TRITTON RESOURCES PTY LTD

ABN 88 100 095 494

Modification Report

for the

Tritton Copper Mine



Modification 9

Prepared by:

RWCorkery&co

December 2024

ACKNOWLEDGEMENT

R.W. Corkery & Co. acknowledge and pay our respects to the Traditional Custodians of the lands comprising NSW and Australia on which our projects are located. We appreciate the knowledge, advice and involvement of the Elders and extended Aboriginal community that contribute to our Projects and extend our respect to all Aboriginal and Torres Strait Islander peoples.

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Acronyms

Aeris	Aeris Resources Limited
AHD	Australian Height Datum
AQMS	Air Quality Monitoring Station
AWS	Automatic Weather Station
BC Act	*Biodiversity Conservation Act 2016*
BoM	Bureau of Meteorology
CORTN	UK Department of Transport's Calculation of Road Traffic Noise (CoRTN) algorithm
DA	Development Application
DECC	Department of Environment & Climate Change
DECCW	Department of Environment, Climate Change and Water
DPHI	NSW Department of Planning, Housing and Infrastructure
DPIRD	Department of Primary Industries and Regional Development
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning & Assessment Act 1979*
EPA	Environment Protection Authority
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
LEP	Local Environmental Plan
MAC	Muller Acoustic Consulting Pty Ltd
ML	Mining Lease
Mtpa	Million tonnes per annum
NAF	non-acid forming
PAF	potentially acid forming
POEO Act	*Protection of the Environment Operations Act 1997*
REAP	Registered Environmental Assessment Practitioner
RMP	Rehabilitation Management Plan
ROM Pad	Run-of-mine Pad
RWC	R.W. Corkery & Co. Pty Limited
SEPP	State Environmental Planning Policy
SSD	State Significant Development
TSF	Tailings Storage Facility

Executive Summary

This *Modification Report* 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 Tritton Mine). The Proposed Modification is intended to optimise aspects of the Tritton Mine for existing mining activities and to further integrate the mining operations at the Tritton Mine with the Company's other operations in the region.

The Applicant operates several distinct open cut and underground mines in the region that collectively make up the Tritton Copper Operations, each of which use facilities at the Mine Site for processing ore. The Applicant has also lodged a development application for the Constellation Copper Mine, a State Significant Development that would be located approximately 45km northeast of the Tritton Mine (see **Figure 1.1**). With plans for five mining operations in the region and mineral processing to occur at the Tritton Mine for each operation, it will be vital that the operations have a level of integration that permits efficient and safe mining. This would avoid the need to replicate mining infrastructure across those various operations, which would be expensive, duplicate environmental impacts and have a shorter useful life than might otherwise be possible.

Specifically, the Proposed Modification includes the following.

1. Increase to the storage capacity of the Tailings Storage Facility (TSF) through an increase to the maximum elevation of the structure from 272 meters (m) Australian Hight Datum (AHD) to 278mAHD.
2. An extension to the Mine life to allow for ongoing mining operations until 31 December 2036.
3. The export of tailing material to all mines within the Tritton Copper Operations (currently only permitted to the Murrawombie Copper Mine) and increase to the limit on export to 500,000tpa.
4. The receipt of waste material from all mines within the Tritton Copper Operations for disposal in the existing Tritton landfill (currently only permitted from the Murrawombie Copper Mine and North East Copper Mine).
5. Increase the annual processing rate from 1.4 million (M) tonnes per annum (tpa) to 1.8Mtpa.
6. Increase the volume of mined material that is permitted to be accepted at the Mine Site from 1.0Mtpa to 1.8Mtpa. Material to be received at the Mine Site would include both mineral ore for processing and suitable waste rock for use in construction or rehabilitation activities. Mined material may be received from any mine within the Tritton Copper Operations.
7. Increase in the total area used for stockpiling of NAF (non-acid forming) waste rock through extension of the existing NAF waste rock stockpile within previously disturbed areas of the Mine Site.

The Proposed Modification is being made under Section 4.55(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act), as it is considered that the Proposed Modification would

remain "substantially the same development" as the Project as of January 2019. The consent authority for the modification application will be the Minister of Planning and Public Spaces (or their delegate).

The Applicant's objectives for the Proposed Modification are as follows.

1. Integrate the Constellation Copper Mine into the existing Tritton Copper Operations
2. Increase operational efficiency at the Tritton Copper Operations.
3. Improve post-mining outcomes through importation of materials for rehabilitation.

The objectives of the Proposed Modification would be able to be achieved without any additional disturbance of land that has not already been approved for mining-related disturbance. Furthermore, other than the expansion of NAF waste rock stockpiling capacity, and the increase in height of the TSF, the objectives of the Proposed Modification would not require any changes to existing or additional infrastructure and/or services. The Proposed Modification would result in a minor increase in the total heavy vehicle movements from the Mine Site to the Hermidale Rail Siding. However, it should be noted that the Proposed Modification does not include the transport of mined materials from other mines within the Tritton Copper Operations, as approval for, and assessment of the relevant environmental impacts are held by the 'source' mining operations.

The residual environmental impacts of the Proposed Modification considered of greatest significance are summarised as follows.

Air Quality

The proposed additional haulage on internal haul roads, the construction of the additional lifts of the TSF, and the increased processing rate have the potential to result in increased dust emissions from the Mine Site. An Air Quality Impact Assessment was prepared for the Proposed Modification to model and compare the existing and approved operations to those under the Proposed Modification. The results of the Air Quality Impact Assessment show that the Proposed Modification would not result in any significant changes to the local air quality amenity for the Mine Site and would not result in any exceedances of any relevant air quality related criteria for the Mine.

Noise

The proposed additional haulage on internal haul roads, the construction of the additional lifts of the TSF, and the increased processing rate have the potential to result in increased noise emissions from the Mine Site. A Noise Impact Assessment was prepared for the Proposed Modification to model and compare the existing and approved operations to those under the Proposed Modification. The assessment also considered the potential for changes to the existing road noise setting from the despatch of concentrate from the Mine Site. The results of the Noise Impact Assessment show that the Proposed Modification would not result in any significant changes to the local noise amenity for the Mine Site, including the approved product haul route, and would not result in any exceedances of any relevant noise related criteria for the Mine.

Visibility

The Proposed Modification would result in an increase in the elevation of the TSF, and an increase in the total area of NAF material stockpiled, and therefore would have the potential to change the existing visual amenity in the vicinity of the Mine Site.

Based on the relative isolation of the Mine Site and the proposed visual amenity related controls, it is considered that the Proposed Modification would not result in significantly visual amenity impacts. It is noted that the Proposed Modification would not include the construction of any novel landforms, rather the proposed elements would be constructed against the backdrop of an existing mine site that has operated for over 20 years.

Traffic and Transport

Several elements of the Proposed Modification involve changes to the existing traffic and transportation environment. However, the principal impacts associated with the Proposed Modification would be a minor increase in heavy vehicle movements between the Mine Site and the Hermidale Rail Siding. Notwithstanding the above, the daily experience of traffic levels using that section of Yarrandale Road is not expected to be impacted, as the proposed increases would not impact on the current daily peak traffic levels.

From a cumulative perspective, the combined traffic generation associated with the Tritton Copper Operations would continue to be minor. Yarrandale Road is infrequently used by light vehicles and peak traffic generation is not expected to change significantly. Yarrandale Road remains in good condition and has been constructed to suit the intended use. As a result, traffic-related risks under the Proposed Modification are expected to remain similar to existing operations. The Proposed Modification does not seek approval for the increased importation of mined materials to the Mine Site from other sources.

Evaluation of the Proposed Modification

The Proposed Modification presents an opportunity to further integrate operations at the Tritton Mine with the broader Tritton Copper Operations, principally with the proposed Constellation Copper Mine. The Proposed Modification would permit the Applicant to accommodate processing and waste management activities within the Mine Site over the life of the Constellation Mine and avoid the need to replicate these activities at the Constellation Mine Site. The includes raising the existing TSF rather than constructing a new TSF elsewhere. With the proposed integration of all of its existing operations, the Applicant can further improve operating efficiencies such as through improved transport management as well as waste management and disposal, ultimately avoiding environmental impacts. In addition, it is proposed to optimise existing approved operations to support planned processing activities and to improve preparations for rehabilitation of the Mine Site.

The Tritton Mine is currently an operating copper mine and the Proposed Modification would not require any changes to the existing and approved land uses within the Mine Site, nor require the disturbance of any lands not already approved for use for mining purposes. The Tritton Mine is considered suitable for the intended ongoing use. The Proposed Modification is in the public interest as it seeks the continued operation of the Mine in a safe and environmentally responsible manner and the provision of ongoing local economic benefits. The Proposed Modification and ongoing operations would be consistent with the aims of ecologically sustainable development as it would encourage the safe, efficient and environmentally responsible operation of the Mine

so that maximum benefit is achieved for the Applicant, the Bogan Shire Council, the local community and the communities of the future. The design of the Proposed Modification achieves a significant overall benefit and sustainable outcome for the local and wider environment without substantial additional environmental risk.

Implementation of the Proposed Modification, including the ongoing operation of the Mine to 2036, would have the following significant benefits to the local community within the Bogan Shire and NSW.

- Continued mining operations in a location that is separated from private residences and other sensitive and uses.
- Improved mining and operational efficiencies with no new surface disturbance and minimal additional environmental impact.
- Support for proposed and existing operations within the Tritton Copper Operations.
- The continued employment of personnel including the current 76% of staff whom reside in the Bogan Local Government Area and contribute to the diversity and sustainability of the region.
- The continued growth and distribution of the economic benefits of the Mine locally and regionally through the use of local services and businesses.
- The ongoing supply of copper to domestic and international markets that is consistent with the objectives identified in the NSW *Critical Minerals and High-tech Metals Strategy 2024-35* (DPIRD, 2024). The copper supply is essential to support growing demand for electricity transmission (supporting the decarbonisation of the power grid) and use in electric vehicles and the renewable energy sector.

The Applicant intends to remain a major source of employment and services in the Bogan Local Government Area. To do this, the mines within the Tritton Copper Operations will need to change. The Proposed Modification maintains and supports the existing operations at the Tritton Mine while also accommodating the proposed Constellation Copper Mine. It is considered that changes to local amenity or the local experience of the mining operation as a result of the Proposed Modification would be difficult to discern from existing approved operations. However, the social and economic benefits associated with the existing and proposed Tritton Copper Operations would continue to be substantial. It is therefore concluded that the proposed medication would firmly be in the public interest.

1. Introduction

1.1 Scope

This *Modification Report* 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 Tritton Mine). The Tritton Mine is located approximately 45km northeast of Nyngan and 22km southwest of Girilambone in western New South Wales (NSW) (the Mine Site). **Figure 1.1** provides an overview of the locality of the Mine Site and the surrounding mineral authorities.

The Applicant operates several distinct open cut and underground mines in the region that collectively make up the Tritton Copper Operations, each of which use facilities at the Mine Site for processing ore. These mines are shown on **Figure 1.1** and include the:

- Tritton Mine;
- Murrawombie Copper Mine;
- North East Copper Mine; and
- Avoca Tank Copper Mine.

The Applicant has also lodged a development application for the Constellation Copper Mine, a State Significant Development that would be located approximately 45km northeast of the Tritton Mine (see **Figure 1.1**).

With plans for five mining operations in the region and mineral processing to occur at the Tritton Mine for each operation, it will be vital that the operations have a level of integration that permits efficient and safe mining. This would avoid the need to replicate mining infrastructure across those various operations, which would be expensive, duplicate environmental impacts and have a shorter useful life than might otherwise be possible. The Proposed Modification is intended to optimise aspects of the Tritton Mine for existing mining activities and to further integrate the mining operations at the Tritton Mine with the Company's other operations in the region.

Specifically, the Proposed Modification includes the following.

1. Increase to the storage capacity of the Tailings Storage Facility (TSF) through an increase to the maximum elevation of the structure from 272 meters (m) Australian Hight Datum (AHD) to 278mAHD.
2. An extension to the Mine life to allow for ongoing mining operations until 31 December 2036.
3. The export of tailing material to all mines within the Tritton Copper Operations (currently only permitted to the Murrawombie Copper Mine) and increase to the limit on export to 500,000tpa.
4. The receipt of waste material from all mines within the Tritton Copper Operations for disposal in the existing Tritton landfill (currently only permitted from the Murrawombie Copper Mine and North East Copper Mine).
5. Increase the annual processing rate from 1.4 million (M) tonnes per annum (tpa) to 1.8Mtpa.

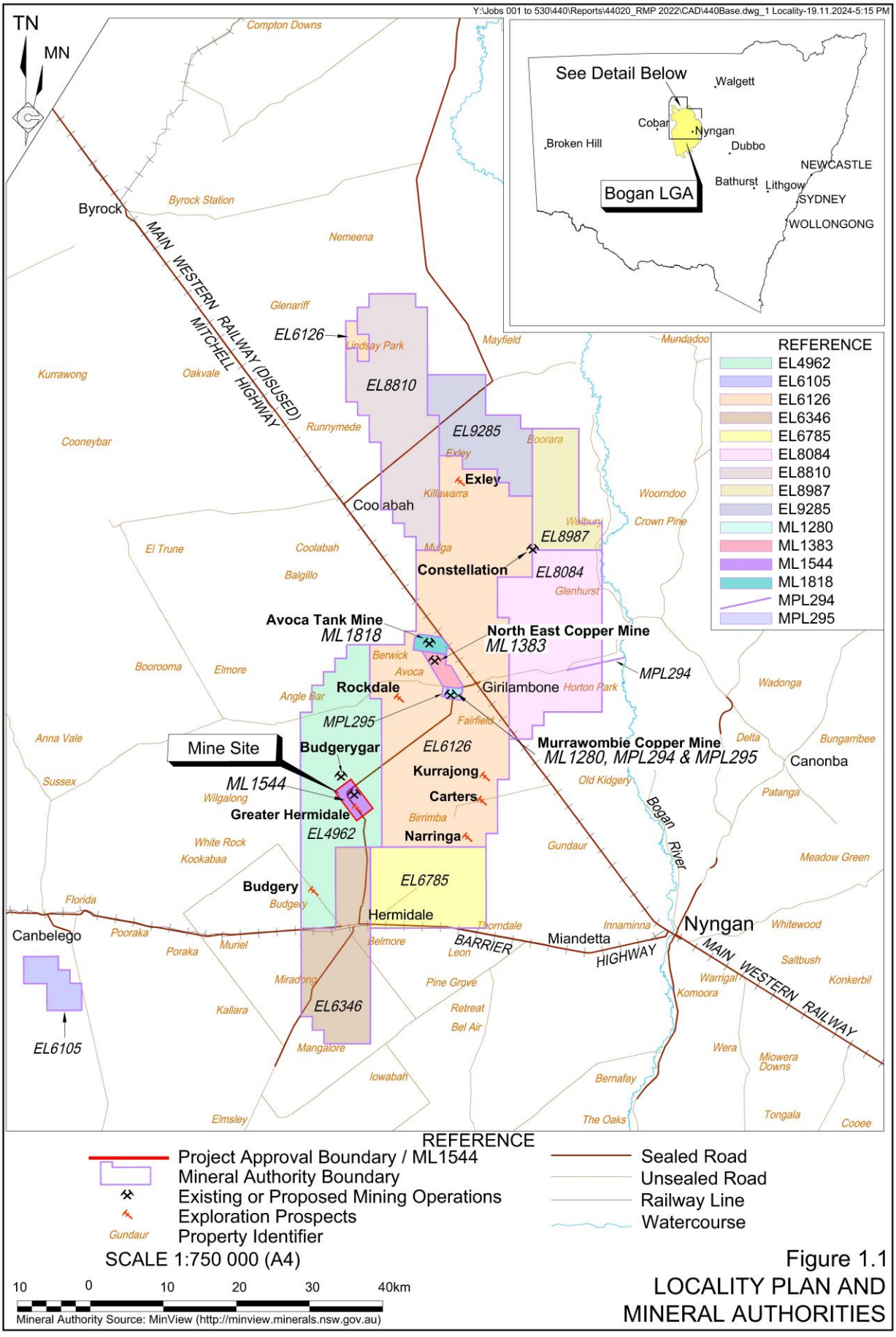


Figure 1.1
LOCALITY PLAN AND MINERAL AUTHORITIES

6. Increase the volume of mined material that is permitted to be accepted at the Mine Site from 1.0Mtpa to 1.8Mtpa. Material to be received at the Mine Site would include both mineral ore for processing and suitable waste rock for use in construction or rehabilitation activities. Mined material may be received from any mine within the Tritton Copper Operations.
7. Increase in the total area used for stockpiling of NAF (non-acid forming) waste rock through extension of the existing NAF waste rock stockpile within previously disturbed areas of the Mine Site.

To avoid any doubt, approval for the transport of materials between the other mines within the Tritton Copper Operations to or from the Tritton Mine would remain with the other mines. Copper concentrate is despatched from the Tritton Mine to the Hermidale rail siding via Yarrandale Road.

The Proposed Modification is being made under Section 4.55(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act), as it is considered that the Proposed Modification would remain "substantially the same development" as the Project as of January 2019. The Project was approved in September 1999 as a State significant development under Part 4 of the EP&A Act. The Project has subsequently been modified eight times including under the now repealed Section 75W of the EP&A Act (pursuant to Clause 8J of the *Environmental Planning and Assessment Regulation 2000*). In accordance with Schedule 2 Section 3BA(6)(b) of the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017*, the Proposed Modification will need to remain "substantially the same" as the Project as last modified under the now repealed Section 75W of Part 3A. Therefore, the modified consent as of MOD6 which was approved in January 2019 is the Project against which the test for "substantially the same" is applied. An evaluation of the Proposed Modification under Section 4.55(2) of the EP&A Act is provided in Section 7.2. The consent authority for the modification application will be the Minister of Planning and Public Spaces (or their delegate).

In addition to DA 41/98, the Mine also operates in accordance with Mining Lease (ML) 1544, Environment Protection Licence (EPL) 11254 and various water access licences and bore licences. The Proposed Modification would require variation to ML 1544 and EPL 11254. No changes to water use or management are proposed.

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 DA 41/98, as approved.

1.2 Background

The Tritton Mine was approved by the NSW Minister for Urban Affairs and Planning in September 1999 and since that time it has become a key part of the Applicant's hub and spoke operating model, with the Tritton Mine receiving and processing ore mined from the wider Tritton Copper Operations. The Applicant intends to operate and manage the proposed Constellation Copper Mine as part of the Tritton Copper Operations and therefore the development application for the proposed Constellation Copper Mine includes the following proposed integration with the Tritton Mine.

- Despatch of up to 1Mtpa of mined ore from the Constellation Mine Site to the Mine Site via the public road network.

- Processing of mined ore at the Tritton Processing Plant, including deposition of tailings material within the Tritton TSF.
- Despatch of copper concentrate produced from ore mined from the Constellation Copper Mine to the existing rail siding at Hermidale for further transportation by rail.
- Transport of tailings material from the Mine Site to the Constellation Mine Site for use as paste fill to support underground mining operations.
- Disposal of certain waste material from the Constellation Copper Mine within the Tritton Landfill.

The Constellation Copper Mine presents an opportunity for continued copper mining in the region, with up to 12.0Mt of ore to be generated through open cut and underground mining methods. Successful integration with the Constellation Copper Mine would require modification to DA41/98 to permit the above activities.

Due to forecast overlaps in production from the existing and proposed mines within the Tritton Copper Operations, the Applicant has identified that an increase in the maximum annual processing rate, as well as an increase in the volume of material that can be accepted at the Tritton Mine Site is required. Consequently, a modification to the approved production and transportation limits to 1.8Mtpa is also being sought.

The Applicant recognises the benefits that may come from the management of waste rock resources as a construction material and for use in rehabilitation. While detailed plans for closure of the TSF will be prepared closer to closure of the facility, the Applicant is pre-emptively seeking approval to permit the receipt of mined waste rock at the Mine Site. The material may be NAF waste rock or other waste rock for which material characterisation has validated its use for construction activities. Other materials may be transferred to the Tritton Mine for use in rehabilitation activities, as needed. The material would be sourced from active mining operations, for example from the pending cutback of the Murrawombie Open Cut, or other locations within the Tritton Copper Operations. In order to accommodate the additional NAF waste rock that would be temporarily stored at the Mine Site (until closure in 2036), the Applicant is also seeking to allow for increased stockpiling capacity within the existing disturbance area of the Mine Site. Any other materials that would be used in rehabilitation, such as for final landform development would not be stockpiled, but would be used immediately and managed to avoid environmental risks (such as through encapsulation).

The Applicant intends to remain a major source of employment and services in the Bogan Local Government Area. To do this, the mines within the Tritton Copper Operations will need to change as some are depleted and others change their role in supporting other operations. The Proposed Modification maintains and supports the existing operations at the Tritton Mine while also accommodating the proposed Constellation Copper Mine in a manner that avoids replicating mining infrastructure that exists at the Mine Site. As production is depleted at the other mines within the Tritton Copper Operations, the Constellation Copper Mine would replace ore sources for processing at the Tritton Copper Mine. The use of existing infrastructure and better integration of mining processes and waste management would improve the efficiency of mining and avoid safety risks associated with constructing and using a new TSF or other large infrastructure. The Applicant is also taking the opportunity to enable better rehabilitation planning outcomes by permitting the transfer of waste rock resources between operations including the Mine Site.

1.3 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 has a diverse portfolio of operational and development assets in Australia, including: the Tritton Copper Operations (see Section 1.4) in NSW, and the Cracow Gold Operations and North Queensland Copper Operations in Queensland, the Jaguar Operations in Western Australia and the Stockman Project in Victoria. Aeris has an experienced Board and management team focused on operational excellence and strengthening the Company's corporate structure.

The Tritton Copper Operations produce approximately 20,000t of copper concentrate and copper cement annually. Tritton Copper Operations also has a strong pipeline of development projects as well as advanced exploration projects.

As a major employer to the local community, the Applicant has continued to provide employment directly through a large locally-resident workforce, or via engagement of local sub-contractors from Nyngan, Hermidale and Girilambone townships or by prioritising sourcing of required materials from local businesses.

The Applicant recorded a total workforce of 404 staff at year end 2023. Of the 404 staff, 76% reside locally and contribute to the community of Nyngan, whist 24% are staff that travel from elsewhere and reside locally during their rostered working period. The Applicant has been actively working towards increasing "local region" employment and believes this is one of the best ways the business can contribute to the community. Since 2012, employment within the local region has increased from 50% to 76% currently, and the Applicant is now contributing more than $49 million each year in salary and wages to the local regions of Nyngan, Hermidale and Girilambone.

1.4 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 2.4. The Mine Site is bisected by Yarrandale Road, the principal road between Girilambone and Hermidale.

1.5 Existing Mining Operations

1.5.1 Tritton Copper Operations

The Applicant owns and operates several mining operations in the vicinity of the Mine Site and the Girilambone village collectively referred to as the Tritton Copper Operations (see **Figure 1.1**). The principal metalliferous resource for the Tritton Copper Operations is copper, however relatively minor volumes of gold and silver ore have been mined and processed over the life of these mines. For the purposes of this document, references to copper ore include any other lawfully mined metalliferous ores.

From inception, the Mine has been developed and operated as the core of the Applicant's regional Hub-and-Spoke model for the Tritton Copper Operations. While each of the Applicant's operations are distinct, they are interconnected, mainly through the use of processing facilities at the Mine Site and shared operational and environmental management practices. The Murrawombie Copper Mine operates as the "base" operations for mining at the Murrawombie, North East, and Avoca Tank Copper Mines, which in turn, is intrinsically linked to operations at the Mine Site. The Applicant is approved to receive up to 1Mt of copper ore at the Mine Site each year that has been sourced from its other operations. The operations also share similar environmental settings and risks including geological and aquifer (groundwater) features that have resulted in similarities in management approach and experiences including for rehabilitation.

The Applicant controls several exploration licences and mining leases in the vicinity of the Mine Site. Further information on the Applicants regional development strategy is presented in Section 2.2.

1.5.2 Tritton Copper Mine

1.5.2.1 Approvals and Licences

Approval for the Mine was granted under DA 41/98 on 1 September 1999 by the then Minister for Planning and Urban Affairs. **Table 1.1** outlines the existing development approvals for the Mine.

Table 1.1
Tritton Copper Mine Existing Development Approvals

Approval	DA Number	Grant Date	Expiry Date	Purpose of Approval
Development Consent	DA 41/98	01/09/1999	21/2/2028	Original Tritton Project Development Approval.
Development Consent	DA 30/2004	20/12/2004	None	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	None	Expansion of the administration facilities at Tritton.
Development Consent	DA 2010/006	25/05/2010	None	Construction of a Paste Fill Plant for the Tritton underground mine.
Development Consent	DA 2010/028	04/11/2010	None	Construction of a Communication Tower at Tritton.
Development Consent	DA 10/2019/021/001	15/01/2020	None	Construction and use of Water Pipeline
Development Consent	CDC2021/002	06/04/2021	None	New Telecommunication Tower
Source: Tritton Resources Pty Ltd				

DA 41/98 has been modified eight 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 NAF waste rock stockpile 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 TSF and ancillary infrastructure.
- MOD 5 (7 April 2015) – to permit an increase in the height of the NAF waste rock stockpile , importation of ore material, and exportation of waste rock.
- MOD 6 (30 January 2019) – to permit the excavation and export of tailings from the TSF for use in the Paste Fill Plant at the Applicant's Murrawombie Copper Mine.
- MOD 7 (12 October 2021) – to permit the construction of two ventilation rises to support underground exploration activities.
- MOD 8 (8 June 2022) – to permit underground mining of 2.6Mt of copper from the Budgerygar deposit, installation of surface infrastructure, increase the NAF waste rock stockpile height by 10m, additional disposal of drill cuttings within the TSF, and an extension of the mine life to 21 December 2028.

Other relevant leases and licences include the following.

- Mining Lease (ML) 1544
- Environment Protection Licence (EPL) 11254.
- Various Water Access Licences and Bore Licences presented in **Table 1.2**.

Table 1.2
Water-Related Approvals for the Tritton Mine

Works Approval(s)	Details	Water Access Licence (WAL)	Share components (ML/year)	Water Sharing Plan
80WA716055	Excavation	WAL31041	304	Lachlan Fold Belt MDB Groundwater Source
80WA716044	1 bore, 1 excavation	WAL31090	30	Lachlan Fold Belt MDB Groundwater Source
80WA702816	2 pumps	WAL9374	705	Macquarie and Cudgegong Regulated Rivers Water Source
80WA702816	2 pumps	WAL9375	210	Macquarie and Cudgegong Regulated Rivers Water Source
80WA702816 and 80CA701324	2 pumps	WAL9940	16	Macquarie and Cudgegong Regulated Rivers Water Source

1.5.2.2 Overview of Operations

Activities approved under DA 41/98 include the following.

- Extraction of a total of approximately 12.83Mt of copper ore using underground mining techniques.

- Importation of no more than 1Mt of ore material in a calendar year for processing at the Mine.
- Construction and use of a NAF waste rock stockpile to a maximum height of 30m above the natural surface or approximately 301.5m AHD.
- Processing of on-site and imported ore to produce a copper concentrate.
- Construction and use of a TSF.
- Export of no more than 30,000 tonnes of waste rock from the Mine in a calendar year, generally for the purposes of local road construction and maintenance.
- 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.
- Export of tailings for paste fill operations at the Murrawombie Copper Mine.
- Receipt of drill cuttings at the Mine Site (no more than 50 laden heavy vehicle loads per calendar year).
- Construction and use of a range of ancillary infrastructure including water management dams and multiple ventilation rises.
- Operation until 21 December 2028.

It should be noted that transportation of ore materials to the Mine Site for processing is approved under development consent for the source of the materials. DA41/98 permits despatch of copper concentrate from the Mine Site to the rail siding at Hermidale.

Figure 1.2 presents an overview of the layout of the Tritton Copper Mine, including but not limited to the following infrastructure.

- Box cut and decline
- Run-of-Mine (ROM) Pad
- Crushing and Screening Plant
- Surge Stockpile
- NAF waste rock stockpile
- Processing Plant
- Settling Pond
- TSF
- Administration and Workshop
- Paste Fill Plant
- Process Water Ponds
- Ventilation fans

Figure 1.3 presents the transport routes used between the Mine Site and the other mines within the Tritton Copper Operations and the route between the Mine Site and the rail siding at Hermidale.

Ore is mined from the existing underground operations, with the majority of waste rock used to backfill underground workings. Any excess NAF waste rock is stockpiled at surface within the NAF waste rock stockpile for eventual use in rehabilitation. Ore is processed using flotation, with tailings discharged to the TSF or used to produce paste fill that is pumped underground to support mining operations. Approximately 15-30% of tailings are used in paste fill production, reducing the space required in the Tailings Storage Facility.

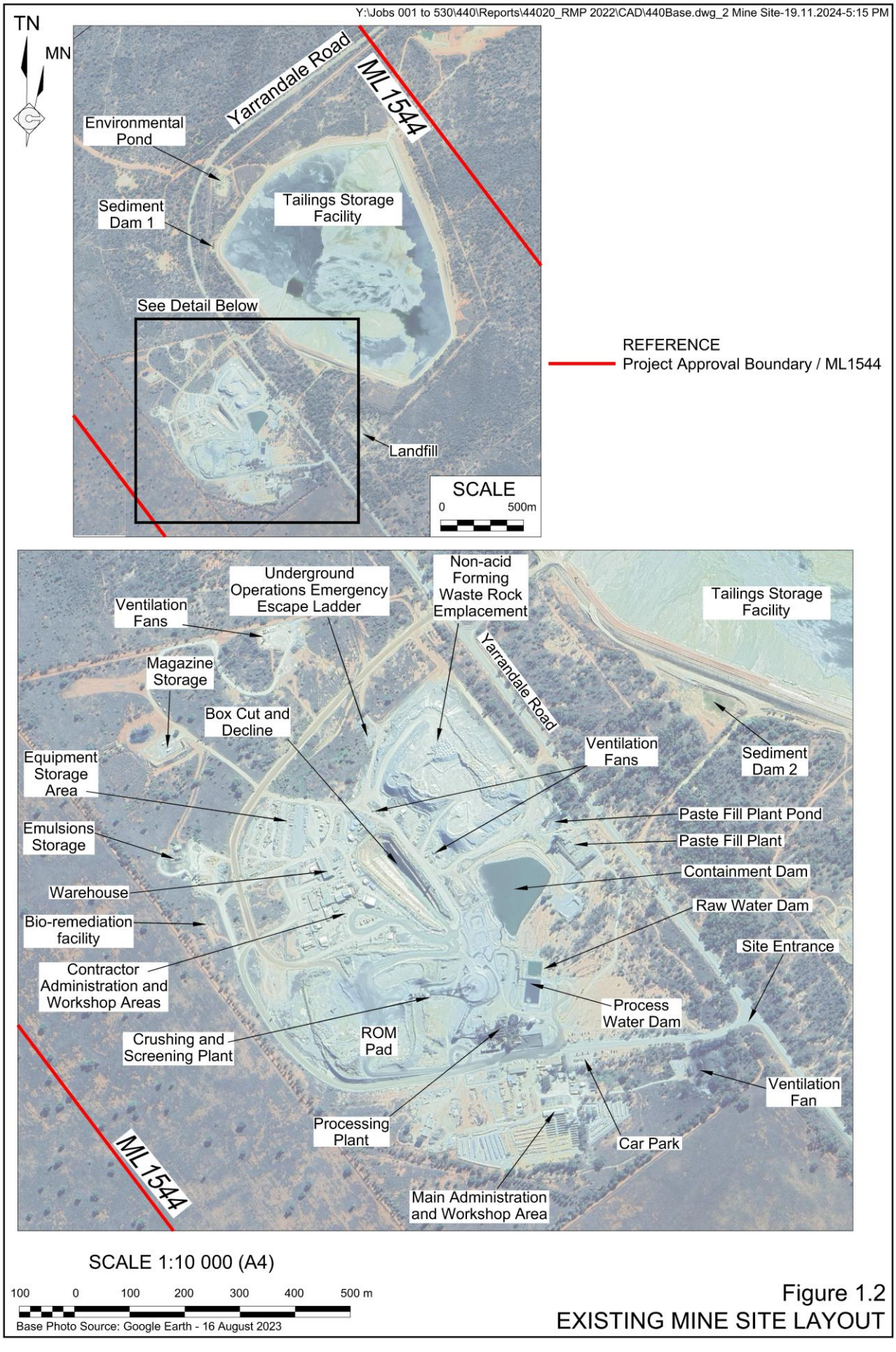
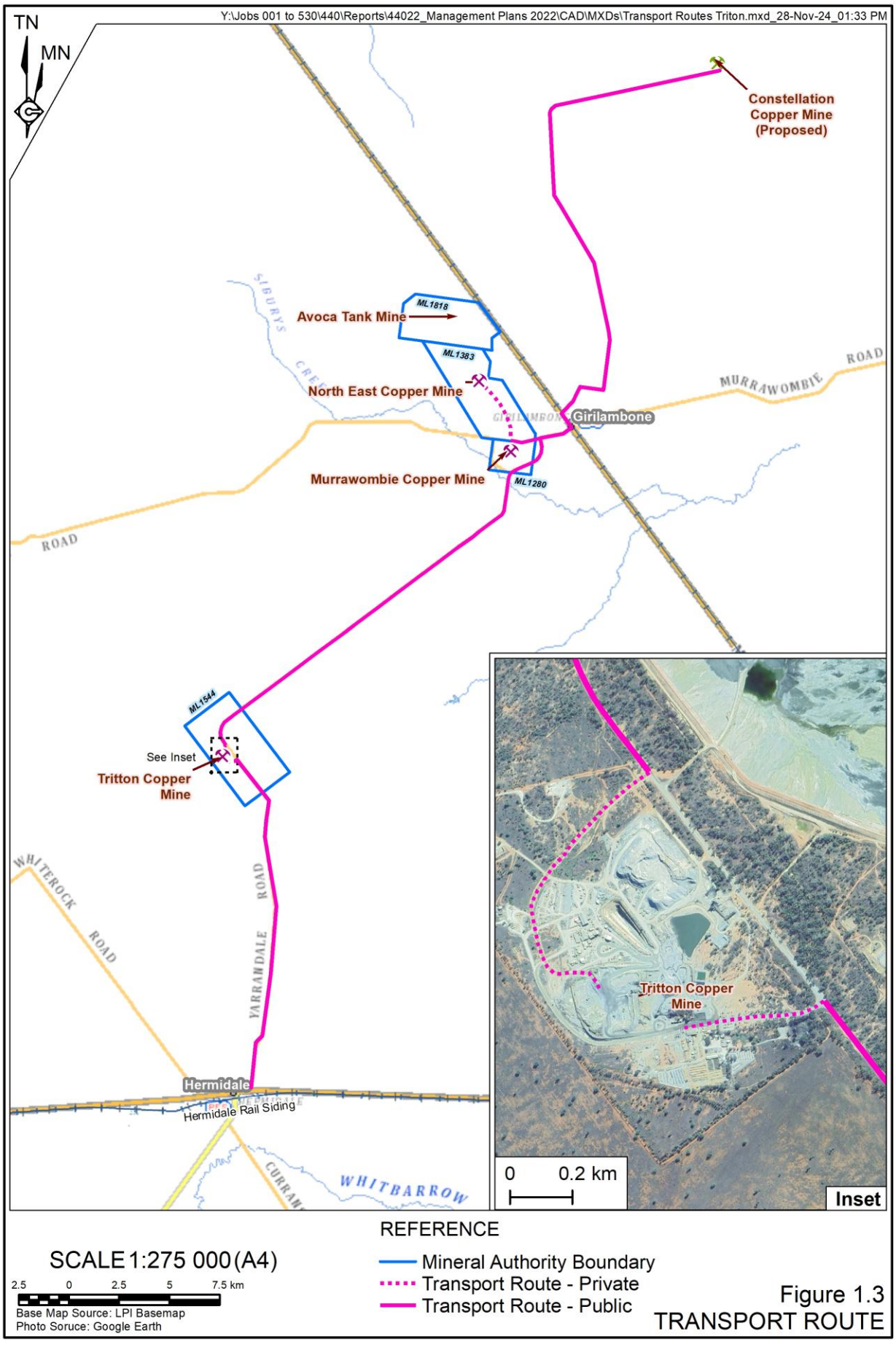


Figure 1.2
EXISTING MINE SITE LAYOUT


Y:\Jobs 001 to 530\440\Reports\44022_Management Plans 2022\CAD\MXDs\Transport Routes Triton.mxd_28-Nov-24_01:33 PM
TN
MN
Constellation Copper Mine (Proposed)
Avoca Tank Mine
ML1818
ML1383
North East Copper Mine
Girilambone
Murrawombie Copper Mine
ML1280
MURRAWOMBIE ROAD
ROAD
ML1544
See Inset
Tritton Copper Mine
WHITEROCK ROAD
YARRANDALE ROAD
Hermidale
Hermidale Rail Siding
WHITBARROW
0 0.2 km
Inset
REFERENCE
Mineral Authority Boundary
Transport Route - Private
Transport Route - Public
SCALE 1:275 000 (A4)
2.5 0 2.5 5 7.5 km
Base Map Source: LPI Basemap
Photo Soruce: Google Earth
Figure 1.3
TRANSPORT ROUTE

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

Concentrate produced by the processing plant at the Mine is placed in sealed shipping containers. These containers are transported via Yarrandale Road to the Hermidale rail siding (see **Figure 1.3**). From the siding, the containers are transported by rail to Newcastle for export to countries commonly including China, India, Japan, Korea or the Philippines.

1.6 Interaction with Other Approved Mining Operations

The interactions between the existing and proposed activities for the Mine with the other mines within the Tritton Copper Operations are outlined in **Appendix 2** and can be summarised as follows.

- **North East Copper Mine** – The North East Copper Mine is approved to export ore material (no limit) to the Murrawombie Copper Mine.
- **Avoca Tank Copper Mine** – The Avoca Tank Copper Mine is approved to export ore material (no limit) to the to the Murrawombie Copper Mine.
- **Murrawombie Copper Mine** – The Murrawombie Copper Mine is currently approved to receive ore material (no limit) from the Avoca Tank and North East Copper Mines.

  The Murrawombie Copper Mine is approved to receive 265,000tpa of tailings material for the production of paste fill to support underground mining operations.

  The Murrawombie Copper Mine is approved to export 1Mtpa of ore material to the Tritton Mine for processing.
- **Proposed Constellation Copper Mine** – The current application for the proposed Constellation Copper Mine includes scope for transportation of up to 1Mtpa of ore to the Tritton Mine over a period of 10 years (total mine life of 16 years).

The following modifications to approved and proposed Tritton Copper Operation mines may be sought by the Applicant to further integrate current operations with the Mine.

- **North East Copper Mine** – A modification to DA6/95 to allow for the transportation and receipt of exported tailings material from the Mine to the North East Copper Mine.
- **Avoca Tank Copper Mine** – A modification to DA10/2015/004/001 to allow for the transportation and receipt of exported tailings material from the Mine to the Avoca Tank Copper Mine.
- **Murrawombie Copper Mine** – A modification to DA1/91 to permit export of >1Mtpa of ore material to the Mine for processing, and the associated increase in truck movements.

1.7 Document Format

The *Modification Report* is structured in **eight** sections and a set of **seven** appendices, as follows.

Section 1: introduces the application with a summary of the scope and background as well as introduction the Applicant and the existing approved Mine and mining operations.

Section 2: provides an overview of the strategic context for the Proposed Modification including a summary of the project need, the Applicant's regional strategy and consideration of regional and strategic planning documents. A review of the local land use context is also provided.

Section 3: presents the Proposed Modification in detail and outlines the approvals required, describes the proposed modifications and compares the current operation with the proposed operation.

Section 4: presents the statutory context for the development including review of relevant legislation, policies and guidelines at various levels of Government.

Section 5: presents various stakeholder engagement activities that have occurred and the outcomes of engagement including information received.

Section 6: presents the outcomes of assessment of key environmental issues including existing management measures that are implemented and the need for additional measures and monitoring.

Section 7: evaluates and justifies the Proposed Modification and presents a conclusion to the *Modification Report*.

Section 8: presents a reference list for the various source documents referred to for information and data used during the preparation of the *Modification Report*.

Appendices: the following documents are referred to throughout the *Modification Report*.

Appendix 1: Updated Project Description – Tritton Copper Mine

Appendix 2: Tritton Copper Operations Approval Matrix

Appendix 3: *CMW Preliminary Engineering Designs for TSF*

Appendix 4: *Tailings Extraction Report*

Appendix 5: Approved Rehab Objectives Statement for ML1544

Appendix 6: Air Quality Impact Assessment – Todoroski Air Sciences (November 2024)

Appendix 7: Noise Impact Assessment – Todoroski Air Sciences (November 2024)

1.8 Management of Investigations

The preparation of this document has involved a study team managed by Mr Nicholas Warren, M.Env.Sc., M.Bus, B.Sc. Principal Environmental Consultant. Mr Warren is a Registered Environmental Assessment Practitioner (REAP) in NSW (Registration Number 1876). He has been assisted by Dr Grace Scullett-Dean, PhD, B.Sc., Environmental Consultant, and Mr Michael Fake, M.Sc., B.Sc., Environmental Consultant both with RWC.

Information concerning the existing and proposed operations was provided by the following personnel from Tritton Resources.

- Ms Gemma Brown (BSc.; B.Soc.Sc) – Principal Environment and Mine Closure with Aeris Resources
- Mr Dirk McNicoll (BSc (Hon)) - Environmental Superintendent for the Tritton Copper Operations
- Ms Cordelia Smart (M.Eng.Sc., B. Eng.) - Senior Environmental Advisor for the Tritton Copper Operations.
- Mr Shae Martin (BAppSc(HumMove), AdvDip WHS) HSET Manager for the Tritton Copper Operations.

Specific environmental investigations have been undertaken to assess the potential environmental impacts of the Proposed Modification. The relevant studies have been appended to this document and are referenced throughout. These studies, the responsible consultancy and the relevant personnel are as follows.

- Todoroski Air Sciences Pty Ltd – Noise and Air Quality Impact Assessment (Philip Henschke, Atmospheric Physicist)

2. Strategic Context

2.1 Project Need

Copper and silver are identified in the NSW *Critical Minerals and High-tech Metals Strategy 2024-35* (DPIRD, 2024) as strategic minerals that are vital for a range of future industries in NSW such as renewable energy, advanced manufacturing and technology enabled primary industries and defence and aerospace industries. With declining ore reserves globally, demand for both copper and silver are expected to outstrip global supply. Copper demand in NSW is expected to double by 2035 which is driven by the renewable energy transition but also for industries such as advanced manufacturing, battery technology, defence and aerospace as well as technology-enabled primary industries (DPIRD, 2024).

Copper is essential to improve the living standards globally. For example, one tonne of copper is estimated to contribute:

- functionality to 40 cars;
- power to 100,000 mobile phones;
- enable operations in 400 computers; and
- distribute electricity to 30 homes.[1]

Copper mining supports a significant proportion of mining activity and employment in regional NSW; since 2019, NSW copper production has averaged 200,000 tonnes per annum (DPIRD, 2024). The Tritton Operations are a key producer of copper within NSW, with approximately 20,000tpa of total copper produced each year. Concentrate produced at the Mine is principally exported to China, India, Japan, Korea and the Philippines. The operation of the Mine results in significant benefits to the Applicant, its shareholders, and employees as well as the local community and State and Federal Governments. As a major employer to the local community, the Applicant has continued to provide employment and use of local services either directly, via engagement of local sub-contractors from Nyngan, Hermidale and Girilambone townships, or by prioritising sourcing of required materials from local businesses.

The activities included in the Proposed Modification would result in increased capability for the Applicant to manage current and future operations in the most cost effective and efficient manner possible, as well as ongoing employment and increased certainty for the Applicant's employees, contractors, and suppliers, as well as those businesses and individuals that rely upon the flow on effects from the Applicant's overall operations.

2.2 Aeris Resources Regional Development Strategy: Geology, Resource, and Exploration

2.2.1 Regional Geology and Resource Significance

The Girilambone Copper Province located to the west and northwest of Nyngan is a significant regional geological resource. Copper was first discovered in the region in 1875, and since that time numerous economic copper deposits have been discovered, including the Tritton,

[1] See https://internationalcopper.org/sustainable-copper/about-copper/copper-an-essential-resource/

Budgerygar, Girilambone district (Murrawombie, Larsen, North East, Avoca Tank), Great Hermindale, Bonnie Dundee, Budgery, Constellation and Kurrajong deposits (Fogarty, 1998). Ongoing exploration and mining activity continues to provide a source of economic stimulus to the region.

The Girilambone Copper Province is located in the western section of the Lachlan Fold Belt and is hosted within the Narrama Formation of the Girilambone Group, a sequence of Ordovician flysch sediments and medium-grained quartz rich greywackes, regionally metamorphosed to quartz-chlorite-sericite schists (Simpson et al., 2023). This sequence extends from as far south as Wagga Wagga, and extends to the north of Girilambone. Copper mineralisation is spatially associated with mafic units, and mafic volcanics occur within a regionally extensive, stratabound belt. Primary mineralization in the region is polymetallic, consisting of pyrite, chalcopyrite, chalcocite, sphalerite and galena, with Cu >1%, Au <0.5g/t and Ag generally at <20 g/t (Fogarty, 1998).

2.2.2 Regional Exploration and Project Development

Aeris' regional exploration tenements are shown on **Figure 1.1**. The Aeris tenement package covers about 2,330km^2 of the Girilambone Basin. Aeris, including its associated companies, predecessors, and joint venture partners have led exploration in the vicinity of the Mine Site since 1993. More than 750,000 tonnes of copper have been discovered on the Aeris tenement package since modern exploration commenced in the 1980s. Successful and ongoing exploration programs have resulted in the development of the mines referred to as the Tritton Copper Operations and have identified multiple additional local and regional deposits, as shown on **Figure 1.1**.

The Constellation copper deposit, located approximately 45km north east of the Mine Site is the latest project to have progressed to the point of mine development. The development application for the proposed Constellation Copper Mine (SSD 41579871) was submitted for assessment in August 2024 and the Applicant is currently preparing a response to the matters raised in submissions and comments received by the Department of Planning, Housing, and Infrastructure (DPHI). The proposed Constellation Copper Mine includes several components that would integrate with the Murrawombie Copper Mine and the Mine.

Multiple other exploration targets in the vicinity of the Tritton Copper Operations show potential for development as satellite deposits, similar to the Applicants existing and proposed operations. This includes but is not limited to the Kurrajong and Budgery deposits, located approximately 20km to the east and 15km south of the Mine Site, respectively (see **Figure 1.1**).

The Applicant's long-term plan for the Mine is to continue to operate as an underground mining operation while progressively incorporating mined ore from other sources to support these operations as a regional processing hub. Funded largely by existing continued mining operations, the Applicant endeavours to identify and realise the economic potential of the region's mineral resources, while building upon the foundations of the success of their current operations.

2.3 Regional Strategic Planning

2.3.1 Bogan Shire Council Community Strategic Plan 2032

The Bogan Shire Council Community Strategic Plan 2032 (the Bogan Strategic Plan) aligns Council's strategic planning with the Bogan LGA community's expectations, aspirations and needs for the Bogan Shire. The Bogan Strategic Plan identifies specific strategies relating to various goals associated with five key areas for the community: social, infrastructure, environmental, economic, and civic leadership. While the Tritton Copper Operations do not influence civic leadership, the operations contribute to the achievement of the community's strategic goals in a variety of ways. The following sections identify how the Proposed Modification would contribute to the relevant strategies under the remaining four goals.

Goal 1 – Social

The strategy highlights the need for an inclusive community that works together and is able to access services and opportunities to support comfortable country living. The Proposed Modification would be consistent with the following strategic direction.

- Strategy 1.4.2 - Provide support and encouragement for local people to obtain work in Bogan Shire after completing tertiary education.

  The Proposed Modification would ensure the continued and additional employment of local community members for an additional 8 years, during which time the Applicant can continue regional exploration projects to identify further resources and additional employment opportunities.

Goal 2 – Infrastructure

The strategy highlights the need to construct and manage reliable and efficient community assets that provide access to quality services. The Proposed Modification would be consistent with the following strategic direction.

- Strategy 2.2.1 – Encourage increased use of rail for transporting agricultural and mining products.

  The Proposed Modification would not impact on existing transport networks and would continue to support the Cobar Branch of the Main Western Line.

Goal 3 – Environment

The strategy highlights the need to "support, enhance and preserve the environment of our shire through sound planning and management practices to ensure a sustainable, healthy and safe community. The Proposed Modification would be consistent with the following strategic directions.

- Strategy 3.2.2 – Operate Bogan Shire waste facilities to comply with standards and regulations.

  The Proposed Modification would reduce reliance on LGA waste infrastructure and minimise land use conflicts through reducing new landfills.

- Strategy 3.3.5 – Protect, preserve and enhance Bogan Shire's natural environments, waterways, flora and fauna through responsible development and management.

  The Proposed Modification would not result in disturbance of additional land. Similarly, the Proposed Modification would not result in additional or significant biodiversity, groundwater, surface water, air quality or other impacts.

Goal 4 – Economic

The strategy highlights the need for "*a vibrant local economy with a diversity of successful businesses that provide local employment opportunities and contribute to a prosperous community*". The Proposed Modification would be consistent with the following strategic directions.

- Strategy 4.1.1 – Support and promote our local business and industry, to identify gaps and develop initiatives for sustainable economic growth and local employment opportunities.

  The Proposed Modification would ensure that the Mine can continue to operate and utilise local suppliers and businesses for sourcing of required materials for an additional 8 years.

- Strategy 4.1.3 – Work in conjunction with mining companies to obtain mutual benefit from an abundance of natural mining resources which provide our shire with opportunities for local economic growth and employment.

  The Proposed Modification would ensure that the steady inflow of economic stimulus delivered to the local community would continue for an additional 8 years, during which time the Applicant can continue regional exploration projects to identify further resources.

2.3.2 Central West and Orana Regional Plan 2041

The *Central West and Orana Regional Plan 2041* published by the now DPHI in December 2022 sets out the NSW Government's blueprint for the future of the Central West and Orana Regions to 2041. The Plan covers an area including Nyngan and Condobolin in the west, Cowra in the South, Oberon and Lithgow in the east and Coonamble and Coonabarabran in the north. The Plan identifies four goals, each with multiple sub-goals or directions, as follows. The following also identifies how the Tritton Copper Operations would contribute to the achievement of the relevant goals and objectives of the plan.

Part 1 – Region-shaping investment

The Plan identifies that the Central West and Orana will benefit from significant region-shaping investment through projects such as the Parkes Special Activation Precinct, renewable energy projects, major transport investment and interest in other infrastructure and mining projects, including the emerging critical minerals sector. The Proposed Modification would be consistent with the following objectives.

- Objective 3: Sustainably manage extractive resource land and grow the critical minerals sector.

  The Proposed Modification would ensure that the Mine can continue to operate uninterrupted in a manner which maximises the use of existing mine-related personnel and plant to produce Copper as a critical mineral.

- Objective 4: Leverage inter-regional transport connections.

  The Proposed Modification would provide continued use of the Cobar Branch of the Main Western Line, supporting critical regional transport infrastructure and reducing reliance on heavy vehicles on public and state roads.

Part 2 – A sustainable and resilient place

The Plan identifies that the Regions have some of Australia's most unique ecosystems which also have significant Aboriginal cultural importance. The Proposed Modification would represent the most efficient use of the land already approved to be disturbed within the Mine Site and would not result in any additional disturbance. The Proposed Modification would be consistent with the following objectives.

- Objective 5: Identify, protect and connect important environmental assets.

  The Proposed Modification would not result in disturbance of additional land. Similarly, the Proposed Modification would not result in additional or significant groundwater, surface water, air quality or other impacts.

- Objective 7: Plan for resilient places and communities

  The Proposed Modification would not result in disturbance of any areas affected by natural hazards.

- Objective 8: Secure resilient regional water resources

  The Proposed Modification would not result in additional utilisation of water resources and would maintain current water recycling practices within the Mine Site.

- Objective 9: Ensure site selection and design embraces and respects the region's landscapes, character and cultural heritage.

  The Proposed Modification would not result in disturbance of additional land nor impacts on additional items of Aboriginal heritage.

Part 4 – Prosperity, productivity and innovation

The Plan identifies that while Central West and Orana is traditionally anchored in agriculture, manufacturing and mining, the region's health, education and tourism sectors present opportunities for economic growth. Growth across these sectors must be carefully managed and planned to ensure land uses are compatible and contribute to the region's ongoing prosperity.

The Proposed Modification would be consistent with the following objectives.

- Objective 18: Leverage existing industries and employment areas and support new and innovative economic enterprises.

  The Proposed Modification would ensure that the steady inflow of economic stimulus delivered to the local community would continue for an additional 8 years, during which time the Applicant can continue regional exploration projects to identify further resources.

- Objective 20: Protect and leverage the existing and future road, rail and air transport networks and infrastructure.

  The Proposed Modification would not impact on existing transport networks and would continue to support the Cobar Branch of the Main Western Line.

2.3.3 Western Plains Regional Economic Development Strategy

The *Western Plains Regional Economic Development Strategy – 2023 Update* relevantly aims to capitalise on the growth potential of the mining sector to boost economic development of the Region. The Strategy identifies mining as an 'engine' industry in the Region and that growth in the mining sector will likely increase demand in the construction, manufacturing, professional, scientific and technical services and transportation sectors. Six of the seven major private investment projects identified in the Strategy since 2018 are critical mineral mining (including the Tritton Copper Operations) or renewable energy projects which rely in part on a steady supply of critical minerals. The Strategy identifies that the region has strong exploration potential for metalliferous mining, and that continued exploration and approval of new mines and mine expansion projects can support long term growth in the sector. It is noted that the Strategy explicitly identifies the "existing copper mine in Bogan" as a target for supporting approvals; the Tritton Copper Operations are the only copping mining operations in the Bogan LGA.

The Proposed Modification would enable the Applicant to continue to provide significant economic and social benefits to the Bogan LGA and wider Western Plains Region.

2.3.4 Economic Development Strategy for Regional NSW

The *Economic Development Strategy for Regional NSW* published by the Department of Trade and Investment, Regional Infrastructure and Services aims to drive economic growth in regional NSW. The Strategy covers all of regional NSW, encompassing all industries and sectors within the State, with mining highlighted as one of the key drivers of economic growth. The Strategy identifies five high level goals encompassing twenty-three actions for Governments. The following identifies those areas where the Strategy provides strategic support for the Proposed Modification.

Goal 1 – Promote key regional sectors and regional competitiveness

The Strategy highlights the mining industry as one of the top three contributors to Gross Regional Product, alongside manufacturing and healthcare and social assistance. The Proposed Modification would be consistent with the following actions.

- Action 1.2 – Increase the value of NSW's mineral industry and the energy sector.

  The Proposed Modification would help to increase the value of the NSW mineral industry by enhancing the Applicant's successful operations within the region and the continued support, employment and development of the Applicants' employees, contractors and suppliers.

Goal 2 – Drive regional employment and regional business growth

Regional employment and business growth is a key goal of the Strategy, with a number of Government actions and programs in place to support this goal. The Strategy identifies increasing the regional skill base to offset the effects of population decline as a key priority; in particular, the development of youth and Aboriginal employment outcomes.

- Action 2.1 – Promote regional job creation.

  The Proposed Modification would enable existing worker positions to continue uninterrupted, ensuring the continuation of flow-on economic effects of consistent employment levels.

- Actions 2.4 and 2.5 – Increase regional skills base and improve Aboriginal employment and business outcomes.

  The Proposed Modification would allow the Applicant to continue to employ apprentices and trainees and contribute to training programs for the local community, including the local Aboriginal community.

2.4 Land Ownership

Figure 2.1 presents land ownership in the vicinity of the Mine Site. Land within the Mine Site is freehold land owned by the Applicant and a private third-party with some Crown land comprising a Travelling Stock Route and the Yarrandale Road reserve. The Mining Lease Boundary is an administrative boundary. All mining activities occur on land owned by the Applicant. Access to the Mine Site is provided directly from Yarrandale Road.

The closest residences to the Mine Site are as follows.

- The "Emu" homestead, located approximately 4.3km north of the Mine Site.
- The "Wilga Downs" residence, located approximately 5.0km to 5.1km southeast of the Mine Site.

There is a reasonable separation distance or "buffer" from existing residences which reduces the risk of potential amenity impacts. The Mine Site has been present in the location since 1998 and is therefore well known to local landholders.

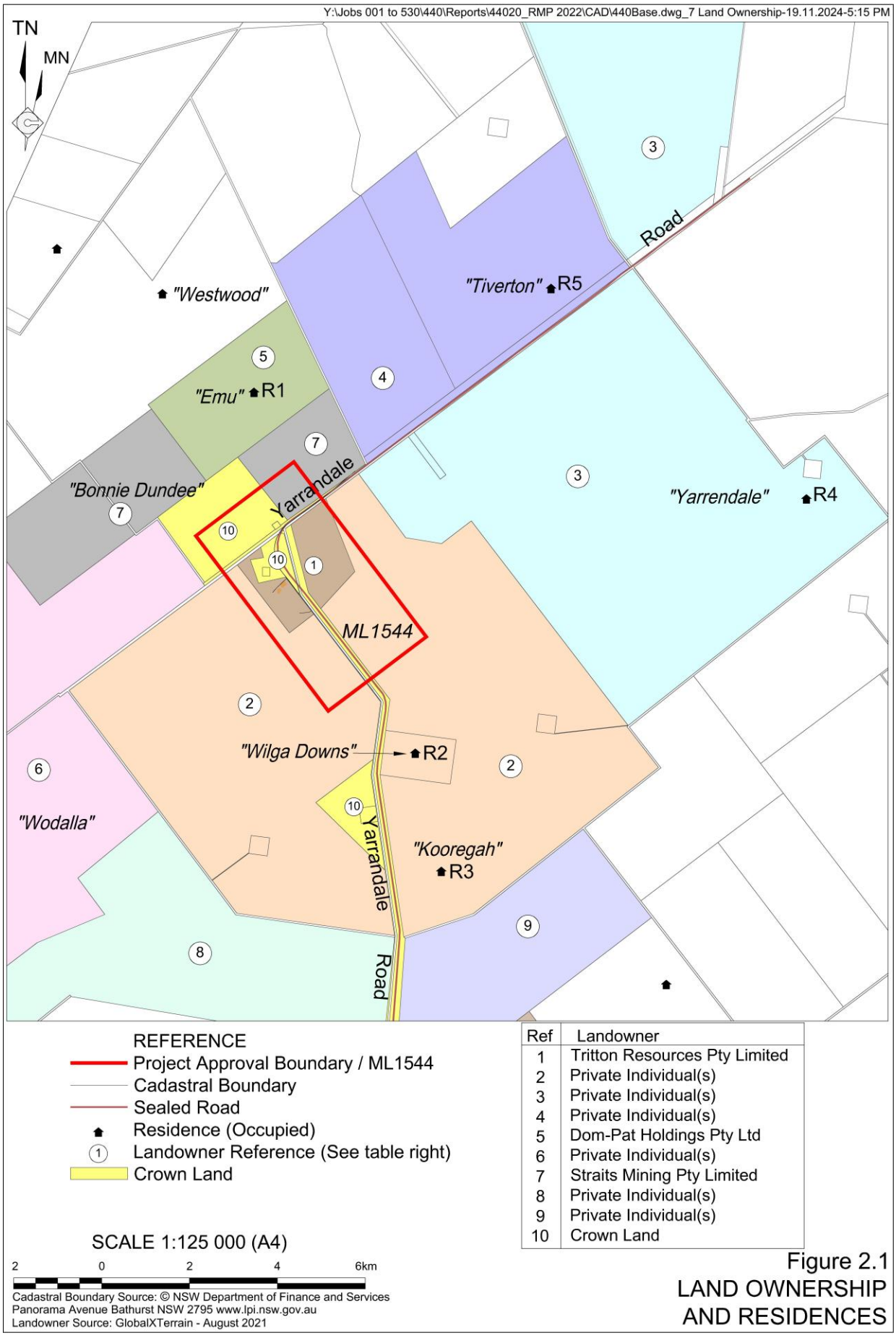


Figure 2.1
LAND OWNERSHIP
AND RESIDENCES

2.5 Land Uses

Figure 2.2 displays the range of land uses within and surrounding the Mine Site. These include mining activities and primary production which is principally comprised of intermittent wheat cropping and sheep or cattle grazing. No agricultural production is undertaken within the operational areas of Mine Site, noting that ML 1544 covers neighbouring agricultural areas.

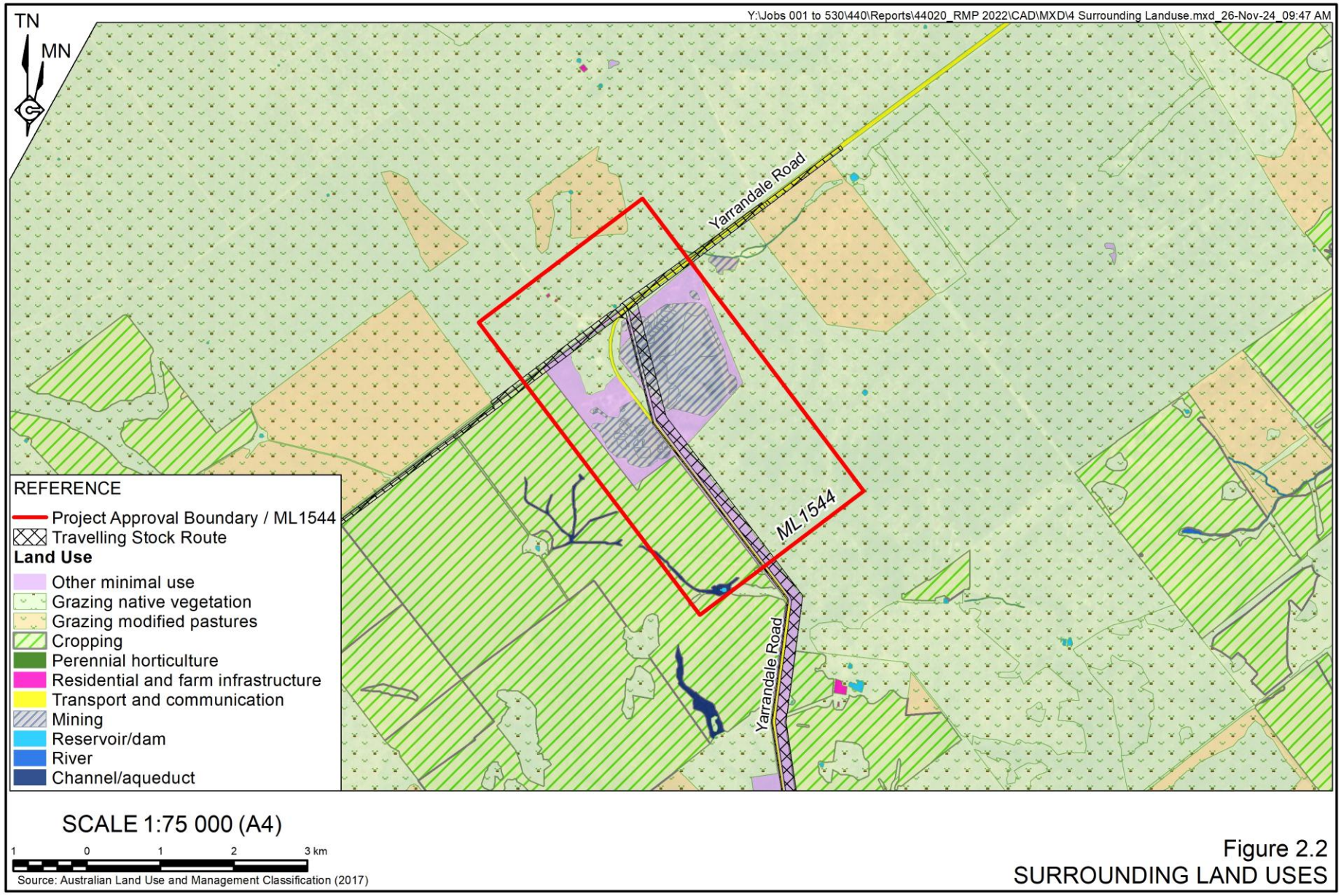


Figure 2.2
SURROUNDING LAND USES

3. Description of the Modification

3.1 Objectives

The Applicant's objectives for development of the Tritton Mine through the 2036 are to:

- continue to operate as an underground mining and processing facility for the approved Tritton and Budgerygar deposits;
- continue to operate as a regional processing facility for the Tritton Copper Operations;
- continue to provide consolidated ancillary mining and support activities for on and off-site mining operations, including:
  - management of processing and general waste materials, water and the despatch of mineral concentrate; and
  - return of tailing material for paste fill production to support economic underground mining;
- continue to work towards providing a safe, stable, and non-polluting landform that permits a suitable final land use for the Mine Site; and
- continue to provide significant economic and social benefits to the local and regional community.

In order to achieve the above, the Applicant's objectives for the Proposed Modification are as follows.

4. Integrate the Constellation Copper Mine into the existing Tritton Copper Operations
5. Increase operational efficiency at the Tritton Copper Operations.
6. Improve post-mining outcomes through importation of materials for rehabilitation.

3.2 Overview of the Proposed Modification

In order to achieve the Company's objectives for mining development through to 2036 it is proposed to modify the following.

1. Increase to the storage capacity of the Tailings Storage Facility (TSF) through an increase to the maximum elevation of the structure from 272 meters (m) Australian Hight Datum (AHD) to 278mAHD.
2. An extension to the Mine life to allow for ongoing mining operations until 31 December 2036.
3. The export of tailing material to all mines within the Tritton Copper Operations (currently only permitted to the Murrawombie Copper Mine) and increase to the limit on export to 500,000tpa.

4. The receipt of waste material from all mines within the Tritton Copper Operations (from within the Tritton Copper Operations) for disposal in the existing Tritton landfill (currently only permitted from the Murrawombie Copper Mine and North East Copper Mine).
5. Increase the annual processing rate from 1.4 million (M) tonnes per annum (tpa) to 1.8Mtpa.
6. Increase the volume of mined material that is permitted to be accepted at the Mine Site from 1.0Mtpa to 1.8Mtpa. Material to be received at the Mine Site would include both mineral ore for processing and suitable waste rock for use in construction or rehabilitation activities. Mined material may be received from any mine within the Tritton Copper Operations.
7. Increase in the total area used for stockpiling of NAF waste rock through extension of the existing NAF waste rock stockpile within previously disturbed areas of the Mine Site.

Table 3.1 presents an overview of the Proposed Modification compared to the 'baseline' as of MOD6 and the currently approved Project as of MOD8.

Table 3.1
Modified Project Summary Table

Element	Project as Approved Under MOD6	Approved Project (MOD8)	Proposed Modification (MOD9)
Project Components			
Duration of Approval (years)	Expires in 2024	Expires in 2028	Expires in 2036
Total Mining Disturbance Area (approx)	231ha	231ha	No change
TSF Stage and Elevation	272m AHD (Stages 1 – 7)	272m AHD (Stages 1 – 7)	278m AHD (Stages 8 – 10)
TSF Footprint	157.6ha	157.6ha	158.5ha
NAF waste rock stockpile Footprint (approx)	6.5ha	6.5ha	8.5ha
NAF waste rock stockpile Elevation	291.5m AHD	301.5m AHD	No change
Activities			
Processing Methods	Conventional Floatation/ Concentration	No change	No change
Importation of Ore	1Mt/year	1Mt/year	1.8Mt/year (combined)
Importation of Waste Rock	0Mt/year	0Mt/year	
Export of Tailings Material – Receiver Location	Murrawombie Copper Mine	Murrawombie Copper Mine	All Tritton Copper Operations (including Constellation Copper Mine)
Source of imported Class 1 and 2 Inert and Class 1 Solid Waste for disposal at Tritton Landfill[2]	Murrawombie and North East Copper Mine	Murrawombie and North East Copper Mine	All Tritton Copper Operations (including Constellation Copper Mine)
Production Rate[1]	1.4Mt	1.4Mt	1.8Mt
Heavy Vehicle Movements (concentrate despatch) – Annual Total	2,050 (cons)	2,050 (cons)	2,650 (cons)
Heavy Vehicle Movements (concentrate despatch) – Daily Average	10	10	No Change

Note 1: The total production rate at the Tritton Mine is comprised of copper ore generated at the Tritton Mine plus copper ore transported from outside the Tritton Mine.

Note 2: The classification of waste materials that are permitted to be imported to the Mine Site for landfilling are defined by condition L2 of EPL 11254.

The following subsections provide a description of the approvals required and the Proposed Modification. No other elements of the Project would be altered as a result of the Proposed Modification. An updated Project description is provided as **Appendix 1**.

Figure 3.1 presents the proposed Mine Site layout including the footprint of the TSF, the location of surface infrastructure and the NAF waste rock stockpile extension areas.

3.3 Approvals Required

Modification to DA41/98 would be required to permit the activities described in Section 3.2. A number of conditions within DA 41/98 may be modified. A detailed list of recommended conditional changes can be provided upon request, however, any change is at the discretion of the consent authority.

A variation to EPL 11254 would be required to update the Mine Site layout and to condition the import and disposal of material within the Tritton Landfill from alternative sources. All imported NAF waste rock would be managed as Virgin Excavated Natural Material.

Amendment to the approved Rehabilitation Outcome Documents under ML1544, namely the *Final Landform and Rehabilitation Plan*, would be required. Revision of the approved *Rehabilitation Objectives Statement* is not likely to be required, as the Proposed Modification would not significantly change the overall rehabilitation outcomes for the Mine Site.

Approvals associated with the transportation of materials to or from any other mine would be required to be attained by each relevant mining operation prior to any of the proposed activities being undertaken. **Appendix 2** presents an 'approval matrix' of the existing and proposed Tritton Copper Operations, which indicates the current status of approval for various activities across and between each mine.

3.4 Integration of Constellation Copper Mine

3.4.1 Proposed Increase to the Maximum Elevation of the Tailings Storage Facility

Existing Environment

The approved design of the TSF includes a maximum elevation of 272m AHD or approximately 18m from the natural surface at the highest point. The TSF is currently at Stage 7 (approximately 272m AHD) of seven approved stages.

Embankments are constructed using 'upstream' lifts. The upstream construction method increases total capacity with only minor increases in total area required (e.g. for buttressing). The current footprint area of the TSF is approximately 157ha, including the embankments. Tailings are transferred to the TSF and are discharged along the perimeter. Discharge location is varied to allow passive drying of the deposited tailings and to control the build-up of the tailings surface.

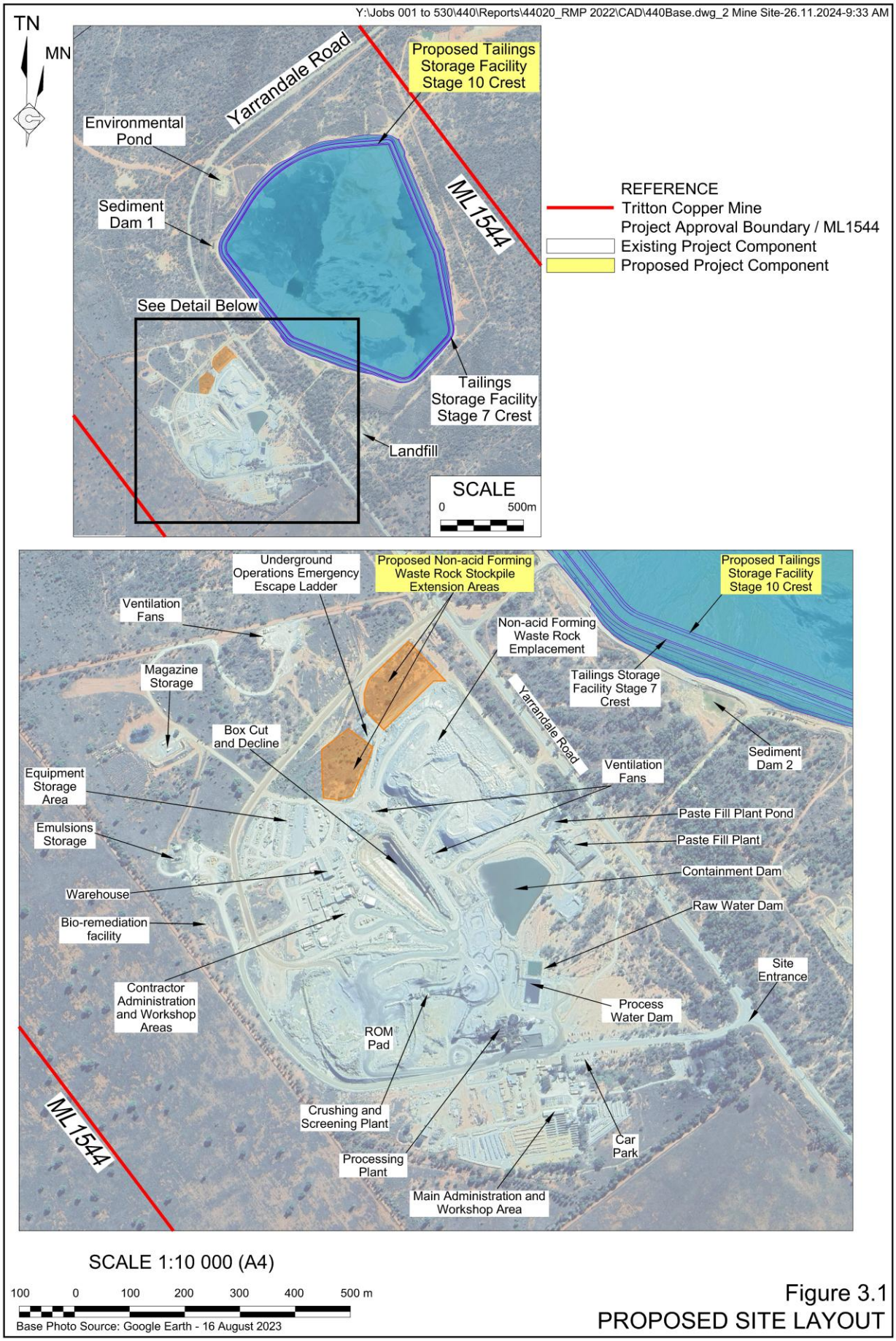


Figure 3.1
PROPOSED SITE LAYOUT

The Mine currently produces an average of approximately 1.3 million (dry) tonnes of tailings per year, of which approximately 0.3million (dry) tonnes are used for backfilling as paste fill and 1.0million (dry) tonnes are emplaced within the TSF. The Stage 7 raise of the TSF provides an additional storage capacity for approximately 4 million (dry) tonnes (to 272mAHD) or 2.6Mm^3 of tailings material based on an average dry density of 1.5t/m^3. It is estimated that the approved TSF has a remaining capacity of approximately 2Mt, with construction of the next stage expected to be required in July 2025.

It is noted that the maximum elevation of the TSF refers only to the maximum elevation of the embankment crest / upper surface of the deposited tailings. Allowance is made for any additional height required for capping and closure of the emplacement. The exact volume/thickness of capping material required for the TSF will be determined during preparation of the detailed/final capping designs closure to the cessation of processing operations.

Proposed Modification

The Applicant is seeking approval to **increase the maximum elevation of the TSF to 278m AHD**.

The proposed increase would provide sufficient capacity for forecast processing operations under the Proposed Modification, including the proposed increase in processing rate and acceptance of ore from the proposed Constellation Copper Mine.

Appendix 3 presents the preliminary engineering designs for the proposed TSF. In summary, the proposed increase would include three additional stages (Stage 8, 9 and 10) consisting of separate upstream lifts approximately 2m in height. Stages 8, 9 and 10 would provide an additional 10Mt or 7Mm^3 of storage capacity for tailings material based on an average dry density of 1.5t/m^3. At the proposed Stage 10, the TSF would have a total storage capacity of 19.5Mm^3. Based on forecast tailings production over the proposed life of Mine, the increased capacity of the TSF would be sufficient for 10 years production at the proposed processing rate of 1.8Mtpa.

The preliminary designs presented in **Appendix 3** include buttressing of certain embankment zones to support the proposed additional lifts. **Figure 3.2** presents the preliminary designs for the upstream lifts and the extent of the proposed buttressing. The maximum width of the buttressing from the base of the existing embankments would be approximately 6m. Minor adjustments to existing surface infrastructure would be required in some areas, including for access roads and surface water management infrastructure, as shown indicatively on **Figure 3.1**. Based on the preliminary designs, the proposed adjustments would be able to be made without any additional disturbance outside of the existing and approved limit of disturbance.

Material sourcing for the proposed additional lifts, including buttressing, would be consistent with the existing operations, with all materials sourced from on-site sources of NAF material, or from suitable off-site sources, depending on material requirements.

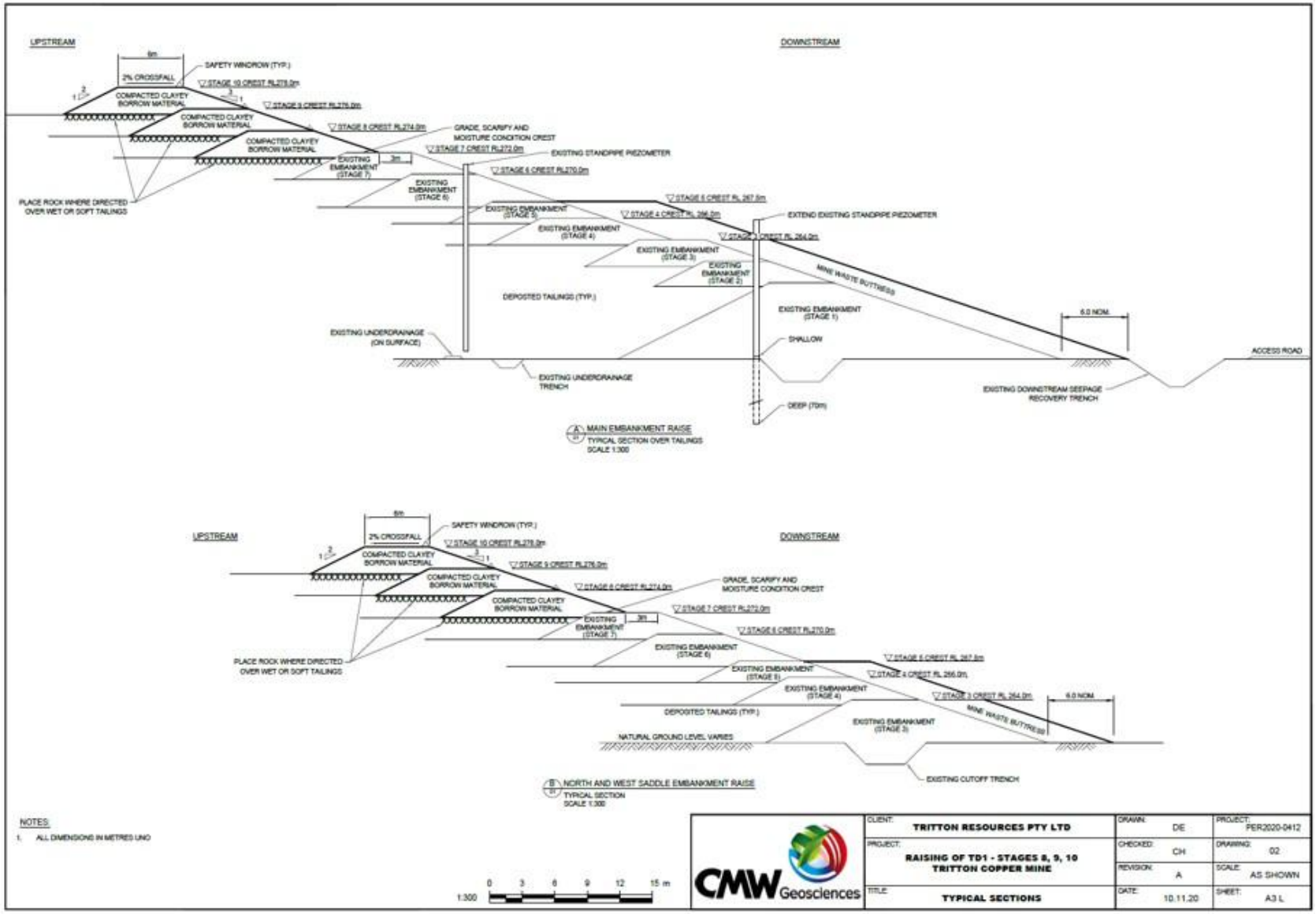


Figure 3.2 Preliminary Design for TSF Raise (Stages 8, 9 and 10)

3.4.2 Extension to the Mine Life

Existing Environment

Condition 3 of DA41/98 states that mining operations are approved to be undertaken until 21 December 2028. In addition, DA41/98 will continue to apply to all other aspects of the Project until rehabilitation of the site and any additional undertakings have been carried out satisfactorily.

Schedule 2 of DA41/98 defines "mining operations" as follows.

> *"Includes the removal and emplacement of ore and waste rock; the processing, handling and storage of ore and tailings on site; and the transport of ore concentrate and tailings offsite."*

Proposed Modification

The Applicant is seeking an **extension to the duration of mining operations until 31 December 2036**.

An increase in the Mine life is essential to support processing of the copper ore at the Mine Site that would be sourced from the proposed Constellation Copper Mine. The Constellation Copper Mine application proposes a maximum processing rate of 1Mtpa, that would be sourced from both open cut and underground mining. The anticipated life of the Constellation Copper Mine is 16 years, which includes an estimated 1-year construction period, ten years of mining operations and five years of decommissioning and rehabilitation activities. Assuming mining commences by 2026, the extension to the Mine life to 2036 would be sufficient to support processing operations for the Constellation Copper Mine.

The proposed extension to the duration of mining operations would not impact on the ability of the Applicant to undertake rehabilitation of the non-operational areas of the Mine Site as soon as reasonably practicable. In contrast, the extended revenue stream would ensure that sufficient skills and resources are available to the Applicant so that rehabilitation operations are more-effectively managed and implemented. In addition, the extended duration would continue to support local and regional exploration undertaken by the Applicant.

3.4.3 Increase to Limits and Inclusion of Additional Receivers for the Export of Tailings Material

Existing Environment

Up to 265,000tpa of tailings are approved to be exported from the Mine Site to the Murrawombie Copper Mine for use as paste fill. In accordance with DA41/98, the Applicant must prepare a Tailings Extraction Management Plan prior to the commencement of tailings excavation. Export of tailings material has not yet commenced.

Preparing tailings material for despatch may occur in two ways. Prior to despatch, tailings material may be excavated from cells within the TSF and temporarily stockpiled to reduce water content before being loaded onto road registered trucks for transport. The design of the extraction cells considers the minimum safe distance between each cell and the embankment of the TSF and the requirement to prevent or minimise incidence of water pooling within each cell. **Appendix 4** presents the approved design report prepared by CMW. An alternative is to load tailings to road registered trucks at the processing plant, limiting the need to transfer the tailings to the TSF. Tailings prepared in this manner would have a higher moisture content.

The development application for the proposed Constellation Copper Mine includes construction and use of a paste fill plant to support underground mining operations. The Applicant anticipates that approximately 50% of tailings material generated by processing mined ore from the Constellation Copper Mine would be required for paste-fill production at the Constellation Copper Mine over the life of that project.

Proposed Modification

The Applicant is seeking to **permit the inclusion of additional receivers for exported tailings** for use in producing paste fill and to **increase the limit on material exported to 500,000tpa**.

Export of tailings material for use as paste fill has two key benefits. Firstly, it supports safe and efficient underground mining operations, and secondly, reduces the overall size of the TSF. The existing and proposed capacity of the TSF is presented in Section 3.4.1 Based on the total volume of tailings material that is anticipated to be required for paste fill production at the proposed Constellation Copper Mine, were export of that material not be permitted, and additional TSF capacity of an estimated1.5Mt would be required.

The proposed peak in mined ore production from the Constellation Copper Mine would be 1Mtpa. On this basis, up to 500,000tpa of tailings material would need to be transferred to the Constellation Copper Mine to support underground mining operations. Despatch of excavated tailings material would be undertaken using the 'return' leg for heavy vehicles delivering ore and other materials to and from the Mine Site. As such, no additional vehicle movements would be required for this activity.

Tailings extraction from the TSF would be undertaken in accordance with the Tailing Extraction Management Plan and in regular consultation with a suitably qualified engineer to ensure construction and operation of the TSF is not impacted by the excavations.

The location and design of the extraction cells would generally be in accordance with those approved under DA41/98, as described in **Appendix 4**. In summary, 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 8 embankment.
- 26m from the Stage 9 embankment.
- 20m from the Stage 10 embankment.

3.4.4 Inclusion of Additional Sources for the Receipt of Waste Material

Existing Environment

The Applicant operates a solid waste landfill within the Mine Site located to the south of the TSF (**Figure 1.2**). In accordance with EPL11254, only Inert Waste Class 1 and Class 2, and Solid Waste Class 1, as defined by Schedule 1 of the POEO Act[2], are permitted to be disposed of within the Tritton Landfill. It is noted that the above definitions do not reflect contemporary waste classification, as identified by the *Waste Classification Guidelines*. The equivalent classification

[2] EPL 11254 references a superseded version of the POEO Act. Waste types are no longer defined in Schedule 1 of the POEO Act.

of permitted waste material is presented in **Table 3.2**. In summary, the Tritton Landfill is permitted to only receive specific wastes classifies as General Solid Waste (putrescible and non-putrescible).

Table 3.2
Classification of Approved Wastes to be Disposed

Waste Type	Original Definition	Equivalent Classification
Solid Waste Class 1	Virgin excavated natural material (such as clay, gravel, sand, soil and rock) that is not mixed with any other type of waste and which: a) has been excavated from areas of land that are not contaminated with human-made chemicals as a result of industrial, commercial, mining or agricultural activities and which do not contain sulphidic ores or soils, or b) consists of excavated natural materials which meet such criteria as may be approved by the EPA.	General Solid Waste (non-putrescible) – *Virgin Excavated Natural Material*
Inert Waste Class 2	Building and demolition waste (e.g. bricks, concrete, paper, plastics, glass, metal and timber), being material resulting from the demolition, erection, construction, refurbishment or alteration of buildings or from the construction, repair or alteration of infrastructure-type development such as roads, bridges, dams, tunnels, railways and airports, and which: a) is not contaminated or mixed with any other type of waste, and b) does not contain any asbestos waste.	General Solid Waste (non-putrescible) – *Building and Demolition Waste* Note: Building and demolition waste, which is classified as General Solid Waste (non-putrescible) does **not** include material from mineral processing works.
Solid Waste Class 1	Municipal waste, being household domestic waste that is set aside for kerb side collection, other types of domestic waste (e.g. domestic clean-up and residential garden waste), or local council generated waste (e.g. waste resulting from street sweeping in litter bins and parks.	General Solid Waste (putrescible)

Proposed Modification

The Applicant is seeking approval to receive wastes generated from the Constellation Copper Mine for disposal within the Tritton Landfill.

The Proposed Modification would allow the Applicant to accept waste generated from the proposed Constellation Copper Mine, should it be approved, for disposal within the Tritton Landfill. No waste would be accepted at the Mine Site without a relevant variation to EPL11245 which currently states the approved source locations. Only waste that meets the criteria as specified in EPL11245 would be accepted at the Mine Site for disposal within the Tritton Landfill.

3.5 Optimisation of Existing Mining Operations

3.5.1 Proposed Increase to Annual Processing Rate

Existing Environment

DA41/98 permits the processing of up to 1.4Mtpa of ore at the Mine with ore sourced either from within the Mine Site (the Tritton and Budgerygar deposited) or from any other Tritton Copper Operations mines, namely the Murrawombie Copper Mine, the North East Copper Mine, and the Avoca Tank Copper Mine.

Proposed Modification

The Applicant is seeking an **increase to the maximum processing rate for the Mine to 1.8Mtpa**.

The upper limit of 1.8Mtpa has been identified based on forecast production during the cutback to the Murrawombie Copper Mine open cut (expected to commence in 2025), as well as forecast ore production from the Tritton Mine and proposed Constellation Copper Mine. The proposed increase would also facilitate processing of reduced ore grades in order to maintain concentrate production levels. The forecast mine production rates are based on fleet and resource utilisation, required development targets and stages, and minimisation of double-handing and stockpiling time. It is noted that peak processing rates of 1.8Mpta are forecast to only be required for a limited period of time, with average processing rates expected to range from approximately 1.4Mtpa to 1.6Mtpa during typical periods.

An increase in the processing rate for the Mine would have the following benefits.

- Enhanced efficiency and utilisation of existing infrastructure.
- Avoid the need to construct an additional processing facility to support the Constellation Copper Mine.
- Concentration of processing plant related impacts in one location (i.e. less cumulative impacts).

The proposed increase would only require an increase in the annual volume of material received at the Mine Site for processing (see Section 3.4.1). No modification to any existing and/or approved infrastructure within the Mine Site would be required for the proposed increased processing rate, including the size and configuration of the ROM Pad and Processing Plant.

As identified in **Table 3.1**, while the increase to annual production would require an increase to total heavy vehicle movements for the transport of concentrate between the Mine Site and Hermidale (2,050 movements to no more than 2,650 movements), the daily average would remain at 10 movements per day. Therefore, daily traffic-related impacts would not change.

3.5.2 Proposed Increase to Received Mined Materials

Existing Environment

Up to 1Mtpa of ore is approved to be received at the Mine Site for processing from the existing and approved Tritton Copper Operations, via the Murrawombie Copper Mine. It should be noted that the approval for transportation of any material is held by the source operation and is considered separate from the approved operation of the Mine (see **Appendix 2**).

Waste rock is not approved to be accepted at the Mine Site.

Proposed Modification

The Applicant is seeking to **increase the total volume of mined material received at the Mine Site to 1.8Mtpa** and to **allow for importation of suitable waste rock**.

Based on forecast production from the approved mining operations within the Tritton Copper Operations, as well as from the proposed Constellation Copper Mine, the Applicant anticipates that an increase in the volume of materials received at the Mine Site for processing is required.

In addition to the above, in consideration of the potential requirement to source increased volumes of waste rock for use in rehabilitation, the Applicant is also seeking approval for waste rock to be included in the cumulative total of mined materials received at the Mine Site.

Imported NAF waste rock or other material suitable for use in construction (validated through materials characterisation) would be stockpiled for use within either the existing waste rock stockpile, or within the proposed extended stockpiling areas (see Section 3.3.4). Other materials intended for use in rehabilitation activities would not be stockpiled and would be used immediately, with suitable management of environmental risks (such as encapsulation). This material may be classified as PAF (potentially acid forming) or may be co-mingled PAF and NAF sourced from existing emplacements at other mines within the Tritton Copper operations.

3.6 Planning for Rehabilitation

3.6.1 Proposed Inclusion of Waste Rock as Mined Materials to be Received

Existing Environment

Production and Use

The Applicant expects to produce an average of 196kt of waste rock per year[3]. Typically, up to 60% of the waste rock is used as backfill to support underground mining operations (either directly, or is temporarily stockpiled at surface), or is emplaced within the NAF waste rock stockpile for later use. Stockpiled NAF material is managed to ensure there is sufficient resources available for rehabilitation while maintaining safe and optimal underground mining operations.

Minor volumes (35,000tpa) of waste rock are approved to be processed and exported from the Mine Site for use as road base.

[3] Based on records for the period of 2021 to 2023.

Requirements

Only waste rock mined within the Mine Site is approved to be stockpiled and used for onsite activities. The principal anticipated use for the stockpiled waste rock is as an inert capping material for closure of the TSF, however the material may also be used for other landform establishment activities, including backfill of the underground Portal and redundant water management infrastructure. Other materials may be used when developing the final landform of the TSF.

A rehabilitation materials balance for the Mine is currently in preparation to guide rehabilitation planning purposes. However the Applicant anticipates that final volumes of material required for rehabilitation, including NAF waste rock required for capping and closure of the TSF and other infrastructure, will not be identified until final capping designs for the TSF have been prepared.

Based on the current preliminary capping design for the TSF, approximately 0.63Mm^3 of NAF waste rock will be required for capping of the TSF. However, the actual volume of waste rock required will be determined based on the final capping designs that will not be prepared until closer to the cessation of mining operations. Additional material may be required for rock armouring of the TSF embankments, and for rehabilitation and closure of other site infrastructure, including the Box Cut, water management infrastructure, and general landform establishment.

Murrawombie Open Pit Cutback

The Applicant anticipates that the approved cut-back of the Murrawombie Open Cut at the Murrawombie Copper Mine will commence in 2025, from which the Applicant anticipates a total of 13.6Mt of waste rock will be produced over a period of 14 months. The Applicant intends to use that material first as capping material for the Heap Leach Pads at the Murrawombie Copper Mine, with all residual material to be placed within the approved southern extension to the Murrawombie waste rock stockpile. The residual NAF material mined from the cutback that is not required for rehabilitation of the Murrawombie Mine Site would be suitable for use in rehabilitation at the Tritton Copper Mine if required.

Proposed Modification

The Applicant is seeking to **allow for importation of waste rock materials as part of the 1.8Mtpa of mined materials accepted at the Mine**.

As accurate volume balances are not yet available for the capping and closure of the TSF, the Applicant is conservatively seeking approval to import NAF waste rock in the event that a potential or actual deficit in on-site production is identified, and due to the limited window of availability based on the anticipated production from the Murrawombie Open Pit Cutback. Other waste rock materials may be required to support closure of the TSF and therefore approval is being sought for receipt of other waste rock for direct use in rehabilitation activities. This material would not be stockpiled at the Mine Site but would be applied directly for rehabilitation.

All waste rock material would be imported within the existing and proposed operational bounds for the importation of ore, namely:

- material would be transported via road-registered trucks on Yarrandale Road;
- the Applicant would ensure a cumulative maximum of 1.8Mtpa of all mined materials is accepted at the Mine Site;
- approval for the transport of the material would be associated with the source location (i.e. Murrawombie Copper Mine).

Imported NAF material would be stockpiled for use within either the existing and approved NAF waste rock stockpile, or within the proposed extended stockpiling areas (see Section 3.6.2).

3.6.2 Extension to NAF Waste Rock Stockpiling Capacity

Existing Environment

The NAF waste rock stockpile has an approved maximum height of 30m (301.5m AHD). The approved footprint for the NAF waste rock stockpile is approximately 6.5ha.

Proposed Modification

The Applicant is seeking to **increase the stockpiling capacity for NAF waste rock within the Mine Site**.

As discussed in Section 3.6.1, the Applicant is in the process of undertaking a rehabilitation materials balance for the Tritton Copper Operations to inform rehabilitation planning. Depending on the results of the materials balance, a greater volume of NAF waste rock may be required to support rehabilitation and closure of the Mine Site. The Applicant is seeking to permit expansion of the stockpiling capacity of the Mine in the event that future capping designs identify the need for an amount of NAF waste rock greater than that which is available within the Mine Site.

The Applicant has identified two areas in the vicinity of the existing NAF waste rock stockpile that would be suitable for the temporary stockpiling of NAF waste rock, as shown on **Figure 3.1**. These locations have been identified based on the following.

- The locations are wholly within the existing limit of disturbance and/or within areas previously disturbed for agriculture within the pre-mining environment.
- The locations are wholly within the erosion and sediment control catchment for the Mine Site.
- The locations are in proximity to the existing NAF waste rock stockpile, reducing the visual impact of the proposed change to the Mine Site from Yarrandale Road.

The proposed additional stockpiling area would be approximately 2ha, increasing the total area of NAF waste rock stockpile(s) to approximately 8.5ha. The extended or additional stockpiling areas would be constructed and operated generally in accordance with the limits of the approved NAF waste rock stockpile , namely:

- maximum lift heights of 10m; and
- maximum elevation of 301.5m AHD.

3.7 Alternatives Considered

A range of alternatives have been considered to support mining at the Constellation Copper Mine and ongoing activities at the Tritton Mine. Alternatives that were considered and ultimately rejected are presented in **Table 3.3** with a brief discussion on the possible benefits and reasons they were not pursued.

Table 3.3
Alternatives Considered and Rejected

Alternative Considered	Comments
Processing for Constellation Copper Mine within that mine site. This would require the development of a dedicated processing plant and TSF which would further require a great area of physical disturbance and vegetation clearing.	This alternative was considered in Section 2.8.2.5 of the EIS for the Constellation Copper Mine (AARC, 2024). Processing at the Constellation Copper Mine would have the benefit of avoiding transportation of mined ore and return of tailings materials. Operations may be contained in the one location, including any associated environmental impacts. Ultimately this alternative was rejected due to: • the relatively short life of the Constellation Copper Mine; • the opportunity to make use of the existing processing plant at the Tritton Mine that was not operating at capacity; • the opportunity to avoid environmental impacts at the Constellation Copper Mine including avoidance of unnecessary vegetation clearing, noise, dust and other amenity impacts, and the use and management of water; and • the capital costs associated with replicating processing infrastructure and developing a new TSF. The capital costs associated with biodiversity offsetting of unnecessary vegetation clearing and replicating infrastructure are estimated to be in the order of $400 million. This is substantial for a mining project with an expected productive life of 10 years. It is considered that these funds would be better directed to other high-capital projects such as the pending closure of the heap leach pads at the Murrawombie Copper Mine. In addition, the development, use and closure of a second TSF would have specific design, construction and environmental management risks including long-term geochemical implications. The approach that has been selected is consistent with the existing Hub-and-Spoke model adopted by the Applicant to encourage support and efficiency between the Tritton Copper Operations. This includes for rehabilitation planning.
Constructing a new TSF in an alternative location	This option was considered as an alternative to raising the TSF embankment. This option was considered by the Applicant's mining engineers as an alternative to avoid structural risks associated with raising the TSF higher than originally intended. Ultimately this option was rejected due to the capital costs and environmental impacts associated with establishing a new TSF that were not considered warranted to support the 10-year productive life of the Constellation Copper Mine and the remaining operating life of the other mines within the Tritton Copper Operations.

Table 3.3 (Cont'd)
Alternatives Considered and Rejected

Alternative Considered	Comments
Avoiding the use of paste fill to support mining operations and thereby avoiding the need to transport tailings material between the Tritton Mine and Constellation Copper Mine.	This alternative was considered in Section 2.8.2.3 of the EIS for the Constellation Copper Mine (AARC, 2024). Long-hole stoping with cemented paste backfill was identified as the most suitable alternative based on consideration of: • geometry; • mining recovery; • mine waste disposal; • future environmental risk; and • capital cost. The alternative to this mining method is to forego mining of larger pillars to provide the necessary stability (foregoing this resource) or to use crushed waste rock in paste fill production (requiring substantial volumes of waste rock and on-site crushing for use). An alternative to transporting tailings is to establish pipelines for pumping of tailings, however this would require substantial capital investment and ongoing maintenance.
Greater reliance on the Council landfill for waste disposal.	The Applicant currently transports some waste materials to the Council landfill for Nyngan. A greater reliance on this landfill is possible. However, given the expected level of waste generation is within the capacity of the Tritton Landfill, this is considered the best location for disposal of suitable waste materials.
Alternative sources for materials for use in rehabilitation.	Other sources of materials for rehabilitation in the region have been considered, however sourcing of these would require either a small 'borrow pit' or other development, giving that fill material is rarely available in this region. The use of suitable waste rock generated at other mines within the Tritton Copper Operations for rehabilitation construction and implementation would provide a beneficial use of this material (as opposed to storage in the waste rock emplacement) and reduce possible environmental impacts associated with alternative sources being developed.

3.8 Rehabilitation and Mine Closure

3.8.1 Rehabilitation Strategy

The overarching strategy for the rehabilitation of the Mine Site is to provide a safe, stable, and non-polluting landform which is commensurate with surrounding landforms and land uses wherever practicable.

The Applicant maintains a *Rehabilitation Management Plan* (RMP) for the Mine Site in accordance with Condition 4 of DA41/98 and generally as required per the conditions of ML1544 under Schedule 8A of the *Mining Regulation 2016*. The RMP includes a comprehensive summary of key background data and information relating to rehabilitation of the Mine Site, including rehabilitation risk, rehabilitation objectives and completions criteria, environmental monitoring and management, and triggers for specific risk control actions and review of the RMP.

In accordance with Schedule 8A of the *Mining Regulation 2016*, the RMP and Rehabilitation Outcome Documents (*Rehabilitation Objectives*, *Rehabilitation Completion Criteria Statement*, and *Final Landform and Rehabilitation Plan*) would likely be required to be updated following modification of DA41/98. The following sections present a summary of the Proposed Modification with regard to rehabilitation of the Mine Site and in consideration of Tritton's obligations under the *Mining Act 1997*.

3.8.2 Risks to Rehabilitation

The Proposed Modification is not anticipated to result in any significant risk to the rehabilitation of the Mine Site, as it would not:

- result in any significant increase in the total disturbance footprint for the Mine Site;
- result in any increase in the amount of land permanently removed from agricultural production;
- impact on the capability of the land to support the principal approved final land use of agricultural production;
- impact on existing stockpiled resources for rehabilitation (e.g. growth medium, large woody debris, etc); or
- impact post-mining water quality or quantity.

The Proposed Modification would have the following positive impacts for rehabilitation and post-mining land uses for the Mine site.

- Permitting additional materials to be imported and stockpiled within the Mine Site for use in rehabilitation would reduce the impact of any rehabilitation material deficit, should it occur. In addition, diversion of waste rock from the Murrawombie Copper Mine Site reduces the overall size of the Murrawombie Waste Rock Emplacement, further improving rehabilitation outcomes.
- Increased despatch of tailings material reduces the overall size and volume of TSF required to support mining and processing operations, reducing the loss of agricultural land and risks associated with dam size overall.
- Extension to the life of the Mine allows Tritton to continue to provide significant social and economic benefits to the local and regional population. The Proposed Modification would facilitate the retention of existing persons, skills and knowledge that are critical to both the success of the Tritton Copper Operations and providing economic diversity to the Bogan LGA.

3.8.3 Rehabilitation Objectives and Rehabilitation Completion Criteria

Existing Environment

The approved Rehabilitation Objectives Statement for ML1544 is presented as **Appendix 5**.

It should be noted that these are presented for reference only and are considered separate to DA41/98.

In accordance with Schedule 8A of the *Mining Regulation 2016*, rehabilitation completion criteria are not required to be submitted to the Resources Regulator for approval until rehabilitation is forecast to be completed and signed off (i.e. accepted by the NSW Resources Regulator) within a 3-year period. As such, the Rehabilitation Completion Criteria presented in Section 4 of the RMP remain as "proposed" and are subject to change depending on the results of ongoing rehabilitation and other environmental monitoring programs.

Proposed Modification

The Proposed Modification would be considered to be commensurate with the approved Rehabilitation Objectives Statement and therefore amendment would not be required under the *Mining Regulation 2016.*

3.8.4 Final Landform Features

Existing Environment

The approved final landform features of the Mine Site generally includes but is not limited to the following.

- A free-draining landform that is commensurate with the pre-mining environment as far as practicable.
- A capped TSF including:
  - a maximum elevation of 272m AHD;
  - an engineered drop-down structure;
  - supporting water management infrastructure, namely containment and sediment dams, groundwater monitoring bores; and
  - access roads suitable for allowing monitoring and maintenance of the landform, as required.
- A final void, including (if not completely backfilled):
  - appropriately designed and located safety infrastructure, namely fencing and vehicle bunding; and
  - a sealed or backfilled portal.
- Water management infrastructure, including:
  - clean water dams suitable for use as stock watering;
  - diversion drains for collection and/or control of surface water flows; and
  - water connections (i.e. pipelines) to site.
- General infrastructure, including:
  - boundary and internal fencing;

- site and internal access roads;
- sheds / workshops / hardstand areas that are suitable for agricultural uses; and
- service connections to site.

All other mining-related infrastructure would be required to be decommissioned or demolished as part of rehabilitation of the Mine Site.

Proposed Modification

The Proposed Modification would require minor changes to the approved final landform features of the Mine Site as follows.

- An increase in the final elevation of the TSF from 272m AHD to 278m AHD.
- Minor changes to the footprint/landform of the TSF to permit buttressing of embankments.

The remainder of the TSF and relevant supporting infrastructure would remain the same. The *Rehabilitation Management Plan* would be updated accordingly following approval of this modification application (Modification 9).

It is noted that the proposed final elevation of 278m AHD relates only to the final elevation of tailings material, and does not include the final capping layers that will be required to cap and close the TSF. The existing preliminary TSF capping design allows for a capping layer of up to 0.4m thick, which would require a relative increase in the final elevation. The final design, and therefore elevation of the capped TSF overall will depend on the specific design requirements identified as part of any final / detailed design to be prepared closer to the end of the life of Mine.

No other changes to the approved final landform features of the Mine Site would be required for the Proposed Modification.

3.8.5 Final Land Use

Existing Environment

The approved final land use for the Mine Site includes the following.

- Agriculture, consisting of grazing of mixed native and exotic pastures.
- Native ecosystem, consisting of mixed native and exotic species suitable for use as a cover system for the TSF.
- Water storage, to support post-mining land uses.
- Final void (if not completely backfilled), consisting of an internally draining and geotechnically stable landform.

Proposed Modification

The Proposed Modification does not include and would not require any changes to the existing and approved final land use of the Mine Site.

4. Statutory Context

This section identifies the relevant statutory requirements that must be considered by the consent authority before the development application may be determined. The relevant statutory requirements are described in terms of power to grant approval, permissibility, and other required approvals. The section concludes with the statutory compliance matters that must be considered by the consent authority.

4.1 Power to Grant Approval

The Proposed Modification is being made under Section 4.55(2) of the EP&A Act, as it is considered that the Proposed Modification would remain "substantially the same development" as the Project as of January 2019. The Project was approved in July 1998 as a State significant development under Part 4 of the EP&A Act. The Project has subsequently been modified eight times including under the now repealed Section 75W of the EP&A Act (pursuant to Clause 8J of the *Environmental Planning and Assessment Regulation 2000*). In accordance with Schedule 2 Section 3BA(6)(b) of the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017*, the Proposed Modification will need to remain "substantially the same" as the Project as last modified under the now repealed Section 75W of Part 3A. Therefore, the modified consent as of MOD6 which was approved in January 2019 is the Project against which the test for "substantially the same" is applied.

4.2 Consent Authority

In accordance with Section 2.7 of the *State Environmental Planning Policy (Planning Systems) 2021* the Independent Planning Commission is the consent authority in respect of an application to modify a development consent that is made by a person who has disclosed a reportable political donation of $1,000 or more.

The Applicant has not made a reportable political donation and therefore the Minister for Planning and Public Spaces (or their delegate) is the consent authority. The Applicant understands that in these circumstances, the Minister has delegated their powers to determine the application to a senior officer of the DPHI.

4.3 Permissibility

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, Section 2.9(1)(b) of *State Environmental Planning Policy (Resources and Energy) 2021* 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.

4.4 Other Approvals

Table 4.1 presents the existing approvals held for the Mine and identifies where modifications to those approvals would be required or where new approvals would be necessary.

Table 4.1
Existing and Additional Approvals

Approval	Modification/ New Approval Required?	Justification/ Comment
EPL 11254	Variation	No variation would be required to permit the Proposed Modification.
ML1544	Amendment	Variation of ML1544 would not be required. Variation of the approved *Rehabilitation Outcome Documents* under ML1544 would be required.
DA 30/2004	No	No changes are proposed to rail loading at the Hermidale Rial Siding.
DA 029/2007	No	No changes are proposed to administration facilities.
DA 2010/006	No	No changes are proposed to the Paste Fill Plant.
DA 2010/028	No	No changes are proposed to communication towers.
DA 10/2019/021/001	No	No changes are proposed to the existing water pipeline.
CDC2021/002	No	No changes are proposed to communication towers.
Water Access Licences (Lachlan Fold Belt MDB Groundwater Source) 31041 31090	No	No changes proposed to groundwater use.
Water Access Licences (Macquarie and Cudgegong Regulated Rivers Water Source) 9374 9375 9940	No	No changes proposed to surface water use.
Works Approvals: 80WA716055 80WA716044 80WA702816 80WA704315 80CA701324	No	No changes to approved works.
Groundwater Monitoring Bores	Yes	No changes proposed to groundwater use and no impacts to groundwater quality and/or quantity are proposed.

4.5 Pre-conditions to Granting Approval

Table 4.2 presents the pre-conditions to the granting of approval that apply to the Proposed Modification.

4.6 Mandatory Matters for Consideration

Table 4.3 presents the mandatory matters for consideration by the consent authority that apply to the proposed modification.

Table 4.2
Preconditions to the Granting of Approval

Section/ Clause	Precondition	Relevance
Environmental Planning and Assessment Act 1979		
4.55(2)	A consent authority may, … modify the consent if a) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and	The proposed modification is being sought under Section 4.55(2) of the EP&A Act as the Project would remain "substantially the same" as the Project as last modified before transition from a Part 3A Project to a State Significant Development. Therefore, the modified consent as of January 2019 (following MOD6 for the export of tailings for paste fill operations at the Murrawombie Mine which met the cut-off date) is the Project against which the test for "substantially the same" is applied. Under the proposed modification, the Project would remain "substantially the same development" as that approved under DA 41/98 for the following reasons. • The scale of the Proposed Modification would be relatively minor in comparison to the approved Mine. • Existing site infrastructure would remain the same; the existing processing plant and ROM Pad are sufficient to support the proposed activities. • The proposed importation of material from 1Mtpa to 1.8Mtpa represents a change from sourcing the majority of ore material from the underground mining operations to a greater proportion of import from other sources, however as the transportation activities are approved elsewhere, the change is not material in nature and limited to the proposed change in processing (1.4Mtpa to 1.8Mtpa). • The environmental impacts of the Project as modified would be similar to the impacts of the approved Mine with the external experience of the Mine largely unchanged. • The proposed increase to production intensity and material handling at the Tritton Mine over an extended period is not expected to generate noise or air quality impacts discernible at nearby residences. • The minor environmental impacts that are currently experienced would continue to be managed through conditions of consent.

Table 4.2
Preconditions to the Granting of Approval

Section/ Clause	Precondition	Relevance
***Environmental Planning and Assessment Act 1979* (Cont'd)**		
4.55(2) (Cont'd)	a) (Cont'd)	• The inclusion of additional locations for the export of tailings and import of waste material is consistent with existing approved operations, with only the locations for export and the source of waste materials to change. • The traffic-related risks under the Proposed Modification would remain similar to existing operations as Yarrandale Road is infrequently used by light vehicles and peak traffic generation is not expected to change significantly. Currently the transport of mined material from external sources is approved under the development consent for the source of the material and therefore assessment of environmental impacts associated with transportation of mined material is undertaken for the source. The Company intends to submit a separate modification application to Bogan Shire Council to allow for the respective increase in transportation limits from other Tritton Copper Operations sites and along Yarrandale Road.
	b) it has consulted with the relevant [government authorities]	This is a matter for DPHI to consider during its assessment of the proposed modification.
	c) it has notified the application in accordance with— i) the regulations, if the regulations so require, or ii) a development control plan	This is a matter for DPHI to consider, however it is anticipated that DPHI will notify the application to relevant stakeholders. In accordance with Clause 2.10(A) of the *State Environmental Planning Policy (Planning Systems) 2021*, development control plans are not relevant to SSD applications.
	d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.	This is a matter for the DPHI to consider. However, the Applicant anticipates preparing a Submissions Report to provide a response to any submissions received.

Table 4.2
Preconditions to the Granting of Approval

Section/ Clause	Precondition	Relevance
State Environmental Planning Policy (Resilience and Hazards) 2021		
4.6	1) A consent authority must not consent to the carrying out of any development on land unless— a) it has considered whether the land is contaminated, and b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.	As the areas of surface disturbance have previously been used for agricultural and/or mining, it is highly unlikely that any contamination is present that would require remediation work prior to undertaking the proposed modification.
	2) Before determining an application for consent to carry out development that would involve a change of use on any of the land specified in subclause (4), the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines.	The proposed modification does not propose a change in use of the land.

Table 4.3
Mandatory Maters for Consideration

Section/ Clause	Matter for Consideration	Relevance/Comment
Environmental Planning and Assessment Act 1979		
1.3	Relevant objects of the Act • 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, • to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment, • to promote the orderly and economic use and development of land, • to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,	The proposed modification would not limit the achievement of the objects 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; and • promote orderly development of the copper resource. Section 7.4.3 addresses matters relevant to Socio-Economic Considerations. Section 7.3 addresses matters relevant to Ecologically Sustainable Development in detail. The proposed modification would encourage the safe, efficient and environmentally responsible operation of the Tritton Copper Mine so that maximum benefit is achieved for the Applicant, the Bogan Shire Council, the local community and the communities of the future. The design of the proposed modification achieves a significant overall benefit and sustainable outcome for the local and wider environment. The proposed modification would not result in significant adverse environmental outcomes. Section 6 presents a detailed analysis of the key environmental aspects that may be affected by the Proposed Modification.
4.15(1)(a)	Relevant environmental planning instruments	See Resources and Energy SEPP, Resilience and Hazards SEPP and Bogan LEP below.
	Relevant development control plans	In accordance with Clause 2.10(a) of the *State Environmental Planning Policy (Planning Systems) 2021*, development control plans are not relevant to SSD applications.
	Any planning agreement	There is no Planning Agreement that applies to the Project.
	The regulations	The Regulations have been considered throughout this document.
	The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,	Section 6 presents an assessment of relevant impacts on the natural and built environment and social and economic impacts.
	The suitability of the site for the development,	Operations have been undertaken at the Mine Site since 1998 and the existing operation is approved to continue operating until 21 December 2028.

Table 4.3 (Cont'd)
Mandatory Maters for Consideration

Section/ Clause	Matter for Consideration	Relevance/Comment
Environmental Planning and Assessment Act 1979 (Cont'd)		
4.15 (Cont'd)	Any submissions made in accordance with this Act or the regulations,	This is a matter for the DPHI to consider. However, the Applicant anticipates preparing a *Submissions Report* following completion of the exhibition period.
	The public interest.	This is addressed in Section 7.4. In summary, however, the proposed modification is considered to be in the public interest through the continued operation of the Mine in a safe and environmentally responsible manner and the provision of ongoing local economic benefits.
Biodiversity Conservation Act 2016		
7.14 (2)	The Minister for Planning, when determining in accordance with the *Environmental Planning and Assessment Act 1979* any such application, is to take into consideration under that Act the likely impact of the proposed development on biodiversity values as assessed in the biodiversity development assessment report.	No additional surface disturbance would be required, therefore it is considered that there would be no impacts to biodiversity values as a direct result of the proposed modification and further consideration of biodiversity values and offsetting obligations is not required.
State Environmental Planning Policy (Resources and Energy) 2021		
2.16	**Non-discretionary development standards for mining** (3) Cumulative noise level. 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	The Noise Impact Assessment (see Section 6.4) determined that anticipated noise emissions would be less than the relevant criterion.
	(4) Cumulative air quality level. The development does not result in a cumulative annual average level greater than 25µg/m^3 of PM_{10} or 8µg/m^3 of $PM_{2.5}$ for private dwellings.	The Air Quality Impact Assessment (see Section 6.3) predicts that the cumulative air quality development standards would continue to be satisfied with the following outcomes for dust dispersion. • Cumulative annual average $PM_{2.5}$ of 3.1 µg/m^3 at the closest private residence. • Cumulative annual average PM_{10} of 7.2µg/m^3 at the closest private residence.

Table 4.3 (Cont'd)
Mandatory Maters for Consideration

Section/ Clause	Matter for Consideration	Relevance/Comment
State Environmental Planning Policy (Resources and Energy) 2021 (Cont'd)		
2.16 (Cont'd)	(5) Airblast overpressure. Airblast overpressure caused by the development does not exceed: (a) 120 dB (Lin Peak) at any time, and (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.	The Proposed Modification would not alter blasting operations.
	(6) Ground vibration. Ground vibration caused by the development does not exceed: (a) 10mm/sec (peak particle velocity) at any time, and (b) 5mm/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.	The Proposed Modification would not alter blasting operations.
	(7) Aquifer interference. 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.	No significant changes to the approved groundwater and aquifer interference impacts are anticipated.
2.17	(a) Consideration is given to: • the existing uses and approved uses of land in the vicinity of the development;	All proposed activities would occur within the existing boundary of ML1544.
	• the potential impact on the preferred land uses (as considered by the consent authority) in the vicinity of the development; and	The Proposed Modification would not be inconsistent with existing approved land use within the Project Site and would therefore not be incompatible with surrounding land uses.
	• any ways in which the development may be incompatible with any of those existing, approved or preferred land uses.	The Proposed Modification would optimise the efficiency of mining activities and improve integration of the Tritton Copper Operations, resulting in public benefit arising from the development.

Table 4.3 (Cont'd)
Mandatory Maters for Consideration

Section/ Clause	Matter for Consideration	Relevance/Comment
State Environmental Planning Policy (Resources and Energy) 2021 (Cont'd)		
2.17 (Cont'd)	(b) The respective public benefits of the development and the existing, approved or preferred land uses are evaluated and compared.	
	(c) Measures proposed to avoid or minimise any incompatibility are considered.	
2.19	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. Measures taken by the Proponent to avoid or minimise any incompatibility are considered. The public benefits of the development and any existing or approved mining, petroleum production or extractive industry must be evaluated and compared.	All nearby operations are owned by the Applicant and there is no identified conflict or risk of resource sterilisation
2.20	(1) Consideration is given to ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure: • impacts on significant water resources, including surface and groundwater resources, are avoided or minimised;	Potential environmental risks and impacts are considered in detail in Section 6. There would be no change to approved impacts to water resources, biodiversity and greenhouse gas emissions.
	• impacts on threatened species and biodiversity are avoided or minimised; and	
	• greenhouse gas emissions are minimised and an assessment of the greenhouse gas emissions (including downstream emissions) of the development is provided.	
2.21	The efficiency of resource recovery, including the reuse or recycling of material and minimisation of the creation of waste, is considered.	The Proposed Modification would optimise existing operations and improve integration of the Tritton Copper Operations, thereby improving overall efficiency.

Table 4.3 (Cont'd)
Mandatory Maters for Consideration

Section/ Clause	Matter for Consideration	Relevance/Comment
State Environmental Planning Policy (Resources and Energy) 2021 (Cont'd)		
2.22	The following transport-related issues are considered. • The transport of some or all of the materials from the site by means other than public road. • Limitation of the number of truck movements that occur on roads within residential areas or roads near to schools. • The preparation of a code of conduct for the transportation of materials on public roads.	Based on the proposed operational controls, the proposed increase in heavy vehicle movements between the Mine Site and the Hermidale Rail Siding is not expected to result in significant environmental impacts to the local traffic environment as experienced on an everyday basis (see Section 6.7).
2.23	The rehabilitation of the land affected by the development is considered including: • the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated; • the appropriate management of development generated waste; • remediation of any soil contaminated by the development; and • 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.	The Proposed Modification would result in minor (predominantly positive) changes to rehabilitation outcomes for the Project (see Section 3.5).

Table 4.3 (Cont'd)
Mandatory Maters for Consideration

Section/ Clause	Matter for Consideration	Relevance/Comment
State Environmental Planning Policy (Resilience and Hazards) 2021		
3.12	In determining an application to carry out development to which this Part applies, the consent authority must consider (in addition to any other matters specified in the Act or in an environmental planning instrument applying to the development)— (a) current circulars or guidelines published by the Department of Planning relating to hazardous or offensive development, and (b) whether any public authority should be consulted concerning any environmental and land use safety requirements with which the development should comply, and (c) in the case of development for the purpose of a potentially hazardous industry—a preliminary hazard analysis prepared by or on behalf of the applicant, and (d) any feasible alternatives to the carrying out of the development and the reasons for choosing the development the subject of the application (including any feasible alternatives for the location of the development and the reasons for choosing the location the subject of the application), and (e) any likely future use of the land surrounding the development.	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 and therefore a risk screening is not necessary.

Table 4.3 (Cont'd)
Mandatory Maters for Consideration

Section/ Clause	Matter for Consideration	Relevance/Comment
Bogan Local Environmental Plan 2011		
7.4	**Terrestrial Biodiversity** (3) Before determining a development application for development on land to which this clause applies, the consent authority must consider whether or not the development— a) is likely to have any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and	Given that the Proposed Modification would not result in additional disturbance of land, it is expected that the modified activities would not result in additional impacts to biodiversity. Therefore, the Proposed Modification is not expected to constrain achievement of the objectives of the Bogan LEP.
	b) is likely to have any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and	
	c) has any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and	
	d) is likely to have any adverse impact on the habitat elements providing connectivity on the land.	
	(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that— a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or	The location of the Proposed Modification is an approved and operating Mine, and no further surface disturbance is proposed. The development would continue to be managed to avoid or mitigate any significant adverse environmental impact to terrestrial biodiversity
	b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or	
	c) if that impact cannot be minimised—the development will be managed to mitigate that impact.	

5. Engagement

5.1 Government Consultation

The Applicant has consulted with DPHI to seek assessment and information requirements for the Proposed Modification in accordance with the *State significant development guidelines – preparing a modification report July 2021*. A scoping meeting was held with officers of DPHI on 15 May 2024.

The Applicant also provides regular briefings to Bogan Shire Council (Council) either directly or through the Community Consultative Committee (which meets to discuss matters pertaining to all of the Applicant's operations in the region). Council discussions have included a summary of the upcoming planning matters relating to all operations including the proposed modification of operations at the Mine that are the subject of this document. No issues regarding the Proposed Modification have been raised in these discussions by Council officers.

5.2 Community Consultation

The Applicant maintains an open-door policy regarding complaints, questions and feedback to the local community. As such, surrounding landholders are regularly consulted through informal telephone conversations.

The Mine's Community Consultative Committee is also kept appraised of the progress of development and planned modification with the meetings on 21 February 2024, 22 May 2024, 11 September 2024, and 11 December 2024 covering the status of operations and the need for the Proposed Modification. Copies of confirmed minutes are available on the Company website[4].

Given that the Proposed Modification is predicted to result in only minor changes to the operation and its potential impacts, no broader community consultation has been undertaken.

5.3 Community Feedback

Given the current support provided to the local community in terms of employment and spending on services and consumables, the main point of interest in feedback from the community has concerned the life of the Tritton project. No specific environmental concerns were raised in discussions.

[4] https://www.aerisresources.com.au/assets/tritton-copper-operations/assets-tritton-copper-operations-community-consultative-committee-minutes/

5.4 Ongoing Consultation

Following an approval to the proposed modification the following consultation activities would be continued by the Applicant.

- Informal phone or in-person discussions with neighbouring landowners to inform them of progress with the Mine.
- CCC meetings would continue to provide an overview of each of the Applicant's operations and discuss matters relevant to the broader community.
- The Applicant would continue regular briefing discussions with Council officers to discuss matters relating to all of the Applicant's operations.

6. Assessment of Key Environmental Issues

6.1 Introduction

This section describes the specific environmental features of the Mine Site and its surrounds that may be affected by the Proposed Modification. Information on existing conditions, proposed safeguards and controls, and potential impacts the Proposed Modification may have following the implementation of these measures is presented for all relevant issues.

6.2 Environmental Setting

6.2.1 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, drainage and climate is provided in the following subsection.

6.2.2 Topography and Drainage

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. The Mine Site is located within the Macquarie–Bogan Catchment, an area of approximately 74,800km^2. 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.

Local and Mine Site Topography and Drainage

Topography and drainage within the Mine Site has largely been disturbed by the approved mining operations, as well as from historical agriculture and mining activity. 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 6.1**).

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.

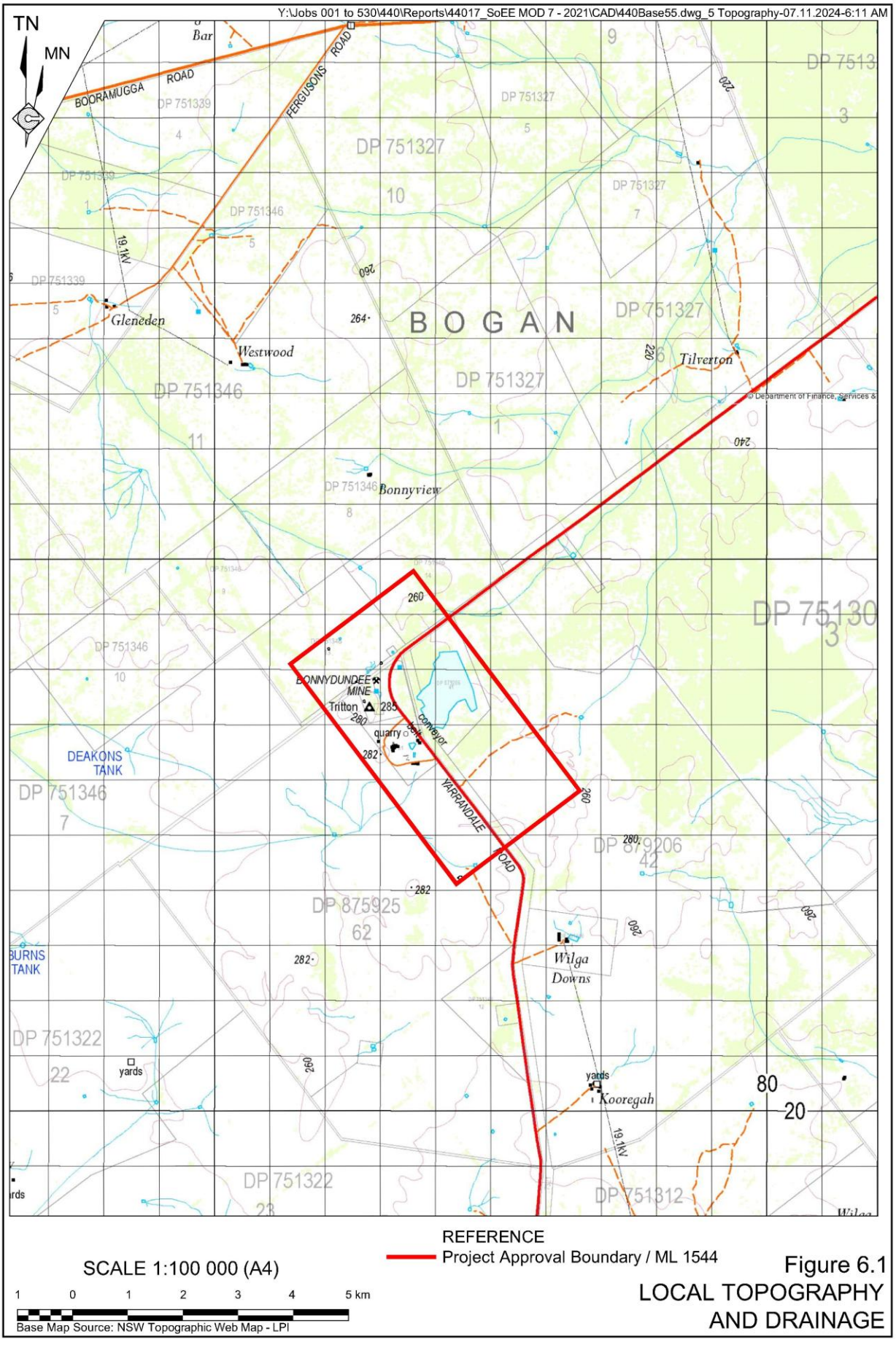


Figure 6.1
LOCAL TOPOGRAPHY AND DRAINAGE

Climate

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.

Data Sources

Meteorological data from the following Bureau of Meteorology (BoM) stations is presented in **Table 6.1**. 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).
- Hermidale Tank Station (Station Number 051026), located approximately 17km to the south of the Mine Site (rainfall).

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

Table 6.1
Monthly Meteorological Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Temperature (ºC) [1] (1920 to 2024)													
Mean Maximum	34.4	33.4	30.5	25.7	20.7	17.0	16.5	18.6	22.7	26.6	30.1	33.0	25.8
Mean Minimum	19.7	19.3	16.5	12.0	7.8	5.0	3.8	4.8	7.8	11.5	15.1	17.9	11.8
Relative Humidity (%) [1] (9am – 1910 / 3pm – 1915 to 2010)													
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
Rainfall (mm) [2] (1905 to 2023)													
Mean rainfall	46.0	47.8	38.2	26.3	32.7	34.7	27.3	26.7	25.7	32.8	36.7	45.1	419.8
Highest daily rainfall	214.6	287.9	217.2	314.5	154.6	158.6	98.0	92.6	106.6	212.6	161.6	213.6	919.5
Evaporation (mm) [3] (1975 – 2005)													
Average evaporation	300	250	200	125	80	50	60	80	125	175	300	300	2045

Source:
[1] – Bureau of Meteorology – Nyngan Airport Station (Station Number 051039).
[2] – Bureau of Meteorology – Hermidale Tank Station (Station Number: 051026).
[3] – Bureau of Meteorology – Average Pan Evaporation Maps (http://www.bom.gov.au/jsp/ncc/climate_averages/evaporation/index.jsp).

Temperature and Humidity

Table 6.1 indicates that January is the hottest month, with a mean maximum temperature of 34.4°C and a mean minimum temperature of 19.7°C. July is the coldest month with a mean maximum temperature of 16.5°C and a mean minimum temperature of 3.8°C. Late autumn, winter and early spring (April to September) is typically the most humid time of the year.

Rainfall and Evaporation

Monthly average rainfall varies between 26.3mm and 47.8mm, 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.

Wind Conditions

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.

6.3 Air Quality

6.3.1 Introduction

The construction of the TSF raise and extension to the waste rock stockpile for the Proposed Modification has the potential to impact air quality in the vicinity of the Mine. An *Air Quality Impact Assessment* was prepared by Todoroski Air Sciences Pty Ltd (Todoroski) to support the Modification Report. The full assessment is presented as **Appendix 6** and is hereafter referred to as Todoroski (2024a). Todoroski (2024a) has been prepared in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2022)

The following subsection provides an overview of the existing environment with respect to air quality at the Mine Site. Potential impacts from the Proposed Modification are presented, and management 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.

6.3.2 Existing Setting

Sensitive Receivers

Figure 6.2 shows the locations of all non-Mine related sensitive receivers in the vicinity of the Mine Site.

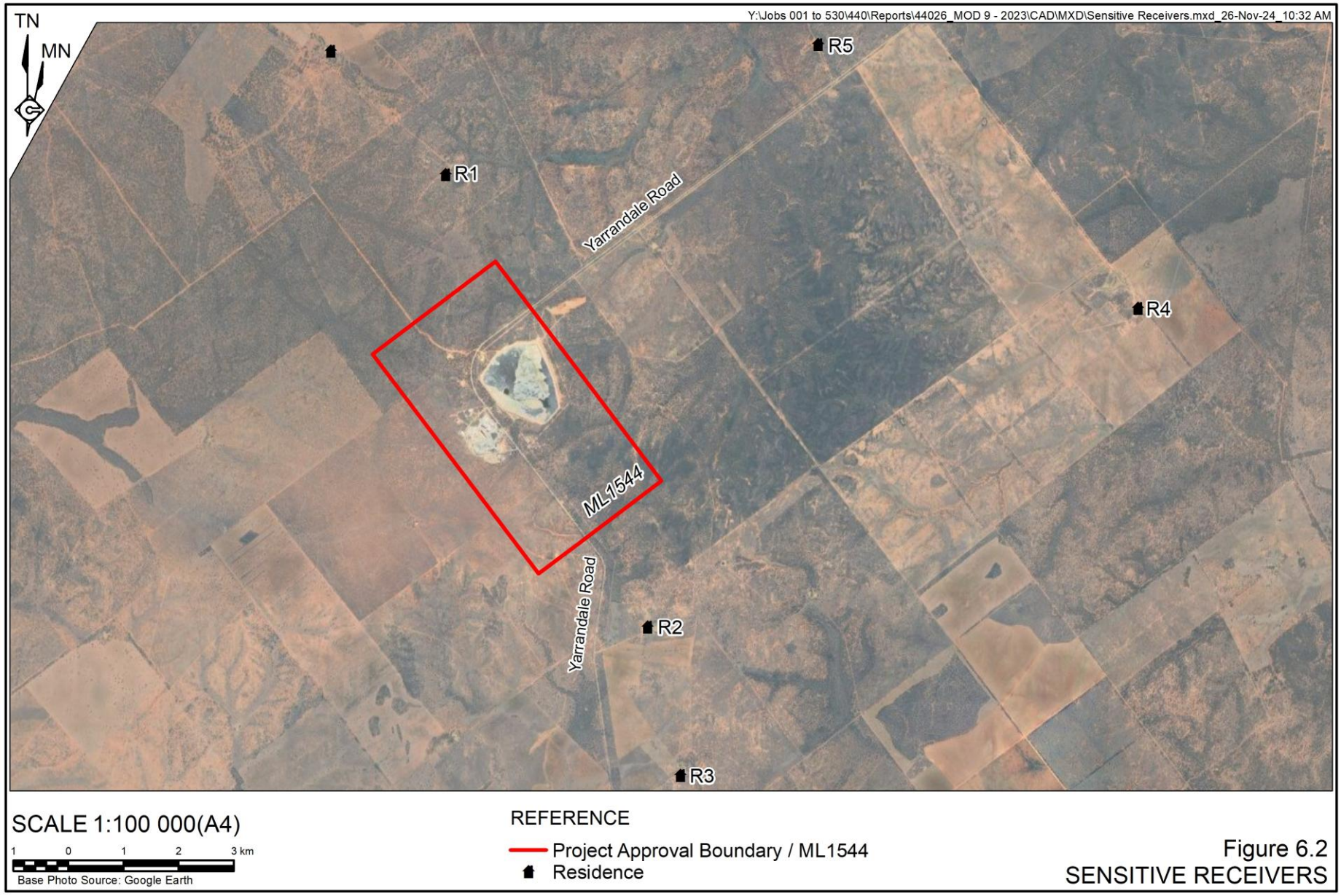


Figure 6.2
SENSITIVE RECEIVERS

Meteorological Data

For air quality modelling purposes, Todoroski (2024) relied on meteorological data sourced from the Bureau of Meteorology (BoM) Automatic Weather Station (AWS) located at Cobar Airport (Site No. 048237), approximately 90km west of the Mine Site.

Data from the year 2021 was selected to provide an approximation of representative conditions surrounding the Mine Site based on examination of the meteorology and background air quality conditions for the period of 2019 to 2023.

Background Air Quality

The main sources of air pollutants in the area surrounding the Mine Site would include emissions from agricultural and mining activities, and anthropogenic activities such as motor vehicle exhaust, vehicles on unsealed roads and domestic wood heaters. Events such as bushfires and dust storms are also a potential source of air pollution in the surrounding area.

Ambient air quality monitoring is not undertaken at the Mine Site. Todoroski (2024a) used available data from the closest Air Quality Monitoring Station (AQMS) to the Mine Site, and dust deposition monitoring data conducted as part of the air quality monitoring for the Mine, to quantify the background levels for the Mine Site.

In accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2022), Todoroski (2024a) used air quality data from the Narrabri AQMS to characterise the ambient background air quality levels surrounding the Mine Site for $PM_{2.5}$ and PM_{10}. Annual average background TSP levels were estimated using a ratio between PM_{10} and TSP.

It should be noted that the Narrabri AQMS is located approximately 318km northeast of the Mine Site. In addition, Todoroski notes that the AQMS is located in a more urbanised environmental with potentially higher ubiquitous ambient air emissions sources such as traffic, domestic wood heater emissions, and nearby industrial and commercial activities. Therefore these monitoring data were expected to provide a conservative estimate of the underlying background levels surrounding the Mine Site.

A summary of the background air quality concentrations adopted by Todoroski (2024a) are provided in **Table 6.2**.

Table 6.2
Background Air Quality

Pollutant	Background level	Units
Annual average TSP	25.1	µg/m³
Maximum 24-hour average PM_{10}	36.4	µg/m³
Annual average PM_{10}	7.0	µg/m³
Maximum 24-hour average $PM_{2.5}$	11.8	µg/m³
Annual average $PM_{2.5}$	3.1	µg/m³
Annual average deposited dust	0.9	g/m²/month
Source: Modified after Table 4-5 of Todoroski (2024a)		

Existing Operations

Existing Mine-related activities that may impact air-quality surrounding the Mine Site 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;
- emissions from the existing exhaust ventilation rise;
- fumes from reagents used in the processing plant.

Monthly monitoring of deposited dust is undertaken in accordance with DA41/98 and the existing and approved *Dust Management Plan*.

6.3.3 Potential Impacts

The following activities associated with the Proposed Modification were considered by Todoroski (2024a) as potential sources of air pollutants.

- Haulage of mined and imported waste rock to the waste rock stockpile extension area.
- Unloading and shaping of waste rock at the waste rock stockpile extension area.
- Loading of haul trucks, transport, and unloading of material for TSF embankment construction.
- Movement of material around the TSF to create embankments.
- Haulage of imported ore material to the ROM pad and loading of ROM material to the crusher.
- Processing of additional ore material.
- Loading product trucks with concentrate and haulage to the Hermidale Rail Siding.
- Excavation of tailings material from the TSF and loading to road registered trucks for transport.
- Particulate emission from the diesel exhaust of vehicles and plant equipment.
- Wind erosion of disturbed areas.

The air quality impact assessment considered all activities within the Mine Site, transport activities on public roads are not subject to impact assessment. It is noted that no additional land would be disturbed as part of the Proposed Modification and therefore the total area where dust-liftoff may occur is expected to remain unchanged.

6.3.4 Assessment Methodology and Criteria

Assessment Methodology

Todoroski (2024a) undertook modelling using a combination of the CALPUFF Modelling System and the Weather Research and Forecasting model (WRF), setup in general accord with the methods provided in the NSW EPA document *Generic Guidance and Optimum Model Setting for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia'*.

Dispersion modelling was undertaken using dust emissions from each operational activity at the Mine, represented as a series of volume sources. Meteorological conditions associated with dust generation (e.g. wind speed) and levels of dust generating activity were considered in calculating hourly varying emission rates for each source. Todoroski (2024a) notes that the effect of rainfall in reducing dust emissions was not considered in the assessment.

Todoroski (2024a) considered two scenarios (approved and proposed operations) for their assessment. The proposed operations scenario represented a reasonable worst-case operating scenario in terms of air quality for the Proposed Modification (i.e. the scenario assumed all 1.8Mtpa of imported mined material is ore material, rather than a mix of ore and other mined materials, resulting in a longer haul route and increased emissions). Both scenarios conservatively assumed that the entire TSF was subject to wind erosion.

Assessment Criteria

Table 6.3 presents the air quality criteria outlined in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2022) which were adopted by Todoroski (2024a).

Table 6.3
NSW EPA Air Quality Assessment Criteria

Pollutant	Averaging Period	Impact	Criterion
TSP	Annual	Total	90µg/m^3
PM_{10}	Annual	Total	25µg/m^3
	24 hour	Total	50µg/m^3
$PM_{2.5}$	Annual	Total	8µg/m^3
	24 hour	Total	25µg/m^3
Deposited dust	Annual	Incremental	2g/m^2/month
		Total	4g/m^2/month
Copper dusts and mists	1 hour	Incremental	18µg/m^3
Copper fumes	1 hour	Incremental	3.7µg/m^3
Iron oxide fumes	1 hour	Incremental	90µg/m^3
Lead	Annual	Total	0.5µg/m^3
Zinc oxide fumes	1 hour	Incremental	90µg/m^3

Source: Modified after Table 3-1 of Todoroski (2024a)

6.3.5 Mitigation and Management Measures

The Applicant would continue to review and implement existing air quality management and mitigation measures, outlined below, in accordance with the approved *Dust Management Plan.*

- Apply water from a water cart to construction / excavation / disposal areas, TSF embankments, access ramps and haul routes during dry and / or windy conditions to suppress dust lift-off.
- Visually inspect disposal areas within the TSF on a weekly basis to ensure that no visible dust is emitted.
- Limit operations where practicable during periods of high wind.
- Ensure that the exhausts of equipment used on the Mine Site are diverted away from the ground surface so as not to generate dust.
- Ensure that all trucks transporting drill cuttings / mill trash to the TSF have their loads covered.
- Undertake underground ventilation at the minimum rate required for safe operation of the mining activities.
- Promptly respond to any complaint relating to air quality.
- Undertake all proposed activities in accordance with existing plans and approvals including the *Dust Management Plan.*

It is noted that 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. Todoroski (2024a) indicates that existing air quality control measures appear to be effective based on available air quality monitoring data, and as such no further management and mitigation measures are required.

6.3.6 Assessment of Impacts

The Proposed Modification would not result in any exceedance of dust- or metals-related air quality criteria for the Mine (Todoroski (2024a). The following subsections present an overview of the results of the Air Quality Impact Assessment for the Proposed Modification.

Dust Concentrations

The predicted incremental and cumulative particulate dispersion modelling results at each of the assessed receptor locations for the existing approved operations scenario and Proposed Modification operations scenario are presented in **Table 6.4** and **Table 6.5** respectively. Todoroski (2024a) defines the cumulative (total) impact as the modelled impact associated with the operation of the Mine combined with the estimated ambient background levels (see Section 6.3.2), while incremental impact considers the operation of the Mine in isolation. Associated isopleth diagrams are presented in Appendix C of Todoroski (2024a).

The predicted incremental results show that minimal incremental effects would arise at the residential receptor locations due to the mining operations. The greatest incremental effects were found to occur at receptors R1 and R2, those closest to the Mine Site. The predicted cumulative results indicate that all the assessed receptors would experience levels below the relevant criteria for each of the assessed dust metrics .

The percentage difference in dust levels between the existing approved operations scenario and the Proposed Modification operations scenario is small. Due to the small incremental concentrations observed relative to the criteria, the difference between the existing and proposed scenarios at the assessment locations is very minor relative to the criteria . It is notable that there would be no change between the existing and proposed scenarios for 24-hour outcomes as the peak operations would not change under the Proposed Modification. Therefore, impacts on a peak operating day would remain acceptable and as currently approved.

Table 6.4
Dust Dispersion Modelling Results – Existing Approved Operations

Receptor ID	$PM_{2.5}$ (µg/m³)		PM_{10} (µg/m³)		TSP (µg/m³)	DD* (g/m²/mth)	$PM_{2.5}$ (µg/m³)		PM_{10} (µg/m³)		TSP (µg/m³)	DD* (g/m²/mth)
	Incremental (average concentrations)						Cumulative (average concentrations)					
	24-hr	Ann.	24-hr	Ann.	Ann.	Ann.	24-hr	Ann.	24-hr	Ann.	Ann.	Ann.
	Air Quality Impact Criteria											
	-	-	-	-	-	2	25	8	50	25	90	4
R1	1.4	<0.1	6.2	0.2	0.3	<0.1	13.2	3.1	42.6	7.2	25.4	0.9
R2	1.1	<0.1	4.7	0.1	0.2	<0.1	12.9	3.1	41.1	7.1	25.3	0.9
R3	0.5	<0.1	2.0	<0.1	<0.1	<0.1	12.3	3.1	38.4	7.1	25.2	0.9
R4	0.2	<0.1	0.8	<0.1	<0.1	<0.1	12.0	3.1	37.2	7.0	25.1	0.9
R5	0.6	<0.1	2.9	<0.1	<0.1	<0.1	12.4	3.1	39.3	7.1	25.2	0.9
* Deposited dust												
Source: Todoroski (2024a) – Table 6-1												

Table 6.5
Dust Dispersion Modelling Results – Proposed Modification Operations

Receptor ID	$PM_{2.5}$ (µg/m³)		PM_{10} (µg/m³)		TSP (µg/m³)	DD* (g/m²/mth)	$PM_{2.5}$ (µg/m³)		PM_{10} (µg/m³)		TSP (µg/m³)	DD* (g/m²/mth)
	Incremental (average concentrations)						Cumulative (average concentrations)					
	24-hr	Ann.	24-hr	Ann.	Ann.	Ann.	24-hr	Ann.	24-hr	Ann.	Ann.	Ann.
	Air Quality Impact Criteria											
	-	-	-	-	-	2	25	8	50	25	90	4
R1	1.4	<0.1	6.2	0.2	0.4	<0.1	13.2	3.2	42.6	7.2	25.5	0.9
R2	1.1	<0.1	4.7	0.1	0.2	<0.1	12.9	3.1	41.1	7.1	25.3	0.9
R3	0.5	<0.1	2.0	<0.1	<0.1	<0.1	12.3	3.1	38.4	7.1	25.2	0.9
R4	0.2	<0.1	0.8	<0.1	<0.1	<0.1	12.0	3.1	37.2	7.0	25.1	0.9
R5	0.6	<0.1	2.9	<0.1	<0.1	<0.1	12.4	3.1	39.3	7.1	25.2	0.9
* Deposited dust												
Source: Todoroski (2024a) – Table 6-2												

Metal Concentrations

Todoroski (2024a) estimated the average metal concentrations at each assessment location using the ratio between deposited metal and deposited dust concentrations calculated from monitoring data and the modelled TSP concentrations (see Section 6.2 of Todoroski (2024a)).

Table 6.6 presents the predicted maximum 1-hour average metal and metal oxide concentrations generated at the Mine Site boundary under the Proposed Modification and at the assessment location with the highest predicted level (Receptor R2). For copper, **Table 6.6** shows the criteria for both copper fumes and dust, with predicted levels below both criteria. The results show the concentrations of copper, iron oxide and zinc oxide are below the criteria at both the Mine Site boundary and the most affected receptor location.

Table 6.6
Maximum Incremental 1-hour Average Metal Concentrations

Pollutant	Most Affected Assessment Location	Conc. at Most Affected Assessment Location (ug/m^3)	Maximum Conc. at Site Boundary	Criteria	
Copper	R2	0.01	1.8	3.7 (fumes)	18 (dust)
Iron oxide	R2	0.6	8.1	90	
Zinc oxide	R2	0.03	0.4	90	
Source: Modified after Table 6-3 of Todoroski (2024a)					

Table 6.7 presents the cumulative annual average lead concentrations at the Mine Site boundary and at the assessment location with the highest predicted level (Receptor R1). The results show the predicted lead levels are negligible at both the Mine Site boundary and the most affected receptor location compared to the criterion.

Table 6.7
Cumulative Annual Average Lead Concentrations

Pollutant	Most Affected Assessment Location	Conc. at Most Affected Assessment Location (ug/m3)	Maximum Conc. at Boundary	Criterion
Lead	R1	2.8×10^{-5}	1.3×10^{-3}	0.5
Source: Modified after Table 6-4 of Todoroski (2024a)				

6.3.7 Conclusion

In summary, due to the isolated nature of the Mine Site, the fact that most mining operations would be undertaken using the same activities and methods as are currently approved and implemented, and the management and mitigations measures that would be implemented to control and minimise potential dust emissions, it is expected that air emissions from mining operations associated with the Proposed Modification would continue to be compliant with all relevant criteria. This is supported by the Todoroski (2024a) assessment, which indicates predicted air quality outcomes associated with the Proposed Modification would be below the relevant criteria for each the assessed dust metrics. Similarly, the predicted outcomes for metal concentrations generated under the Proposed Modification would continue to be low and unlikely to present a health risk at privately-owned residences.

6.4 Noise

6.4.1 Introduction

The Proposed Modification has the potential to alter the noise environment around the Mine Site. A *Noise Impact Assessment* was prepared by Todoroski Air Sciences Pty Ltd (Todoroski) to support the Modification Report. The full assessment is presented as **Appendix 7** and is hereafter referred to as Todoroski (2024b). Todoroski (2024b) has been prepared in accordance with the following.

- *Noise Policy for Industry* (NSW EPA, 2017)
- *NSW Road Noise Policy* (NSW DECCW, 2011)
- *Interim Construction Noise Policy* (NSW DECC, 2009)

The following subsection provides an overview of the existing environment with respect to noise and vibration at the Mine Site. Potential impacts from the Proposed Modification are presented, and management 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.

6.4.2 Existing Setting

Approved Operations

The noise environment 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. **Figure 6.2** shows the locations of all non-Mine related sensitive receivers in the vicinity of the Mine Site.

Within the Mine Site, operational noise is generated by:

- transportation of ore and waste rock;
- crushing, grinding and processing of ore;
- construction and use of the tailings storage facility; and
- transportation of copper concentrate to the rail siding.

Underground activities at the Mine Site currently require irregular blasting activities at a depth of at least 100m below ground level.

It is noted that annual noise monitoring is undertaken for the Mine in accordance with Condition L3 of EPL 11254 and the existing and approved *Noise and Vibration Management Plan*. The results of this monitoring indicate that mining and processing operations are generally inaudible at monitoring locations and operational noise emissions generated by the Mine are compliant with all criteria (MAC, 2023).

Background Noise Levels

Todoroski (2024b) uses the minimum Rating Background Levels (**Table 6.8**) for residential receivers as they are the most stringent background noise levels that can be applied in accordance with the *Noise Policy for Industry* (NSW EPA, 2017).

Table 6.8
Adopted Rating Background Level

Period[1]	Adopted Rating Background Noise Levels (dB LA_{90})
Day	35
Evening	30
Night	30
Note 1: Day: period from 7:00am – 6:00pm, Monday to Saturday, or 8:00am – 6:00pm on Sundays and public holidays Evening: period from 6:00pm – 10:00pm Night: all other periods	
Source: Todoroski (2024b) – Modified after Tabel 3-1	

Meteorological Conditions

Metrological conditions were modelled based on the same CALMET model used in the Air Quality Impact Assessment (see Section 6.3.4). Analysis of the CALMET data using Noise Enhancement Wind Analysis shows that that significant winds are characterised to occur in the day period from the south-southeast during winter and spring and in the night-time period from the south-southeast during winter. Based on the location of the Mine Site relative to the residential dwelling located to the south, this receptor would experience these significant winds which would potentially increase perceived noise levels at that location. Temperature inversions can also lead to an increase in received noise levels at larger distances when compared to normal conditions. Temperature inversions are considered to be noise enhancing factor when occurring at more than 30% of the total night-time periods during winter. Analysis of the CALMET data shows that temperature inversions likely occur approximately 34% of the time and hence are a significant feature of the area.

6.4.3 Potential Impacts

Key activities associated with the Proposed Modification that would have the potential to result in noise-related impacts include the following.

- Traffic along Yarrandale Road and on internal haul roads
- Haulage of mined and imported waste rock to the waste rock stockpile extension area.
- Unloading and shaping of waste rock at the waste rock stockpile extension area.
- Construction of the proposed Stages 8 to 10 of the TSF at an increased elevation and involving loading of haul trucks, transport, and unloading of materials.
- Movement of material around the TSF to create embankments.
- Haulage of imported ore material to the ROM pad and loading of ROM material to the crusher.
- Processing of ore material.
- Loading product trucks with concentrate and haulage to the Hermidale Rail Siding.
- Excavation of tailings material from the TSF and loading to road registered trucks for transport.

Noise levels for all other activities associated with the Proposed Modification are expected to remain constant with the existing and approved operational setting.

6.4.4 Assessment Methodology and Criteria

Noise Trigger Levels

In accordance with the *Noise Policy for Industry* (NSW EPA, 2017), the Project Noise trigger Level is determined as the lower (more stringent) value of the Project Intrusiveness Noise Level and Project Amenity Noise Level and are applied to the most affected point at a noise-sensitive receiver. The Project Intrusive Noise Level represents the level below which the intrusiveness of an industrial noise source may generally be considered acceptable, as the level of noise from the source's $L_{Aeq,15min}$ does not exceed the background noise level by more than 5dB. Where the $L_{Aeq,15min}$ represents the equivalent continuous (energy average) A-weighted sound pressure level of the source over 15 minutes. The Project Amenity Noise Level represents the 'objective' or cumulative limit for all industrial noise within a given environment for a sensitive receiver. Todoroski (2024b) used the Rural Noise Amenity Area for the area in the vicinity of the Mine Site in accordance with the *Noise Policy for Industry* (NSW EPA, 2017). The Project Noise Trigger Levels adopted for assessment of the Proposed Modification are set out in **Table 6.9**.

Table 6.9
Project Noise Trigger Levels ($L_{Aeq, 15min}$ dB(A))

Receiver	Noise Amenity Area	Period	Intrusive Noise Criteria ($L_{Aeq\ 15min}$ dBA)	Amenity Noise Level ($L_{Aeq\ 15min}$ dBA)	Adopted Project Noise Trigger Levels ($L_{Aeq\ 15min}$ dBA)
Residential	Rural	Day	40	50	**40**
		Evening	35	45	**35**
		Night	35	40	**35**
Note: Adopted trigger levels are consistent with noise criteria set out in Condition 38 of DA 41/98.					
Source: Todoroski (2024b) – Table 3-3					

Road Traffic Noise Criteria

Table 6.10 presents the relevant road traffic noise criteria adopted by Todoroski (2024b) in accordance with the *NSW Road Noise Policy* criteria (DECCW, 2011).

Table 6.10
Road Traffic Noise Criteria for Residential Land-use

Road Category	Type of Project/ Land Use	Assessment criteria - dBA	
		Day (7:00am-10:00pm)	Night (10:00pm-7:00am)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	L_{Aeq}, (1 hour) 55 (external)	L_{Aeq}, (1 hour) 50 (external)

Construction Noise Levels

Todoroski (2024b) assesses construction noise levels in accordance with the *Interim Construction Noise Guideline* (NSW DECC, 2009).

Assessment Methodology

Todoroski (2024b) developed a computer model including a three-dimension digital terrain map using an Environmental Noise Model noise model to quantify potential noise emissions at sensitive receivers in the vicinity of the Mine Site. The scenario modelled conservatively assumes the maximum number of plant and equipment operating simultaneously at their typical noise emission level and are therefore considered to represent the worst-case scenario.

Todoroski (2024b) modelled potential noise impacts under a single scenario which includes standard operational conditions (e.g. processing, haulage, etc), as well as the construction of the TSF lifts at the proposed maximum elevation. The scenario applies potential worst-case (noise-enhancing) meteorological conditions assuming low wind speeds and a stability category F (most stable atmospheric conditions).

Assumed sound power levels for modelled noise sources are listed in Table 5-1 of Todoroski (2024b).

6.4.5 Mitigation and Management Measures

The Applicant would continue to implement the following mitigation measures to reduce potential impacts on sensitive receptors.

- Switch off plant and equipment engines when they not in use for extended periods.
- Use broadband reversing and low nuisance start up alarms on mobile equipment.
- Modify activity during periods of meteorological enhancement.
- Promptly respond to any complaint relating to noise or blasting.
- Undertake all proposed activities in accordance with existing plans and approvals including the *Noise and Vibration Management Plan.*

6.4.6 Assessment of Impacts

The following subsections present an overview of the results of the Noise Impact Assessment (Todoroski, 2024b) for the Proposed Modification.

Operational Noise

Table 6.11 presents the predicted noise modelling results at the assessed sensitive receiver locations for a single worst-case operational scenario under the Proposed Modification. The results indicate the predicted worst-case scenario noise levels would comply with the applicable Project noise trigger level (i.e. 35 dB(A)) at all assessed receiver locations during all assessed periods.

Table 6.11
Predicted Operational Noise Impacts

Receiver ID	Predicted level (dB(A))	Project Noise Trigger level (dB(A))
R1	<35	35
R2	<35	35
R3	<35	35
R4	<35	35
R5	<35	35

Road Traffic Noise

Todoroski (2024b) used the calculation of Road Traffic Noise (CORTN) to predict the noise levels associated with Mine-related traffic under the Proposed Modification at the closest and most impacted receiver (**Table 6.13**). The results indicate that traffic noise levels would comply with the relevant criteria.

Table 6.12
Road Traffic Noise Levels

Receiver	Road Section	Distance to Residence (km)	Traffic Movements (per hour)	Mine Related Traffic Noise under Proposed Modification (dB(A))	Criteria (dB(A))
R5	Yarrandale Road	0.7	15	<55	55 (daytime)
	Yarrandale Road	0.7	15	<50	50 (night-time)
Source: Todoroski (2024b) – Table 6-2					

Construction Noise

Todoroski (2024b) concluded that no significant risk of construction noise impacts will arise. This is principally due to the necessary construction activities (e.g. the waste rock stockpile extension), requiring similar activities and use of similar plant and equipment utilised for the modelled operational activities. Therefore, similar or lower noise levels to existing operational plant and equipment would be generated.

6.4.7 Conclusion

The Proposed Modification would not result in an exceedance of any relevant noise criteria at any sensitive receiver (Todoroski 2024b). It is therefore predicted that the Tritton Mine would continue to operate with minimal acoustic impacts at privately-owned residences under the Proposed Modification.

6.5 Surface Water

6.5.1 Introduction

The following subsection provides an overview of the existing environment with respect to surface water at the Mine Site. Long-term impacts to surface water quality and/or quantity are not anticipated to occur as the Proposed Modification does not include any novel activities, and all surface disturbance would occur within existing surface water management areas. However, temporary impacts such as increased erosion and sedimentation during construction activities have been identified as a potential risk. In addition, contamination of surface water resources due to damage to or failure of the TSF embankments is conservatively considered as a potential risk. Potential impacts from the Proposed Modification are presented, and additional mitigation and management measures are proposed to reduce or prevent these impacts. This is followed by discussion of any residual impacts relating to the Proposed Modification.

6.5.2 Existing Setting

6.5.2.1 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 is not likely to 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 runoff from disturbed areas in sediment basins.
- Collect any chemicals or process solution within the system and contain on site.
- Reuse clean water where practicable for processing or dust control.

Further detailed information is presented in the *Water Management Plan*. The following presents a summary of key water management principles and practices for the Mine.

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, 90th 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 freeboard 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 TSF is regularly monitored and has been constructed to limit the risk of failure.

6.5.3 Potential Impacts

The primary potential impact to surface water that may result from the Proposed Modification would be damage to the TSF perimeter embankment or lining resulting from construction activities, leading to potential leakage of tailings and possible contamination of surface water resources.

During construction activities, i.e. establishment of the extended waste rock stockpile and construction of the TSF buttressing would likely result in increased risk of erosion and sedimentation, leading to potential degradation of surface water resources.

6.5.4 Mitigation and Management Measures

Risks to water quality from the Proposed Modification relate principally to potential contamination or failure of the TSF. These risks are currently managed through the design and operational control measures described in the existing approved *Water Management Plan*, *Erosion and Sediment Control Plan*, and *Waste Rock Characterisation and Management Plan* and 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.

- Prior to commencement, undertake a visual inspection of all surface water management infrastructure within the vicinity of any proposed activity, and including the downstream 'receiving' infrastructure, to assess condition and identify any management/maintenance actions that may be required. Undertake any required maintenance prior to commencement.
- At all times adhere to the *Erosion and Sediment Control Plan*, including the use of temporary control measures, as required.

In addition, the following operational safeguards and procedures would be implemented during excavation of tailings from the TSF to minimise risks to surface water quality.

- All excavation and emplacement activities would be located a minimum of:
  - 80m from the inner edge of the embankment; and

  - 150m from the inner edge of the decant pond.

  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.
- Conduct weekly visual inspections of the cells to ensure that water is not ponding in them or near the perimeter embankment following deposition.
- Backfill the cells with waste material 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.

6.5.5 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. Furthermore, existing erosion and sediment controls are considered adequate to manage potential temporary impacts during construction activities. Notwithstanding the above, the Applicant would continue to monitor surface water and groundwater quality. These results would continue to be reported in the Annual Review which is distributed to all applicable regulatory authorities.

6.6 Visual Amenity

6.6.1 Introduction

The following subsection provides an overview of the existing environment with respect to visual amenity at the Mine Site. Potential impacts from the proposed modification are presented, and management 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.

6.6.2 Existing Setting

Visual amenity impacts of the existing approved operations are limited to obstructed views of Mine infrastructure from vehicles travelling on Yarrandale Road. The principal components of the Mine Site that are visible from Yarrandale Road are as follows.

- the southern end of the Tailings Storage Facility;
- the Waste Rock Emplacement;
- the Processing Plant;
- the mullock Stockpile Areas;

- the Hoisting Shaft Headframe and Winder; and
- the Administration and Workshop area.

Considering the remote location of the Mine Site, these visual amenity impacts have previously been assessed to be acceptable.

6.6.3 Potential Impacts

The Proposed Modification would result in an increase in the elevation of the approved TSF from approximately 18m above ground level or 272m AHD to a proposed approximately 24m above ground level or 278AHD. The increased size of the TSF would be visible to users of Yarrandale Road. However, the structure would not be visible form surrounding residences. In addition, the proposed extension to the waste rock stockpile would result in an increase in the total area of waste rock stockpile visible from Yarrandale Road.

6.6.4 Mitigation and Management Measures

The following mitigation measures would be implemented to minimise potential visual amenity impacts.

- Promptly respond to any complaint relating to visual amenity.
- Undertake all proposed activities in accordance with existing plans and approvals.

6.6.5 Assessment of Impacts

Based on the relative isolation of the Mine Site and the proposed visual amenity related controls, it is considered that the Proposed Modification would not result in significantly visual amenity impacts. It is noted that the Proposed Modification would not include the construction of any novel landforms, rather the proposed elements would be constructed against the backdrop of an existing mine site that has operated for over 20 years. In addition, as all NAF waste rock stored in the existing and proposed waste rock stockpiles would be used for rehabilitation and final landform establishment at the time of Mine closure, the waste rock stockpiles would only be a temporary feature in the landscape with the final topography to be consistent with the pre-disturbance landform.

6.7 Transportation and Traffic

6.7.1 Introduction

The following subsections provide an overview of the existing transportation and traffic setting for the Mine as well as for the larger Tritton Copper Operations. It is noted that multiple components of the Proposed Modification do not include transportation. All transport between the Tritton Mine and other mines within the Tritton Copper Operations is approved under the other operation. Further information on other approvals that would be required is presented in Section 4.7 and **Appendix 1**. Potential impacts from transport associated with the Proposed

Modification are presented, and additional mitigation and management measures are proposed to reduce or prevent these impacts, where required. This is followed by discussion of any residual impacts relating to the Proposed Modification, and how these impacts will be monitored.

6.7.2 Existing Setting

The following transportation activities are approved to occur under DA 41/98.

- General vehicle movements required for typical operation of the Mine Site (i.e. regular light vehicle movements, delivery of consumables / infrastructure / mobile plant etc as required) (**no limit on total movements**).
- Heavy vehicle movements associated with the
  - transportation of mineral concentrate between the Mine Site and the Hermidale Rail Siding (**no more than 2,050 movements per annum**).
  - receipt of drill cuttings at the Tritton Mine (**no more than 100 vehicle movements per annum**).

Approval to undertake all other transportation activities is held by other operations. This includes heavy vehicle movements for the importation of mined materials to the Mine Site, and heavy vehicle movements for the export of tailings material from the Mine Site.

Yarrandale Road is a local road, managed by Bogan Shire Council. The full length of Yarrandale Road from Hermidale to the intersection with Booroomugga Road and from the intersection of Booroomugga Road with Yarrandale Road to the North East Copper Mine has been sealed. Vehicles entering the public road network from the Mine Site at Yarrandale Road have clear access and sight distance. The sight distance is estimated to be in the order of 900m and provides excellent visibility of approaching traffic. Traffic volumes on Yarrandale Road are generally very low with limited public use of this road. It is estimated that local use of the Yarrandale Road involves between 20 to 40 light vehicles movements per day, principally for local access to rural properties. The road is therefore predominantly used for the mining operations and local residents are aware of the presence of road trains on this road.

6.7.3 Potential Impacts

The Proposed Modification would result in an increase in the total heavy vehicle movements associated with the transportation of mineral concentrate from the Mine Site to the Hermidale Rail Siding. Based on a processing rate of 1.8Mpta, the Mine would generate an additional 300 laden heavy vehicles per year on average, for a total of 2,650 heavy vehicle movements per year. Notwithstanding the above, there would be no change to the current daily peak of no more than 10 heavy vehicle movements per day.

In addition to the above, due to the proposed extension to the life of the Mine, the existing and proposed impacts associated with traffic and transportation would be experienced for a longer period.

As the Tritton Mine is the centre of processing activities for the Tritton Copper Operations, all transport activities linking other mines to the Tritton Mine are approved under those operations and do not require assessment for the Proposed Modification.

6.7.4 Mitigation and Management Measures

The Applicant manages the existing traffic and transportation setting under the approved *Traffic Management Plan* and in accordance with DA41/98. This includes, but is not limited to the following.

- Development and implementation of a Drivers' Code of Conduct.
- Covering of all loads.
- Coordination with local bus operators to avoid school bus times.

The Applicant would review the existing *Traffic Management Plan* in the context of the Proposed Modification to ensure that existing controls remain relevant and effective. No other management and mitigation measures are anticipated to be required for the Proposed Modification.

6.7.5 Assessment of Impacts

Based on the proposed operational controls, the proposed increase in heavy vehicle movements between the Mine Site and the Hermidale Rail Siding is not expected to result in significant environmental impacts to the local traffic environment as experienced on an everyday basis.

Similarly, any potential longer-term impacts associated with the proposed extension to Mine life are not expected to result in any significant changes to daily life for local road users. The Applicant has operated the Mine as well as the wider Tritton Copper Operations for several decades without any major traffic-related incident. In addition, no traffic-related complaints have been made to the Applicant in recent years for the operating mines. Based on the above, the proposed increase in the total time where Mine-related traffic would use the local road network is not expected to result in any significant impacts.

From a cumulative perspective, the combined traffic generation associated with the Tritton Copper Operations would continue to be minor. Yarrandale Road is infrequently used by light vehicles and peak traffic generation is not expected to change significantly. Yarrandale Road remains in good condition and has been constructed to suit the intended use. As a result, traffic-related risks under the Proposed Modification are expected to remain similar to existing operations.

6.8 General Environmental Issues

The Applicant considers that the remaining environmental impacts associated with the ongoing operations under DA 41/98, as modified, would remain generally consistent with existing approved operations.

Table 6.13 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 6.13
Assessment of Impacts for Remaining Environmental Issues

Objectives	Existing Environment	Management/Mitigation Measures	Impact Assessment
Soil and Land Capability			
To ensure that the Proposed Modification includes an environmentally sound approach to soil management and rehabilitation.	The Tritton Mine is an active mine site. Soil resources have been previously stripped and soil stockpiles established. Progressive and final rehabilitation is described in the *Rehabilitation Management Plan*.	The Proposed Modification would not result in the disturbance of any additional land that has not previously been disturbed for mining activities. In addition, the progressive and final rehabilitation measures identified in the *Rehabilitation Management Plan* 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.
Aboriginal Heritage			
To identify any sites of Aboriginal heritage value and consider the area within a regional Aboriginal heritage context.	The location of all known Aboriginal heritage sites that are within or in the vicinity of the Mine Site are presented in the *Cultural Heritage Management Plan*. In summary, other than those that have been approved to be removed within the footprint of the TSF, no remaining sites are located within or near to any core operational areas of the Mine Site.	The Proposed Modification would not disturb any land that has not previously been approved for disturbance and therefore no additional control measures or assessments 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.
Biodiversity			
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 Site has been completed and it 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 significant native 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.
Groundwater			
To ensure that operation of the Mine Site does not result in significant impacts to groundwater quality or quantify, except as approved.	Operation of the Mine Site includes interaction with groundwater, including through licenced take of groundwater. Groundwater impacts are managed in accordance with the approved *Water Management Plan*. The Proposed Modification does not include any activities that would impact on the existing groundwater setting for the Mine.	The Proposed Modification would not require any additional management and mitigation measures.	The Proposed Modification would not result in any impact to the existing and approved groundwater setting.

Table 6.13 (Cont'd)
Assessment of Impacts for Remaining Environmental Issues

Objectives	Existing Environment	Management/Mitigation Measures	Impact Assessment
Socio-economic			
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 Mine and consequently the continued social and economic benefits of the Mine.

7. Evaluation of Merits

7.1 Introduction

As a conclusion to the *Modification Report*, the Project is evaluated and justified through consideration of its potential impacts on the environment and potential benefits to the local and wider community.

The evaluation of the Project is undertaken by firstly assessing the statutory requirements that apply to the modification through consideration of:

- Section 4.55(2) of the EP&A Act in relation to the permissibility of modification to development consent for State significant development; and
- Section 4.15(1) of the EP&A Act in relation to the evaluation of applications for development in general.

The Project is then evaluated as a whole against the principles of Ecologically Sustainable Development (ESD) in order to provide further guidance as to the acceptability of the Project.

Section 7.4 presents the justification of the Project and revisits any residual impacts on the biophysical and social environment as a result of the Proposed Modification and reviews the Project against the objects of the EP&A Act.

7.2 Statutory Requirements

7.2.1 Section 4.55(2) Considerations (EP&A Act)

As described in Section 1.1, the Proposed Modification is being made under Section 4.55(2) of the EP&A Act which is provided in full below.

> *(2) **Other modifications.** A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if -*
>
> *a) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and*
>
> *b) it has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 4.8) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and*
>
> *c) it has notified the application in accordance with:*
>
> *(i) the regulations, if the regulation so require, or*
>
> *(ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and*
>
> *d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.*

The following subsections provide an evaluation of the Proposed Modification against these provisions.

Substantially the Same Development

The Proposed Modification to DA 41/98 to permit the proposed optimisation of existing mining operations and the further integration of the Mine with the Company's other approved and proposed operations in the region is considered to be materially consistent with the activities approved under DA 41/98. While there are a number of proposed changes to the operation, these changes are of the same essence as those currently occurring and do not represent a radical transformation of the Mine. Under the Proposed Modification, the Project would remain "substantially the same development" as that approved under DA 41/98 for the following reasons.

- The scale of the Proposed Modification would be relatively minor in comparison to the approved Mine.
- Existing site infrastructure would remain the same; the existing processing plant and ROM Pad are sufficient to support the proposed activities.
- The proposed importation of material from 1Mtpa to 1.8Mtpa represents a change from sourcing the majority of ore material from the underground mining operations to a greater proportion of import from other sources, however as the transportation activities are approved elsewhere, the change is not material in nature and limited to the proposed change in processing (1.4Mtpa to 1.8Mtpa).
- The environmental impacts of the Project as modified would be similar to the impacts of the approved Mine with the external experience of the Mine largely unchanged.
- The proposed increase to production intensity and material handling at the Tritton Mine over an extended period is not expected to generate noise or air quality impacts discernible at nearby residences.
- The minor environmental impacts that are currently experienced would continue to be managed through conditions of consent.
- The inclusion of additional locations for the export of tailings and import of waste material is consistent with existing approved operations, with only the locations for export and the source of waste materials to change.
- The traffic-related risks under the Proposed Modification would remain similar to existing operations as Yarrandale Road is infrequently used by light vehicles and peak traffic generation is not expected to change significantly. Currently the transport of mined material from external sources is approved under the development consent for the source of the material and therefore assessment of environmental impacts associated with transportation of mined material is undertaken for the source.

Consultation with the relevant Minister, public authority or approval body

This is a matter for DPHI to consider during its assessment of the proposed modification.

Notification of the Application

This is a matter for DPHI to consider, however it is anticipated that DPHI will notify the application to relevant stakeholders.

Submissions Regarding the Proposed Modification

This is a matter for the DPHI to consider. However, the Applicant would be pleased to respond to any submissions received by DPHI during the assessment process.

7.2.2 Section 4.15(1) Considerations (EP&A Act)

Section 4.15(1) of the EP&A Act sets out the matters for consideration by a consent authority when determining an application for development consent.

(1) ***Matters for consideration—general***

In determining a development application, a consent authority is to take into consideration such of the following matters as are of relevance to the development the subject of the development application:

a) the provisions of:

(i) any environmental planning instrument, and

(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Planning Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and

(iii) any development control plan, and

(iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and

(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), and

(v) (Repealed)

that apply to the land to which the development application relates,

b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,

c) the suitability of the site for the development,

d) any submissions made in accordance with this Act or the regulations,

e) the public interest.

The following subsections provide an evaluation of the Proposed Modification against these provisions.

Environmental Planning Instruments, Plans and Regulations (Section 4.15(1a))

All relevant environmental planning instruments, plans and regulations are addressed in Section 4. In summary, the Proposed Modification is permissible and consistent with the aims and objectives of relevant local and State environmental legislation and guidelines.

Likely Impacts of the Development (Section 4.15(1b))

Section 6 provides an assessment of the environmental factors potentially impacted by the Proposed Modification. The proposed management and mitigations measures would limit potential environmental impacts and the modification would not generate adverse environmental impacts beyond those already approved for the Mine.

Suitability of the Site (Section 4.15(1c))

Operations have been undertaken at the Mine Site since 1998. The Proposed Modification would not require any changes to the existing and approved land uses within the Mine Site, nor require the disturbance of any lands not already approved for use for mining purposes.

Submissions (Section 4.15(1d))

It is anticipated that DPHI will take any submissions into consideration during the assessment of this application.

The Public Interest (Section 4.15(1e))

The Applicant considers that the Proposed Modification serves the public interest as it would allow for the continued safe and efficient operation of the Mine while increasing operational efficiency of the existing and proposed mining operations within the wider Tritton Copper Operations. The Mine has an important role in the local community and currently employs 404 personnel (at year end 2023). Employment of local personnel provides additional flow-on benefits to the local community. Additionally, the environmental outcomes would be consistent with existing Mine operations resulting in no additional significant impacts and an improved environmental outcome from the disposal of waste materials on-site, reducing reliance on Council-owned facilities.

It is therefore concluded that the Proposed Modification is in the public interest through the continued operation of the Mine in a safe and environmentally responsible manner and the provision of ongoing local economic benefits.

7.3 Ecologically Sustainable Development

7.3.1 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), recognised for over two decades, are based upon meeting the needs of the current generation while conserving our ecosystems for the benefit of future generations. In order to achieve sustainable development, recognition needs to be placed upon the integration of both short-term and long-term environmental, economic, social and equitable objectives.

The four principles of sustainable development are as follows.

- The precautionary principle.
- The principle of intergenerational equity.
- The principle of the conservation of biodiversity and ecological integrity.
- The principle for the improved valuation, pricing and incentive mechanisms.

7.3.2 Precautionary Principle

Satisfaction of the precautionary principle rests on the available understanding of environmental risk and the assessment of consequences of management. In order to satisfy this principle, emphasis must be placed on anticipation and prevention of environmental damage where uncertainty exists, 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. Where uncertainty existed a conservative approach to assessment was assumed and justified with programs for ongoing management and monitoring to occur in the event of unexpected outcomes.

The Applicant has designed control measures to anticipate potential environmental impacts relating to activities proposed under the Proposed Modification, which are detailed in Section 6.

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.

7.3.3 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.

- The Applicant seeks 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.
- The proposed increase to the annual processing rate (1.4Mtpa to 1.8Mtpa) would be achieved using the existing processing infrastructure at the Mine. The proposed importation of material from 1Mtpa to 1.8Mtpa would represent a change from sourcing the majority of ore material from underground mining operations to a greater proportion of import from other mines within the Tritton Copper

Operations. This approach enables the Applicant to utilise existing infrastructure at the Mine to its full capacity while supporting efficient mining operations at the Tritton Copper Operation mines.

- The extension of the waste rock stockpile and the raise of the TSF would ensure the continued safe and efficient operation of the Tritton Copper Mine. The proposed activities would be undertaken within previously disturbed areas, thus ensuring impacts to biodiversity and heritage values are avoided.

The Proposed Modification would allow for the continued safe and 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 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.

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

7.3.5 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.

- The Proposed Modification would allow for mining operations to continue in a profitable, safe and environmentally responsible manner.
- The Proposed Modification has been designed to minimise surface disturbance.
- 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 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 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 for post-mining land uses that are conducive to pre-mining and surrounding uses, namely agricultural production and nature conservation.

7.3.6 Conclusion

The Proposed Modification would encourage the safe, efficient and environmentally responsible operation of the Mine so that maximum benefit is achieved for the Applicant, the Bogan Shire Council, the local community and the communities of the future. The design of the Proposed Modification achieves a significant overall benefit and sustainable outcome for the local and wider environment.

7.4 Justification of the Proposed Modification

7.4.1 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.

7.4.2 Biophysical Considerations

Section 6 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.

Noise and Air Quality

Due to the isolated nature of the Mine Site, the fact that most mining operations would be undertaken using the same activities and methods as are currently approved and implemented, and the management and mitigations measures that would be implemented to control and potential noise and dust emissions, it is expected that noise and dust emissions from mining operations associated with the Proposed Modification would continue to be compliant with all relevant criteria.

Visual Amenity

Based on the relative isolation of the Mine Site and the proposed visual amenity related controls, it is considered that the Proposed Modification to surface infrastructure, namely the TSF raise and extension of the waste rock stockpile , would not impact significantly on visual amenity. The proposed changes also do not include any novel landform features and are therefore not considered likely to be readily perceived by users of Yarrandale Road. In addition, as far as practicable all waste rock stored in the waste rock stockpile would be used for rehabilitation and

final landform establishment at the time of Mine closure. Based on the above, the waste rock stockpile would only be a temporary feature in the landscape with the final topography to be largely consistent with the pre-disturbance landform.

Traffic and Transportation

Several elements of the Proposed Modification involve changes to the existing traffic and transportation environment. However, the principal impacts associated with the Proposed Modification would be a minor increase in heavy vehicle movements between the Mine Site and the Hermidale Rail Siding. Notwithstanding the above, the daily experience of traffic levels using that section of Yarrandale Road is not expected to be impacted, as the proposed increases would not impact on the current daily peak traffic levels.

From a cumulative perspective, the combined traffic generation associated with the Tritton Copper Operations would continue to be minor. Yarrandale Road is infrequently used by light vehicles and peak traffic generation is not expected to change significantly. Yarrandale Road remains in good condition and has been constructed to suit the intended use. As a result, traffic-related risks under the Proposed Modification are expected to remain similar to existing operations. The Proposed Modification does not seek approval for the increased importation of mined materials to the Mine Site from other sources.

7.4.3 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 Mine as well as all other existing and proposed mines within the Tritton Copper Operations and consequently the continued distribution of the economic benefits of the Applicants regional operations. Any changes to local amenity or the local experience of the mining operation would be difficult to discern from existing approved operations.

7.4.4 Consequences of Not Proceeding with the Proposed Modification

The principal consequence of not proceeding with the Proposed Modification relates to the need to identify an alternative location for mined ore processing, tailings management and waste management for the proposed Constellation Mine. In addition, the intended return of tailings material and waste management would be required from alternative locations. The Proposed Modification proposes the most efficient use of the current operations, limiting impacts elsewhere while ensuring that the Applicant may make the most of existing infrastructure and its existing mining operations. The proposed raise to the TSF represents a minor risk when compared to the possible development of an alternative TSF elsewhere. The Applicant is proposing to avoid the need to replicate mining infrastructure across its various operations, which would be expensive, duplicate environmental impacts and have a shorter useful life than might otherwise be possible. If the Proposed Modification were not to proceed, these benefits would be forgone and minor changes to local amenity would be avoided.

With the approved cutback operations at the Murrawombie Copper Mine scheduled to commence during 2025, there is a limited window of opportunity for the diversion of suitable waste rock from the Murrawombie Copper Mine Site to the Mine Site. Should that not occur and a material deficit at the Mine Site be identified, alternative sources of material would need to be identified, including but not limited to re-mining of any of the existing waste rock stockpiles within the Tritton Copper Operations. Those activities would require disturbance of rehabilitated areas and additional development consents for the activities to occur.

In addition, the ongoing use of the Tritton Landfill presents an opportunity to divert Inert Waste Class 1 and Class 2, and Solid Waste Class 1 away from Council's landfill to an existing landfill at the Mine Site that would be rehabilitated along with other Mine-related infrastructure. Should this opportunity be foregone, all wastes would need to be sent to the Bogan Shire Council landfill at a higher cost and ultimately reducing the operating life of that landfill.

Based on the above, the consequences of not proceeding with the Proposed Modification would directly and indirectly impact on the operation and economic viability of the existing and proposed mines within the Tritton Copper Operations.

7.5 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 objects 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 Mine and the wider Tritton Copper operations; and
- promote orderly development of the regional copper resource.

7.6 Conclusion

The Proposed Modification presents an opportunity to further integrate operations at the Tritton Mine with the broader Tritton Copper Operations, principally with the proposed Constellation Copper Mine. The Proposed Modification would permit the Applicant to accommodate processing and waste management activities within the Mine Site over the life of the Constellation Mine and avoid the need to replicate these activities at the Constellation Mine Site. The includes raising the existing TSF rather than constructing a new TSF elsewhere. With the proposed integration of all of its existing operations, the Applicant can further improve operating efficiencies such as through improved transport management as well as waste management and disposal, ultimately avoiding environmental impacts. In addition, it is proposed to optimise existing approved operations to support planned processing activities and to improve preparations for rehabilitation of the Mine Site.

Implementation of the Proposed Modification, including the ongoing operation of the Mine to 2036, would have the following significant benefits to the local community within the Bogan Shire and NSW.

- Continued mining operations in a location that is separated from private residences and other sensitive and uses.
- Improved mining and operational efficiencies with no new surface disturbance and minimal additional environmental impact.
- Support for proposed and existing operations within the Tritton Copper Operations.
- The continued employment of personnel including the current 76% of staff whom reside in the Bogan Local Government Area and contribute to the diversity and sustainability of the region.
- The continued growth and distribution of the economic benefits of the Mine locally and regionally through the use of local services and businesses.
- The ongoing supply of copper to domestic and international markets that is consistent with the objectives identified in the NSW *Critical Minerals and High-tech Metals Strategy 2024-35* (DPIRD, 2024). The copper supply is essential to support growing demand for electricity transmission (supporting the decarbonisation of the power grid) and use in electric vehicles and the renewable energy sector.

The Applicant intends to remain a major source of employment and services in the Bogan Local Government Area. To do this, the mines within the Tritton Copper Operations will need to change. The Proposed Modification maintains and supports the existing operations at the Tritton Mine while also accommodating the proposed Constellation Copper Mine. It is considered that changes to local amenity or the local experience of the mining operation as a result of the Proposed Modification would be difficult to discern from existing approved operations. However, the social and economic benefits associated with the existing and proposed Tritton Copper Operations would continue to be substantial. It is therefore concluded that the proposed medication would firmly be in the public interest.

8. References

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Todoroski Air Science Pty Ltd (Todoroski) (2024b). *Noise Impact Assessment,* presented as **Appendix 8** of this document.

Appendices

Appendix 1 Updated Project Description

Appendix 2 Tritton Copper Operations Approval Matrix

Appendix 3 CMW Preliminary Engineering Designs for TSF

Appendix 4 Tailings Extraction Report

Appendix 5 Approved Rehabilitation Objectives Statement for ML1544

Appendix 6 Air Quality Impact Assessment

Appendix 7 Noise Impact Assessment

Appendix 1

Updated Project Description

(Total No. of pages including blank pages = 4)

DESCRIPTION OF THE TRITTON COPPER MINE

INTRODUCTION

This report presents the Revised Project Description for the Tritton Copper Mine as approved under DA41/98. The Tritton Copper Mine is owned and operated by Tritton Resources Pty Ltd (Tritton) and is located approximately 45km northeast of Nyngan and 22km southwest of Girilambone, NSW (the Mine Site) For the purposes of this report, the Mine Site refers to the area covered by Mining Lease 1544, as shown on **Figure A.1**. The proposed changes to the Project under Modification 9 are presented in red text.

PROJECT DESCRIPTION – EXISTING AND PROPOSED

Table A.1
Description of the Tritton Copper Mine

Project Component	Project Description – Mod 8 (Existing)	Project Description – Mod 9 (Proposed)
Tenement	Mining Lease (ML) 1544	No change
Mine Site	Area as covered by ML 1544	No change
Mine Site Access	Yarrandale Road	No change
Duration of Mining Activities	21 December 2028	31 December 2036
Mining Methods	Underground only	No change
Mined Deposits and Reserves	Tritton (10.2 million tonnes (Mt)) and Budgery (2.6Mt)	No change
External Ore Sources	Murrawombie Copper Mine (ML 1280, MPL 294, MPL 295) North East Copper Mine (ML 1383) Avoca Tank Project (ML 1818)	Murrawombie Copper Mine (ML 1280, MPL 294, MPL 295) North East Copper Mine (ML 1383) Avoca Tank Project (ML 1818) Constellation Copper Mine (pending approval).
Annual Externally Sourced Ore	1Mt per annum (pa)	1.8Mtpa cumulative with waste rock
Annual Processing Rate	1.4 Mtpa	1.8 Mtpa
Processing Methods	Crushing and Grind Circuit Floatation	No change
Product	Copper Concentrate (no limit)	No change
Despatch Route	Mine Site to Hermidale Rail Siding via Yarrandale Road.	No change.
Annual Despatch Limit	No limit	No change

Table A.1 (Cont'd)
Description of the Tritton Copper Mine

Project Component	Project Description – Mod 8 (Existing)	Project Description – Mod 9 (Proposed)
Tailings Use (Annual Limit)	Emplacement within Tailings Storage Facility (TSF) (Nil) Paste Fill (Nil) Export to Murrawombie Copper Mine (265,000tpa)	Emplacement within Tailings Storage Facility (TSF) (Nil) Paste Fill (Nil) Export to any mine within Tritton Copper Operations (1Mtpa)
Tailings Storage Facility	Area: Approximately 157 hectares (ha) Maximum Elevation and Height: 272m Australian Height Datum (AHD), 20m. Construction: Valley Fill / Upstream Lift Discharge: Perimeter Capacity: 12.5Mt (approx.) Lifts / Stages: 7	Area: Approximately 157.9 hectares (ha) Maximum Elevation and Height: 278m Australian Height Datum (AHD), 26m. Construction: Valley Fill / Upstream Lift Discharge: Perimeter Capacity: 19.5Mm^3 (approx.) Lifts / Stages: 10
Waste Rock Management	Export (Road base / construction material) (30,000tpa) NAF Import (Nil)	Export (Road base / construction material) (30,000tpa) Waste Rock Import (1.8Mtpa[1])
Water Supply Sources	Macquarie and Cudgegong Regulated Rivers Water Source • WAL 9374 (High Security Licence) – 705ML • WAL 9375 (General Security Licence) – 210ML • WAL 9940 (Supplementary Licence) – 16ML • WAL 43405 (Unregulated River) – 0ML Lower Bogan Unregulated River Water Source • WAL 34407 – 931ML (Unregulated River (Regulated Supply)) Lachlan Fold Belt Murray Darling Basin (MDB) Groundwater Source • WAL 31049 (Aquifer Access) – 10ML • WAL 31090 (Aquifer Access) – 30ML • WAL 31041 (Aquifer Access) – 304ML	No change

[1] Cumulative with imported ore

Table A.1 (Cont'd)
Description of the Tritton Copper Mine

Project Component	Project Description – Mod 8 (Existing)	Project Description – Mod 9 (Proposed)
Water Management Infrastructure	Environmental Pond Sediment Dam(s) Clean Water Diversion(s) Contaminated Water Storage(s) Clean Water Storage(s)	No change
Ancillary Infrastructure	Box Cut and Portal Ventilation Rise(s) (3) General supporting infrastructure, including but not limited to: Office(s), Amenities, Workshop(s), Exploration / Coreyard, Bioremediation Facility, Magazine(s), Hardstand / Laydown Area(s), Parking. Biological / Rehabilitation Resources Stockpile(s). Communication and Services Infrastructure and Connections. Internal access roads (light and heavy vehicle)	No change
Hours of Operation	General: 24 hours / 7 days a week Waste Rock Export: between 7:00am and 10:00pm Surface Blasting: between 9:00am and 6:00pm Monday to Friday (excluding public holidays) (or as approved by EPA)	No change
Waste Disposal	Landfilling (solid and inert wastes) Irrigation (sewerage)	No change
Waste Receival	For Landfilling: Solid and Inert Waste generated at Tritton (Environmental Protection Licence (EPL) 11245), Murrawombie, North East and/or Avoca Tank Copper Mines (EPL 4501). For Disposal in TSF: Drill Cuttings (50 laden loads per calendar year)	For Landfilling: Solid and Inert Waste generated at any mine within the Tritton Copper Operations For Disposal in TSF: Drill Cuttings (50 laden loads per calendar year)

PROJECT LAYOUT

Figure A.1 presents the indicative approved and proposed layout of the Mine Site as generally described in **Table A.1** and as generally described in Condition 1 of Part A of DA41/98.

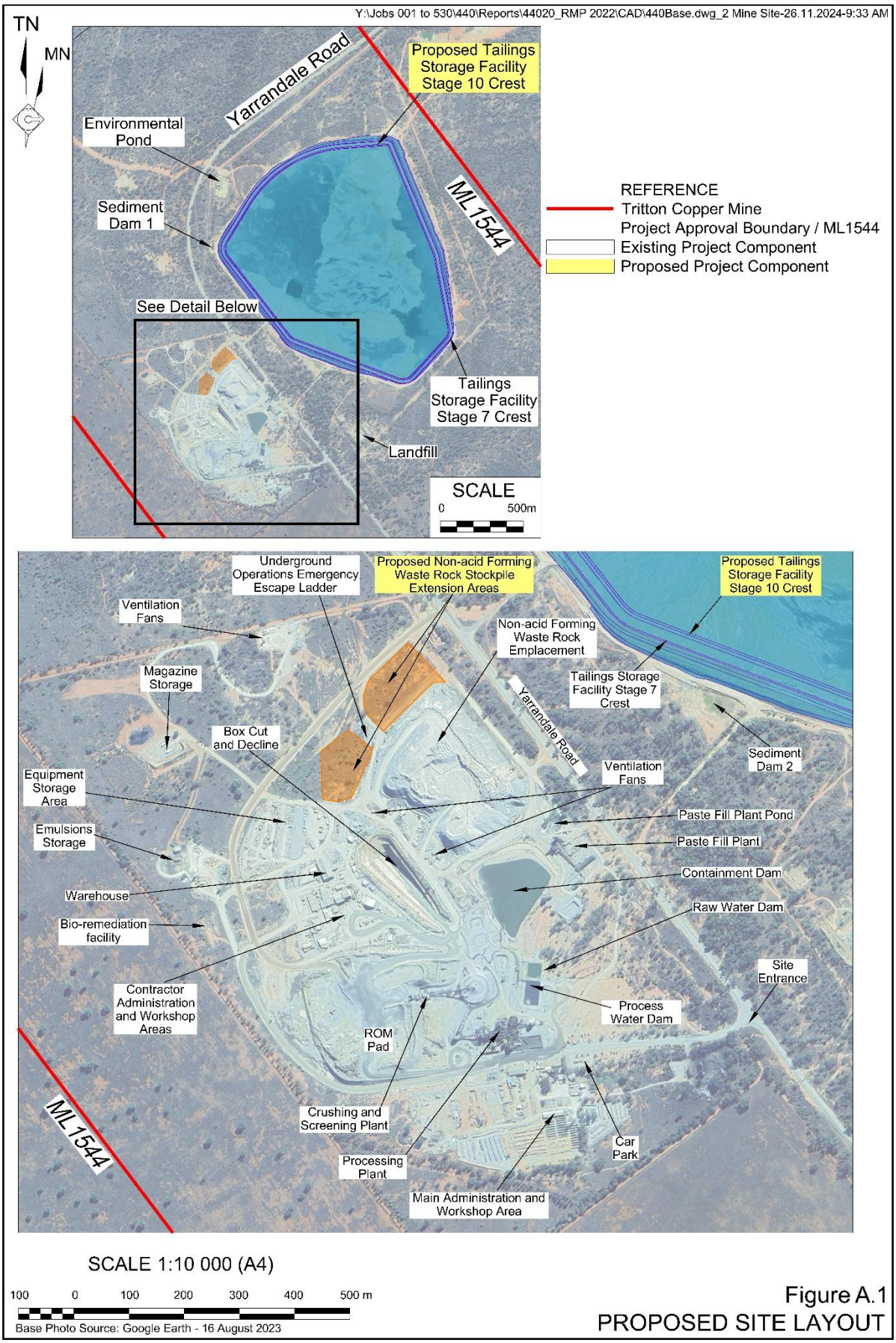

Figure A.1
PROPOSED SITE LAYOUT

Appendix 2

Tritton Copper Operations Approval Matrix

(Total No. of pages including blank pages = 2)

Activity	Mining Development				
	Tritton	**Murrawombie**	**North East**	**Avoca Tank**	**Constellation (as proposed)**
Principal Approval	DA41/98 (as modified)	DA1/91 (as modified)	DA6/95 (as modified)	DA10/2015/004/001 (as modified)	SSD 41579871
Operating Life	21 December 2028 31 December 2036	No expiry	No expiry	No expiry	16 years from date of approval
Processing Limit	1.4Mtpa 1.8Mtpa	No limit	Nil	Nil	Maximum production of 1.8Mtpa
Ore Export (Destination - Limit)	Nil	Tritton – 1Mtpa	Murrawombie – no limit	Murrawombie (via North East) – no limit	Murrawombie – 1Mtpa
Ore Import (Source – Limit)	Murrawombie (including North East and Avoca) - 1Mtpa All Tritton Copper Operations - 1.8Mtpa	North East and Avoca Tank – no limit	Avoca Tank – no limit	Nil	Nil
Ore Processing (Method – Limit)	Flotation - 1.4Mtpa Flotation - 1.8Mta	Heap Leach Pads and Solvent Extraction Electro Winning – no limit	Nil	Nil	Heap Leach Pads – 2Mt (total)
Tailings Disposal	TSF	Heap Leach Pads	Nil	Nil	Heap Leach Pads
Tailings Use	Paste Fill	Paste Fill	Nil	Nil	Paste Fill
Tailings Export (Destination – Limit)	Murrawombie – 265,000tpa All Tritton Copper Operations – 500,000tpa	Nil	Nil	Nil	Nil
Tailings Import (Source – Limit)	Nil	Tritton – 265,000tpa	Nil	Nil	Tritton - Unlimited
Product Despatch (Route – Limit)	Yarrandale Road (HV) to Hermidale rail siding - Nil	Yarrandale Road (HV) to Mitchell Highway - Nil	Nil	Nil	Okeh Road (HV) to Mitchell Highway (1Mtpa) and Yarrandale Road to Tritton
Waste Rock Export (Use – Limit)	External Constrution - 0.03Mtpa	Nil	Nil	North East – no limit	Nil
Waste Rock Import (Source – Limit)	Nil All Tritton Copper Operations – up to 1.8Mtpa cumulative with ore	Road Base from Tritton	Avoca Tank – no limit	Road Base from Tritton	Road Base from Tritton

Key	Approved	Proposed	External Approval or Modification Required

Appendix 3

CMW Preliminary Engineering Designs for TSF

(Total No. of pages including blank pages = 124)

9 March 2018

RAISING OF TD1, STAGES 6 AND 7

TRITTON MINES, NSW

DSC DESIGN REPORT

Tritton Resources Pty Ltd

Ref. PER2017-0066AB Design Report Rev0

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

www.cmwgeosciences.com

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Appendix D – Stability Analyses Results
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1 INTRODUCTION

This report presents the design for the Stage 6 and 7 raising of Tailings Dam 1 (TD1) at Aeris' Tritton Mines located west of Nyngan near Hermidale in NSW.

TD1 is situated at the Tritton Mines which are located approximately 65km west of Nyngan on the Yarrandale Road, which joins the townships of Hermidale and Girilambone. The approximate centre of the tailings dam is at mine grid 20,200mN and 31,500mE or AMG 6,527,300mN and 474,500mE. A project location plan is presented as Figure 1 and a site plan as Figure 2.

TD1 was commissioned in 2004. TD1 has been raised in several stages between 2007 and 2017 (Stage 2 (2007), Stage 3 (2008-2010), Stage 4 (2013-14) and Stage 5 (2017)).

This design report covering Stages 6 and 7 was commissioned by Jamie Barrow of Tritton Resources Pty Ltd by a purchase order 4500118972, dated 14 August 2017.

1.1 Objectives

The design report is required to document the design of Stages 6 and 7 raising of TD1 for submission to the NSW Dams Safety Committee (NSW DSC) for approval as well as other government regulatory stakeholders including the NSW Planning and Environment (NSW PE). It should be noted that the raising of TD1 to the Stage 7 crest RL272.0 already has EPA NSW approval. It is understood the approval was granted under Notice of Modification for MOD 4 of Condition 2(10) of DA 41/98 via email correspondence dated 2 November 2015 received from the NSW PE.

2 BASIS FOR DESIGN

The design for the raising of TD1 is based on the following:

- Tailings production to TD1, 1.1 Mtpa with due allowance for underground tailings paste backfill
- Slurry density ex-plant: 60 to 65% solids
- Design of staged embankment raising to RL272.0m, the current approved crest level from the EPA
- Design in general accordance with ANCOLD Guidelines (2012). The consequence category will determine the water management (e.g. freeboard and stormwater storage capacity required) and geotechnical embankment design requirements.

The New South Wales Dams Safety Committee (DSC) D1 Form which summaries the design is provided in Appendix G.

2.1 Previous Studies

The tailings dam was located and partially designed by Knight Piesold (KP) prior to Tritton Resources becoming the owners of the project. A geotechnical investigation was undertaken by Soil & Rock Engineer (SRE) in November 2003, the associated geotechnical report was dated January 2004.

The original design by KP was reviewed and reassessed by SRE, based on changed production rates and mine life projections, design information and assumptions are outlined in SRE's design report titled 'Design Report, Tailings Storage Facility 1, Tritton Copper Project', Revision 1, dated 2 March 2004.

The most recent design report for TD1 was produced for Stage 5 embankment raising and was prepared by Coffey during 2015. The report was titled "Stage 5 Design Report, Tailings Storage Dam 1 Straits Tritton Copper Mine" reference MWP00100AW-Stage 5 design report Rev 0, dated August 2015.

2.2 Existing Facility Description

The tailings dam is used to store milled mine waste (tailings slurry). Tailings slurry is deposited into the storage from a perimeter distribution system that fully encircles the facility. Tailings are also directed underground in campaigns for mine backfilling purposes.

There is one spillway associated with this tailings dam. The spillway has been designed to pass the 1:100 average exceedance probably (AEP) rainfall event with an average flow depth of less than 0.5m and the half PMP event at less than 1m depth. The spillway is located through the northern abutment, and has been raised along with the perimeter embankments. The existing spillway has an invert level at RL266.5m or 1m below the Stage 5 embankment crest of RL267.5m.

The upstream catchment areas that affected the facility are managed by an upstream diversion drain and bund that deflects or redirects runoff around the facility, or into a catchment dam. TD1 is now surrounded by perimeter embankments and the catchment reporting into TD1 is from incident rainfall only.

Stage 1 construction (starter embankment) was completed in September 2004 to RL260.0m, with a spillway invert at RL259.0m. Initial construction also comprised an underdrainage water interception system located immediately upstream of the main embankment, a downstream toe drain, collection sump and recovery pump. Four monitoring bores were installed prior to commissioning in November 2004.

Construction of the western saddle embankment commenced as part of Stage 3 works which were completed in early 2011.

The embankments have been raised and extended in four stages using 2m and 1.5m upstream raising lifts and compacted borrow material. Stage 5 construction works (to RL267.5) were in progress during the most recent surveillance review in January 2017 and are now complete. This construction comprised keyway excavation and embankment construction.

Surveillance reviews have been undertaken on an annual basis the most recent was completed in January 2017. The mine has commissioned the next surveillance review for February 2018 covering the performance of TD1 during the 2017 calendar year.

2.3 Tailings Properties

The future tailings will be from the processing of underground ore and should be geotechnically and geochemically similar to the present tailings being stored in TD1. A geotechnical investigation was under taken on TD1 using CPT probing of the deposited tailings, and sampling and laboratory testing in September 2017. The results of the geotechnical investigation are summarised in Section 2.4 and presented in full in Appendix B.

2.4 Geotechnical Investigations

The geotechnical investigation was performed by Barnson Pty Ltd in September 2017, based on a scope prepared by CMW, setting minimum requirements. The Barnson investigation exceeded the CMW scope requirements and comprised the following:

- Sampling of existing borrow areas comprising Sheather's Pit, Yarran Pit and Existing Dam Stockpile;

- Tube sampling of insitu tailings from the tailings beaches adjacent to the CPT probe locations (i.e. at the surface of the tailings);
- Laboratory testing comprising particle size distribution (PSD) tests, standard compaction (SMDD) tests, undrained triaxial tests, Atterberg limits determinations, laboratory constant head permeability tests and moisture content tests; and
- Cone Penetration Testing (CPT) through the deposited tailings stored in TD1 at 6 locations.

The CPT testing was conducted by Probedrill Pty Ltd to a CMW scope requirements, refer to Section 4.

The Barnson Material Evaluation Report is included in Appendix B. The CPT results and interpretation of the CPT results are included in Appendix C.

2.4.1 Laboratory Test Results

The results of the classification tests on the borrow samples indicated:

- The Yarran Pit sample is a medium plasticity sandy clay with 83% fines (material passing the 75 micron).
- The Sheather's Pit sample is a low plasticity sandy clay with 69% fines.
- The 50/50 Yarran / Sheather's sample is a low plasticity sandy clay with 76% fines.
- Dam stockpile sample is a low plasticity gravelly clay with 41% fines
- A mine waste sample is a non-plastic silty gravel with 16% fines.

The results of the classification testing indicate the Sheather's Pit, 50/50 Yarran / Sheather's and Dam stockpile samples were adequate for perimeter embankment construction.

The Yarran sample had a high fines content and a low strength (friction angle 19^o) and hence was assessed as un-suitable for use in perimeter embankment construction unless blended with the Sheather's Pit clayey material to at least a 50/50 ratio. The mine waste sample lacked fines for use in embankment construction, but could be used as a cover/capping material.

The results of the standard compaction tests on the suitable borrow materials (Sheather's Pit, 50/50 Yarran / Sheather's and Dam stockpile samples) for embankment materials gave an average maximum dry density of 1.75t/m^3 at an optimum moisture content of 15.5%.

The results of the consolidated undrained triaxial testing on the suitable borrow materials (Sheather's Pit, 50/50 Yarran / Sheather's and Dam stockpile samples) for embankment materials gave an average of the results of cohesion, 4.7kPa and angle of internal friction of 30^o.

The results of the permeability tests on the borrow samples (Sheather's Pit, 50/50 Yarran / Sheather's and Dam stockpile) remoulded to around 100% of standard maximum dry density (SMDD) gave very low permeabilities of 2 x10^{-10}m/s to 1x10^{-10}m/s, according to Terzaghi and Peck (1967) it has a classification of practically impermeable. This permeability exceeds the requirements specified by the NSW EPA of 1 x10^{-9}m/s for construction materials.

The results of the classification tests on the tailings samples indicated the samples were a non-plastic sandy silt.

The results of the consolidated undrained triaxial testing on the tailings materials gave an average of the results of cohesion, 0kPa and angle of internal friction of 37.2^o. An inferred angle of internal friction of 30^o from the CPT probing was utilised in stability analyses. From the recent triaxial testing (on tube samples of near surface tailings) the range of dry densities recorded, was 1.60 t/m^3 to 1.89 t/m^3 with an average of 1.73t/m^3 (i.e. similar to densities recorded in the 2017 Surveillance review).

2.5 Seismicity

The Tritton Mine is located in a region with comparatively low seismic risk. The Peak Ground Acceleration (PGA) factor for earthquake loading was obtained by referring to Australian Standard AS1170.4-2007, which for an Annual Exceedance Probability (AEP) of 10% in 50 years or approximately a 1 in 500 year event indicates a PGA factor of 0.06g for the Nyngan area.

The AEP for the Maximum Design Earthquake (MDE) for dams with a consequence category of significant is 1:1,000 year (AEP). The PGA factor for the MDE for TD1 is 0.08g (i.e. 1.3 x 0.06g).

3 TAILINGS DAM DESIGN

3.1 Design Codes/Standards/Guidelines

The design has been conducted in general accordance with the following guidelines:

- DSC, DSC3 suite of guidelines, namely DSC3A (Nov 2015) – *'Consequence Categories for Dams'*, DSC3B (June 2010) – *'Acceptable Flood Capacities for Dams'*, DSC3C (June 2010) – '*Acceptable Earthquake Capacity for Dams'*, DSC3F (June 2012 - '*Tailings Dams*' and DSC3G (June 2010)- '*General Dam Safety Considerations'*
- ANCOLD (2012). '*Guidelines on Tailings Dams Planning, Design, Construction, Operation and Closure'*.
- Completed NSW DSC forms D1, D2, D6 and D8 are also attached to this report.

3.2 Consequence Category

Based on the DSC3A and DSC3F Guidelines, the consequence category for TD1 has been re-assessed as 'Significant', based on Table 2 in the guide and the following considerations:

- Population at risk (PAR): <1. Note if the PAR was >1 to 10, the consequence category will be the same.
- Receiving Environment: Rural / Productive.
- Severity of Damage or Loss: Medium – saline liquid and unsightly solids.

The ANCOLD (2012) consequence rating based on the above considerations, that is Medium damage, (refer Table 1 of ANCOLD (2012)) and a population at risk of <1 is 'Low' (refer Table 2 of ANCOLD (2012)). Medium damage is characterised by loss of infrastructure of the order $10M to $100M, significant impacts to business (i.e. the mine), impact area 5km^2 or less, impact duration less than 5 years, and significant impacts on rural land and local flora and fauna.

For liquefaction assessment, TD1 was assumed to be a 'significant' consequence facility.

3.3 Operation and design considerations

The following operational considerations have been incorporated into the design, noting that existing operating manuals (DSC2F and DSC2G), risk schedules and Dam Safety Management systems (DSC2A) will remain in place and do not require updating:

- 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 within and around the central decant. The pond is to be maintained away from the perimeter embankments at all times.
- Water will be removed from the facility and pumped back to the process plant via a decant pump located centrally in TD1.
- The tailings storage area will assume the form of a truncated prism with a depressed cone on the top surface. The facility will have the capacity to store a considerable volume of water during a storm event. Freeboard requirements are presented in Section 9.
- On eventual decommissioning, the facility will remain as a permanent feature of the landscape and drain to an increasingly stable mass. The top surface and batters will be stabilised and rehabilitated.

3.4 Summary of TD1 Dimensions

Key dimensions of TD1 are presented in Table 1.

Table 1: Summary of Key Dimensions	
Maximum starter embankment height	8m
Maximum final embankment height	20m
Overall upstream, slope angle	1:2 (v.:h.)
Overall downstream, slope angle	1:3 (v.:h.)
Embankment Crest Width	6m
Footprint area	150ha
Tailings storage area	134ha
Embankment crest level - Final	RL272.0m

The description of embankment staging and discussion on reasoning is presented in the proceeding sub-sections.

3.5 Drawings

The following design drawings are presented in Appendix A.

Table 2: Drawings	
Title	**Drawing No.**
General Arrangement – Stage 6	PER2017-0066-01
General Arrangement – Stage 7	PER2017-0066-02
Sections and Details	PER2017-0066-03
Sections and Details - Spillways	PER2017-0066-04

3.6 TD1 Storage Characteristics

The estimated tailings storage areas, volumes and storage capacity for TD1 are summarised in Table 3. The estimated storage characteristics of the proposed TD1 staged embankment raises assume tailings insitu density of 1.5 t/m^3 and an average beach slope of 1:60. These parameters are based on recent sampling and testing (2017) and survey information.

Table 3 - Estimated Tailings Storage Areas and Storage Volumes

Stage	Crest RL (m)	Approx. Area (ha)	Approx. Stage Volume (Mm^3)	Cumulative Additional Storage Capacity (Mt)	Cumulative Storage Life (years)
6	270	125	3,100,000	4.7	4
7	272	130	2,600,000	8.6	7.5

Note: Storage life is based on an average insitu dry density of 1.5t/m^3 and an average beach slope of 1:60 (from 2017 Surveillance Review)

3.7 Embankment Design

Stage 1 construction (starter embankment) was completed in September 2004 to RL260.0m. The embankment has been raised in 3, 2m upstream lifts and 1, 1.5m upstream lift, using clayey borrow material to its current crest RL267.5m. The maximum embankment height at present is approximately 15m.

The starter embankment and extensions to the starter embankment (Stages 1, 2, 3, 4 and 5) incorporated a cut-off trench excavated into low permeability clay, a minimum of 1m bgl. in order to reduce seepage losses.

The TD1 Stage 6 and 7 perimeter embankments will be raised in two stages using 1, 2.5m lift and 1, 2.0m lift using upstream construction techniques. The upstream raises will utilise roller compacted clayey borrow material. Due to the undulating ground conditions the embankment height will vary from a maximum of approximately 20m to a minimum height of 0m where the embankment runs into ridge areas.

Where the existing embankments abut low hills on the north and south of the facility, vegetation and topsoil will be stripped and the cut-off trench extended up the abutment. The cut-off trench will be backfilled by compacted clayey borrow material.

The accessway to the central decant area will be raising along with the perimeter embankments using centre-line construction techniques.

3.8 Water recovery system

Water liberated from the deposited tailings slurry is recovered via a pump located at the water pond, in the centre of TD1. The location of the water pond is visually monitored and is manoeuvred by regularly changing the location of the spigots that are discharging tailings slurry. Recovered water is returned to the processing plant, however during construction some water is used for moisture conditioning of materials and dust suppression purposes. Current operational controls ensure the water pond is not located near any perimeter embankment. This has been regularly confirmed by every annual surveillance review.

3.9 Liners

The facility is underlain by low permeability clays. As part of the starter embankment construction the TD1 basin was compacted such that the foundation has a permeability of 10^{-9} m/s. During each staged construction phase, after vegetation and topsoil has been removed the newly cleared basin area is covered with a low permeability clayey liner.

3.10 Construction method

Construction specifications for the raising construction are presented in Appendix F and will follow the same successful procedures used for all previous staged embankment construction phases.

4 PIEZOMETER MONITORING

The position of the phreatic surface for the embankment design at the proposed final stage of crest RL272.0m (i.e. at 20m embankment height) was assessed as part of the compilation of the geotechnical model for stability assessments. The assessment was based on the water monitoring data provided in *"2016 Calendar Year Surveillance Review Tailings Dam 1"* report (Coffey, 2017). Within the embankment, the level was inferred considering the highest water level measured in the embankment piezometer (PZH005 at RL255m) which is 12.5m below the current embankment crest level (RL267.5m).

Plots of the phreatic surface throughout the embankment are presented on the stability plots presented in Appendix D.

5 LIQUEFACTION ASSESSMENT

5.1 General

Liquefaction is a complex process that typically occurs in loose, saturated coarse silt to fine grained sandy soils whereby dynamic loading, such as from an earthquake, results in the build-up of pore water pressures. When the pore water pressure exceeds the overburden stress, the effective stress reduces to zero and the soil inter-granular contact stresses reduce to zero resulting in a loss of shear strength. At this point, the soil is said to have liquefied and behaves like a fluid.

If liquefaction of the deposited tailings underlying the upstream embankment raise occurs, the reduction in saturated strength may result in failure or settlement of the upstream embankment into the liquefied tailings.

Static liquefaction can also occur in tailings storage facilities triggered by factors such as slope instability and high rates of tailings / construction rates of rise. Given the relatively low rate of construction and filling rate, static liquefaction is not considered likely to be an issue for TD1.

This section provides assessment of cyclic liquefaction occurring in the deposited tailings that provide the foundation for the upstream raise from RL 259.7 to RL 269.5.

The cyclic liquefaction assessment was carried out using Geologismiki software, CLiq, using the recent CPTU data (2017). CLiq outputs provide consistent output results by applying the National Centre for Earthquake Engineering Research (NCEER) method (Youd et al, 2001; Robertson & Wride, 1998). It also includes the latest assessment procedure developed by Robertson (2010) which is applicable to all soil types combining a check for cyclic liquefaction (sands) and cyclic softening (clays).

5.2 Input Parameters

The earthquake parameters relied upon for this assessment were based on a Maximum Design Earthquake (MDE) for a Significant consequence category (ANCOLD, 2012) as presented in Section 3.2. The following cases were examined for liquefaction assessment:

Case 1

- Design Earthquake Magnitude = 5.5;
- Maximum Design Earthquake (MDE), 1:500-year, Peak Ground Acceleration (PGA) = 0.06g (ref: AS 1170.4-2007); and
- Phreatic surface at top of tailings.

Case 2

Case 2 examined a Significant consequence category storage (refer DSC3F Guidelines).

- Design Earthquake Magnitude = 6;
- MDE, 1: 1,000-year, Peak Ground Acceleration (PGA) = 0.08g (ref: AS 1170.4-2007); and
- Phreatic surface at top of tailings.

Case 3

Case 3 examined a Significant consequence category storage (refer DSC3F Guidelines).

- Design Earthquake Magnitude = 6;
- MDE, 1: 1,000-year, Peak Ground Acceleration (PGA) = 0.08g (ref: AS 1170.4-2007); and
- Phreatic surface 4m below top of tailings, similar to stability analyses presented in Section 6.

The CPT results provided were taken in the deposited tailings adjacent to the embankments around the facility to depths of between 5m and 15m. The details of the locations of the CPTU's and the results are presented in Appendix C.

5.3 Results

The plots of each CPT, the resulting Soil Behaviour Type (SBT), Cyclic Resistance Ratio (CRR), liquefaction potential, and Factor of Safety (FoS) of liquefaction are attached as Appendix C. The CPT results identified that the tailings generally comprise layers of silty sand and sandy silt with intermittent layers of clayey silt and silty clay.

The FoS for liquefaction is assessed based on a ratio of the cyclic resistance ratio, determined by CPT strength profile, and the cyclic stress ratio, determined by the earthquake event.

The phreatic surface adopted in Cases 1 and 2 assumed a surface at the top of the tailings, with all tailings material been fully saturated. Case 3 assumed a phreatic surface 4m below the top-surface. Noting however that is NOT the actual case with TD1 with the phreatic surface being well below the tailings beach surface generally in excess of 12m depth or not being present at all in the tailings profile.

A summary of the liquefaction assessment results is presented in Table 4.

Table 4: Summary of Liquefaction Assessment Results					
CPTU	**Average Cone Tip Resistance, q_c (MPa)**	**Description of tailings**	**Factor of Safety for liquefaction potential (Case1)**	**Factor of Safety for liquefaction potential (Case 2)**	**Factor of Safety for liquefaction potential (Case 3)**
CPTU01	0.5 to 2.5	Soft to firm silty sand/sandy silt intermittent layers of firm clayey silt/ silty clay	>1.5	Generally >1 with several discrete layers just below 1	>1.5
CPTU02	0.9 to 3.8	Soft to firm silty sand/sandy silt intermittent layers of stiff clayey silt/ silty clay	>1.5	Generally >1 with several discrete layers just below 1	>1.2
CPTU03	2.1 to 4.9	Soft to firm silty sand/sandy silt intermittent layers of stiff clayey silt/ silty clay	>1.5	Generally >1 with several discrete layers just below 1	>1.0
CPTU04	1.1 to 3.5	Soft to firm silty sand/sandy silt intermittent layers of stiff clayey silt/ silty clay	>1.5	Generally >1 with several discrete layers just below 1	>1.0
CPTU05	0.4 to 2.5	Soft to firm silty sand/sandy silt intermittent layers of firm clayey silt/ silty clay	>1.5	Generally >1 with several discrete layers just below 1	>1.5
CPTU06	0.4 to 3.5	Soft to firm silty sand/sandy silt intermittent layers of firm clayey silt/ silty clay	>1.5	Generally >1 with several discrete layers just below 1	>1.3

Based on the results of the liquefaction assessment summarised in Table 4, the tailings material is generally considered to be non-liquefiable for the earthquake loads adopted. Only in the Case 2 'worst case' scenario, was there potential for liquefaction in discrete minor (thin) layers, with the Factor of Safety for liquefaction just below 1. It is important to highlight that for the assessment we have considered the worst-case scenario, with the tailing material fully saturated below surface level. Provided operational practices, particularly regarding water management (i.e. that water is around the central decant away from the perimeter embankments), as described in this TD Design Report, operations manual and Annual Surveillance Review, are followed, we consider the tailings underlying the proposed upstream raise have a low risk of liquefaction (refer to Case 3).

6 STABILITY ANALYSIS

6.1 Method of Analysis

Stability analyses were undertaken to assess the stability of the TD1 embankment up to the final stage (Stage 7) with a crest RL272.0m (i.e. at 19m embankment height). The analyses were undertaken in general accordance with ANCOLD (2012).

The computer software package 'Slide' was utilised to undertake the analyses. Slide is a two-dimensional slope stability program for evaluating the safety factor of circular and non-circular failure surfaces in soil and rock slopes. The stability of the slip surfaces for static loading was assessed using vertical slice limit equilibrium methods and simplified Bishop method.

The following cases were examined in the stability analyses:

- Case 1: Static Analysis - Downstream failure of the TD embankment with crest level of RL272m (20m embankment height) under drained condition based on limit equilibrium method.
- Case 2: Static Analysis - Downstream failure of the TD embankment with crest level of RL275m (20m embankment height) under undrained condition based on limit equilibrium method.

A post-seismic analysis was not required as the tailings have been assessed as non-liquefiable at the design earthquake loads. In addition, in compliance with ANCOLD (2012) and in lieu of pseudo static analyses, a deformation assessment was performed (refer Section 7). The phreatic surface adopted in all cases were based on the piezometer results, refer to Section 4.

6.2 Parameters

The parameters adopted in the analyses were based on investigations undertaken by Coffey, CMW initiated reviews undertaken by Barnson's and the recently completed CPT data interpretation (refer to Appendix C). Table 5 provides a summary of the strength parameters used in the stability analyses.

Table 5Summary of Strength Parameters*

Material Type	Bulk Density (kN/m³)	Undrained	Effective Strength Parameter *	
		Cohesion Su (kPa)	Cohesion C' (kPa)	Friction angle Φ' (Degrees)
Tailings (Drained)	18	-	0	30
Tailings (Undrained)	18	40	-	-
Embankment	18.5	-	5	30
Foundation	18.5	-	25	33
Bedrock	18.5	-	25	33

6.3 Results of the Stability Analyses

The results of the stability analyses for the various cases examined are summarised in Table 6, with the computer printouts presented in Appendix D.

Table 6 - Results of Stability Analyses		
Case	**Factor of Safety**	**Recommended Minimum Factors of Safety***
1	2.14	1.5
2	1.51	1.5

*Note: Recommended factors of safety in accordance with ANCOLD (2012).

The stability analyses indicate that the cases examined have adequate factors of safety for the drained and undrained conditions when compared with the recommended minimum factors of safety in ANCOLD (2012).

6.4 General Comments in Respect to Stability

The tailings dam has been designed to provide temporary water storage following extreme storm events. If water does extend to the embankment, which is considered very unlikely, it is anticipated this will be a temporary occurrence given 'continuous' water removal from the tailings dam. The tailings dam should be operated in such a manner as to ensure that the `normal' decant water pond is kept a minimum of 200m away from the main embankment and perimeter embankments at all times.

7 DEFORMATION ANALYSIS

Figure 6 in ANCOLD (2012) provides guidance on deformation assessment dependent on whether liquefaction occurs. Based on the liquefaction assessment carried out, liquefaction of the tailings forming the foundation of the upstream raising is not likely for the design earthquake loads and hence a preliminary assessment of embankment deformation due to an earthquake was estimated using the Swaisgood (2003) method. This method utilises an empirical formula based on observed crest settlement resulting from analysed 'real' earthquakes, with no liquefaction.

The permanent displacements and settlements expected for a 20m high embankment were estimated under a Magnitude 6 earthquake, corresponding with a loading of 0.08g for 1 in 1,000 AEP MDE event.

From the analysis, it is concluded that for the highest embankment section (worse case), the deformation due to a MDE event is likely to be in the order of 35mm. Such deformation is insignificant when compared with the operational freeboard of 300mm.

8 SURFACE WATER DIVERSION

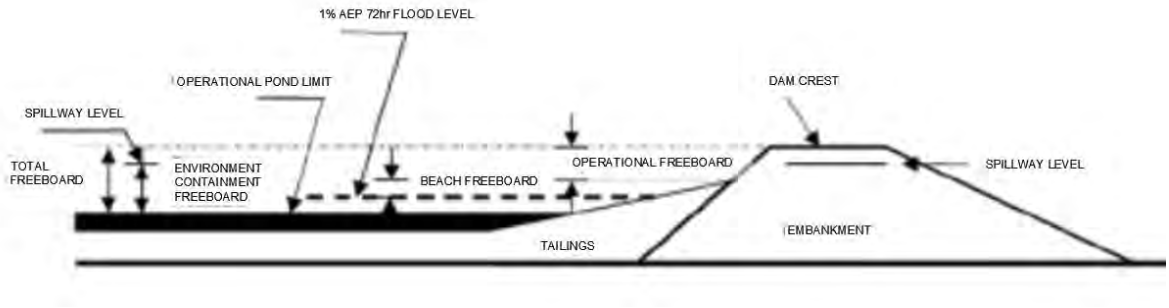
There is an existing upstream diversion drain and bund that deflects or redirects runoff around the facility, or into a catchment dam. TD1 is now surrounded by perimeter embankments and the catchment reporting into TD1 is from incident rainfall only. No additional diversion works are required as part construction of the Stages 6 and 7 raising of TD1.

9 TD1 WATER MANAGEMENT

9.1 Freeboard

The minimum freeboard requirements are presented in the DSC3F Guidelines for a 'Significant' consequence category facility (refer Table 3, DSC3F). The minimum operational freeboard should be 0.3m and minimum total freeboard should be able to store a 10^{-4} AEP storm event of 72 hour duration.

A 1^{-4} AEP, 72-hour duration rainfall depth of 472mm was adopted for the design to assess the total freeboard (refer Diagram associated with. Table 3, DSC3F, below).



Temporary storage of a storm water volume of approximately 650,000m^3 (i.e. 138ha x 472mm) on top of TD was considered in the design. This storm water volume will occupy less than 50% of the TD basin, which based on survey information has an estimated volume of 2,700,000m^3.

9.2 Spillways

TD1 is a valley type storage facility where the main embankment has dammed a small valley in its upper reaches. Diversion channels and bunds have been constructed upstream of the tailings dam to intercept and divert any runoff around the facility. TD1 is now surrounded by perimeter embankments and the catchment reporting into TD1 is from incident rainfall only.

The tailings dam has an incident catchment area of 138ha. The estimated inflow volume from a 0.5 probable maximum flood (PMF), 3 hour event (0.26m), assuming a runoff coefficient of 1.0 has been determined at 180,000m^3.

The current spillway is located through the northern abutment due to lower ground levels and excavation volumes. As part of Stage 6 embankment upstream raising construction, the emergency spillway will be raised, as has occurred in the past. The Stage 6 spillway is a similar width to the Stage 5 spillway which was designed to pass a 0.5 PMF event and has a design capacity of 16m^3/sec. This spillway is now slightly over designed due a reduction in the catchment area, checks indicate the spillway capacity is appropriate for the reduced catchment size.

The final intended location of the spillway, at closure of TD1, is on the southern side of the facility. The exact location of the closure spillway should be confirmed prior to decommissioning in preparation for closure of the facility. The closure spillway has been designed for a 0.5 PMF event (ANCOLD 2012, requires 1:1,000 year AEP plus allowance for 1:10 year wave run-up). Table 7 summarises the closure spillway design:

Table 7 - Summary of Hydrology/Hydraulic Analyses of the Closure Spillway	
Total Catchment Area (i.e. catchment area below diversion drains)	138ha
Rainfall depth of a 0.5 PMF 3 hour event (greater than the ANCOLD 2012 requirement, 1:1000yr. AEP plus wave run-up)	260mm
Peak Inflow - from catchment area below diversion drains	33m³/s
Peak Outflow - down spillway	16m³/s
Closure spillway dimensions	23m width, 0.5m flow depth, nominal spillway invert 1m below main embankment crest
Total Spillway Capacity (no freeboard)	46m³/s

The closure spillway will comprise an entrance weir discharging to an open channel (refer to drawing PER2017-0066-02 for a preliminary alignment). Where possible the spillway will be excavated into natural ground and will be lined with rock protection dependent on the ground conditions actually encountered when the spillway is excavated. Drawing PER2017-0066-04 provides details of the spillway design including requirements for erosion/rock protection. The erosion/rock protection requirements for the spillway should be confirmed prior to decommissioning in preparation for closure of the facility.

10 WATER BALANCE ANALYSES

Based on the most recent surveillance review reports, the average annual water return for TD1 is estimated be around 20% to 25% of slurry water inflow (2016 audit 18% and 2015 audit 24%). A water balance analysis for the TD1 operation has been undertaken using a spreadsheet to examine expected TD inflows and outflows.

Inflows and outflows for the facility were estimated on a monthly basis. Inflows include rainfall and slurry water. Outflows include evaporation, seepage losses and water retained in tailings (pore water). Water balance calculations are included in Appendix E.

A Stage 7: Typical water balance, average climatic conditions case was examined. Assumptions and other data adopted for the water balance are listed below:

- Climate data was obtained from the BoM website. Mean annual rainfall and mean daily evaporation figures were obtained for the 'Nyngan Airport' station which is located approximately 65km from the mine.
- Tailings area of approx. 138ha
- A tailings runoff coefficient of 0.35 was assumed.
- Pool and running beaches equal to 5 ha
- Evaporation pan factor of 0.75.
- Average tailings moisture content of 33%.
- Tailings slurry density of 60% (Section 2.4).
- Tailings production rate of 1.1Mtpa.
- Permeability for seepage through deposited tailings, 10^{-8} m/s and dam floor 10^{-9} m/s.

The results of the analysis indicate potential annual average water returns of approximately 30% of the tailings slurry water deposited into the facility can be expected under average climatic conditions.

The results also indicate that water recovery will vary according to the management of the facility, specifically the size of the pond and running beaches. The actual quantity of water available for return to the plant may vary from the figures presented based on the following factors:

- Variations in slurry density.
- Continuity of tailings discharge.
- Distance between the discharge point and decant pond.
- Size of the decant pond and running beaches from where evaporation is greatest.
- Climatic conditions at the time of operation.
- The efficiency of the decant system during operation.

11 DAM BREAK ASSESSMENT

11.1 Breach characteristics

If a TD1 embankment breach were to occur, tailings would only be partially released from the storage impoundment, as the majority of the tailings beaches are generally dry due to periodic rotation of the active spigot point(s). In addition, remobilised tailings will behave as a thickened slurry and therefore will not be as free-flowing as water.

Under worst case probable maximum precipitation (PMP) Rainy day failure conditions:

- The storage capacity of TD1 is estimated at 12,000,000m³.
- PMP storm volume is estimated at 650,000m³. This was based on a 1:10,000 year AEP, 72 hour event rainfall depth of 472mm over the TD1 catchment of 138ha. A sheet showing the estimation of this event is attached in Appendix E.
- The tailings failure volume likely to be released from TD1 at the final stage height of nominally 20m, in the event of an embankment failure under PMP rainy day conditions, would be of the order 4.6Mm³, i.e. approximately 33% of the impounded storage capacity and the PMP storm volume.
- Based on T MacDonald and J Langridge - Monopolis (1984), embankment breaches typically occur relatively quickly (typically 0.5 an hour to 4 hours), Based on this methodology, it is estimated that the breach will occur over several hours (assessed to be 4 hours).

The calculation of breach characteristics is included in Appendix E.

11.2 Hydraulic modelling

The results from breach modelling indicates that the flow from a ‘dam break’ under ‘worst case’ (PMP) rainy day conditions will be at least 650m^3/s with a breach development of approx. 4 hours. A plan showing the extent of this flow immediately downstream of TD1 is provided in Appendix F. The estimated flow depth downstream at the peak flow around 2m to 3m.

The following consequences of a dam break are considered most likely:

- Loss of human life is expected. The PAR is expected to be low (<1).
- Public infrastructure: Yarrandale Road, Hermidale to Girilambone section; dam-break flow over the road approximately 6km downstream of the main embankment. Dependent on the scale of the dam break, significant flow may not be experienced at the road.

- Economic loss due to plant shutdown and production loss, repairs of damaged sections of TD1 and local access roads.
- Environmental impact: potential for contamination of soils, vegetation distress and surface water requiring environmental 'clean-up'.

11.3 Energy Methods – Sunny Day Case

The sunny day case was also considered. This case was examined using energy methods to estimate tailings run-out were embankment moves downstream as a block. This is similar foundation failures that have occurred in recent cases, including Mt Polley in Canada, Los Frailes in Spain and a Hungarian Alumina failure a few years ago. This failure type would also be applicable to liquefaction failure of the upstream raised section of the main embankment.

The linear energy based method (Seddon K.D. 2010) has been used to estimate the runout distance assuming level topography and a linear movement of the liquefied tailings block along the embankment length. The conservative liquefied shear strength of the tailings has been estimated as 3 kPa from the recent CPT investigation. The estimated tailings volume released during failure is based on Rico (2007).

The estimated runout distance of the tailings is less than 300 m at the maximum embankment height. The results are presented in Appendix E. Based on this assessment, if this type of failure were to occur, minimal infrastructure downstream would be affected (e.g. piezometers, bores and pump sumps etc). At the saddle embankment height (11m final height) on the western side of TD1 the run-out distance is likely to be less than 250m (i.e. only minor effect to local roads has been assessed, noting that the Plant is upslope of TD1).

11.4 Controls

The conditions for TD1 embankment failure to occur would be driven largely by the size and extent of the decant pond on the facility as well as the magnitude of a trigger seismic event, embankment deformation, the grading of the tailings and saturation of the tailings adjacent to the embankment. Effective management of the decant pond to ensure excess water is continually removed and that the location of the pond is maintained centrally on TD1 will minimise the risk of a perimeter embankment breach and release of saturated tailings.

TD1 embankment failure is not expected provided the facility is operated in accordance with the requirements set out in the TD Operations Manual. To date the annual surveillance reviews have confirmed a small water pond is always present and the pond is kept well away from the perimeter embankment. The pond is at least 300m from the main embankment.

In the event that the TTD were in imminent danger of failure and breach, an Emergency Action Plan (EAP) would need to be enacted (also refer to Operations Manual).

12 OPERATIONAL ASPECTS

The existing operating manual is reviewed annually as part of the surveillance review of TD1. Major revision of the manual is not required as part of the Stage 6 and 7 design.

13 CLOSURE CONSIDERATIONS

The downstream tailings slopes of TD1 perimeter embankments will be progressively rehabilitated during the operational life of the facility. The maximum slope angle will be 20^{o}.

The closure design of TD1 will include a closure spillway. This spillway will be constructed at the south-eastern corner of the facility. The spillway divert runoff from the top surface of TD1 to the south west and then west adjacent the southern abutment of the main embankment. Where possible the spillway will be excavated into natural ground and will be lined with rock protection.

Towards the end of the life of TD1 tailings deposition could be concentrated from the northern side of the facility in order to push the low point on the facility towards the proposed closure spillway location.

Once tailings deposition has been completed within TD1 and the top surface of the tailings has gained adequate bearing capacity, it will be capped with a layer of mine waste (0.5m nominal thickness) to minimise dust generation from dried tailings and provide support for topsoil / growth medium for re-vegetation.

14 REFERENCES

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

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11. A Dalpatram (2011). 'Estimation of Tailings Dam Break Discharges', presentation at USSD workshop on Dam Break Analysis Applied to Tailings Dams.
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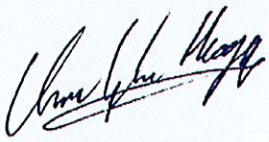
13. Seddon KD (2010), *'Approaches to estimation of run-out distances for liquefied tailings'*, Mine Waste 2010, Perth, Western Australia

For and on behalf of
CMW Geosciences Pty Ltd



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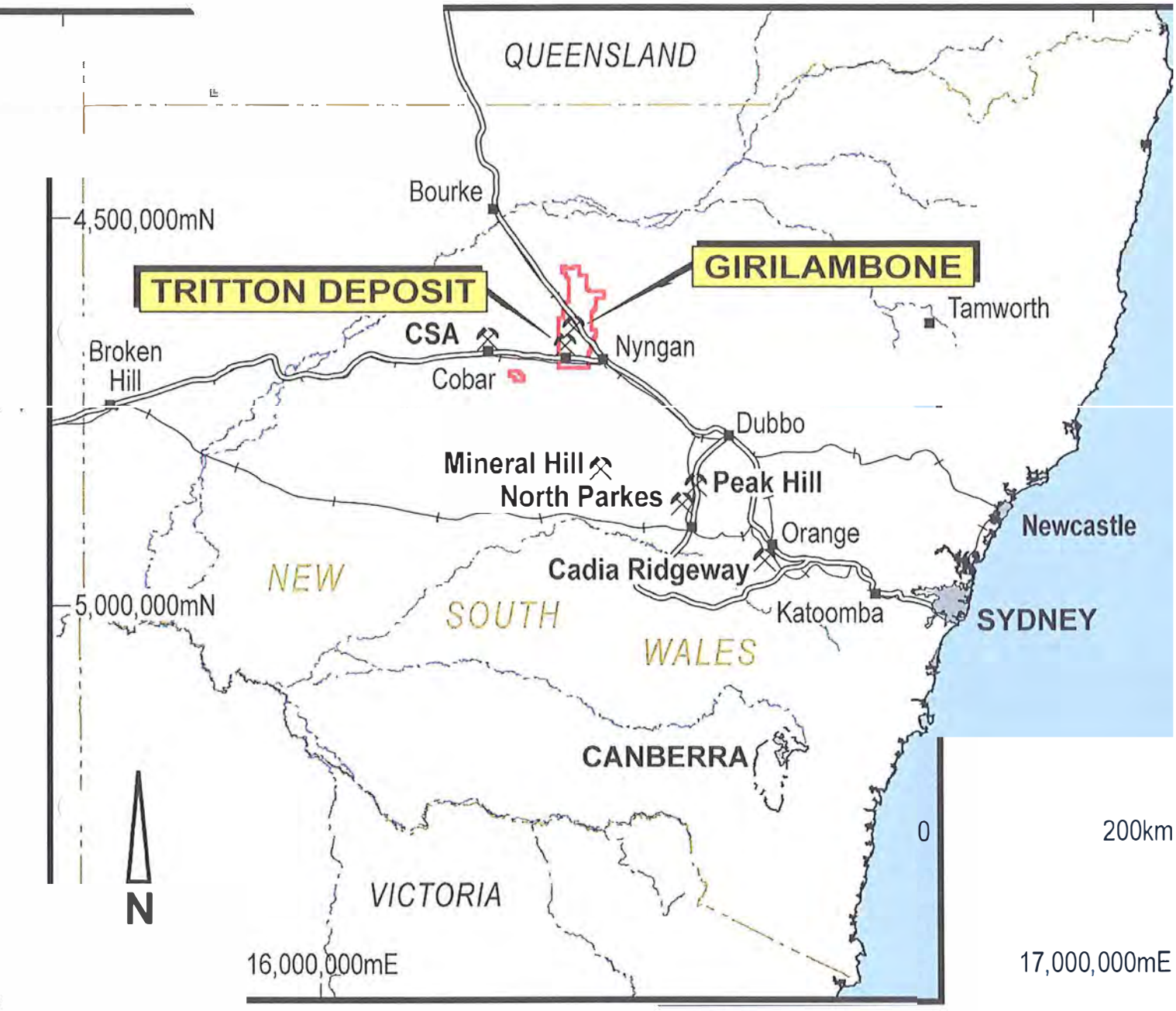
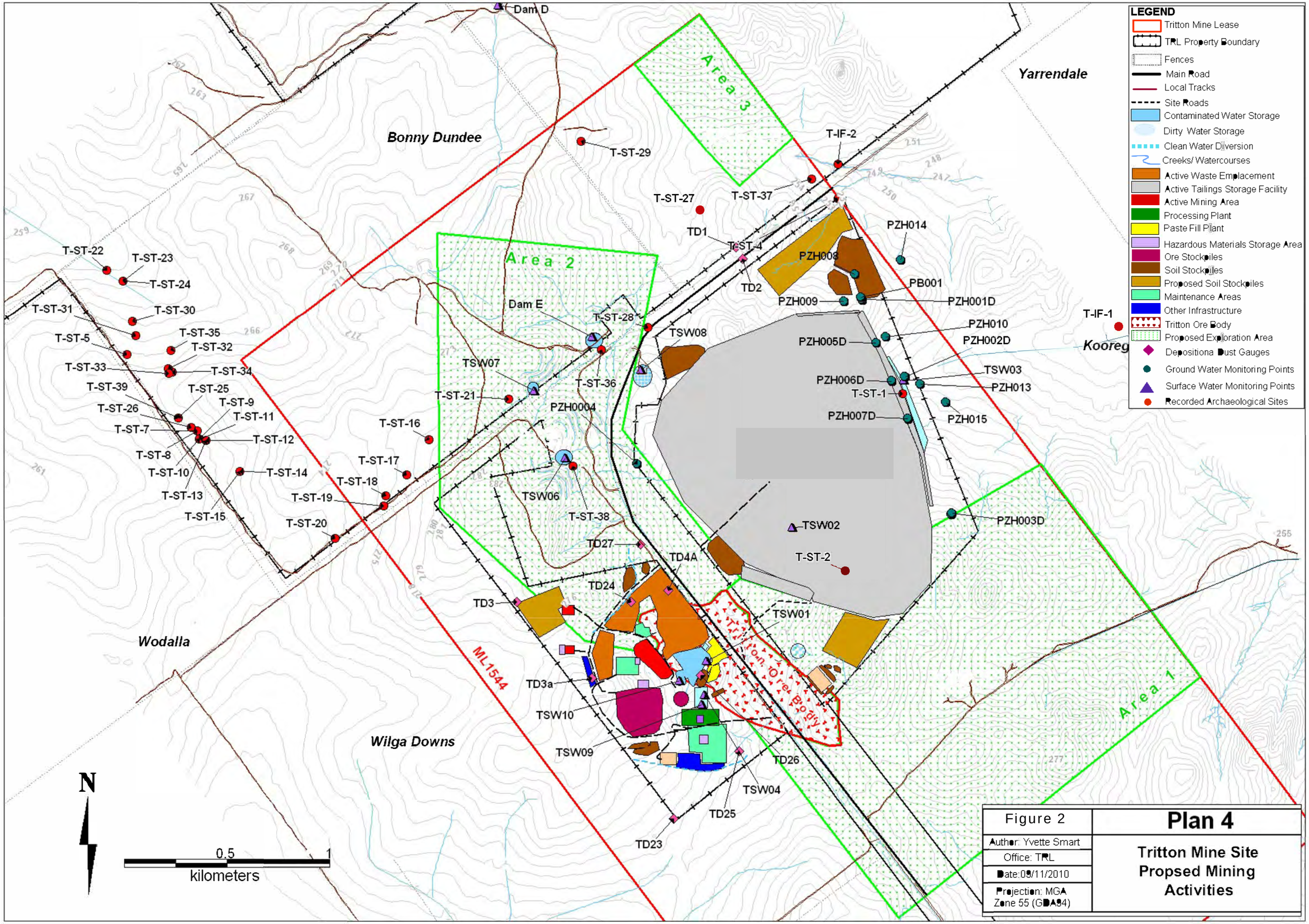
Figures



Tritton Resources Limited

PROJECT LOCATION PLAN

FIGURE 1


LEGEND
Tritton Mine Lease
TRL Property Boundary
Fences
Main Road
Local Tracks
Site Roads
Contaminated Water Storage
Dirty Water Storage
Clean Water Diversion
Creeks/ Watercourses
Active Waste Emplacement
Active Tailings Storage Facility
Active Mining Area
Processing Plant
Paste Fill Plant
Hazardous Materials Storage Area
Ore Stockpiles
Soil Stockpiles
Proposed Soil Stockpiles
Maintenance Areas
Other Infrastructure
Tritton Ore Body
Proposed Exploration Area
Depositiona Dust Gauges
Ground Water Monitoring Points
Surface Water Monitoring Points
Recorded Archaeological Sites
Bonny Dundee
Yarrendale
Wodalla
Wilga Downs
Kooreg
Area 3
Area 2
Area 1
ML1544
Tritton Ore Body
Dam D
Dam E
T-ST-29
T-ST-27
T-ST-37
T-IF-2
TD1
T-ST-4
TD2
PZH014
PZH008
PB001
PZH009
PZH001D
T-IF-1
PZH010
PZH002D
PZH005D
TSW03
PZH013
PZH006D
T-ST-1
PZH007D
PZH015
T-ST-28
TSW08
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T-ST-21
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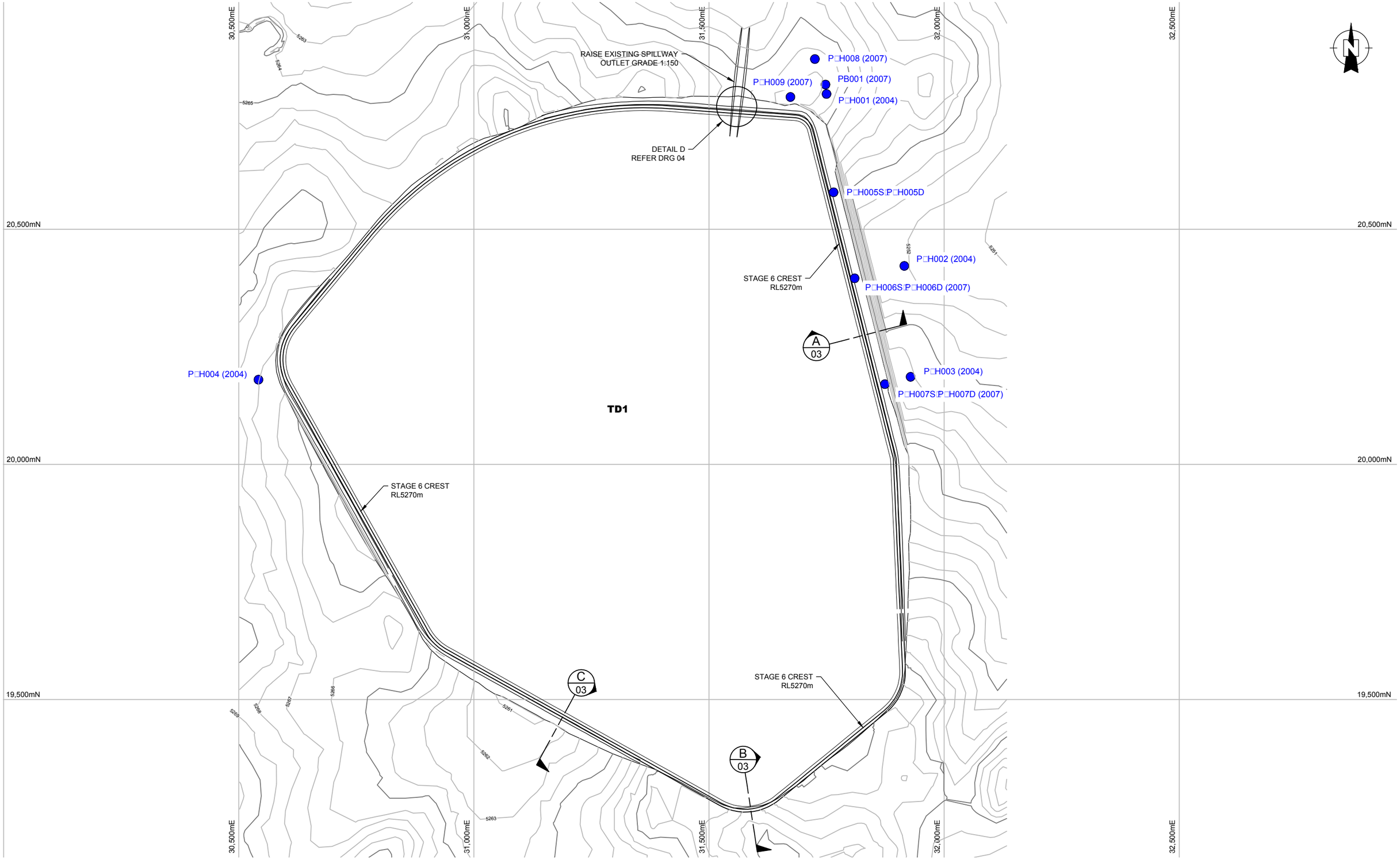
T-ST-18
T-ST-19
T-ST-20
TSW06
T-ST-38
TSW02
PZH003D
TD27
TD4A
T-ST-2
TD24
TD3
TSW01
TD3a
TSW10
TSW09
TD26
TSW04
TD25
TD23
T-ST-22
T-ST-23
T-ST-24
T-ST-31
T-ST-30
T-ST-35
T-ST-5
T-ST-32
T-ST-33
T-ST-34
T-ST-39
T-ST-25
T-ST-26
T-ST-9
T-ST-11
T-ST-7
T-ST-12
T-ST-8
T-ST-10
T-ST-14
T-ST-13
T-ST-15
N
0.5
1
kilometers
Figure 2
Plan 4
Author: Yvette Smart
Office: TRL
Date:09/11/2010
Projection: MGA Zone 55 (GDA94)
Tritton Mine Site
Propsed Mining
Activities

Appendix A

Drawings (4 No.)



LEGEND:

P□H004 EXISTING PIE□OMETER

NOTES:

1. EXISTING DECANT ACCESSWAY TO BE RAISED AS RE□UIRED BY SITE DICTATED CONDITIONS

1:7500 0 75 150 225 300 375 m

CMW Geosciences

CLIENT: TRITTON RESOURCES PTY LTD		DRAWN: DE	PROJECT: PER2017-0066
PROJECT: RAISING OF TD1□STAGES □ AND □ TRITTON COPPER MINE		CHECKED: CH	DRAWING: 01
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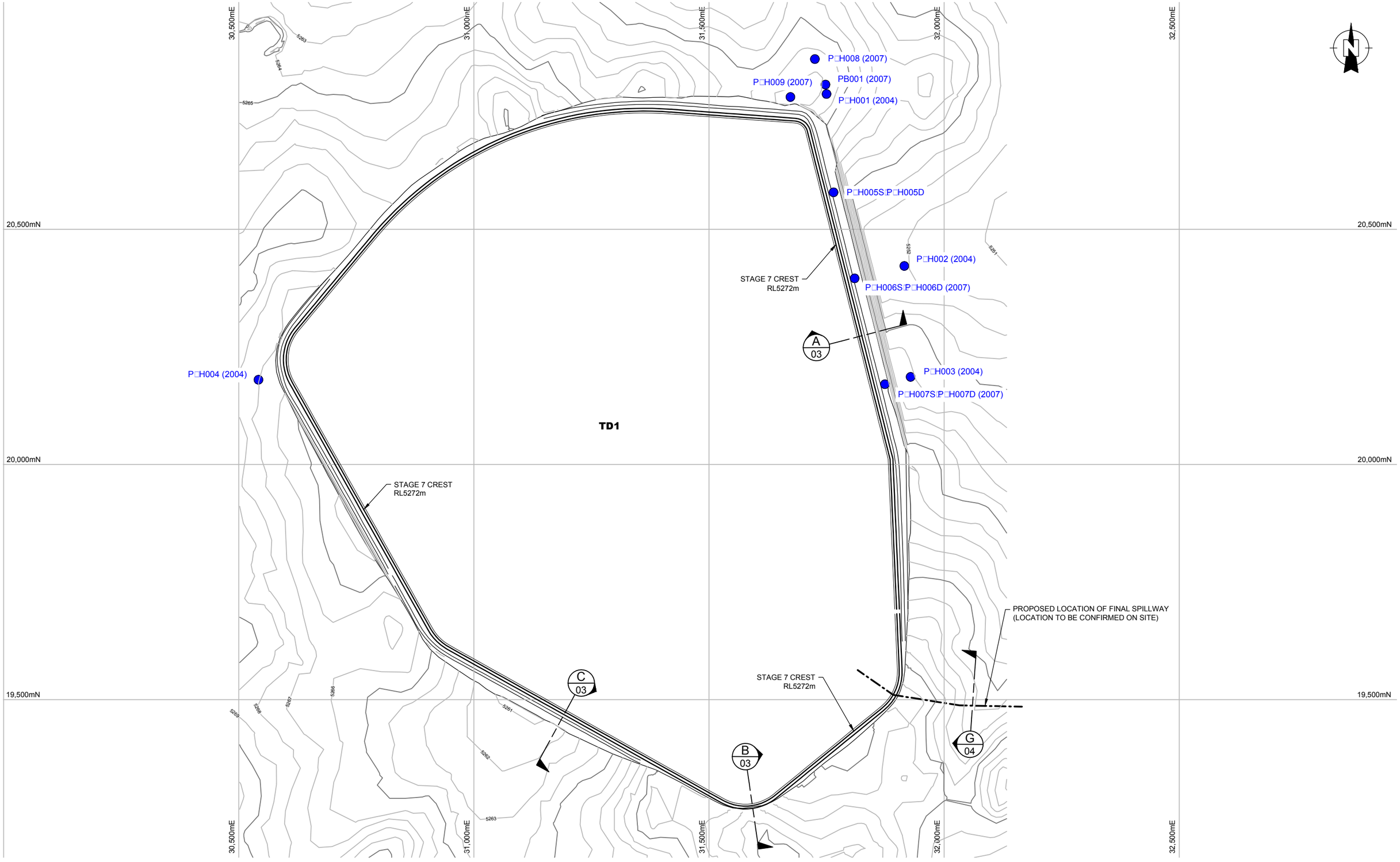
TITLE: GENERAL ARRANGEMENT □STAGE □		DATE: 09.11.17	SHEET: A3 L



LEGEND:

- P□H004 EXISTING PIE□OMETER

NOTES:

1. EXISTING DECANT ACCESSWAY TO BE RAISED AS RE□UIRED BY SITE DICTATED CONDITIONS

1:7500 0 75 150 225 300 375 m

CMW Geosciences

CLIENT: TRITTON RESOURCES PTY LTD		DRAWN: DE	PROJECT: PER2017-0066
PROJECT: RAISING OF TD1□STAGES □ AND □ TRITTON COPPER MINE		CHECKED: CH	DRAWING: 02
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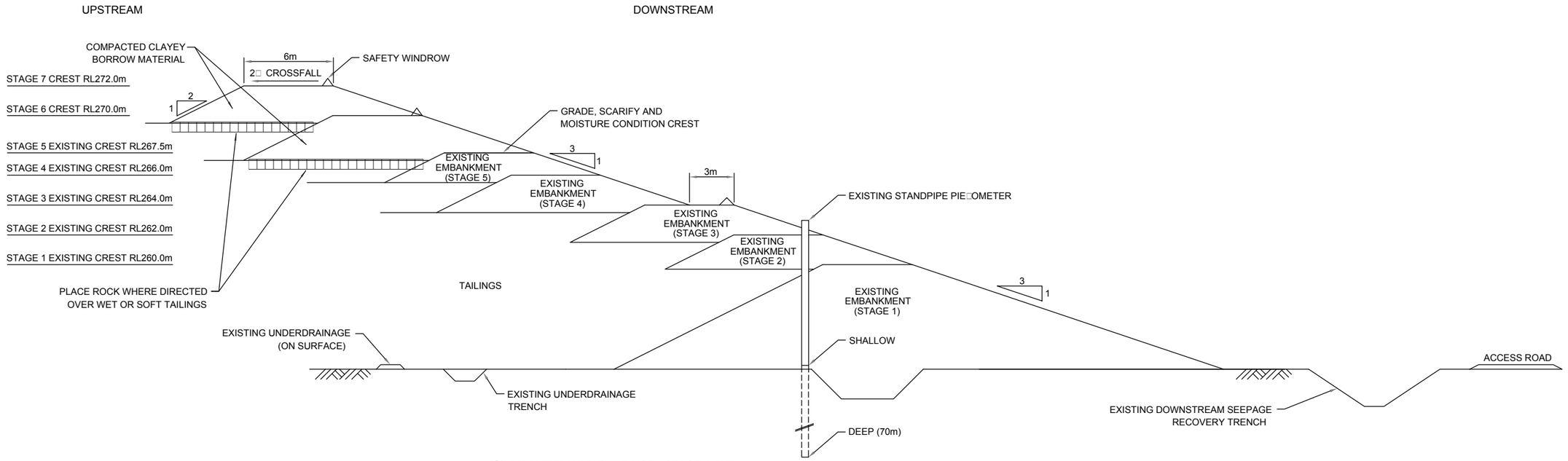
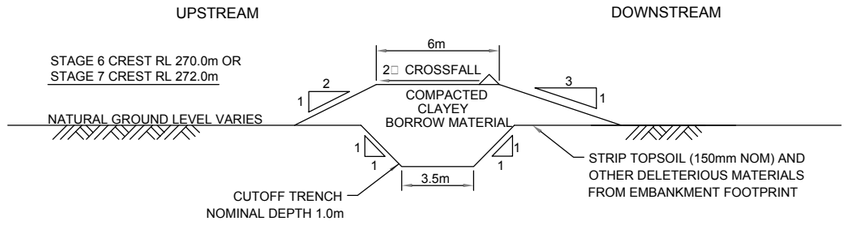
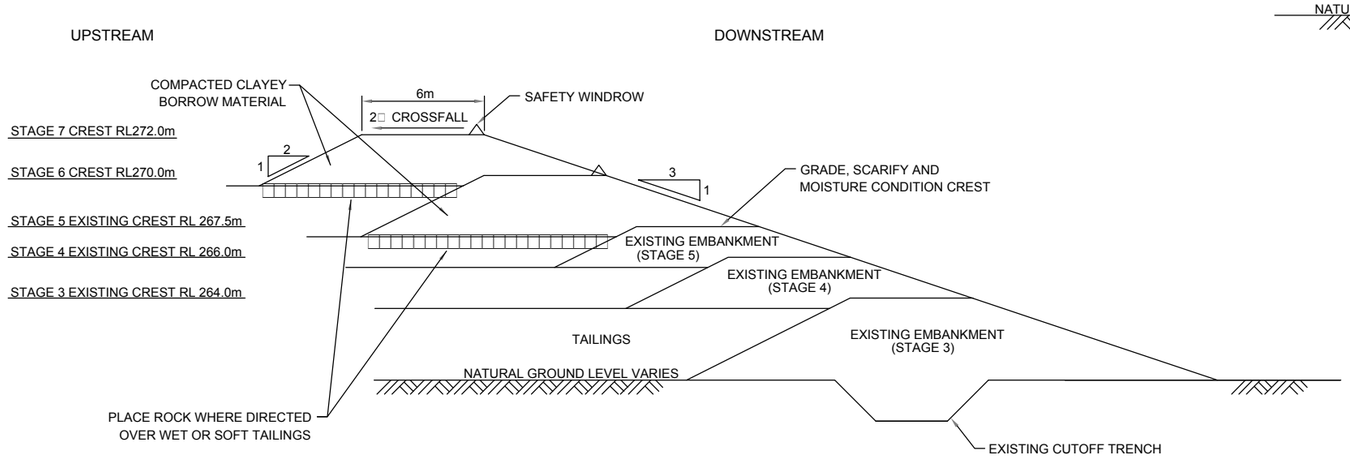


A 01.02 MAIN EMBANKMENT RAISE - STAGE 6 AND 7
TYPICAL SECTION OVER TAILINGS
SCALE 1:300



B 01.02 EMBANKMENT EXTENSION RAISE - STAGE 6 AND 7
SECTION OVER NATURAL GROUND
SCALE 1:300



C 01.02 NORTH AND WEST SADDLE EMBANKMENT RAISE - STAGE 6 AND 7
TYPICAL SECTION
SCALE 1:300

1:300 0 3 6 9 12 15 m

CMW Geosciences	CLIENT: TRITTON RESOURCES PTY LTD	DRAWN: DE	PROJECT: PER2017-0066
	PROJECT: RAISING OF TD1□ STAGES □ AND □ TRITTON COPPER MINE	CHECKED: CH	DRAWING: 03
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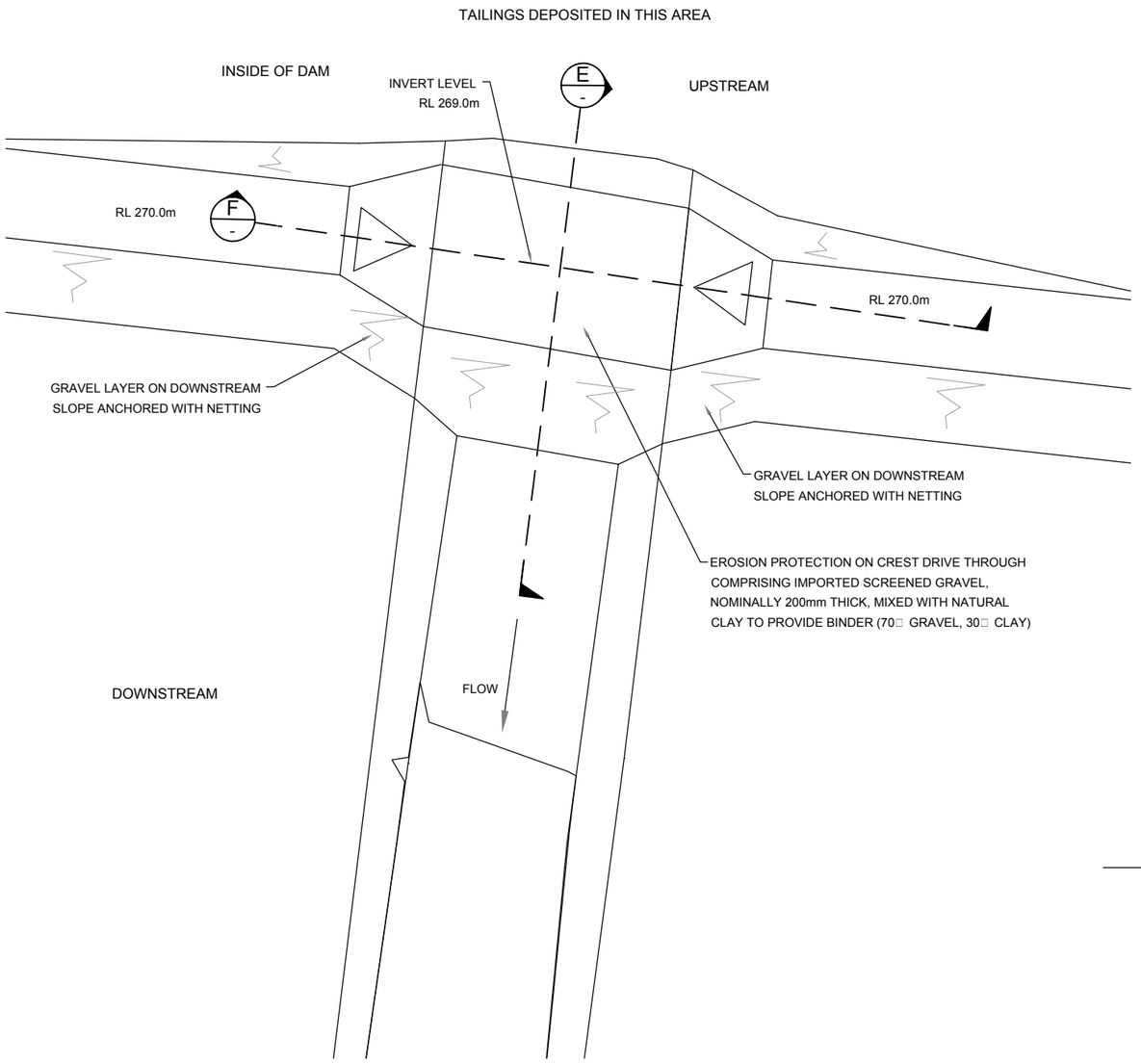
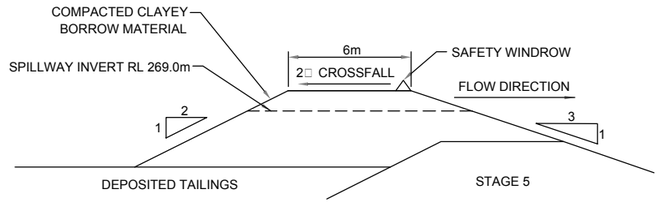
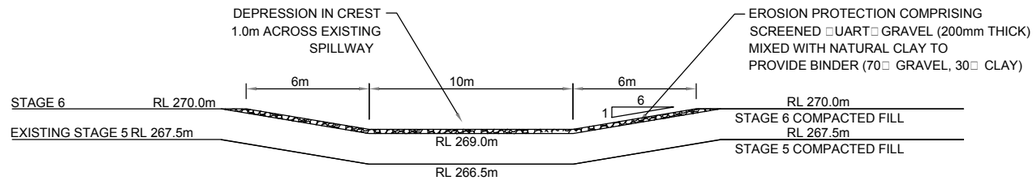


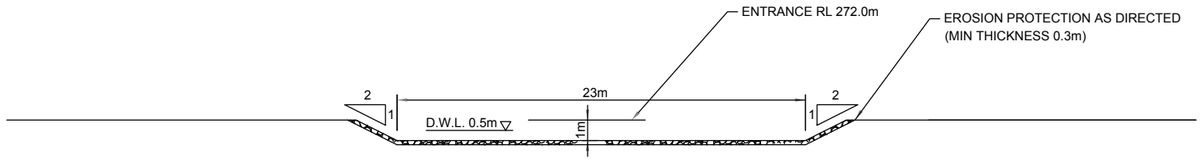
D 01 NORTH SADDLE EMBANKMENT - STAGE 6
PLAN VIEW ACROSS EXISTING SPILLWAY
SCALE 1:300



E - NORTH SADDLE EMBANKMENT - STAGE 6
SPILLWAY AREA CROSS-SECTION
SCALE 1:300



F - NORTH SADDLE EMBANKMENT - STAGE 6
SPILLWAY DETAIL SECTION
SCALE 1:300



G 02 CLOSURE SPILLWAY - STAGE 7
SPILLWAY DETAIL SECTION
SCALE 1:300

1:300 0 3 6 9 12 15 m

CMW Geosciences

CLIENT: TRITTON RESOURCES PTY LTD		DRAWN: DE	PROJECT: PER2017-0066
PROJECT: RAISING OF TD1□ STAGES □ AND □ TRITTON COPPER MINE		CHECKED: CH	DRAWING: 04
		REVISION: 0	SCALE: AS SHOWN
TITLE: SECTIONS S□ EET □		DATE: 09.11.17	SHEET: A3 L

Appendix B

Geotechnical Investigation Report

Material Evaluation Report for Stages 6 & 7 TSF1

Assessment Site: Existing Borrow Pits - Tritton Copper Tails Storage Dam 1

Client: Aeris Resources

Address: P.O. Box 386, Nyngan NSW 2825

(Our Reference: 10265-GR06a)

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APPENDICES

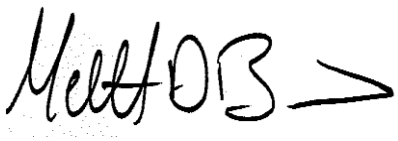
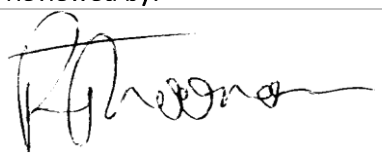
Appendix A – General Notes
Appendix B – NATA Laboratory Reports

Disclaimer

This report has been prepared solely for Aeris Resources in accordance with the scope provided by the client and for the purpose(s) as outlined throughout this report.

Barnson Pty Ltd accepts no liability or responsibility for or in respect of any use or reliance upon this report and its supporting material by anyone other than the client.

Project Name:	Tails Storage Dam No. 1 Stage 6 & 7
Client:	Aeris Resources
Project No.	10265-GR06a
Report Reference	10265-GR06a
Date:	25.01.2018
Revision:	A

Prepared by:	Reviewed by:
	
Matthew Brown Geotechnical Consultant Director	Richard Noonan BE (Hons) ME FIE Aust CPEng Director

1.0 INTRODUCTION

The purpose of this report is to outline the findings of borrow pit materials testing carried out to enable the construction on Stage 6 & 7 of the tailings dam.

Tritton Mine is proposing to raise the existing tails storage embankment an additional 5m to RL272m.

The testing undertaken was from both existing borrow pits and existing U50 tails samples taken on the 28th September 2017.

The scope of samples and testing was outlined in a technical memorandum by CMW Geosciences dated 26th September 2017

1.1 Limitations

The geotechnical section of Barnson Pty Ltd has conducted this investigation and prepared this report in response to specific instructions from the client to whom this report is addressed. This report is intended for the sole use of the client, and only for the purpose which it is prepared. Any third party who relies on the report or any representation contained in it does so at their own risk.

1.2 Geotechnical Testing

Representative samples from the site were subjected to the following range of tests in accordance with relevant method of Australian Standard AS1289:

- PSD
- Maximum Dry Density
- Undrained Triaxle
- Atterberg Limits
- Permeability
- Moisture Content

The PSD, Permeability and Triaxle testing was conducted by GHD in Artarmon NSW. Acc No 679.

2.0 EXISTING BORROW AREAS

2.1 Sheather's Pit

The material won from Sheather's pit has been used since stage 1 in the constructions of the embankments. The material is noted to be a red brown silty clay.

The testing conducted from the samples recovered included, undrained triaxle, permeability, PSD, PI & MDD.

Plate 1 - Sheathers Pit Stockpile

2.2 Yarran Pit

Currently this borrow pit is being used for the floor lining and also being mixed 50/50 ratio with sheather's pit for areas of embankments. The material is noted to be a grey silty clay.

The testing conducted from the samples recovered included, undrained triaxle, permeability, PSD, PI & MDD.

2.3 Existing Dam Stockpile

This area has recently been excavated. It is proposed the material be used in the embankment construction if suitable and meeting the specifications. The material is noted to be a brown/red/light brown silty sandy clay with depth.

The testing conducted from the samples recovered included, undrained triaxle, permeability, PSD, PI & MDD.

Plate 2 - Dam Storage Excavated

2.4 In-situ Tailings

In conjunction with the Electrical Friction Cone Penetration Testing (CPT) carried out five undisturbed samples U50 tubes were taken from selected locations along the existing embankment.

The testing conducted from the samples recovered included, undrained triaxle, PSD, PI.

Plate 3 - CPT Testing Rig

3.0 METHOD OF SAMPLING

On the 26th of September 2017, bulk samples were taken from the above mentioned borrow areas, additionally U50 samples were taken of the existing in-situ tails material.

4.0 NATA LABORATORY TESTING SUMMARY

Disturbed and bulk samples were taken during the field investigation. Laboratory testing was carried out on selected samples of all different material types, with details of the sampling and testing shown below:

4.1 Maximum Dry Density

MDD testing was conducted on the samples across the site to determine the Maximum Dry Density values. The results are shown below:

Table 1: Maximum Dry Density Results

Sample No.	Location	Maximum Dry Density (t/m)	Optimum Moisture Content (%)
Bulk Sample 1	Sheather's Pit	1.72	15.0
Bulk Sample 2	Yarran Pit	1.70	18.9
Bulk Sample 3	Sheather's/Yarran Blend	1.72	17.0
Bulk Sample 4	Dam Stockpile	1.81	14.5
Bulk Sample 5	Mine Waste	2.13	8.1

4.2 Consolidated Undrained Triaxial

The Consolidated Undrained (CU) test is the most common triaxial procedure, as it allows strength parameters to be determined based on the effective stresses (i.e. ϕ′ and c′). This is achieved by recording the excess pore pressure change within the specimen as shearing takes place.

Table 2: Undrained Shear Strength

Sample No.	Location	Moisture Content (%)	Friction Angle, Ø' (°)	Cohesion, c' (kPa)
Bulk Sample 1	Sheather's Pit	15.2	32	3
Bulk Sample 2	Yarran Pit	18.8	19	10
Bulk Sample 3	Sheather's/Yarran Blend	17.0	25	5.4
Bulk Sample 4	Dam Stockpile	14.5	33	5.8
Probe 1	Tails Storage Dam	23.1	37	0
Probe 2	Tails Storage Dam	15.4	37	0
Probe 3	Tails Storage Dam	13.7	35	3
Probe 4	Tails Storage Dam	11.5	38	0
Probe 5	Tails Storage Dam	16.4	39	0

The results of all testing conducted are shown and attached in ***Appendix B.***

4.3 Particle Size Distribution Testing

The particle size distribution results are shown in ***Appendix B.*** These results aided the classification of the soils encountered.

4.4 Plasticity Index

The plasticity results are summarised in the below table:

Table 3: Plasticity Index Testing Results

Sample No.	Location	Liquid Limit (%)	Plasticity Index (%)
Bulk Sample 1	Sheather's Pit	30	14
Bulk Sample 2	Yarran Pit	34	15
Bulk Sample 3	Sheather's/Yarran Blend	30	14
Bulk Sample 4	Dam Stockpile	31	13
Bulk Sample 5	Mine Waste	Not Obtainable	Not Obtainable
Probe 1	Tails Storage Dam	Not Obtainable	Not Obtainable
Probe 2	Tails Storage Dam	Not Obtainable	Not Obtainable
Probe 3	Tails Storage Dam	Not Obtainable	Not Obtainable
Probe 4	Tails Storage Dam	Not Obtainable	Not Obtainable
Probe 5	Tails Storage Dam	Not Obtainable	Not Obtainable

In our experience with cohesive soils with a Plasticity Index range of 11-27% are likely to be moderately reactive to moisture change. Cohesive soils with a Plasticity Index range of 27-35% are likely to be highly reactive to moisture change. Cohesive soils with a Plasticity Index greater than 35% are likely to be very highly to extremely reactive to moisture change.

4.5 Permeability Testing

Permeability testing was performed throughout the test pits performed at the proposed sludge lagoons locations.

Table 4: Permeability Test Results

Sample No.	Location	Permeability Test Results Achieved (m/sec)
Bulk Sample 1	Sheather's Pit	1E-10
Bulk Sample 2	Yarran Pit	1E-10
Bulk Sample 3	Sheather's/Yarran Blend	1E-10
Bulk Sample 4	Dam Stockpile	2E-10
Bulk Sample 5	Mine Waste	1E-08

The above results indicate the in-situ clay is impervious when compacted.

4.6 Moisture Content Testing

The in-situ moisture content range for each area is summarised in the below table:

Table 5: In-Situ Moisture Content Results

Sample No.	Location	Field Moisture Content (%)
Bulk Sample 1	Sheather's Pit	6.0
Bulk Sample 2	Yarran Pit	1.7
Bulk Sample 3	Sheather's/Yarran Blend	4.3
Bulk Sample 4	Dam Stockpile	7.3
Bulk Sample 5	Mine Waste	1.9

None of the above results are considered abnormal in-situ moisture content values.

5.0 CONCLUSION

The testing methods adopted are indicative of the site's sub-surface conditions to the depths excavated and to specific sampling and/or testing locations in this investigation, and only at the time the work was carried out.

The accuracy of geotechnical engineering advice provided in this report may be limited by unobserved variations in ground conditions across the site in areas between and beyond test locations and by any restrictions in the sampling and testing which was able to be carried out, as well as by the amount of data that could be collected given the project and site constraints.

These factors may lead to the possibility that actual ground conditions and materials behaviour observed at the test locations may differ from those which may be encountered elsewhere on the site.

If the sub-surface conditions are found to differ from those described in this report, we should be informed immediately to evaluate whether recommendations should be reviewed and amended if necessary.

Appendix A - General Notes

GEOTECHNICAL INVESTIGATION GENERAL NOTES

This report contains the results of a geotechnical investigation conducted for a specific purpose and client. The results should not be used by other parties, or for other purposes, as they may contain neither adequate nor appropriate information. In particular, the investigation does not cover contamination issues unless specifically required to do so by the client.

TEST HOLE LOGGING

The information on the test hole logs (boreholes, test pits, exposures etc.) is based on a visual and tactile assessment, except at the discrete locations where the test information is available (field and/or laboratory results). The borehole logs include both factual data and inferred information. Reference should be made to the relevant sheets for the explanation of logging procedures (Soil and Rock Descriptions, Core Log Sheet Notes etc.).

GROUNDWATER

Unless otherwise indicated, the water levels presented on the borehole logs are the levels of free water or seepage in the test hole recorded at the given time of measuring. The actual groundwater level may differ from this recorded level depending on material permeability's (i.e. depending on response time of the measuring instrument). Further, variations of this level could occur with time due to such effects as seasonal, environmental and tidal fluctuations or construction activities. Confirmation of groundwater levels, phreatic surfaces or piezo metric pressures can only be made by appropriate instrumentation techniques and monitoring programmes.

INTERPRETATION OF RESULTS

The discussion or recommendations contained within this report normally are based on a site evaluation from discrete borehole area. Generalised, idealised or inferred subsurface conditions (including any geotechnical cross-sections) have been assumed or prepared by interpolation and/or extrapolation of these data. As such these conditions are an interpretation and must be considered as a guide only.

CHANGE IN CONDITIONS

Local variations or anomalies in the generalised ground conditions do occur in the natural environment, particularly between discrete borehole locations. Additionally, certain design or construction procedures may have been assumed in assessing the soil-structure interaction behaviour of the site. Furthermore, conditions may change at the site from those encountered at the time of the geotechnical investigation through construction activities and constantly changing natural forces.

Any change in design, in construction methods, or in ground conditions as noted during construction, from those assumed or reported should be referred to this firm for appropriate assessment and comment.

GEOTECHNICAL VERIFICATION

Verification of the geotechnical assumptions and/or model is an integral part of the design process – investigation, construction verification and performance monitoring. Variability is a feature of the natural environment and, in many instances, verification of soil or rock quality, or foundation levels are required. There may be a requirement to extend foundation depths to modify a foundation system or to conduct monitoring as a result of this natural variability. Allowance for verification by geotechnical personnel accordingly should be recognised and programmed during construction.

FOUNDATIONS

Where referred to in the report, the soil or rock quality, or the recommendation depth of any foundation (piles, caissons footings etc.) is an engineering estimate. The estimate is influenced and perhaps limited, by the fieldwork method and testing carried out in connection with the site investigation, and other pertinent information as has been made available. The material quality and/or foundation depth remains, however, an estimate and therefore liable to variation. Foundation drawings, designs and specifications should provide for variations in the final depth, depending upon the ground conditions at each point of support, and allow for geotechnical verification.

REPRODUCTION OF REPORTS

Where it is desired to reproduce the information contained in our geotechnical report, or other technical information, for the inclusion in contract documents or engineering specification of the subject development, such reproductions should include at least all of the relevant test hole and test data, together with the appropriate standard description sheets and remarks made in the written report of a factual or descriptive nature.

ROCK

Rock Strength

Rock strength is a scale of strength, based on point load index testing, or field testing.

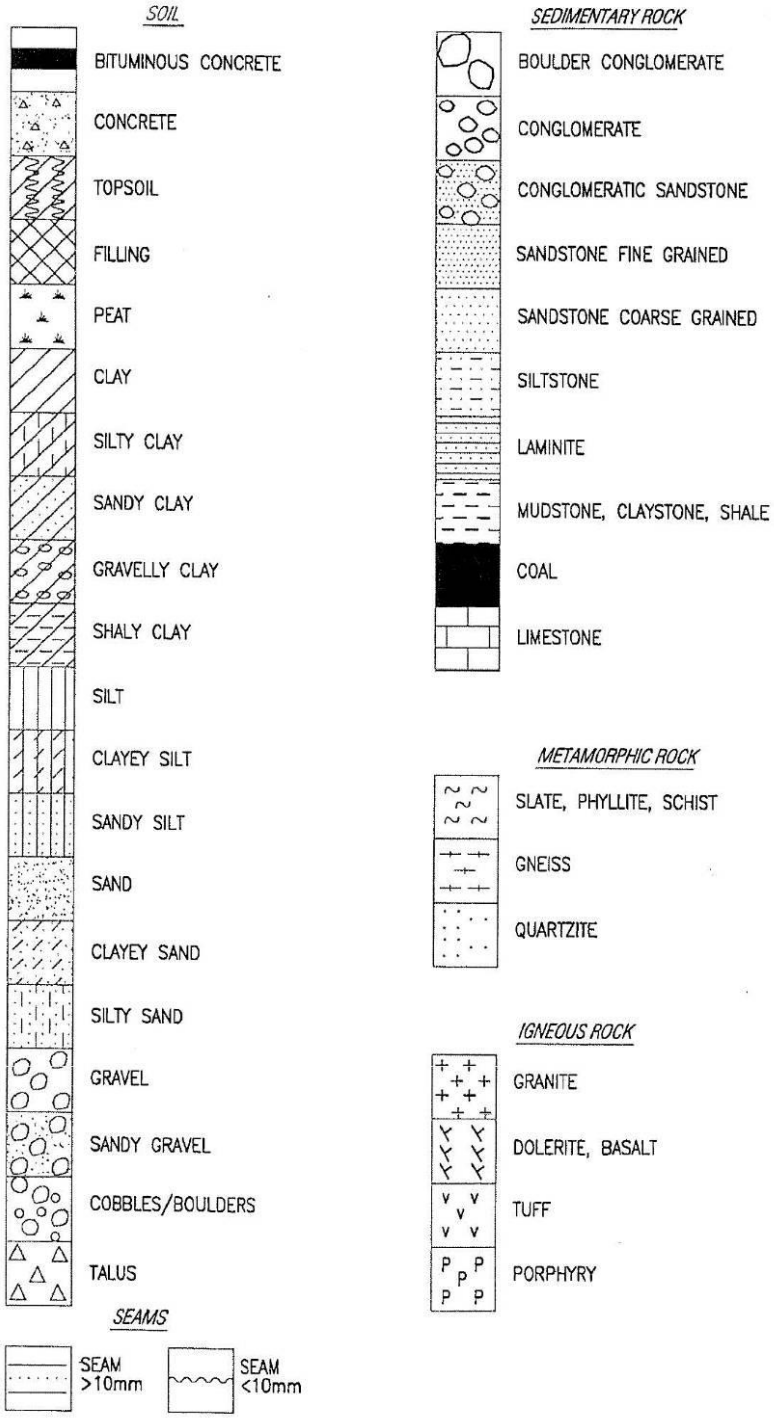
Term	Letter Symbol	Point load index (Mpa) Is(50)	Field guide to strength
Extremely low	EL	< 0.03	Easily remoulded by hand to a material with soil properties.
Very low	VL	0.03 – 0.1	Material crumbles under firm blows with sharp end of pick.
Low	L	0.1 – 0.3	Easily scored by knife, has dull sound under hammer.
Medium	M	0.3 – 1.0	Readily scored with knife, core pieces broken by hand with difficulty
High	H	1 – 3	Rock rings under hammer, core piece broken by pick only.
Very high	VH	3 – 10	Hand specimen breaks with pick after more than one blow.
Extremely high	EH	> 10	Hand specimen breaks with pick after several than one blow.

Rock Weathering

Rock weathering is the degree of rock weathering, determined in the field.

Term	Letter Symbol	Definition
Residual soil	RS	Soil developed on extremely weathered rock.
Extremely weathered rock	XW	Soil is weathered to such an extent that it has soil properties, i.e. it disintegrates or can be remoulded in water.
Distinctly weathered rock	DW	Rock strength usually changed by weathering. The rock may be discoloured, usually by iron staining, porosity is increased.
Slightly weathered rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh rock	FR	Rock shows no sign of decomposition or staining.

GRAPHIC SYMBOLS FOR SOIL & ROCK



Appendix B – NATA Laboratory Reports

barnson
DESIGN. PLAN. MANAGE

Barnson Pty Ltd A.C.N 088 342 625

16L Yarrandale Road
Dubbo NSW 2830

Ph: 1300 227 676
Fax: (02) 6884 5857

Consulting Civil, Structural and Geotechnical Engineers, Environmental Consultants
Project Management, NATA Accredited Laboratory

Report For Particle Distrubution and Soil Index Properties

CLIENT: Aeris Resources
ADDRESS: P.O. Box 386, Nyngan NSW 2825 REFERENCE: 10265-01
PROJECT: Material Evaluation
LOCATION: Tritton Copper Tails Storage Dam 1, Yarrandale Road, Hermidale NSW
DATE: 11/10/2017

Sample		Probe 1	Probe 2	Probe 3	Probe 4
Material Description		Brown-Yellow Sandy Silt	Brown-Yellow Sandy Silt	Brown-Yellow Sandy Silt	Brown-Yellow Sandy Silt
% Passing Each Sieve	75.0mm	100	100	100	100
	53.0mm	100	100	100	100
	37.5mm	100	100	100	100
	26.5mm	100	100	100	100
	19.0mm	100	100	100	100
	13.2mm	100	100	100	100
	9.50mm	100	100	100	100
	6.70mm	100	100	99	100
	4.75mm	100	99	98	99
	2.36mm	99	99	96	96
	1.18mm	98	98	96	95
	600µm	97	97	95	94
	425µm	96	96	95	94
	300µm	95	95	94	93
	150µm	93	92	89	91
	75µm	83	78	74	79

Determination of Particle Size Distrubution by sieving was conducted as per AS1289.3.6.1

Soil Properties Index		**Standard** ☐	**One Point** ☑		
Liquid Limit	%	Not Obtainable	Not Obtainable	Not Obtainable	Not Obtainable
Plastic Limit	%	Non-Plastic	Non-Plastic	Non-Plastic	Non-Plastic
Plasticity Index	%	Non-Plastic	Non-Plastic	Non-Plastic	Non-Plastic

Comments:

Determination of Soil Properties Index was conducted as per AS1289.3.1.1 / 3.1.2, AS1289.3.2.1 & AS1289.3.3.1

Wet Sieving		Air Drying		Natural State	
Dry Sieving	x	Oven Drying	x		

Pretreatment Method: T102 CA3
T103 W

Approved Signatory: _____
Nick Reardon

Date: 12.1.2018

barnson
DESIGN . PLAN . MANAGE

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16L Yarrandale Road
Dubbo NSW 2830

Ph: 1300 227 676
Fax: (02) 6884 5857

Consulting Civil, Structural and Geotechnical Engineers, Environmental Consultants
Project Management, NATA Accredited Laboratory

Report For Particle Distrubution and Soil Index Properties

CLIENT: Aeris Resources
ADDRESS: P.O. Box 386, Nyngan NSW 2825 REFERENCE: 10265-02
PROJECT: Material Evaluation
LOCATION: Tritton Copper Tails Storage Dam 1, Yarrandale Road, Hermidale NSW
DATE: 11/10/2017

Sample		Probe 5			
Material Description		Brown-Yellow Sandy Silt			
% Passing Each Sieve	75.0mm	100			
	53.0mm	100			
	37.5mm	100			
	26.5mm	100			
	19.0mm	100			
	13.2mm	100			
	9.50mm	100			
	6.70mm	100			
	4.75mm	99			
	2.36mm	99			
	1.18mm	99			
	600µm	98			
	425µm	98			
	300µm	98			
	150µm	93			
	75µm	78			

Determination of Particle Size Distrubution by sieving was conducted as per AS1289.3.6.1

Soil Properties Index		**Standard** ☐	**One Point** ☑		
Liquid Limit	%	Not Obtainable			
Plastic Limit	%	Non-Plastic			
Plasticity Index	%	Non-Plastic			

Comments:

Determination of Soil Properties Index was conducted as per AS1289.3.1.1 / 3.1.2, AS1289.3.2.1 & AS1289.3.3.1

Wet Sieving		Air Drying		Natural State	
Dry Sieving	x	Oven Drying	x		

Pretreatment Method: T102 **CA3**
T103 **W**

NATA

Approved Signatory: _____
Nick Reardon

Date: 12.1.2018

Accredited for compliance with ISO/IEC 17025 - Testing
Laboratory No. 9605

barnson
DESIGN . PLAN . MANAGE

Barnson Pty Ltd A.C.N 088 342 625

16L Yarrandale Road
Dubbo NSW 2830

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Fax: (02) 6884 5857

Consulting Civil, Structural and Geotechnical Engineers, Environmental Consultants
Project Management, NATA Accredited Laboratory

Report For Particle Distrubution and Soil Index Properties

CLIENT: Aeris Resources
ADDRESS: P.O. Box 386, Nyngan NSW 2825 REFERENCE: 10265-03
PROJECT: Material Evaluation
LOCATION: Tritton Copper Tails Storage Dam 1, Yarrandale Road, Hermidale NSW
DATE: 11/10/2017

Sample		Yarrin Pit	Sheathers Pit	50/50 Yarran/Sheathers	Dam Stockpile
Material Description		Grey Silty Clay	Brown Silty Clay	Brown-Grey Silty Clay	Red-Brown Gravelly Sandy Clay
% Passing Each Sieve	75.0mm	100	100	100	100
	53.0mm	100	100	100	98
	37.5mm	100	100	100	98
	26.5mm	100	99	100	95
	19.0mm	100	98	100	92
	13.2mm	100	98	100	89
	9.50mm	100	97	99	84
	6.70mm	100	95	98	80
	4.75mm	100	93	96	76
	2.36mm	99	90	95	69
	1.18mm	98	87	93	62
	600µm	97	85	91	57
	425µm	94	83	89	53
	300µm	92	80	86	50
	150µm	87	75	81	45
	75µm	83	69	76	41

Determination of Particle Size Distrubution by sieving was conducted as per AS1289.3.6.1

Soil Properties Index		**Standard** ☐	**One Point** ☑		
Liquid Limit	%	34	30	30	31
Plastic Limit	%	19	16	16	18
Plasticity Index	%	15	14	14	13

Comments:

Determination of Soil Properties Index was conducted as per AS1289.3.1.1 / 3.1.2, AS1289.3.2.1 & AS1289.3.3.1

Wet Sieving		Air Drying		Natural State	
Dry Sieving	x	Oven Drying	x		

Pretreatment Method: T102 CA3
T103 W

Approved Signatory: _____
Nick Reardon

Date: 12.1.2018

NATA

Accredited for compliance with ISO/IEC 17025 - Testing
Laboratory No. 9605

barnson
DESIGN. PLAN. MANAGE

Barnson Pty Ltd A.C.N 088 342 625

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Fax: (02) 6884 5857

Consulting Civil, Structural and Geotechnical Engineers, Environmental Consultants
Project Management, NATA Accredited Laboratory

Report For Particle Distrubution and Soil Index Properties

CLIENT: Aeris Resources
ADDRESS: P.O. Box 386, Nyngan NSW 2825 REFERENCE: 10265-04
PROJECT: Material Evaluation
LOCATION: Tritton Copper Tails Storage Dam 1, Yarrandale Road, Hermidale NSW
DATE: 11/10/2017

Sample		Mine Waste			
Material Description		Grey Silty Clay			
% Passing Each Sieve	75.0mm	100			
	53.0mm	100			
	37.5mm	100			
	26.5mm	100			
	19.0mm	95			
	13.2mm	87			
	9.50mm	77			
	6.70mm	68			
	4.75mm	60			
	2.36mm	46			
	1.18mm	34			
	600µm	27			
	425µm	24			
	300µm	22			
	150µm	19			
	75µm	16			

Determination of Particle Size Distrubution by sieving was conducted as per AS1289.3.6.1

Soil Properties Index		**Standard** ☐	**One Point** ☑		
Liquid Limit	%	Not Obtainable			
Plastic Limit	%	Non-Plastic			
Plasticity Index	%	Non-Plastic			

Comments:

Determination of Soil Properties Index was conducted as per AS1289.3.1.1 / 3.1.2, AS1289.3.2.1 & AS1289.3.3.1

Wet Sieving		Air Drying		Natural State	
Dry Sieving	x	Oven Drying	x		

Pretreatment Method: T102 CA3
T103 W

Approved Signatory: _____
Nick Reardon

Date: 12.1.2018

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Laboratory No. 9605

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Consulting Civil, Structural and Geotechnical Engineers, Environmental Consultants
Project Management, NATA Accredited Laboratory

Report For Standard Compaction

CLIENT: Aeris Resources
ADDRESS: P.O. Box 386, Nyngan NSW 2825 REFERENCE: 10265-05
PROJECT: Material Evaluation
LOCATION: Tritton Copper Tails Storage Dam 1, Yarrandale Road, Hermidale NSW
DATE: 30/10/2017

Sample	Material Description	Material Oversize (%)		Standard Maximum Dry Density t/m^3	Standard Optimum Moisture %
		19.0mm	37.5mm		
Sheathers Pit	Brown Silty Clay	N/a	N/a	1.72	15.0
Yarrin Pit	Grey Silty Clay	N/a	N/a	1.70	18.9
50/50	Brown-Grey Silty Clay	N/a	N/a	1.72	17.0
Dam Stockpile	Red-Brown Gravelly Sandy Clay	10	N/a	1.81	14.5
Mine Waste	Grey Silty Gravel	6	N/a	2.13	8.1

Comments:

Sample preparation as per AS1289.1.1 Section 5.4
Determination of Maximum Dry Density and Optimum Moisture as per AS 1289 5.1.1

Approved Signatory: _____ Date: 12.1.2018
Nick Reardon

NATA

Accredited for compliance with ISO/IEC 17025 - Testing
Laboratory No. 9605

Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702417
		Job No.:	2125993
Project:	Project 10265	**Sample No.:**	SYD17-0471-03
	Tritton Copper Mine	**Test Date:**	13.12.2017
Client Id.:	Sheathers Pit **Borehole No.:** n/av	**Depth (m):**	n/av
Description:	red brown sandy CLAY		
Sample History:	Supplied by Client	**Sample Type:**	Remoulded

SAMPLE INFORMATION

Specimen No.:	1	
Initial Height (mm):	99.5	
Initial Diameter (mm):	50.3	
Initial Wet Density (t/m³):	1.97	MDD / OMC Supplied by client
Initial Dry Density (t/m³):	1.71	MDD = 1.717 t/m³
Initial Moisture Content (%):	15.2	OMC = 15.0 %
Final Moisture Content: Top (%):	18.8	
Middle (%):	18.2	
Bottom (%):	18.0	
B Response (%):	96.4	

TEST DATA (Multi-Stage Test)

Stage No.:	**1**	**2**	**3**		
Back Pressure (kPa):	500	500	500		
Effective Consolidation Stress (kPa):	50	100	200		
Rate of Strain (mm/min):	0.00122	0.00244	0.00122		
Deviator Stress at Failure (kPa):	77	138	257		
Pore Water Pressure at Failure (kPa):	21	41	80		
Consolidation Volume Change (ml):	2.9	1.7	3.0		
Strain at Failure (%):	1.2	3.8	6.9		
σ'_1 (kPa):	107	197	369		
σ'_3 (kPa):	30	60	113		

Test Comments: Filter paper side drains used
No visible shear failure plane

Remarks:

Tested By: S. Ihnativ

Checked By: TSH

Approved Signatory:

D. Brooke

Date: 8/01/2018

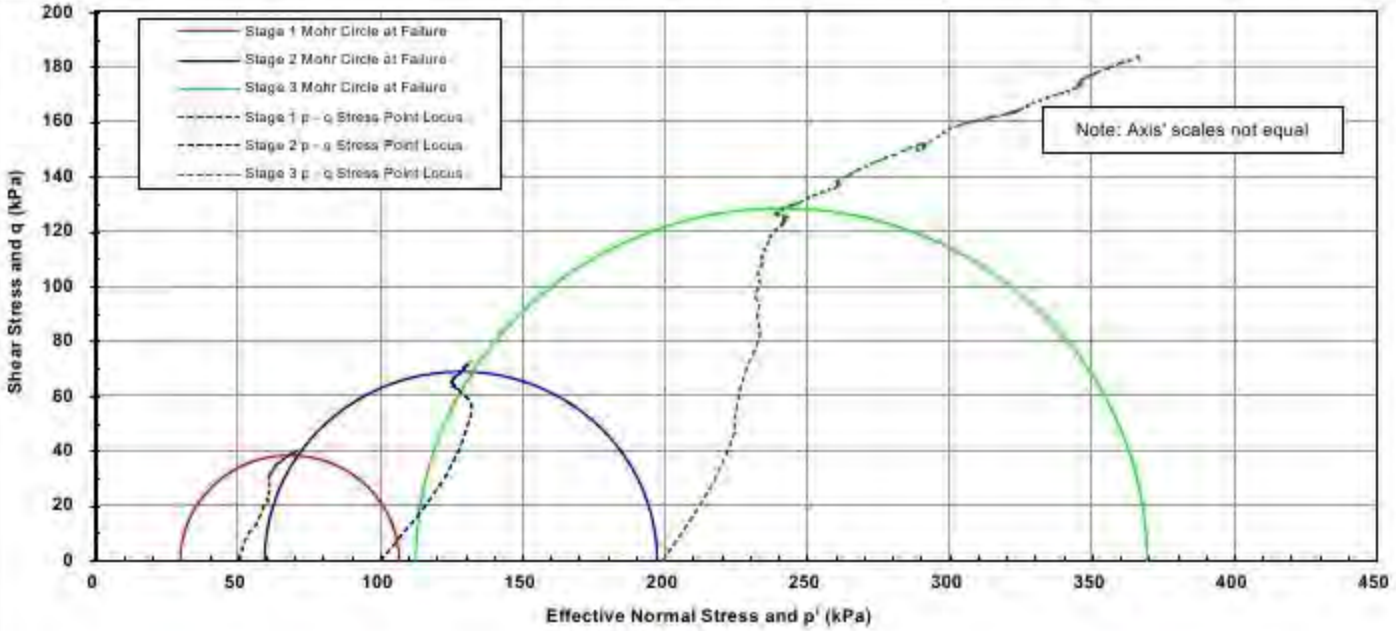
GHD
Unit 5, 43 Herbert Street Artarmon, N.S.W. 2064
Telephone: (02) 9462 4700 Fax: (02) 9462 4710
Geotechnical Testing Services

NATA Accredited for compliance with ISO/IEC 17025 - Testing Laboratory Accreditation Number 679

Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

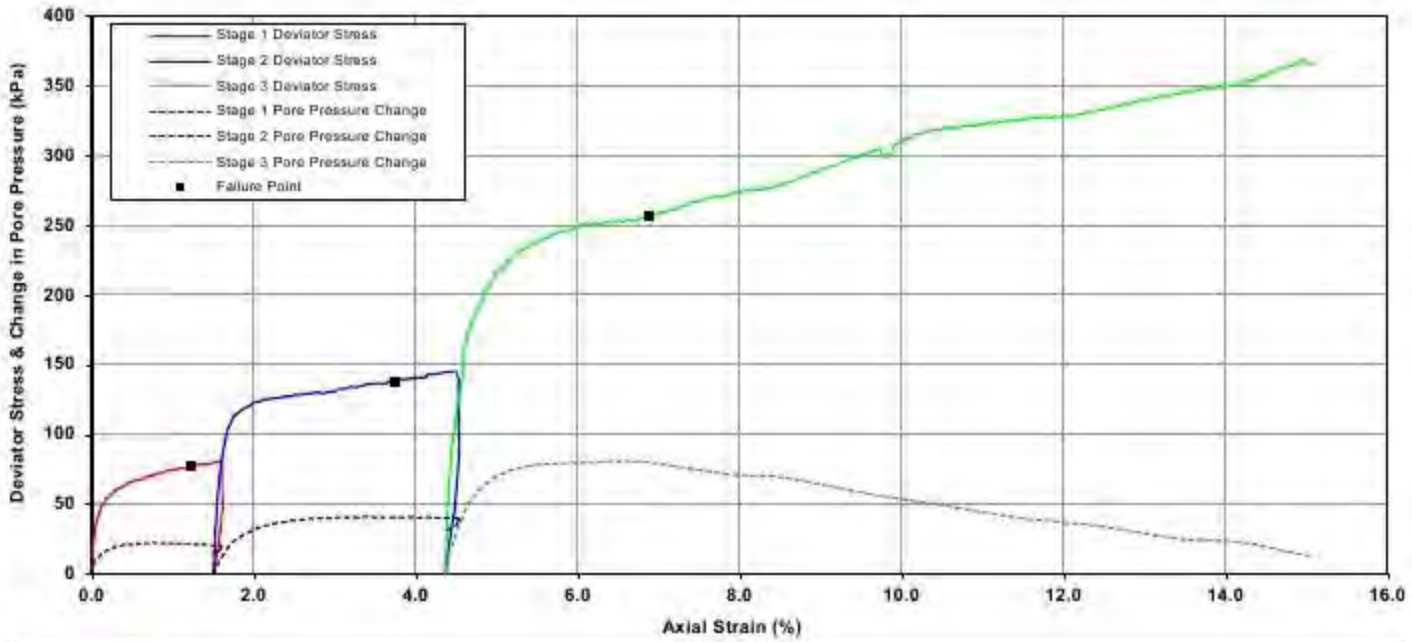
Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702417
		Job No.:	2125993
Project:	Project 10265 Tritton Copper Mine	**Sample No.:**	SYD17-0471-03
		Test Date:	13.12.2017
Client Id.:	Sheathers Pit	**Borehole No.:** n/av	**Depth (m):** n/av



Interpretation between stages :	1 to 2	2 to 3	3 to 4	4 to 5	1 to 3
Effective Cohesion c' (kPa) :	4	1			3
Angle of effective internal friction Φ' (Degrees) :	31	32			32

Angle of effective internal friction and effective cohesion for this result calculated by linear regression.
Geotechnical Engineer should appraise result.



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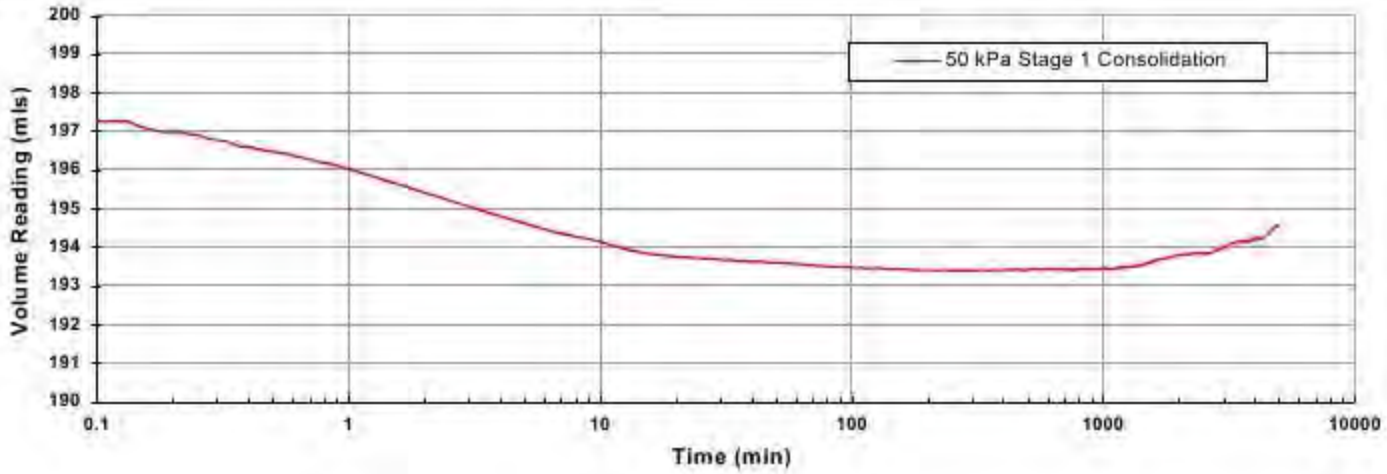
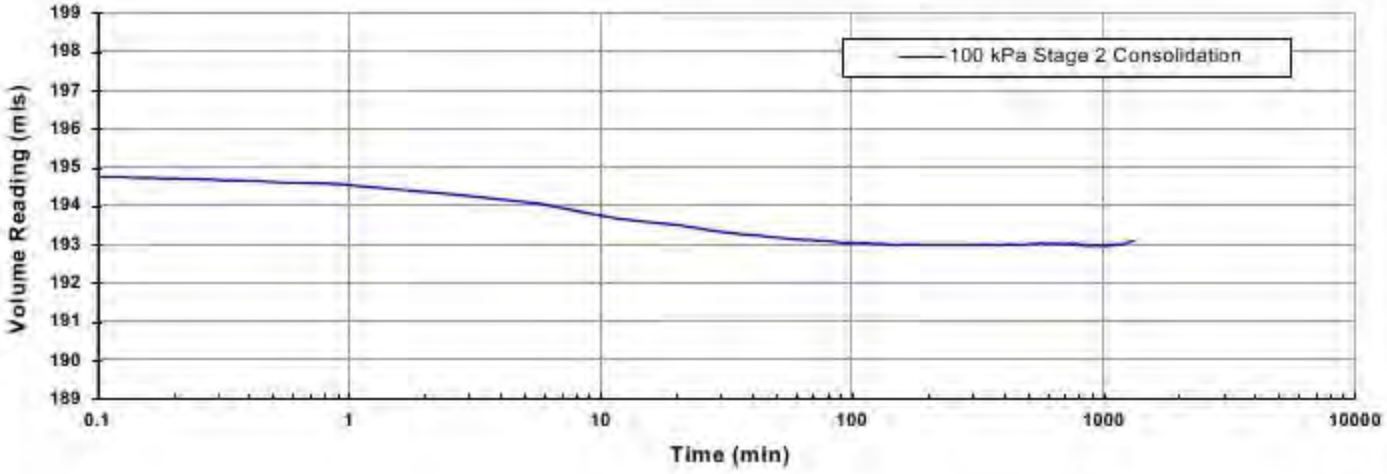
Geotechnical Testing Services

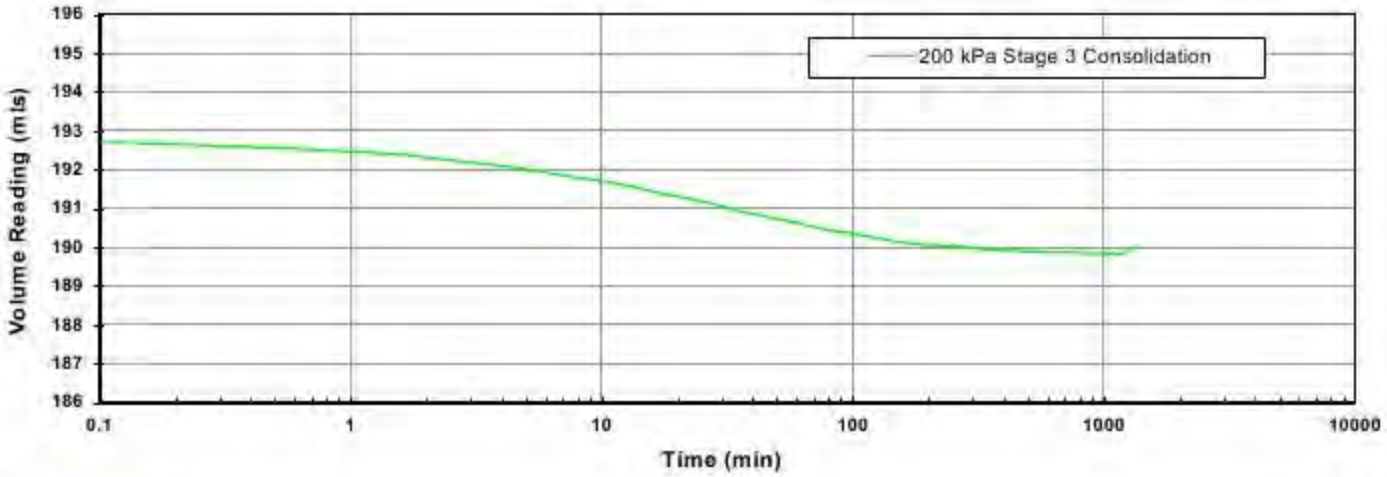
Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702417
		Job No.:	2125993
Project:	Project 10265 Tritton Copper Mine	**Sample No.:**	SYD17-0471-03
		Test Date:	13.12.2017
Client Id.:	Sheathers Pit	**Borehole No.:** n/av	**Depth (m):** n/av







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Geotechnical Testing Services

Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702416
		Job No.:	2125993
Project:	Project 10265	**Sample No.:**	SYD17-0471-02
	Tritton Copper Mine	**Test Date:**	11.12.2017
Client Id.:	Yarrins Pit **Borehole No.:** n/av	**Depth (m):**	n/av
Description:	grey CLAY		
Sample History:	Supplied by Client	**Sample Type:**	Remoulded

SAMPLE INFORMATION

Specimen No.:	1	
Initial Height (mm):	99.5	
Initial Diameter (mm):	50.3	
Initial Wet Density (t/m³):	2.02	MDD / OMC supplied by client
Initial Dry Density (t/m³):	1.70	MDD = 1.703 t/m³
Initial Moisture Content (%):	18.8	OMC = 19.0 %
Final Moisture Content: Top (%):	20.0	
Middle (%):	19.8	
Bottom (%):	19.2	
B Response (%):	95.4	

TEST DATA (Multi-Stage Test)

Stage No.:	**1**	**2**	**3**
Back Pressure (kPa):	500	500	500
Effective Consolidation Stress (kPa):	50	100	200
Rate of Strain (mm/min):	0.00061	0.00122	0.00122
Deviator Stress at Failure (kPa):	56	89	176
Pore Water Pressure at Failure (kPa):	20	35	46
Consolidation Volume Change (ml):	2.9	2.0	2.8
Strain at Failure (%):	0.7	2.1	9.5
σ'_1 (kPa):	86	153	328
σ'_3 (kPa):	30	64	153

Test Comments: Filter paper side drains used
No visible shear failure plane

Remarks:

Tested By: S. Ihnativ

Checked By: TSH

Approved Signatory:

D. Brooke

Date: 15/01/2018

GHD
Unit 5/43 Herbert Street Artarmon, N.S.W. 2064
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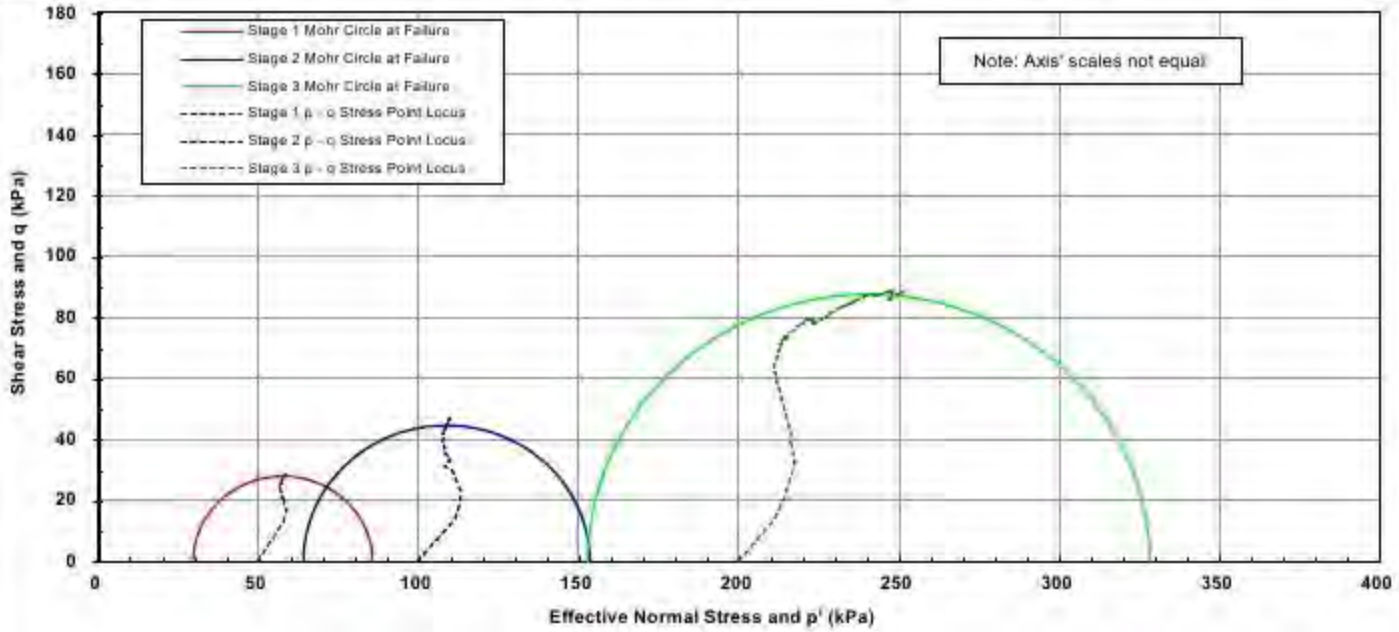
Geotechnical Testing Services

NATA Accredited for compliance with ISO/IEC 17025 - Testing
Laboratory Accreditation Number 679

Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

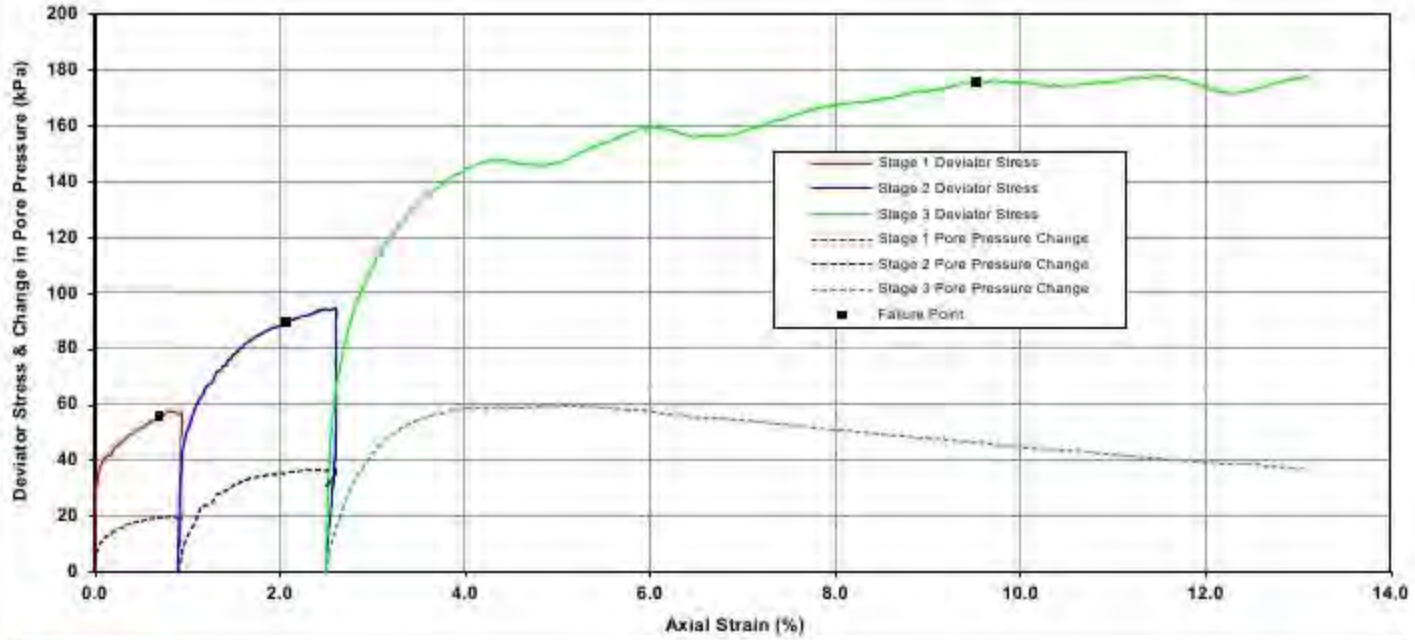
Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702416
		Job No.:	2125993
Project:	Project 10265	**Sample No.:**	SYD17-0471-02
	Tritton Copper Mine	**Test Date:**	11.12.2017
Client Id.:	Yarrins Pit	**Borehole No.:** n/av	**Depth (m):** n/av



Interpretation between stages :	1 to 2	2 to 3	3 to 4	4 to 5	1 to 3
Effective Cohesion c' (kPa) :	10	10			10
Angle of effective internal friction Φ' (Degrees) :	19	19			19

Angle of effective internal friction and effective cohesion for this result calculated by linear regression.
Geotechnical Engineer should appraise result.



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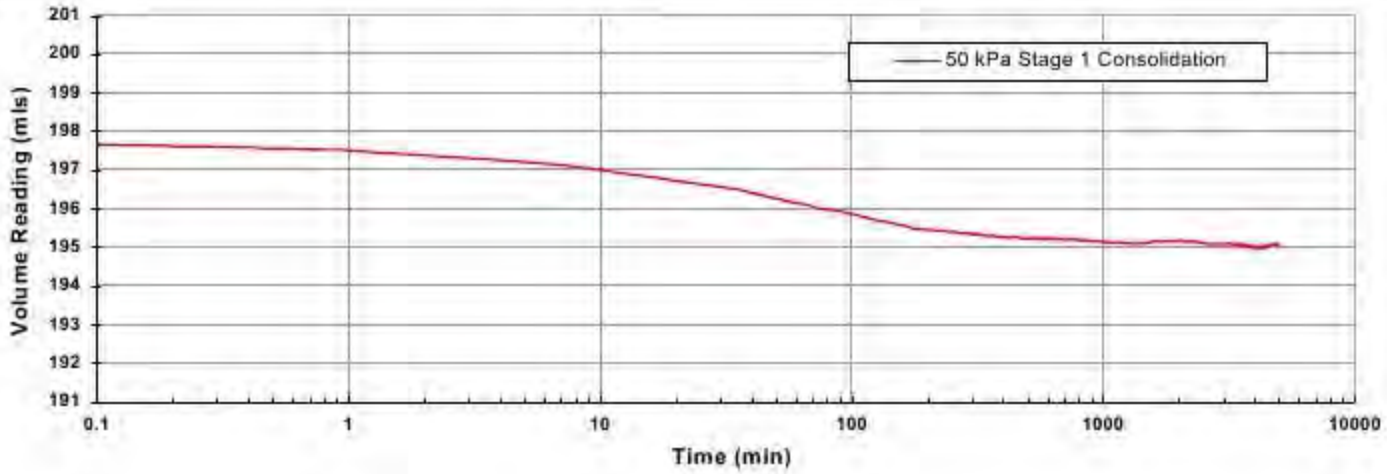
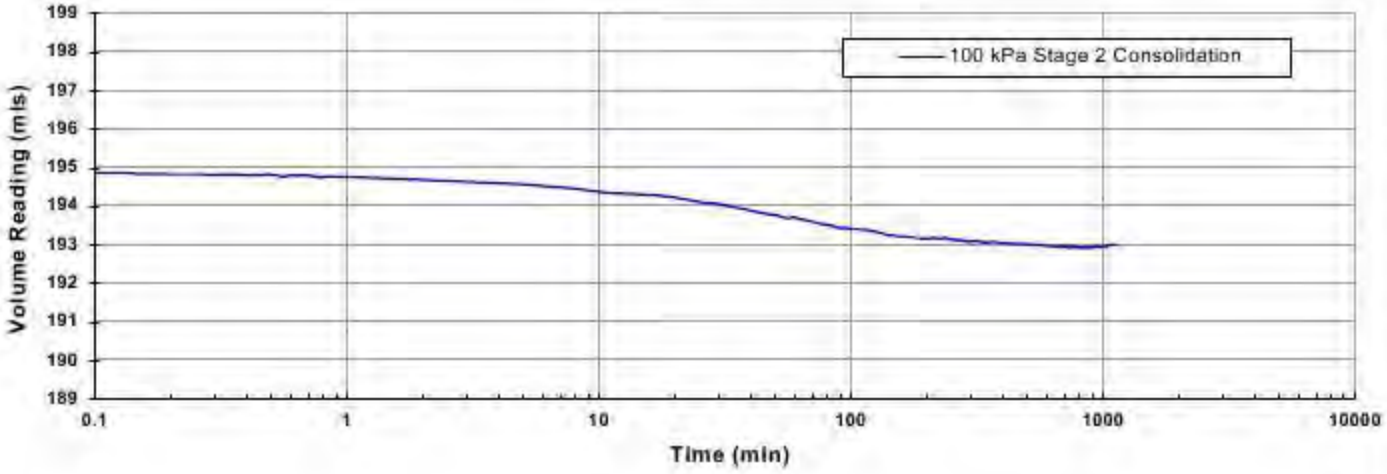
Geotechnical Testing Services

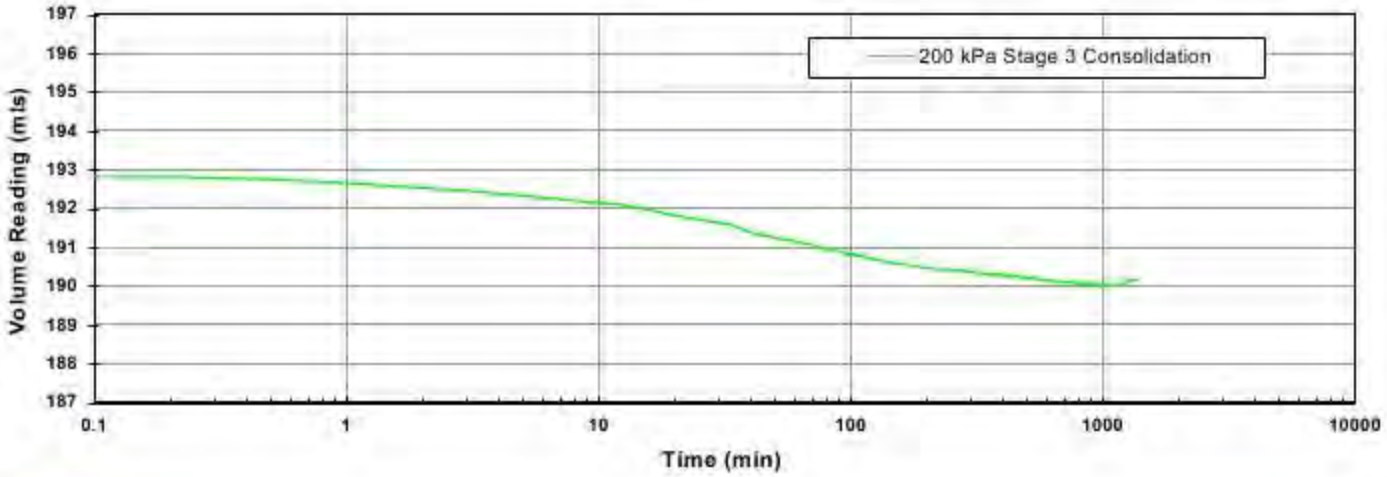
Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702416
		Job No.:	2125993
Project:	Project 10265	**Sample No.:**	SYD17-0471-02
	Tritton Copper Mine	**Test Date:**	11.12.2017
Client Id.:	Yarrins Pit	**Borehole No.:** n/av	**Depth (m):** n/av







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Sydney Laboratory
31 Hope Street, Melrose Park NSW 2114
T : (61 2) 8876 0500
ABN 55 139 460 521

CU - Triaxial shear test: stress - strain plots

client : *GHD Geotechnical Pty Ltd*
principal : *Barnsons Pty Ltd*
project : *Project 10265 - Job No.:2125993*
location : *Tritton Copper Mine*

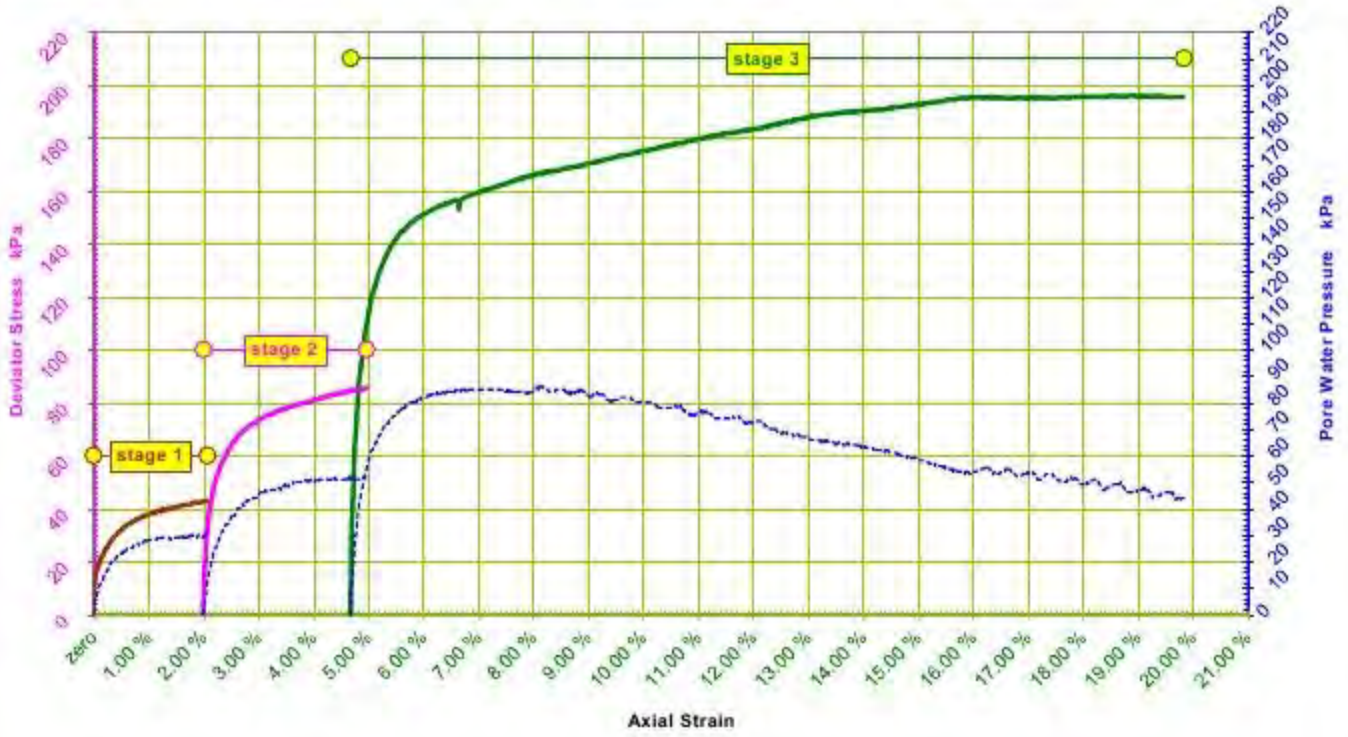
job no : ***754-SYDS00086AA***
date : *11/12/17 to 19/12/17*
report number: *SYDS17R-01138CU-TXL*
laboratory number: *SYDS17S-01138; SYD17-0471 05*

Sample number: ***50/50 - Tarrin/ Sheatlers Pits***
Failure Criteria: ***Maximum principal effective stress ratio***

Test Method : ***AS1289.6.4.2***
(Appendix B6 Stage Testing)

Material Classification: *(CICH) SILTY CLAY - medium to high plasticity, mottled grey-red brown, some fine to coarse sand, trace of fine to medium gravel (<9.5 mm tested)*

note 1 : *Single Individual Recompacted Specimen - (Multistage); Initial Bar B response = 0.95*
note 2 : *Initial Specimen Dimensions (mm):- 125.5 x 63.6 (Dia); Height change during Saturation = 0.5 mm*
note 3 : *Recompacted to 100% Standard Maximum Dry Density and at Standard Optimum Moisture Content.*
note 4 : *Sample, pressures supplied by Client; Type of failure: progressive plastic deformation.*



Type of Test: *Saturated, consolidated, undrained, with pore water measurements.*

Shear Stage Data

Stage	$\Delta\sigma_3$	Strain Rate	ε_f	σ_3'	u_0	u_f	$(\sigma_1 - \sigma_3)\phi$
	kPa	%/min	%	kPa	kPa	kPa	kPa
1	48.000	0.0060	2.074	18.000	702.000	732.000	43.170
2	99.000	0.0060	4.948	47.000	701.000	753.000	85.645
3	199.000	0.0060	7.570	114.000	701.000	786.000	163.113

Initial Back Pressure: 700.0 kPa

Initial Cell Pressure(s):

Stage 1:	750.0 kPa
Stage 2:	800.0 kPa
Stage 3:	900.0 kPa

Effective principal stresses at 20% axial strain and Consolidation conditions

ε_f	σ_3'	σ_1'	u_f	$(\sigma_1 - \sigma_3)\phi$	Drainage Condition
%	kPa	kPa	kPa	kPa	Stages 1, 2 & 3
-	-	-	-	-	one end and radial boundary

Angle of Friction: ***25.0*** *degrees*
Cohesion: ***5.4*** *kPa*

GLEN TRIAX 2 005 2017

Moisture Contents:

Initial: *Stage 1:* 17.0 %
Final: *Whole:* *Stage 3:* 18.8 %

Initial Dry Density: 1.72 t/m3
Initial Wet Density: 2.02 t/m3

NATA TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing
The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/national standards

Authorised Signature: Garry K Collins 27/12/17

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A TETRA TECH COMPANY

Sydney Laboratory
31 Hope Street, Melrose Park NSW 2114
T : (61 2) 8876 0500
ABN 55 139 460 521

CU - Triaxial shear test: shear path & Mohr circle plot

client : GHD Geotechnical Pty Ltd
principal : Barnsons Pty Ltd
project : Project 10265 - Job No.:2125993
location : Tritton Copper Mine

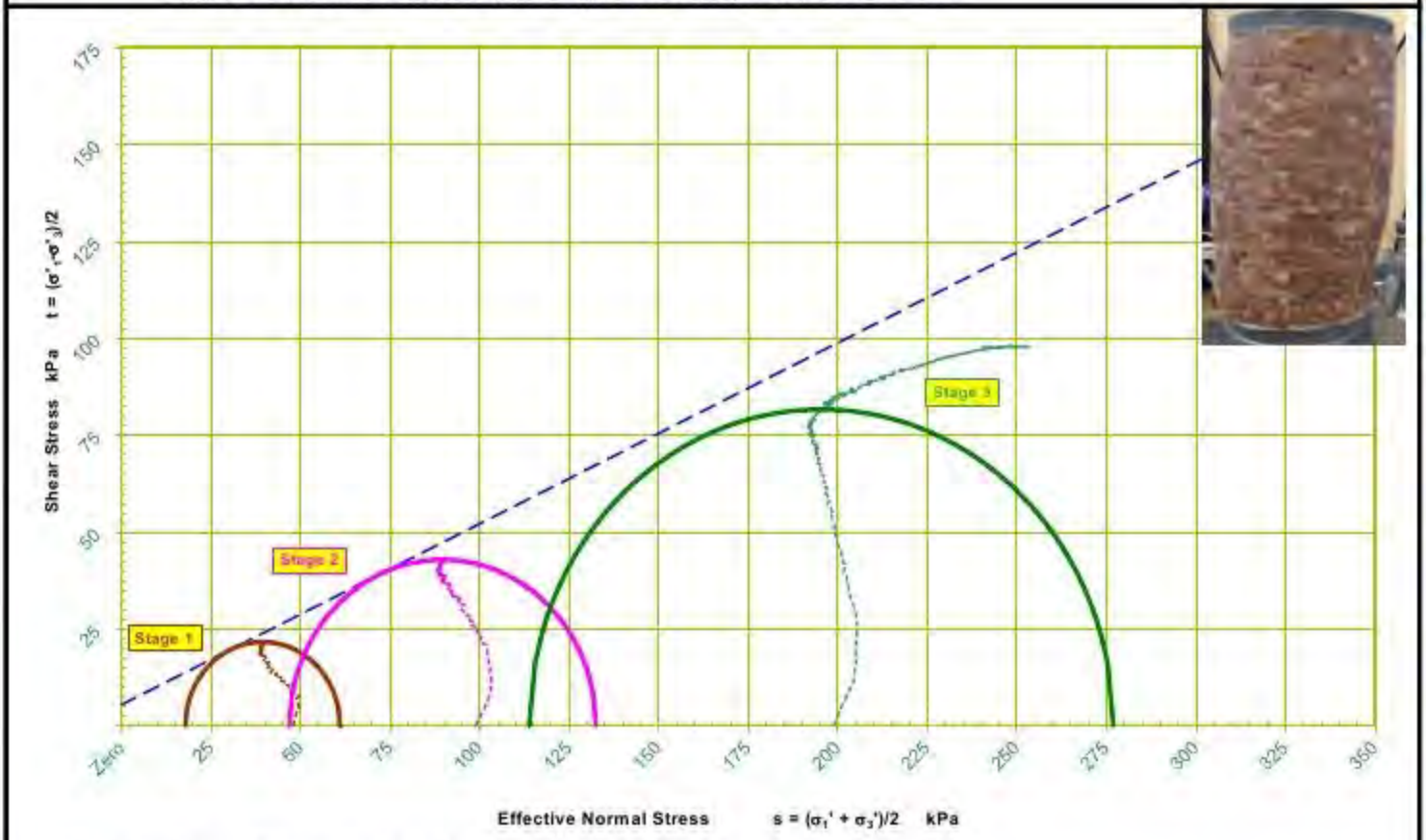
job no : 754-SYDS00086AA
test dates : 11/12/17 to 19/12/17
report number: SYDS17R-01138CU-TXL
laboratory number: SYDS17S-01138; SYD17-0471 05

Sample number: **50/50 - Tarrin/ Sheatlers Pits**
failure criteria: **Maximum principal effective stress ratio**

Test Method : **AS1289.6.4.2 (Appendix B6 Stage Testing)**

material classification: *(CICH) SILTY CLAY - medium to high plasticity, mottled grey-red brown, some fine to coarse sand, trace of fine to medium gravel (-9.5 mm tested)*

note 1 : *Single Individual Recompacted Specimen - (Multistage); Initial Bar B response = 0.95*
note 2 : *Initial Specimen Dimensions (mm):- 125.5 x 63.6 (Dia); Height change during Saturation = 0.5 mm*
note 3 : *Recompacted to 100% Standard Maximum Dry Density and at Standard Optimum Moisture Content.*
note 4 : *Sample, pressures supplied by Client: Type of failure: progressive plastic deformation.*



Type of Test: *Saturated, consolidated, undrained, with pore water measurements.*

Shear Stage Data

Stage	$\Delta\sigma_{3}$	Strain Rate	ε_f	σ_3'	σ_1'	$(\sigma_c' + \sigma_3')/2$	$(\sigma_1' - \sigma_3')/2$	$\sigma 1' / \sigma 3'$	u_0	u_f	$(\sigma_1 - \sigma_3)\phi$
	kPa	%/min	%	kPa	kPa	kPa	kPa		kPa	kPa	kPa
1	48.000	0.0060	2.074	18.000	61.170	39.585	21.585	3.398	702.000	732.000	43.170
2	99.000	0.0060	4.948	47.000	132.645	89.822	42.822	2.822	701.000	753.000	85.645
3	199.000	0.0060	7.570	114.000	277.113	195.557	81.557	2.431	701.000	786.000	163.113

Effective principal stresses at 20% axial strain and Consolidation conditions

ε_f	σ_3'	σ_1'	u_f	$(\sigma_1 - \sigma_3)\phi$	Drainage Condition
%	kPa	kPa	kPa	kPa	Stages 1,2 & 3
-	-	-	-	-	one end and radial boundary

Angle of Friction: 25.0 degrees
Cohesion: 5.4 kPa

GLEN TRIAX 1 005 2017

Moisture Contents:

Initial:
Stage 1: 17.0 %
Final:
Whole :
Stage 3: 18.8 %

Initial Dry Density: 1.72 t/m3
Initial Wet Density: 2.02 t/m3

NATA TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing
The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/national standards.

Authorised Signature: Garry K Collins 27/12/17

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Sydney Laboratory
31 Hope Street, Melrose Park NSW 2114
T : (61 2) 8876 0500
ABN 55 139 460 521

CU - Triaxial shear test: stress - strain plots

client : *GHD Geotechnical Pty Ltd*
principal : *Barnsons Pty Ltd*
project : *Project 10265 - Job No.:2125993*
location : *Tritton Copper Mine*

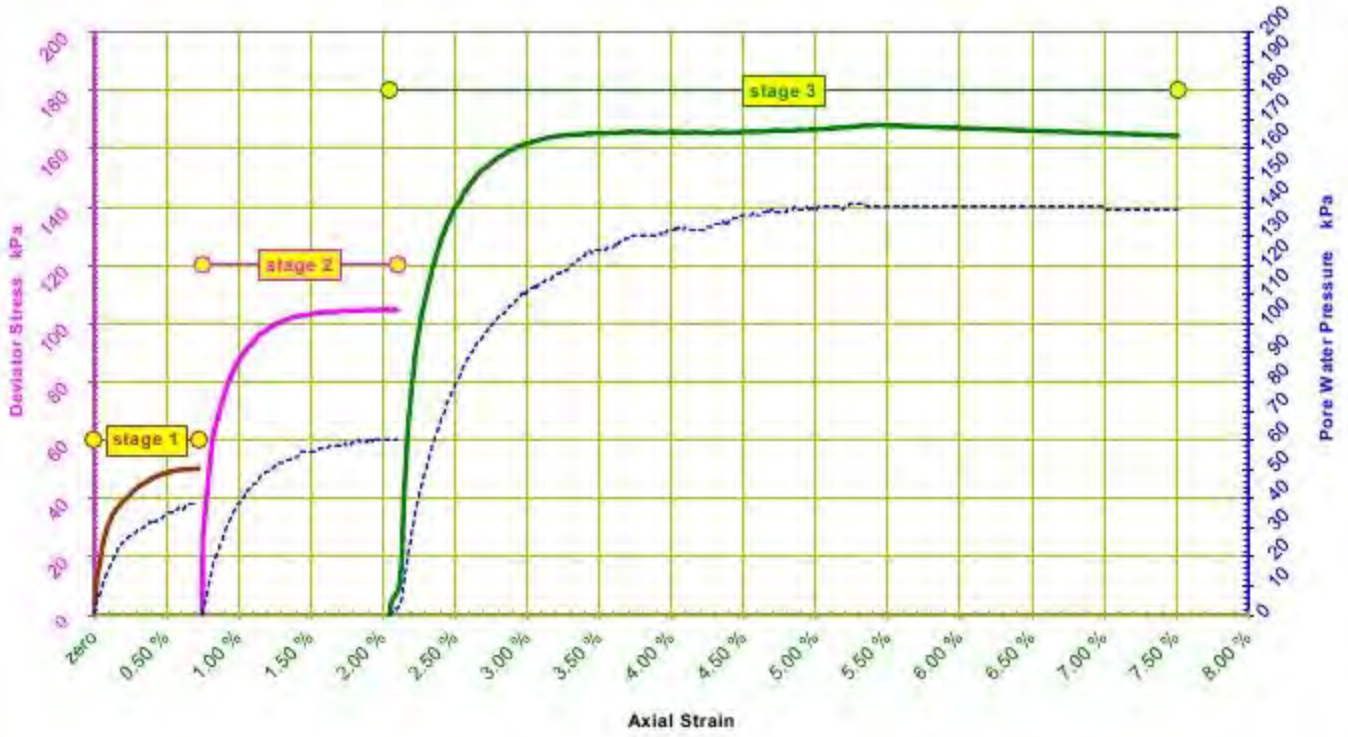
job no : ***754-SYDS00086AA***
date : *11/12/17 to 18/12/17*
report number: *SYDS17R-01137CU-TXL*
laboratory number: *SYDS17S-01137; SYD17-0471 04*

Sample number: ***Dam Stockpile***
Failure Criteria: ***Maximum principal effective stress ratio***

Test Method : ***AS1289.6.4.2***
(Appendix B6 Stage Testing)

Material Classification: *(CI) SANDY SILTY CLAY - medium plasticity, mottled red brown, fine to coarse sand, some fine to coarse gravel (-19.0 mm tested)*

note 1 : *Single Individual Recompacted Specimen - (Multistage); Initial Bar B response = 0.95*
note 2 : *Initial Specimen Dimensions (mm):- 199.8 x 99.8 (Dia); Height change during Saturation = 0.5 mm*
note 3 : *Recompacted to 100% Standard Maximum Dry Density and at Standard Optimum Moisture Content.*
note 4 : *Sample, pressures supplied by Client; Type of failure: progressive plastic deformation.*



Type of Test: *Saturated, consolidated, undrained, with pore water measurements.*

Shear Stage Data

Stage	$\Delta\sigma_3$	Strain Rate	ε_f	σ_3'	u_0	u_f	$(\sigma_1 - \sigma_3)\phi$
	kPa	%/min	%	kPa	kPa	kPa	kPa
1	50.000	0.0060	0.732	12.000	600.000	638.000	50.245
2	97.000	0.0060	2.018	37.000	603.000	663.000	104.648
3	199.000	0.0060	4.695	60.000	601.000	740.000	166.007

Initial Back Pressure: 600.0 kPa

Initial Cell Pressure(s):

Stage 1:	650.0 kPa
Stage 2:	700.0 kPa
Stage 3:	800.0 kPa

Effective principal stresses at 20% axial strain and Consolidation conditions

ε_f	σ_3'	σ_1'	u_f	$(\sigma_1 - \sigma_3)\phi$	Drainage Condition
%	kPa	kPa	kPa	kPa	Stages 1, 2 & 3
-	-	-	-	-	one end and radial boundary

Angle of Friction: ***33.0*** *degrees*
Cohesion: ***5.8*** *kPa*

GLEN TRIAX 2 005 2017

Moisture Contents:

Initial:	*Stage 1:*	14.5 %
Final:		
	Whole: *Stage 3:*	17.4 %

Initial Dry Density: *1.47 t/m3*
Initial Wet Density: *1.68 t/m3*

NATA TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing
The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/national standards

Authorised Signature: Garry K Collins 27/12/17

coffey
A TETRA TECH COMPANY

Sydney Laboratory
31 Hope Street, Melrose Park NSW 2114
T : (61 2) 8876 0500
ABN 55 139 460 521

CU - Triaxial shear test: shear path & Mohr circle plot

client : *GHD Geotechnical Pty Ltd*
principal : *Barnsons Pty Ltd*
project : *Project 10265 - Job No.:2125993*
location : *Tritton Copper Mine*

job no : ***754-SYDS00086AA***
test dates : *11/12/17 to 18/12/17*
report number: *SYDS17R-01137CU-TXL*
laboratory number: *SYDS17S-01137; SYD17-0471 04*

Sample number: ***Dam Stockpile***
failure criteria: ***Maximum principal effective stress ratio***

Test Method : ***AS1289.6.4.2***
(Appendix B6 Stage Testing)

material classification: *(CI) SANDY SILTY CLAY - medium plasticity, mottled red brown, fine to coarse sand, some fine to coarse gravel (-19.0 mm tested)*

note 1 : *Single Individual Recompacted Specimen - (Multistage); Initial Bar B response = 0.95*
note 2 : *Initial Specimen Dimensions (mm):- 199.8 x 99.8 (Dia); Height change during Saturation = 0.5 mm*
note 3 : *Recompacted to 100% Standard Maximum Dry Density and at Standard Optimum Moisture Content.*
note 4 : *Sample, pressures supplied by Client: Type of failure: progressive plastic deformation.*

Type of Test: *Saturated, consolidated, undrained, with pore water measurements.*

Shear Stage Data

Stage	$\Delta\sigma_{3}$	Strain Rate	ε_f	σ_3'	σ_1'	$(\sigma_c' + \sigma_3')/2$	$(\sigma_1' - \sigma_3')/2$	$\sigma 1' / \sigma 3'$	u_0	u_f	$(\sigma_1 - \sigma_3)\phi$
	kPa	%/min	%	kPa	kPa	kPa	kPa		kPa	kPa	kPa
1	50.000	0.0060	0.732	12.000	62.245	37.122	25.122	5.187	600.000	638.000	50.245
2	97.000	0.0060	2.018	37.000	141.648	89.324	52.324	3.828	603.000	663.000	104.648
3	199.000	0.0060	4.695	60.000	226.007	143.004	83.004	3.767	601.000	740.000	166.007

Effective principal stresses at 20% axial strain and Consolidation conditions

ε_f	σ_3'	σ_1'	u_f	$(\sigma_1 - \sigma_3)\phi$	Drainage Condition
%	kPa	kPa	kPa	kPa	Stages 1,2 & 3
-	-	-	-	-	one end and radial boundary

Angle of Friction: ***33.0*** *degrees*
Cohesion: ***5.8*** *kPa*

GLEN TRIAX 1 005 2017

Moisture Contents:

Initial:	Stage 1:	14.5 %	
Final:			
Whole :	Stage 3:		17.4 %

Initial Dry Density: *1.47 t/m3*
Initial Wet Density: *1.68 t/m3*

NATA TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing
The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/national standards.

Authorised Signature: Garry K Collins 27/12/17

Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702410
		Job No.:	2125993
Project:	Project 10265	**Sample No.:**	SYD17-0470-01
	Tritton Copper Mine	**Test Date:**	20.10.2017
Client Id.:	Probe 1 **Borehole No.:** n/av	**Depth (m):**	n/av
Description:	grey sandy SILT		
Sample History:	Supplied by Client	**Sample Type:**	48mm Sample Tube

SAMPLE INFORMATION

Specimen No.:	**1**
Initial Height (mm):	95.5
Initial Diameter (mm):	47.7
Initial Wet Density (t/m³):	2.14
Initial Dry Density (t/m³):	1.74
Initial Moisture Content (%):	23.1
Final Moisture Content: Top (%):	22.8
Middle (%):	23.8
Bottom (%):	22.9
B Response (%):	96.2

TEST DATA (Multi-Stage Test)

Stage No.:	**1**	**2**	**3**
Back Pressure (kPa):	500	500	500
Effective Consolidation Stress (kPa):	50	100	200
Rate of Strain (mm/min):	0.0122	0.0122	0.00244
Deviator Stress at Failure (kPa):	107	244	415
Pore Water Pressure at Failure (kPa):	15	19	62
Consolidation Volume Change (ml):	2.3	2.5	3.2
Strain at Failure (%):	2.2	5.3	7.7
σ'_1 (kPa):	142	326	554
σ'_3 (kPa):	36	82	139

Test Comments: Side drains not used
Shear failure plane = 71°

Remarks:

Tested By: S. Ihnativ

Checked By: DB

Approved Signatory:

D. Brooke

Date: 7/11/2017

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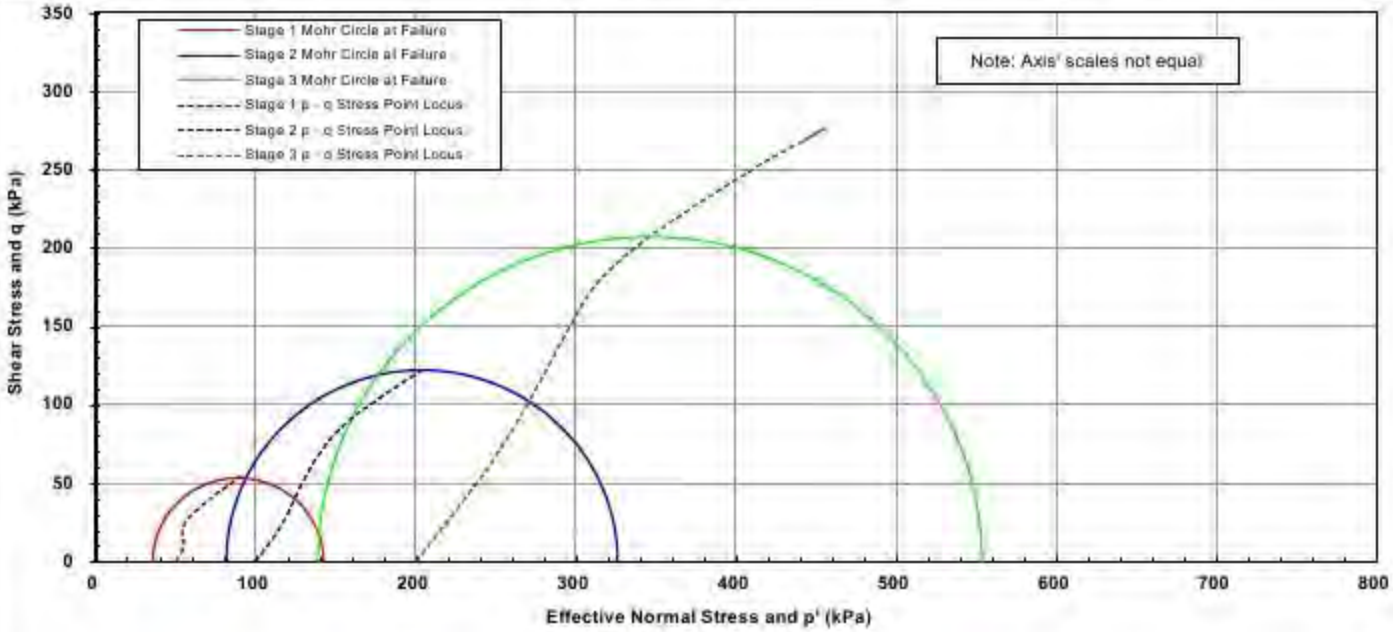
Geotechnical Testing Services

NATA Accredited for compliance with ISO/IEC 17025 - Testing
Laboratory Accreditation Number 679

Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

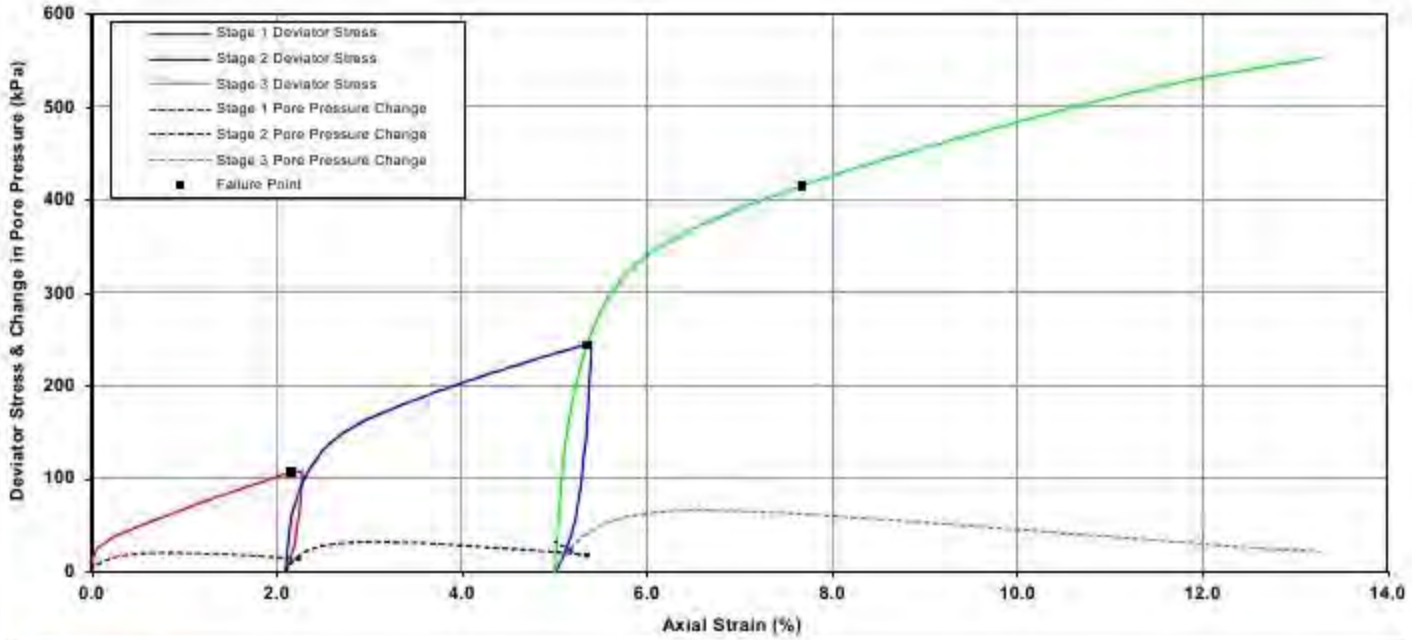
Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702410
		Job No.:	2125993
Project:	Project 10265 Tritton Copper Mine	**Sample No.:**	SYD17-0470-01
		Test Date:	20.10.2017
Client Id.:	Probe 1	**Borehole No.:** n/av	**Depth (m):** n/av



Interpretation between stages :	1 to 2	2 to 3	3 to 4	4 to 5	1 to 3
Effective Cohesion c' (kPa) :	0	0			0
Angle of effective internal friction Φ' (Degrees) :	37	37			37

Angle of effective internal friction and effective cohesion for this result calculated by linear regression.
Geotechnical Engineer should appraise result.



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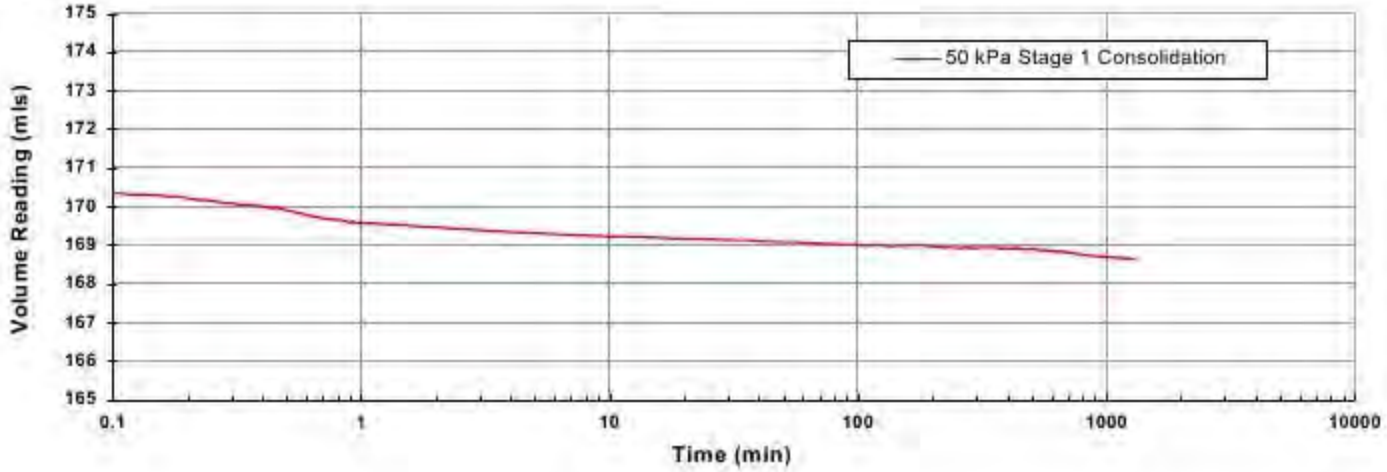
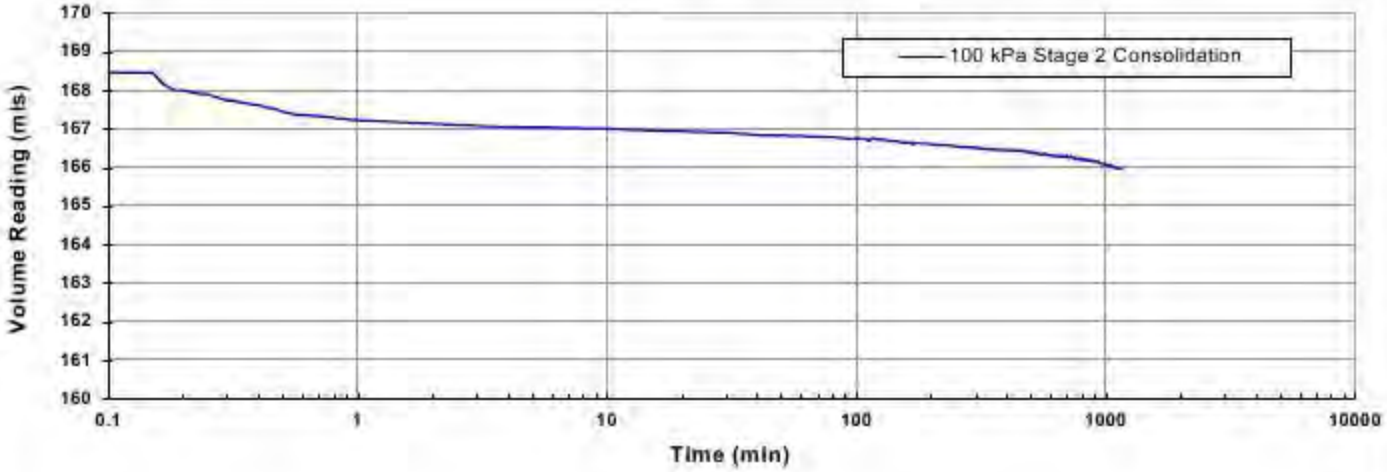
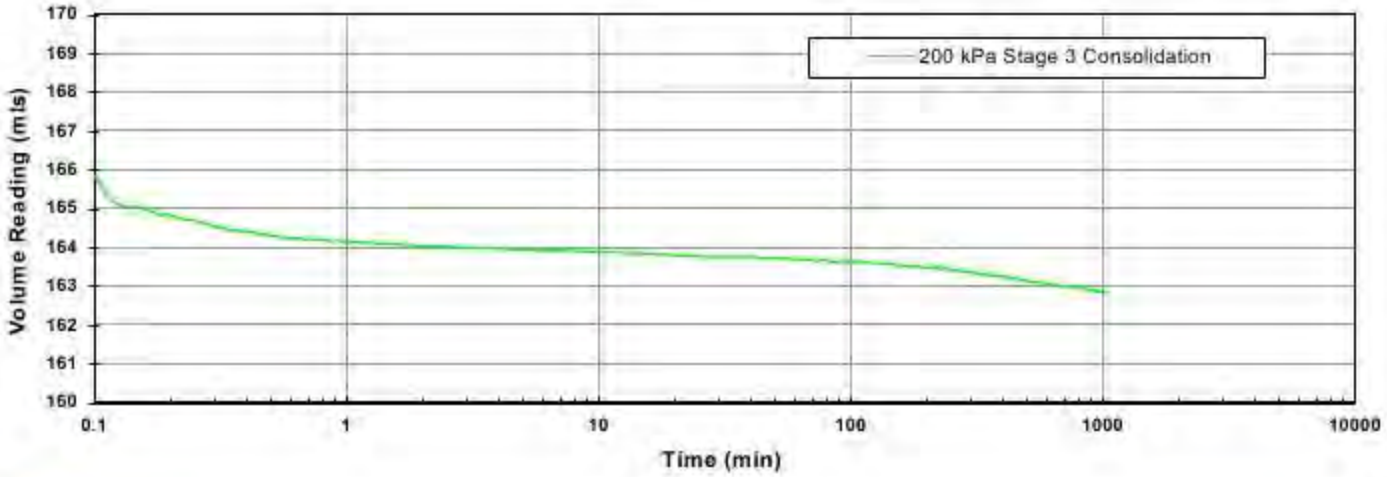
Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702410
		Job No.:	2125993
Project:	Project 10265	**Sample No.:**	SYD17-0470-01
	Tritton Copper Mine	**Test Date:**	20.10.2017
Client Id.:	Probe 1	**Borehole No.:** n/av	**Depth (m):** n/av







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NATA

Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702411
		Job No.:	2125993
Project:	Project 10265	**Sample No.:**	SYD17-0470-02
	Tritton Copper Mine	**Test Date:**	31.10.2017
Client Id.:	Probe 2 **Borehole No.:** n/av	**Depth (m):**	n/av
Description:	Sandy SILT: dark grey & yellow brown		
Sample History:	Supplied by Client	**Sample Type:**	48mm Sample Tube

SAMPLE INFORMATION

Specimen No.:	1
Initial Height (mm):	95.3
Initial Diameter (mm):	47.8
Initial Wet Density (t/m³):	2.10
Initial Dry Density (t/m³):	1.82
Initial Moisture Content (%):	15.4
Final Moisture Content: Top (%):	18.1
Middle (%):	23.7
Bottom (%):	22.5
B Response (%):	96.9

TEST DATA (Multi-Stage Test)

Stage No.:	**1**	**2**	**3**
Back Pressure (kPa):	500	500	500
Effective Consolidation Stress (kPa):	50	100	200
Rate of Strain (mm/min):	0.00122	0.00244	0.00244
Deviator Stress at Failure (kPa):	142	247	468
Pore Water Pressure at Failure (kPa):	4	19	47
Consolidation Volume Change (ml):	3.1	1.0	1.4
Strain at Failure (%):	1.6	2.7	4.3
σ'_1 (kPa):	189	328	621
σ'_3 (kPa):	47	81	153

Test Comments: Side drains not used
Axial Failure

Remarks:

Tested By: S. Ihnativ

Checked By: TSH

Approved Signatory:

D. Brooke

Date: 15/11/2017

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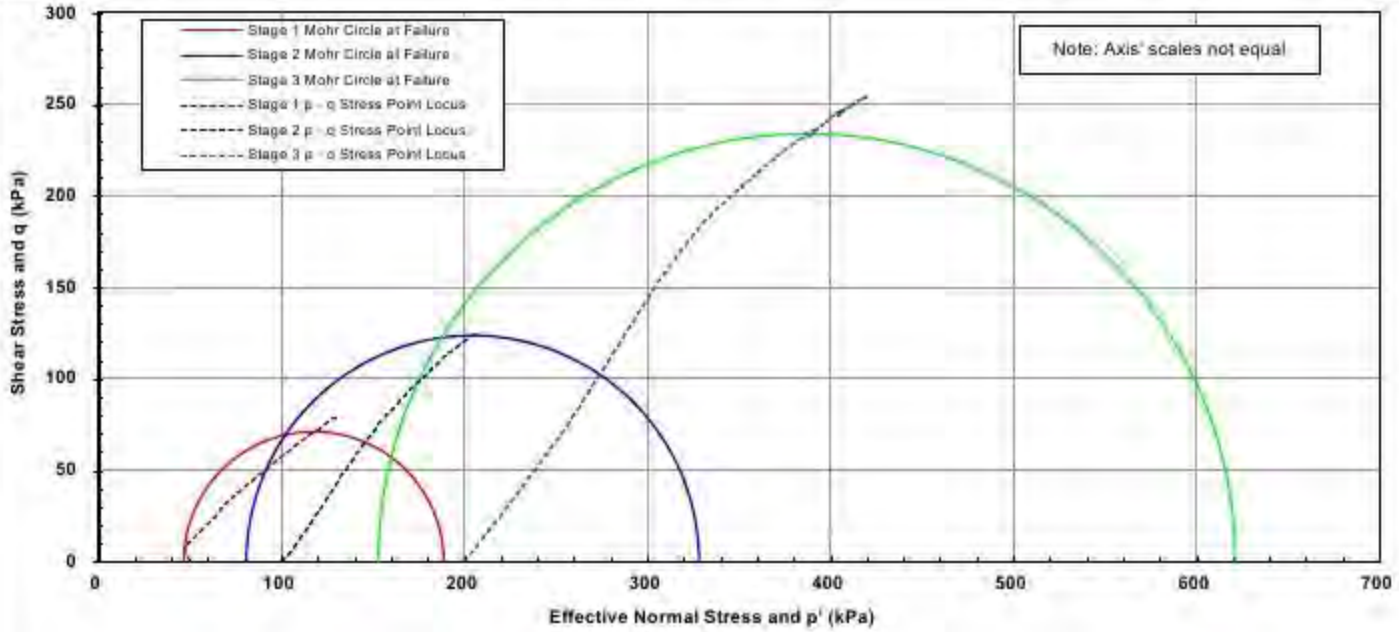
Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

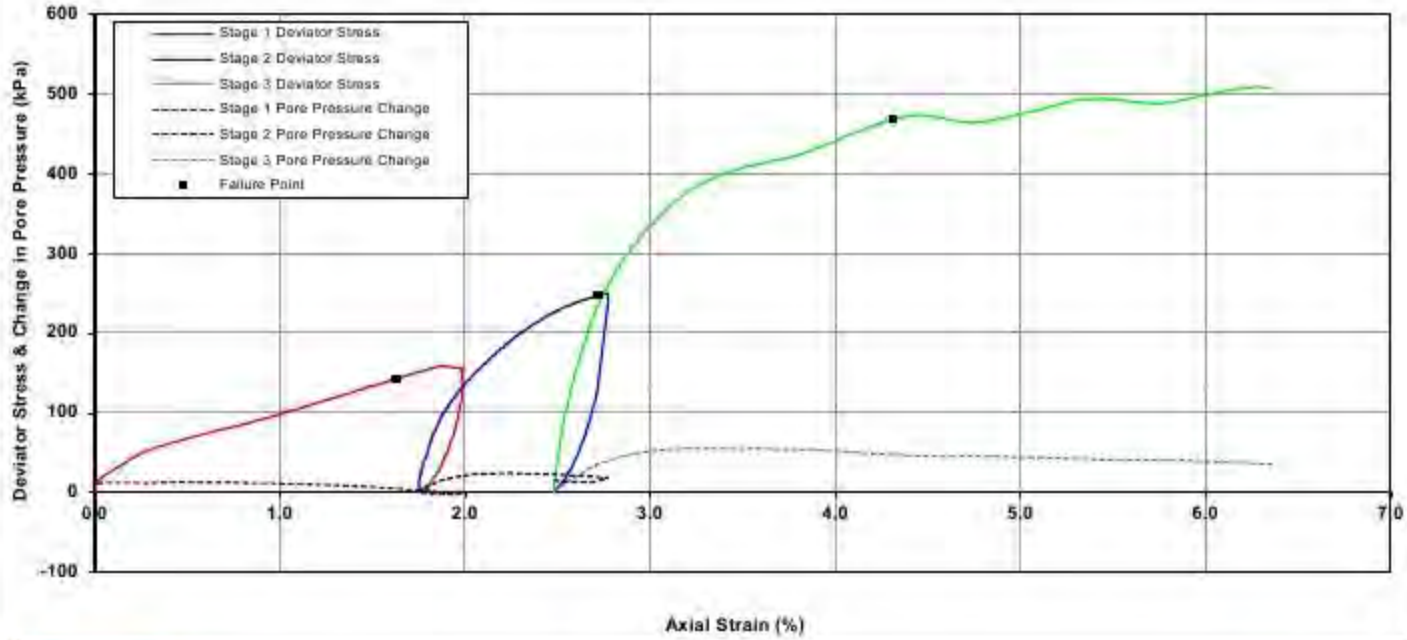
Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702411
		Job No.:	2125993
Project:	Project 10265	**Sample No.:**	SYD17-0470-02
	Tritton Copper Mine	**Test Date:**	31.10.2017
Client Id.:	Probe 2	**Borehole No.:** n/av	**Depth (m):** n/av



Interpretation between stages :	1 to 2	2 to 3	3 to 4	4 to 5	1 to 3
Effective Cohesion c' (kPa) :	0	0			0
Angle of effective internal friction Φ' (Degrees) :	37	37			37

Angle of effective internal friction and effective cohesion for this result calculated by linear regression.
Geotechnical Engineer should appraise result.



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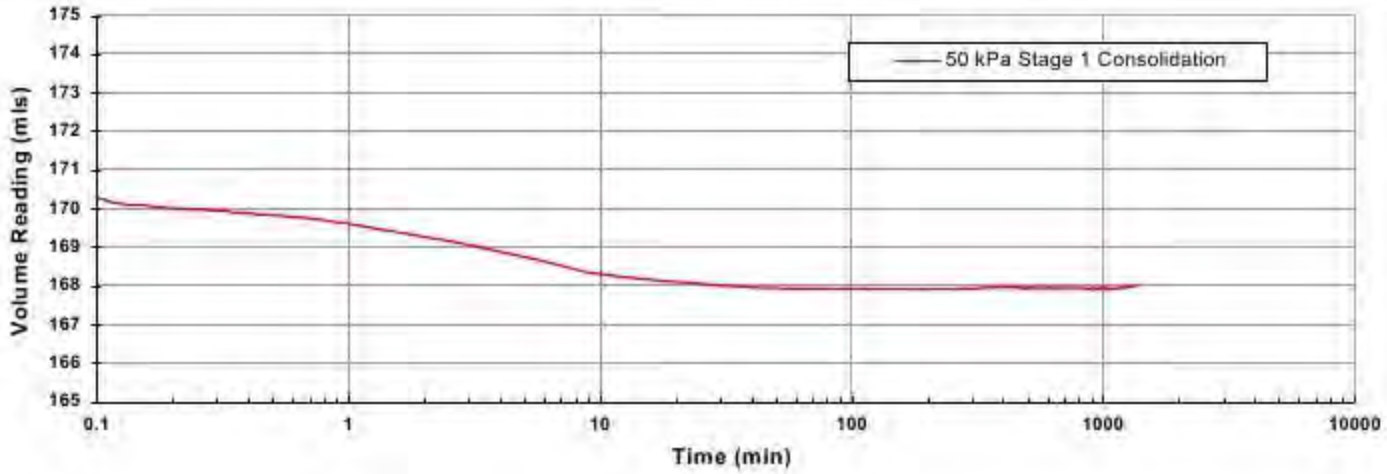
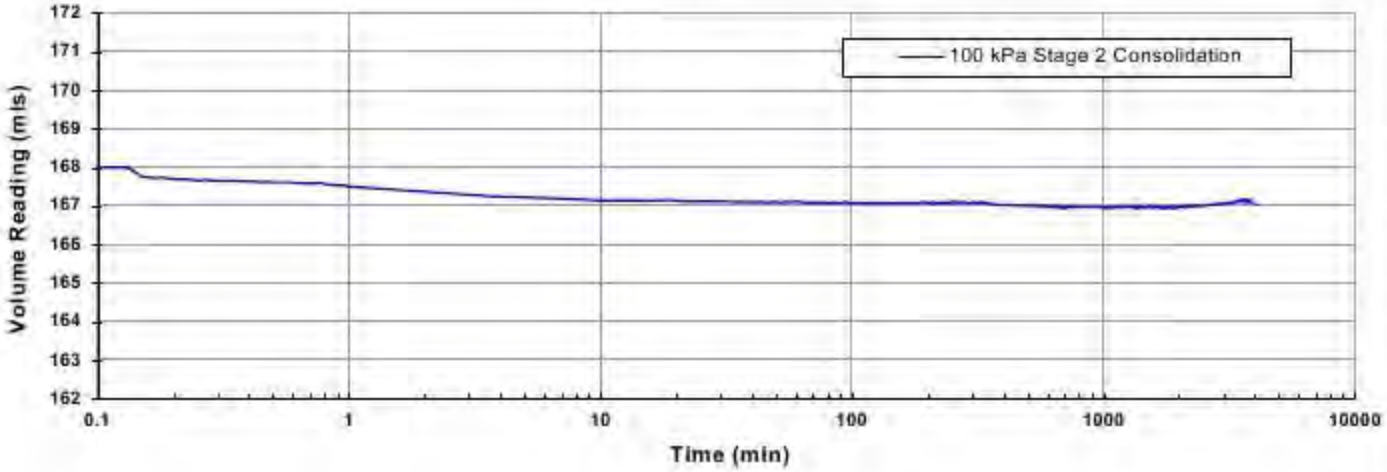
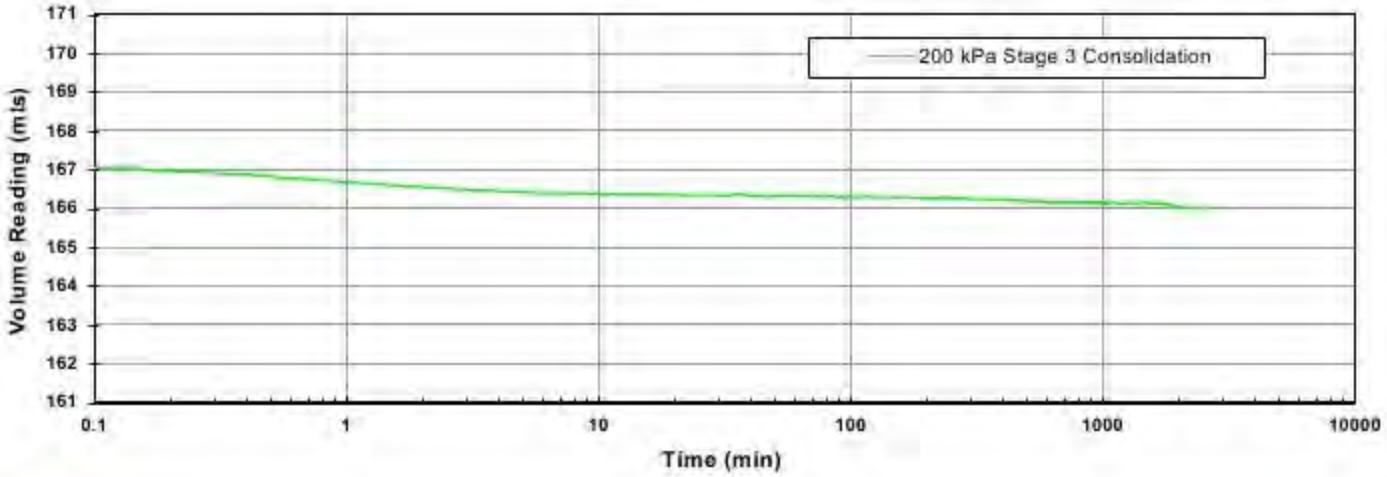
Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702411
		Job No.:	2125993
Project:	Project 10265	**Sample No.:**	SYD17-0470-02
	Tritton Copper Mine	**Test Date:**	31.10.2017
Client Id.:	Probe 2	**Borehole No.:** n/av	**Depth (m):** n/av







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Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702412
		Job No.:	2125993
Project:	Project 10265	**Sample No.:**	SYD17-0470-03
	Tritton Copper Mine	**Test Date:**	14.11.2017
Client Id.:	Probe 3 **Borehole No.:** n/av	**Depth (m):**	n/av
Description:	grey SILT		
Sample History:	Supplied by Client	**Sample Type:**	50mm Sample Tube

SAMPLE INFORMATION

Specimen No.:	1
Initial Height (mm):	95.5
Initial Diameter (mm):	47.8
Initial Wet Density (t/m³):	1.84
Initial Dry Density (t/m³):	1.62
Initial Moisture Content (%):	13.7
Final Moisture Content: Top (%):	25.1
Middle (%):	24.1
Bottom (%):	21.9
B Response (%):	96.4

TEST DATA (Multi-Stage Test)

Stage No.:	**1**	**2**	**3**
Back Pressure (kPa):	500	500	500
Effective Consolidation Stress (kPa):	50	100	200
Rate of Strain (mm/min):	0.00122	0.00122	0.00122
Deviator Stress at Failure (kPa):	105	189	350
Pore Water Pressure at Failure (kPa):	16	36	77
Consolidation Volume Change (ml):	3.4	1.2	0.3
Strain at Failure (%):	1.3	2.6	4.1
σ'_1 (kPa):	139	254	474
σ'_3 (kPa):	34	65	124

Test Comments: Side drains not used
No visible shear failure plane

Remarks:

Tested By: S. Ihnativ

Checked By: TSH

Approved Signatory:

D. Brooke

Date: 18/12/2017

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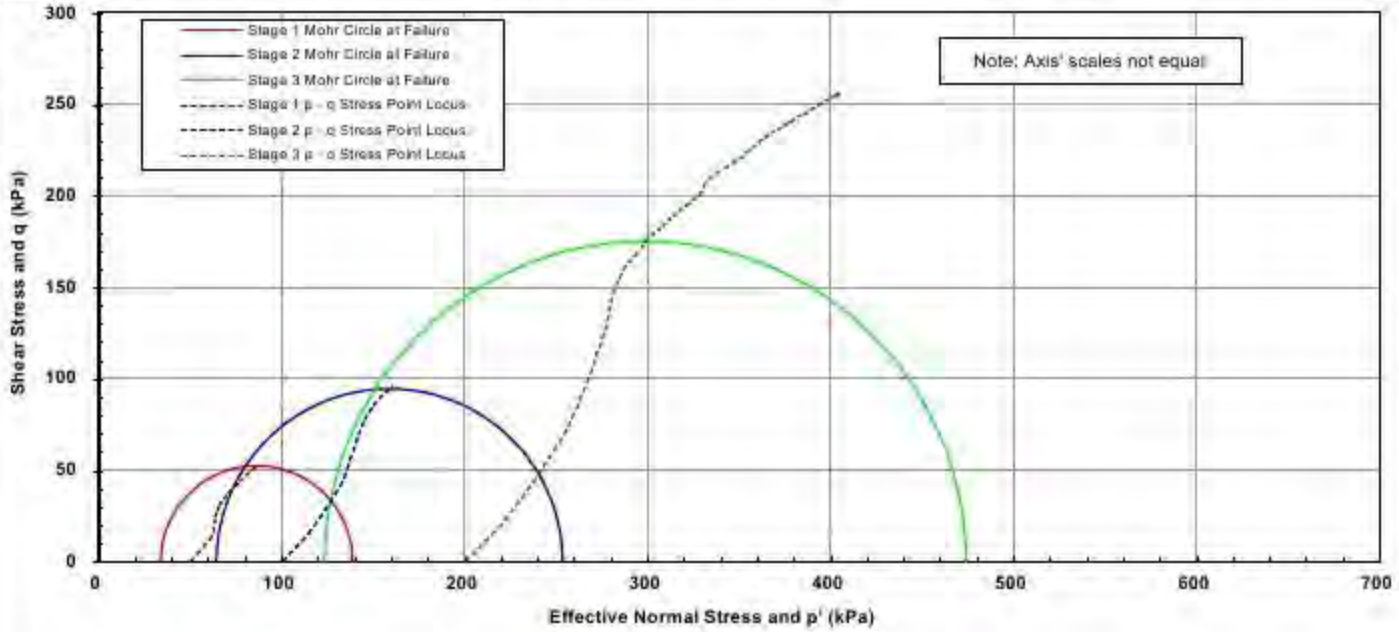
Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

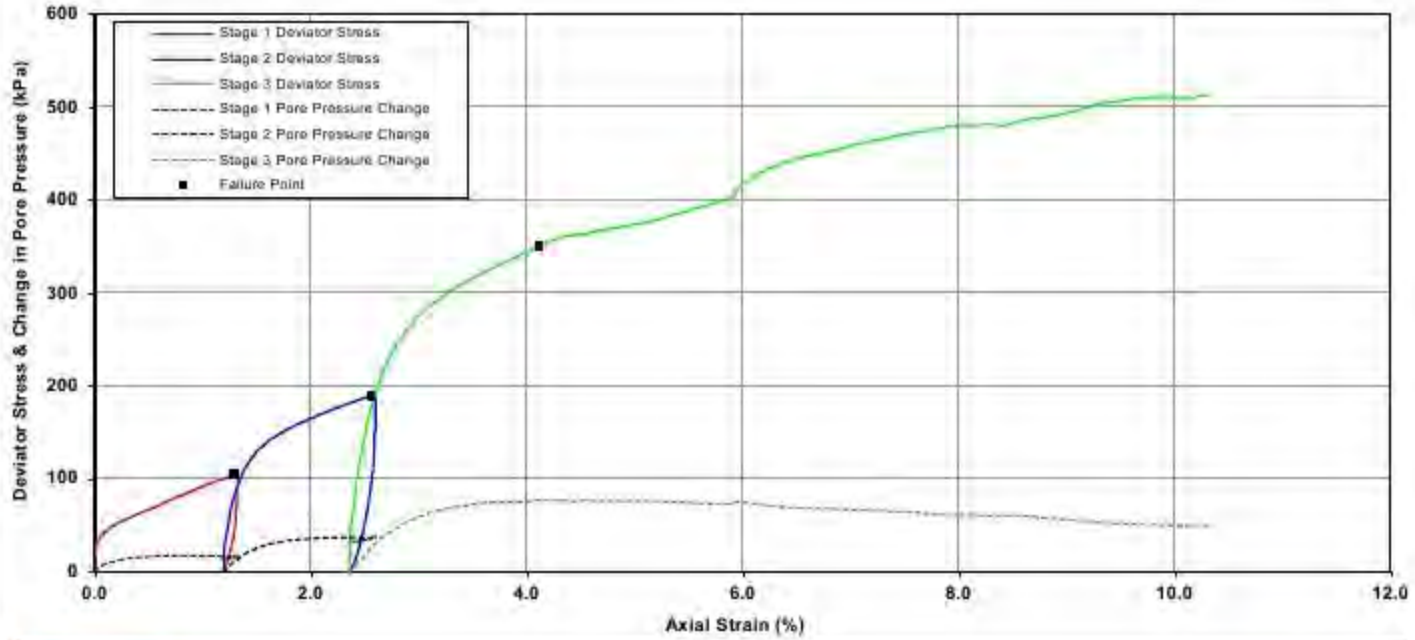
Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702412
		Job No.:	2125993
Project:	Project 10265 Tritton Copper Mine	**Sample No.:**	SYD17-0470-03
		Test Date:	14.11.2017
Client Id.:	Probe 3	**Borehole No.:** n/av	**Depth (m):** n/av



Interpretation between stages :	1 to 2	2 to 3	3 to 4	4 to 5	1 to 3
Effective Cohesion c' (kPa) :	3	3			3
Angle of effective internal friction Φ' (Degrees) :	35	35			35

Angle of effective internal friction and effective cohesion for this result calculated by linear regression.
Geotechnical Engineer should appraise result.



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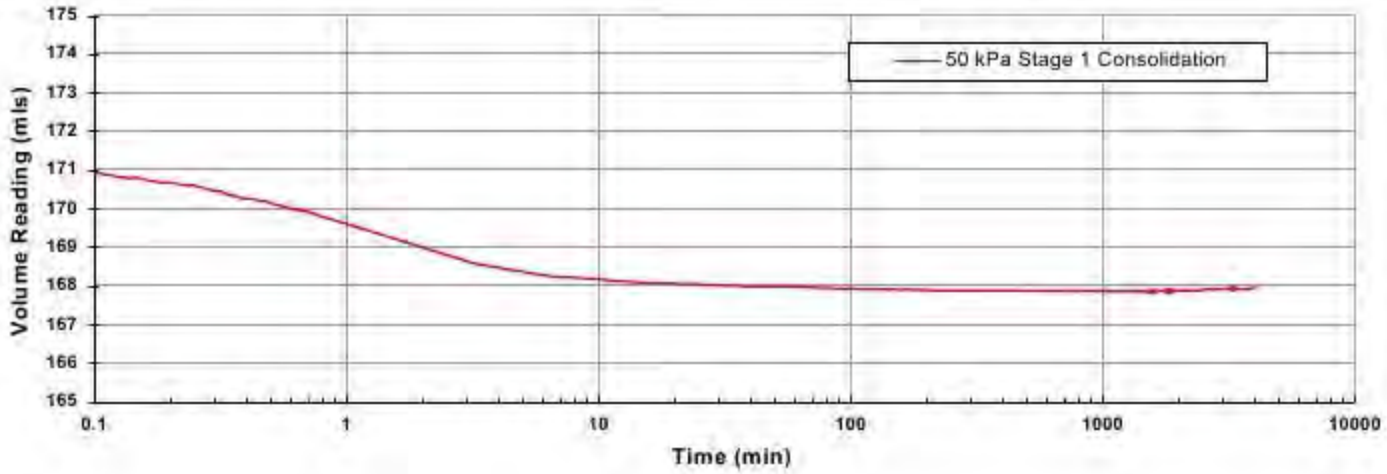
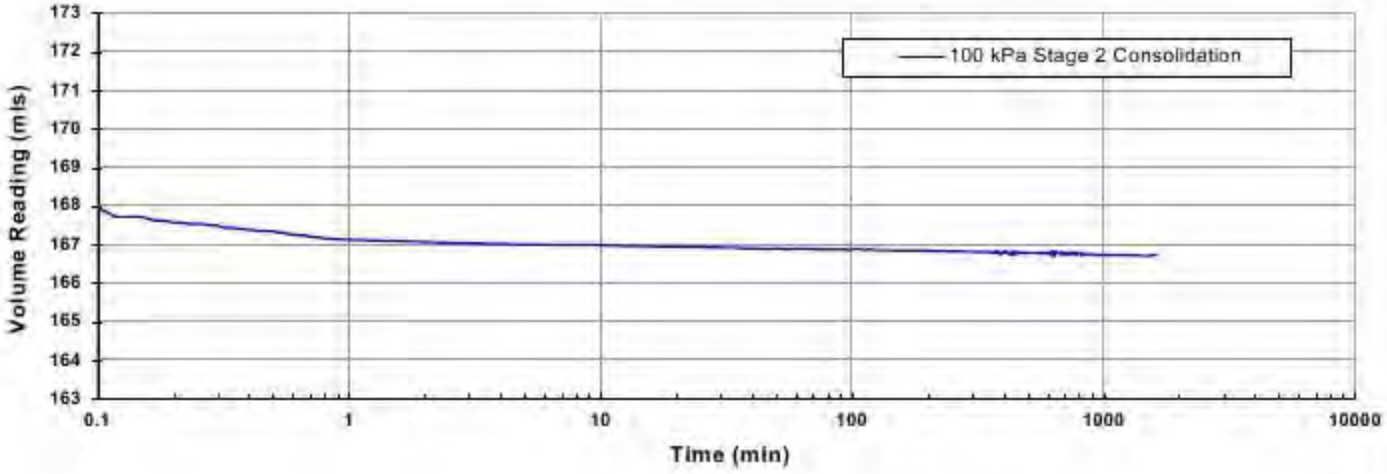
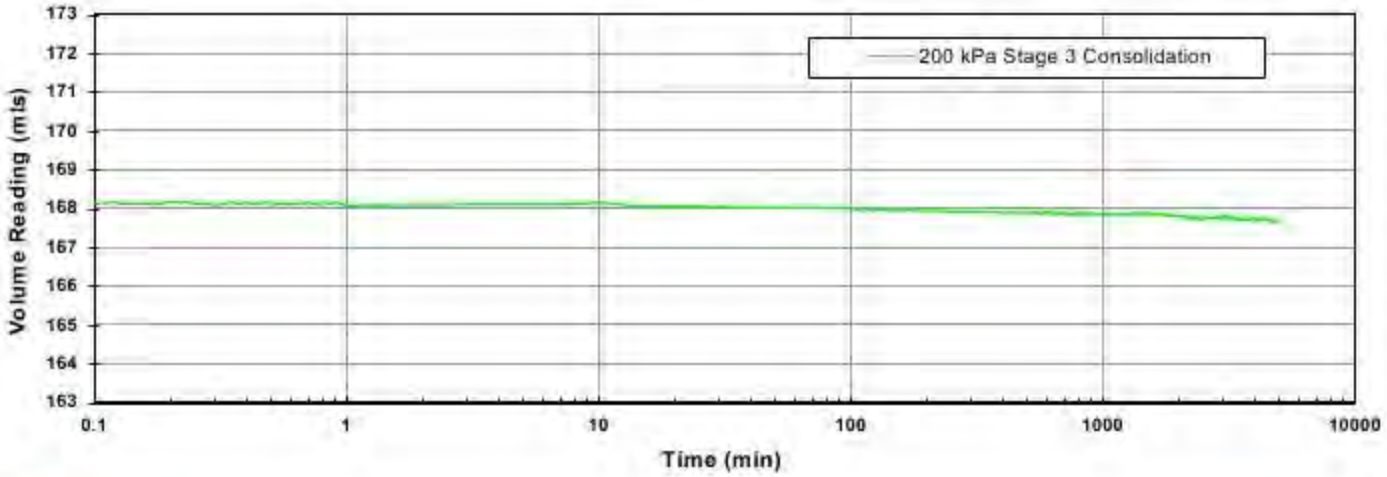
Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702412
		Job No.:	2125993
Project:	Project 10265	**Sample No.:**	SYD17-0470-03
	Tritton Copper Mine	**Test Date:**	14.11.2017
Client Id.:	Probe 3	**Borehole No.:** n/av	**Depth (m):** n/av







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Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD172413
		Job No.:	2125993
Project:	Project 10265	**Sample No.:**	SYD17-0470-04
	Tritton Copper Mine	**Test Date:**	15.11.2017
Client Id.:	Probe 4 **Borehole No.:** n/av	**Depth (m):**	n/av
Description:	brown SILT		
Sample History:	Supplied by Client	**Sample Type:**	50mm Sample Tube

SAMPLE INFORMATION

Specimen No.:	1
Initial Height (mm):	95.5
Initial Diameter (mm):	47.8
Initial Wet Density (t/m³):	2.10
Initial Dry Density (t/m³):	1.89
Initial Moisture Content (%):	11.5
Final Moisture Content: Top (%):	25.9
Middle (%):	22.7
Bottom (%):	21.4
B Response (%):	96.4

TEST DATA (Multi-Stage Test)

Stage No.:	**1**	**2**	**3**
Back Pressure (kPa):	500	500	500
Effective Consolidation Stress (kPa):	50	100	200
Rate of Strain (mm/min):	0.00122	0.00122	0.00122
Deviator Stress at Failure (kPa):	116	205	419
Pore Water Pressure at Failure (kPa):	12	31	65
Consolidation Volume Change (ml):	1.6	0.4	0.1
Strain at Failure (%):	1.3	2.1	3.6
σ'_1 (kPa):	153	271	553
σ'_3 (kPa):	37	66	134

Test Comments: Side drains not used
No visible shear failure plane

Remarks:

Tested By: S. Ihnativ

Checked By: TSH

Approved Signatory:

D. Brooke

Date: 18/12/2017

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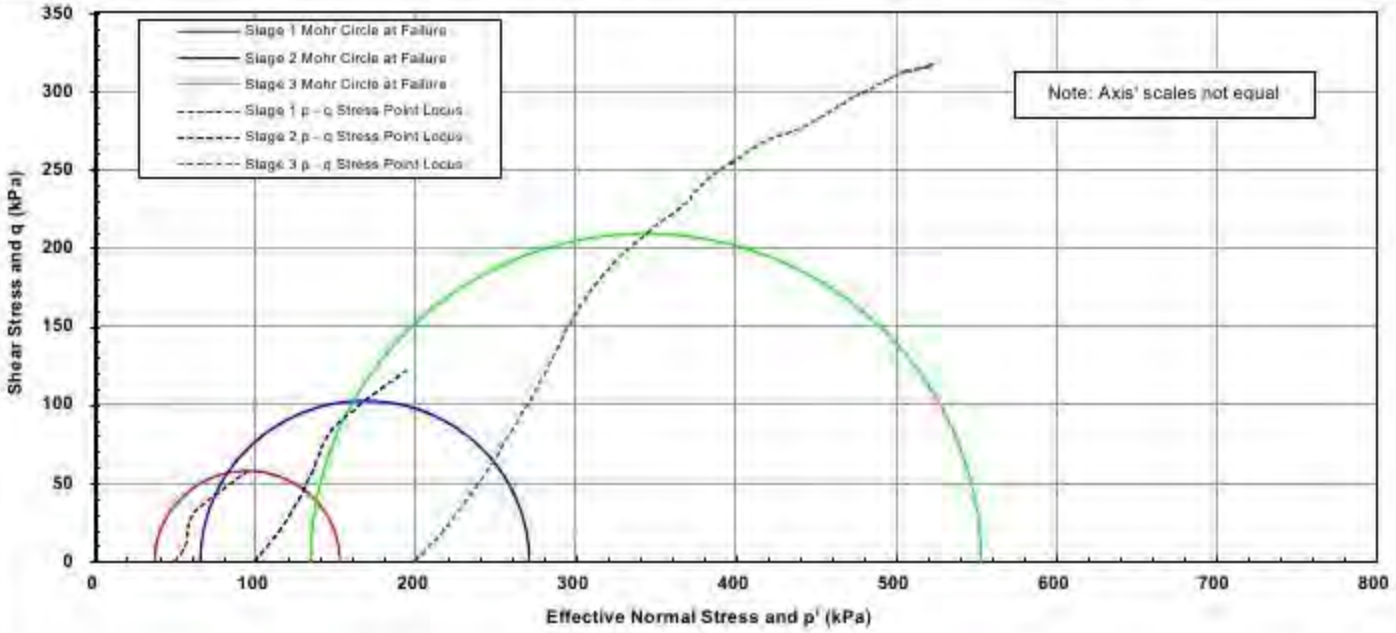
Laboratory Accreditation Number 679

Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

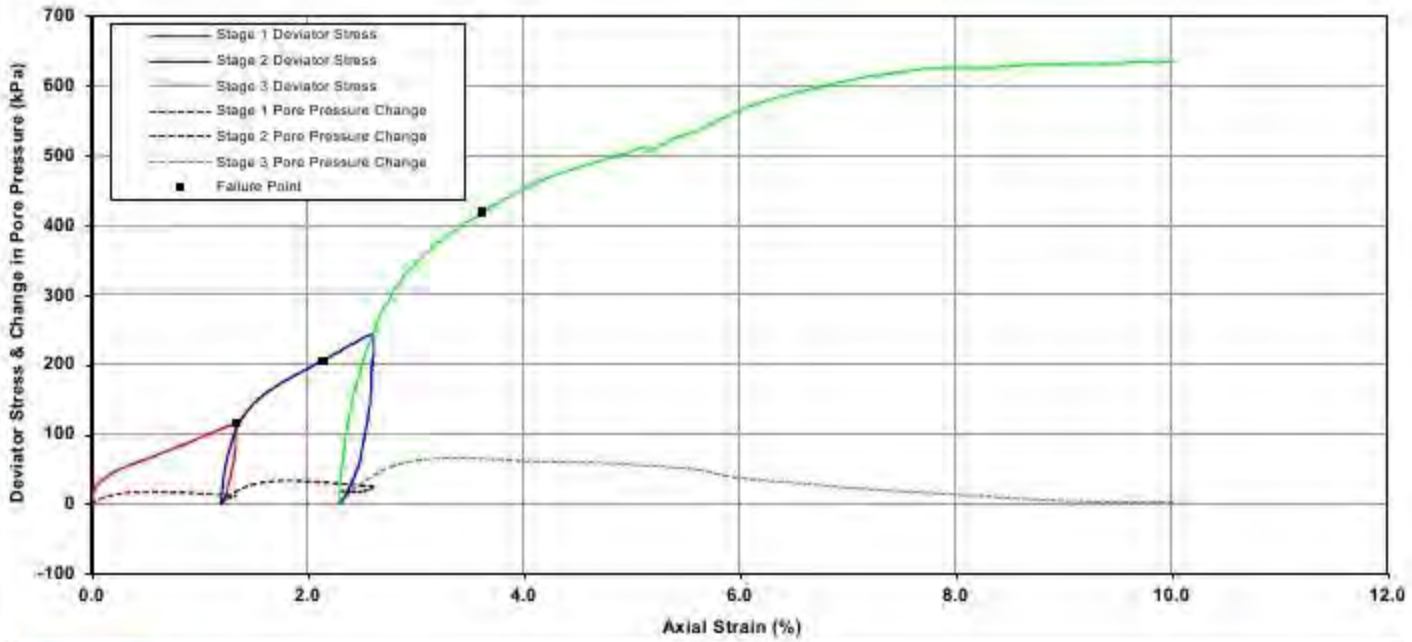
Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD172413
		Job No.:	2125993
Project:	Project 10265	**Sample No.:**	SYD17-0470-04
	Tritton Copper Mine	**Test Date:**	15.11.2017
Client Id.:	Probe 4	**Borehole No.:** n/av	**Depth (m):** n/av



Interpretation between stages :	1 to 2	2 to 3	3 to 4	4 to 5	1 to 3
Effective Cohesion c' (kPa) :	0	0			0
Angle of effective internal friction Φ' (Degrees) :	38	37			38

Angle of effective internal friction and effective cohesion for this result calculated by linear regression.
Geotechnical Engineer should appraise result.



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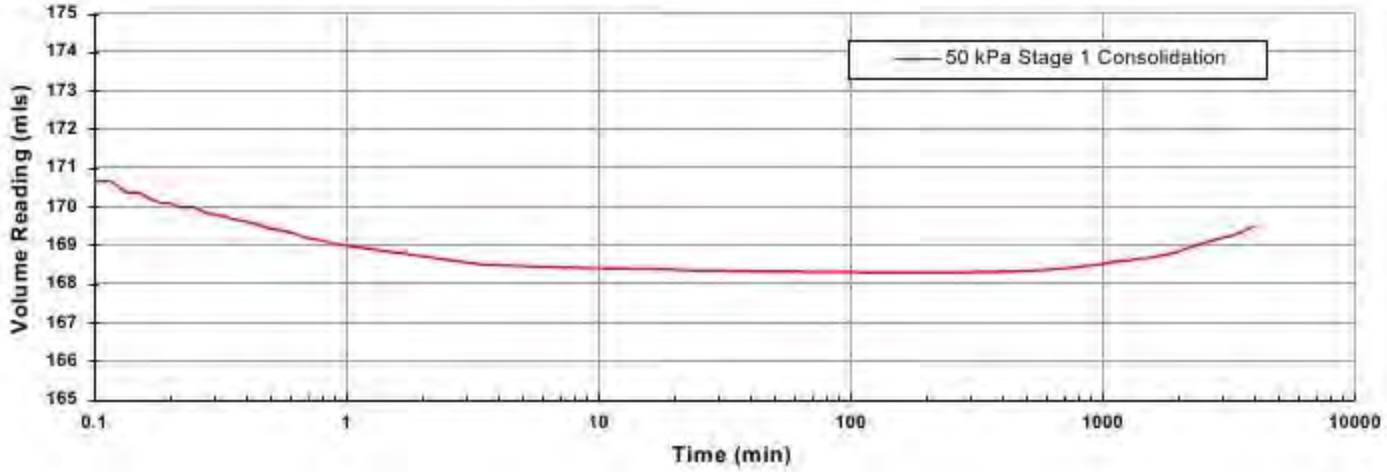
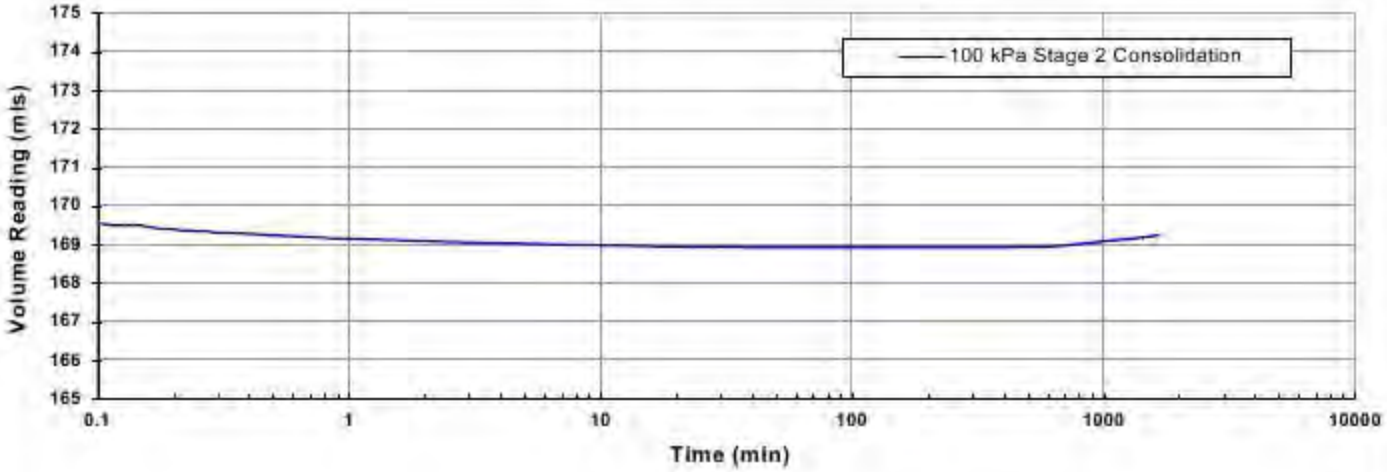
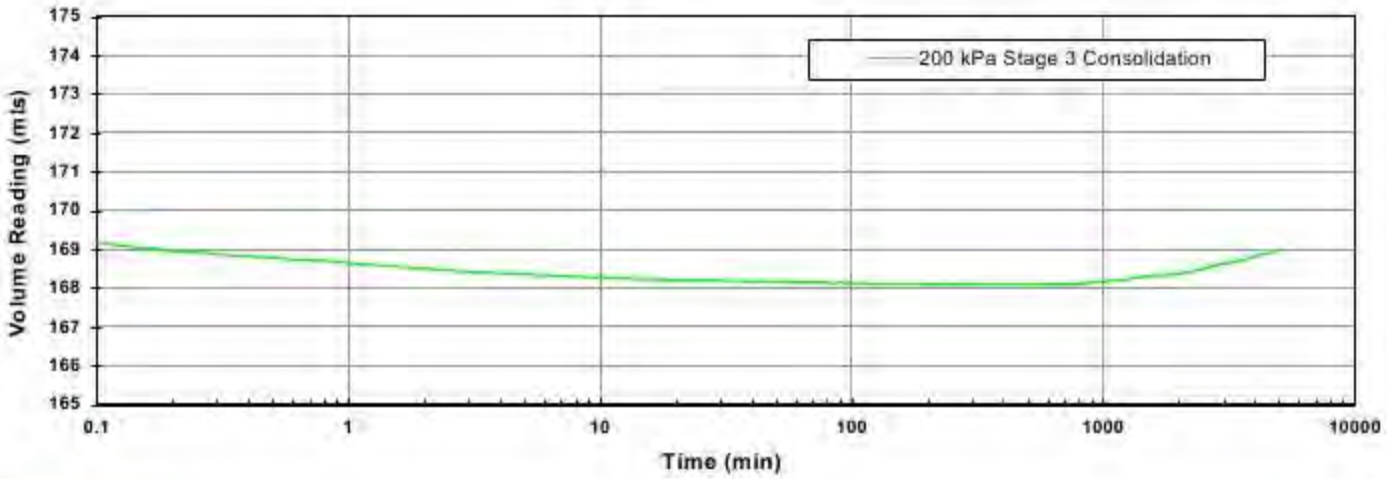
Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD172413
		Job No.:	2125993
Project:	Project 10265	**Sample No.:**	SYD17-0470-04
	Tritton Copper Mine	**Test Date:**	15.11.2017
Client Id.:	Probe 4	**Borehole No.:** n/av	**Depth (m):** n/av







GHD
Unit 5/43 Herbert Street Artarmon, N.S.W. 2064
Telephone: (02) 9462 4700 Fax: (02) 9462 4710
Geotechnical Testing Services

NATA

Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702414
		Job No.:	2125993
Project:	Project 10265 Tritton Copper Mine	**Sample No.:**	SYD17-0470-05
		Test Date:	9/01/2018
Client Id.:	Probe 5 **Borehole No.:** n/av	**Depth (m):**	n/av
Description:	grey brown SILT		
Sample History:	Supplied by Client	**Sample Type:**	50mm Sample Tube

SAMPLE INFORMATION

Specimen No.:	1	
Initial Height (mm):	95.5	
Initial Diameter (mm):	47.8	Specimen remouled at field moist & density conditions
Initial Wet Density (t/m³):	1.86	
Initial Dry Density (t/m³):	1.60	
Initial Moisture Content (%):	16.4	
Final Moisture Content: Top (%):	19.6	
Middle (%):	18.2	
Bottom (%):	18.4	
B Response (%):	98.5	

TEST DATA (Multi-Stage Test)

Stage No.:	**1**	**2**	**3**		
Back Pressure (kPa):	500	500	500		
Effective Consolidation Stress (kPa):	50	100	200		
Rate of Strain (mm/min):	0.0122	0.0122	0.0122		
Deviator Stress at Failure (kPa):	109	223	479		
Pore Water Pressure at Failure (kPa):	17	33	57		
Consolidation Volume Change (ml):	4.0	4.9	3.1		
Strain at Failure (%):	1.7	4.1	8.7		
σ'_1 (kPa):	141	290	621		
σ'_3 (kPa):	32	67	142		

Test Comments: Side drains not used
No visible shear failure plane

Remarks: Remoulded specimen

Tested By: S. Ihnativ

Checked By: DB

Approved Signatory:

D. Brooke

Date: 25/01/2018

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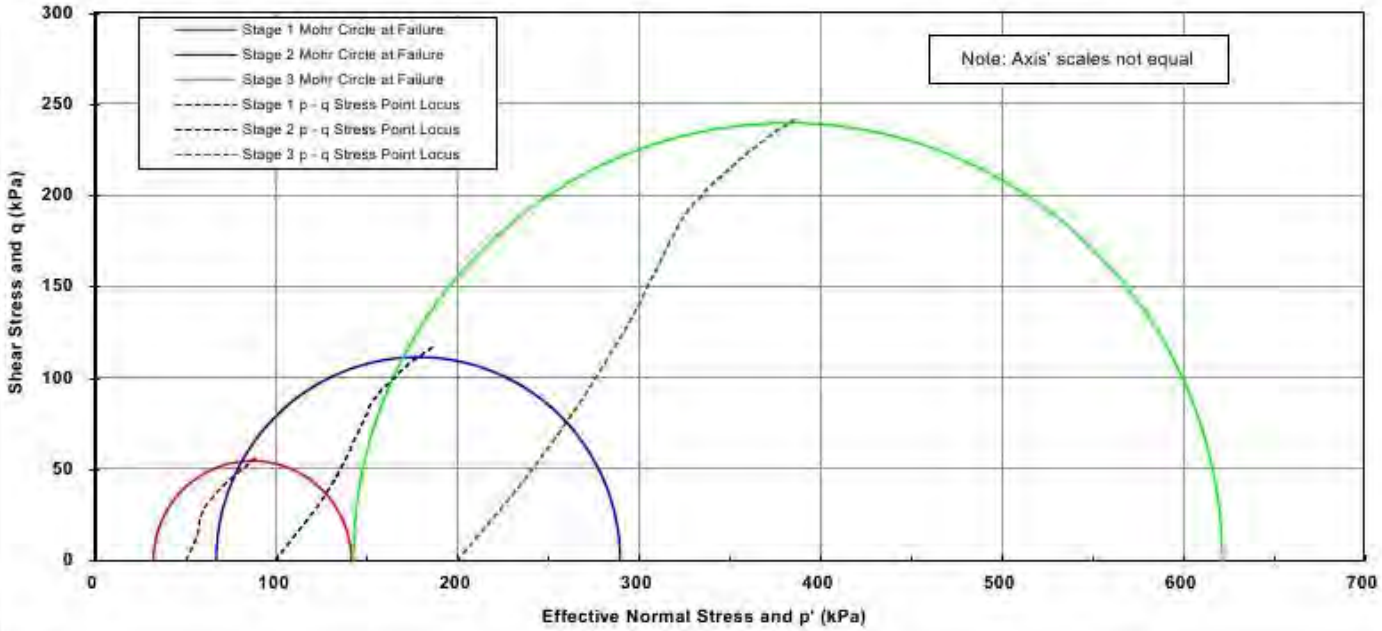
Geotechnical Testing Services

NATA Accredited for compliance with ISO/IEC 17025 - Testing
Laboratory Accreditation Number 679

Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

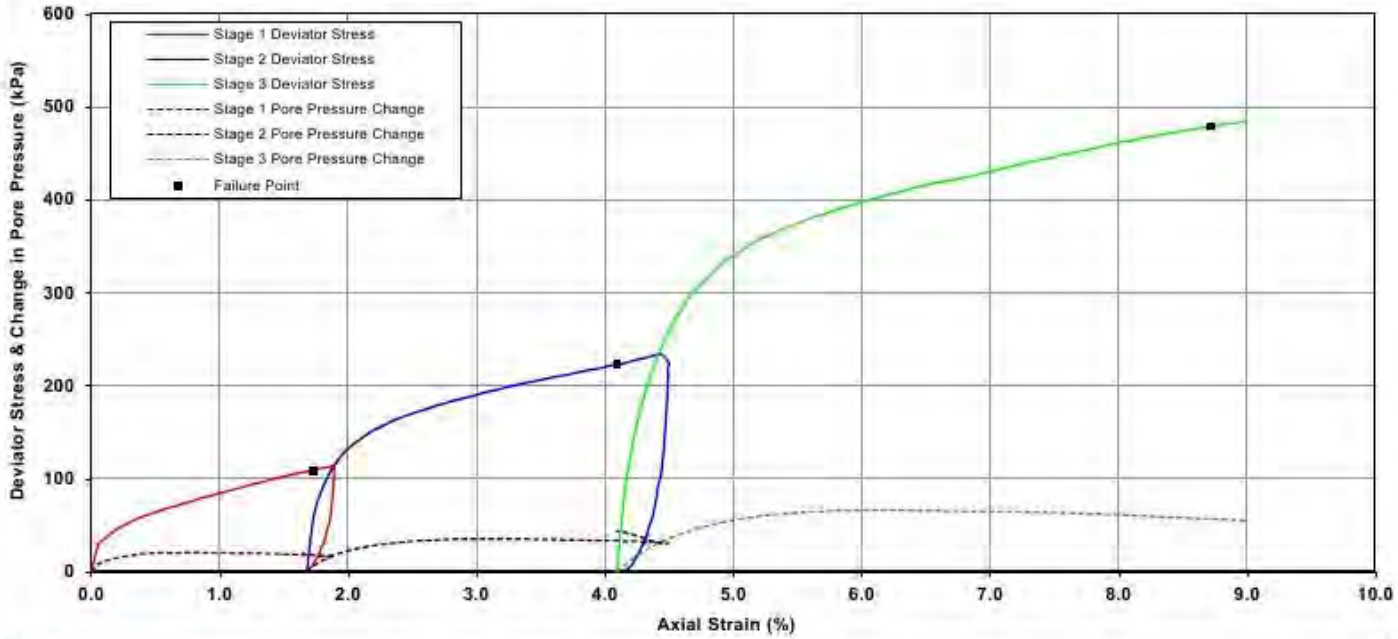
Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702414
		Job No.:	2125993
Project:	Project 10265 Tritton Copper Mine	**Sample No.:**	SYD17-0470-05
		Test Date:	9/01/2018
Client Id.:	Probe 5	**Borehole No.:** n/av	**Depth (m):** n/av



Interpretation between stages :	1 to 2	2 to 3	3 to 4	4 to 5	1 to 3
Effective Cohesion c' (kPa) :	1	-1			0
Angle of effective internal friction Φ' (Degrees) :	38	39			39

Angle of effective internal friction and effective cohesion for this result calculated by linear regression.
Geotechnical Engineer should appraise result.



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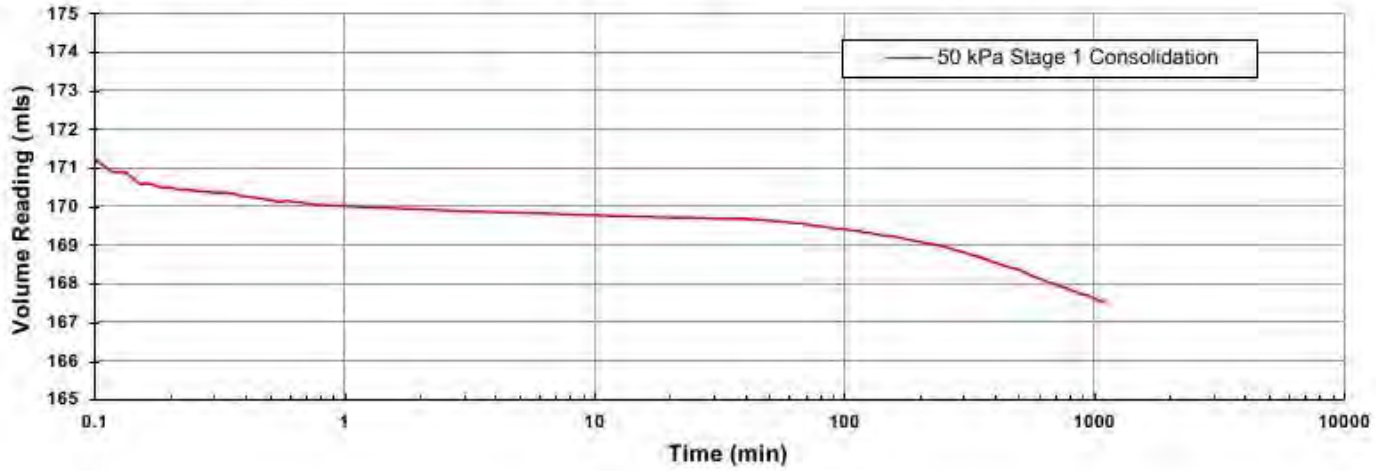
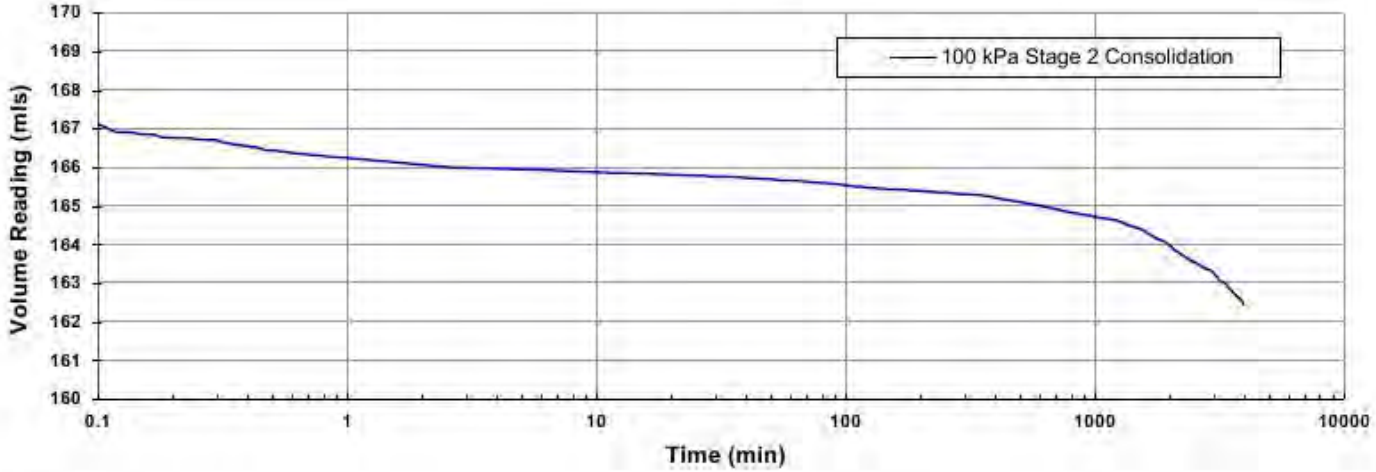
Geotechnical Testing Services

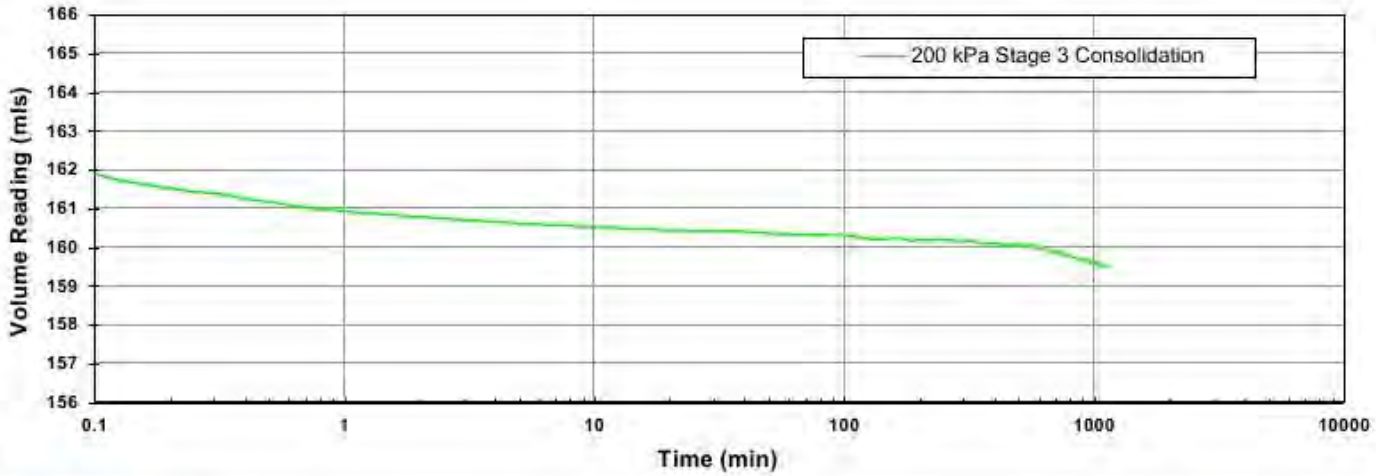
Consolidated Undrained Triaxial (CU) with measurement of pore water pressure

Test Method: AS1289.6.4.2

Client:	Barnson Pty Ltd	**Report No.:**	SYD1702414
		Job No.:	2125993
Project:	Project 10265 Tritton Copper Mine	**Sample No.:**	SYD17-0470-05
		Test Date:	9/01/2018
Client Id.:	Probe 5	**Borehole No.:** n/av	**Depth (m):** n/av







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Unit 5, 43 Herbert Street Artarmon, N.S.W. 2064
Telephone: (02) 9462 4700 Fax: (02) 9462 4710
Geotechnical Testing Services

Sydney Laboratory
Unit 5/43 Herbert St
Artarmon NSW 2064
email: artarmon@ghd.com.au
web: www.ghd.com.au/ghdgeotechnics
Tel: (02) 9462 4860
Fax: (02) 9462 4710

Aggregate/Soil Test Report

Report No: SYD1702417
Issue No: 1
This report replaces all previous issues of report no 'SYD1702417'

Client: Barnson Pty Ltd
16L Yarrandale Rd
Dubbo NSW 2830

Project: 2125993

Accredited for compliance with ISO / IEC 17025 - Testing

NATA Accredited Laboratory Number: 879

Approved Signatory: Jure G Vukovic (Senior Laboratory Technician)

Date of Issue: 31/10/2017

Sample Details

GHD Sample No	SYD17-0471-03
Date Sampled	01/10/2017
Sampled By	Sampled By Client
Location	Tritton Copper Mine
BH / TP No.	Sheathers Pit
Soil Description	Sandy CLAY; red/brown with gravel

Test Results

Description	Method	Result	Limits
Coef of Permeability (m/sec)	AS 1289.6.7.3	1 E-10	
Mean Stress Level (kPa)		30	
Permeant Used		Syd tap water	
Length (mm)		79.2	
Diameter (mm)		73.3	
Length/Diameter Ratio		1.08	
Laboratory Moisture Ratio (%)		100.5	
Laboratory Density Ratio (%)		100.0	
CompactiveEffort		Standard	
Method of Compaction		Remoulded	
Surcharge Applied (Kg)		0.0	
Pressure Applied (Kpa)		10	
Oversize Sieve (mm)		9.5	
Percentage Oversize (%)		1.5	
Moisture Content (%)		18.2	
Date Tested		31/10/2017	

Comments

N/A

Sydney Laboratory
Unit 5/43 Herbert St
Artarmon NSW 2064
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web: www.ghd.com.au/ghdgeotechnics
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Fax: (02) 9462 4710

Aggregate/Soil Test Report

Report No: SYD1702416
Issue No: 1
This report replaces all previous issues of report no 'SYD1702416'

Client: Barnson Pty Ltd
16L Yarrandale Rd
Dubbo NSW 2830

Project: 2125993

Accredited for compliance with ISO / IEC 17025 - Testing

NATA Accredited Laboratory Number: 879

Approved Signatory: Jure G Vukovic (Senior Laboratory Technician)

Date of Issue: 31/10/2017

Sample Details

GHD Sample No	SYD17-0471-02
Date Sampled	01/10/2017
Sampled By	Sampled By Client
Location	Tritton Copper Mine
BH / TP No.	Yarrins Pit
Soil Description	CLAY with sand; grey trace gravel

Test Results

Description	Method	Result	Limits
Coef of Permeability (m/sec)	AS 1289.6.7.3	1 E-10	
Mean Stress Level (kPa)		30	
Permeant Used		Syd tap water	
Length (mm)		80.0	
Diameter (mm)		73.5	
Length/Diameter Ratio		1.09	
Laboratory Moisture Ratio (%)		100.5	
Laboratory Density Ratio (%)		100.0	
CompactiveEffort		Standard	
Method of Compaction		Remoulded	
Surcharge Applied (Kg)		0.0	
Pressure Applied (Kpa)		10	
Oversize Sieve (mm)		9.5	
Percentage Oversize (%)		0.0	
Moisture Content (%)		20.4	
Date Tested		23/10/2017	

Comments

N/A

Sydney Laboratory
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Aggregate/Soil Test Report

Report No: SYD1702419
Issue No: 1
This report replaces all previous issues of report no 'SYD1702419'

Client: Barnson Pty Ltd
16L Yarrandale Rd
Dubbo NSW 2830

Project: 2125993

Accredited for compliance with ISO / IEC 17025 - Testing

NATA Accredited Laboratory Number: 879

Approved Signatory: Jure G Vukovic (Senior Laboratory Technician)

Date of Issue: 6/11/2017

Sample Details

GHD Sample No	SYD17-0471-05
Date Sampled	01/10/2017
Sampled By	Sampled By Client
Location	Tritton Copper Mine
BH / TP No.	50/50 Yarnins & Sheathers
Soil Description	CLAY with sand; red/grey trace gravel

Test Results

Description	Method	Result	Limits
Coef of Permeability (m/sec)	AS 1289.6.7.3	1 E-10	
Mean Stress Level (kPa)		30	
Permeant Used		Syd Tap Water	
Length (mm)		75.0	
Diameter (mm)		63.6	
Length/Diameter Ratio		1.18	
Laboratory Moisture Ratio (%)		99.5	
Laboratory Density Ratio (%)		99.0	
CompactiveEffort		Standard	
Method of Compaction		Remoulded	
Surcharge Applied (Kg)		0.0	
Pressure Applied (Kpa)		10	
Oversize Sieve (mm)		9.5	
Percentage Oversize (%)		1.3	
Moisture Content (%)		18.9	
Date Tested		30/10/2017	

Comments

N/A

Sydney Laboratory
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Fax: (02) 9462 4710

Aggregate/Soil Test Report

Report No: SYD1702418
Issue No: 1
This report replaces all previous issues of report no 'SYD1702418'

Client: Barnson Pty Ltd
16L Yarrandale Rd
Dubbo NSW 2830

Project: 2125993

Accredited for compliance with ISO / IEC 17025 - Testing

NATA Accredited Laboratory Number: 879

Approved Signatory: Jure G Vukovic (Senior Laboratory Technician)

Date of Issue: 6/11/2017

Sample Details

GHD Sample No	SYD17-0471-04
Date Sampled	01/10/2017
Sampled By	Sampled By Client
Location	Tritton Copper Mine
BH / TP No.	Dam Stockpile
Soil Description	Sandy CLAY; red/brown with gravel

Test Results

Description	Method	Result	Limits
Coef of Permeability (m/sec)	AS 1289.6.7.3	2 E-10	
Mean Stress Level (kPa)		30	
Permeant Used		Syd Tap Water	
Length (mm)		79.9	
Diameter (mm)		73.2	
Length/Diameter Ratio		1.09	
Laboratory Moisture Ratio (%)		102.0	
Laboratory Density Ratio (%)		99.5	
CompactiveEffort		Standard	
Method of Compaction		Remoulded	
Surcharge Applied (Kg)		0.0	
Pressure Applied (Kpa)		10	
Oversize Sieve (mm)		9.5	
Percentage Oversize (%)		0.0	
Moisture Content (%)		16.8	
Date Tested		30/10/2017	

Comments

N/A

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Fax:(02) 9462 4710

Aggregate/Soil Test Report

Report No: SYD1702415
Issue No: 1
This report replaces all previous issues of report no 'SYD1702415'

Client: Barnson Pty Ltd
16L Yarrandale Rd
Dubbo NSW 2830

Project: 2125993

Accredited for compliance with ISO / IEC 17025 - Testing

NATA Accredited Laboratory Number: 879

Approved Signatory: Jure G Vukovic (Senior Laboratory Technician)

Date of Issue: 6/11/2017

Sample Details

GHD Sample No	SYD17-0471-01
Date Sampled	01/10/2017
Sampled By	Sampled By Client
Location	Tritton Copper Mine
BH / TP No.	Mine Waste
Soil Description	Gravelly SAND; grey with silt

Test Results

Description	Method	Result	Limits
Permeability (m/sec)	AS 1289.6.7.2	1 E-08	
Laboratory Moisture Ratio		100.0	
Laboratory Density Ratio		100.0	
CompactiveEffort		Standard	
Method of Compaction		Remoulded	
Surcharge Applied (Kg)		0.0	
Pressure Applied (Kpa)		0	
Material Retained And Later Discarded (%)		6.8	
Sieve Size (mm)		19.00	
Date Tested		1/11/2017	

Comments

N/A

Appendix C

Analysis of CPT Results

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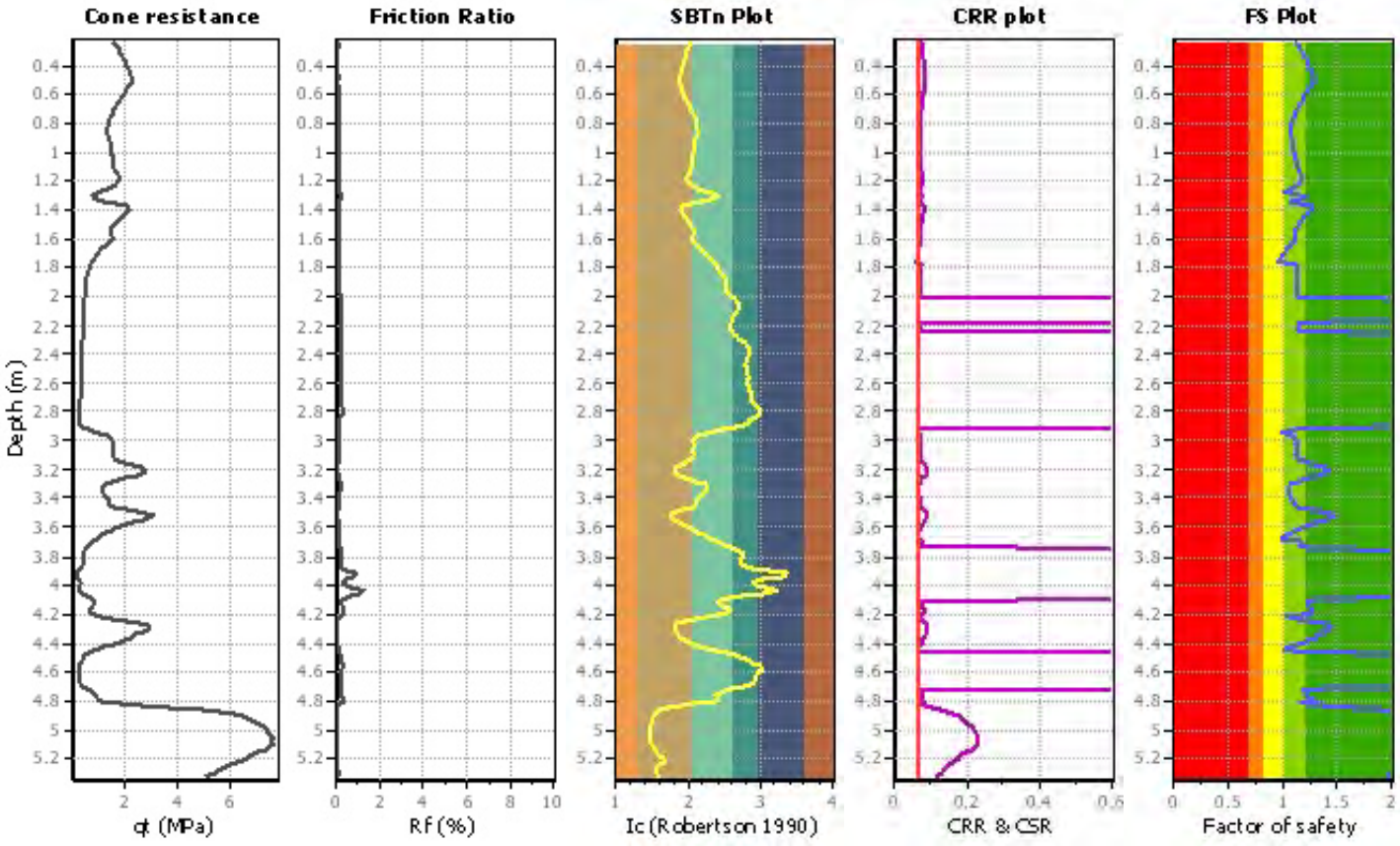
LIQUEFACTION ANALYSIS REPORT

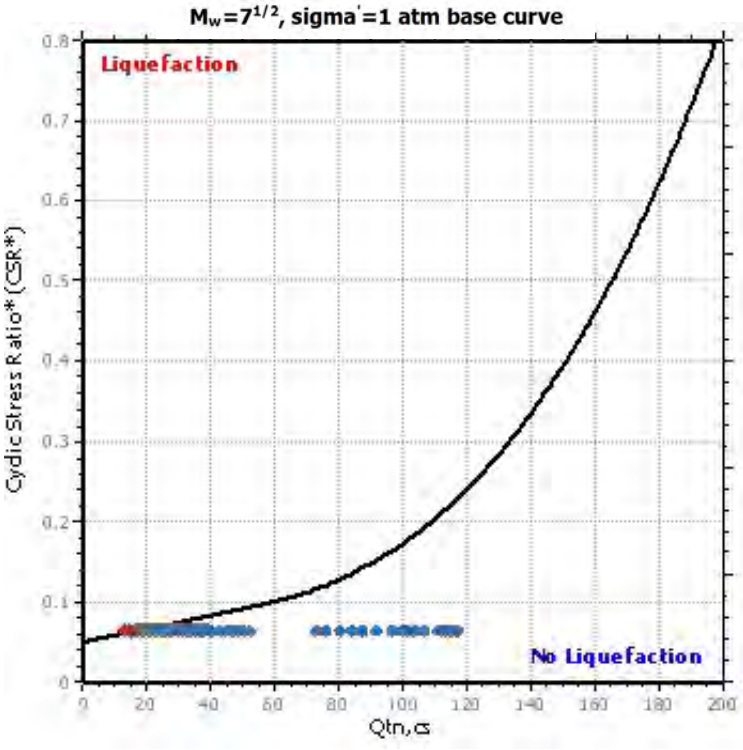
Project title : **Location :**

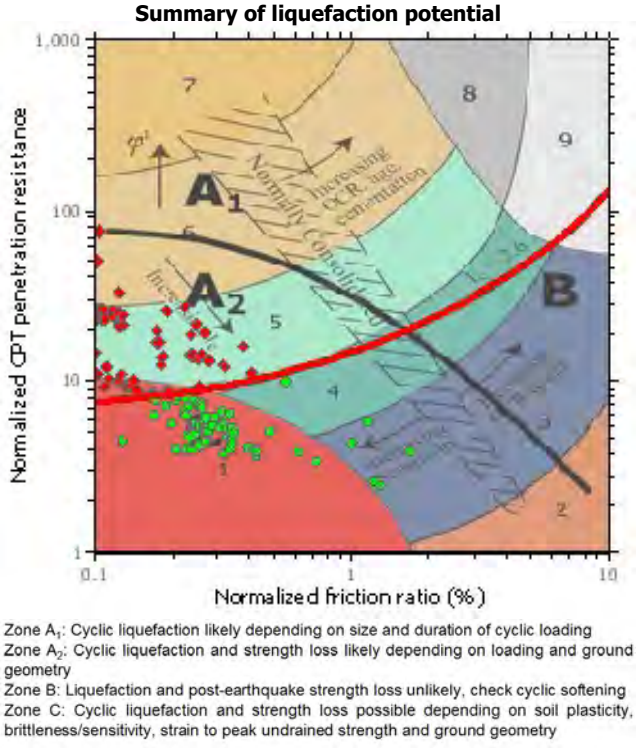
CPT file : AR0001M3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	0.00 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.08	Unit weight calculation:	18.00 kN/m³	K_σ applied:	Yes	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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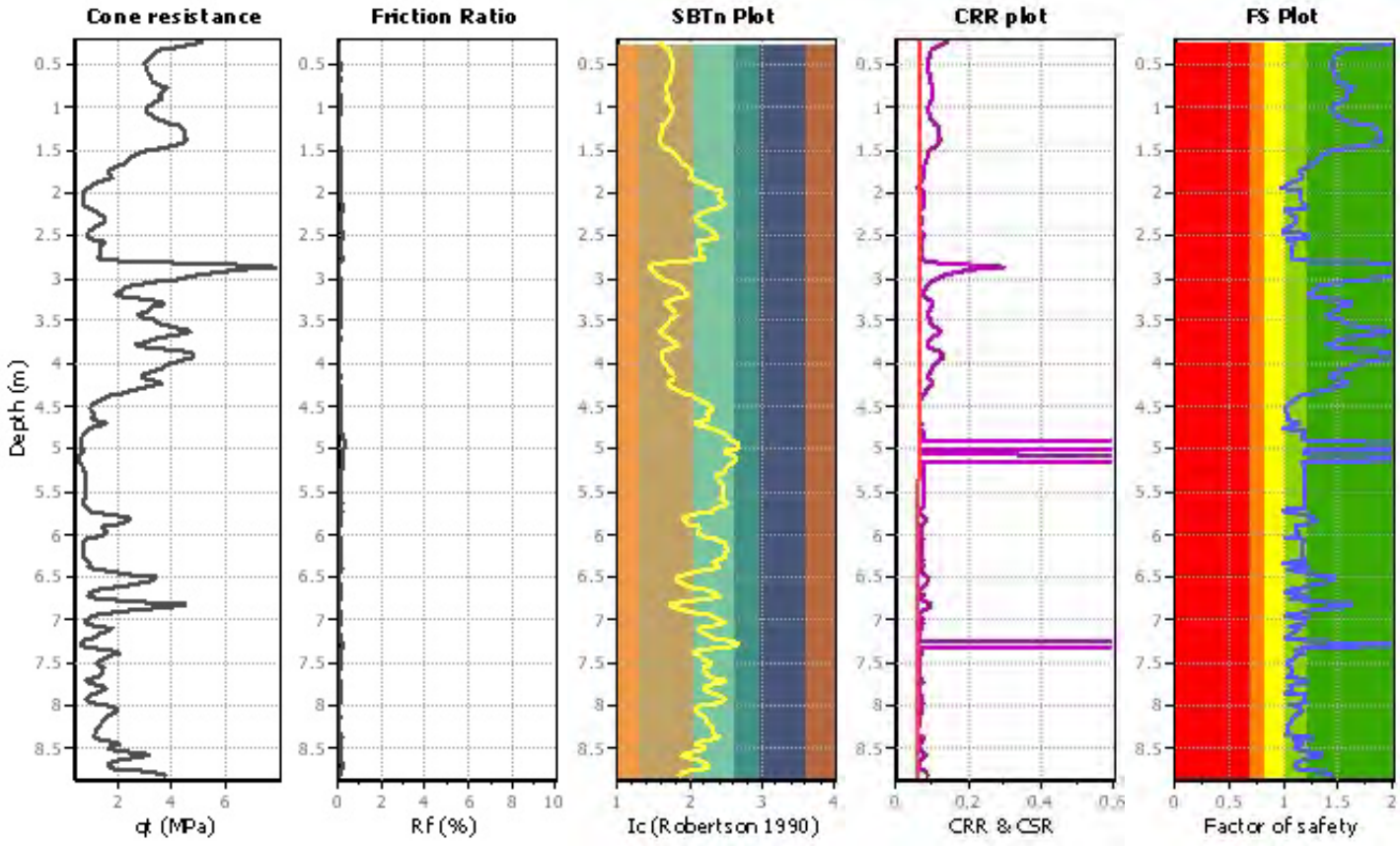
LIQUEFACTION ANALYSIS REPORT

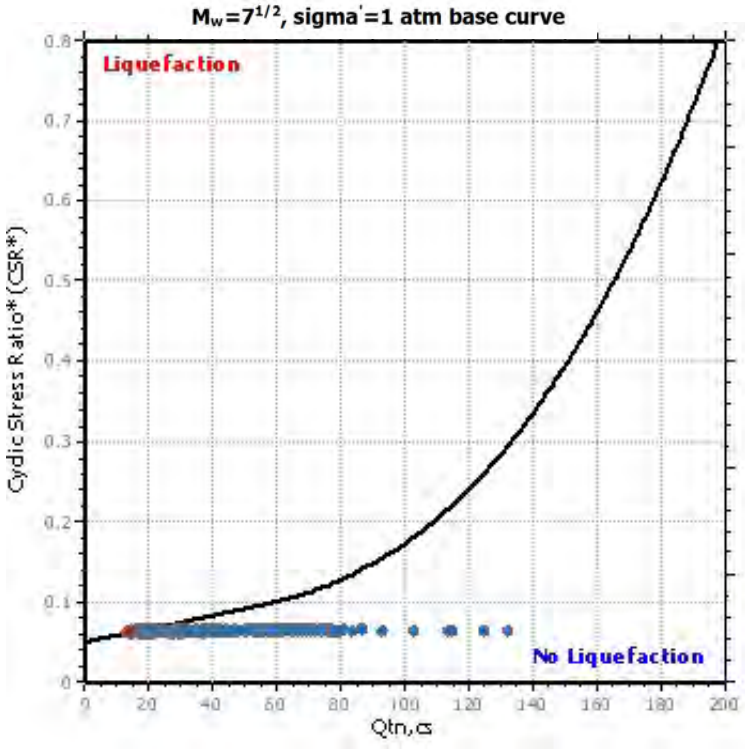
Project title : **Location :**

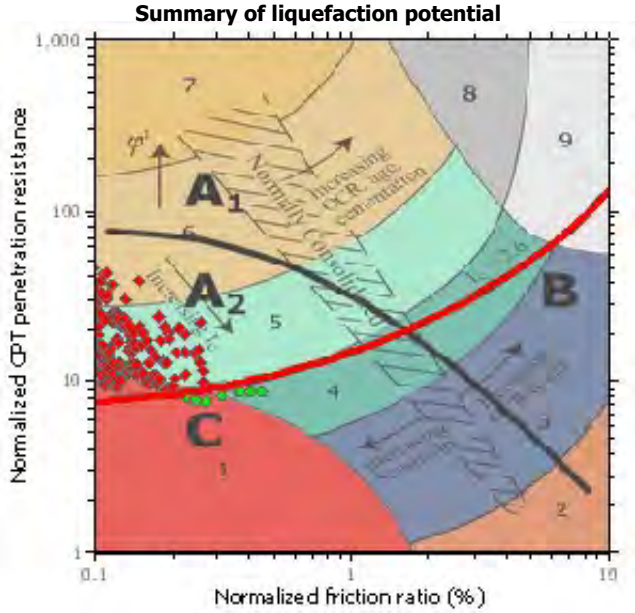
CPT file : AR0002M3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	0.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.08	Unit weight calculation:	18.00 kN/m³	K_σ applied:	Yes		







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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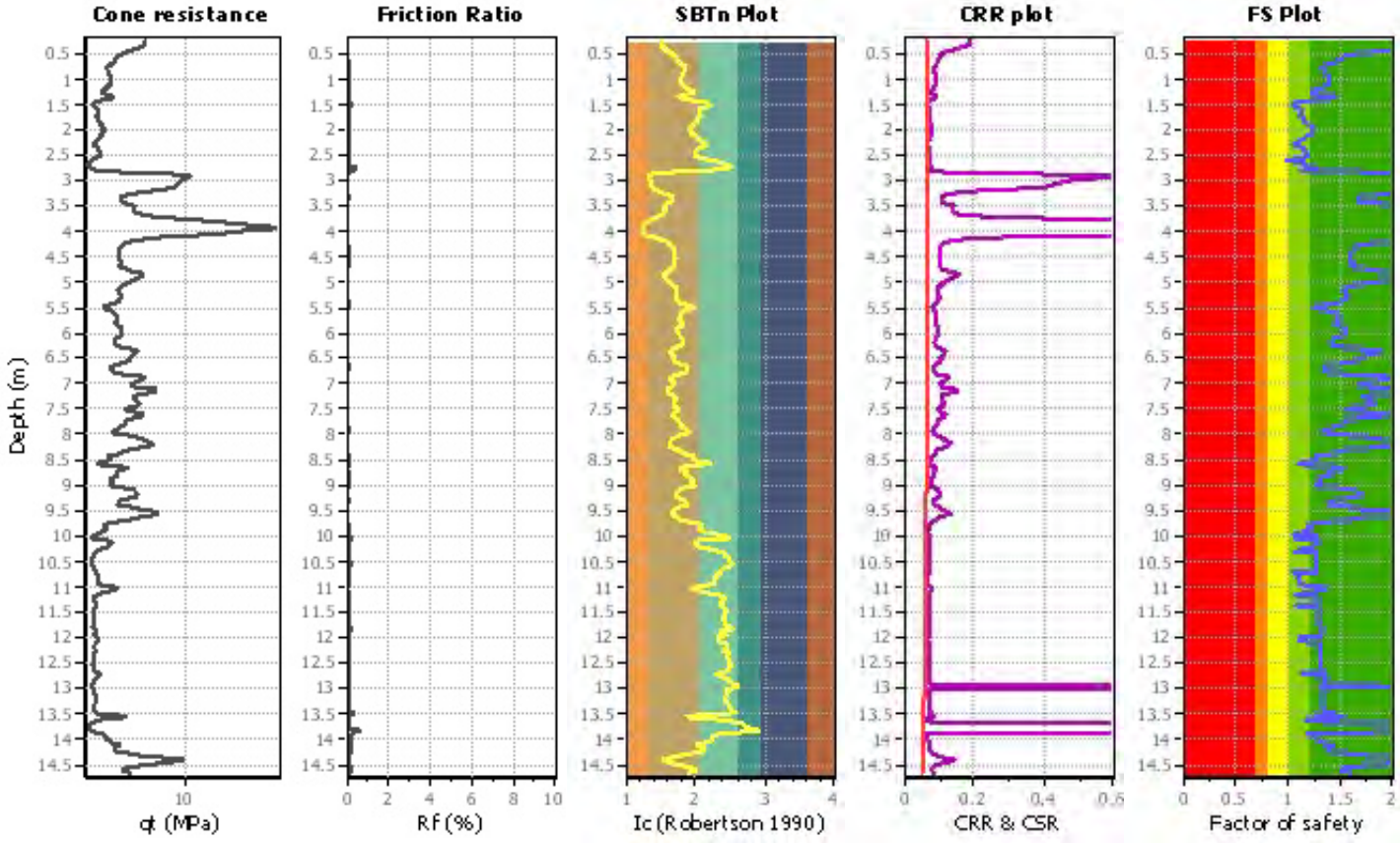
LIQUEFACTION ANALYSIS REPORT

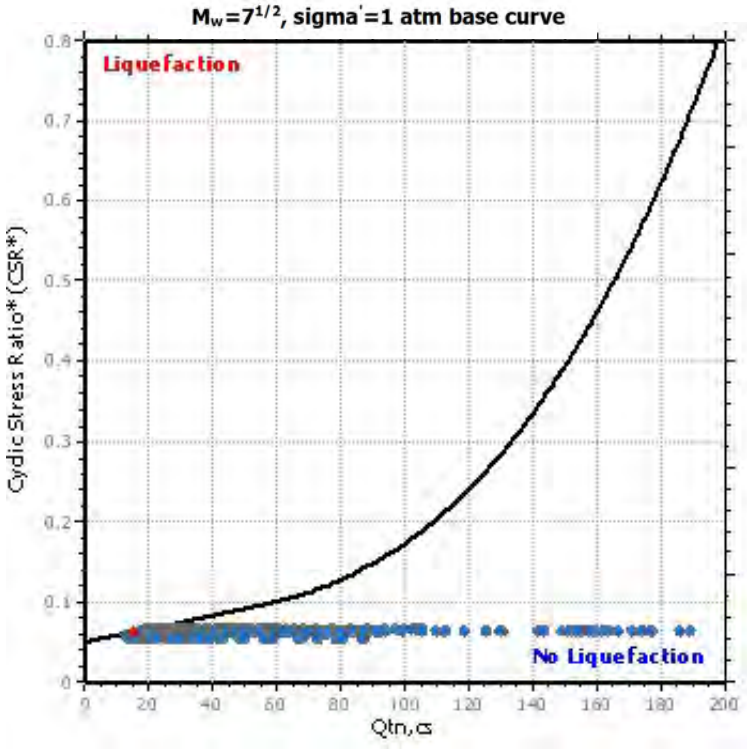
Project title : **Location :**

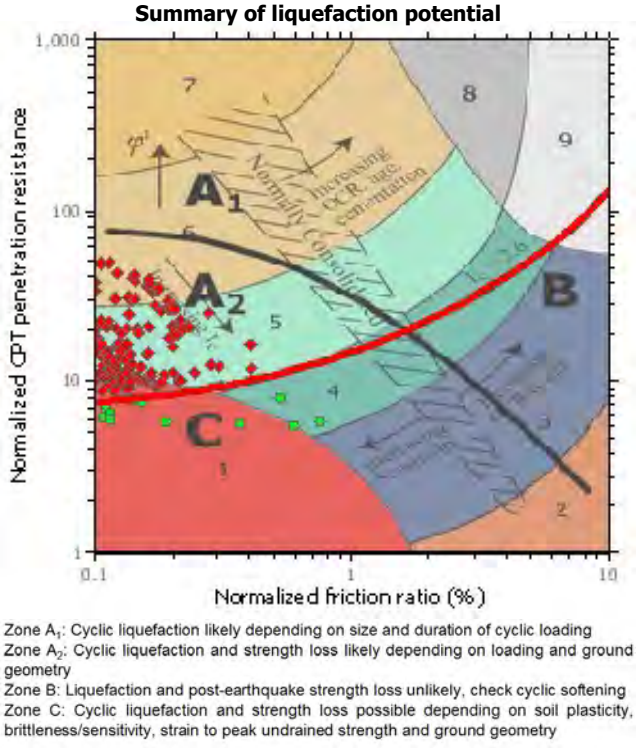
CPT file : AR0003M3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	0.00 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.08	Unit weight calculation:	18.00 kN/m³	K_σ applied:	Yes	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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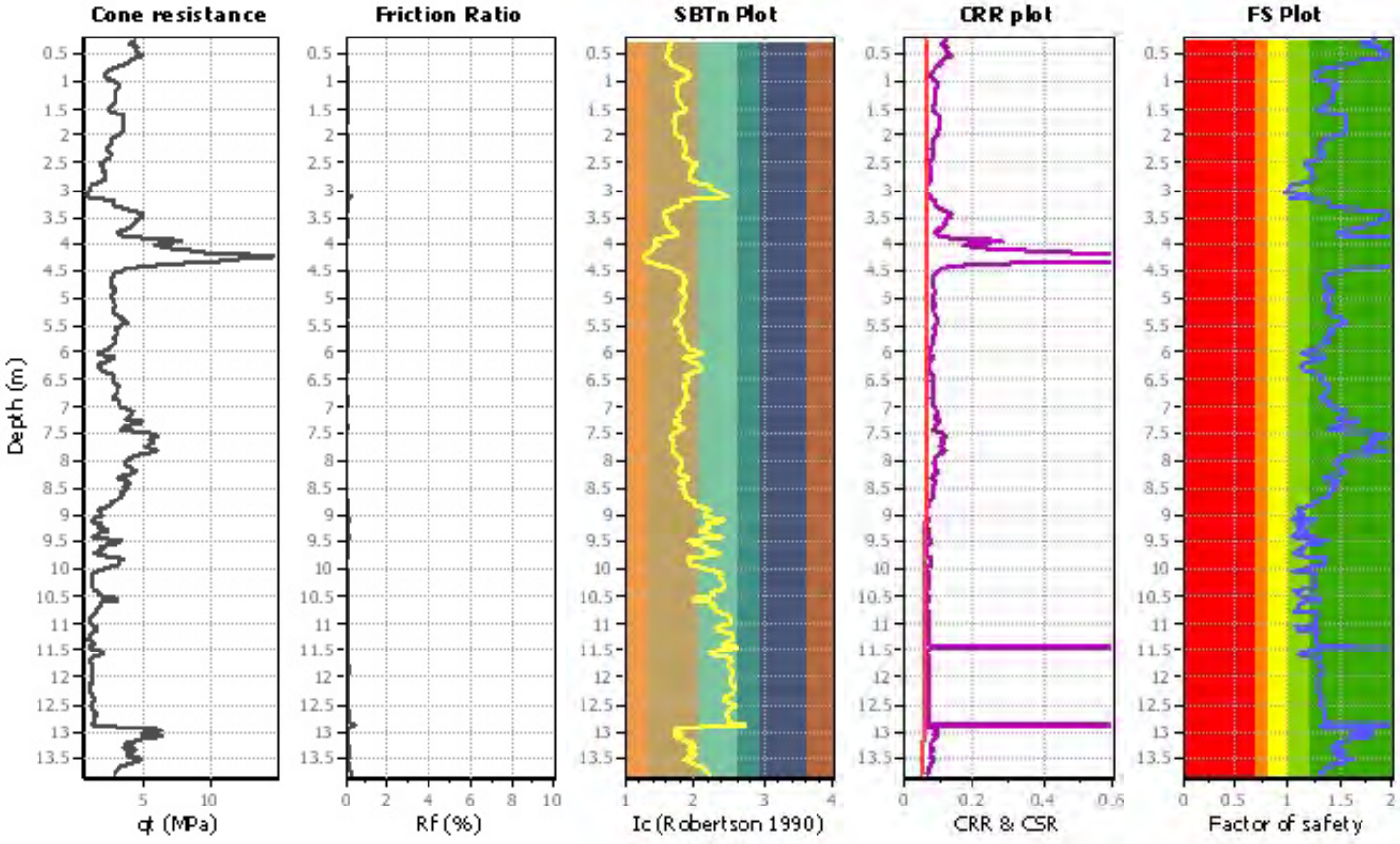
LIQUEFACTION ANALYSIS REPORT

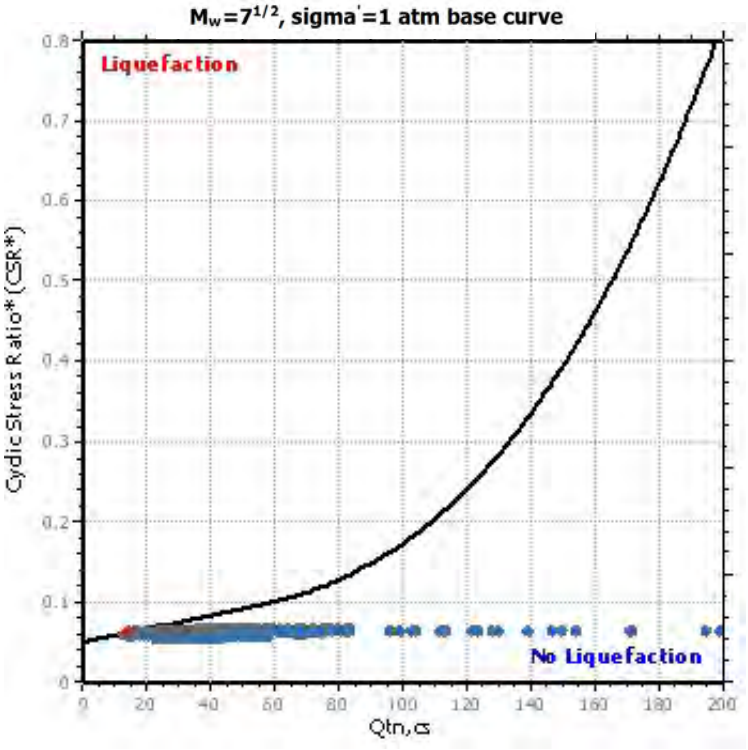
Project title : **Location :**

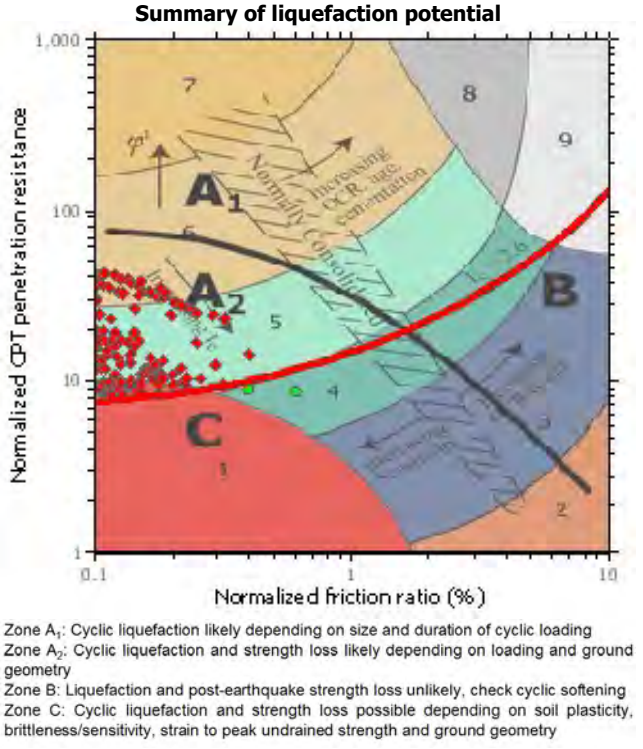
CPT file : AR0004M3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	0.00 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.08	Unit weight calculation:	18.00 kN/m³	K_σ applied:	Yes	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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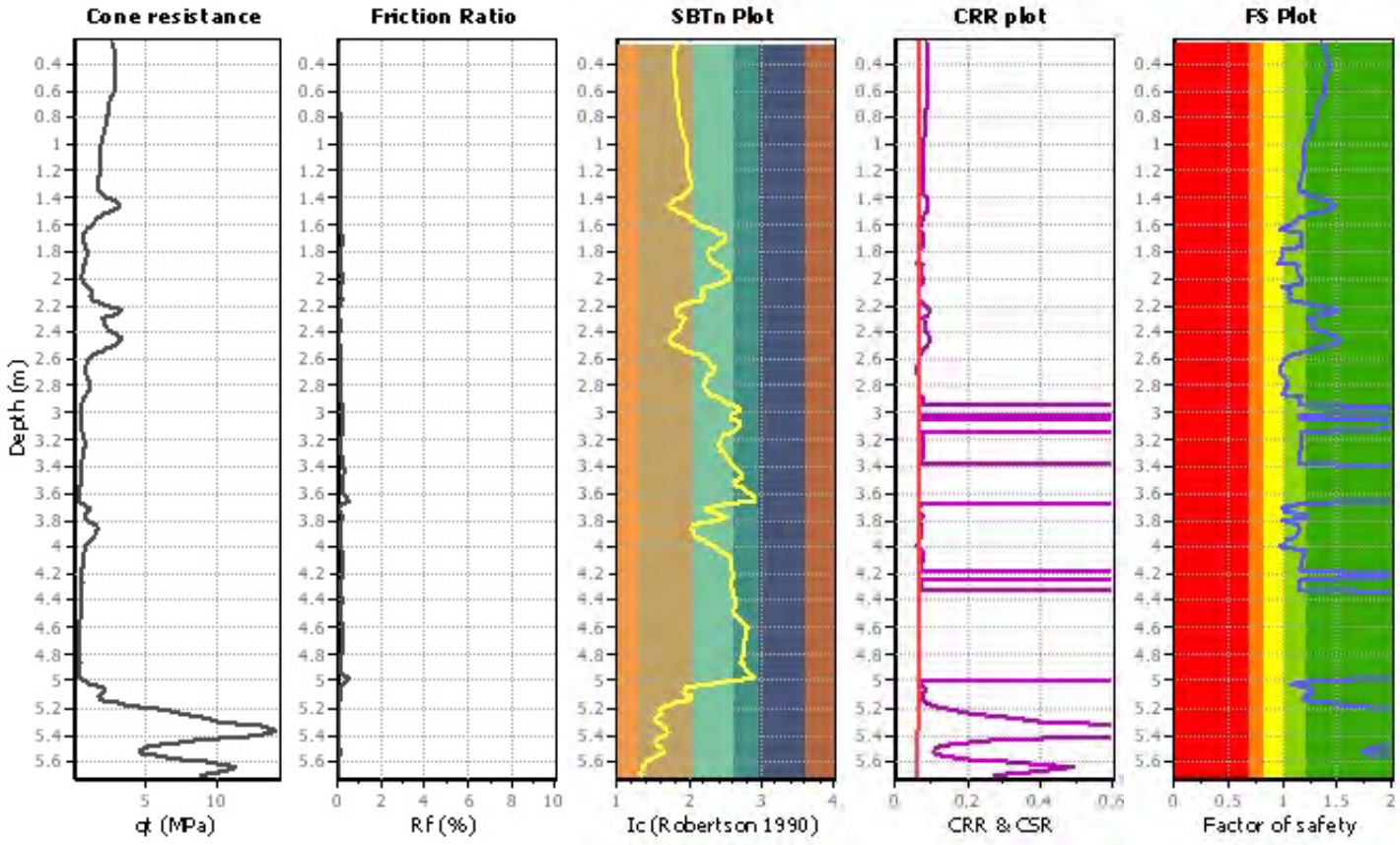
LIQUEFACTION ANALYSIS REPORT

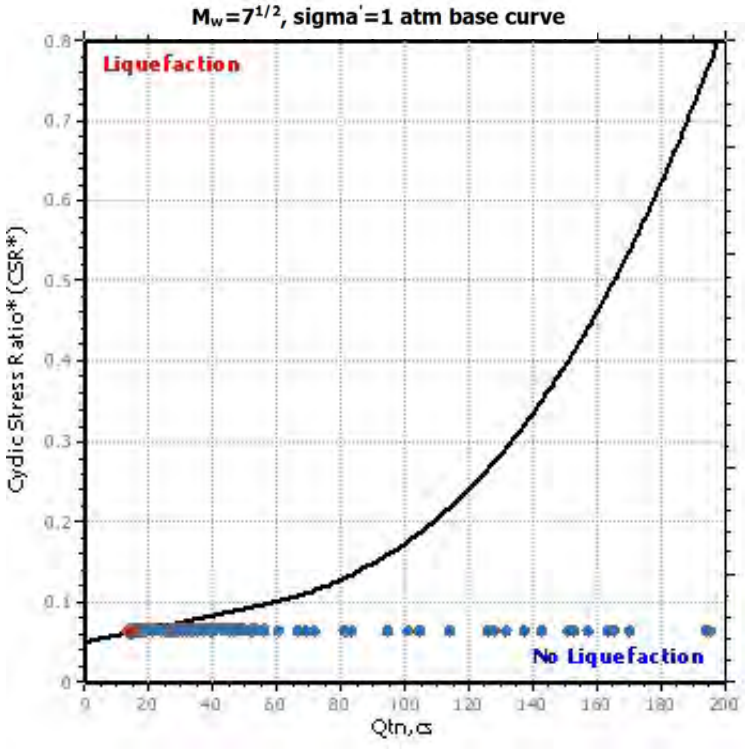
Project title : **Location :**

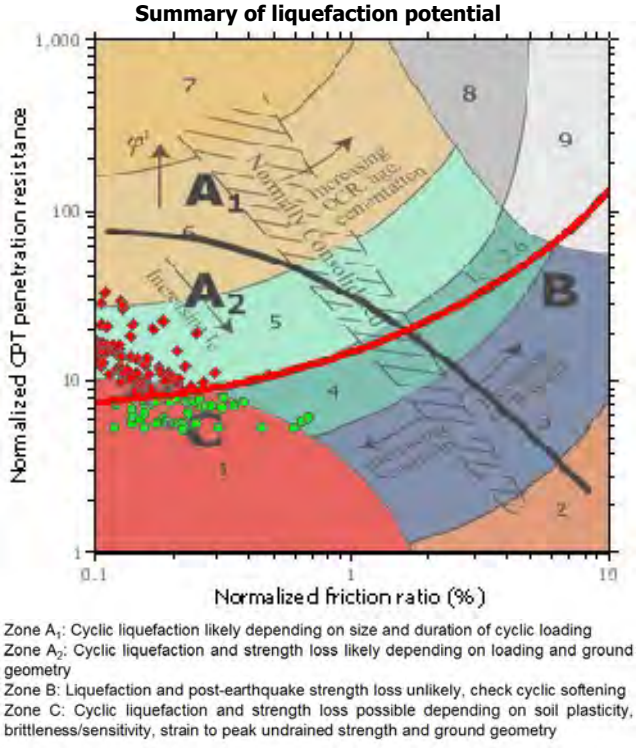
CPT file : AR0005M3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	0.00 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.08	Unit weight calculation:	18.00 kN/m³	K_σ applied:	Yes	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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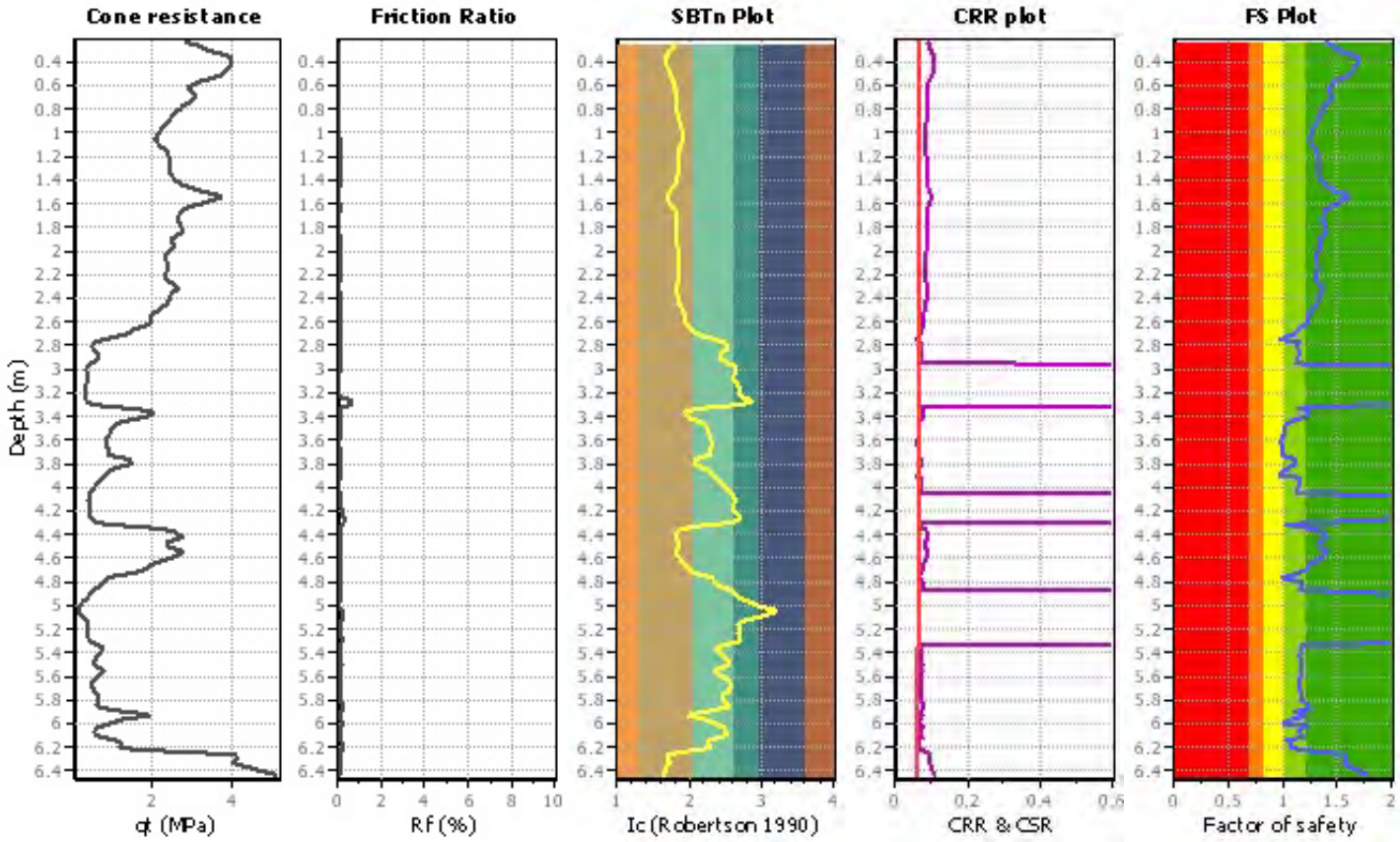
LIQUEFACTION ANALYSIS REPORT

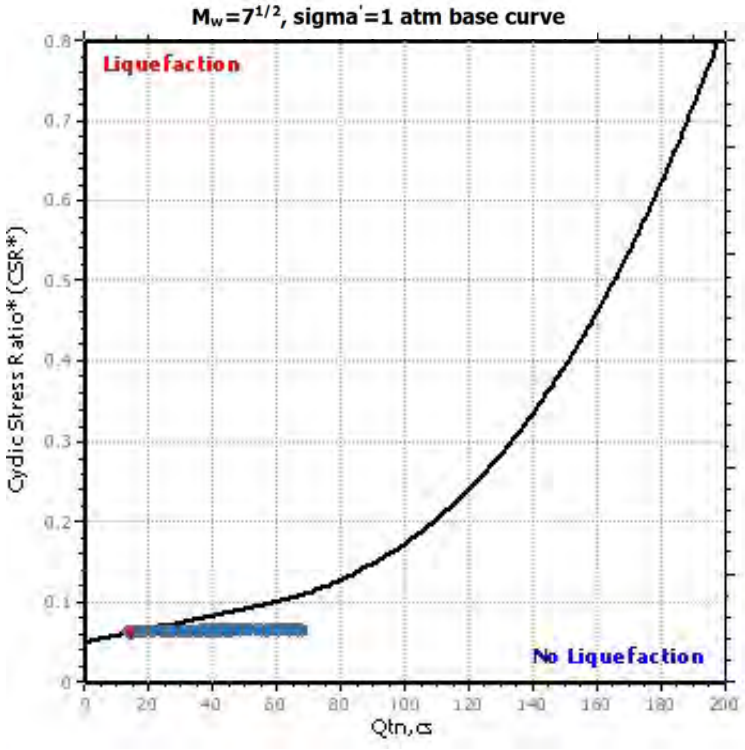
Project title : **Location :**

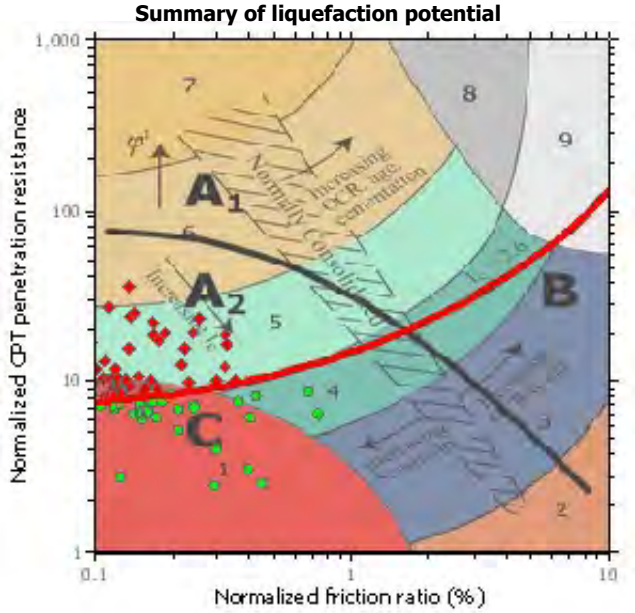
CPT file : AR0006M3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	0.00 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.08	Unit weight calculation:	18.00 kN/m³	K_σ applied:	Yes	MSF method:	Method based







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Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
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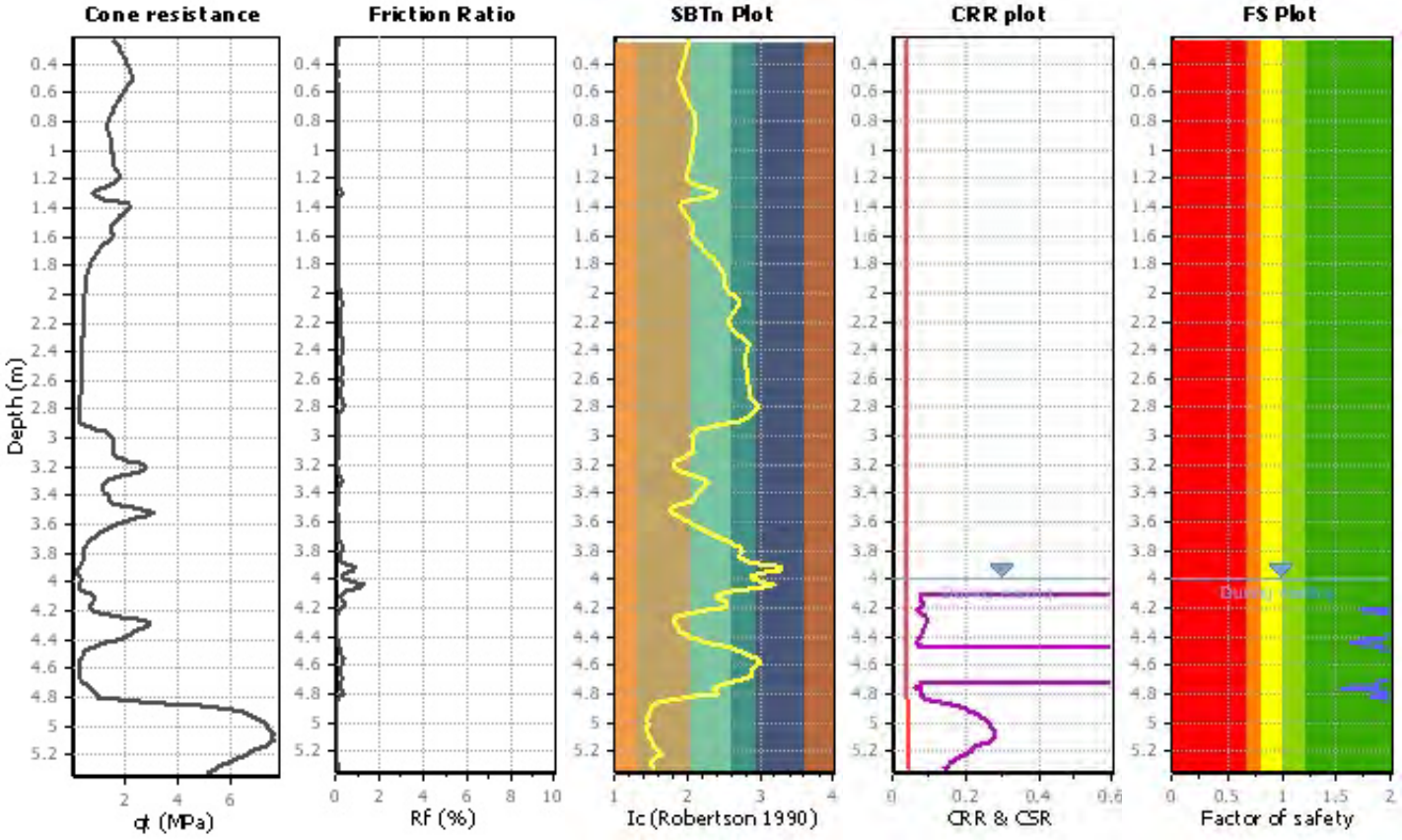
LIQUEFACTION ANALYSIS REPORT

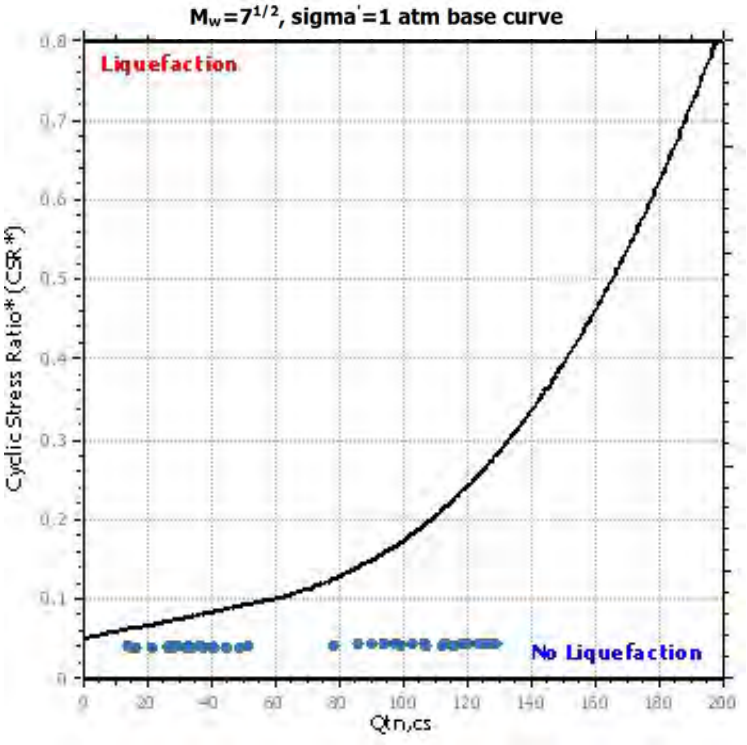
Project title : **Location :**

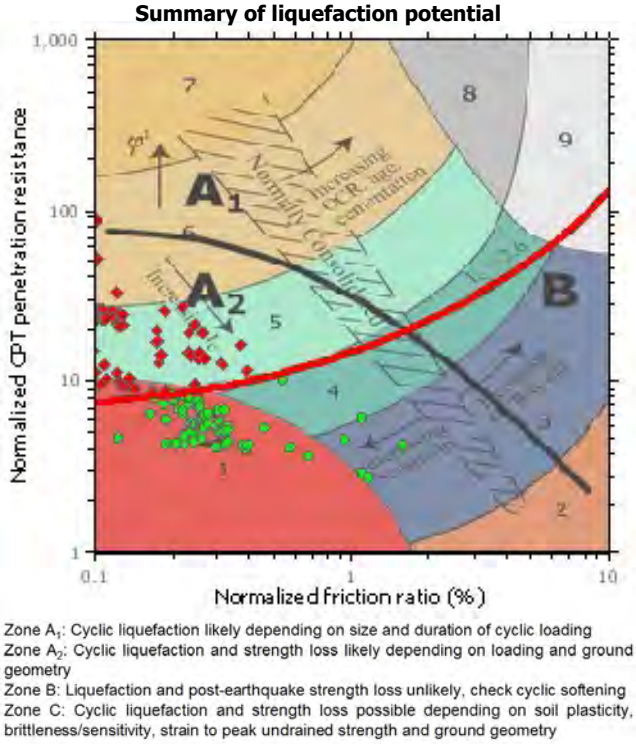
CPT file : AR0001M3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	4.00 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
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Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

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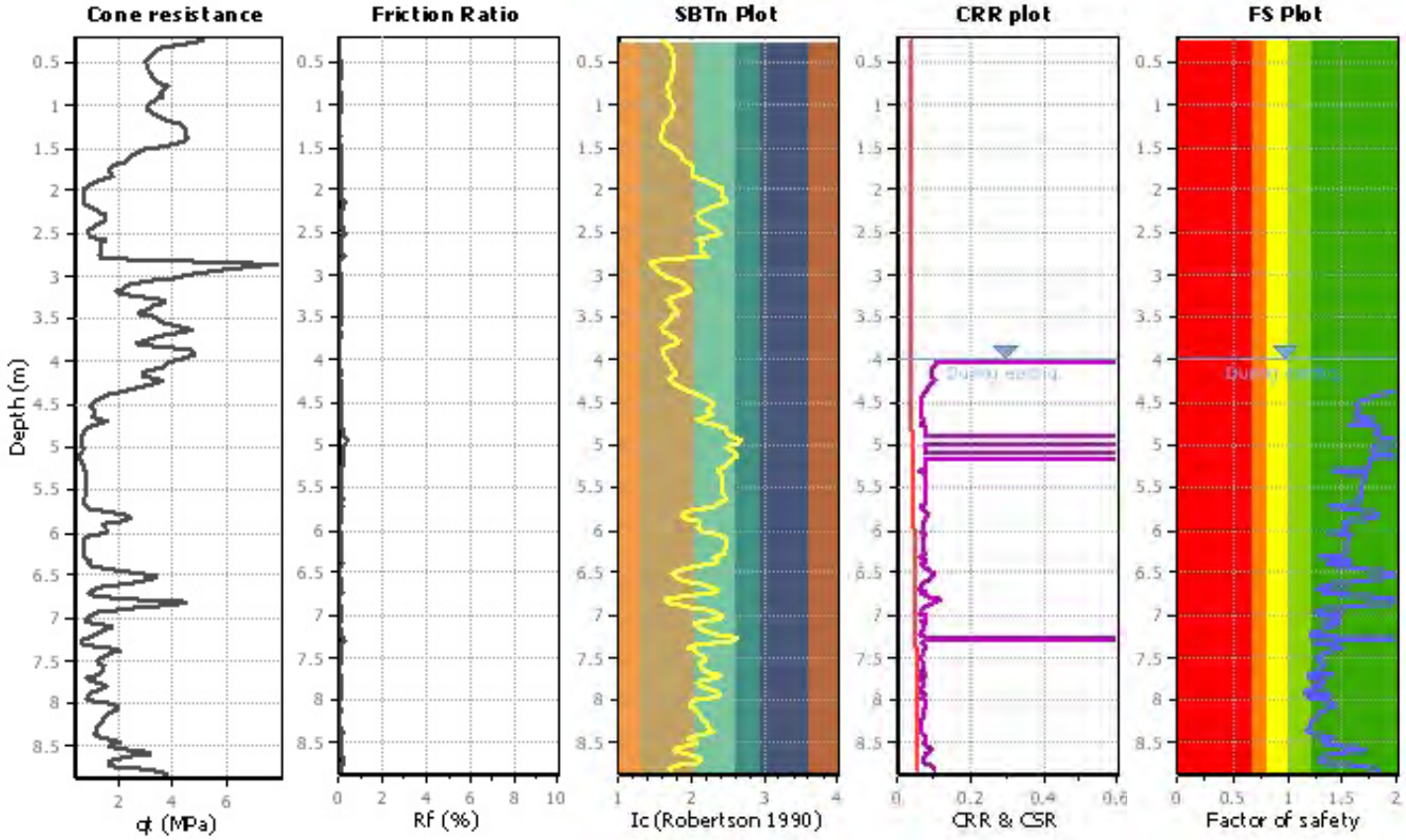
LIQUEFACTION ANALYSIS REPORT

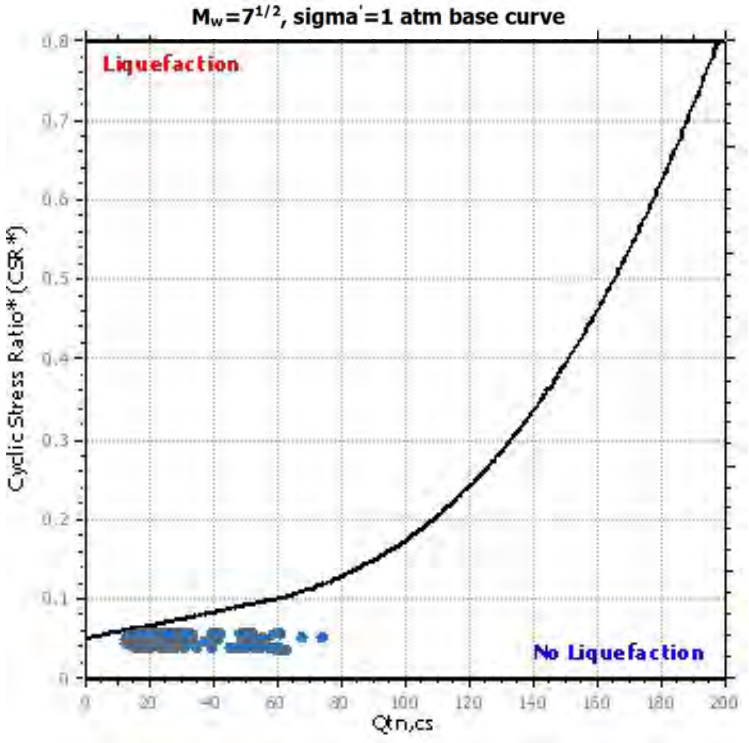
Project title : **Location :**

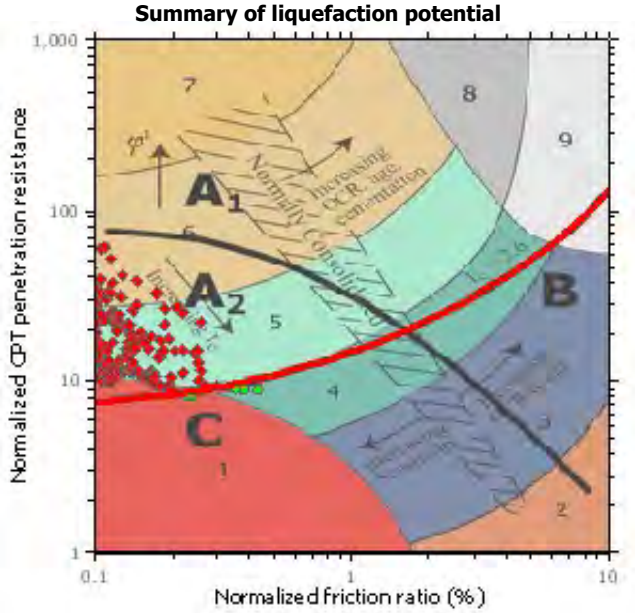
CPT file : AR0002M3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	4.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		







Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
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Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
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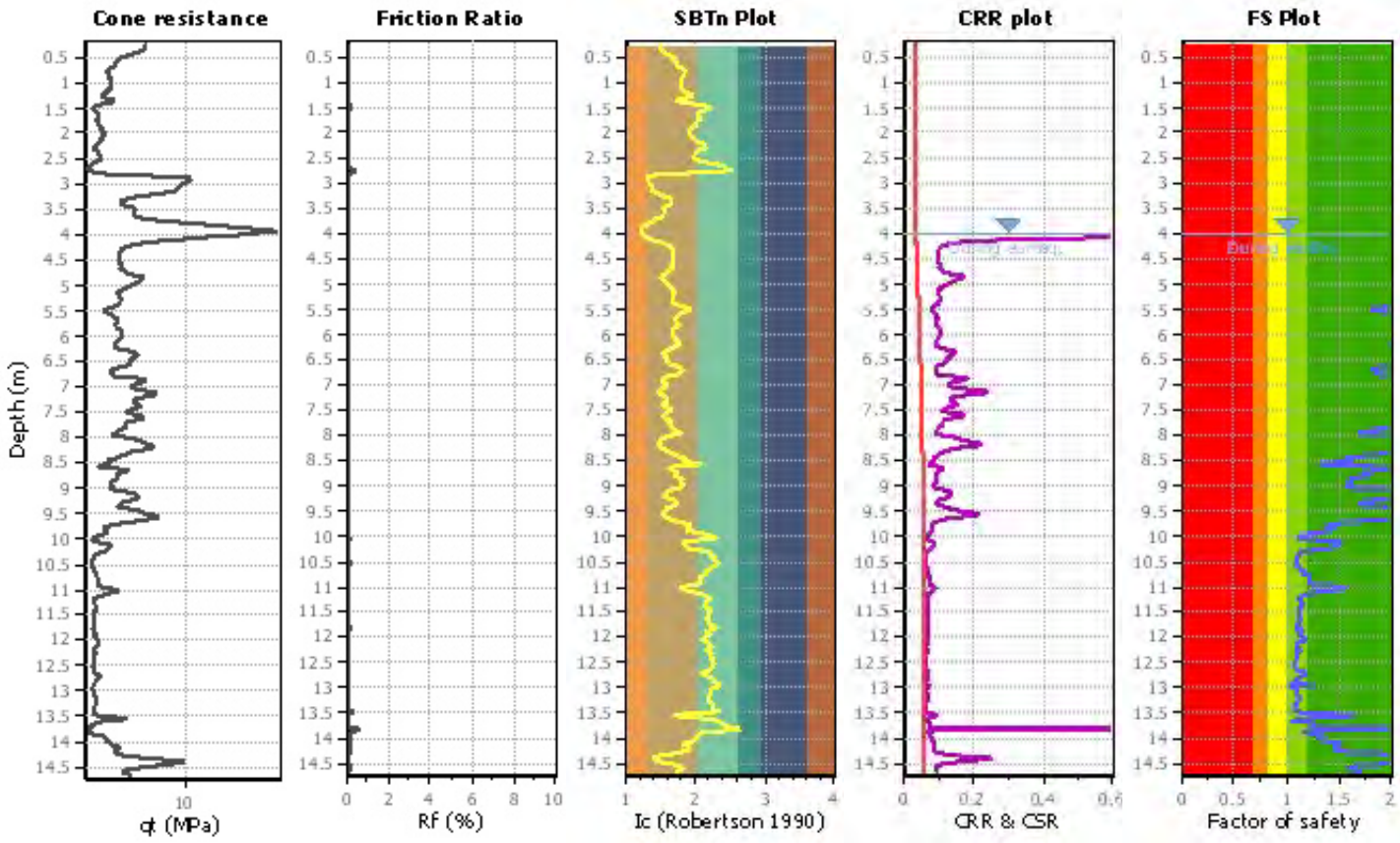
LIQUEFACTION ANALYSIS REPORT

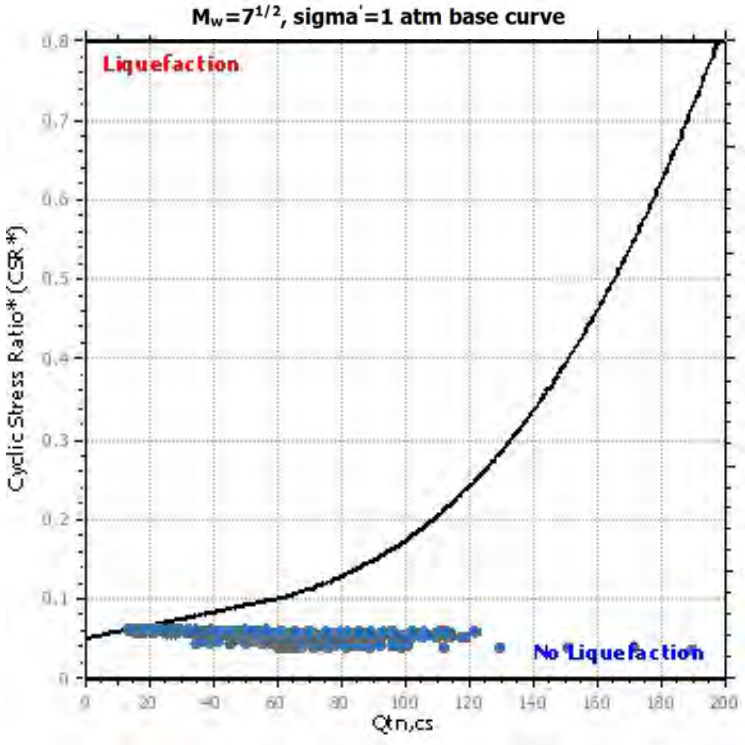
Project title : **Location :**

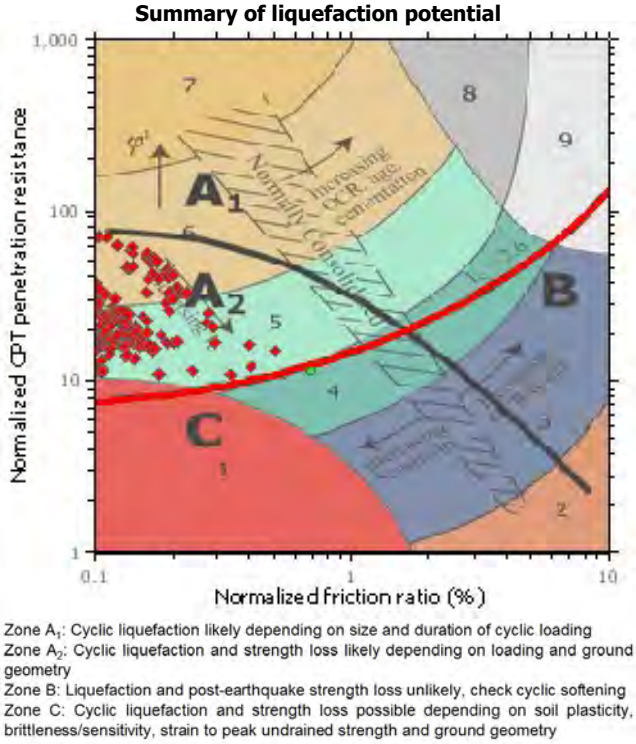
CPT file : AR0003M3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	4.00 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based







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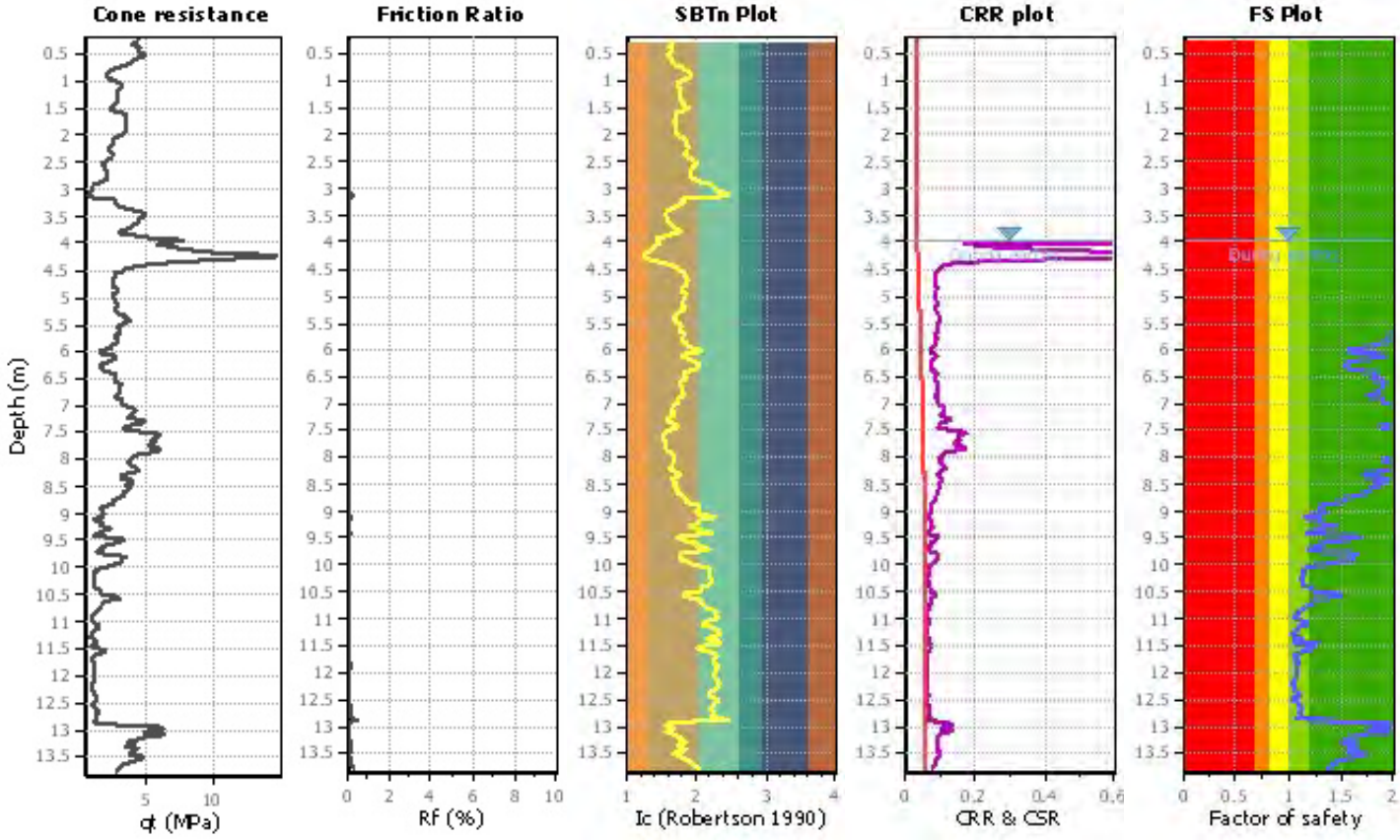
LIQUEFACTION ANALYSIS REPORT

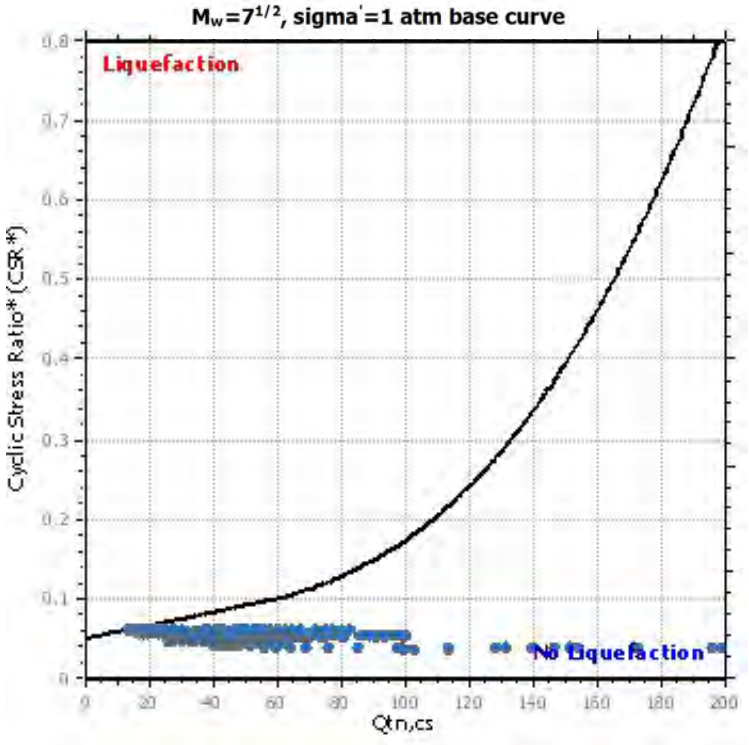
Project title : **Location :**

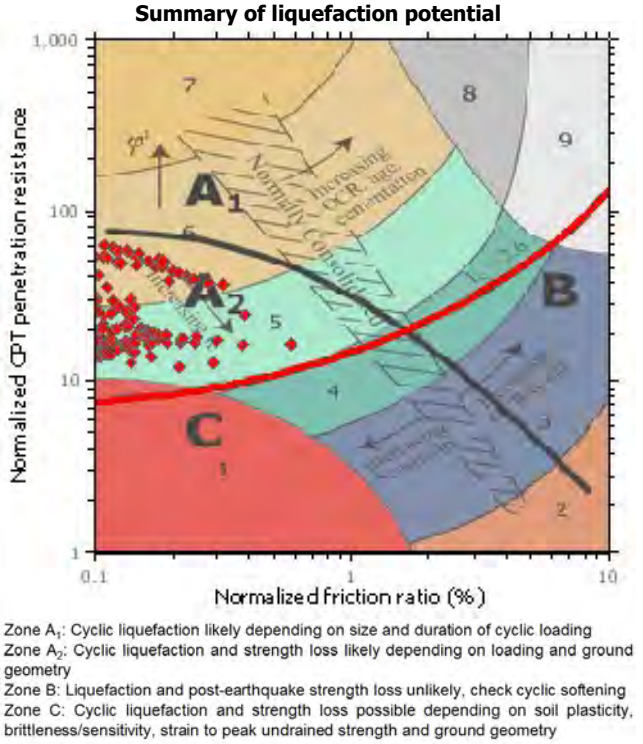
CPT file : AR0004M3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	4.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		







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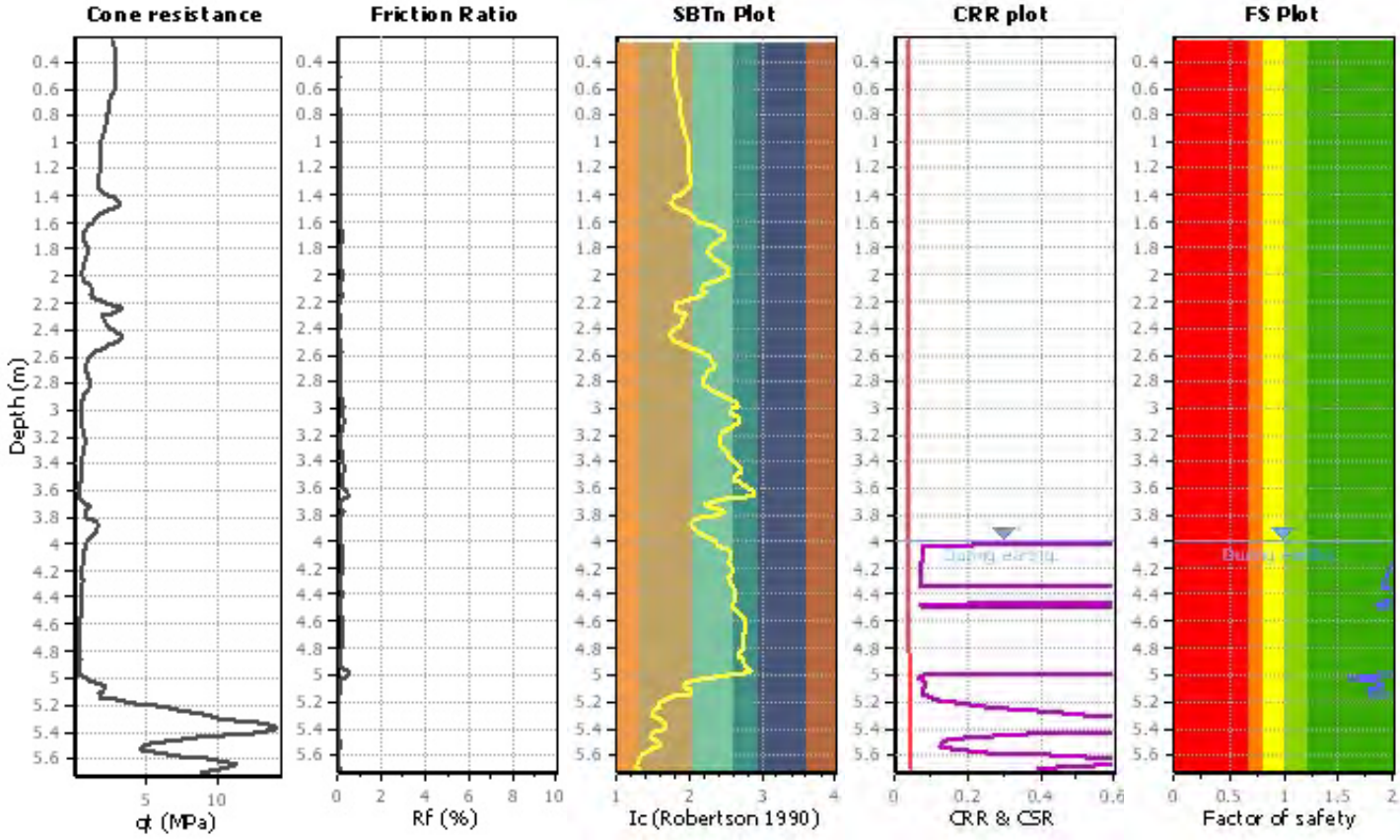
LIQUEFACTION ANALYSIS REPORT

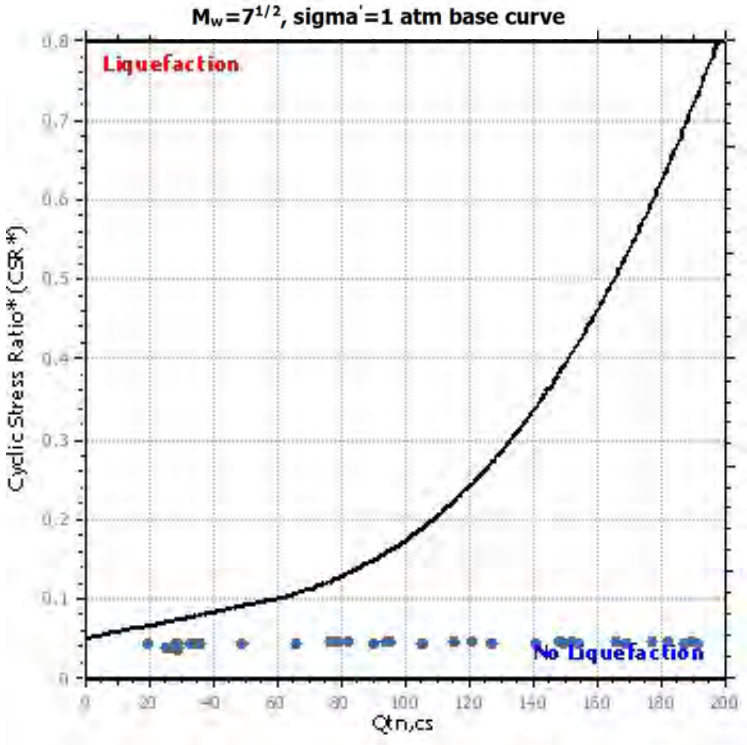
Project title : **Location :**

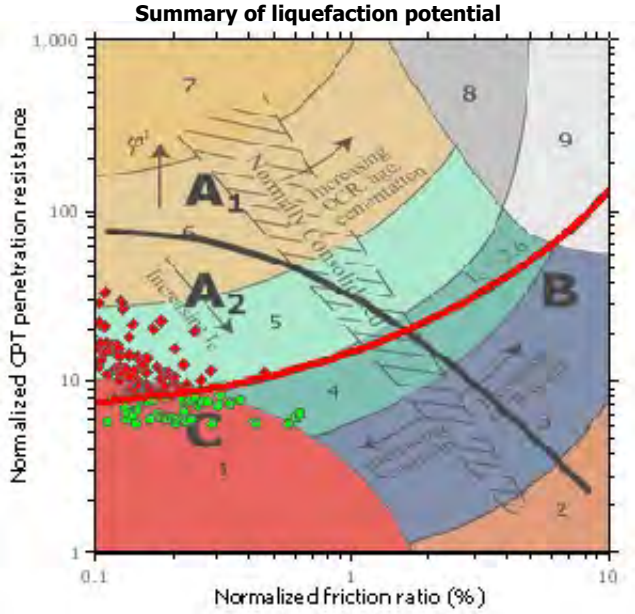
CPT file : AR0005M3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	4.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		







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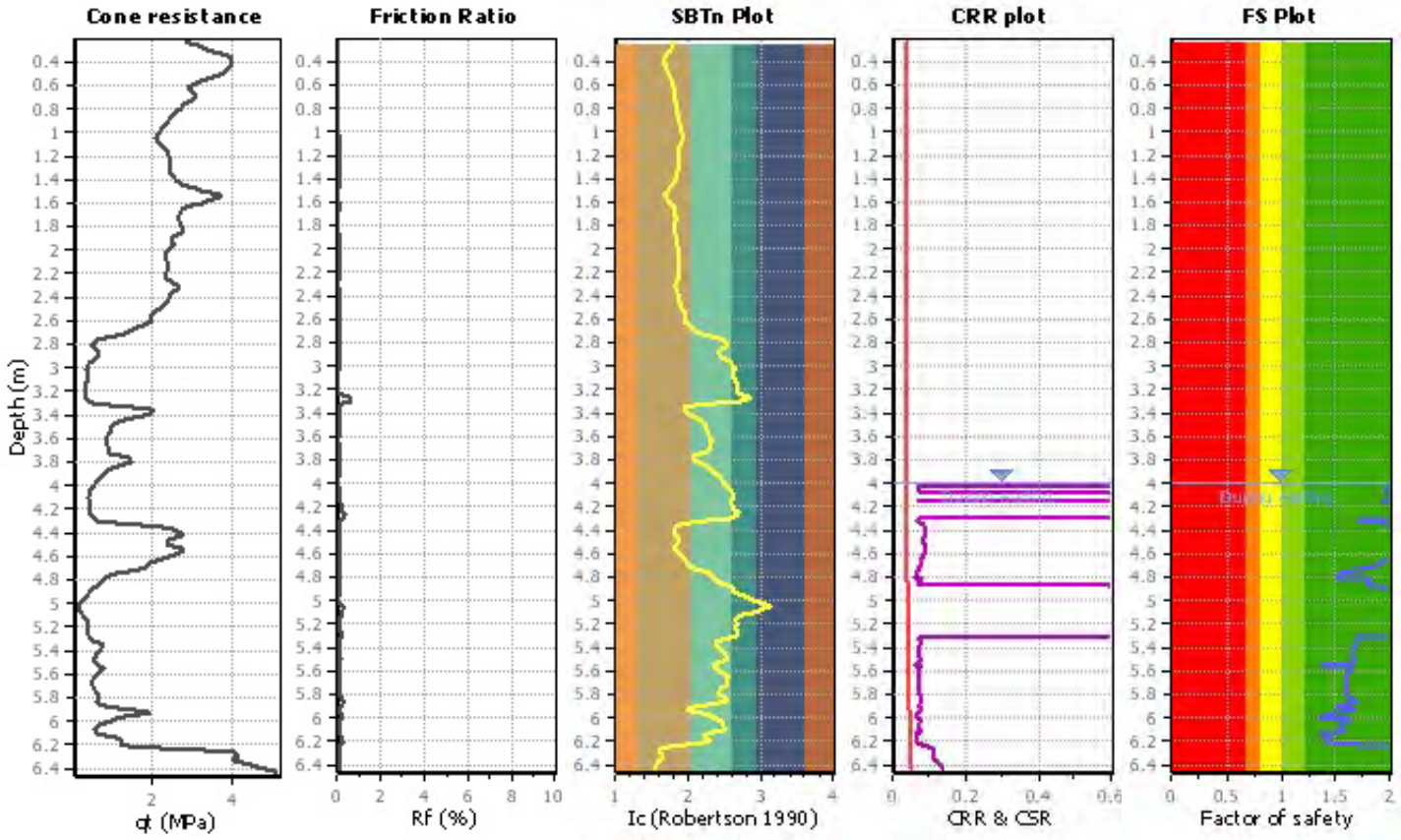
LIQUEFACTION ANALYSIS REPORT

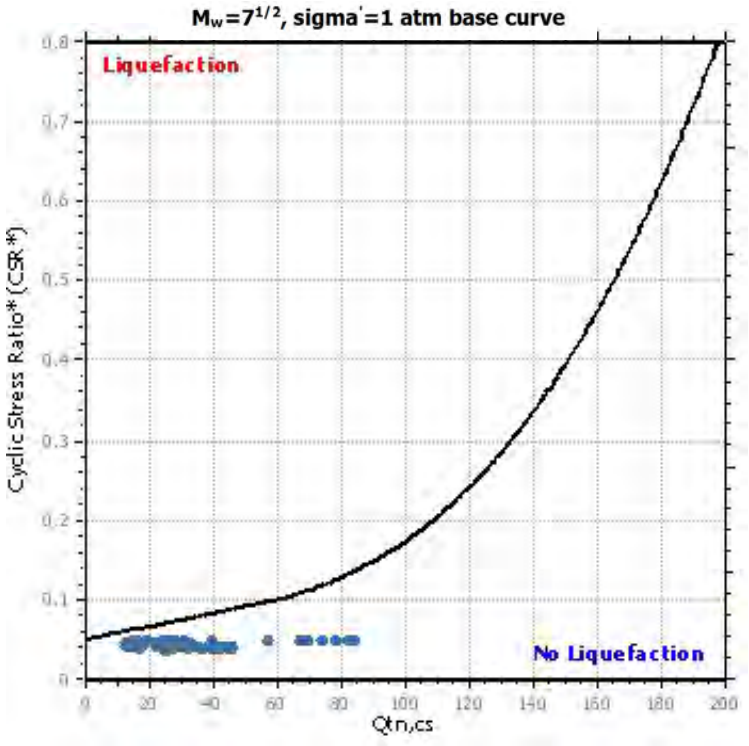
Project title : **Location :**

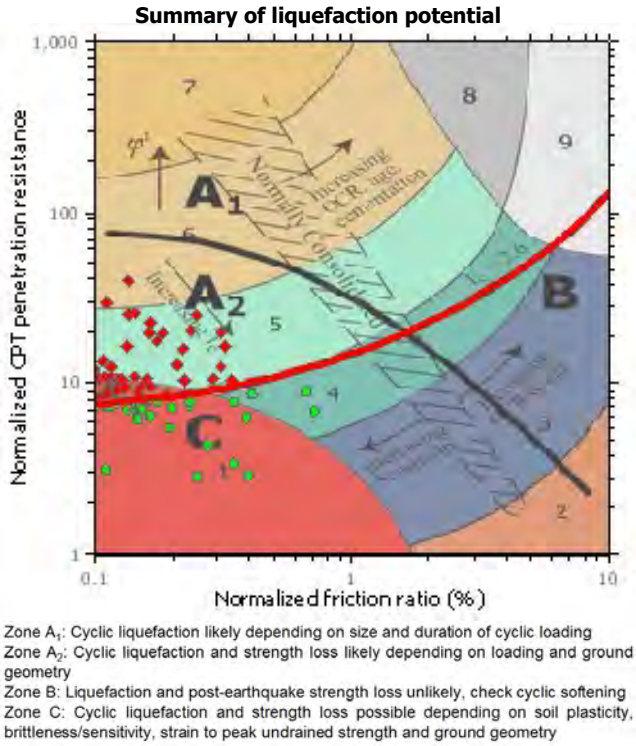
CPT file : AR0006M3

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	0.00 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	4.00 m	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based







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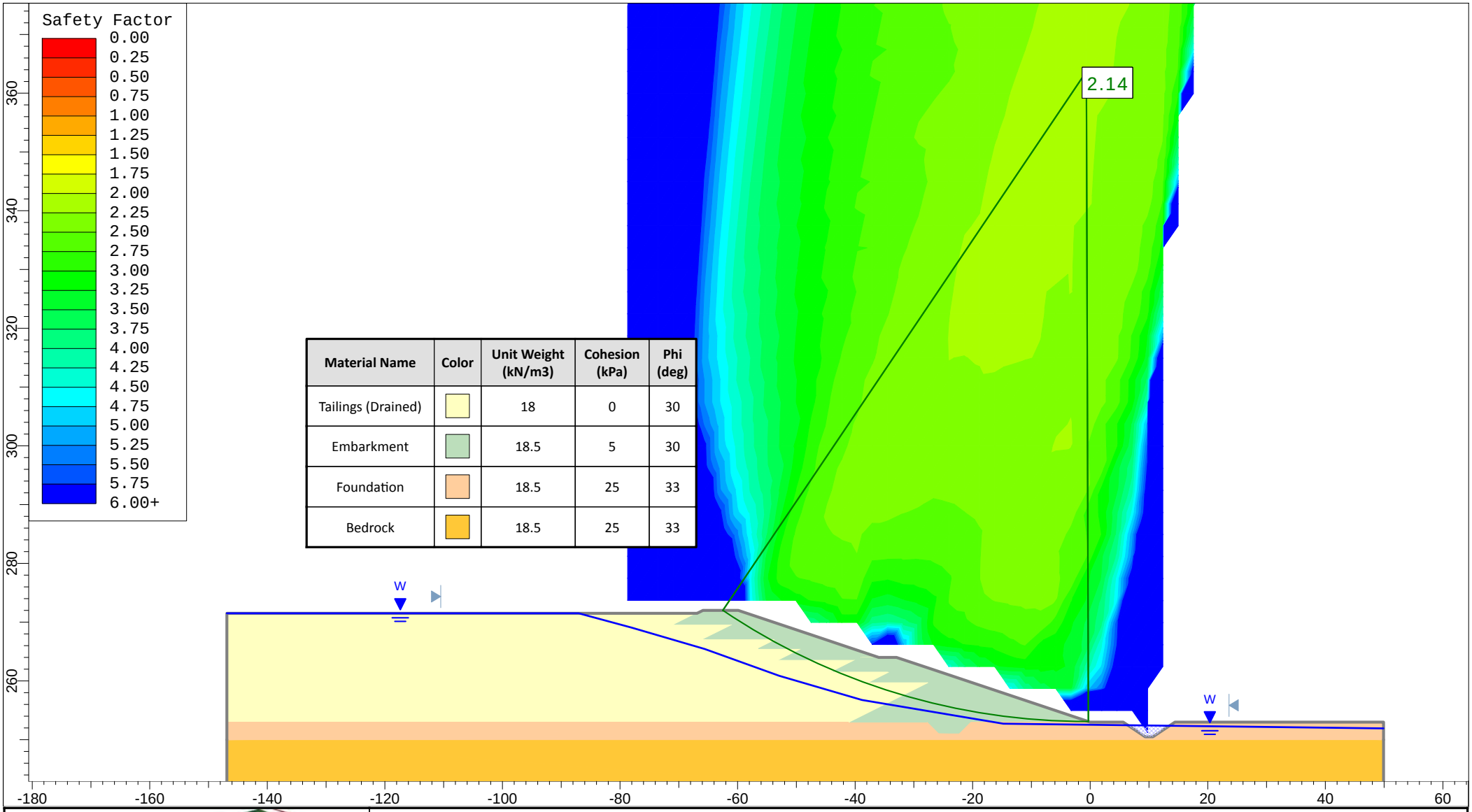
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Appendix D

Stability Analyses

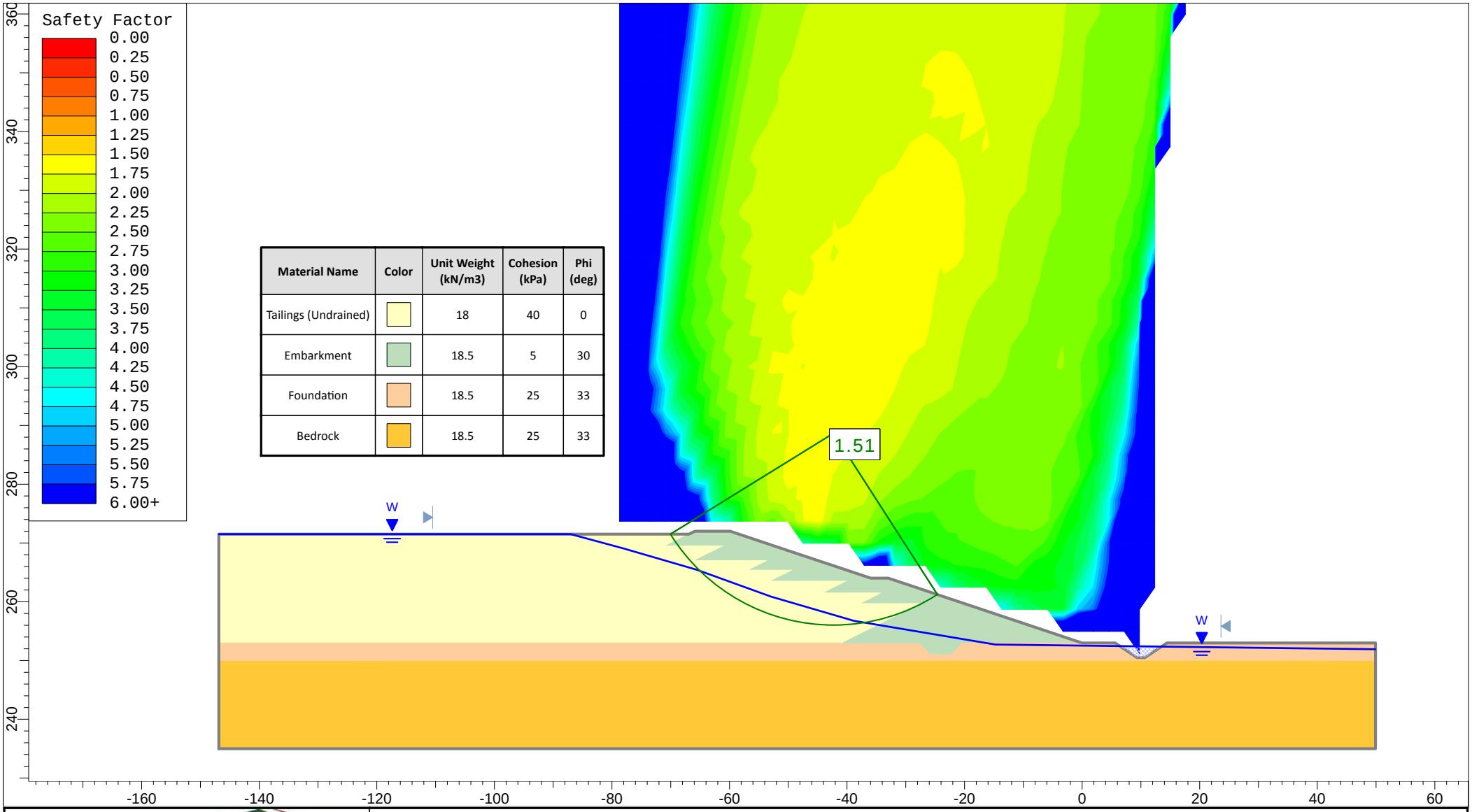


Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Tailings (Drained)		18	0	30
Embarkment		18.5	5	30
Foundation		18.5	25	33
Bedrock		18.5	25	33

CMW Geosciences

SLIDEINTERPRET 7.026

Project	Tritton Copper Tailings Dam				
Analysis Description	Main Embarkment Crest RL272 Drained Stability Analysis				
Drawn By	MS	*Scale*	1:900	*Company*	Aeris Tritton Operations
Date	21/11/2017, 12:26:24 PM			*File Name*	Tritton Copper Tailings (Drained).slim



Material Name	Color	Unit Weight (kN/m3)	Cohesion (kPa)	Phi (deg)
Tailings (Undrained)		18	40	0
Embarkment		18.5	5	30
Foundation		18.5	25	33
Bedrock		18.5	25	33

CMW Geosciences

SLIDEINTERPRET 7.026

Project	Tritton Copper Tailings Dam				
Analysis Description	Main Embarkment Crest RL272 Undrained Stability Analysis				
Drawn By	MS	*Scale*	1:900	*Company*	Aeris Tritton Operations
Date	21/11/2017, 12:26:24 PM			*File Name*	Tritton Copper Tailings (Undrained2).slim

Appendix E

Dam Break Analyses and Hydraulic Assessments

NOTES:

1. IMAGE FROM GOOGLE EARTH

1:20 000 0 200 400 600 800 1000 m

CMW Geosciences

CLIENT: AERIS TRITTON OPERATIONS		DRAWN: DE	PROJECT: PER2017-0066
PROJECT: RAISING OF TD1, STAGES 6 AND 7 TRITTON COPPER MINE		CHECKED: CH	FIGURE: E1
		REVISION: 0	SCALE: 1:20,000
TITLE: TD1 DAM BREAK ASSESSMENT		DATE: 09.11.17	SHEET: A3 L

PROJECT	: STAGE 6 AND 7 TD1	Date	15-Jun-19
CLIENT	: TRITTON RESOURCES PTY LTD	Job No	PER2017-0251
LOCATION	: TRITTON COPPER MINE	Rev	A
SUBJECT	: DAM BREAK STUDY, WORST CASE		
Scenario:	Worst Case (PMP Rainy Day Failure Conditions)		

BREACH CHARACTERISTICS	Using Empirical Method		MacDonald and Langridge - Monopolis (1984)
Input Parameters	**Value**	**Unit**	**Comments**
New Embankment Crest Level	272.0	mRL	From design
Lowest Ground Level (on South-Western Side)	252.0	mRL	From survey contours
Maximum Embankment Height (on South-Western Side)	**20.0**	m	From design
Approximate Emb Length corresponding to Highest Section	1,000	m	assumed
Embankment Crest Width	6.0	m	From design-minimum width 30m to several 100s of metres
Upstream Embankment Slope	2.0	H to 1V	From design
Downstream Embankment Slope	3.00	H to 1V	From design
Embankment Cross Section Area	1,120.0	m^2	Embankment cross section area at highest section
Total Tailings Tonnes stored in TSF	9.00	Mt	Estimated total storage capacity
Dry Density	1.5	t/m^3	From design
Bulk Density		t/m^3	From design
Tailings Volume stored in TSF (V_T)	**12,000,000**	m^3	Estimated total tailings volume
PMP Storm Volume over TSF Catchment	**650,000**	m^3	*Rainy Day Failure Scenario - PMP storm event adopted*
Total Released Tailings Volume from the TSF (V_F)	**4,610,000**	m^3	Allowed for released tailings ~ 33% of storage volume
	3,769	acre-feet	Converted from m^3 to acre-feet (1 acre-feet = 1233 m3)

Note: For conservative assessment, it was assumed that embankment breaches will be occurred through the whole embankment height. Tailings released from the embankment breaches were assumed to be liquefied.

Output Parameters - Breach Characteristics	**Value**	**Unit**	**Comments**
Breach Shape - Trapezoidal Side Slopes	**2**	**V to 1H**	Adopted approximate trapezoidal breach shape (T MacDonald and J Langridge - Monopolis, 1984)
Breach Height (H_o)	**20.0**	m	Adopted the bottom of the breach is at the base of the embankment
	65.6	feet	Converted from meter to feet
Breach Formation Factor (V_F x H_o)	**92,200,000**	m^3 x m	Used this figure to predict the volume of embankment material removed during a breach
	2.5E+05	acre-ft x ft	Converted from m^3 x m to acre-feet x feet
Embankment Volume Eroded during Breach (V_M)	**3.7E+04**	yrd^3	Embankment volume removed during a breach (determined from **Figure 1**, T MacDonald and J Langridge - Monopolis, 1984)
	28,486	m^3	Converted from cubic yard to cubic meter (1 cubic yard = 0.765 cubic meter)
Average Breach Width (W_{ave})	**25**	m	Calculated based on the removed embankment volume during a breach and embankment geometry
Base Breach Width (W_b)	**15**	m	Calculated based on the removed embankment volume during a breach and embankment geometry
Top Breach Width (W_t)	**35**	m	Calculated based on the removed embankment volume during a breach and embankment geometry
Breach Shape Area (A_F)	**509**	m^2	Breach shape area at highest embankment section
Equivalent Released Tailings Volume behind Breach Area	**163,350**	m^3	Used this figure to estimate the equivalent tailings failed length behind breach area
Equivalent Tailings Failed Length behind Breach Area (x_o)	**320**	m	Calculated based on the released tailings volume (behind breach area) and breach shape
Adopted Breach Development Time (t_F)	**4.00**	hour	Determined from **Figure 2**, T MacDonald and J Langridge - Monopolis, 1984) 4.3 check
Flow through breach	320	m^3/s	Total release volume divided by breach development time
Peak Tailings Run-out Flow (Q_P)	**640**	m^3/s	Assuming a triangular hydrograph
Peak Tailings Run-out Flow (Q_P)	**2,173**	m^3/s	Based on Rico M, Beniti G, Diez-Herrero G 2008

CMW Geosciences Pty Ltd, Chapman Morton Woodward	CLIENT: TRITTON RESOURCES PTY LTD	DESIGNER:	CH
	PROJECT: STAGE 6 AND 7 TD1 TRITTON COPPER MINE	CHECKED:	LM
		REVISION:	0
	TITLE: DAM BREAK ASSESSMENT-SUNNY DAY CASE	DATE:	7/11/2017
		PROJECT:	PER2017-0066

Step 1: Estimate runout volume following a dam overtopping, embankment stability or piping failure.

Total volume of tailings and water in the facility at the time of failure, V_T (m^3):	6,000,000	
Volume of tailings and water released at failure, V_F (m^3):	**2,406,466**	Eq. 7 Rico et. Al. 2007

$$V_F = 0.354 \times V_T^{1.008}$$

Assumptions:

The formula represents the maximum tailings volume that can be released in the most extreme situation in which pond volume was empouted folllowing the dam break.

The failure mechanism is from the base of the facility to the highest embankment level at RL1491m.

Step 2: Estimate preflow horizontal distance of failure volume.

Embankment height, h_0 (m):	20	
Embankment Length 1	4400	
Estimated pre-flow horizontal distance, x_0 embankment 1(m):	**27**	Seddon K. D. 2010

Assumptions:

Failure occurs along full length of embankment. Failure at aech embankment is assessed.
Eneregy based linear method as per Seddon K.d> 2010
Zero grade.

$$H_o x_o = h\, x_f$$

$$\therefore h = (x_o / x_f) H_o$$

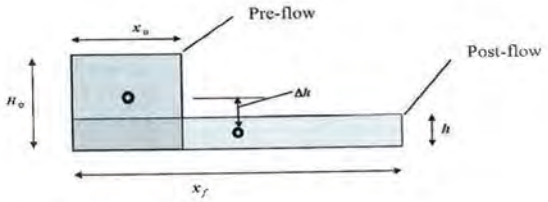


Figure 2 Simplified flow slide geometry

Step 3: Estimate runout distance following a dam overtopping, embankment stability or piping failure.

Bulk unit weight (kN/m^3):	16		
Undrained shear strength (kPa):	3		
Estimated post-flow horizontal distance of failure volume, x_f embankment 1 (m):	**328**	Eqn. 6 Seddon K.D. 2010	(Goal seek)

$$x_f^2 + x_o x_f - 2\gamma x_o H_o^2 / s_u = 0$$

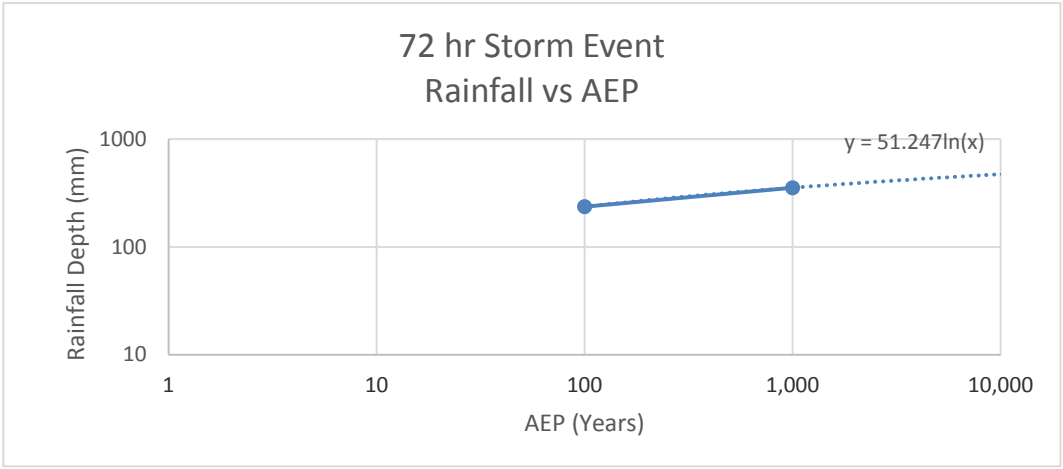
Runout distance, R_0 embankment 1 (m):	**301**	Eqn. 7 Seddon K.D. 2010

$$Ro = x_f - x_o$$

Project: **: STAGE 6 AND 7 TD1**
Client: **: TRITTON RESOURCES PTY LTD**
Location: **: TRITTON COPPER MINE**
Job No.: **: PER2017-0066**
Subject: **: Rainfall Depth vs AEP (years)**

	Rainfall depth (mm)	
AEP (yrs)	**72hr event**	
100	236	
1,000	354	
10,000	472	
0.5 PMP	260	

			Extrapolated
AEP	100	1,000	10,000
mm	236	354	472



TD1-Spillway Sizing

Qp	Peak flow
Ip	Peak inflow
V	storm volume
S	Temporary storage

Ip	33.2	m^3/s	for 1/2 PMP	Area	1,380,000	m^2
V	358,800	m^3		1/2 PMP	0.26	m
S	690,000	m^3		3 hrs by GSDM		
				PMP	0.52	m

Qp Ip (1-V/S) m^3/s

15.9 for 1/2 PMP

Qp	20.0	Operational capacity	spillway width	10	m

Spillway flow-weir flow-2Lh^3/2

	16.3	m^3/s	spillway width	23	m
Average flow velocity over spillway			flow depth	0.5	m
	1.4	m/s			

Total Spillway capacity 46.0 m^3/s
(no freeboard)

Appendix F

Scope of Work and Technical Specification

13 February 2018

RAISING OF TD1, STAGES 6 AND 7

TRITTON COPPER MINE, NSW

SCOPE OF WORKS AND TECHNICAL SPECIFICATION

Tritton Resources Pty Ltd

Ref. PER2017-0066AC RevA

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

www.cmwgeosciences.com

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1 INTRODUCTION

This Scope of Work covers the construction of the raising of the tailings storage embankments, decant accessway and decant infrastructure associated with the raising of Tailings Dam 1 (TD1) at the Tritton Copper Mine and is to be read in conjunction with the drawings. The works mainly involve bulk earthworks to raise the existing embankments.

The Scope of Work shall comprise the provision of all material, construction plant, equipment, labour, supervision, tools, services, warehousing if required, testing equipment, and each and every item of expense necessary for the construction, testing and documents for work shown in the drawings schedules and specifications forming part of the Contract for the raising of TD1, at the Tritton Copper Mine.

All works shall be constructed complete and operational except as specifically excluded and shall include all necessary auxiliary works, accessories and the incorporation of all miscellaneous material, minor parts and other such items, whether or not the items are specified, where it is clearly the intent of the Contract that they should be supplied or where they are obviously required and necessary to complete and commission the work.

Tailings will be discharged into the storage being raised. The contractor will need to liaise with Tritton Resources Pty Ltd regarding the embankment construction sequence. Pipework is controlled and operated by the Principal.

The Contractor should fully co-operate with the pipe handling / operating crew and shall work in with their activities at all times. The Contractor shall protect all active and non-active pipework, electrical cables to decant pumps, pumps and standpipe piezometers, which are in place. The Principal shall be immediately notified of any damage to pipework, electrics, pumps or piezometers, no matter how minor.

1.1 Drawings

The following Drawings complete this Scope of Work:

Title	Drawing No.
General Arrangement – Stage 6	PER2017-0066-01
General Arrangement – Stage 7	PER2017-0066-02
Sections and Details	PER2017-0066-03
Sections and Details - Spillways	PER2017-0066-04

1.2 Code of Practice

Unless otherwise specified, or shown on the drawings, the Contractor is to provide all materials and carry out all the work in accordance with the latest revisions of the relevant Australian Standard Codes.

All work under this Contract shall be performed strictly in accordance with the following specifications, drawings and other documents, which by this reference forms part of this Contract, unless expressly noted otherwise.

AS 1289 Methods of testing soils for engineering purposes.

AS 1726 Geotechnical site investigations.

AS 3798 Guidelines on earthworks for commercial and residential developments.

The Works shall be carried out to comply with the latest revision of the Drawings, Codes and Standards specified, or where no standards are specified, to Australian Standards, or to the appropriate British or other recognised Standards.

Before making any change in any work under the Contract to comply with any revisions to the relevant codes and standards, the Contractor shall give to the Tritton Resources Pty Ltd (Principal) written notice specifying the reason therefore and requesting his direction thereon. The Principal shall decide whether a change is necessary and issue an order accordingly under the provisions of the General Conditions of Contract.

1.3 Site inspection

The Contractor shall inspect the site and must allow for the following factors in their price:

- The nature and requirements of the work to be done.
- All conditions on and adjacent to the site.
- Access to the site.
- The types of soil and vegetation present on the site.
- The expected or known water table.
- The nearest sources of suitable construction material which complies with this Specification.
- The source of water for construction purposes.
- The Contractor is to manage saline water usage, hydrocarbon storage and dust suppression to the Principal's requirements.
- Prevailing climatic conditions for the site.

1.4 Safety

The Contractor shall:

- Carry out the works in a safe manner and comply with all of Principal's procedures and guidelines.
- Conform to all relevant Acts or Statutes of Parliament, Regulations, By-Laws or Orders relating to the safety of persons and property on or about the site.

1.5 Site location and description

The site is approximately 140 hectares in total area and comprises the existing TD1 at Tritton.

2 DESCRIPTION OF WORK – SPECIFIC

The Scope of Work shall include, but is not necessarily limited to the following:

2.1 General

The work shall include:

- Attend a Site Induction of approximately five (5) hours' duration before the commencement of works if they have not already attended one in the last six (6) months.
- Carry out all works indicated or implied in the Drawings or in the Specification.
- Supply all labour, plant and materials (except those indicated as being supplied by the Principal) necessary for completion of the works.

- Maintain all works as required by the Contract documents and for the period stated therein.

All construction shall be to the minimum lines and grades shown on the Drawings or as required by the Owner's Representative as work progresses.

During the progress of the works, the Owner's Representative may find it necessary to revise the lines, levels and grades of any part of the works because of the conditions revealed by the works.

2.2 Survey

The Contractor shall:

- Be responsible for the protection of all permanent and temporary beacons or bench marks, and Principal supplied pegging.
- Setting out and construction of the works from the Principal supplied datums/bench marks provided.
- Ensure initial and/or final surveys are undertaken prior to the removal or placement of any material, especially where such action will destroy or cover the surface just surveyed.
- Provide an as built survey of the completed works.

The Contractor may undertake their own survey of any item, either in conjunction with the Principal, or separately. The Contractor and Owners Representative shall agree on the results of measurement surveys that are carried out prior to any works being covered up or within seven (7) days of a survey being undertaken. Should agreement not be reached, the difference shall be documented such that the matter can be later decided without disruption to the Contractor's programme.

The maximum permissible horizontal deviation from the finished lines or zone boundaries shall be -0m to +0.5m.

Vertical deviation shall be -0m to +0.2m, provided no abrupt changes in slope or level are present on any finished surface.

Measurement for payment of all embankment fill material shall be made for the compacted material, measured in place and only to the design lines and grades required (excluding 'tolerances').

2.3 Clearing and Establishment Works

The work shall include:

- Remove all vegetable matter and scrub from the area of the proposed TSF footprint at the abutments. The area to be cleared shall extend approximately 5m past the downstream toe of the embankment. All stripped vegetation should be pushed into heaps in locations as indicated by the Owner's Representative.
- Remove all solid obstructions, tree stumps, roots and logs from beneath the footprint of the TSF perimeter embankment at the abutment.
- Clear the agreed routes of all haul roads of all vegetation standing and fallen. Push this vegetation into heaps as approved by the Owner's Representative.
- Form up, lay base course as is necessary and do all things necessary to form and maintain haul roads linking the pit area to the site and other haul roads necessary for the works and which are approved by the Owner's Representative.
- Keep all haul roads sprayed and wetted to totally prevent the generation of airborne dust during the course of road construction and usage.

- Prepare a quality assurance and quality control programme to cover all aspects of work included within this Construction Specification for the Principals approval.
- On subsequent stages, remove gravel wear course materials from the embankment crests, and stockpile for re-use if possible.
- Provide all things necessary to implement the approved QA/QC programme.

2.4 Foundation Preparation

The work shall include:

At Abutments

- Strip topsoil from the TD1 footprint to a nominal depth below the natural ground surface of 0.1 m. The depth of stripping may be increased as directed by the Owner's Representative. Stockpiling of topsoil shall be in areas nominated by the Owner's Representative. Stockpiles shall have a maximum height of 2.0m and side slopes of 1 (vertical) to 1.5 (horizontal).
- Tyne, moisture condition (to within –2% / +2% of OMC) and compact the TD1 embankment foundation to a depth of 0.3m. The prepared surface of the embankment footprint should be watered and compacted using a minimum of 6 passes of a 12t vibratory roller.
- Prepare the foundation for the cut-off trench under the perimeter embankment as shown on drawings by excavating into clayey material, a nominal depth of 1m below the existing ground surface or as directed by the Owner's Representative. The depth shall be increased if loose gravels or sands are present in the excavation so the base of the excavation is in competent low permeability material or rock. Side batters shall have a minimum slope of 1:1.
- Ripping may be necessary to construct the cut-off excavation. Blasting in the TD1 storage area is not anticipated. No blasting or excavation into or through any competent rock shall be undertaken unless approval has been received from the Owner's Representative.
- All areas to receive fill shall be left in a clean and suitable condition to allow an uninterrupted placement of fill. No fill shall be placed in the cut-off until the base of all excavations has been inspected and approved by the Owner's Representative.
- On new clear areas, a low permeability layer (0.3m min) (permeability, $k = 10^{-9}$m/s) should be placed and compacted to the same standard as the clay embankment fill (see Section 2.5).
- Allow for keeping water from excavations by pumping, dewatering, or other suitable means, and adequately dispose of it clear of the works.

Raising of Existing Embankments

- Remove gravel wear course materials from the embankment crests, and stockpile for re-use, if possible.
- Tyne and moisture condition (to within –2% / +2% of OMC) the top of the existing embankments prior to the placement of additional fill and following gravel wear course removal.
- The tailings beaches forming part of the foundation shall be tyned and track rolled (by excavators or similar) in order to remove any visible desiccation cracks on the tailings beaches within the embankment foundation.
- Allow for keeping water from excavations by pumping, dewatering, or other suitable means, and adequately dispose of it clear of the works.

2.5 Earthworks

The Contractor shall:

- Prepare a method statement for the construction of initial lift(s) on the tailings beach. The Contractors attention is drawn to the possibility of low shear strength materials being encountered on the tailings beach. The method statement prepared by the Contractor shall not only include details on the proposed method of construction on the tailings beach but also the safety measures to be adopted to ensure the work is carried out with minimal risk to personnel and equipment. The Contractor shall submit details of the proposed method of work on the tailings beach to the Owners Representative prior to the commencement of construction.
- Raise perimeter embankments of TD1 using clayey borrow material sourced from Principal approved borrow areas (i.e. Sheather's Pit, Dam stockpile or blended materials). The clayey material should be sandy clay or gravelly clay, complying with the following requirements:
  - Minimum fines content 30% (material passing 75-micron size)
  - Maximum fines content 70%.
  - Low plasticity material (liquid limit <32% and plasticity index <15%)
- Adjust the moisture content of the borrow material, approved for use in the perimeter embankment construction. Moisture condition the borrow to within the range of -2%, +2% of the optimum moisture content (OMC) as determined from laboratory test 5.1.1 of AS1289 (2005). The borrow materials shall be cured to ensure the moisture is thoroughly mixed and evenly spread through all materials proposed for embankment construction.
- Place all fill material comprising the perimeter embankment in homogeneous horizontal layers not exceeding 300mm loose lift thickness. Each lift shall be compacted by a minimum of 6 passes of a 12t vibratory roller or approved equivalent. Placement should be continuous. If a break in fill placement allows the exposed surface to dry, it should be lightly tyned, watered and compacted prior to fill placement recommencing. No oversize rock is to be placed into the embankments. Largest size should be 150mm. Drawing nos. PER2017-0066-01 to 04 outline the grades and lines to which the embankments are to be constructed.
- Each layer shall be compacted to achieve a density ratio greater than 95% of the maximum dry density - standard compaction as determined from laboratory test AS 1289.5.1.1. The actual number of passes of a 12t vibratory roller or an approved equivalent to achieve a density greater than 95% standard compaction (AS 1289.5.1.1) shall be determined on site using roller trials.
- Raise the internal decant accessway using traffic compacted mine waste from nominated sources located adjacent to the storage.
- Raise and maintain the existing access ramps as required to enable the construction equipment to access the existing embankment crests. The location of any additional ramps shall be approved by the Owners Representative prior to commencement of these works. The additional ramps may be left in place at the discretion of the Principal.
- The crests of the completed external embankments shall be graded to the inside (upstream) of the storage at a 2% crossfall. A windrow (safety bund) of not less than 0.5m height shall be left on the outside of the crest of all external embankments.
- The crest of the completed new decant accessway embankment shall be graded to one side at a 2% crossfall as agreed with the Owners Representative. The finished crest shall have a 0.5m minimum high windrow (safety bund) placed along both sides. The windrows shall have breaks at regular intervals (50m minimum) to allow water discharge.

- Sheet the crest of the perimeter and internal embankments, and the decant accessway with 100mm thick crushed aggregate wearing course. The crushed aggregate shall be sourced from a location nominated by the Owner's Representative and from reclaimed gravel wear course materials if deemed suitable for reuse.
- Allow for keeping water from the works during construction by shaping finished surfaces with a fall to the centre of the storage.
- Allow for maintaining the borrow areas free of large accumulations of water.

2.6 Completion

The Contractor shall:

- Batter down the sides of the borrow pits, as appropriate, for stability on completion of the work. Materials not considered suitable for use in the works shall be evenly spread over the borrow pit surface.
- Clean up all rubbish, remove all plant and supply materials, trim all banks neatly, spread all excavated material not specified to be removed from the site and leave the site in a clean and tidy condition.

2.7 Construction sequence

The Contractor shall liaise with the Principal to agree a sequence for the works. The Contractor shall endeavour to complete the perimeter embankments in the sequence agreed.

3 EXCLUSIONS

The following works will be performed by others:

- Prior to commencement of the construction the Principal will remove all tailings distribution pipework (pipes, spigots, droppers etc) from the embankments to be raised and provide the Contractor with clear access.
- At the completion of the construction of the embankments, the Principal will install the tailings distribution pipework (pipes, spigots, droppers etc) on the embankment crest.
- Placement of all pump equipment at the decant location.
- Crushing and screening of waste rock to produce road-base and decant filter rock.
- Placement of all associated electrical equipment at the decant location.

The Contractor shall:

- Fully co-operate with the pipe handling and operating crew and shall work in with their activities at all times.
- Avoid damaging the tailings distribution pipework and any electrical installations which is either operational or has been removed from the crest of the storage by the Principal. Any pipework or electrical equipment damaged by the Contractor through carelessness shall be replaced at no additional cost to the Principal.

4 PRINCIPAL SUPPLIED ITEMS

4.1 Survey

The Principal will provide co-ordinates and levels of survey marks within the vicinity of the storage. The works shall be set out all lines and levels using the survey marks provided.

4.2 Materials

The Principal will supply material for construction of the embankment from designated sources. The Contractor shall make their own arrangements for loading and hauling of materials.

4.3 Water

Water will be made available to the Contractor at no charge. Supply will be from a standpipe located at the plant site. Access to the standpipe will not be exclusive to the Contractor. The Contractor shall determine the type and suitability of the water supplies for use in this Contract. The Contractor shall make their own arrangements for loading and hauling of water.

5 INSPECTION AND TESTING

5.1 Inspection

The Owners Representative will be entitled, at all times to inspect, examine and test the materials and workmanship being provided under the Contract. Such inspection, examination or testing, if made, shall not release the Contractor from any obligation under the Contract.

The Contractor shall co-operate with and provide full opportunity to the Owners Representative to monitor regularly the progress of the Works of the Contractor and his Subcontractors to the detailed extent necessary to satisfy progress relative to the Construction Program.

All pertinent information to enable the Owners Representative to determine the adequacy of the advance planning for material procurement, machine and manpower resources to meet the Construction Program shall be made freely available to the Owners Representative.

These requirements shall be incorporated in orders placed with Subcontractors.

5.2 Test Plans

Compliance tests will be carried out by a qualified technician from a NATA registered laboratory engaged by the Principal.

Compliance testing of compaction shall be at the rate of not less than 1 field density test per layer per material type per 2,500m^2 (or 1 test per 750m^3). Standard compaction testing should be performed (as a minimum) to a ratio of 1 standard compaction to 3 field density tests, or as directed by the Owners Representative. It is envisaged that the laboratory technician will be required on site on a part-time basis during embankment construction.

Compliance testing of Clayey borrow material for percentage of fines and Plasticity Index (PI) shall be at the minimum rate of 1 test per 10,000m^3.

The Contractor shall, at his own expense, rework or replace materials which do not meet the compaction and other compliance requirements.

Test certificates shall be made available to the Contractor on an ongoing basis throughout the construction.

6 PERMITS, LICENCES AND APPROVALS

Further to the General Conditions of Contract, the Principal will obtain Dam Safety Committee, Department of Planning and Environment and NSW EPA approvals.

All other necessary permits, licenses and approvals shall be obtained by the Contractor.

7 SUBSTITUTIONS

The Contractor shall:

- Not substitute any alternative to the equipment and materials included in the Works without the prior written consent of the Principal.
- Make diligent efforts to utilise the specified Materials to be incorporated into the Works but where the Contractor considers there are commercial or other advantages to be derived by the Principal, the Contractor may submit a proposal for a substitute material for approval by the Principal prior to commencement of the work. Such proposal for substitution shall be in writing and state reasons for and (if applicable) advantages of the substitute material. The Principal shall determine whether the substitute material will be permitted and such determination shall be binding and conclusive upon the Contractor. Approval of a substitution will be given as a variation under of the General Conditions of Contract incorporating any adjustment to the Contract Sum.

8 MATERIALS

Where the Principal agrees to supply Materials to the Contractor in the performance of the Contract then the following conditions will apply:

- The items shall be included in the Contractor's materials procurement schedules. The Contractor shall, upon arrival at Site to commence work, check and ensure that Principal Supplied Materials are available and will not cause any delay to the Contractor's work progress.
- Items stored by the Principal, shall be removed from the Principal's store or storage area by the Contractor when required by him or when directed by the Owner’s Representative (whichever is the sooner). However, no items shall be removed from the Principal's store or storage area by the Contractor without first obtaining authority from the Owners Representative and the Contractor shall sign receipts or other documentation required acknowledging receipt of the Free Issue Materials.
- From the time the Principal Supplied Materials are removed from the Principal's store or storage area or are delivered to the site the Contractor shall be responsible for and shall keep safely and in good order all those Principal Supplied Materials including any returnable packing or containers.
- The Contractor shall account for all Principal Supplied Materials used and shall return to the Principal in good order and condition any Principal Supplied Materials remaining unused on completion of the work. Subject to any insurance cover the Contractor shall be responsible for the cost of replacement or repair of any Principal Supplied Materials lost or damaged while he is responsible therefore.
- The Contractor shall immediately notify the Owners Representative of any damaged to or loss of any of those Principal Supplied Materials at any time and shall as soon as possible specify the extent and circumstances of the damage or loss.
- Principal Supplied Materials used by the Contractor are used at the sole risk of the Contractor. Any failure to perform the Contract by the Contractor shall not be excused by any matter or thing arising from or incidental to the use of Principal Supplied Materials.

9 DATA REQUIREMENTS

As built Drawings, should be supplied to the Owner's Representative within 14 days of practical completion of the work.

Appendix G

DSC Forms

New South Wales Government

Dams Safety Committee

D1 Form

Basic Data Form for Dams

1. Name of dam: Tailings Dam 1

2. Location of dam:

   a) Place Name: Tailings Dam 1

   b) CMA/LPMA/Other Topographic Series Map Series Name: _____

   Number: _____

   c1) Geographic Co-ordinates: Latitude: _____ Longitude: _____

   c2) **[OR]** Projected Co-ordinates: Grid: MGA ☐ AMG ☑ Other ☐ (please tick)

   Zone (if known): 54 ☐ 55 ☐ 56 ☐ Other ☐ (please tick)

   Easting 474,500mE m Northing 6,527,300mN m

   (Note: DSC prefers Geographic data in decimal degrees)

   d) Please attach a copy of the appropriate Topographic Map showing the outline of the area covered by full supply level (indicating Reduced Level) of the dam and any further augmentation.

   e) Approximate Elevation (mAHD): 472 Crest ☑ FSL ☐

3. River/Stream: No named creeks/streams near by

4. Owner: AERIS TRITTON MINE Phone No.: 02 6838 1100

   Address: TRITTON MINE, YARANDALE ROAD, HERMIDALE NSW 2837

   Owner's Representative: CMW Geosciences Phone No.: 08 6555 4920

   Address: Suite 19, 127 Herdsman Pde.

   Wembley WA 6014

5. Catchment Area: 0.13 km^2

6. Dam Height: 20m m

7. Storage Volume: 12,000 ML

   a) Material stored (attach details): Mine tailings

8. Purpose of Dam: Storage of tailings slurry

9. Type of Dam (i.e. concrete gravity, zoned earthfill, etc.): Compacted earth-fill. Starter embankment raised using upstream construction methods

10. Design Flood Assessment

Inflow Flood Peak: 33 m^3/s Annual Exceedance Probability 0.5 PMF

Method: _____ Date: 2018

a) Spillway Type: Channel through rock abutment

11a. Sunny Day Consequence Category: (please tick the appropriate box – see DSC3A)

☐ Extreme ☐ High A ☐ High B ☐ High C ☑ Significant ☐ Low ☐ Very Low

Reasons for assessment (including PLL or PAR): PAR<1, Extent of impact less than 300m. No impact to plant or other infrastructure.

11b. Flood Consequence Category: (please tick the appropriate box – see DSC 3A)

☐ Extreme ☐ High A ☐ High B ☐ High C ☑ Significant ☐ Low ☐ Very Low

Reasons for assessment (including PLL or PAR): PAR > to 10, Potential for tailings and water flow to Yarandale Road.

12. Names of and River Distances to Downstream Dams: None within 10km

The following data is required for existing dams only

13. Engineered by: Soil & Rock Engineering (2004), then Coffey. Stages 6 and 7, CMW.

14. Constructed by: Wilde Earthmoving (2004). Supervision of stages by Barnson.

15. Year of completion: Stage 2 (2007), Stage 3 (2008-2010), Stage 4 (2013-14), Stage 5 (2017)

16. Frequency of Surveillance Inspections: Annually

17. Date of last Inspection: January 2017

18. Was a Surveillance Report prepared? Yes, dated May 2017

Chris Hogg	9/3/18	CONSULTANT
Name	Signature & Date	Designation (Owner, Manager, Consultant etc.)

New South Wales
Dams Safety Committee

D2(6/91)

NOTICE OF INTENTION TO DESIGN OR MODIFY A DAM

1. NAME OF DAM: Tailings Dam 1, TD1

2. DAM OWNER: Tritton Resources Pty Ltd

3. NAME OF CONSULTANTS/ORGANISATIONS TO BE ENGAGED IN VARIOUS ASPECTS OF THE DESIGN:

   (a) Main Design CMW Geosciences Pty Ltd

   (b) Geological/Geotechnical as above

   (c) Hydrological as above

   (d) Other

4. MODIFICATION DETAILS: (IF APPLICABLE)

   Construction of Stages 6 and 7 to RL272 m

5. NAME OF DESIGN REVIEW CONSULTANT, IF ANY: Ian Grieve

6. PROPOSED PROGRAMME:

   (a) Completion of Plans and Specifications: February 2018

   (b) Commencement of Construction: 2018/2019

   (c) Completion of Construction: TBA

7. PRELIMINARY ARRANGEMENT

   A copy of the *preliminary arrangement drawing* is forwarded herewith.

Jamie Barrow
Name

Jamie Barrow
Signature

Tritton Resources Pty Ltd
Designation (Owner, Manager, Consultant etc.)

9/3/18
Date

New South Wales Government

NSW Dams Safety Committee

D6 Form

Flood Security Status Form

(to be included in Flood/Hydrology Studies)

1. Dam Name: Tailings Dam 1, TD1
2. Owner of dam: Tritton Resources Pty Ltd
3. Catchment Area: 0.138 km^2
4. Flood Consequence Category (Refer to DSC3A): Significant
5. Required Acceptable Flood Capacity (Refer to DSC3B – Table 5.1): 10-4
6. Method of rainfall derivation: Extrapolated from 1:100 and 1:1000 AEP 72 hr
7. Method of inflow hydrograph derivation:
8. Peak PMF Inflow: 33 m^3/s
9. Peak Design Inflow Flood: 33 m^3/s
10. Peak Design Outflow Flood: 16 m^3/s
11. Spillway Capacity (or Dam Crest Outflow Flood): 20 m^3/s
12. Estimate of AEP of the Spillway Capacity (or Dam Crest Flood): >10-4
13. Hydrologist's assessment of Flood Capacity provided? (compare 10 & 11 above)
    Capacity 1.25 x design

Signature of person completing this form

Chris Hogg, CMW Geosciences Pty Ltd

Name and organisation of person completing this form

14/2/2018 9/3/18

Date of completion of this form

OFFICE USE ONLY:

DSC assessment of Acceptable Flood Capacity:

New South Wales Government

Dams Safety Committee

Dam Owners Address Form (D8)

Explanation

Owners of Prescribed Dams are required to provide this information and to notify the Committee of any changes.

The focus of the Dams Safety Act is on "owners" of dams taking actions to ensure the safety of their dams. It is therefore important for the Committee to identify dam owners. However in some cases it may be quicker for all concerned if the Committee contacted, or provided copies of correspondence to, some other person. Spaces are provided to enable you to nominate these persons.

The full contact details for the "owner" must be provided**. In all cases official correspondence will be addressed to this person**. For small organisations, or dams owned by individuals, this may be all the information required.

There is no need to enter contact details more than once. Simply mark the box "As above" or similar to indicate that the same person is an alternative contact.

In relation to the following dam(s): [Write dam names here]

.....

.....

I advise that the following information is correct to the best of my knowledge

(signed) ..... date .....

1. The owner of these dams in terms of S 4(1) of the Dams Safety Act 1978 is:

Organisation/Person .....

This organisation:

- ☐ Owns the land on which the dam is located*
- ☐ Manages the dam
- ☐ Maintains the dam
- ☐ Holds the Mining Lease on which the dam is located
- ☐ Operates the dam

Tick all that apply

** If you (or your organization) do not own the land please advise the name and address of the landowner below*

The following organisations may also be owners of the dam in terms of S 4(1) of the Act:

.....

.....

.....

.....

2. Official correspondence should be addressed to:

Name .....

Organisation .....**

Position .....

Mail (Line 1) .....

(Line 2) .....

(Line 3) .....

City ..... State ..... PCode .....

Ph ..... FAX ..... Mobile .....

Email .....

*** This will be the same as the owner organization listed on page 1*

3. The following person may be contacted to discuss the status of the dam, arrange for inspections, or for other informal queries:

Name .....

Organisation .....**

Position .....

Mail (Line 1) .....

(Line 2) .....

(Line 3) .....

City ..... State ..... PCode .....

Ph ..... FAX ..... Mobile .....

Email .....

☐ Please mark official correspondence to "Attention of" this person ***

OR

☐ Please provide copies of official correspondence ("cc:") to this person

**** You can only tick this box once on this form. Cross check Q3, Q4 and Q5*

4. The following person provides specialist dam safety advice on the dam (is our internal or external "Dam Safety Consultant") and may be contacted informally if there are technical queries in relation to the surveillance of the dam:

Name .....

Organisation .....

Position .....

Mail (Line 1) .....

(Line 2) .....

(Line 3) .....

City ..... State ..... PCode .....

Ph ..... FAX ..... Mobile .....

Email .....

☐ Please mark official correspondence to "Attention of" this person***

OR

☐ Please provide copies of official correspondence ("cc:") to this person

**** You can only tick this box once on this form. Cross check Q3, Q4 and Q5*

5. The following person is located at the dam and may be contacted in an emergency situation for advice on the status of the dam (ideally this person would be located close to the dam):

Name .....

Organisation .....

Position .....

Mail (Line 1) .....

(Line 2) .....

(Line 3) .....

City ..... State ..... PCode .....

Ph ..... FAX ..... Mobile .....

Email .....

☐ Please mark official correspondence to "Attention of" this person***

OR

☐ Please provide copies of official correspondence ("cc:") to this person

**** You can only tick this box once on this form. Cross check Q3, Q4 and Q5*

Appendix 4

Tailings Extraction Report

(Total No. of pages including blank pages = 11)

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

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Appendix A – Drawings (1 No.)

1 INTRODUCTION

This report that 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^3, this equates to a borrow volume of 200,000m^3. 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 a 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

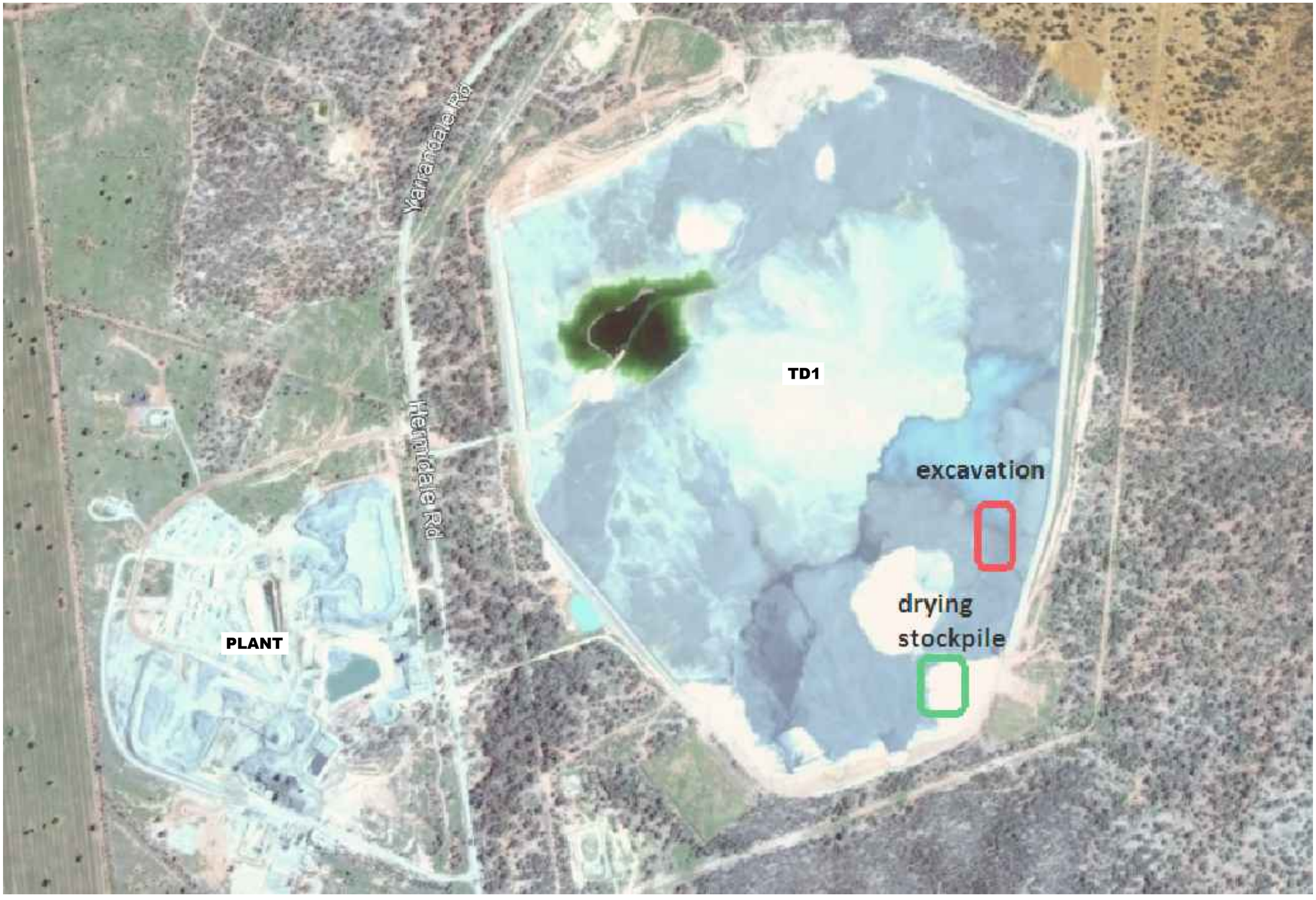
Reviewed by:

Ian Grieve

Principal Consultant

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

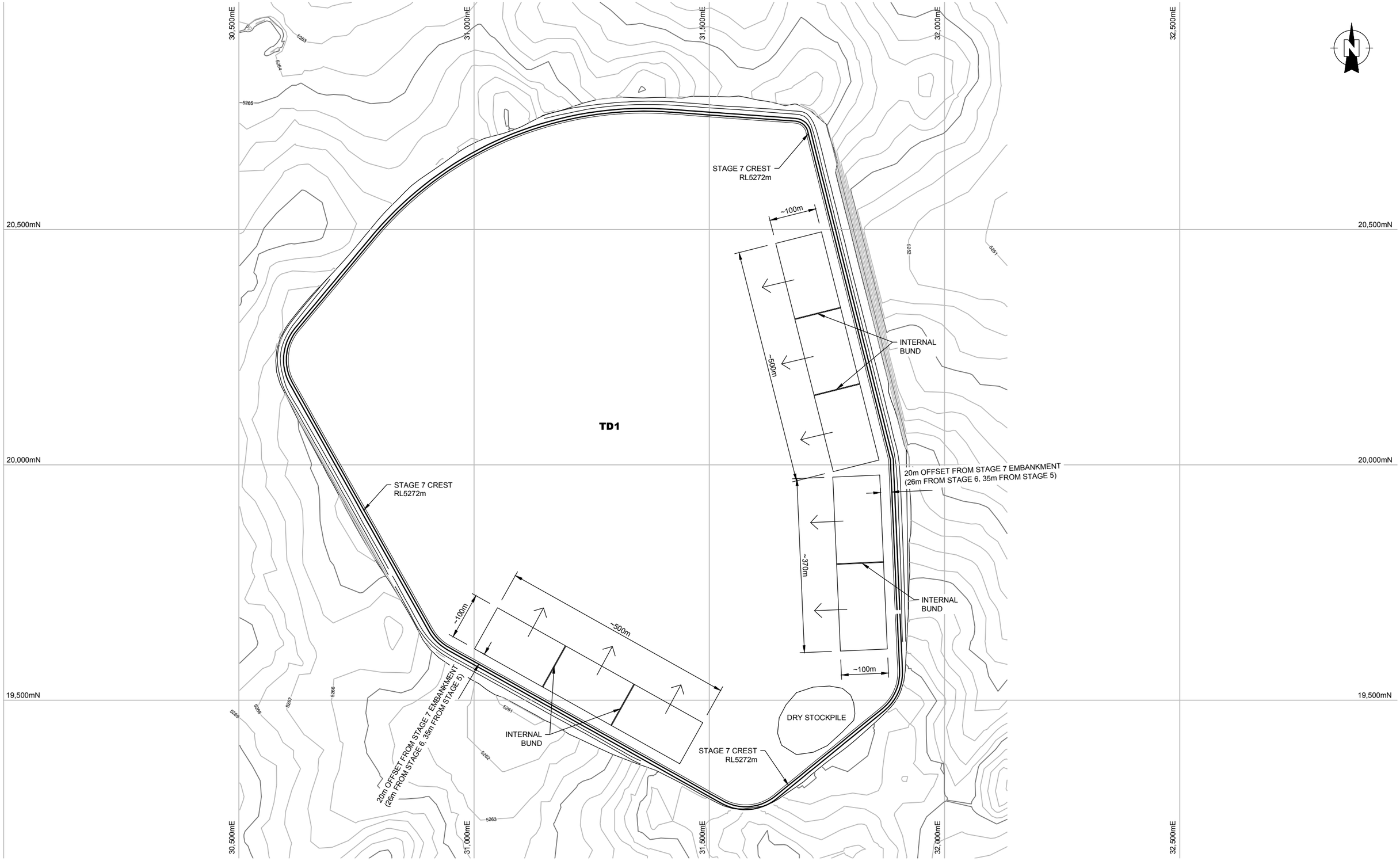
Figures



CMW Geosciences	CLIENT: **TRITTON RESOURCES PTY LTD**	DRAWN: DE	PROJECT: PER2017-0066
	PROJECT: **EXCAVATION OF TAILINGS FROM TD1 TRITTON MINES**	CHECKED: CH	FIGURE: 01
		REVISION: 0	SCALE: NTS
	TITLE: **SITE PLAN**	DATE: 07.06.18	SHEET: A3 L

Appendix A

Drawings (1 No.)



LEGEND:

DRAINS EXCAVATED DOWN BEACH FROM BORROW CELLS

NOTES:

1. TO BE READ WITH CMW REPORT REFERENCE PER2017-0066AD REV 0

1:7500 0 75 150 225 300 375 m

CMW Geosciences

CLIENT: TRITTON RESOURCES PTY LTD		DRAWN: DE	PROJECT: PER2017-0066
PROJECT: EXCAVATION OF TAILINGS FROM TD1 TRITTON MINES		CHECKED: CH	DRAWING: 101
		REVISION: 0	SCALE: 1:7500
TITLE: GENERAL ARRANGEMENT		DATE: 09.11.17	SHEET: A3 L

Appendix 5

Approved Rehabilitation Objectives Statement for ML1544

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

NSW GOVERNMENT

NSW Resources Regulator

ROBJ0001324

APPROVED REHABILITATION OBJECTIVES STATEMENT

Tritton Copper Mine

TUESDAY 24 OCTOBER 2023

NSW Resources Regulator

Contents

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Important note.....-1
Rehabilitation Objectives.....4

Summary

DETAIL	APPROVAL
Reference	ROBJ0001324
Date of approval	Tuesday 24 October 2023
Mine	Tritton Copper Mine
Contact	Quinton Bruwer

Important note

The Regulator may make the information in your application and any supporting information (including this approval) available for inspection by members of the public, including by publication on its website or by displaying the information at any of its offices. If you consider any part of your application to be confidential, please communicate this to the Regulator via the message function on this application within the Portal.

Rehabilitation Objectives

The following rehabilitation objectives have been approved.

REHABILITATION OBJECTIVE CATEGORY	SPATIAL REFERENCE	REHABILITATION OBJECTIVES
Bushfire	A2	The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.
Ecological rehabilitation	A2	The vegetation structure of the final landform is commensurate with one or more of the surrounding PCT types (PCT103, PCT105, PCT250) and that are deemed suitable to establish over the Tailings Storage Facility without impacting upon the integrity of the cover / cap.
Ecological rehabilitation	A2	Levels of ecosystem function have been established that demonstrate that the vegetation is self-sustainable
Ecological rehabilitation	A2	The vegetation composition includes native species commensurate with one or more of the surrounding PCT types (PCT103, PCT105, PCT250) and that are deemed suitable to establish over the Tailings Storage Facility without impacting upon the integrity of the cover / cap.
Groundwater	A2	Impacts to groundwater regime are within range as per the development consents or as predicted by groundwater assessments.
Groundwater	A2	Groundwater quality from mine site is similar to, or better than the pre-disturbance water quality.
Land contamination	A2	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.
Landform stability	A2	The final landform is stable for the long-term and does not present a risk of environmental harm to the surrounding environment or a safety risk to the public/stock/native fauna.

APPROVED REHABILITATION OBJECTIVES STATEMENT

ROBJ0001324 | Tritton Copper Mine

NSW Resources Regulator

REHABILITATION OBJECTIVE CATEGORY	SPATIAL REFERENCE	REHABILITATION OBJECTIVES
Management of waste and process materials	A2	Residual waste materials stored on site (e.g. tailings, coarse rejects and other wastes) will be appropriately contained / encapsulated so it does not pose any hazards or constraints for intended land use.
Removal of infrastructure	A2	All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials.
Retention of infrastructure	A2	All infrastructure that is to remain as part of the final land use is safe, does not pose any hazard to the community.
Retention of infrastructure	A2	All infrastructure that is to remain as part of the final land use benefits from the relevant approvals (e.g. development consent and / or licence/lease/binding agreement, etc).
Surface water	A2	Runoff water quality from mine site is similar to, or better than the pre-disturbance runoff water quality.
Agricultural revegetation	B1	Land capability similar to pre-mining capability (Class V or Class VI).
Agricultural revegetation	B1	Revegetation is sustainable for the long-term and only requires maintenance that is consistent with the intended final land use.
Bushfire	B1	The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.
Groundwater	B1	Groundwater quality from mine site is similar to, or better than the pre-disturbance water quality.
Groundwater	B1	Impacts to groundwater regime are within range as per the development consents or as predicted by groundwater assessments.
Land contamination	B1	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.

APPROVED REHABILITATION OBJECTIVES STATEMENT

ROBJ0001324 | Tritton Copper Mine

NSW Resources Regulator

REHABILITATION OBJECTIVE CATEGORY	SPATIAL REFERENCE	REHABILITATION OBJECTIVES
Landform stability	B1	The final landform is stable for the long-term and does not presenta risk of environmental harm to the surrounding environment or a safety risk to the public/stock/native fauna.
Management of waste and process materials	B1	Residual waste materials stored on site (e.g. tailings, coarse rejects and other wastes) will be appropriately contained / encapsulated so it does not pose any hazards or constraints for intended land use.
Removal of infrastructure	B1	All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials.
Retention of infrastructure	B1	All infrastructure that is to remain as part of the final land use is safe, does not pose any hazard to the community.
Retention of infrastructure	B1	All infrastructure that is to remain as part of the final land use benefits from the relevant approvals (e.g. development consent and / or licence/lease/binding agreement, etc).
Surface water	B1	Runoff water quality from mine site is similar to, or better than the pre-disturbance runoff water quality.
Agricultural revegetation	B3	Land capability similar to pre-mining capability (Class V or Class VI).
Agricultural revegetation	B3	Revegetation is sustainable for the long-term and only requires maintenance that is consistent with the intended final land use.
Bushfire	B3	The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.
Groundwater	B3	Impacts to groundwater regime are within range as per the development consents or as predicted by groundwater assessments.
Groundwater	B3	Groundwater quality from mine site is similar to, or better than the pre-disturbance water quality.

APPROVED REHABILITATION OBJECTIVES STATEMENT

ROBJ0001324 | Tritton Copper Mine

NSW Resources Regulator

REHABILITATION OBJECTIVE CATEGORY	SPATIAL REFERENCE	REHABILITATION OBJECTIVES
Land contamination	B3	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.
Landform stability	B3	The final landform is stable for the long-term and does not presenta risk of environmental harm to the surrounding environment or a safety risk to the public/stock/native fauna.
Removal of infrastructure	B3	All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials.
Retention of infrastructure	B3	All infrastructure that is to remain as part of the final land use is safe, does not pose any hazard to the community.
Retention of infrastructure	B3	All infrastructure that is to remain as part of the final land use benefits from the relevant approvals (e.g. development consent and / or licence/lease/binding agreement, etc).
Surface water	B3	Runoff water quality from mine site is similar to, or better than the pre-disturbance runoff water quality.
Agricultural revegetation	B4	Land capability similar to pre-mining capability (Class V or Class VI).
Agricultural revegetation	B4	Revegetation is sustainable for the long-term and only requires maintenance that is consistent with the intended final land use.
Bushfire	B4	The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.
Groundwater	B4	Impacts to groundwater regime are within range as per the development consents or as predicted by groundwater assessments.
Groundwater	B4	Groundwater quality from mine site is similar to, or better than the pre-disturbance water quality.

APPROVED REHABILITATION OBJECTIVES STATEMENT

ROBJ0001324 | Tritton Copper Mine

NSW Resources Regulator

REHABILITATION OBJECTIVE CATEGORY	SPATIAL REFERENCE	REHABILITATION OBJECTIVES
Land contamination	B4	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.
Landform stability	B4	The final landform is stable for the long-term and does not presenta risk of environmental harm to the surrounding environment or a safety risk to the public/stock/native fauna.
Management of waste and process materials	B4	Residual waste materials stored on site (e.g. tailings, coarse rejects and other wastes) will be appropriately contained / encapsulated so it does not pose any hazards or constraints for intended land use.
Removal of infrastructure	B4	All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials.
Retention of infrastructure	B4	All infrastructure that is to remain as part of the final land use is safe, does not pose any hazard to the community.
Retention of infrastructure	B4	All infrastructure that is to remain as part of the final land use benefits from the relevant approvals (e.g. development consent and / or licence/lease/binding agreement, etc).
Surface water	B4	Runoff water quality from mine site is similar to, or better than the pre-disturbance runoff water quality.
Agricultural revegetation	B8	Land capability similar to pre-mining capability (Class V or Class VI).
Agricultural revegetation	B8	Revegetation is sustainable for the long-term and only requires maintenance that is consistent with the intended final land use.
Bushfire	B8	The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.
Groundwater	B8	Groundwater quality from mine site is similar to, or better than the pre-disturbance water quality.

APPROVED REHABILITATION OBJECTIVES STATEMENT

ROBJ0001324 | Tritton Copper Mine

NSW Resources Regulator

REHABILITATION OBJECTIVE CATEGORY	SPATIAL REFERENCE	REHABILITATION OBJECTIVES
Groundwater	B8	Impacts to groundwater regime are within range as per the development consents or as predicted by groundwater assessments.
Land contamination	B8	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.
Landform stability	B8	The final landform is stable for the long-term and does not presenta risk of environmental harm to the surrounding environment or a safety risk to the public/stock/native fauna.
Removal of infrastructure	B8	All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials.
Retention of infrastructure	B8	All infrastructure that is to remain as part of the final land use benefits from the relevant approvals (e.g. development consent and / or licence/lease/binding agreement, etc).
Retention of infrastructure	B8	All infrastructure that is to remain as part of the final land use is safe, does not pose any hazard to the community.
Surface water	B8	Runoff water quality from mine site is similar to, or better than the pre-disturbance runoff water quality.
Groundwater	G3	Groundwater quality from mine site is similar to, or better than the pre-disturbance water quality.
Groundwater	G3	Impacts to groundwater regime are within range as per the development consents or as predicted by groundwater assessments.
Land contamination	G3	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.
Landform stability	G3	The final landform is stable for the long-term and does not presenta risk of environmental harm to the surrounding environment or a safety risk to the public/stock/native fauna.

APPROVED REHABILITATION OBJECTIVES STATEMENT

ROBJ0001324 | Tritton Copper Mine

NSW Resources Regulator

REHABILITATION OBJECTIVE CATEGORY	SPATIAL REFERENCE	REHABILITATION OBJECTIVES
Removal of infrastructure	G3	All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials.
Retention of infrastructure	G3	All infrastructure that is to remain as part of the final land use is safe, does not pose any hazard to the community.
Retention of infrastructure	G3	All infrastructure that is to remain as part of the final land use benefits from the relevant approvals (e.g. development consent and / or licence/lease/binding agreement, etc).
Surface water	G3	Runoff water quality from mine site is similar to, or better than the pre-disturbance runoff water quality.
Water approvals	G3	Structures that take or divert water such as final voids, dams, levees etc. are appropriately licensed and where requried ensure sufficient licence shares are held in the water sources(s) to account for water take.
Groundwater	J5	Impacts to groundwater regime are within range as per the development consents or as predicted by groundwater assessments.
Groundwater	J5	Groundwater quality from mine site is similar to, or better than the pre-disturbance water quality.
Land contamination	J5	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.
Landform stability	J5	The final landform is stable for the long-term and does not presenta risk of environmental harm to the surrounding environment or a safety risk to the public/stock/native fauna.
Removal of infrastructure	J5	All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials.

REHABILITATION OBJECTIVE CATEGORY	SPATIAL REFERENCE	REHABILITATION OBJECTIVES
Retention of infrastructure	J5	All infrastructure that is to remain as part of the final land use is safe, does not pose any hazard to the community.
Retention of infrastructure	J5	All infrastructure that is to remain as part of the final land use is safe, does not pose any hazard to the community.
Water approvals	J5	Structures that take or divert water such as final voids, dams, levees etc. are appropriately licensed and where requried ensure sufficient licence shares are held in the water sources(s) to account for water take.