



**TRITTON RESOURCES PTY LTD**

ABN 88 100 095 494

# Environmental Assessment

for the

## Tritton Copper Mine



## Modification 6

*Prepared by:*



**R.W. CORKERY & CO. PTY. LIMITED**

August 2018





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ABN 88 100 095 494

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## Modification 6

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## LIST OF ABBREVIATIONS

|          |                                                                               |
|----------|-------------------------------------------------------------------------------|
| AHD      | Australian Height Datum                                                       |
| DA       | Development Application                                                       |
| DPE      | NSW Department of Planning and Environment                                    |
| DRG      | Department of Planning and Environment – Division of Resources and Geoscience |
| EA       | Environmental Assessment                                                      |
| EIS      | Environmental Impact Statement                                                |
| EL       | Exploration Licence                                                           |
| EP&A Act | <i>Environmental Planning &amp; Assessment Act 1979</i>                       |
| EPA      | Environment Protection Authority                                              |
| ESD      | Ecologically Sustainable Development                                          |
| ML       | Mining Lease                                                                  |
| MOP      | Mining Operations Plan                                                        |
| MPL      | Mining Purpose Lease                                                          |
| Mtpa     | Million tonnes per annum                                                      |
| OEH      | Office of Environment and Heritage                                            |
| RMS      | Roads and Maritime Services                                                   |
| ROM Pad  | Run-of-mine Pad                                                               |
| RWC      | R.W. Corkery & Co. Pty Limited                                                |
| TSF      | Tailings Storage Facility                                                     |

## Executive Summary

Tritton Resources Pty Ltd (the Applicant) is seeking a modification to Development Application 41/98 (DA 41/98) for the Tritton Copper Mine (the Mine) to permit the excavation and export of tailings from the Tailings Storage Facility (TSF) for use in the proposed Paste Fill Plant at the Applicant's Murrawombie Copper Mine, located approximately 18km to the northeast of the Mine (the Proposed Modification).

The Mine currently operates in accordance with DA 41/98 as well as with Mining Lease (ML) 1544, the Mining Operations Plan for Tritton Copper Mine (ML1544) (the approved MOP), Environment Protection Licence 11254 and various water access licences and bore licences.

This application is to be made under Section 75W of the *Environmental Planning & Assessment Act 1979* (EP&A Act), in accordance with the transitional arrangements of the EP&A Act associated with the repeal of Part 3A.

The Proposed Modification would permit the extraction and export of tailings material from the TSF at the Mine Site for use as an input to the proposed Paste Fill Plant at the Murrawombie Copper Mine. It is estimated that approximately 265 000t of tailing material would be exported per year. Transportation of the material from the Mine Site either as a backload from ore material deliveries or in a dedicated campaign, has been sought under the development application for the construction and operation of the Paste Fill Plant at the Murrawombie Copper Mine. Therefore, only the excavation and export of material is considered in this document.

Tailings material would be extracted from discrete extraction area cells with design and operational controls established to limit impacts to the design and stability of the TSF and to limit impacts to the ongoing function of the facility. The Applicant has developed operational procedures for the extraction of tailings material that minimises risks to the embankment and the liner of the TSF as well as limiting potential impacts to water resources and dust generation.

As the Proposed Modification relates only to the TSF, which is an area already disturbed for mining, the key environmental issues for assessment are limited to potential impacts to water resources and air quality. There would be only minor changes to traffic levels, noise generation, visual amenity for the operation and no changes relating to soils and land management, biodiversity or Aboriginal cultural heritage.

The excavation activities involved in the Proposed Modification carry the risk of damaging the lining or embankment of the TSF, which could potentially result in tailings or leachate leakage and consequential contamination of surface water and groundwater resources. Management and mitigation measures that would be implemented to control this risk and prevent associated impacts include excavating at minimum distances from the inner edge of the embankment and to maximum depths, backfilling of excavated cells, regular visual inspections, and maintaining accurate records of all activities. With these controls, the proposed activities would not pose a significant risk to the integrity of the TSF.

The Proposed Modification also has the potential to generate dust whilst excavating, stacking, drying, and loading the tailings material, which may elevate levels of airborne pollutants and deposited dust at residential receivers surrounding the Mine Site. A range of management and mitigation measures would be implemented to limit these air quality impacts, including visual inspections, use of a water cart to suppress dust, shaping drying stockpiles to limit wind erosion, limiting or ceasing operations during windy conditions, and covering all loads. Considering these controls in conjunction with the moisture content of the tailings, it is unlikely



that the Proposed Modification would cause significant additional dust emissions from the Mine Site.

Finally, the social and economic implications of the Proposed Modification are on balance overwhelmingly positive. The Proposed Modification would enable the continued efficient operation of the Applicant's operations and consequently the continued distribution of the economic benefits of these operations. In contrast, modified operations would barely change local amenity or the local experience of the mining operation.

In light of the assessment presented throughout the *Environmental Assessment*, it is concluded that the Proposed Modification to the Tritton Copper Mine could be implemented and operated in a manner that would satisfy all relevant statutory goals and criteria, environmental objectives and reasonable community expectations.

# 1. INTRODUCTION

## 1.1 SCOPE

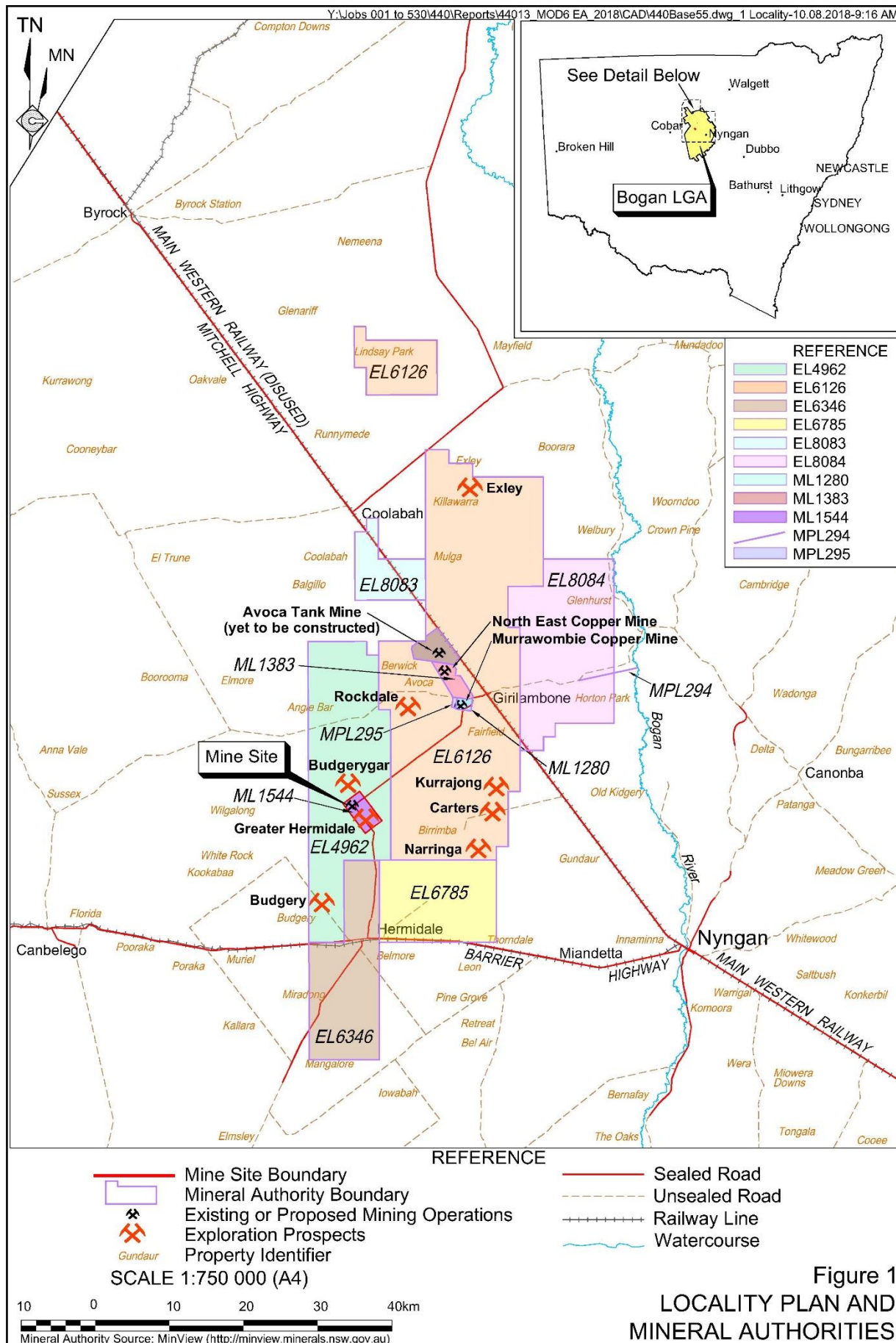
This *Environmental Assessment* has been prepared by R.W. Corkery & Co. Pty. Limited (RWC) on behalf of Tritton Resources Pty Ltd (the Applicant) who is seeking a modification to Development Application (DA) 41/98 for the Tritton Copper Mine (the Mine) to permit the excavation and export of tailings material from the Tailings Storage Facility (TSF) for use in the proposed Paste Fill Plant at the Applicant's Murrawombie Copper Mine, located approximately 18km to the northeast of the Mine (the Proposed Modification).

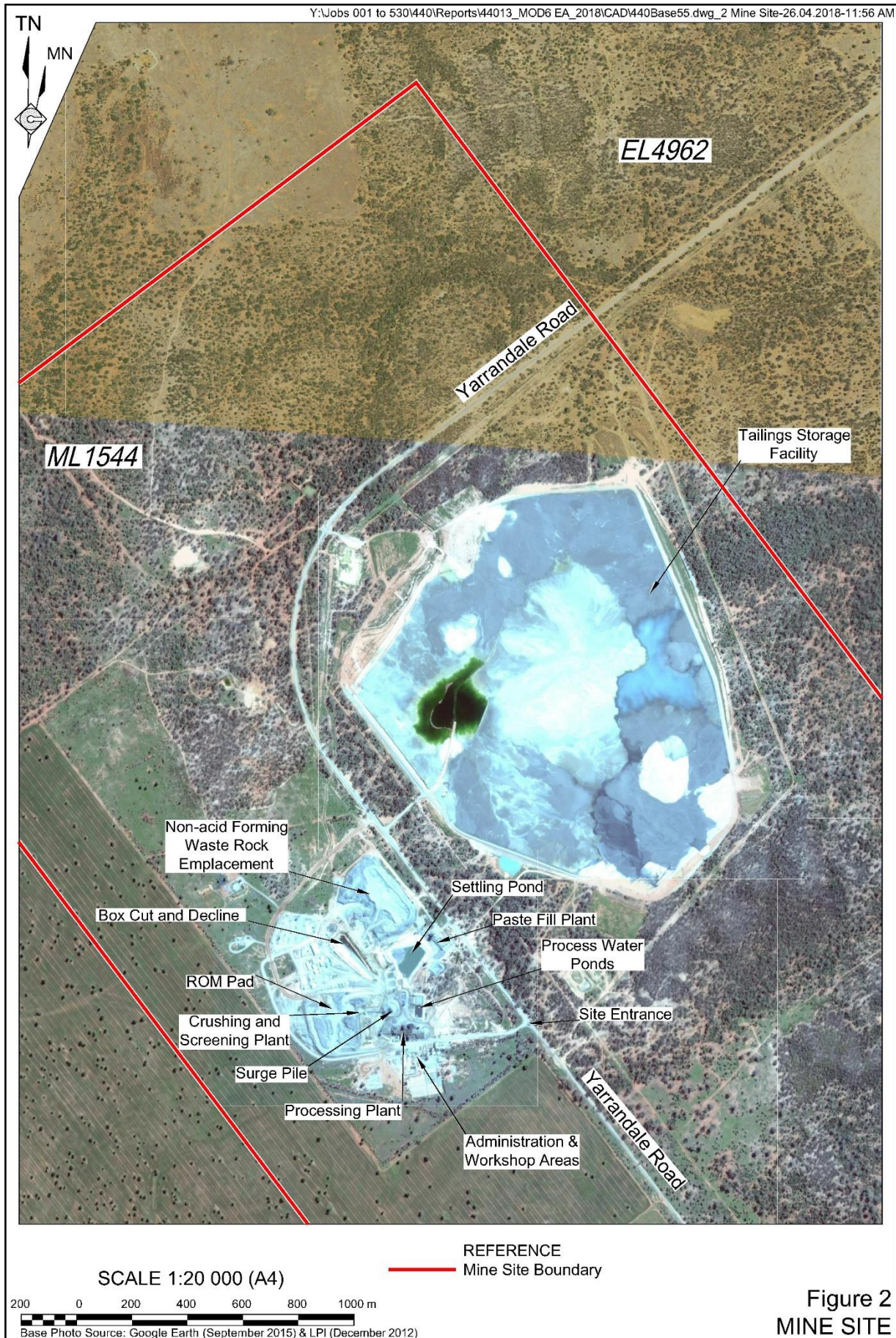
In addition to DA 41/98, the Mine also operates in accordance with Mining Lease (ML) 1544, the *Mining Operations Plan for Tritton Copper Mine (ML1544)* (the approved MOP), Environment Protection Licence 11254 and various water access licences and bore licences. The Mine is located approximately 45km northeast of Nyngan and 22km southwest of Girilambone in western NSW. **Figure 1** provides an overview of the locality of the Mine and the surrounding mineral authorities. A more detailed overview of the Mine and associated infrastructure and operational areas is provided as **Figure 2**.

The NSW Department of Planning and Environment (DPE) has confirmed that the application to modify DA 41/98 is to be made under Section 75W of the *Environmental Planning & Assessment Act 1979* (EP&A Act), in accordance with the transitional arrangements of the EP&A Act associated with the repeal of Part 3A. A separate application has been submitted to Bogan Shire Council seeking approval for the construction and operation of a Paste Fill Plant at the Murrawombie Copper Mine as well as transportation operations involved in its operation (majority backload from approved ore transportation).

The information contained in this document relates only to those components of the Mine that would be the subject of the Proposed Modification. Aspects of the Mine that would not be modified would continue to be undertaken in accordance with the following.

- Development Application No. 41/98.
- EIS titled *Tritton Copper Project - Environmental Impact Statement*, dated June 1998, prepared by R W Corkery & Co Pty Limited.
- *Species Impact Statement*, dated December 1998, prepared by Countrywide Ecological Service in conjunction with Greg Richards and Associates and Geoff Cunningham Natural Resource Consultants.
- Information accompanying modification application No. 41/98 MOD-1, dated 15 June [2004], prepared by Tritton Resources Limited.
- Information accompanying modification application No. 41/98 MOD-2, dated 30 June 2005, prepared by Tritton Resources Limited.
- *Modification Application* dated 20 February 2007 and accompanying SoEE for a Proposed Surface Waste Rock Dump at the Tritton Copper Mine, Hermidale, prepared by Tritton Resources Limited.





- *Modification Application DA 41/98 MOD 4*, dated 3 October 2007, and accompanying SoEE for the Tritton Expansion Project – Stage 2, prepared by Straits Resources Limited;
- The *Response to Submissions* prepared by Straits Resources Limited and received by DPE on 26 November 2007; and
- *Modification Application DA 41/98 MOD 5*, dated 7 April 2015, and accompanying *Environmental Assessment* for an increase in the height of the Waste Rock Emplacement, importation of ore material, and exportation of waste rock, prepared by R W Corkery & Co Pty Limited.

## 1.2 THE APPLICANT

The Applicant, Tritton Resources Pty Ltd, is a wholly owned subsidiary of Aeris Resources Limited (Aeris). The Applicant, through its associated companies, has operated the Tritton and Girilambone Copper Mines since 1992.

Aeris is an established copper mining and exploration company listed on the Australian Securities Exchange. Aeris' flagship asset is the Tritton Copper Operations in NSW which produce approximately 25 000t of copper concentrate and copper cement annually. The operations incorporate multiple mines and a 1.5Mt per annum processing plant. Aeris has an experienced Board and management team focussed on operational excellence and strengthening the Company's corporate structure.

## 1.3 MINE SITE

The Mine Site is coincident with the area of ML 1544 and covers an area of approximately 1 400ha. The Mine Site comprises both freehold land and Crown land. Land ownership within and surrounding the Mine Site is described further in Section 4.1.4. The Mine Site is bisected by Yarrandale Road, the principal road between Girilambone and Hermidale.

**Figure 3** presents an overview of the layout of the Tritton Copper Mine, including the following infrastructure.

- Box cut and decline.
- ROM Pad.
- Crushing and Screening Plant.
- Crushed Ore Stockpile.
- Non-acid Forming Waste Rock Emplacement.
- Processing Plant.
- Paste Fill Plant.
- Containment Dam.
- Tailings Storage Facility.
- Administration, Car Park and workshop areas.
- Ventilation Fans.
- Equipment Storage Area.
- Road Base Preparation Area.
- Warehouse.
- Raw Water Dam.
- Process Water Dam.



Mining continues to be undertaken at the Tritton underground operations. The waste rock extracted is used to backfill underground workings, with any excess being placed at surface within the Non-acid Forming Waste Rock Emplacement. Ore is processed using flotation, with tailings discharged to the Tailings Storage Facility.

Underground mining and processing operations are undertaken 24-hours per day, 7 days per week.

Concentrate produced by the processing plant at the Tritton Copper Mine is placed in sealed shipping containers. These containers are transported via Yarrandale Road to the Hermidale rail siding. From the siding, the containers are transported by rail to Newcastle for export to China, India, Japan, Korea or the Philippines by ship.

## **1.4 BACKGROUND**

In May 2010, Bogan Shire Council granted Development Application DA 2010/006 (DA 2010/006) to permit the construction and operation of a Paste Fill Plant at the Mine. Construction of the Paste Fill Plant commenced in 2010 and the plant was commissioned in 2011 and has successfully supported operation of the Mine since that time.

Underground mining at the Murrawombie Copper Mine recommenced in October 2016 and it has been identified that the recovery of the available resources would be enhanced by eliminating the necessity for ore pillars to provide geotechnical stability and replacing this function with paste fill material. The Applicant has therefore decided to seek approval from the Bogan Shire Council for the construction and operation of a Paste Fill Plant at the Murrawombie Copper Mine (application provided separately to Bogan Shire Council).

The Applicant is experienced and confident with the application of paste fill generated from the tailings material resulting from processing operations at the Tritton Copper Mine. It is therefore proposed to export tailings material that has been excavated from the TSF at the Tritton Copper Mine to the Murrawombie Copper Mine, where it will be stored for a short period before being used in the proposed Paste Fill Plant. The export of this material would also permit the Paste Fill Plant to operate as the Applicant tests the feasibility of using heap leach materials currently stockpiled at the Murrawombie Copper Mine in this process.

The operation of the Paste Fill Plant at the Murrawombie Copper Mine is considered to provide for a beneficial use of tailings or heap leach material generated at the mining operations.

It is noted that there have been no environmental incidents or complaints as result of construction and use of the existing Paste Fill Plant at the Tritton Copper Mine.

## **1.5 EXISTING MINING OPERATIONS**

### **1.5.1 Introduction**

The Applicant controls several exploration licences and mining leases in the vicinity of the Mine Site and operates the Murrawombie Copper Mine. The North East Copper Mine is currently on care and maintenance while the Avoca Tank Mine is yet to commence development. This sub-section provides an overview of the mineral authorities held by the Applicant, the inferred resources and reserves within the Mine Site and the existing approved activities as they apply to this modification.

### 1.5.2 Existing Mineral Authorities

**Table 1** presents the mineral authorities held by the Applicant and related companies in the vicinity of the Mine Site. **Figure 1** presents the locations of the mineral authorities identified in **Table 2**.

**Table 1**  
**Existing Mineral Authorities**

| Mineral Authority<br>(Mining Act 1992)                                                                                                | Holder / Applicant        | Grant Date | Expiry Date                |
|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------|----------------------------|
| ML 1544                                                                                                                               | Tritton Resources Pty Ltd | 22/12/2003 | 22/12/2024                 |
| ML 1383                                                                                                                               | Tritton Resources Pty Ltd | 13/01/1996 | 13/01/2038                 |
| ML 1280 <sup>2</sup>                                                                                                                  | Tritton Resources Pty Ltd | 06/08/1992 | 05/08/2034 <sup>2</sup>    |
| MPL 294                                                                                                                               | Tritton Resources Pty Ltd | 06/08/1992 | 05/08/2034 <sup>1, 2</sup> |
| MPL 295 <sup>2</sup>                                                                                                                  | Tritton Resources Pty Ltd | 06/08/1992 | 05/08/2034 <sup>1, 2</sup> |
| EL 4962                                                                                                                               | Tritton Resources Pty Ltd | 19/03/1996 | 19/03/2022 <sup>2</sup>    |
| EL 6346                                                                                                                               | Tritton Resources Pty Ltd | 23/11/2004 | 23/11/2022                 |
| EL 6785                                                                                                                               | Tritton Resources Pty Ltd | 22/05/2007 | 22/05/2021                 |
| EL 6126                                                                                                                               | Tritton Resources Pty Ltd | 15/09/2003 | 14/09/2021                 |
| EL 8084                                                                                                                               | Tritton Resources Pty Ltd | 10/05/2013 | 10/05/2018 <sup>1</sup>    |
| Note 1: Renewal sought – pending determination                                                                                        |                           |            |                            |
| Note 2: Issued under the <i>Mining Act 1973</i> – All other authorities issued under the <i>Mining Act 1992</i>                       |                           |            |                            |
| Source: Minview ( <a href="http://minview.minerals.nsw.gov.au">http://minview.minerals.nsw.gov.au</a> ) and Tritton Resources Pty Ltd |                           |            |                            |

### 1.5.3 Previous Exploration Operations

The Applicant has actively undertaken exploration activity within its Exploration Licences and Mining Leases (**Figure 1**). The following provides a summary of those exploration activities.

- Resource extensional drilling programs, testing depth and lateral extension of the Tritton, North East resources.
- Diamond drilling to define copper resources adjacent to operations, including the Budgerygar and Budgery prospects.
- Reverse circulation and diamond drilling of geochemical soil anomalies, leading to new discoveries, including the Avoca Tank and Kurrajong projects.
- Successful grass roots exploration, including soil geochemistry and regional geophysical surveys across the tenement package.

In addition, the Applicant, in conjunction with the New South Wales Geological Survey and Geoscience Australia, has categorised the geological style of mineralisation within the Applicant's tenement package as a Volcanic Associated Massive Sulfide Deposit – Besshi style. This will allow better targeted exploration, for this style mineralisation in the future.

## 1.5.4 Identified Resources and Reserves

**Table 2** presents the estimated mineral resource associated with the Tritton Copper Mine deposit.

**Table 2**  
**Mineral Resource Estimate – 30 June 2017**

| Classification                                                | Tonnes (kt)  | Cu (%)     | Cu (kt)    |
|---------------------------------------------------------------|--------------|------------|------------|
| Measured                                                      | 3 700        | 1.8        | 69         |
| Indicated                                                     | 4 200        | 1.5        | 62         |
| Inferred                                                      | 2 000        | 1.2        | 20         |
| <b>Total</b>                                                  | <b>9 900</b> | <b>1.6</b> | <b>150</b> |
| Source – Aeris Resources Ltd. – Annual Report to 30 June 2017 |              |            |            |

## 1.5.5 Approved Activities

### 1.5.5.1 Introduction

This subsection provides a brief overview of the relevant approved and proposed activities at the Applicant's operations in the vicinity of the Mine. The Applicant currently employs approximately 373 people across its various operations in the vicinity of the Mine, the majority of whom reside within the Bogan Local Government Area.

### 1.5.5.2 Tritton Copper Mine

Approval for the Tritton Copper Mine was granted under DA 41/98 on 1 September 1999 by the then Minister for Planning and Urban Affairs. **Table 3** outlines the existing development approvals for the Mine.

DA 41/98 has been modified five times as follows. Approved dates are identified in parenthesis.

- MOD 1 (26 August 2004) – various minor amendments.
- MOD 2 (22 September 2005) – to permit modifications to concentrate transport operations between the Mine Site and the Hermidale rail siding.
- MOD 3 (12 June 2007) – to permit construction of the existing Non-acid Forming Waste Rock Emplacement and ancillary infrastructure.
- MOD 4 (19 December 2007) – to permit an increase in the throughput for the processing plant from 0.4Mtpa to 1.4Mtpa, as well as an enlarged Tailings Storage Facility and ancillary infrastructure.
- MOD 5 (7 April 2015) - to permit an increase in the height of the Waste Rock Emplacement, importation of ore material, and exportation of waste rock.

**Table 3**  
**Tritton Copper Mine Existing Development Approvals**

| Approval                          | DA Number   | Grant Date | Expiry Date | Purpose of Approval                                                                                           |
|-----------------------------------|-------------|------------|-------------|---------------------------------------------------------------------------------------------------------------|
| Development Consent               | DA 41/98    | 01/09/1999 | 22/12/2024  | Original Tritton Project Development Approval.                                                                |
| Development Consent               | DA 30/2004  | 20/12/2004 | 29/12/2009  | Construction of the Rail Loading Hardstand at the Hermidale Rail Siding for the export of copper concentrate. |
| Development Consent               | DA 029/2007 | 25/05/2007 | 24/05/2012  | Expansion of the administration facilities at Tritton.                                                        |
| Development Consent               | DA 2010/006 | 25/05/2010 | 25/5/2015   | Construction of a Paste fill Plant for the Tritton underground mine.                                          |
| Development Consent               | DA 2010/028 | 04/11/2010 | 4/11/2015   | Construction of a Communication Tower at Tritton.                                                             |
| Source: Tritton Resources Pty Ltd |             |            |             |                                                                                                               |

Other relevant leases and licences include the following.

- Environment Protection Licence 11254.
- Various Water Access Licences and Bore Licences.

Activities approved under DA 41/98 that are relevant to the Proposed Modification for the Mine include the following.

- Extraction of a total of approximately 10.2Mt of copper ore using underground mining techniques.
- Construction and use of a Non-acid Forming Waste Rock Emplacement to a maximum height of 20m above the natural surface or approximately 291m AHD.
- Importation of copper ore from the Company's other operations for processing.
- Processing of on-site and imported copper ore to produce a copper concentrate.
- Transportation of the copper concentrate in shipping containers to the Hermidale rail siding, located approximately 19km to the south of the Tritton Copper Mine, and transportation of that material by train to port for export.
- Construction and use of a tailings storage facility.

### 1.5.5.3 Murrawombie Copper Mine

The Murrawombie Copper Mine is located approximately 20km to the northeast of the Mine Site and comprises the following operations (**Figure 1**). **Table 4** presents the principal consents and licences for the Murrawombie Copper Mine.

**Table 4**  
**Murrawombie Copper Mine Consents and Licences**

| Consent/Licence                   | No.      | Grant Date | Expiry Date | Purpose of Approval                                                            |
|-----------------------------------|----------|------------|-------------|--------------------------------------------------------------------------------|
| Development Consent               | 1/91     | 25/10/1995 | N/A         | Original Development Approval for the Murrawombie Mine.                        |
| Development Consent               | 5/95     | 21/09/1995 | N/A         | Ancillary works associated with the original Murrawombie Development Approval. |
| Development Consent Modification  | 1/91     | 13/12/2007 | N/A         | See Section 1.4.5.5.                                                           |
| Development Consent               | 2010/022 | 13/9/2010  | 13/9/2015   | Subdivision of Booramugga Road which intersects the Murrawombie mining area.   |
| Development Consent               | 2010/029 | 04/11/2010 | 04/11/2015  | Construction of a Communication Tower at Murrawombie.                          |
| Environment Protection Licence    | 4501     | 13/12/1999 | -           | Mining (other than coal).                                                      |
| Source: Tritton Resources Pty Ltd |          |            |             |                                                                                |

Approved activities at the Murrawombie Copper Mine include the following.

- Operation of an open cut and underground mining operation.
- Construction of a waste rock emplacement to the west of the approved open cut.
- Construction of a flotation plant (not constructed).
- Operation of four heap leach pads to the east and northeast of the approved open cut, three of which have been constructed.
- Operation of a copper cementation plant for the recovery of copper.
- Transportation of up to 1Mtpa of copper ore to the Tritton Copper Mine for processing (see Section 1.4.5.5).
- Construction and use of ancillary infrastructure.

An application for development approval to construct and operate a Paste Fill Plant at the Murrawombie Copper Mine has been submitted to Bogan Shire Council in conjunction with this application. Tailings material intended to be used for this Paste Fill Plant would be sourced from the Mine Site.

#### **1.5.5.4 North East Copper Mine**

**Table 5** presents the principal consents and licences for the North East Copper Mine (**Figure 1**) which is currently on Care and Maintenance.

**Table 5**  
**North East Open Cuts Consents and Licences**

| Approval                          | No.             | Grant Date | Expiry Date | Purpose of Approval                                          |
|-----------------------------------|-----------------|------------|-------------|--------------------------------------------------------------|
| Development Consent               | 6/95            | 25/10/1995 | N/A         | Original Development Approval for the North East Open Cuts.  |
| Development Consent Modification  | 42/2007M (6/95) | 26/07/2007 | N/A         | See Section 1.4.5.5.                                         |
| Development Consent               | 049/2007        | 13/09/2007 | 13/09/2012  | Construction of the North East Open Cuts surface facilities. |
| Development Consent Modification  | 18/2010 (6/95)  | 2/7/2010   | N/A         | Construction of the North East ROM Pad.                      |
| Environment Protection Licence    | 4501            | 13/12/1999 | -           | Mining (other than coal).                                    |
| Source: Tritton Resources Pty Ltd |                 |            |             |                                                              |

Approved activities at the North East Open Cuts and Underground Mine include the following.

- Operation of three open cuts namely the North East, Hartmans and Larsens Open Cuts and an underground mining operation beneath the North East and Larsens Open Cuts.
- Construction of two waste rock emplacements.
- Transportation of up to 1Mtpa of copper ore to the Tritton Copper Mine for processing (see Section 1.4.5.5).
- Construction of ancillary infrastructure.

#### **1.5.5.5 Avoca Tank Copper Mine**

The Avoca Tank Copper Mine was approved by a Joint Regional Planning Panel on 15 September 2016 under Development Application 10/2015/004/001. The site for the Avoca Tank Copper Mine is located approximately 25km to the northeast of the Mine Site (**Figure 1**) and comprises the following operations.

- Operation of an underground mining operation.
- Transportation of ore material to the Mine Site for processing.
- Establishment of a temporary surface waste rock emplacement.
- Establishment of surface infrastructure, site access road, water pipeline and transmission line from the North East Mine and ancillary infrastructure.
- Construction and rehabilitation of a final landform.

Construction of the Avoca Tank Copper Mine is yet to commence substantially.

#### **1.5.5.6 Interrelation of Development Consents for the Tritton Operations**

Transportation of ore from the North East and Murrawombie Copper Mines was approved as part of the Tritton Expansion Project in 2007. the Applicant notes that the principal approvals for its operations interrelate as follows.

- DA 1/91 – Murrawombie Copper Mine.  
Regulates open cut and underground mining and heap leach operations within the Murrawombie Mine Site.
- DA 6/95 – North East Copper Mine.  
Regulates open cut and underground mining operations within the North East Mine Site and transportation of up to 1Mtpa of ore, 24 hours per day, 7 days per week, from the North East and Murrawombie Mines to the gate of the Tritton Copper Mine.
- DA 41/98 – Tritton Copper Mine.  
Regulates underground mining, processing of up to 1.4Mtpa of ore from the Tritton, Murrawombie and North East Mines, transportation of concentrate to the Hermidale Siding and management of associated tailings.
- DA 10/2015/004/001 – Avoca Tank Copper Mine  
Regulates underground mining operations within the Avoca Tank Mine Site and transportation of ore, 24 hours per day, 7 days per week to the gate of the Tritton Copper Mine.

### **1.6 CONSULTATION**

#### **1.6.1 Community Consultative Committee**

The Applicant hosts Community Consultative Committee meetings every three months at which the combined Tritton operations are discussed including progress, planning and future activities. The proposed paste fill plant at the Murrawombie Copper Mine and the extraction of tailings from the Tailings Storage Facility at the Mine Site have been discussed at these meetings, the most recent of which was held on 14 August 2018. There were no concerns or queries raised at the meeting on 14 August 2018 regarding the proposed modification.

The Applicant is confident that should members of the Community Consultative Committee have concerns about the operations, that they would be raised in the meetings or that personnel from Aeris Resources would be approached directly. No direct queries or comments have been received for the modification.

#### **1.6.2 Government Agency Consultation**

An email and letter were sent to DPE on 22 February 2018 requesting assessment requirements for the proposed modification and enquiring whether it assessment under the former Section 75W of the EP&A Act was still the appropriate pathway given that the transitional arrangement for former Part 3A projects was then yet to be repealed. A response was received on 28 February 2018 confirming that the Proposed Modification could be considered under the former Section 75W of the EP&A Act.

No assessment requirements were included with the DPE correspondence.

**Appendix 2** presents a copy of correspondence received from DPE.

## 1.7 FORMAT OF THE REPORT

This *Environmental Assessment* includes five sections of text, references and two appendices. The information presented in this document covers all aspects of the planning, development, operation, rehabilitation and environmental monitoring of the Proposed Modification at a level of detail reflecting the environmental risk posed by each issue.

The format of the *Environmental Assessment* is as follows.

**Section 1:** introduces the Proposed Modification, the Applicant, the Mine Site and the mineral authorities held by the Applicant. Background information in relation to mining and mineral exploration operations at surrounding operations is also provided. The section concludes with information on the structure of the document and management of investigations.

**Section 2:** describes the Applicant's objectives and provides a description of the Proposed Modification. This section describes the procedures that would be implemented to safely extract tailings material from within the TSF with a focus on reducing risk to the function and stability of the TSF.

**Section 3:** provides a description of consultation undertaken and the legislative context for the application.

**Section 4:** describes the general environmental setting of the Mine Site, with particular focus on aspects of the local environment likely to be critical to the assessment of the Proposed Modification. The management and mitigation measures that have been incorporated into the Proposed Modification design to protect the local environment are also presented. This section also analyses the potential impact the Proposed Modification would have on the physical, biological and social environment once the proposed safeguards and procedures are adopted.

**Section 5:** provides a conclusion to the document which justifies the Proposed Modification in terms of biophysical, economic and social considerations, ecologically sustainable development and the requirements of Section 75W of the EP&A Act. Section 5 also records the consequences of not proceeding with the Proposed Modification.

**References:** lists the various source documents referred to for information and data used during the preparation of the *Environmental Assessment*.

**Appendices:** present the following additional information.

1. A copy of the TD1 Tailings Excavation Tritton Mines, NSW - Operational Guidelines (prepared by CMW Geosciences)
2. DPE Correspondence dated 28 February 2018

## **1.8 MANAGEMENT OF INVESTIGATIONS**

This document has been prepared by Mr Nicholas Warren (B.Sc., M.Bus, M.Env.Sc.), Senior Environmental Consultant, assisted by Mr Andrew Bridle (B.A., M.Env.Mgmt.) both with RWC.

Mr Dean Woods, Environmental Coordinator with Aeris Resources provided information in relation to the existing and proposed activities and reviewed and approved this document for release.

## **2. DESCRIPTION OF THE PROPOSED MODIFICATION**

### **2.1 INTRODUCTION**

#### **2.1.1 Objectives of the Modification**

The Applicant's original objectives in developing the Mine are identified in Section 2.1.1 of the original EIS for the application (RWC, 1998) and are as follows.

- To develop a safe underground mine that would maximize the recovery of copper-bearing ore.
- To produce a high-quality copper concentrate.
- To undertake all development and operations in a manner that complies with all relevant statutory requirements and minimizes the adverse impacts on the local environment throughout and beyond the operational life of the proposed project.

The Applicant's objectives in modifying DA 41/98 are as follows.

- Extraction and export of tailings material from the Tailings Storage Facility at the Mine Site for use at the Murrawombie Copper Mine as an input to the Paste Fill Plant.
- To minimise, to the maximum extent practicable, the impact on the local environment and community and other stakeholders.

#### **2.1.2 Overview of the Proposed Modifications**

The Proposed Modification would permit the extraction and export of tailings material from the TSF at the Mine Site for use as an input to the proposed Paste Fill Plant at the Murrawombie Copper Mine. Transportation of the material from the Mine Site either as a backload from ore material deliveries or in a dedicated campaign, has been sought under the development application for the construction and operation of the Paste Fill Plant at the Murrawombie Copper Mine. Therefore, only the excavation and export of material is considered in this document.

Tailings material would be extracted from discrete extraction area cells with design and operational controls established to limit impacts to the design and stability of the TSF and to limit impacts to the ongoing function of the facility.

### 2.1.3 Modifications Required

The Applicant anticipates that the following modifications to DA 41/98 will be required. The proposed additions are underlined.

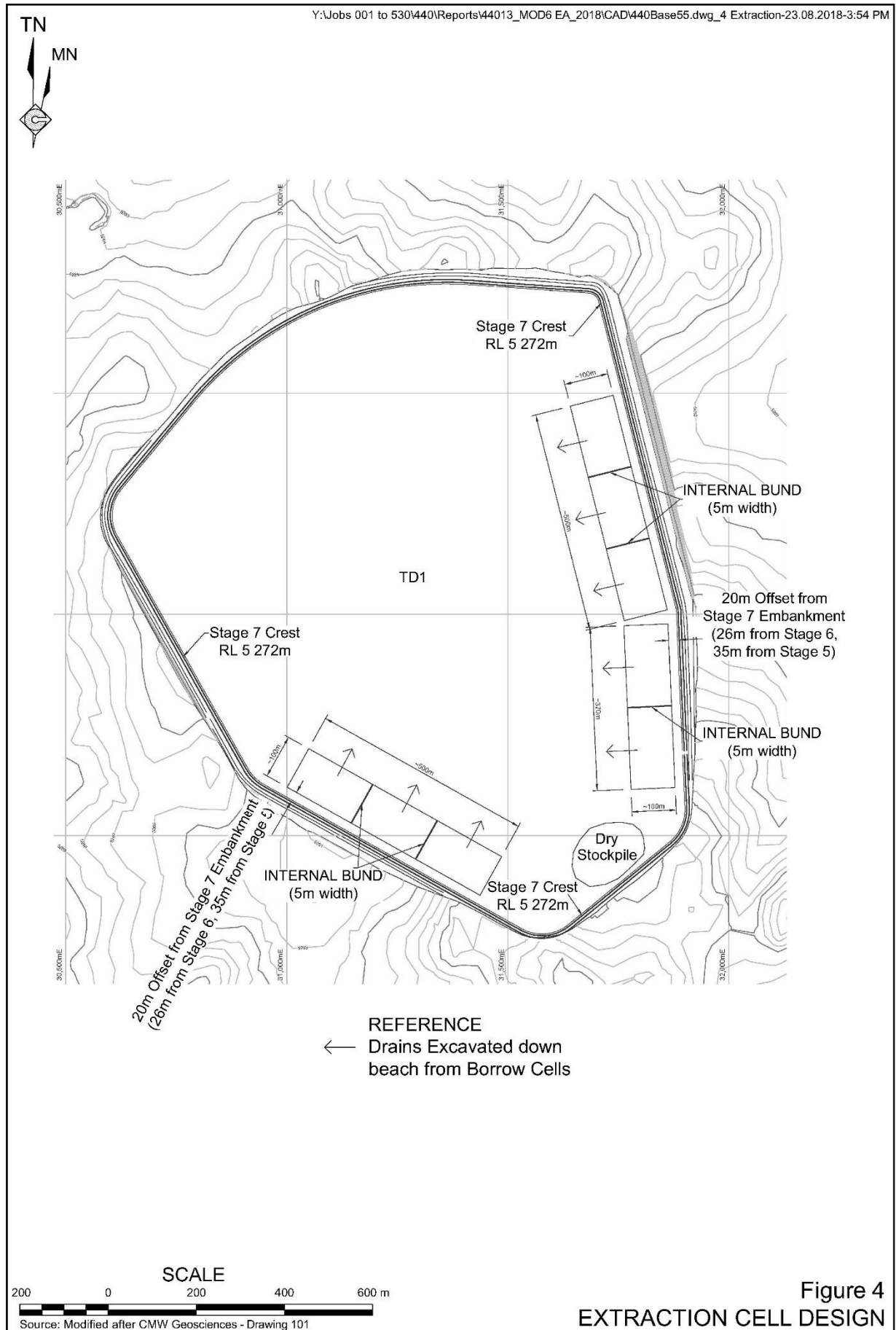
#### CONDITION 1

The Applicant shall carry out the development generally in accordance with the:

- a) Development Application No. 41/98;
- b) EIS titled Tritton Copper Project - Environmental Impact Statement, dated June 1998, prepared by R W Corkery & Co Pty Limited;
- c) Species Impact Statement, dated December 1998, prepared by Countrywide Ecological Service in conjunction with Greg Richards and Associates and Geoff Cunningham Natural Resource Consultants;
- d) Information accompanying modification application No. 41/98 MOD-1, dated 15 June 2004, prepared by Tritton Resources Limited,
- e) Information accompanying modification application No. 41/98 MOD-2, dated 30 June 2005, prepared by Tritton Resources Limited;
- f) modification application No. 21\_3\_2007, dated 20 February 2007, and accompanying SEE for a Proposed Surface Waste Rock Dump at the Tritton Copper Mine, Hermidale, prepared by Tritton Resources Limited;
- g) modification application DA 41/98 MOD 4, dated 3 October 2007, and accompanying SEE for the Tritton Expansion Project – Stage 2, prepared by Straits Resources Limited;
- h) the Response to Submissions prepared by Straits Resources Limited and received by the Department on 26 November 2007;
- i) Environmental Assessment titled *Environmental Assessment for the Tritton Copper Mine Modification 5*, dated November 2014, including the associated response to submissions dated 19 January 2015, and additional information dated 26 February 2015;
- j) Environmental Assessment titled *Environmental Assessment for the Tritton Copper Mine Modification 6*, dated August 2018; and
- k) conditions of this consent.

### 2.2 EXTRACTION AREA CELL DESIGN

CMW Geosciences Pty Ltd was commissioned to review and recommend operational guidelines for the recovery of tailings through excavation of material currently stored in the TSF at the Mine Site. Locations for excavation activities, buffers to the TSF embankments and drying stockpiles are displayed on **Figure 4**. CMW Geosciences Pty Ltd reviewed the location of the proposed excavation in relation to the location of the perimeter embankment and the effect on the overall embankment stability as well as the ongoing tailings emplacement operations.



The following design specifications were recommended by CMW Geosciences Pty Ltd (**Appendix 1**) and would be implemented by the Applicant for the development of extraction area cells.

- The dried strength of the TSF surface would be assessed prior to the use or placement of any equipment. This would be assessed by tapping or prodding the surface with the bucket of an excavator to determine surface strength. If the surface is deemed sufficiently strong, the excavator would move forward onto the tested surface and then repeat the process. If conditions change that may affect surface strength, such as rainfall, the surface would be reassessed.
- The excavation areas would be located a minimum distance from the TSF embankment in order to ensure water does not pond next to the perimeter embankments and does not impede future embankment construction. The distance to the upstream edge (inner edge) from the crest of the embankment for each stage of development would be as follows.
  - 35m from the existing Stage 5 embankment.
  - 26m from the Stage 6 embankment.
  - 20m from the Stage 7 embankment.
- An intact bund of unexcavated tailings with a minimum width of 5m would be retained at nominally 150m centres along the excavation. This would create distinct extraction area cells that are not contiguous.
- Excavation would generally be parallel to the embankment alignment and the excavation depth would be to a maximum depth of 1.5m. The depth of the liner of the TSF ranges from 5.9m to 10.9m below the current surface, and therefore excavation would remain approximately 4.4m to 9.4m above the liner.
- The walls of the excavation area would be nominally 1:2 (V:H).
- Outlet drains from the extraction area should be excavated at a level equal to half the excavation depth and be extended across the TSF surface towards the decant area to remove water from the extraction area cells. The length of these drains will be determined by the surface slope and trafficability of the tailings.

## 2.3 TAILINGS RECOVERY OPERATIONS

The following summarises the proposed tailings recovery operations.

- In situ tailings material would be excavated from the TSF from designated excavation areas with the use of an excavator and loaded onto dump trucks.
- Material would be transported to the designated drying stockpile area within the footprint of the TSF. This is an area with a naturally elevated floor level located in relatively close proximity to the eastern embankment wall (see **Figure 4**).

- The stockpiled tailings material would be left for at least two days for drying. The material should achieve a moisture content of less than 12% before being deemed ready for export to the Murrawombie Copper Mine.
- An excavator would load the dried tailings material into a haul truck for transport. Haul trucks would approach the drying stockpile area via the TSF perimeter road and access the TSF via a simple unsealed road crossing over the surface of the embankment and a small access ramp onto the TSF. An example of this access arrangement is shown in **Plate 1**. A water truck would be used during the loading and hauling process for dust suppression as required.



**Plate 1 Example of Tailings Storage Facility Access Point**

## 2.4 CAMPAIGN TIMING AND EXTENT

It is estimated that approximately 265 000t of tailing material would be exported per year. The Paste Fill Plant at the Murrawombie Mine is expected to operate on a campaign basis over one or two days and up to four days consecutively. Tailings extraction would be planned to allow two days drying time and progressive backloading of tailings material (to avoid the need for dedicated road truck trips) in order to provide a sufficient supply of material for paste production. Campaign length and intensity would be entirely dependent on underground operations at the Murrawombie Mine and would continue over the life of underground operations at Murrawombie Copper Mine.

## 2.5 ONGOING TAILINGS EMPLACEMENT OPERATIONS

The currently approved operations at the Mine involve emplacement of tailings material in the form of a slurry in thin discrete layers, not exceeding 0.3m thickness. This subjects each layer to similar drying cycles that enhances the strength gain of the surface. Tailings material is deposited via multiple spigots located on the upstream perimeter embankment crest. Deposition is carried out such that the decant pond is maintained in the vicinity of the submersible pumps. The pond is maintained away from the perimeter embankments at all times.

CMW Geosciences Pty Ltd recommended the following amendments to tailings deposition operations under the Proposed Modification that would be implemented by the Applicant.

- Tailings would be discharged preferentially into the extraction area cells in layers, of approximately 0.3m thickness. This would allow the tailings to settle in the cell and decant water to flow from the cell to the decant area via a drainage channel.
- Weekly visual inspections would ensure that water is not ponding in the extraction area cells (i.e. near the perimeter embankment) following deposition.
- The excavation area cells would be backfilled with tailings well in advance of any normal cyclic tailings deposition being undertaken in that area.
- An accurate plan of the location of extraction area cells, dates when tailings depositions started and ceased, and the outcomes of visual inspections would be kept by Mine personnel.

## 2.6 FINAL LANDFORM AND REHABILITATION

Rehabilitation of the Mine Site is described in the document *Mining Operations Plan for Tritton Copper Mine (ML1544)* (the approved MOP). That document was approved by the Division of Resources and Geoscience on 29 April 2016.

The approved MOP identified that the long-term land use strategy for the TSF would be to return the land to light grazing and native vegetation conservation, though agricultural capacity will remain limited by environmental and climate conditions.

The domain would be capped with NAF waste rock material, covered with a layer of topsoil and shaped to be water shedding. Revegetation would involve seeding with shallow rooted native grass species to provide a stabilising groundcover. All livestock and feral species would be restricted from the domain, to limit grazing pressures, until such time as vegetation is suitably established.

Tailings excavation activities under the Proposed Modification would not alter the achievement of final land use goals for the TSF, however the removal of tailings material for beneficial use in underground operations would result in a reduced volume of tailings material remaining in the TSF. This may slightly reduce the overall elevation of the final rehabilitated landform.

Should the Proposed Modification be approved, the Applicant would consult with the Division of Resources and Geoscience to amend the approved MOP to incorporate tailings recovery in the operational overview and risk assessment.

### 3. RISK ASSESSMENT AND LEGISLATIVE CONTEXT

#### 3.1 INTRODUCTION

The following subsections provide the results of a risk assessment undertaken by the Applicant following review of design and operational controls for tailings recovery and ongoing tailings deposition under the Proposed Modification and a review of the legislative context for the modification application. This information informs the assessment of environmental issues presented in Section 4.

#### 3.2 ENVIRONMENTAL RISK ASSESSMENT

The approach to the analysis of risk was generally in accordance with Australian Standards HB 203:2006 and AS/NZS 4360:2004. This environmental risk analysis has also been reviewed and updated generally in accordance with AS/NZS ISO 31000:2009 *Risk Management – Principles and Guidelines*.

**Tables 6, 7 and 8** present the consequence, likelihood and risk rating used during this analysis. **Table 9** presents the results of the risk analysis, with the residual risk following implementation of standard mitigation measures. The risk consequences have been determined largely upon review of the outcomes of the numerous assessments completed for the Mine Site since the original *Environmental Impact Statement* (EIS) was prepared in 1998 (RWC, 1998).

**Table 6**  
**Qualitative Consequence Rating**

| Level | Descriptor | Description                                                                                                                                                                                                                                                     |
|-------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Negligible | No detrimental impact on the environment is measurable or envisaged.                                                                                                                                                                                            |
| 2     | Minor      | An event which could have temporary and minor effects on the environment, such as a non-reportable environment incident.                                                                                                                                        |
| 3     | Moderate   | An event which would create substantial temporary or minor permanent damage to the environment, such as a reportable incident not likely to result in prosecution.                                                                                              |
| 4     | Major      | An event which could have a substantial and permanent consequence to the environment such as an environmental incident which would result in prosecution, adverse local publicity and community complaints.                                                     |
| 5     | Severe     | A major event which could cause severe damage to the environment with actual or potential loss of credibility with key stakeholders, environmental liability, regulatory intervention, national publicity/complaints, or could close the operation prematurely. |

Note: Rating modified after AS/NZS ISO31000:2009 Risk Management - Principles and Guidelines

**Table 7**  
**Qualitative Likelihood Rating**

| Level | Descriptor     | Description                                                        |
|-------|----------------|--------------------------------------------------------------------|
| A     | Certain        | Is an ongoing occurrence or will occur under all conditions        |
| B     | Almost Certain | Is expected to occur in most circumstances                         |
| C     | Likely         | Will probably occur in most circumstances                          |
| D     | Possible       | Might occur at some time                                           |
| E     | Unlikely       | Could occur at some time                                           |
| F     | Rare           | Not expected to occur, unless subject to exceptional circumstances |
| G     | Very Rare      | Theoretically possible but not expected to occur.                  |

Source: Rating modified after HB 89:2012 – Figure B7

**Table 8**  
**Qualitative Risk Rating**

| Likelihood                | Consequences |         |            |         |          |
|---------------------------|--------------|---------|------------|---------|----------|
|                           | Negligible 1 | Minor 2 | Moderate 3 | Major 4 | Severe 5 |
| <b>A (Certain)</b>        | M            | H       | H          | VH      | VH       |
| <b>B (Almost Certain)</b> | M            | H       | H          | VH      | VH       |
| <b>C (Likely)</b>         | M            | M       | H          | H       | VH       |
| <b>D (Possible)</b>       | L            | M       | M          | H       | H        |
| <b>E (Unlikely)</b>       | L            | L       | M          | M       | H        |
| <b>F (Rare)</b>           | L            | L       | L          | M       | M        |
| <b>G (Very Rare)</b>      | L            | L       | L          | L       | M        |

Note: Rating modified after HB 89:2012 - Figure B8

**Table 9**  
**Environmental Risk Assessment**

| Risk                                                                              | Consequence                                                                    | Inherent Risk | Mitigation & Management                                                                                                                                                                                                                 | Residual Risk |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Embankment wall failure                                                           | Surface & groundwater contamination. Soil contamination. Flora & fauna deaths. | H(5D)         | Maintain a 50m offset from the final embankment wall of dam design.<br>Limited cut face to 1:2 into the tailings.<br>Avoid continuous excavation.                                                                                       | M(5G)         |
| Floor liner damage                                                                | Groundwater contamination. Soil contamination.                                 | H(4D)         | The excavation area is located in the South Eastern corner of the TSF. This location ensures an appropriate depth to avoid contact with the TSF clay lined floor. Extraction cells are to be extracted to a depth no greater than 1.5m. | L(3G)         |
| Dust generation whilst excavating, stacking, loading, transporting and unloading. | Surface water contamination. Soil contamination. Flora & fauna deaths.         | M(2D)         | A water cart will be used to suppress dust, where required.<br>Moisture content of tailings to remain at approximately 12%                                                                                                              | L(2E)         |
| Loss of tailings material when transporting                                       | Surface & groundwater contamination. Soil contamination. Flora & fauna deaths. | M(3E)         | Ensure appropriate drying out time to achieve desired moisture content. Use a water cart to assist in achieving desired moisture content if the tailings material becomes too dry.                                                      | L(2F)         |
| Exposed ponds of contaminated water                                               | Flora & fauna deaths.                                                          | L(2E)         | The excavated pits will be refilled with tailings and be constructed with an outlet drain.                                                                                                                                              | L(2F)         |

### 3.3 REVIEW OF PLANNING ISSUES

#### 3.3.1 Introduction

A number of State and regional planning instruments apply to the Proposed Modification. These planning instruments were reviewed to identify any environmental aspects requiring consideration in this document. This subsection provides a brief summary of each relevant planning instrument and any environmental issues that require consideration for the assessment of the Proposed Modification.

### 3.3.2 State Planning Issues

#### 3.3.2.1 Application of Part 3A of the Environmental Planning and Assessment Act 1979

The EP&A Act provides the framework for the assessment and approval of development in NSW and is administered by DPE. Development Consent DA 41/98 was approved by the Minister for Urban Affairs & Planning on 1 September 1999. Clause 8J(8)(c) identifies that such an approval is “taken to be a [an] approval under Part 3A of the Act & Section 75W of the Act applies to any modification of such consent”. Section 75W is as follows.

##### **“75W Modification of Minister’s approval**

(1) In this section:

**Minister’s approval** means an approval to carry out a project under this Part, and includes an approval of a concept plan.

**Modification of approval** means changing the terms of a Minister’s approval, including:

- (a) revoking or varying a condition of the approval or imposing an additional condition of the approval, and
  - (b) changing the terms of any determination made by the Minister under Division 3 in connection with the approval.
- (2) The applicant may request the Minister to modify the Minister’s approval for a project. The Minister’s approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.
- (3) The request for the Minister’s approval is to be lodged with the Director- General. The Director-General may notify the applicant of environmental assessment requirements with respect to the Proposed Modification that the applicant must comply with before the matter will be considered by the Minister.
- (4) The Minister may modify the approval (with or without conditions) or disapprove of the modification.”

#### 3.3.2.2 Mining SEPP

The *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (Mining SEPP) was gazetted in recognition of the importance to New South Wales of mining and petroleum production and extractive industries, and to provide proper management and orderly and economic use and development of land containing mineral, petroleum and extractive material resources and to establish appropriate planning controls to encourage ecologically sustainable development through environmental assessment and sustainable management.

The SEPP specifies matters requiring consideration in the assessment of any mining, petroleum production and extractive industry development, as defined in NSW legislation. A summary of the matters that the consent authority must consider when assessing a new or modified proposal, and where these have been addressed in this document, is provided in **Table 10**.

**Table 10**  
**Application of the Mining SEPP**

Page 1 of 2

| Relevant SEPP Clause                                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Section       |
|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 12AB: Non-discretionary development standards for mining | 1) The object of this clause is to identify development standards on particular matters relating to mining that, if complied with, prevents the consent authority from requiring more onerous standards for those matters (but that does not prevent the consent authority granting consent even though any such standard is not complied with).                                                                                                                                                                                                                                               | Noted         |
|                                                          | 2) The matters set out in this clause are identified as non-discretionary development standards for the purposes of section 4.15 (2) and (3) of the Act in relation to the carrying out of development for the purposes of mining.<br>Note. The development standards do not prevent a consent authority from imposing conditions to regulate project-related noise, air quality, blasting or ground vibration impacts that are not the subject of the development standards.                                                                                                                  | Noted         |
|                                                          | 3) Cumulative noise level<br>The development does not result in a cumulative amenity noise level greater than the acceptable noise levels, as determined in accordance with Table 2.1 of the Industrial Noise Policy, for residences that are private dwellings.                                                                                                                                                                                                                                                                                                                               | Section 4.4   |
|                                                          | 4) Cumulative air quality level<br>The development does not result in a cumulative annual average level greater than 30µg/m <sup>3</sup> of PM <sub>10</sub> for private dwellings.                                                                                                                                                                                                                                                                                                                                                                                                            | Section 4.3   |
|                                                          | 5) Airblast overpressure<br>Airblast overpressure caused by the development does not exceed:<br>(a) 120 dB (Lin Peak) at any time, and<br>(b) 115 dB (Lin Peak) for more than 5% of the total number of blasts over any period of 12 months, measured at any private dwelling or sensitive receiver.                                                                                                                                                                                                                                                                                           | No change     |
|                                                          | 6) Ground vibration<br>Ground vibration caused by the development does not exceed:<br>(a) 10 mm/sec (peak particle velocity) at any time, and<br>(b) 5 mm/sec (peak particle velocity) for more than 5% of the total number of blasts over any period of 12 months, measured at any private dwelling or sensitive receiver.                                                                                                                                                                                                                                                                    | No change     |
|                                                          | 7) Aquifer interference<br>Any interference with an aquifer caused by the development does not exceed the respective water table, water pressure and water quality requirements specified for item 1 in columns 2, 3 and 4 of Table 1 of the Aquifer Interference Policy for each relevant water source listed in column 1 of that Table.<br>Note. The taking of water from all water sources must be authorised by way of licences or exemptions under the relevant water legislation.                                                                                                        | Section 4.2   |
|                                                          | 8) The Minister is to review a non-discretionary development standard under this clause if a government policy on which the standard is based is changed.                                                                                                                                                                                                                                                                                                                                                                                                                                      | Noted         |
| 12: Compatibility with other land uses                   | Consideration is given to:<br>- the existing uses and approved uses of land in the vicinity of the development;<br>- the potential impact on the preferred land uses (as considered by the consent authority) in the vicinity of the development; and<br>- any ways in which the development may be incompatible with any of those existing, approved or preferred land uses.<br>The respective public benefits of the development and the existing, approved or preferred land uses are evaluated and compared.<br>Measures proposed to avoid or minimise any incompatibility are considered. | Section 4.1.4 |

**Table 10 (Cont'd)**  
**Application of the Mining SEPP**

Page 2 of 2

| Relevant SEPP Clause                                                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Section              |
|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| 12A: Consideration of voluntary land acquisition and mitigation policy     | Before determining an application for consent for State significant development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider any applicable provisions of the voluntary land acquisition and mitigation policy.                                                                                                                                                                                                                                                                                                        | Not required         |
| 13: Compatibility with mining, petroleum production or extractive industry | <p>Consideration is given to whether the development is likely to have a significant impact on current or future mining, petroleum production or extractive industry and ways in which the development may be incompatible.</p> <p>Measures taken by the Applicant to avoid or minimise any incompatibility are considered.</p> <p>The public benefits of the development and any existing or approved mining, petroleum production or extractive industry must be evaluated and compared.</p>                                                                                         | Section 5.3          |
| 14: Natural resource and environmental management                          | <p>Consideration is given to ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure:</p> <ul style="list-style-type: none"> <li>- impacts on significant water resources, including surface and groundwater resources, are avoided or minimised;</li> <li>- impacts on threatened species and biodiversity are avoided or minimised; and</li> <li>- greenhouse gas emissions are minimised and an assessment of the greenhouse gas emissions (including downstream emissions) of the development is provided.</li> </ul> | Throughout Section 4 |
| 15: Resource recovery                                                      | The efficiency of resource recovery, including the reuse or recycling of material and minimisation of the creation of waste, is considered.                                                                                                                                                                                                                                                                                                                                                                                                                                            | Section 5.3          |
| 16: Transportation                                                         | <p>The following transport-related issues are considered.</p> <ul style="list-style-type: none"> <li>- The transport of some or all of the materials from the site by means other than public road.</li> <li>- Limitation of the number of truck movements that occur on roads within residential areas or roads near to schools.</li> <li>- The preparation of a code of conduct for the transportation of materials on public roads.</li> </ul>                                                                                                                                      | No change            |
| 17: Rehabilitation                                                         | <p>The rehabilitation of the land affected by the development is considered including:</p> <ul style="list-style-type: none"> <li>- the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated;</li> <li>- the appropriate management of development generated waste;</li> <li>- remediation of any soil contaminated by the development; and</li> <li>- the steps to be taken to ensure that the state of the land does not jeopardize public safety, while being rehabilitated or at the completion of rehabilitation.</li> </ul>    | 2.6                  |

### 3.3.2.3 Infrastructure SEPP

The *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) identifies, amongst other things, the matters to be considered in the assessment of development adjacent to or in the vicinity of particular types of infrastructure.

The Proposed Modification does not seek to amend any activities in the vicinity of the classes of infrastructure identified by the Infrastructure SEPP. As a result, the Infrastructure SEPP does not apply to this modification.

### 3.3.2.4 SEPP 33 – Hazardous and Offensive Development

*State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP33)* aims to manage the development of hazardous and offensive industries, or potentially hazardous and offensive industries. Without the implementation of appropriate impact minimisation measures, these industries would (or potentially would) pose a significant risk in relation to the locality, to human health, life or property, or to the biophysical environment.

The Proposed Modification would not result in any additional use or storage of hazardous materials within the Mine Site. It is therefore concluded that the Proposed Modification would not pose a significant risk from hazardous or offensive development, therefore a risk screening is not necessary and this SEPP is not considered further.

## 3.3.3 Regional and Local Planning Issues

### 3.3.3.1 Central West Local Land Services Local Strategic Plan 2016-2021

The Central West Local Land Services *Local Strategic Plan 2016-2021* establishes broad goals for natural resource management in the region, including the following.

- Resilient, self-reliant and prepared local communities.
- Biosecure, profitable, productive and sustainable primary industries.
- Healthy diverse and connected natural environments.

The Plan seeks to ensure that communities are engaged in the maintenance or improvement of natural resources across the region and identifies as a regional priority the implementation of programs that support and protect natural resources, including threatened species, endangered ecological communities, cultural values/sites and native vegetation.

Based on the proposed minor nature of amendments proposed within the Mine Site, it is not anticipated that the Proposed Modification would limit the success of natural resource management goals for the Central West.

### 3.3.3.2 Bogan Local Environment Plan 2011

The Mine Site is situated within land zoned as Zone RU1 - Primary Production under the *Bogan Local Environment Plan 2011* (Bogan LEP). The objectives of Zone RU1 – Primary Production under that plan are as follows.

- “To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To encourage diversity in primary industry enterprises and systems appropriate for the area.
- To minimise the fragmentation and alienation of resource lands.
- To minimise conflict between land uses within this zone and land uses within adjoining zones.”

It is noted that underground mining is not identified as permissible with consent within this zone. However, Clause 70(1)(b) of the Mining SEPP identifies that mining is permissible, with consent, on any land where agriculture is permissible. As agriculture is permissible under Zone RU1 under the Bogan LEP, underground mining is also permissible, with consent.

It is also identified that the Mine Site is situated in an area zoned as “Moderate Biodiversity Sensitivity” under the Bogan LEP. Clause 7.4 of the Bogan LEP identifies that the objective of the LEP in relation to such land is to maintain terrestrial biodiversity by:

- “protecting native fauna and flora; and
- protecting the ecological processes necessary for their continued existence; and
- encouraging the conservation and recovery of native fauna and flora and their habitats.”

In determining any application for development consent, the consent authority must consider whether or not the development:

- “is likely to have any adverse impact on the condition, ecological value and significance of the fauna and flora on the land;
- is likely to have any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna;
- has any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land; and
- is likely to have any adverse impact on the habitat elements providing connectivity on the land.”

Given that the Proposed Modification would not result in additional disturbance of land, it is not expected that the modified activities would result in additional impacts to biodiversity (see Section 4.4). Therefore, the Proposed Modification is not expected to constrain achievement of the objectives of the Bogan LEP.

## **4. ASSESSMENT OF KEY ENVIRONMENTAL ISSUES**

### **4.1 ENVIRONMENTAL SETTING**

#### **4.1.1 Introduction**

The assessment of various environmental aspects of the Proposed Modification throughout this section is reliant upon a range of background information common to many of the key environmental issues. Information relating to the topography, climate, land ownership and residences and land uses surrounding the Mine Site is provided in the following subsection.

#### **4.1.2 Topography and Drainage**

##### **4.1.2.1 Regional Topography and Drainage**

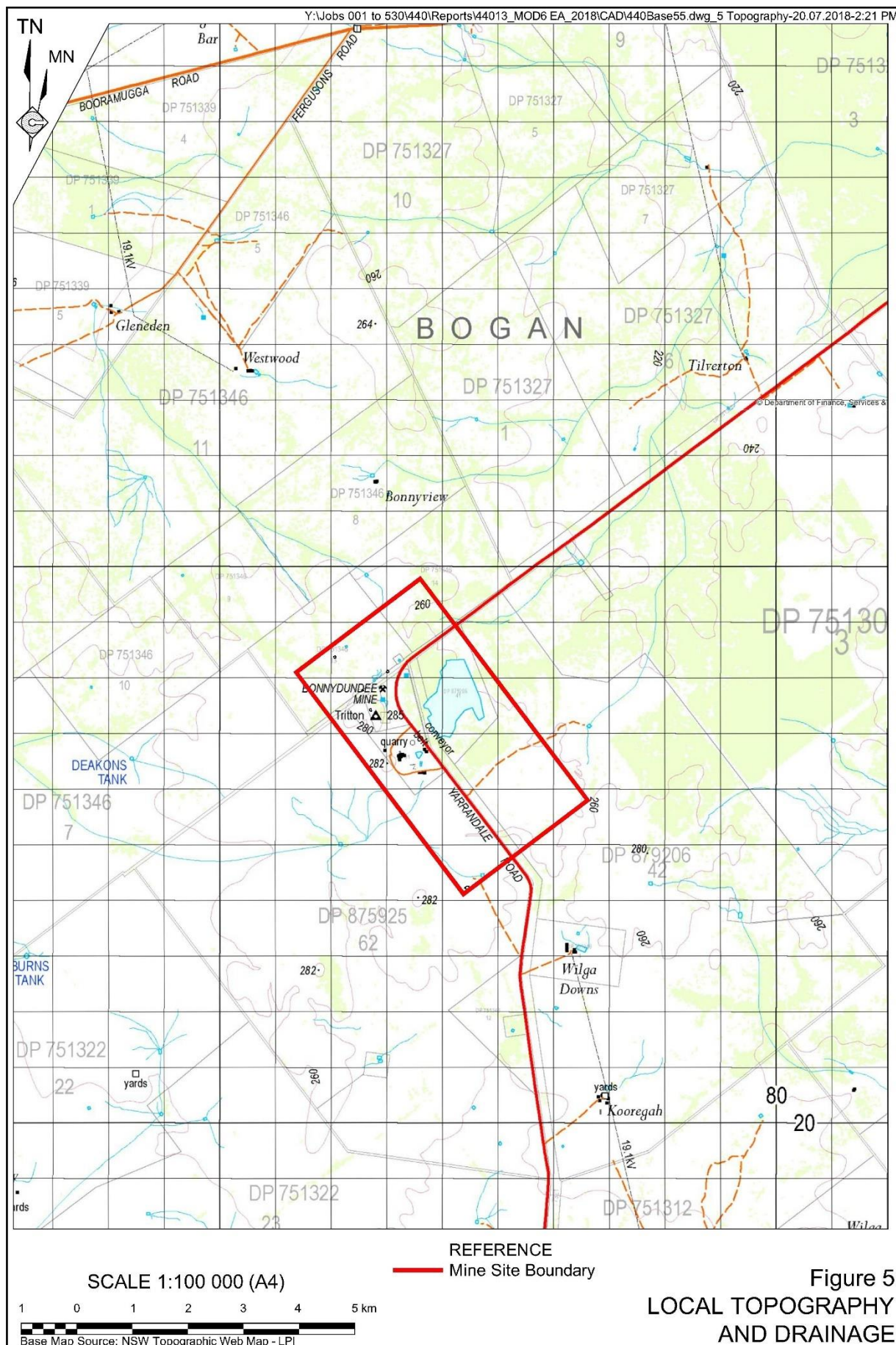
The Mine Site is situated in the western plains region of NSW where the regional topography is characterised by a gently undulating landform with low ridges and occasional locally prominent hills (**Figure 5**). The Mine Site is located within the Macquarie–Bogan Catchment, an area of approximately 74 800km<sup>2</sup>. The Bogan River rises approximately 19km northwest of Parkes before flowing in a north-northwesterly direction through Nyngan, approximately 45km to the southeast of the Mine Site and eventually meets the Barwon River, approximately 25km northeast of Bourke.

##### **4.1.2.2 Local and Mine Site Topography and Drainage**

Topography and drainage within the Mine Site has largely been disturbed by the approved mining operations (**Figure 3**). Surface water flows within the Mine Site are managed through erosion and sediment controls established within operational, stockpiling and tailings storage areas.

Local topography is characteristic of the regional topography, featuring gently undulating land with low ridges and occasional locally prominent hills. Elevations vary from approximately 235m AHD to 270m AHD. (**Figure 5**).

Local drainage is characterised by ephemeral streams which either terminate in farm dams or, to the east of the Mine Site, flow towards the Bogan River. The closest substantial drainage line to the Mine Site is Sidburys Creek located approximately 20km to the northeast of the Mine Site. Sidburys Creek flows in a south-easterly direction towards the Bogan River. To the north and east of the Mine Site, the majority of the runoff flows are ephemeral, flowing via gullies and overland flow towards Sidburys Creek and other un-named intermittent tributaries of the Bogan River. To the south and west of the Mine Site the majority of ephemeral streams drain towards the south. These may occasionally reach the Whitbarrow Creek, on the southern side of the Barrier Highway, which flows in an easterly direction towards the Bogan River.



### 4.1.3 Climate

#### 4.1.3.1 Introduction

Climatic conditions have the potential to influence a range of Mine-related impacts at surrounding residences and on the local environment. The climate in the vicinity of the Mine Site may be classified under the Köppen climate classification as a “warm semi-arid climate”, i.e. hot, dry summers and relatively cool dry winters, with the rainfall pattern having a summer maximum.

This subsection provides a brief overview of the climatic conditions surrounding the Mine Site, focusing particularly on those aspects of the climate that are likely to influence the potential Mine-related environmental impacts.

#### 4.1.3.2 Data Sources

Meteorological data from the following Bureau of Meteorology (BOM) stations is presented in **Table 11**. Long term climate data was sourced from the following locations as they provided the largest and most complete datasets within the local area.

- Nyngan Airport Automated Weather Station (Station Number 51039), located approximately 49km southeast of the Mine Site (temperature, humidity and wind).
- Girilambone (Wongala) Station (Station Number 151158), located approximately 16km to the northeast of the Mine Site (rainfall).

Evaporation data was sourced from the Bureau of Meteorology’s Average Pan Evaporation Map.

**Table 11**  
**Monthly Meteorological Data**

|                                                                                                                                                                                                                                     | Jan   | Feb   | Mar  | Apr   | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec   | Ann   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|------|-------|------|------|------|------|------|------|------|-------|-------|
| <b>Temperature (°C) <sup>1</sup> (1920 to 2018)</b>                                                                                                                                                                                 |       |       |      |       |      |      |      |      |      |      |      |       |       |
| Mean Maximum                                                                                                                                                                                                                        | 34.4  | 33.4  | 30.5 | 25.7  | 20.7 | 17.0 | 16.4 | 18.5 | 22.6 | 26.7 | 30.1 | 33.0  | 25.8  |
| Mean Minimum                                                                                                                                                                                                                        | 19.6  | 19.2  | 16.5 | 11.9  | 7.8  | 5.0  | 3.7  | 4.8  | 7.8  | 11.5 | 15.0 | 17.9  | 11.7  |
| <b>Relative Humidity (%)<sup>1</sup> (9am – 1910 / 3pm – 1915 to 2010)</b>                                                                                                                                                          |       |       |      |       |      |      |      |      |      |      |      |       |       |
| 9:00am                                                                                                                                                                                                                              | 48    | 53    | 56   | 61    | 72   | 80   | 79   | 70   | 59   | 51   | 47   | 46    | 60    |
| 3:00pm                                                                                                                                                                                                                              | 31    | 36    | 37   | 40    | 49   | 55   | 52   | 44   | 38   | 34   | 30   | 29    | 39    |
| <b>Rainfall (mm) <sup>2</sup> (1879 to 2014)</b>                                                                                                                                                                                    |       |       |      |       |      |      |      |      |      |      |      |       |       |
| Mean rainfall                                                                                                                                                                                                                       | 50.6  | 47.6  | 42.2 | 34.7  | 36.0 | 33.2 | 29.3 | 29.6 | 27.7 | 34.8 | 36.3 | 42.8  | 444.4 |
| Highest daily rainfall                                                                                                                                                                                                              | 145.0 | 146.1 | 89.6 | 193.2 | 85.0 | 63.2 | 55.1 | 59.4 | 54.0 | 63.0 | 80.0 | 102.0 | 193.2 |
| <b>Evaporation (mm) <sup>3</sup> (1975 – 2005)</b>                                                                                                                                                                                  |       |       |      |       |      |      |      |      |      |      |      |       |       |
| Average evaporation                                                                                                                                                                                                                 | 300   | 250   | 200  | 125   | 80   | 50   | 60   | 80   | 125  | 175  | 300  | 300   | 2045  |
| Source:                                                                                                                                                                                                                             |       |       |      |       |      |      |      |      |      |      |      |       |       |
| <sup>1</sup> – Bureau of Meteorology – Nyngan Airport Station (Station Number 051039).                                                                                                                                              |       |       |      |       |      |      |      |      |      |      |      |       |       |
| <sup>2</sup> – Bureau of Meteorology – Girilambone (Wongala) Station (Station Number: 151158).                                                                                                                                      |       |       |      |       |      |      |      |      |      |      |      |       |       |
| <sup>3</sup> – Bureau of Meteorology – Average Pan Evaporation Maps<br>( <a href="http://www.bom.gov.au/jsp/ncc/climate_averages/evaporation/index.jsp">http://www.bom.gov.au/jsp/ncc/climate_averages/evaporation/index.jsp</a> ). |       |       |      |       |      |      |      |      |      |      |      |       |       |

#### 4.1.3.3 Temperature and Humidity

**Table 11** indicates that January is the hottest month, with a mean maximum temperature of 34.4°C and a mean minimum temperature of 19.6°C. July is the coldest month with a mean maximum temperature of 16.4°C and a mean minimum temperature of 3.7°C. Late autumn, winter and early spring (April to September) is typically the most humid time of the year.

#### 4.1.3.4 Rainfall and Evaporation

Monthly average rainfall varies between 29.3mm and 50.6mm, with more rainfall in summer than winter. Rainfall variability is greatest in the warmer months of December to February. In general, monthly rainfall can be highly variable, with all months recording no rainfall in some years. Similarly, maximum daily rainfall can more than double average monthly rainfall, particularly in late summer and autumn, indicating that intense storms can occur.

Mean monthly evaporation varies throughout the year, from approximately 300mm in November, December and January to approximately 50mm in June. Mean monthly evaporation exceeds rainfall in all months and annual evaporation exceeds annual rainfall by a factor of four, indicating that the area is typically in water deficit.

#### 4.1.3.5 Wind Conditions

Wind roses, indicating wind speed and direction, have been sourced from the BOM-operated Nyngan Airport Automated Weather Station (Station Number 051039) and are displayed on **Figure 6**. That data indicates that prevailing winds throughout the year are from the south. During the winter and spring, winds from the southeast also feature while during the summer and autumn period winds feature from a variety of directions.

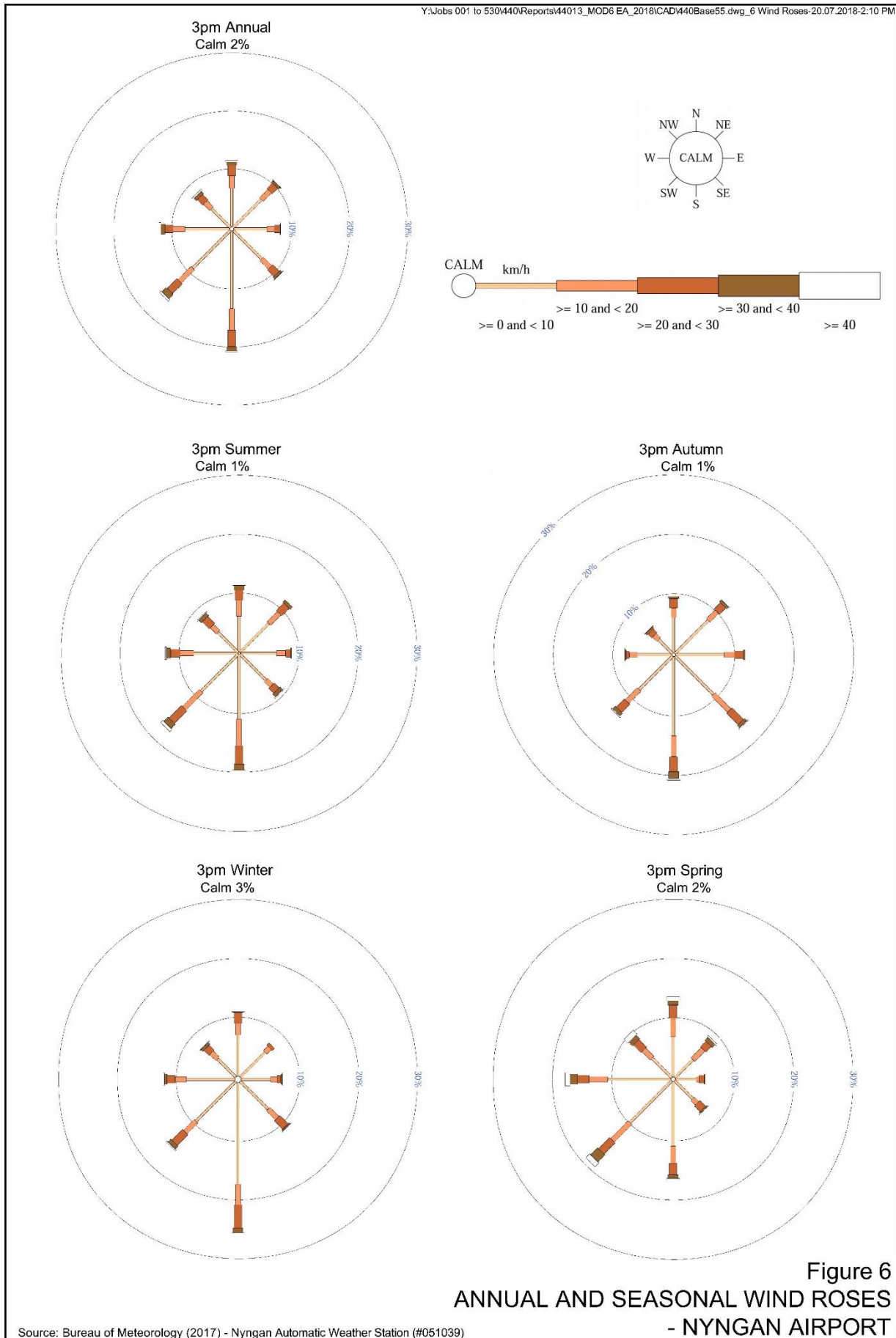
### 4.1.4 Land Ownership, Residences and Land Use

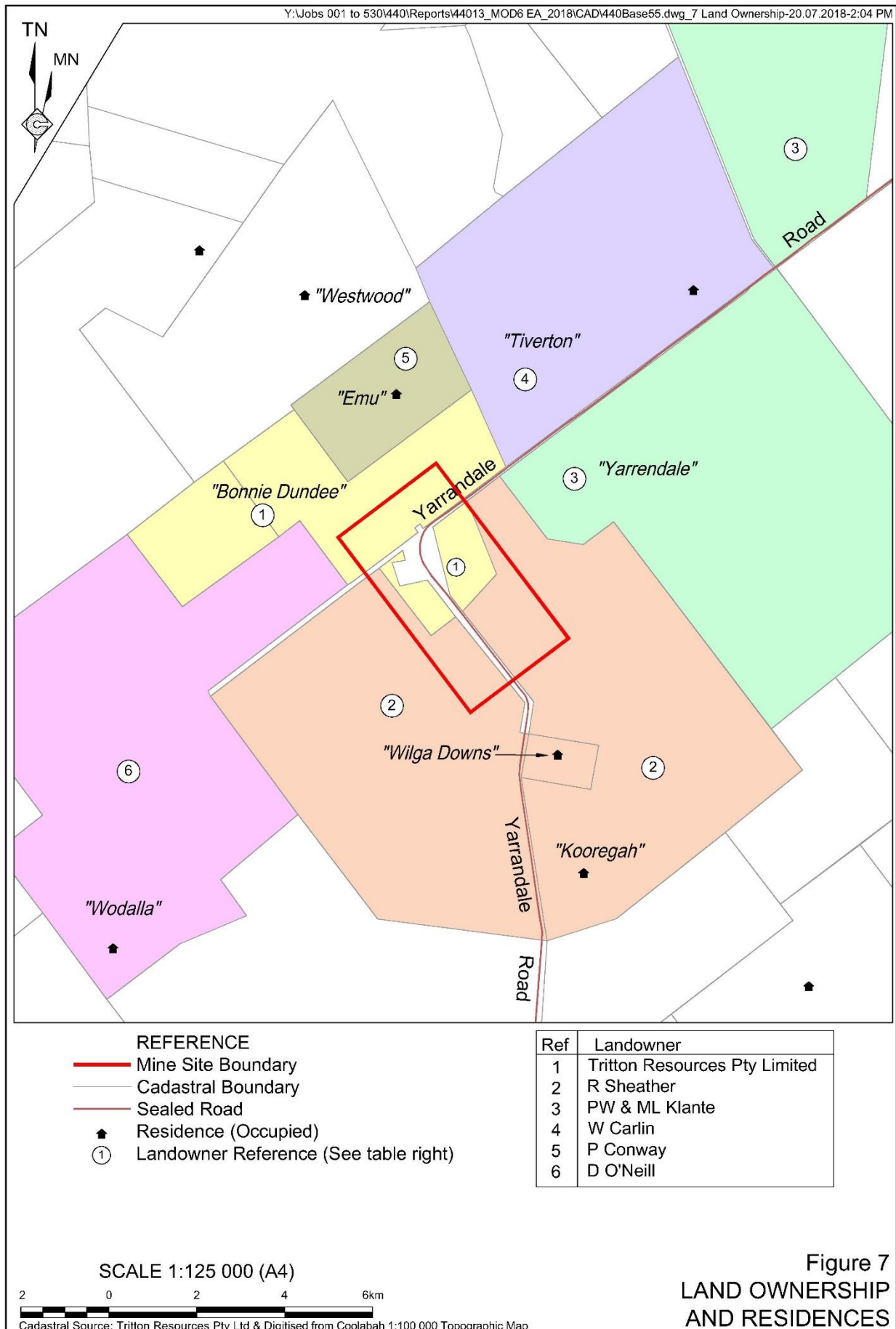
#### 4.1.4.1 Land Ownership and Residences

**Figure 7** presents land ownership in the vicinity of the Mine Site. Land within the Mine Site is freehold land owned by the Applicant and Mr Roger Sheather with some Crown land comprising a Travelling Stock Route and the Yarrandale Road reserve. The Applicant has consulted with Mr Sheather who is aware of the Proposed Modification and the proposed activities. Access to the Mine Site is provided directly from Yarrandale Road.

The closest residences to the Mine Site are as follows.

- The ‘Emu’ homestead owned by Mr Conrad Conway, located approximately 4.5km north of the existing waste rock emplacement.
- The ‘Wilga Downs’ residence owned by Mr Roger Sheather, located approximately 4.7km to southeast of the existing waste rock emplacement.





#### 4.1.4.2 Land Use

**Figure 8** displays the range of land uses within and surrounding the Mine Site. These include mining activities, and primary production, principally, intermittent wheat cropping and sheep or cattle grazing. No agricultural production is undertaken within the Mine Site.

## 4.2 WATER RESOURCES

### 4.2.1 Introduction

The following subsection provides an overview of the existing environment with respect to surface water and groundwater at the Mine Site. The environmental risk assessment in Section 3.2 highlighted the potential for contamination of surface water and groundwater resources as a result if the excavation activities in the TSF. Potential impacts from the Proposed Modification are presented, and additional operational controls and mitigation measures are proposed to reduce or prevent these impacts. This is followed by discussion of any residual impacts relating to the Proposed Modification, and how these impacts will be monitored.

### 4.2.2 Existing Setting

#### 4.2.2.1 Surface Water

Most watercourses in the vicinity of the Mine Site are ephemeral and therefore create few issues with diversion of clean water from the Mine Site. The Mine operates under zero discharge conditions and therefore does not impact the surrounding environment.

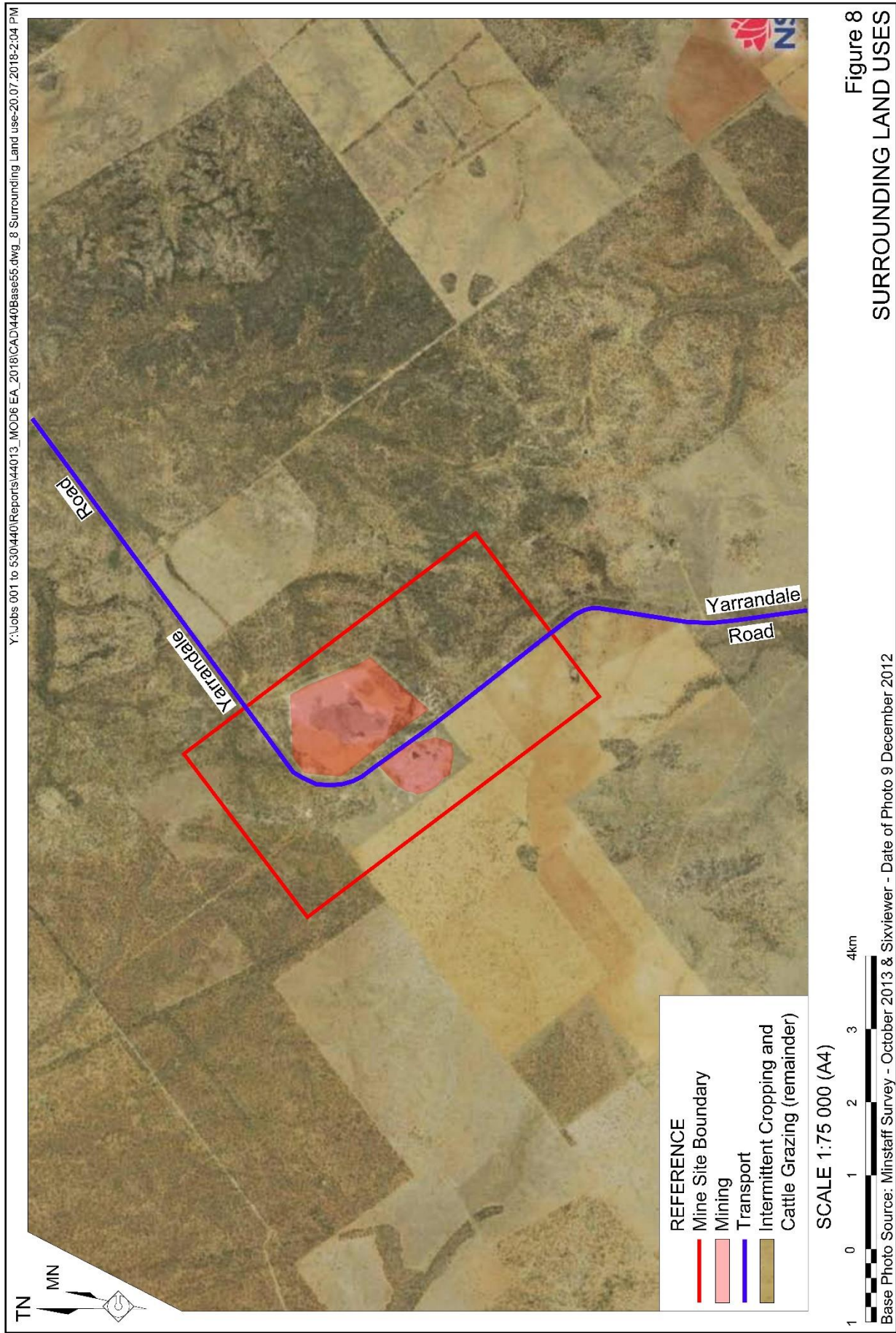
Surface water management structures at the Mine Site are designed to separately manage clean water, dirty water and contaminated water in order to meet the following objectives.

- Divert clean water from disturbed areas.
- Collect coarse sediments in runoff from disturbed areas.
- Collect any chemicals or process solution within the system and contain on site.
- Reuse water where practicable for processing or dust control.

Clean water diversion banks or drains have been constructed to divert clean surface water around operational areas and away from the Mine Site and reduce catchment size. Dirty water diversion drains or banks have been constructed to ensure that all potentially sediment-laden or contaminated water is collected and reused.

Sediment retention basins have been constructed to capture and store water from catchments where there are exposed soils but with little or no risk of contamination occurring. These basins were designed with sufficient capacity to contain a 5-day, 90<sup>th</sup> percentile rainfall event based on 100 years of Nyngan rainfall data, in addition to 2 years of anticipated soil loss.

Containment dams have been constructed to capture runoff from catchments containing potentially contaminating material and were designed to contain the runoff from a 100-year, 72-hour storm event. Water levels are maintained at a low level to ensure sufficient available capacity for rainfall events.



All chemical and fuel storage areas are bunded, and the tailings pipeline lies within a bunded corridor

Surface water monitoring is regularly conducted at six locations in and around the Mine Site. Weekly inspections of water management structures are conducted to ensure that:

- structures are intact and are diverting clean water as intended;
- dam levels are below freeboard limits;
- pumping systems are operational; and
- structures are free of terrestrial fauna.

The Tailings Storage Facility is regularly monitored and has been constructed to limit the risk of failure.

#### **4.2.2.2 Groundwater**

Thirteen groundwater monitoring sites have been established at the Mine Site and indicate standing water levels ranging from 25m to 85m below ground surface. Groundwater quality is poor, with measured electrical conductivities up to 27 000µs/cm. Where groundwater is intercepted in the existing mine, it is pumped to the surface and used for processing.

Groundwater at the Mine Site is generally limited and is confined to local structures and along contacts between weathered and fresher rocks.

Groundwater resources in the region are highly saline not generally used as a water source.

#### **4.2.3 Potential Impacts**

The primary potential impact to surface water or groundwater that may result from the Proposed Modification would be damage to the Tailings Storage Facility perimeter embankment or lining resulting from excavation of tailings material, leading to potential leakage of tailings and possible contamination of surface water and groundwater resources.

#### **4.2.4 Operational Controls and Mitigation Measures**

Risks to groundwater quality from the Mine relate principally to potential contamination from the Tailings Storage Facility, while risks to surface water quality are primarily related to pollution through failure of the Tailings Storage Facility, sediment-laden runoff or hydrocarbon spills and acid mine drainage. These risks are managed through the design and operational control measures summarised above and described in the existing approved Water Management Plan 2016, Erosion and Sediment Control Plan 2015, and Waste Rock Characterisation and Management Plan 2016. These measures would be continued under the Proposed Modification. Additional management and mitigation measures that would be implemented under the Proposed Modification to manage and mitigate potential impacts to surface water and groundwater include the following.

- Locate excavation activities a minimum of:
  - 35m from the inner edge of the existing Stage 5 embankment;

- 26m from the inner edge of the Stage 6 embankment; and
- 20m from the inner edge of the Stage 7 embankment

to ensure that water does not pond next to the perimeter embankments, and to allow for unimpeded future embankment construction.

- Excavate the tailings material to a maximum depth of 1.5m. The liner is 5.9m to 10.9m below the current surface level ensuring any risk of liner disruption is negligible.
- Preferentially discharge tailings into excavated cells, and completely fill each cell before progressing to the next, to allow tailings to settle and limit ponding of surface water.
- Conduct weekly visual inspections of the cells to ensure that water is not ponding in them near the perimeter embankment following deposition.
- Backfill the cells with tailings well in advance of any normal cyclic tailings deposition being undertaken in that area.
- Maintain an accurate plan of the location of cells, dates when tailings depositions started and ceased, and the outcomes of visual inspections.

## **4.2.5 Assessment of Impacts**

Based on the proposed operational controls, it is considered that the proposed activities would not result in significant risk to the stability of the TSF embankments or damage the lining of the TSF.

### **4.2.5.1 Monitoring**

The Applicant would continue to monitor surface water and groundwater quality. These results would continue to be reported in the Annual Environmental Management Report which is distributed to all applicable regulatory authorities.

## **4.3 AIR QUALITY**

### **4.3.1 Introduction**

The following subsection provides an overview of the existing environment with respect to air quality at the Mine Site. The environmental risk assessment in Section 3.2 highlighted the potential for additional dust emissions resulting from the Proposed Modification. Potential impacts from the Proposed Modification are presented, and additional operational controls and mitigation measures are proposed to reduce or prevent these impacts. This is followed by discussion of any residual impacts relating to the Proposed Modification, and how these impacts will be monitored.

#### 4.3.2 Existing Setting

The Mine Site is located in an area with a warm semi-arid climate where high evaporation rates can cause dust lift off from wind erosion and other ground-disturbing activities. Mine-related activities that may enhance dust lift off include:

- ore and waste rock handling and haulage;
- construction and management of stockpiles;
- processing of ore and waste rock; and
- movement of vehicles on unsealed roads.

Other sources of air pollution generated through Mine-related activities include:

- exhaust emissions from diesel and other petrol combustion;
- fumes from blasting; and
- fumes from reagents used in the processing plant.

An assessment of air quality at the Tritton Copper Mine was completed by Heggies Pty Ltd (2007) in conjunction with the SoEE for the Tritton Expansion Project–Stage 2. The assessment considered particulate matter and deposited dust emissions that would result from activities involved in the expansion of mining activities. Heggies (2007) concluded the following in relation to air quality at the Mine Site at all the nearest non-project related residences.

- Cumulative 24-hour average PM<sub>10</sub> would be less than 41.0µg/m<sup>3</sup>.
- Cumulative Annual Average PM<sub>10</sub> would be less than 18.1µg/m<sup>3</sup>.
- Cumulative annual average deposited dust would be less than 2.6g/m<sup>2</sup>/month.

#### 4.3.3 Monitoring Results

The Applicant currently monitors deposited dust at a range of locations within and surrounding its existing operations on a monthly basis. **Figure 9** displays the location of selected dust monitoring locations. The monitoring gauges at Budgery and Girilambone provide an indication of background levels while the various monitoring locations in the vicinity of the Mine Site record operational dust levels and deposited dust along the boundaries of the Mine Site. **Table 12** presents the annual average insoluble solids monitoring results at the locations identified on **Figure 9** between 2014 and 2018.

#### 4.3.4 Potential Impacts

The primary potential air quality impact that may result from the Proposed Modification would be the generation of dust whilst excavating, stacking, drying, and loading the tailings material. This may result in potential elevated levels of total suspended particulates, PM<sub>10</sub>, PM<sub>2.5</sub> and deposited dust at residential receivers surrounding the Mine Site.

**Table 12**  
**Deposited Dust Monitoring 2014-2018**

| Location                                                                     | Dust Gauge | Location Description                                           | 2014 | 2015 | 2016 | 2017 | 2018* |
|------------------------------------------------------------------------------|------------|----------------------------------------------------------------|------|------|------|------|-------|
| <b>Background Monitoring</b>                                                 |            |                                                                |      |      |      |      |       |
| Budgery                                                                      | BD1        | Old Mine Shaft                                                 | 1.1  | 1.6  | 1.5  | 1.1  | 3.4   |
| Budgery                                                                      | BD2        | Old Mine Shaft                                                 | 0.6  | 0.9  | 0.8  | 0.5  | 1.4   |
| Budgery                                                                      | BD3        | Old Mine Shaft                                                 | 2.0  | 1.6  | 1.3  | 1.6  | 2.4   |
| Budgery                                                                      | BD4        | Old Mine Shaft                                                 | 2.3  | 1.2  | 0.9  | 1.3  | 1.7   |
| Budgery                                                                      | TD8A       | Old Mine Shaft                                                 | 1.9  | 3.4  | 1.2  | 0.7  | 1.7   |
| Girilambone                                                                  | BG1        | Vacant Scrub Land                                              | 0.8  | 0.8  | 0.7  | 0.8  | 1.2   |
| Girilambone                                                                  | BG2        | Vacant Scrub Land                                              | 0.9  | 1.1  | 0.8  | 1.1  | 1.6   |
| <b>Tritton Mine Operational Areas</b>                                        |            |                                                                |      |      |      |      |       |
| Tritton                                                                      | TD3B       | West of ROM stockpile.                                         | 10.8 | 5.8  | 6.2  | 2.1  | 2.5   |
| Tritton                                                                      | TD24       | Adjacent to haul road                                          | 7.7  | 6.5  | 8.5  | 7.0  | 4.3   |
| Tritton                                                                      | TD25       | Southwest of the ROM stockpile                                 | 2.5  | 2.6  | 3.7  | 3.1  | 3.6   |
| Tritton                                                                      | TD26       | South of the waste rock emplacement adjacent to Settling Pond  | 6.3  | 4.4  | 4    | 3.7  | 4.1   |
| <b>Tritton Mine Boundary Areas</b>                                           |            |                                                                |      |      |      |      |       |
| Yarrandale Road                                                              | TD1        | Adjacent to Yarrandale Road north of Tailings Storage Facility | 1.0  | 0.8  | 0.7  | 1    | 1.3   |
| Yarrandale Road                                                              | TD2        | Adjacent to Yarrandale Road north of Tailings Storage Facility | 1.6  | 1.4  | 1.1  | 1.2  | 1.5   |
| Tritton                                                                      | TD3        | Northwest of the Haul Road                                     | 2.6  | 2.2  | 1.8  | 3.8  | 1.7   |
| Tritton                                                                      | TD23       | South of the ROM stockpile                                     | 3.2  | 1.6  | 1.5  | 1.3  | 1.4   |
| Tritton                                                                      | TD27       | North of waste rock emplacement                                | 2.5  | 1.7  | 1.8  | 2.0  | 1.7   |
| * - Values are an average of monitored results from January 2018 – June 2018 |            |                                                                |      |      |      |      |       |
| Source: Tritton Resources                                                    |            |                                                                |      |      |      |      |       |

#### 4.3.5 Operational Controls and Mitigation Measures

The tailings material stored in the TSF has a moisture content of approximately 15%. As a result, there have been no issues with dust emissions from the TSF during its operating history. The moisture content of the tailings material would be high enough to limit dust emissions during excavation, loading, hauling and unloading of the tailings material onto the drying stockpile area within the TSF footprint. The excavated tailings material would be dried in stockpiles for approximately two days to achieve a moisture content of less than 12%. This moisture content would minimise the amount of dust lift off from the tailings material during drying, loading, transport off-site and unloading of the material. The following management and mitigation measures would be implemented to further limit air quality impacts from the Proposed Modification.

- Visually inspect the excavation area of the TSF on a weekly basis to ensure that no visible dust is emitted from the area.

- Apply water from a water cart to the excavation area, TSF embankment, access ramp, haul route, and drying stockpiles during dry and/or windy conditions to suppress dust lift-off.
- Ensure the drying stockpiles have slopes of no more than 1:3 (V:H), in order to improve stability.
- Limit operations where practicable during periods of high winds.
- Ensure that the exhausts of construction, loading and hauling equipment would be diverted away from the ground surface so as not to generate dust.
- Ensure that all trucks transporting dried tailings material from the Mine Site have their loads covered prior to exiting the stockpile area.
- Immediately cease any operations that are resulting in visible dust emissions beyond the TSF boundary.
- Respond promptly to any air quality-related complaints, including modifying on-site operations in the event that dust emissions from those operations are not acceptable.

#### **4.3.6 Assessment of Impacts**

Taking into consideration the moisture content of the tailings material both before and after drying, and the additional management and mitigation measures that would be implemented to control any potential dust emissions, the Proposed Modification would be unlikely to result in significant additional dust emissions from the Mine Site.

#### **4.3.7 Ongoing Monitoring**

The Applicant would continue to undertake air quality monitoring as described in Section 4.3.3. These results would continue to be reported in the Annual Environmental Management Report which is distributed to all applicable regulatory authorities.

### **4.4 REMAINING ENVIRONMENTAL ISSUES**

The Applicant contends that the remaining environmental issues are likely to be largely unaffected by the Proposed Modification. As a result, and in the interest of brevity, each of these issues has been addressed in this subsection in tabular form.

**Table 13** presents an overview of these issues. For each issue the Applicant's objectives in managing environmental aspects, a description of the existing environment, an overview of environmental management and mitigation measures that would be implemented and an assessment of potential residual impacts after implementation of management and mitigation measures are provided.



**Table 13**  
**Assessment of Impacts for Remaining Environmental Issues**

Page 1 of 3

| Objectives                                                                                                                | Existing Environment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Management/Mitigation Measures                                                                                                                                                                                                                                                                                                                        | Impact Assessment                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NOISE</b>                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                               |
| To ensure that the Proposed Modification does not result in higher noise levels than those already generated at the Mine. | <p>The noise climate around the Mine Site is influenced by typical rural activities such as ploughing, harvesting and transportation, together with noise associated with stock, insects and birds. Wind in trees and distant traffic also contribute to the local noise climate.</p> <p>Within the Mine Site, operational noise is generated by:</p> <ul style="list-style-type: none"> <li>• surface ventilation fans;</li> <li>• transportation of ore and waste rock;</li> <li>• crushing, grinding and processing of ore;</li> <li>• construction and use of the tailings storage facility; and</li> <li>• transportation of copper concentrate to the rail siding.</li> </ul> | The Proposed Modification would involve the use of a front-end loader and haul truck to excavate and transport tailings material from the TSF. Operation of this equipment would not result in higher overall noise levels than those already generated at the Mine. As a result, existing noise mitigation measures are considered to be sufficient. | The Proposed Modification would not result in higher noise levels. As a result, there would be no additional noise impacts expected as a result of the Proposed Modification. |
| <b>VISUAL AMENITY</b>                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                               |
| To ensure that the Proposed Modification does not result in additional impacts to the visual amenity of the area.         | <p>The existing visual amenity surrounding the Mine Site is typical of rural areas in western NSW, consisting primarily of scrubby woodland vegetation or land cleared and developed for agriculture.</p> <p>The closest residence to the Mine Site is located approximately 4.5km away.</p> <p>The Mine Site is located directly adjacent to Yarrandale Road, with operations and the waste rock emplacement visible to road users travelling in both directions.</p>                                                                                                                                                                                                              | The Proposed Modification would not result in any significant changes to the appearance of the Mine Site from publicly accessible vantage points. As a result, existing mitigation measures are considered to be sufficient.                                                                                                                          | Given that the Proposed Modification would not result in any changes to the Mine Site from external viewpoints, no additional visual amenity impacts would be caused.         |

**Table 13 (Cont'd)**  
**Assessment of Impacts for Remaining Environmental Issues**

| Objectives                                                                                                                         | Existing Environment                                                                                                                                                                                                                                                                                                                                                                       | Management/Mitigation Measures                                                                                                                                                                                                                                                                           | Impact Assessment                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TRANSPORTATION AND TRAFFIC</b>                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| To ensure that appropriate measures are taken to manage any additional traffic generated as a result of the Proposed Modification. | <p>Approval for transportation of the tailings material from the Mine Site to the Murrawombie Copper Mine has been sought under the development application for the construction and operation of the Paste Fill Plant at the Murrawombie Copper Mine.</p> <p>Existing transportation activities between the Mine Site and the Applicant's other operators would continue as approved.</p> | No additional transport activities would be generated under the Proposed Modification.                                                                                                                                                                                                                   | The Applicant anticipates that the majority of the tailings material would be transported as back loads from approved transportation activities for delivery of ore material to the Mine Site, in dedicated campaigns. As a result, transportation of tailings material to the Murrawombie Copper Mine would not result in significant changes to existing transportation levels or significant impacts additional to existing operations approved under DA 41/98. |
| <b>SOIL AND LAND CAPABILITY</b>                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| To ensure that the Proposed Modification includes an environmentally sound approach to soil management and rehabilitation.         | The Mine Site is an active mine site. Soil resources have been previously stripped and soil stockpiles established. Progressive and final rehabilitation is described in the approved MOP.                                                                                                                                                                                                 | The Proposed Modification would not result in the disturbance of any additional land. In addition, the progressive and final rehabilitation measures identified in the approved MOP would continue to be implemented. As a result, no soil or land capability-specific management measures are proposed. | Given that the Proposed Modification would not result in the disturbance of any additional land, the Applicant considers that the Proposed Modification would have no impact to existing soil and land capability.                                                                                                                                                                                                                                                 |



**Table 13 (Cont'd)**  
**Assessment of Impacts for Remaining Environmental Issues**

| Objectives                                                                                                                                                         | Existing Environment                                                                                                                                                                                                                                                                                                                                                                                                            | Management/Mitigation Measures                                                                                                                                                                                                                                                                                                                                                     | Impact Assessment                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ABORIGINAL CULTURAL HERITAGE</b>                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                       |
| To identify any sites of Aboriginal heritage value and consider the area within a regional Aboriginal heritage context.                                            | No known sites or artefacts of Aboriginal cultural heritage value are located within the Mine Site nor are any relevant Aboriginal cultural heritage values known to apply over the land on which the Mine is situated.                                                                                                                                                                                                         | As previous assessments have not identified any Aboriginal sites within the areas of approved disturbance and as the Proposed Modification would not disturb additional land, no additional control measures are required. Existing protocols relating to the unexpected discovery of sites or artefacts with Aboriginal cultural heritage value would continue to be implemented. | The Proposed Modification would not result in disturbance of additional areas. As a result, there would be no impact expected as a result of the Proposed Modification.               |
| <b>BIODIVERSITY</b>                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                       |
| To ensure the Proposed Modification does not adversely impact native flora and fauna, their habitat or other biodiversity values in the vicinity of the Mine Site. | The surface infrastructure development of the Mine has been completed and is operating such that any vegetation clearing and other disturbance to land which may act as a habitat to native fauna has been completed.                                                                                                                                                                                                           | The Proposed Modification would not result in the clearing of vegetation or otherwise result in the removal of habitat that would impact native flora and fauna. No additional mitigation measures are considered necessary.                                                                                                                                                       | The Proposed Modification is not expected to impact biodiversity values in the vicinity of the Mine Site.                                                                             |
| <b>SOCIO-ECONOMIC</b>                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                       |
| To identify any positive or negative social or economic impacts that may result from the Proposed Modification and ensure that social equity is maintained.        | The assessment prepared for the EIS submitted with the original development application in 1998 concluded that the operation of the Mine would not adversely affect the population of the Bogan Shire or the availability of housing and community services. The provision of employment, operational and maintenance spending and royalties was expected to provide significant direct and indirect benefits to the community. | As the Proposed Modification would result in only minor changes to the approved Mine, it is not considered that any additional mitigation or management measures are necessary.                                                                                                                                                                                                    | The Proposed Modification would enable the continued efficient operation of the Tritton Copper Mine and consequently the continued distribution of the economic benefits of the Mine. |

## **5. EVALUATION AND JUSTIFICATION OF THE PROPOSED MODIFICATION**

### **5.1 INTRODUCTION**

This section provides an evaluation of the Proposal against the principles of Ecologically Sustainable Development (ESD) and a justification for the application in terms of its biophysical and socio-economic impacts. Finally, the alternative of not proceeding with the Proposed Modification is considered.

### **5.2 ECOLOGICALLY SUSTAINABLE DEVELOPMENT**

#### **5.2.1 Introduction**

Sustainable practices by industry, all levels of government and the community are recognised to be important for the future prosperity and well-being of the world. The principles of Ecologically Sustainable Development (ESD) that have been recognised for over a decade were based upon encouraging development that meets the needs of the current generation while conserving ecological processes, upon which life depends, for the benefit of future generations.

Under existing operations and in planning the proposed activities to modify, the Applicant has endeavoured to continue to address each of the sustainable development principles. The following sub-sections draw together the features of the Proposed Modification that reflect the principles of sustainable development, namely:

- decision making that integrates both short-term and long-term environmental, economic, social and equitable considerations;
- the precautionary principle;
- the principle of inter-generational equity;
- the principle of the conservation of biodiversity and ecological integrity; and
- the principle for the improved valuation and pricing of environmental resources.

#### **5.2.2 Integrating Short Term and Long Term Decision Making**

The Proposed Modification would allow for the continued efficient operation of the Tritton Copper Mine. Decisions made regarding the Proposed Modification were guided by the following considerations.

- The need for an economical, readily available and nearby source of material to supply the proposed Paste Fill Plant at the Applicant's Murrawombie Copper Mine.
- To enable the beneficial use of tailings material from the Mine to produce Paste Fill to be applied within the underground workings of the Murrawombie Copper Mine to ensure the safety and stability of these areas.

- To reduce the amount of tailings that are required to be stored in the Tailings Storage Facility, thus reducing the long-term environmental and economic liabilities associated with it.
- Potential impacts to the environmental setting at the Mine Site including key environmental concerns regarding impacts to water resources and air quality.
- To enable the efficient production of copper concentrate and ensure continued supply to the Mine's customers. This would also influence the subsequent economic benefits for the Applicant, the Mine's employees, the Bogan Shire Council, the surrounding community and ultimately the State of NSW.

These considerations have enabled the Applicant to design the Proposed Modification in a manner that integrates the short term benefits of production efficiency with longer term benefits to the environmental setting and the longevity of operations at the Mine Site.

### 5.2.3 The Precautionary Principle

In order to satisfy this principle, emphasis must be placed on anticipation and prevention of environmental damage, rather than reacting to it. The Applicant has applied extensive experience developed through existing operations and comprehensive knowledge of the existing environment to plan the Proposed Modification and to mitigate potential risks to the environment. An anticipatory approach has been taken to planning design and operational controls that would be implemented under the Proposed Modification.

Design and Implementation of Safeguards - The Applicant has designed control and management measures to anticipate potential environmental impacts relating to activities proposed under the Proposed Modification. These include undertaking the excavation operations in a way that ensures that the integrity of the TSF liner is maintained, thus preventing potential contamination of surface water and groundwater resources.

The precautionary principle has been considered during all stages of the design and assessment of the Proposed Modification. The approach adopted provides a high degree of certainty that the Proposed Modification would not result in any major unforeseen impacts.

### 5.2.4 Inter-generational Equity

Inter-generational equity embraces value concepts of justice and fairness so that the basic needs of all sectors of society are met and there is a fair distribution of costs and benefits to the community. This provides for both inter-generational (between generations) and intra-generational (within generations) equity considerations.

Equity within generations requires that the economic and social benefits of the development be distributed appropriately among all members of the community. Equity between generations requires that the non-material well-being or "quality of life" of existing and future residents of the local community would be maintained throughout and beyond the life of the Proposed Modification.

Both elements of social equity are addressed through the design of the Proposed Modification itself, the implementation of operational safeguards to mitigate any short-term or long-term environmental impacts, and the proposed rehabilitation of the areas directly disturbed.

Examples of matters relating to inter-generational equity that are relevant to the Proposed Modification are provided below.

- **Mine Site Objectives** – An objective of all operations at the Mine Site is to undertake development and operations in a manner that minimises adverse impacts on the local environment throughout and beyond the operational life of the Mine. This approach enables the Applicant to develop the Mine to maximise economic and social benefits while ensuring beneficial environmental values are preserved for future generations.
- **Design of Proposal Components** – The design of the Proposed Modification would ensure the continued efficient operation of both the Tritton and Murrawombie Copper Mines. The proposed activities would provide the environmental benefits of reduced surface storage of tailings material and provide for the beneficial use of this material to increase the efficiency of resource recovery in the underground workings of Murrawombie Mine whilst ensuring geotechnical stability. The approach to excavation and use of tailings material would provide benefits to ongoing operations at both Mines while ensuring there is no substantial legacy of environmental issues at the Sites.

The Proposed Modification would allow for the continued and more efficient extraction of raw materials used to produce products that would not only benefit today's generation but many generations to come. In addition, the employment and economic benefits of operations at the Tritton Copper Mine would continue to provide the flow on effects from supply and services while providing a source of revenue outside of the Bogan Shire, enabling future growth and development that would benefit the existing and future generations.

### **5.2.5 Conservation of Biological Diversity and Ecological Integrity**

The protection of biodiversity and maintenance of ecological processes and systems are central goals of sustainability. It is important that developments do not threaten the integrity of the ecological system as a whole or the conservation of threatened species in the short- or long-term.

The Proposed Modification would not lead to disturbance of additional land or vegetation clearing. The proposed excavation of tailings material would create an additional source of noise emissions from the Mine Site and may vary the emission of dust generated by operations. These elements have been considered in Section 4.4 and Section 4.3 respectively.

It is not considered that the Proposed Modification would result in significant impacts to local fauna and flora.

### 5.2.6 Improved Valuation and Pricing of Environmental Resources

The issues that form the basis of this principle relate to the acceptance that the polluter pays, all resources are appropriately valued, cost-effective environmental stewardship is adopted, and the adoption of user-pays principles based upon the full life cycle of the costs.

The value placed by the Applicant on environmental resources is evident in the following elements of the Proposed Modification.

- Operational Objectives – The objectives of the Proposed Modification include the aim to operate in a profitable, safe and environmentally responsible manner.
- Design of the Proposed Modification – The Proposed Modification has been designed to maximise the beneficial use of tailings, reducing the need to construct additional lifts to increase the storage capacity of the TSF. The Modification would also reduce the need to transport inputs to the proposed Paste Fill Plant at Murrawombie Mine from more distant sources, reducing fuel consumption and greenhouse gas emissions. Moreover, the use of paste fill produced from the extracted material at the Murrawombie Mine would enhance recovery of the available resources there by eliminating the necessity for ore pillars.
- Assessment of the Proposed Modification – The assessment of various potential impacts has addressed the likely residual effects on the environment. This assessment has considered the necessary environmental safeguards and measures to be implemented to prevent irreversible damage to the environment within and surrounding the Mine Site.

The Applicant proposes to continue operations at the Tritton Copper Mine in a manner that minimises environmental impacts in the direct vicinity of the Mine Site. The proposed ongoing monitoring of environmental attributes at the Mine Site provides a proactive approach to maintaining environmental assets. Ultimate rehabilitation of the Mine Site would provide a final landform that blends with the surrounding environment and provides suitable habitat for native flora and fauna.

### 5.2.7 Conclusion

The objectives of the Proposed Modification aim to encourage the efficient and environmentally responsible operation of the Tritton and Murrawombie Copper Mines, including utilisation of waste resources, so that maximum benefit is achieved for the Company, the Bogan Shire Council, the local community and the communities of the future. The design of the Proposed Modification has addressed each of the sustainable development principles and, on balance, it is concluded that the Proposed Modification achieves a significant overall benefit and sustainable outcome for the local and wider environment.

## 5.3 JUSTIFICATION OF THE PROPOSED MODIFICATION

### 5.3.1 Introduction

In assessing whether the development and operation of the Proposed Modification is justified, consideration has been given both to biophysical and socio-economic factors including the

predicted residual impacts on the local and wider environment and the potential benefits of the Proposed Modification. This section also considers the consequences of the Proposed Modification not proceeding.

### **5.3.2 Biophysical Considerations**

Section 4 presents a range of residual impacts on the biophysical environment that are predicted should the Mine continue to operate in the manner proposed and, after the adoption of a number of design and operational procedures and mitigation measures. The residual impacts considered of greatest significance, and the proposed management of these, are summarised as follows.

#### **Water Resources**

The excavation activities involved in the Proposed Modification carry the risk of damaging the lining or embankment of the TSF, which could potentially result in tailings or leachate leakage and consequential contamination of surface water and groundwater resources. Management and mitigation measures that would be implemented to control this risk and prevent associated impacts include excavating at minimum distances from the inner edge of the embankment and to maximum depths, backfilling of excavated cells, regular visual inspections, and maintaining accurate records of all activities. With these controls, the proposed activities would not pose a significant risk to the integrity of the TSF.

#### **Air Quality**

The Proposed Modification has the potential to generate dust whilst excavating, stacking, drying, and loading the tailings material, which may elevate levels of airborne pollutants and deposited dust at residential receivers surrounding the Mine Site. A range of management and mitigation measures would be implemented to limit these air quality impacts, including visual inspections, use of a water cart to suppress dust, shaping drying stockpiles to limit wind erosion, limiting or ceasing operations during windy conditions, and covering all loads. Considering these controls in conjunction with the moisture content of the tailings, it is unlikely that the Proposed Modification would cause significant additional dust emissions from the Mine Site.

### **5.3.3 Socio-economic Considerations**

The social and economic implications of the Proposed Modification are on balance overwhelmingly positive. The Proposed Modification would enable the continued efficient operation of the Tritton Copper Mine and consequently the continued distribution of the economic benefits of the Mine. While the modified operations would barely change local amenity or the local experience of the mining operation.

### 5.3.4 Consequences of Not Proceeding with the Proposed Modification

The consequences of not proceeding with the Proposed Modification relate principally to the lost operational efficiencies that are expected to be generated by the proposed activities described in Section 2.

Beneficial utilisation of tailings material is an essential component of the Applicant's efforts to increase the resource recovery and reduce the environmental impacts of mining operations. The use of this waste material to produce paste fill at the proposed Murrawombie Mine plant would enable the economic provision of geotechnical stability at that Mine's underground workings while increasing the recovery rate of available ore reserves. This process would also reduce the frequency with which the capacity of the TSF at Tritton Mine would need to be increased and reduce the amount of tailings stored at surface by the end of Mine life.

Exporting tailings to Murrawombie Mine would eliminate the potential traffic and environmental impacts associated with sourcing equivalent material for the proposed Paste Fill Plant there from more distant sources, while backloading the material from incoming ore deliveries would reduce or negate the need for additional truck movements. Without this source of material for the Paste Fill Plant at Murrawombie Mine, the Applicant would need to import material from more distant locations, potentially outside the Bogan Shire, resulting in reduced efficiencies and higher costs associated with transportation of the material.

If the Proposed Modification were not to proceed, each of these benefits being forgone. Minor changes to local amenity would be avoided in this scenario.

## 5.4 OBJECTS OF THE EP&A ACT

The objects of the EP&A Act are described in Section 1.3 of the Act as follows.

*The objects of this Act are as follows:*

- a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,*
- b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,*
- c) to promote the orderly and economic use and development of land,*
- d) to promote the delivery and maintenance of affordable housing,*
- e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,*
- f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),*
- g) to promote good design and amenity of the built environment,*

- h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,*
- i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,*
- j) to provide increased opportunity for community participation in environmental planning and assessment.*

The Proposed Modification would not limit the achievement of the object of the EP&A Act and would in effect assist with the achievement of objectives to:

- promote the social and economic welfare of the local community through the efficient and continued economic benefits of the operation;
- facilitate ecologically sustainable development through beneficial use of the tailings material; and
- promote orderly development of the copper resource at the Applicant's Murrawombie Mine through the use of paste fill as opposed to retaining ore columns for stability.

## 5.5 CONCLUSION

In light of the assessment presented throughout the *Environmental Assessment*, it is concluded that the Proposed Modification to the Tritton Copper Mine could be implemented and operated in a manner that would satisfy all relevant statutory goals and criteria, environmental objectives and reasonable community expectations.

This document has identified that the Proposed Modification would provide the following benefits.

- It would allow for the continued and more efficient operation of the Tritton and Murrawombie Copper Mines and through this provide the conditions under which the Applicant may:
  - develop safe underground mines that would maximize the recovery of copper-bearing ore;
  - produce a high quality copper concentrate; and
  - undertake all development and operations in a manner that complies with all relevant statutory requirements and minimizes the adverse impacts on the local environment throughout and beyond the operational life of the proposed project.
- It would enable beneficial use of tailings material from the TSF as an input to the Paste Fill Plant at Murrawombie Mine.
- It would facilitate the enhanced recovery of available resources at Murrawombie Mine by eliminating the necessity for ore pillars to provide geotechnical stability.

- It would reduce the frequency with which the TSF embankment would need to be lifted to increase capacity.
- It would eliminate the need to transport equivalent material from more distant sources.
- It would minimise, to the maximum extent practicable, the impact on the local environment and community and other stakeholders.
- It would satisfy sustainable development principles.
- It would continue to provide the benefits of employment, operational spending and royalties related to the continued production of copper concentrate within the Bogan Shire and the State of NSW.

## **6. REFERENCES**

**Heggies Pty Ltd (2007).** *Tritton Copper Mine Expansion Project - Air Quality Impact Assessment.*

**R.W. Corkery & Co. Pty Ltd (RWC) (1998).** *Tritton Copper Project Environmental Impact Statement.*

# Appendices

(Total No. of pages including blank pages =16)

- Appendix 1 TD1 Tailings Excavation, Tritton Mines,  
NSW, Operational Guidelines - prepared by  
CMW Geosciences June 2018 (12 pages)
- Appendix 2 DPE Correspondence dated 28 February  
2018 (4 pages)

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# Appendix 1

## TD1 Tailings Excavation, Tritton Mines, NSW, Operational Guidelines - prepared by CMW Geosciences June 2018

(Total No. of pages including blank pages = 12)

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7 June 2018

**TD1 TAILINGS EXCAVATION**  
**TRITTON MINES, NSW**  
**OPERATIONAL GUIDELINES**

Tritton Resources Pty Ltd  
Ref. PER2017-0066AD Rev0

Unit 19 Wembley Green Offices,  
127 Herdsman Parade, Wembley, WA 6014

[www.cmwgeosciences.com](http://www.cmwgeosciences.com)



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## Figures

Figure 1 – Site Plan

## Appendices

Appendix A – Drawings (1 No.)

## 1 INTRODUCTION

This report provides basic operational guidelines for the excavation of tailings from Tailings Dam 1 (TD1) at Aeris' Tritton Mines west of Nyngan near Hermidale in NSW. Tailings mined from within TD1 will be used in the proposed Girilambone pastefill plant. Figure 1 shows TD1 in relation to other infrastructure at Tritton.

The scope of this study included:

- Compile a report that provides recommendations on the mining of tailings from the TD1 for use as paste fill. Comment on the implications for the function of the TD1.
- Include a plan drawing showing the schematic operational plan for the TD1.

This report was commissioned by Dean Woods, Environmental Co-ordinator of Tritton Resources Pty Ltd by a purchase order 4500131769, dated 1 June 2018.

It should be noted that, the tailings excavation proposal currently does not alter the design requirements as stated in the CMW (2018) Stage 6 and 7 embankment design report and does not have significant effect on tailings dam stability provided the operational aspects outlined in this document are adhered to. Any changes to the excavation criteria outlined in this document should be assessed by a specialist consultant. In addition, the proposal does not alter the DSC consequence category.

## 2 PROPOSED TAILINGS RECOVERY

The following summarises the proposed tailings recovery operations:

- In situ tailings dried material will be excavated from TD1 from designated excavation areas with the use of an excavator and loaded onto dump trucks.
- Dump trucks will cart the material to the designated storage area within the TD1 footprint. The designated storage area is an area with a naturally elevated floor level and located relatively close in proximity of the eastern embankment wall (refer to the drawing in Appendix A).
- The dumped piles of tailings material will be left for approximately 2 days for drying. The material should achieve a moisture content of less than 12% (wt/wt) before being deemed ready for loading and transport to the Girilambone site.
- An excavator will load the dried tailings material into haul trucks for transport. The desired moisture content will minimise dust generation during loading, transport and unloading activities whilst also ensuring the material is dry enough to avoid the material from liquefaction during transport.
- The haul trucks will unload the tailings material within the designated storage area at the proposed Girilambone pastefill plant storage area.

It is estimated that operations would occur over approximately 84 days per year which is roughly 1 campaign of 7 days per month. Tritton Mines will be aiming for an average of around 200,000 to 400,000 tonnes per year over the life of Murrawombie operations.

## 3 TAILINGS DAM DESIGN REVIEW

### 3.1 Geotechnical Considerations

The following issues were examined as part of the assessment:

- The location of the excavation in relation to the perimeter embankment and effect on stability overall embankment stability.
- The location of the excavation in relation to the perimeter embankment and effect on operations, in particular tailings beaching and water flow to the decant

In assessing the above issues, the stability assessments conducted as part of the design of Stage 6 and 7 Embankment raising of TD1 were reviewed. In these analyses, a worst case phreatic surface was assumed, with a pond near the perimeter embankment. The critical failure surfaces were adjacent to the embankment, that is, originating near the crest and exiting at the embankment toe or at the starter embankment crest level.

### 3.2 Drawing

A drawing is provided showing typical extents of the tailings recovery operation, refer Appendix A. The drawing shows the approximate extent of 1 year's operation, assuming 300,000t of tailings is recovered. Assuming a settled dry density of 1.5 t/m<sup>3</sup>, this equates to a borrow volume of 200,000m<sup>3</sup>. If the borrow has a depth of 1.5m, the borrow area required would be approximately 13.3ha or approximately 10% of the tailings storage area.

### 3.3 Recommendations

The following recommendations are made with respect to tailings recovery:

Prior to the use or placement of any equipment on the tailings beach the dried strength should be assessed. The recent probing indicated the presence of randomly located layers of 'soft' or low strength tailings.

- The excavation should be located a minimum of 35m from the upstream edge (inner edge) from the crest of the existing Stage 5 embankment.
- The excavation should be a minimum of 20m from the Stage 7 embankment (26m for Stage 6 embankment), as measured from the upstream crest in order to ensure water does not pond next to the perimeter embankments and allow for unimpeded future embankment construction.
- The excavations should not be continuous. It is a design requirement that an intact bund (i.e. unexcavated tailings) of a minimum width of 5m be provided at nominally 150m centres along the excavation. That is discrete borrow areas are developed.
- Excavation shall generally be parallel to the embankment alignment and the borrow depth should be a maximum of 1.5m.
- The batters on the excavation should be nominally 1:2 (v:h).
- Outlet drains from the borrows should be excavated at a level equal to half the borrows depth and be extended across the beach towards the decant area to remove water from the borrow cells as they are filled. The length of these drains will be determined by the beach slope and trafficability of the tailings.

### **3.4 Operation and design considerations**

In general, TD1 can be operated in accordance with the operating procedures outlined in the recent Stage 6 and 7 design report and the existing operations manual. In summary:

- Tailings in the form of slurry will be discharged sub-aerially and cyclically into the facility in thin discrete layers, not exceeding 0.3m thickness, in order to allow optimum density and strength gain by subjecting each layer to a drying cycle. Deposition will take place via multiple spigots located on the upstream perimeter embankment crest.
- Spigotting is to be carried out such that the supernatant pond is maintained in the vicinity of the submersible pumps. The pond is to be maintained away from the perimeter embankments at all times.

The following should be specifically performed in relation to the tailings recovery project:

- Tailings should be discharged preferentially into the borrow cells. An individual cell should be completely filled before progressing to the next cell. The tailings will settle in the cell and decant water will flow from the cell down a drainage channel to the decant area.
- Water should not be allowed to pond in the borrow area cells (i.e. near the perimeter embankment) following deposition. Decant water should flow via drains to the central decant area (i.e. away from the perimeter embankments).
- The borrow excavations should be backfilled with tailings well in advance of any normal cyclic deposition being undertaken in that area.
- An accurate plan of the location of borrow areas should be kept as well as the dates filling started and ceased.

## 4 REFERENCES

The following standards and references were used in the preparation of this report.

1. CMW Geosciences (2018), *'Raising of TD1, Stages 6 and 7, Tritton Mines, NSW, DSC Design Report'*, prepared for Tritton Resources Pty Ltd
2. New South Wales Dams Safety Committee (DSC), June 2012, DSC3F Guide, *'Tailings Dams'*

For and on behalf of  
CMW Geosciences Pty Ltd



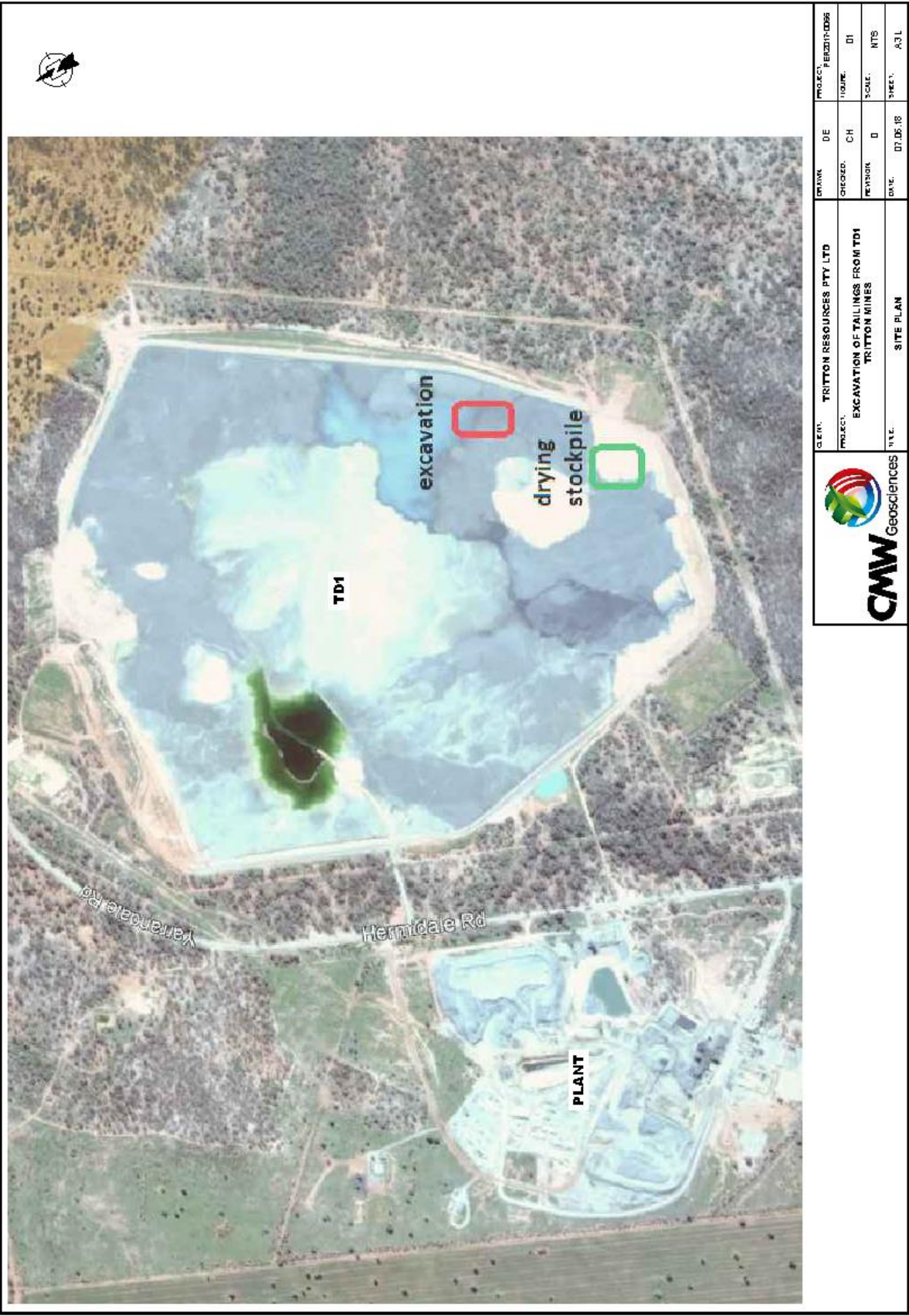
Christopher Hogg  
Principal Tailings Engineer

Reviewed by:

Ian Grieve  
Principal Consultant

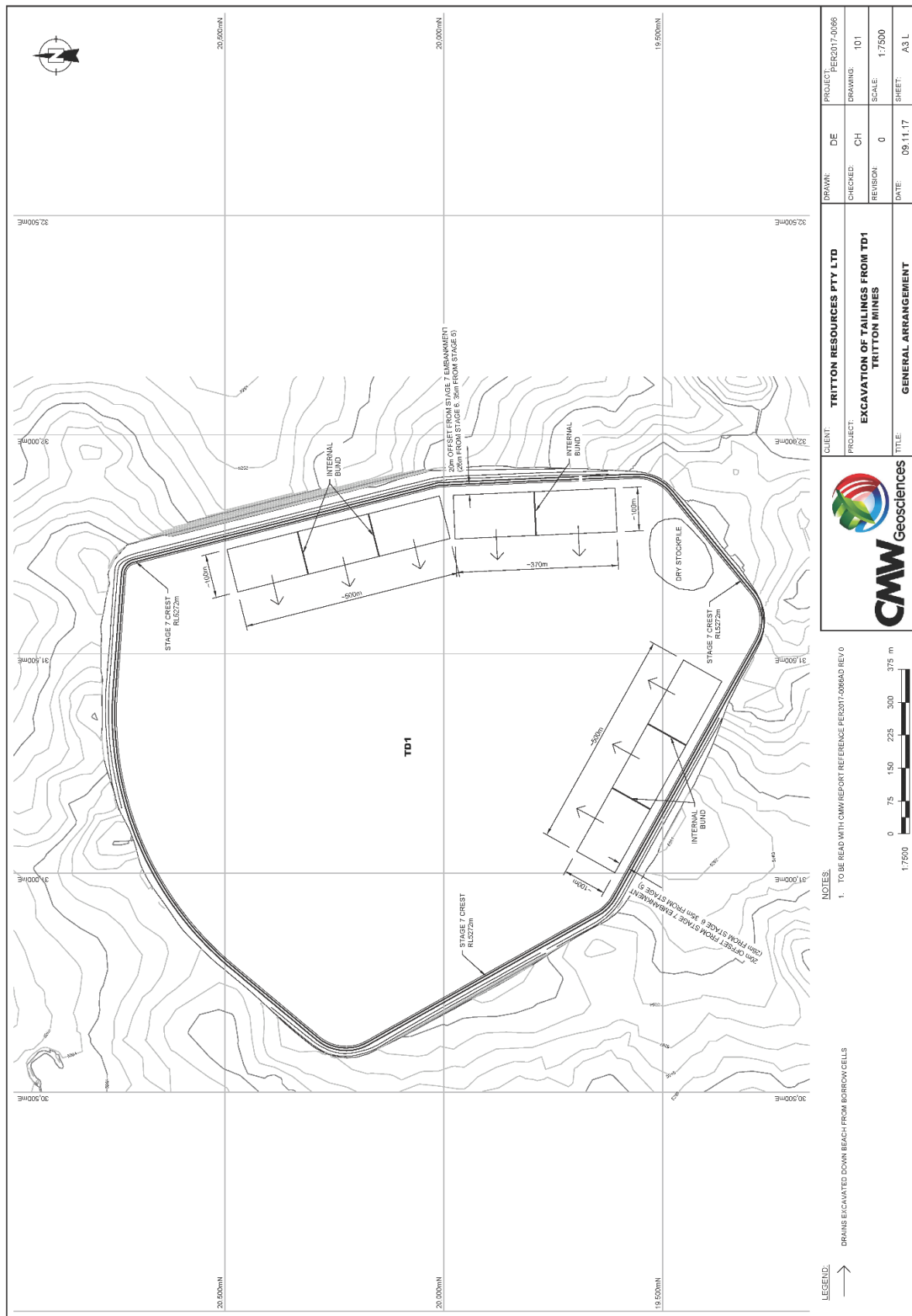
Distribution: 1 copy to Tritton Resources Pty Ltd (electronic) Original copy held by CMW Geosciences Pty Ltd

## Figures



## **Appendix A**

### **Drawings (1 No.)**



# Appendix 2

## DPE Correspondence dated 28 February 2018

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Planning Services  
Resource & Energy Assessments  
Contact: Phillipa Duncan  
Phone: 9274 6451  
Email: [phillipa.duncan@planning.nsw.gov.au](mailto:phillipa.duncan@planning.nsw.gov.au)

Mr Nick Warren  
Senior Environmental Consultant  
R.W. Corkery & Co.

Via email: [nick@rwcorkery.com](mailto:nick@rwcorkery.com)

Dear Mr Warren

**Tritton Copper Mine (DA 41/98)**

I refer to your letter dated 26 February 2018 on behalf of Tritton Resource Pty Ltd about a proposed modification to the Tritton Copper Mine.

The Department has reviewed the information you provided. I can advise you that the proposed modification to the project can be considered under the former Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Department will be in contact with you shortly to discuss the next steps.

If you wish to discuss the matter further, please contact Phillipa Duncan on (02) 9274 6451.

Yours sincerely

 28/2/18

Clay Preshaw  
Director  
Resource & Energy Assessments

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