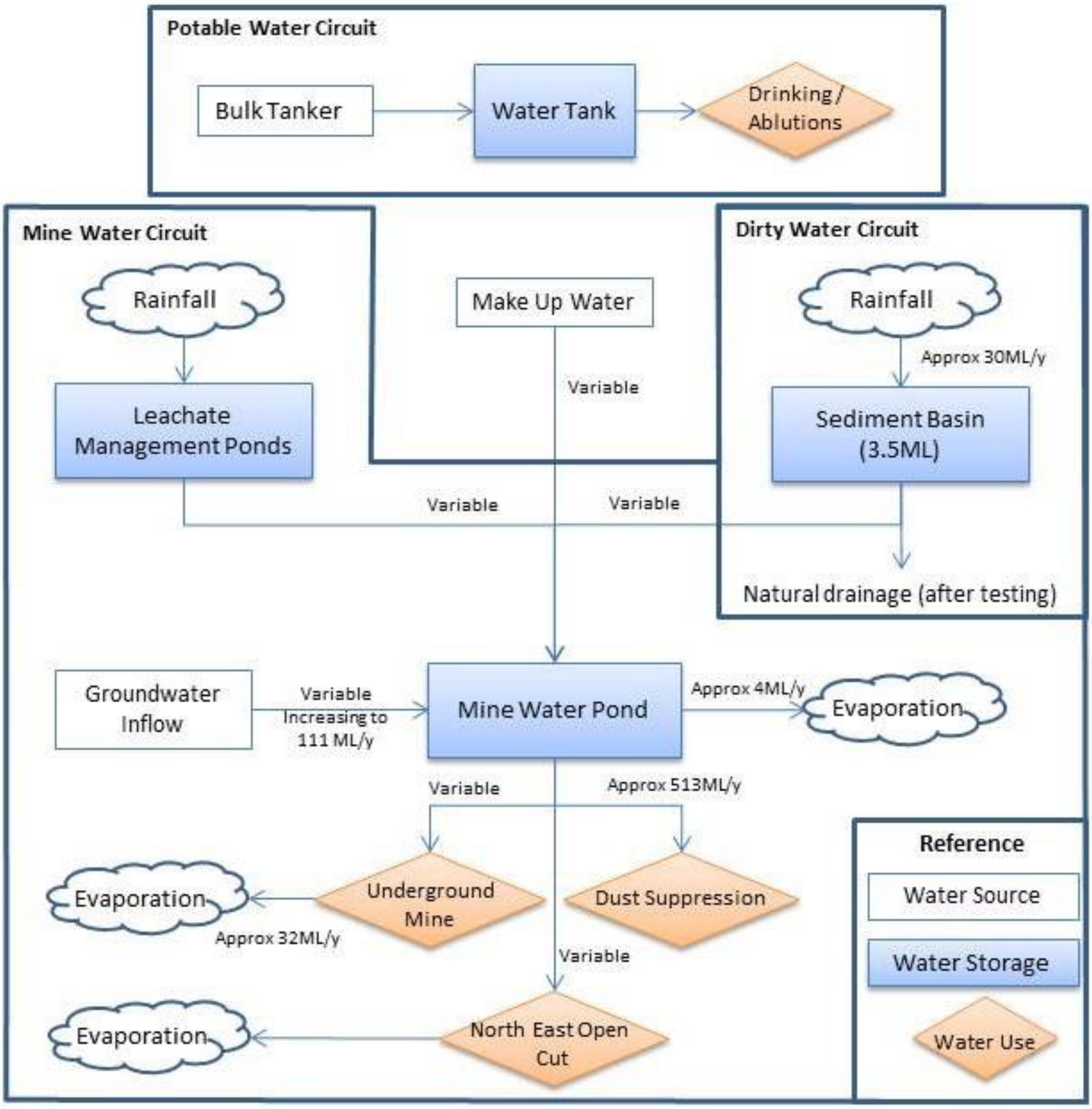

Figure 2.6
SCHEMATIC WATER BALANCE

  – surface water flows within the ROM Pad and waste rock emplacement - the volume of water from this source would vary but is unlikely to be substantial.

- Dirty water – the volume of available dirty water would depend on annual rainfall. In an average year, up to 30ML of water may be available.
- Make up water – any shortfall in water for operational purposes would be sourced from the Applicants licenced raw water dam at the Murrawombie Mine and transported to the Project Site via the proposed pipeline.

The Proposal also includes the following water uses or destinations.

- The proposed underground mine – water would be pumped from the Mine Water Pond to the underground mine for use in mining operations. The majority of that water would be returned to surface, however, a proportion would be lost to evaporation via the mine ventilation system. This has been conservatively estimated at approximately 1L/s or 32ML/yr.
- Dust suppression – dust suppression operations would conservatively be required over an active area of 2ha, with other areas protected, as required, through the use of chemical suppressants or other mechanisms. At an assumed application rate of 2mm/m^2/hour over 321 10-hour days, an estimated 128ML/yr would be required for dust suppression operations.
- North East Open Cut – in the event that more mine water was produced than could be used by the Proposal, the additional water would be transferred to the North East Open Cut. As the excess water would be largely groundwater and the North East Open Cut has partially filled with groundwater, transfer of that water would not result in adverse environmental impacts.

As a result, the Proposal would be able to adequately balance its water demands and supplies in such a manner that mine water would not be permitted to flow to natural drainage.

2.6.4 Water Management

An aerated wastewater treatment or pump out septic system would be installed in the vicinity of the ablutions facilities. This system would comply with the requirements of Bogan Shire Council and would be approved for use by Council prior to being commissioned.

2.7 TRANSPORTATION

2.7.1 Internal Project Site Transportation

A range of existing and proposed internal roads would be required to facilitate extraction of ore and waste rock and to permit movement of mobile plant within the Project Site. These would include the following (**Figure 2.1**).

- The Site Access Road which would permit access for light and heavy vehicles to the Surface Facilities Area.
- Internal access roads which would permit movement of mine-related vehicles within the Project Site.

All proposed roads would be unsealed and constructed in a manner that would permit all weather access to and within the Project Site. In addition, all proposed roads would be designed and constructed in accordance with the requirements of *Managing Urban Stormwater – Soils and Construction – Volume 2C Unsealed Roads* (DECC, 2008a).

The Site Access Road would be constructed to the same standard as the existing private haul road from the North East Mine to the Murrawombie Mine, namely a 12m wide road with a combined road base of approximately 400mm.

All internal roads would be sheeted with suitable material to minimise dust generation as a result of vehicle movements and would be watered with a water truck as required. Alternatively, suitable dust suppressant products would be mixed with water sprayed on the roads to minimise water required for dust suppression operations.

A lockable gate would be installed at the southern end of the Site Access Road and would be closed and locked to prevent vehicular access when the Project Site is non-operational.

Finally, the Project Site road network would be constructed and signposted in a manner that would ensure separation between mine and non-mine vehicles. Site access would be controlled and non-approved drivers and vehicles would be prevented from accessing the active sections of the Project Site without an appropriate clearance or escort.

2.7.2 External Transportation

2.7.2.1 External Road Network

Figure 2.7 presents the surrounding road network and the proposed road train transportation route. The proposed transportation route for ore material between the ROM Pad and the Tritton Copper Mine would be via:

- the Site Access Road;
- the existing private haul road between the North East and Murrawombie operations; and
- Booramugga and Yarrandale Roads.

All ore material from the Project Site would be transported to the Tritton Copper Mine via the above route. That traffic accessing the Project Site from Nyngan would do so via the Mitchell Highway and Booroomugga Road before entering the Site Access Road. The Applicant anticipates that the route would principally used for the transportation of personnel and deliveries of goods such as diesel and equipment, however, allowance has been made for occasional campaign based traffic of waste rock materials to supply road maintenance materials from Bogan Shire Council and other local customers.

The existing private haul road between the North East and Murrawombie operations is an unsealed road approximately 12m wide. Maintenance of the road is funded entirely by the Applicant. A lockable gate is installed at the southern end of the road. That gate is closed and locked when the North East Open Cut and Underground are non-operational.

Booramugga and Yarrandale Roads are sealed public roads. Both roads are in good condition and are managed by Bogan Shire Council.

The Mitchell Highway is a sealed public road. The road is in good condition and is a State Road managed by the Roads and Maritime Service.

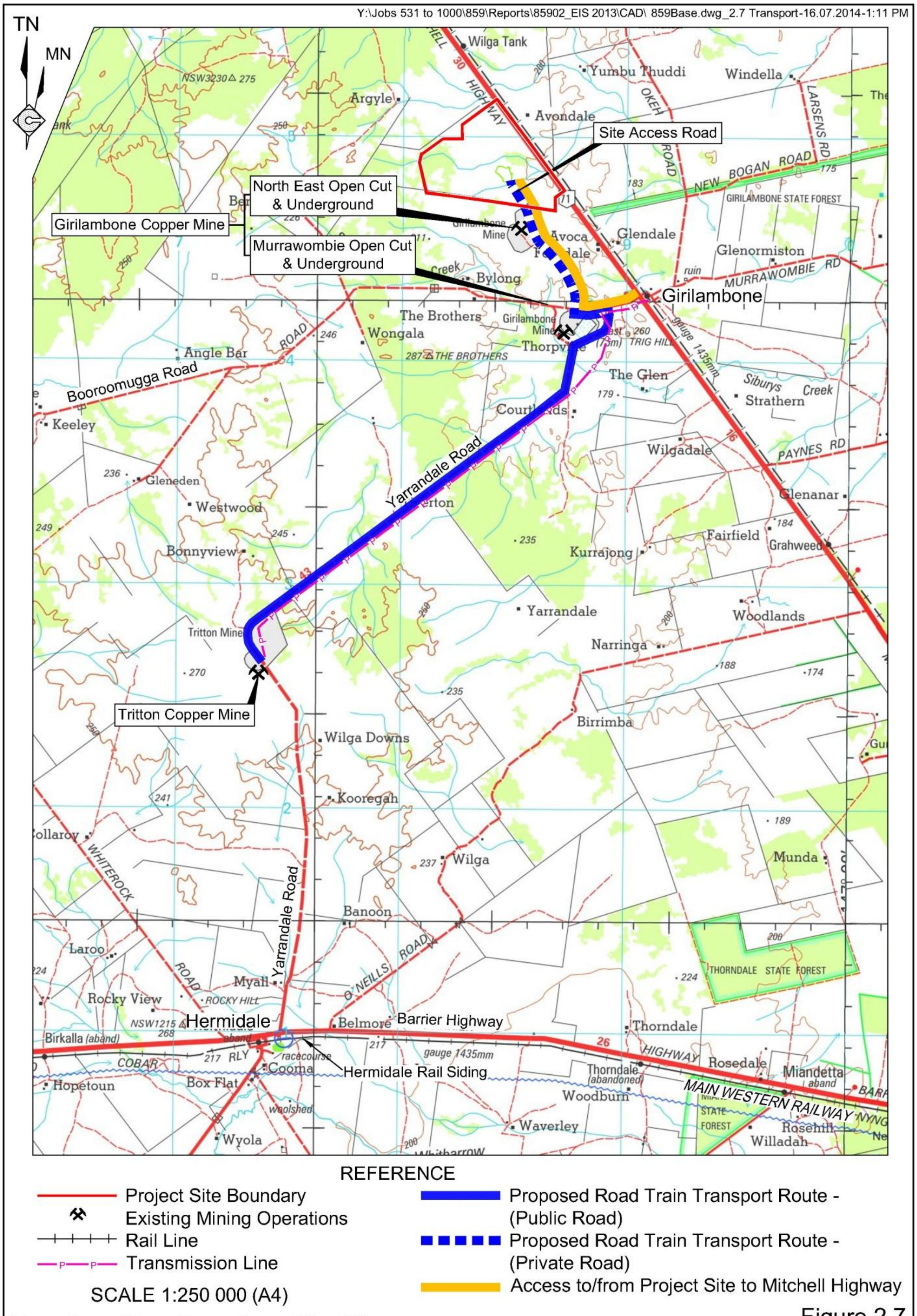

Figure 2.7
SURROUNDING ROAD NETWORK

2.7.2.2 Traffic Types and Levels

Traffic types associated with the Proposal would include the following.

- Light vehicles: including passenger vehicles and small buses.
- Heavy vehicles: including rigid trucks and semi-trailers delivering consumables, processing reagents and supplies, or transporting road maintenance materials to local projects.
- Oversize and long vehicles: including low loaders delivering mining equipment and two trailer road trains transporting ore material.

The Applicant anticipates that ore production within the Project Site would replace production from existing operations at the Girilambone Copper Mine. As a result, traffic levels of the public road network are not expected to change significantly as a result of the Proposal. Notwithstanding this, **Table 2.9** presents the anticipated Proposal-related traffic levels for each of the principal transportation routes identified in the previous subsection.

Table 2.9
Anticipated Maximum Daily Traffic Movements[1]

Route	Light Vehicles	Heavy Vehicles	Long and Oversize Vehicles
Proposal Construction			
Project Site – Tritton Copper Mine	12	2	nil
Project Site – Nyngan	24	4	nil
Proposal Operation			
Project Site – Tritton Copper Mine	6	2	50[2]
Project Site – Nyngan	12	2	nil

Note 1: Two vehicle movements = one return trip
Note 2: Based on the maximum production rate of 316 000tpa, transportation operations on 270 days per year and 52t per load.
Source: Tritton Resources Pty Ltd

2.8 FACILITIES AND SERVICES

2.8.1 Facilities

The Applicant would establish the workshop and laydown area, which would comprise the following.(**Figure 2.1** and **2.4**).

- A workshop comprising shipping containers and an arched roof structure.
- One or more transportable stores buildings/shipping containers.
- A hardstand area sufficiently large to permit all mobile plant to be parked.
- A series of demountable buildings that would comprise the site office, crib (meals) room, ablution facilities, first aid room, security and meeting rooms.
- An unsealed car park area.
- A vehicle wash down bay.

All visitors would be required to stop and sign in at the site office prior to being permitted to access the active sections of the Project Site.

In addition a fuel bay and refuelling area incorporating bunded fuel and waste oil tank(s) 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.

Finally, a laydown area would be constructed to permit storage of equipment awaiting use or removal from the Project Site.

2.8.2 Services

2.8.2.1 Introduction

The Applicant 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.

2.8.2.2 Electricity Supply

A 11kV power line would be constructed from the Applicant's existing power supply at the North East Open Cut and Underground (**Figure 2.1** and **2.4**). The power line would be located adjacent to the Site Access Road and would provide power to the underground mine, workshop and other facilities within the Project Site.

A substation would be established in the vicinity of the ventilation rise to reduce the voltage of the supply to that suitable for use underground. This supply would be transferred to the underground workings initially via a temporary supply line to the portal and decline, and later by a supply line installed in the ventilation rise.

The voltage of the supply would be further reduced to 240V for supply to the workshop, offices, crib room and ablutions facilities.

Power for surface water pumps and other infrastructure may be provided by diesel or petrol generators.

2.8.2.3 Communications

The Project Site would be serviced by telephone and data lines. These services may be provided via a satellite or wireless link. In addition, communications within the remainder of the Project Site would be via a digital radio network.

2.8.2.4 Hydrocarbons

All diesel fuel for the mobile equipment would be stored in tanks with a total indicative capacity of approximately 110 000L within the fuel store area. The tanks would either be self-bunded or would be located within a covered, concrete-sealed bund that would be sized to meet the relevant containment requirements and Australian Standard AS 1940:2004 *The Storage and Handling of Flammable and Combustible Liquids*, 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 store 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 there work locations using a mobile fuel tanker or tray-mounted fuel tanks.

Any bulk oils, greases and waste oils would be stored within the fuel store. In addition, bunded pallets 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 Applicant would ensure that all contractors and employees are appropriately trained in their use.

2.9 NON-PRODUCTION WASTE MANAGEMENT

Non-production waste would be managed in accordance with Clause 46K(1) of the *Protection of the Environment Operations (Waste) Regulation 2005* and the *NSW Waste Avoidance and Resource Recovery Strategy 2007* which was prepared with regard to the *Waste Avoidance and Resource Recovery Act 2001*. The underlying principle for all waste management would be to minimise waste generation, to recover, reuse and to recycle waste materials as much as possible, and to reduce environmental harm in accordance with the principles of ecologically sustainable development.

Table 2.10 provides a description of how non-production waste would be stored, managed and subsequently removed from the Project Site.

In addition, the Applicant would implement a purchasing policy that would take into account waste management and would, where practicable, purchase products that would result in the least waste generation. The Applicant would also ensure that all recyclable materials would, where practicable, be recycled on site or would be transported to an appropriate recycling facility.

2.10 PROPOSAL LIFE AND HOURS OF OPERATION

2.10.1 Hours of Operation

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

Table 2.10
Non-Production Waste Management

Waste Type	Storage	Removal Method
General solid waste (putrescible), including food scraps and inert materials	Covered bins located within the crib room, office 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.
Waste oils and greases	Placed within bunded area(s) within the workshop area.	Collected on a regular basis by a licensed waste contractor and transported to an appropriately licensed facility.
Batteries	Batteries would be placed within a covered and marked used battery storage area until removed from site.	Batteries would be collected as necessary by a licensed disposal contractor and recycled.
Tyres	Tyres would be placed within a marked used tyre storage area until removed from site or used for another purpose.	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.
Scrap Steel /Metal	Stored in a specified areas within the workshop area or elsewhere such as the laydown area, as required.	Collected as necessary by a scrap metal recycler.
General Recyclables	Covered bins located within lunch rooms, offices, camp site and elsewhere as required. Where these bins are located outside a closed building they would be fitted with animal-proof lids.	Collected as necessary by a licensed recycling contractor and transported to an appropriate recycling facility.
Source: Tritton Resources Pty Ltd		

Table 2.11
Proposed Hours of Operation

Activity	Proposed Days of Operation	Proposed Hours of Operation
Vegetation clearing and topsoil stripping	7 days a week	Daylight hours
Site establishment operations, including box cut establishment	7 days a week	24 hours per day
Underground mining operations	7 days a week	24 hours per day
Transportation operations	7 days a week	24 hours per day
Maintenance operations	7 days a week	24 hours per day
Rehabilitation operations	7 days a week	Daylight hours
Source: Tritton Resources Pty Ltd.		

2.10.2 Proposal Life

The Applicant anticipates that site establishment, including establishment of the surface facilities area and the box cut and decline, would take up to 12 months to complete. Ore mining operations would commence in Year 2 of the Proposal and would require approximately 4 years to complete, with a further 2 years required for site decommissioning and rehabilitation. As a result, the proposed life of the Proposal would be 7 years.

The Applicant, however, notes that mining rates may vary from those identified in **Table 2.2** and that the actual Proposal Life may be longer than 7 years. In addition, throughout the life of the Proposal, the Applicant would continue to explore for possible extensions to the known mineralisation and for new areas of mineralisation within its mineral authorities. Further, ore reserves identified may extend the Proposal life, in which case separate applications for approval to extract that material would be made at that time.

2.11 EMPLOYMENT, CAPITAL COST AND ECONOMIC CONTRIBUTIONS

The Applicant notes that the proposed Avoca Tank Project would form a component of the Applicant's overall operations and that it would effectively replace existing operations the Girilambone Copper Mine. Section 4.15.4 presents an overview of the contribution made by the Tritton and Girilambone Copper Mines as a whole. Notwithstanding this, the following presents an overview of the employment, capital cost and economic contributions that the Avoca Tank Project would make to the local, regional, State and national economies.

- Approximately 55 full-time equivalent positions during the construction and operation of the Mine.
- The capital cost of the Project is anticipated to be approximately $20 million.
- The Proposal would contribute approximately $6.4 million per year to the local and regional economy through wages and a further $1.7 per year through purchases of local goods and services.
- The Proposal would contribute approximately $9.2 million per year to the State and national economy through purchases of goods and services within NSW and Australia.
- The Proposal would contribute approximately $4.0 million per year to the local, State and national governments through the payment of rates, taxes and royalties.

2.12 SAFETY/SECURITY MANAGEMENT

The Applicant would incorporate the Proposal into its existing *Health and Safety Management System*. The system identifies roles and responsibilities, procedures for investigation of near misses and safety incidents, and requirement for a regular and trigger-related review and audit of the system.

The Applicant would implement the following to maintain a level of safety and security appropriate for the proposed activities.

i) Use of locked gates to exclude access when site personnel are not working within the Project Site.

ii) Installation of and maintenance of safety signage around the Project Site and perimeter fencing, where necessary.

iii) A requirement that all visitors entering and departing the Project Site report their location to the Applicant through the use of a tag board and sign in/sign out process as appropriate.

2.13 SITE REHABILITATION AND DECOMMISSIONING

2.13.1 Introduction

Rehabilitation of all areas to be disturbed throughout the life of the Proposal would be an integral part of the Proposal. Rehabilitation activities would be planned and undertaken in accordance with a *Mining Operations Plan* (MOP) to be submitted to DRE and approved following the issue of development consent and prior to the commencement of on-site activities. The MOP would also address any rehabilitation-related requirements nominated in the development consent for the Proposal. Finally, it is noted that the MOP will be required to be accompanied by a rehabilitation cost estimate prepared in accordance with the relevant guidelines. That estimate would identify the likely costs associated with rehabilitation of the Proposal and a security to cover those costs would be required to be provided prior to the commencement of site establishment and construction operations.

In addition to the rehabilitation commitments in the *Environmental Impact Statement*, rehabilitation would be planned and undertaken with reference to the following documentation.

- *Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry* (Commonwealth Government, 2006).
- *Mine Closure and Completion – Leading Practice Sustainable Development Program for the Mining Industry* (Commonwealth Government, 2006).
- *Strategic Framework for Mine Closure* (ANZMEC, 2000).

2.13.2 Rehabilitation Hierarchy

Figure 2.7 provides an indicative illustration as to the primary and secondary domains of the Project Site. The rehabilitation hierarchy for the Proposal follows the rehabilitation hierarchy identified in *ESG3: Mining Operations Plan (MOP) Guidelines* dated September 2013 and published by DRE. A summary of each phase of the rehabilitation hierarchy is as follows.

Decommissioning

Specific details of decommissioning completion criteria would be covered the MOP. In general, however, the decommissioning phase of the rehabilitation hierarchy would involve the cessation of usage of infrastructure, as well as its demolition or dismantling and removal of built structures and any remediation of the land that may be required. Specific decommissioning activities that relate to completion criteria at this stage in the rehabilitation hierarchy are outlined in Section 2.13.7.

Landform Establishment

The landform establishment phase involves the earthworks required to cover and/or profile all or part of each domain to create a landform suitable for the proposed final land use, including construction of final surface water controls, where required. Specific procedures relating to landform establishment that relate to completion criteria at this stage of the rehabilitation hierarchy are outlined in Section 2.13.7.

Growth Media Development

The growth media development phase of the rehabilitation hierarchy involves the replacement of soil over disturbed areas and preparation of the soil for revegetation including fertiliser or ameliorant application, and ripping or scarifying the soil. Specific procedures relating to growth media development are outlined in Section 2.13.7.

Ecosystem and Land Use Establishment

The ecosystem and land use establishment phase of the rehabilitation hierarchy involves the revegetation of the rehabilitated landform with native species commensurate with the targeted final land use. Specific procedures relating to ecosystem and land use establishment are outlined in Section 2.13.7.

Ecosystem and Land Use Sustainability

The ecosystem and land use sustainability phase of the rehabilitation hierarchy occurs once monitoring shows that there is adequate vegetation over the area. During this stage, the area would continue to be monitored and would not reach its nominated sustainable end land use until monitoring determines that the completion criteria summarised in **Table 2.12** have been met.

Table 2.12
Indicative Rehabilitation Completion Criteria, Performance Indicators and Monitoring Strategy

Page 1 of 2

Rehabilitation Phase	Indicative Completion Criteria	Performance Indicator	Monitoring Strategy
Decommissioning	All built infrastructure removed from site and disturbance areas ready for landform establishment operations.		Photographs. Visual inspection on completion.
Landform Establishment	All slopes stable and, with the exception of the Box Cut, suitable for soil placement.	All slopes (with the exception of the Box Cut) less than 1:3 (V:H).	Survey on completion.

Table 2.12 (Cont'd)
Indicative Rehabilitation Completion Criteria, Performance Indicators and Monitoring Strategy

Page 2 of 2

Rehabilitation Phase	Indicative Completion Criteria	Performance Indicator	Monitoring Strategy
Landform Establishment (Cont'd)	The rehabilitated area does not represent an erosion hazard.	Surface water control structures installed and stabilised.	Photographs. Visual inspection on completion. Survey on completion.
Growth Media Development	Subsoil/topsoil placed on the shaped landform to the required depth.	Minimum 20cm of topsoil spread.	Test pits following spreading. Photographs.
	Soil ameliorants and fertiliser applied.	Soil testing complete and recommendations implemented.	Testing report(s) prior and following spreading. Contractor invoices.
	Soil scarified and ready for revegetation.	Surface even and slightly roughened to encourage water infiltration.	Photographs. Visual inspection on completion. Survey.
Ecosystem and Land Use Establishment	Appropriate species mix is selected.	Species mix is consistent with surrounding vegetation.	Ecology survey of surrounding vegetation – pre-closure.
	Seed spread and becoming established.	Appropriate strike rate taking into account species and climatic conditions.	Landscape Function Analysis survey – immediately post-revegetation.
		No significant 'bare' patches	
	Appropriate native plant species richness is present for the restored community.	Comparison to control site established in equivalent remnant vegetation.	Landscape Function Analysis survey – 6 monthly until established.
	Appropriate micro-habitat features established.		
Ecosystem and Land Use Sustainability	The area and its sustainability is consistent with the intended land use.	Establish areas of rehabilitation consistent with approval conditions.	Landscape Function Analysis survey – annual until relinquishment.
	Exotic weeds or vegetation are not competing or impacting on the intended land use.	Noxious weeds are no more prevalent within rehabilitation areas than analogue sites.	Weed and pest survey – 6 monthly until relinquishment.
	Feral pests are not impacting on the intended land use.	Feral pests are no more prevalent within rehabilitation areas than analogue sites.	

2.13.3 Rehabilitation Objectives

The Applicant's rehabilitation objectives are divided into the following three specific categories. The specific objectives associated with each category are as follows.

Decommissioning and Landform Establishment

- To stabilise all disturbed areas and minimise erosion and dust generation.
- To provide a geotechnically stable, safe and non-polluting landform which provides land suitable for the final land use of intermittent agriculture and which requires land management practices no greater surrounding undisturbed land.

Growth Media Development and Ecosystem Establishment

- To provide for soil management over the life of the Proposal which addresses the constraints related to stripping, storage and replacement on the final landform.
- To achieve a soil profile capable of sustaining the specified final land use.
- To provide for surface micro-habitats such as fallen timber, surface rocks or other features which would encourage colonisation by native flora and fauna.
- To establish vegetation with the species diversity commensurate to the ecological community disturbed.

Ecosystem Development (Final Land Use)

- To return all disturbed areas, with the exception of the box cut, to a final land use of intermittent agriculture.

2.13.4 Strategic Rehabilitation Management

2.13.4.1 Rehabilitation Domains

Rehabilitation domains refer to areas of related disturbance based on processes and use prior to rehabilitation and for which decommissioning and rehabilitation activities would be similar. A description of each domain is as follows (**Figure 2.8**). Numbering of individual domains is consistent with Section 5 of *ESG3: Mining Operations Plan (MOP) Guidelines* dated September 2013 and published by DRE.

Primary Domains

Domain 1 – Infrastructure Area

This domain includes the hardstand and laydown areas, car park, fuel store and refuelling bay, water pipeline, power line and all roads.

Domain 3 – Water Management Structures

This domain includes the Mine Water Pond and sediment basin.

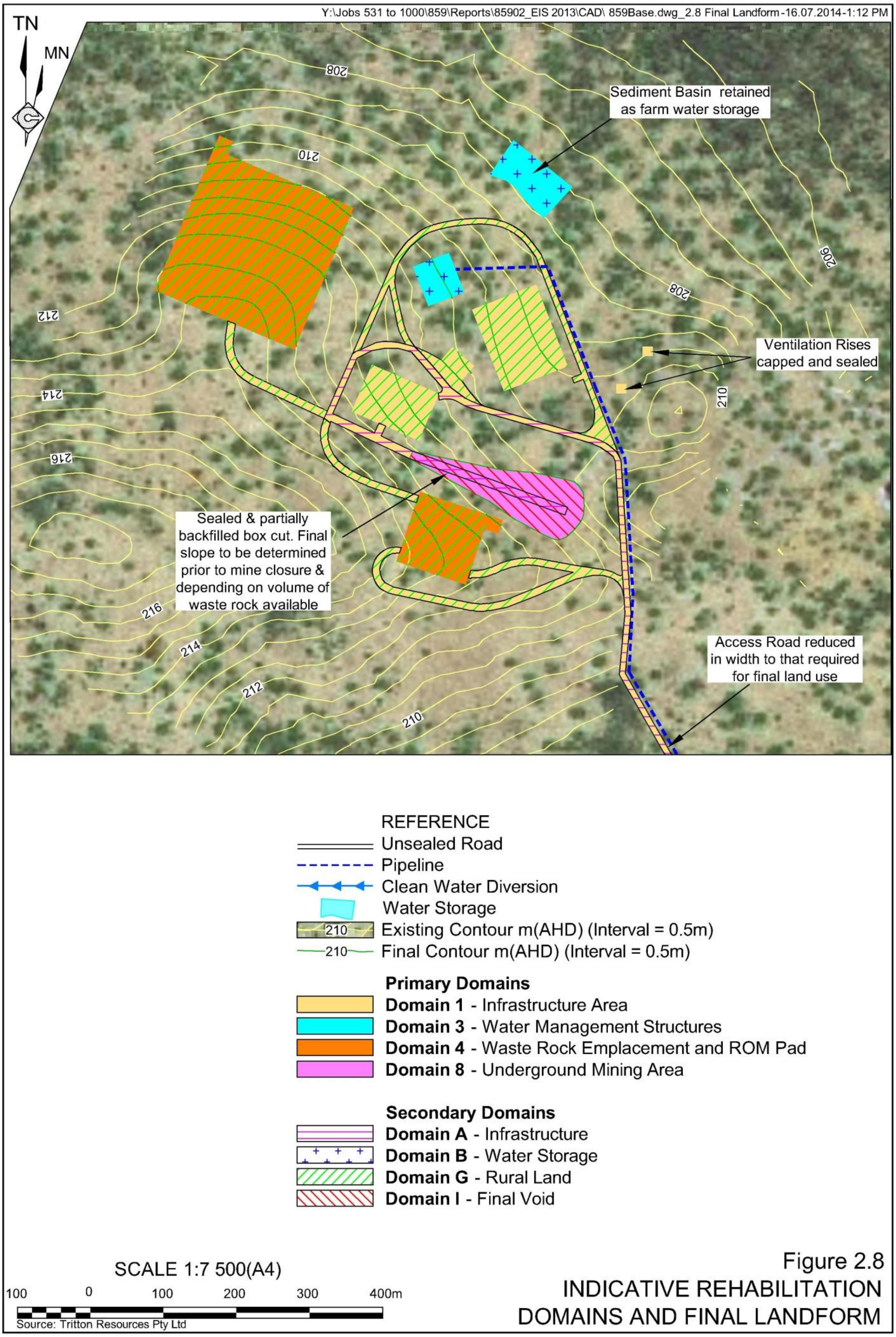

Figure 2.8
INDICATIVE REHABILITATION DOMAINS AND FINAL LANDFORM

Domain 4 – Waste Rock Emplacement and ROM Pad

This domain includes the waste rock emplacement and ROM Pad.

Domain 8 – Underground Mining Area

This domain includes the box cut, portal and ventilation rise and emergency egress.

<u>Secondary Domains</u>

Domain A – Infrastructure

This domain would include the Site Access Road which would be used for continued land management purposes.

Domain B – Water Management

This domain would include the Mine Water Pond and sediment basin which would be retained for ongoing agricultural use.

Domain G – Rural Land

All areas, with the exception of the boxcut and water management structures would be returned to a final land use of intermittent agriculture.

Domain I – Final Void

This domain would include the box cut and capped and sealed ventilation rises.

2.13.4.2 Rehabilitation Completion Criteria, Performance Indicators and Monitoring Strategy

Strategic rehabilitation completion criteria, associated performance indicators and monitoring strategy for the Proposal are summarised in **Table 2.12**. It is noted that **Table 2.12** provides a range of general criteria and that further detailed criteria would be provided in any MOP prepared following granting of development consent.

2.13.5 Final Landform

Figure 2.8 presents the final landform for the Proposal. In summary, the landform would comprise the following.

- A sealed portal and partially backfilled box cut, with the final slope to be determined depending on the volume of waste rock available. In addition, both rises would be capped and sealed. All mine openings would be sealed in accordance with the requirements of NSW Trade and Investment – Mine Safety at the time of mine closure.
- The Mine Water Pond and sediment basin would be retained as farm water storages.

- The remaining disturbed areas would be rehabilitates as follows.
  - Hardstand areas would be scraped and sheeting material placed within the box cut.
  - Compacted areas would be deep ripped.
  - Surface water control structures would be installed as required.
  - Soil would be spread.
  - Seed of species consistent with the Benson 103 – Poplar Box – Gum – barked Codibah – White Cypress Pine (Benson 103) Community would be spread.
  - Rehabilitated areas would be fenced until the newly established vegetation is able to withstand grazing by native and exotic animals.

The Site Access Road would be maintained for land management purposes. The width of the road would be reduced to a width suitable for that purpose, with the remainder of the road rehabilitated as described above.

2.13.6 Final Land Use

In proposing an end land use for the Project Site, the Applicant has considered:

- the current land use within the Project Site and surrounding properties (see Section 4.1.5.2);
- the infrastructure that would be developed within the Project Site; and
- the proximity of the Project Site to other industry.

End land uses considered included:

- the development of another industry;
- a return to an agricultural end land use; and
- the conservation of biodiversity.

In considering an end land use of another industry, the Applicant notes that the Proposal would result in construction of a number of items of infrastructure that may potentially be amenable to other industrial land uses. These include power and water supplies, and hardstand areas. However, limiting the potential for future industrial use of the Project Site is the distance from the Project Site to major population centres, including Nyngan.

In considering an end land use of agriculture, the Applicant notes that the Project Site and surrounding properties are currently used for intermittent agriculture, principally grazing, as climatic conditions permit.

In considering an end land use of nature conservation, the Applicant noted that sections of the Project Site, as well as large areas surrounding the Project Site, have been extensively disturbed by prior agricultural and other activities. There exists an opportunity for the Project Site to result in additional areas of land that would be used for the conservation of native habitat.

However, the Applicant also notes that land set aside for nature conservation is unlikely to generate sufficient income to pay for the required land management activities such as fencing and weed and pest control.

In light of the above, the Applicant proposes that the end land use would be intermittent agriculture.

2.13.7 Rehabilitation Methods and Procedures

2.13.7.1 Domain 1 – Surface Facilities Area and Infrastructure

Following completion of mining-related operations, and assuming that no further mining operations are proposed, the Applicant would remove infrastructure and services specifically established to service the mining operation that would no longer be required. This would include the following.

- All temporary buildings, including the office, crib room, ablutions and workshop.
- The waste water treatment facility.
- The fuel store and oil/water separator.

Other items of infrastructure would remain for ongoing land management purposes or for future mining operations. Indicatively, this would include the following.

- Buried water supply pipeline.
- Power line and power supply to the underground mine.
- Site Access Road, reduced in width to that require for ongoing light vehicle access.

Samples of soil below and surrounding areas potentially subject to hydrocarbon contamination would be taken and analysed. In the event that contamination is identified, contaminated material would be excavated and removed from the Project Site to a facility licensed to accept such material. Once excavation is complete, a second soil sample would be taken to confirm that all contaminated material has been removed.

All concrete footings and foundations of buildings or structures would be broken up and removed or covered. The materials used to form roads and hardstands would be removed and the areas ripped. All areas to be rehabilitated would be re-profiled to mimic the pre-mining landform.

Previously stockpiled topsoil would be spread over the ripped and profiled landform and covered with any previously cleared vegetation stockpiled within the Project Site. The following soil management procedures would be implemented.

- The final landform would have an even but roughened surface which would be ripped along the line of the contour to break any compacted and/or smooth surfaces. Ripping would also assist the keying of the soil into the underlying substrate, maximise aeration and infiltration and minimise erosion.

- Soil would be placed and spread on the shaped landform to the depths identified in **Table 2.12**. If required, soil would be ameliorated prior to revegetation to prevent surface crusting, increase moisture and organic content, and/or buffer surface temperatures to improve germination.
- Soil would not be respread when too moist, to avoid excessive compaction, or too dry to avoid excessive dust and wind erosion.
- The final landform would be spread with seed of a mix of species representative of the existing vegetation community, namely Benson 103.
- Finally, previously cleared and stockpiled vegetation would then be spread over the revegetated areas.

2.13.7.2 Domain 3 – Water Management Structures

The Mine Water Pond and sediment basin would be retained as farm water storages for future land management purposes. The combined capacity of the structures would be less than 3.5ML. This is significantly less than the harvestable right capacity of the Project Site of approximately 90ML.

Prior to decommissioning the Mine Water Pond for use as farm water storage, the Applicant would:

- return water within the pond back underground;
- remove the accumulated sediment and pond liner and dispose of the sediment as potentially acid generating material within the underground workings and the liner at an approved waste management facility; and
- construct a suitable inlet and spill way.

Alternatively, if the pond is not required as farm water storage, it would be decommissioned as described above and filled in. The footprint of the pond would be rehabilitated as described in Section 2.13.6.1.

Sediment and erosion control structures constructed for the mining operation that are not required for the final landform would be removed and rehabilitated as described previously.

2.13.7.3 Domain 4 – Waste Rock Emplacement and ROM Pad

As described in Section 2.4.3, the waste rock emplacement would comprise three separate placement areas as follows.

- Cell 1 – weathered, non-acid forming waste rock placement area. Material within this area would preferentially be retained on surface for use during rehabilitation operations within the Project Site and at the Applicant's other mining operations.

- Cell 2 – non-weathered, non-acid forming waste rock placement area. Material within this area may be transported back underground for used as backfill within completed stopes. Alternatively, material remaining at surface may be used during rehabilitation operations at the Applicant's other mining operations without further approval, or for non-mining related purposes, such as local road maintenance.
- Cell 3 – potentially acid forming waste rock placement area. Material within this area would be transported back underground and would be placed within completed stopes. As a result, at mine closure, this area would comprise a lined hardstand area with no accumulated waste rock remaining at the completion of mining operations.

In addition, the ROM Pad would comprise a hardstand area with all ore material removed.

Following the completion of mining operations, the Applicant would remove the accumulated sheeting material from the ROM Pad and Cell 3 of the waste rock emplacement area. Given the potential for this material to be contaminated with acid forming material, it would be transported back underground and placed either in a completed stope or in a location that would be below the regional water table.

Following removal of the sheeting material, these areas would be deep ripped, shaped to reflect the pre-mining topography and rehabilitated as described in Section 2.13.6.1.

Cells 1 and 2 would remain unrehabilitated until all material within them has been used for rehabilitation. In the event that any material remains, it would be:

- shaped to form a suitable final landform with slopes of 1:3 (V:H) or less;
- covered with weathered waste rock and soil; and
- revegetated as described in this section.

2.13.7.4 Domain 8 – Underground Mining Area

This domain includes the box cut, portal and rises.

The portal and rises would be capped and sealed in a manner that would permit reopening of the mine in accordance with the relevant guidelines applicable at the time of mine closure. Indicatively, this would require placement of a suitably engineered concrete cover over the rises and construction of a lockable barrier across the portal. Alternatively the portal may be blocked using placed waste rock.

The box cut would be bunded and fenced during the life of the Proposal. Following completion of mining operations, and confirmation of the volume of waste rock required for rehabilitation at the Applicant's other operation, remaining non-acid generating waste rock would be transported to the box cut which would be partially back filled.

2.13.8 Ecosystem Development and Monitoring

The Applicant's commitment to effective rehabilitation would involve an ongoing monitoring and maintenance program following completion of mining-related operations. Rehabilitated areas would be regularly inspected, particularly following rainfall events. During these inspections the following would be noted.

- Evidence of any erosion or sedimentation from areas with establishing vegetation cover.
- Success of vegetation establishment.
- Natural regeneration of native species.
- Adequacy of drainage controls.
- General stability of the rehabilitated areas.

Representatives of relevant government agencies would inspect the progress of rehabilitation on the Project Site during annual AEMR meetings.

Rehabilitation remediation and enhancement activities would include but not be limited to the following.

- Where rehabilitation success fails to achieve performance nominated in the MOP, maintenance activities would be initiated. These contingency management activities would be documented in the MOP, however, are likely to 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 and exotic fauna, until the rehabilitated landform can withstand grazing pressure.
- Appropriate noxious weed and pest control or eradication methods and programs would be undertaken.

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 2.13.3.3 are achieved to the satisfaction of the relevant government agencies.

2.14 ALTERNATIVES CONSIDERED

2.14.1 Introduction

The Director-General's requirements for the Proposal require that this document include a description of the alternatives considered, including a detailed justification for the Proposal. This sub-section identifies the feasible alternatives considered and rejected during the design and planning phase of the Proposal. The alternative of not developing the Proposal is considered in Section 5.4.5 and an evaluation of the Proposal in terms of Ecologically Sustainable Development and biophysical, socio-economic and planning considerations is provided in Section 5.3.

2.14.2 Alternative Site Layout

The Applicant considered a range of site layouts for the Proposal. In summary, however, the layout of the Proposal is constrained by the following.

- The location of the mineralisation. While the mining operations would not result in surface subsidence, the location of the decline and box cut, and therefore the remaining surface infrastructure, is constrained by the location of the mineralisation.
- The exact location and orientation of the box cut is constrained by the depth to competent rock. The Applicant has placed the boxcut in an area where such material is as close as possible to the surface, minimising the depth to which the box cut must be established and therefore the volume of waste rock required to be removed to construct it.

Following establishment of the location of the box cut, the remaining infrastructure was placed as close as possible to the box cut to ensure that the minimum area of disturbance would be required. In addition, the size of each component of the layout was determined based on the minimum likely requirements.

2.14.3 Alternative Access Route

Potential exists to access the Project Site directly from the Mitchell Highway. This alternative would require the following.

- Construction of a Site Access Road from the Mitchell Highway to the Project Site, a distance of approximately 1.5km.

- Construction of suitable intersections between the highway and the Project Site Access Road and Booramugga Road. This is likely to be significantly more costly than simply extending the existing private haul road.
- Transportation of ore via the Project Site Access Road, Mitchell Highway, Booramugga Road and Yarrandale Road, a distance of approximately 35km. This compares with the proposed transportation route which would be approximately 31km. This alternative would also require laden ore trucks to turn right onto the Mitchell Highway and then right into Booroomugga Road, both movements that would require giving way to potentially fast moving traffic.

In light of the above this alternative was rejected.

2.14.4 On-Site Processing

The Applicant considered establishing a stand alone processing facility for the Avoca Tank ore. However, given the relatively small size of the ore body and therefore limited life of the Proposal, capital cost for a new plant and the amenability of the ore to treatment at the Applicant's existing processing facility at the Tritton Copper Mine, the option of on-site processing was rejected.