November 27, 2023

Mr Sara Cooke
Principal
AARC Environmental Solutions Pty Ltd
164 Wharf St,
Spring Hill, QLD, 4000

Dear Sara,

BARALABA SOUTH PROJECT
BARALABA SOUTH GEOTECHNICAL ASSESSMENT

INTRODUCTION

Cartledge Mining and Geotechnics (CM&G) received a request from Baralaba South Pty Ltd (the Proponent) to provide a geotechnical assessment of the existing Baralaba South Project Pre-Feasibility Study. Baralaba South is currently undertaking an update of the previous pre-feasibility study that will be delivered in 2024. CM&G is contributing to this project.

Project Overview

The recent enactment of the *Qld Mineral and Energy Resources (Financial Provisioning) Act 2018 (MERFP Act)* and amendments to the *Qld Environmental Protection Act 1994 (EP Act)* require that mining operations submit a Progressive Rehabilitation and Closure Plan (PRC Plan). The primary purpose of a PRC Plan is to:

- Require the EA holder to plan how and where activities will be carried out on land to maximise progressive land rehabilitation to a stable condition.
- Provide the condition to which the EA holder must rehabilitate the land before the EA can be surrendered.

The detail required to be included in a PRC Plan is extensive, and it is detailed in the Department of Environment and Science (DES) Progressive Rehabilitation and Closure Plans (PRC Plans) Guideline (2021). The guidelines outline numerous areas of investigation and analysis. The project will require CM&G to compile a portion of the final submission concerning a geotechnical study. The geotechnical study's requirements and scope of work will be elaborated below.

Relevant Information

The following reports were reviewed as part of this study:

- Report by Pells Sullivan Meynink Engineering Consultants Pty Ltd, 'Baralaba Expansion Project, Baralaba South Operation: Geotechnical Feasibility Investigation', document reference: PSM1673-037R DRAFT, dated 18 December 2012.

Purpose

The purpose of this letter is to provide guidelines for the geotechnical design of the existing Baralaba South Project's final void for submission as part of the PRCP process.

METHODOLOGY

A desktop view of the available information was undertaken. Based on this study, slope recommendations were provided using engineering judgment based on the final slope geometry and expected ground conditions. Due to the ongoing work and expected changes in the geotechnical model and its constituent components (i.e. geology, structural, hydrogeological and rockmass models), further studies will be required to update the recommendations provided herein.

SITE CONDITIONS

The Project is known to be a structurally complex site with thrust faulting and folding endemic, see Figure 1. Pells Sullivan Meynink Engineering Consultants Pty Ltd (PSM) previously completed a study of the ground conditions identifying tectonically affected conditions similar to those encountered at the operating Baralaba North mine. As part of the current study, the previously assessed geological model requires extensive updating to accommodate significant changes in the interpreted geological and structural geological conditions.

The author's experience indicates that the geological and structural geological conditions are typically the dominant models in controlling geotechnical risk for a mine site. Consequently, recommendations herein will require further assessment following updating the site geotechnical model.

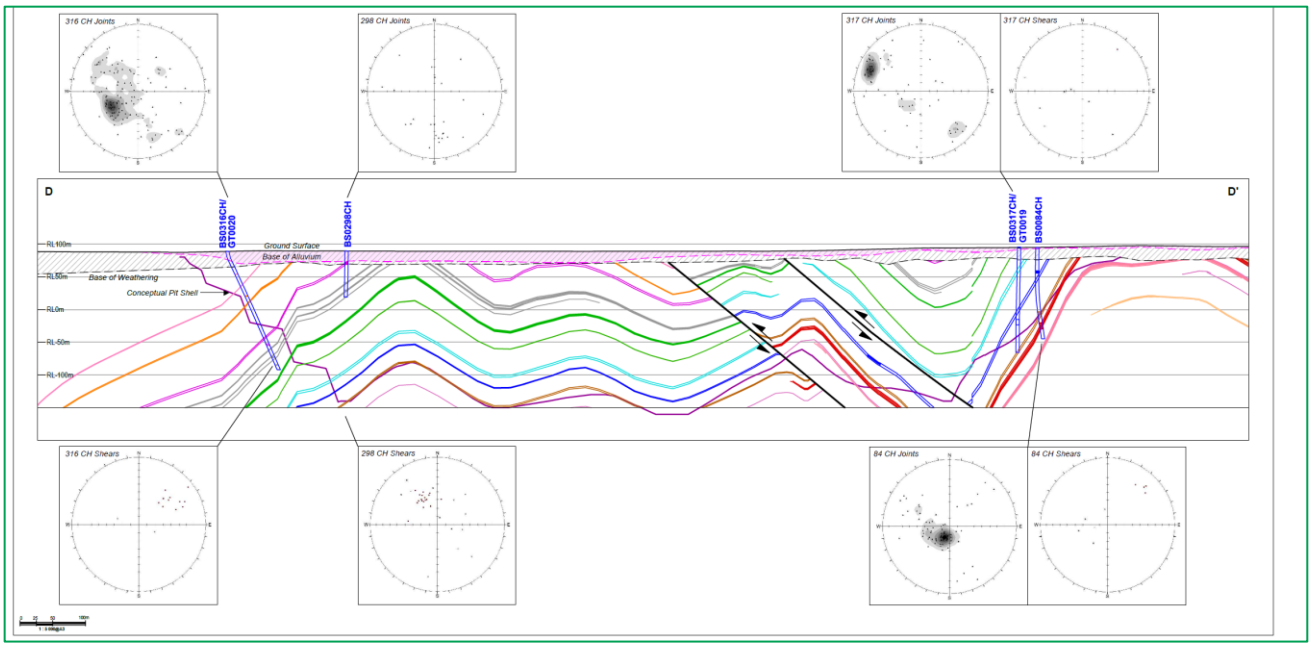

Figure 1: Cross-section showing the interpreted structural complexity of The Project (taken from report by PSM).

Final void design

The mine planning progression for the Project will result in the southern extent of the mining pit remaining as a final void. Highwall slope design for the Project is limited by the interaction of undercutting shears and faults in the underlying geology. A kinematic and slope stability analysis was undertaken for the Project, and the following design recommendations were proposed:

- 30m bench height;
- 65° bench angle; and
- 15m wide berms.

The proposed final void design parameters are outlined in Table 1. Upon completion of final void earthworks in a given area, a survey will be undertaken by an appropriately qualified person to confirm that the area has been shaped in accordance with the completion criteria.

Table 1: Projected final void landform design

Feature	Approximate maximum height (m)	Overall maximum slope (degrees)
Highwall	340	40°
In-Pit Spoil Dump (Lowwall)	340	32°

Notes: 1 – void area at natural topographic level

The final void will be left in a geotechnically stable condition, and the design will be validated closer to mine closure to ensure the exposed structures are appropriately accommodated and remain safe and stable. Bunds will be constructed along the crest of the final void to prevent vehicular access. Fencing may also be used to restrict further access to the final void by unauthorised people, wildlife and stock.

Final void method of construction

Free dig excavation is anticipated for the alluvial cover sediments using hydraulic excavator equipment. Drill and blast methods will be required to excavate weathered and fresh rock. For final walls, a combination of pre-splitting and trim blasting is recommended to mitigate damage and achieve the necessary slope angles. Pre-splitting allows for isolated rock to be blasted from the surrounding rock mass using lightly charged, closely spaced holes to fracture a plane along a required design profile. Trim blasting achieves a smooth wall with minimum overbreak using a light charge and a well-distributed row of holes along the final excavation line. Alternative blasting techniques may be trialled during mining of the interim walls.

For retained highwall or low wall slopes or where interspersed parcels of native vegetation are proposed for visual relief or other purposes, direct seeding of a mixture of endemic native species will be undertaken. Selected flora species will provide a suitable food source and shelter for native fauna.

Predicted stability of the final landform design

The slope design for the Project has been informed by a geotechnical pre-feasibility study, which recommended that during operations, design parameters should not exceed a 45° slope, 15 m bench height, and a 5 m berm for alluvium, and a 55° slope, 15 m bench height and 6 m berm for weathered Permian slopes. Highwall slope design is limited by undercutting shears and faults in the geology, and, for stability, operational benches will not exceed an angle of 65° and an overall angle of 42–51°. The slopes developed for the final design are less than those recommended for stability during operations and are consistent with the design criteria utilised at Baralaba Central Mine, which has a similar geology.

CLOSURE

I trust that the information provided satisfies your requirements, and if you have any questions or comments regarding the contents of this letter, don't hesitate to contact the undersigned.

Yours Sincerely,

TIM CARTLEDGE
Principal Geotechnical Engineer
CP, CPEng, RPEQ (Civil, Geotechnical-Mining)
NER, APEC Engineer, IntPE (Aus)