



Memorandum

To: Natassja Bell, Brendan Bow, Adam Liebenberg
Company: Atlas
From: Jin Jun Jiang
Date: 15 May 2017
Subject: Razorback cave CA-CO-03

Cave Description

Cave CA-CO-03 is located at the eastern side of the Razorback Pit near the bottom of the hill slope.

Based on the current survey data, the cave entrance faces north-east and is approximately 6 m high and 15 m wide, and characterised by two major chambers and numerous smaller sub-chambers that could not be defined due to their size restricting access. The chamber adjoining the entrance has an arched shape and extends 15 m to the rear where the chamber constricts to 2 m wide and 3 m high. This constriction opens into a rear chamber approximately 4 m wide, 4 m high and 10 m long. The cave is generally orientated in a north-east to south-west direction. The two sub-chambers are not defined at this stage.

Stability Assessment

As shown in Figure 1 below, the cave is located inside chert unit which is considered to be a strong rock unit in the area.

Although the entrance of the cave is considered to be relatively wide, the arched shape is favourable in terms of stability.

The dimensions of the cave linking two chambers are 2 m wide and 3 m high, and the dimensions of the second chamber at end are 4 m wide and 4 m high. These dimensions are considered to be favourable for the stability of the cave in terms of size and shape.

Atlas has obtained extensive experience of monitoring, blasting and mining near caves of both environmental and cultural heritage significance at its Mt Dove and Abydos operations. Atlas' Mt Dove Operation was approved to mine outside a 20 m buffer measured from the entrance of Cave MD-AN-2, a night/transitory roost for Pilbara Leaf-nosed Bats. Monitoring at Mt Dove showed that while there was some minor physical damage to the entrance of the cave, mining had little to no effect on Pilbara Leaf-nosed Bat visitation, and so was unlikely to have negatively affected the population as stated by MWH reports (MWH, 2016b and MWH, 2015).

At Atlas' Abydos Operation, the approved Scarborough Pit is designed 35 m from the heritage Yurlu Kankala Rock Shelter which is significantly larger in size than Cave CA-CO-03. Similar to Mt

Dove, mining in the Scarborough Pit to date has not resulted in any structural damage to this cave, with the exception of some minor rock falls from the weathered roof surface. A comprehensive monitoring program has been developed to monitor blasting effect and cave condition at this location.

Furthermore, at both the Mt Dove and Abydos operations, no visual cracks on pit floor and pit walls have been identified in proximity to the caves which may have potential to channel airflow from the surface through these caves and alter their internal microclimate.

Considering the favourable shape and relatively small size of the Cave CA-CO-03, its location with a strong rock unit, a 50 m buffer between the pit edge and the cave entrance (or a 25 m buffer between the pit edge and the back of the cave) is considered to be sufficient to maintain the integrity of this cave. While minor rock falls may occur inside the cave or near the entrance, no large rock falls or fractural damage is expected. Certainly, the cave condition will be closely monitored by Atlas geotechnical personnel during mining of the Razorback Pit to ensure there is no major structural damage (i.e., major rockfall or fracturing) which may change the internal microclimate of the cave and prevent its future use by bats.

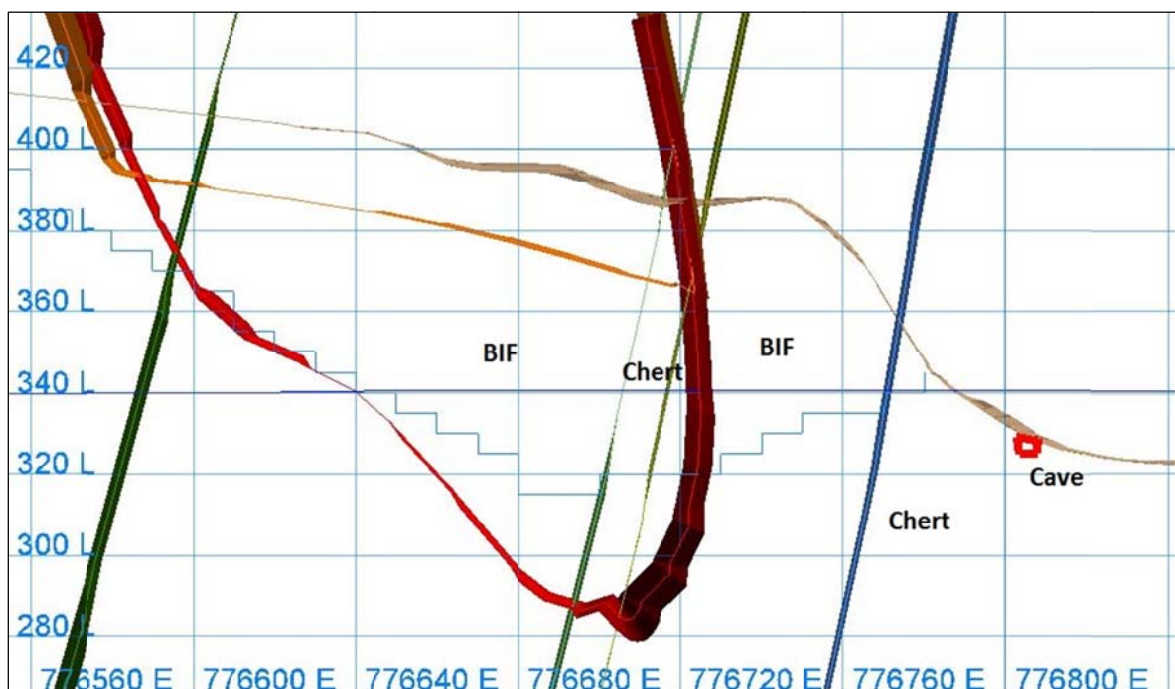


Figure 1. A sectional view of the Razorback Pit, rock units and cave CA-CO-03.

Yours sincerely

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Reference

- MWH. 2015. Mt Dove DSO Project: Pilbara Leaf-nosed Bat Monitoring Survey 2015, Unpublished report prepared by MWH Australia Pty Ltd for Atlas Iron Limited, Perth, Western Australia.
- MWH. 2016b. Corunna Downs Project: Terrestrial Vertebrate Fauna Impact Assessment, Unpublished report prepared by MWH Australia Pty Ltd for Atlas Iron Limited, Perth, Western Australia.