



Tailings Capacity Assessment



Continued Operations at Baal Bone Colliery Tailings Capacity Assessment

The Wallerawang Collieries Limited

9 October 2009

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Tailings Capacity Assessment

Prepared for

The Wallerawang Collieries Limited

Prepared by

AECOM Australia Pty Ltd

17 Warabrook Boulevard, Warabrook NSW 2304, Australia

PO Box 73, Hunter Region MC, Warabrook NSW 2310

T +61 2 4911 4900 F +61 2 4911 4999 www.aecom.com

ABN 20 093 846 925

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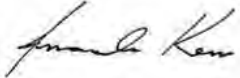
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Executive Summary

Baal Bone Colliery requires an assessment of the remaining tailings storage capacity currently on site.

The Baal Bone Colliery site was investigated with the goal of determining the capacity of existing and potential rejects emplacement areas (REA).

The Baal Bone Colliery site has previously operated a number of reject emplacement areas. REA 6 is currently in use. Recent survey data was analysed by AECOM and it was found that sufficient capacity remains in REA 6 (Cell 1 and 2) to service the process plant until mid 2012.

A further area, the Southern Void, was also identified as a potential reject emplacement area. Recent survey showed that this area has sufficient capacity to service the mine from approximately mid 2012 (following completion of REA6) to the end of 2015.

If the mine intends to extend operations beyond 2015, and continues to produce tailings and coarse reject at the current rate, further investigation will be required into future suitable emplacement areas.

1.0 Introduction

1.1 Project Background

The Baal Bone Colliery operated by The Wallerawang Collieries Limited (TWCL) under a development approval which expires in 2010. TWCL intends to continue mining beyond 2010 and needs to obtain approval to continue current operations on this site. In order to obtain approvals to continue mining past 2010, TWCL is preparing an Environmental Assessment (EA) in support of an application for continued development approval and to demonstrate operations are sustainable for another 10 to 15 years.

As part of this EA process it is important to demonstrate that the existing practises to manage the site are sustainable during future operation. As part of this assessment, Baal Bone Colliery has engaged AECOM to prepare an assessment of the remaining tailings and coarse reject storage capacity currently on site.

This report outlines the assessment of the remaining storage available in REA 6 and investigation into other areas available on site. This document relates to above-ground storage of tailings and coarse reject only.

1.2 Background Review

A background review was undertaken based on the available information that was provided by the client. This includes:

- Survey data collected on 22 May 2009 by Craven, Elliston & Hayes Pty Ltd of the south eastern corner of the site (DWG No BBREH09);
- Report titled: *Construction and Operation of Reject Emplacement Area 6 (REA6) at Baal Bone Colliery* (Umwelt 2008);
- Report titled: *Construction and Operation of Reject Emplacement Area 5 (REA5) at Baal Bone Colliery* dated September 2005; and
- Xstrata Tailings Storage Management, HSEC STD 8.1.

1.3 Site Overview

The site is located approximately 25km north west of Lithgow. A section of the mine area was originally open cut mined in the 1950s, down to a depth of up to 15 m below natural surface levels in some areas of the site. An area of a more recent open cut pit to the south of the site was reserved for the disposal of tailings. The remainder of the site has been rehabilitated in stages. The pit top area, the coal handling and the stockpile areas are located in the centre of the site.

A layout of the site showing relevant features is provided as **Figure 1**.

Figure 1 – Baal Bone Colliery



2.0 Tailings Capacity Assessment

2.1 Tailings Operations and Characteristics

Product from Baal Bone is largely thermal coal for export and the Coal Handling and Preparation Plant (CHPP) has a recovery rate of approximately 75%, with the residual reject material consisting of 7% fines and 18% coarse material.

The CHPP has a maximum design processing rate of 2.6 million tonnes per annum (Mtpa), resulting in an annual production of 114,000m³ of fine reject material and 360,000m³ coarse reject material. Fine reject material is pumped as 20 to 25% slurry to the reject emplacement area (REA).

REA 6 is constructed in the void of the former open cut workings in the southern extent of the site. It is bounded by the high wall to the south, and consists of two cells separated by an embankment. The embankment between the cells and the walls are constructed of coarse reject. The base of the cell is the excavated coal seam floor and the top embankment level of REA 6 is 878 m AHD. REA 6 has a capacity of approximately 352,000m³ (refer to **Section 2.2**) and has been used for approximately the last year. The location of REA 6 and surrounding contours is shown in **Figure 3**.

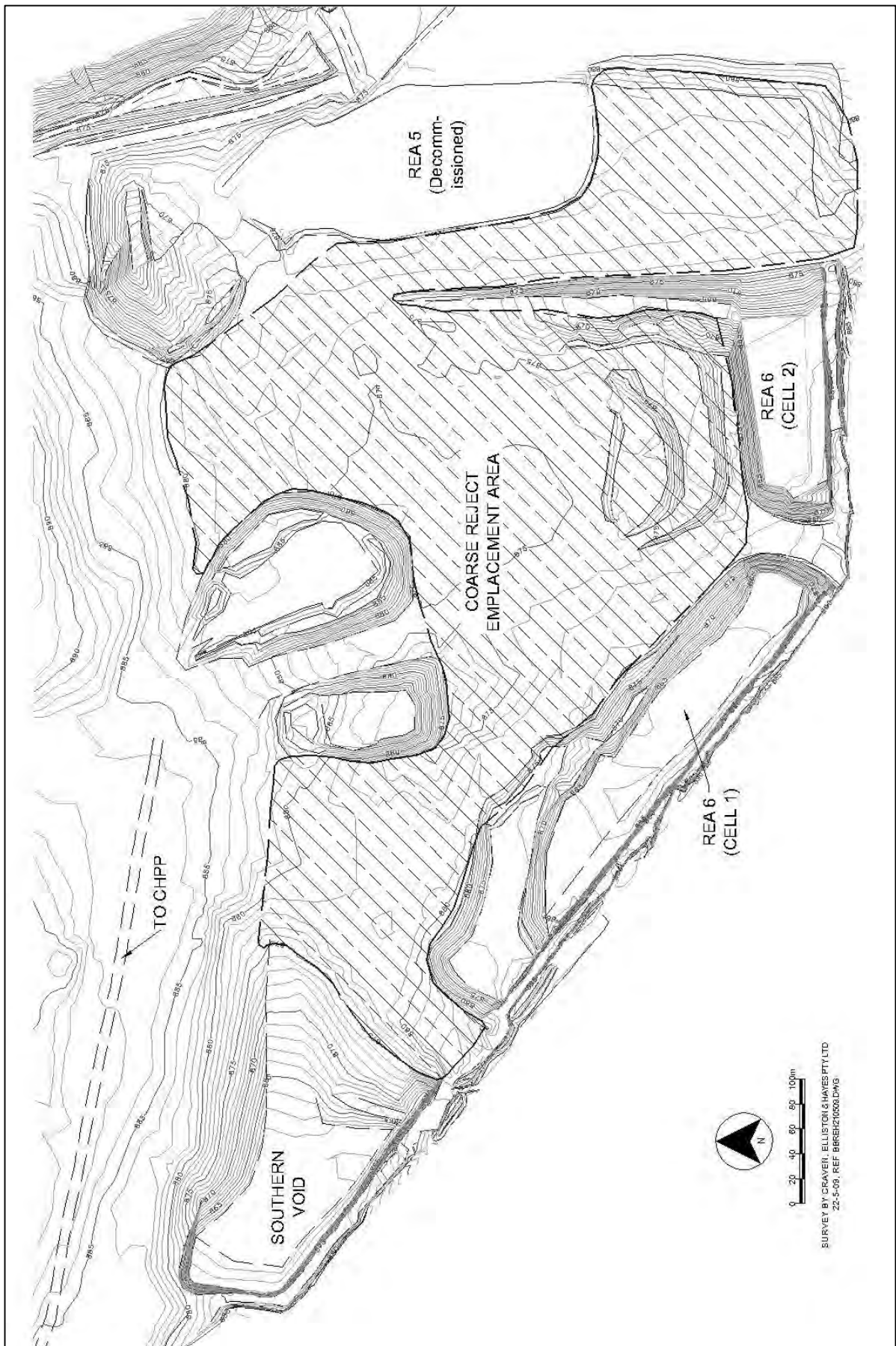
Tailings slurry is pumped from the CHPP and discharged into Cell 1. Leachate water is then allowed to decant through the embankment wall by percolation through the wall and also via a decant pipe to Cell 2.

Discussions with site staff indicated that the fine rejects slurry is rapidly self-dewatering, usually only requiring two weeks for a crust to form on cessation of deposition. **Figure 2** shows an existing rejects deposition area with cracks in the crust evident.

Figure 2 – REA 5 showing zero surface water and a crust forming



Figure 3 – Reject Placement Areas



At completion of REA 6, Cell 1 will then be dewatered and capped with a minimum thickness of 2.5 metres coarse reject material, overlain by 1.0m of clay loam. The final design of the rehabilitated emplacement area will be in accordance with the current Baal Bone Open Cut Mining Operations Plan.

2.2 Remaining Tailings Disposal Capacity

Currently the only emplacement area in use is REA 6 (Figure 5). The other above ground emplacement on site, REA 2 and 5, have been filled to capacity.

Based on recent survey data for the site it was calculated that REA 6 has a total capacity of approximately 352,000m³ for tailings emplacement (Cell 1) and 102,000m³ for leachate collection and storage (Cell 2). At the maximum emplacement rate of 114,000m³ per year, this area can provide approximately 3.2 years of total storage. Given that this storage area has been used for the last year, it is estimated that REA 6 (Cell 1) will provide storage for a further 2.2 years, or to the middle of 2011.

Following completion of Cell 1, Cell 2 can be used to accept tailings, thereby providing an additional 0.9 years of storage capacity.

The following graph (Figure 4) shows the volume of the Cell 1 against elevation (RL). The volume of the REA was calculated from recent survey work (Baal Bone Colliery Rehabilitation Survey, May 2009, drawing number BBREH09, dated 22/5/09) by taking the volume of a slice at each RL and adding them to give a total volume. Survey was provided at 1m contours. The bottom and top of the pit are at 862m AHD and 878m AHD respectively.

Figure 4 – Storage Volume versus Elevation (REA6)

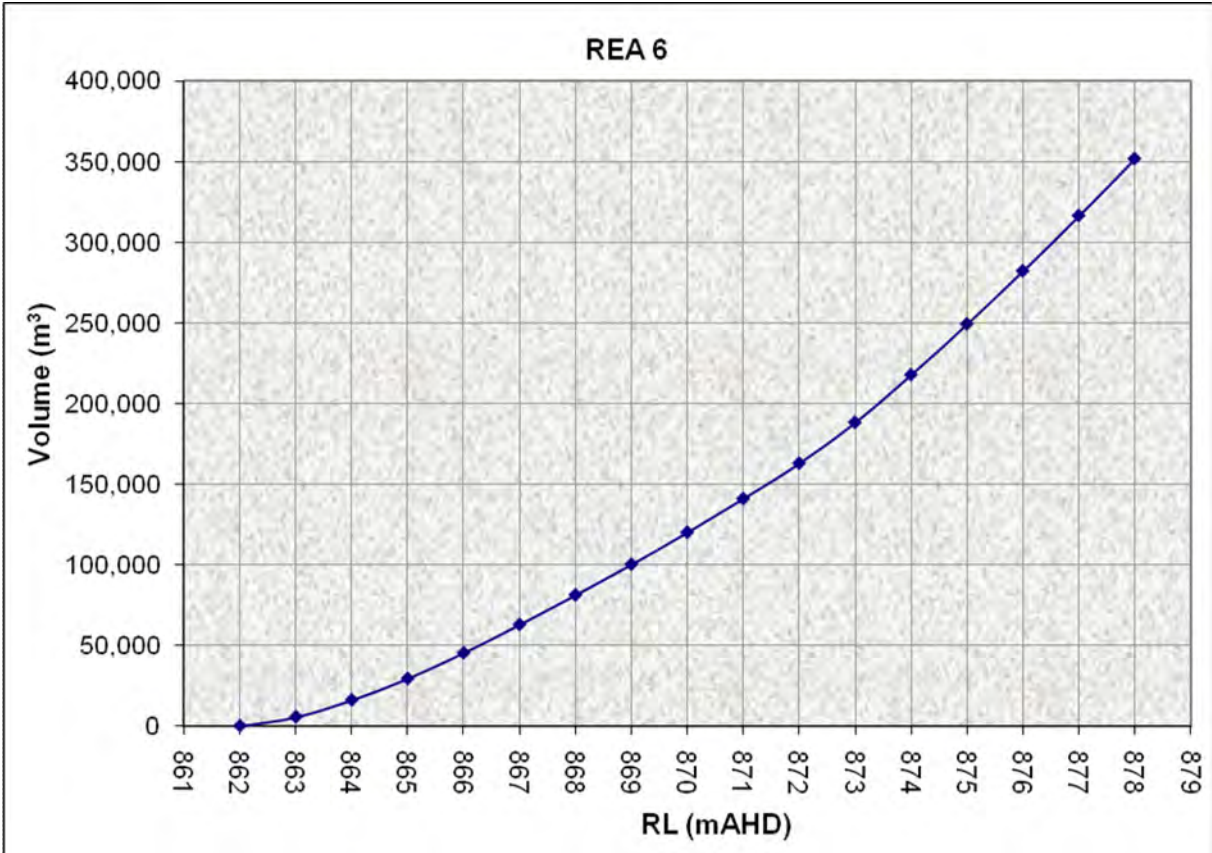


Figure 5 – REA 6, looking South West, showing current deposition level and coarse reject emplacement



Other considerations in determining the storage capacity of each rejects emplacement areas include:

- Allowance for flood events. It is expected that a 1 in 100 year ARI, 72 hour storm event will produce in excess of 200mm of rainfall and that the catchment area is the area of the dam only;
- Allowance for capping in accordance with the mine's tailings management plan; and
- Allowance for free water above the tailings surface at emplacement.

Due to the historical evidence that suggests that Baal Bone Colliery fine rejects freely dewater and the existing dams can be filled to near capacity, minimal allowance of the above has been made in this assessment.

2.3 Future Emplacement Areas

An alternative emplacement area has been identified at the Baal Bone Colliery site for deposition of fine tailings slurry. This area is a remnant open cut void currently referred to as the Southern Void (refer to **Figure 6**). The Southern Void is located north west of REA 6 and, based on recent survey data, has a total volume of approximately 383,000m³. At the maximum emplacement rate of 114,000m³/year, the Southern Void can provide tailings storage for approximately 3.3 years, or from about the middle of 2012 to the end of 2015.

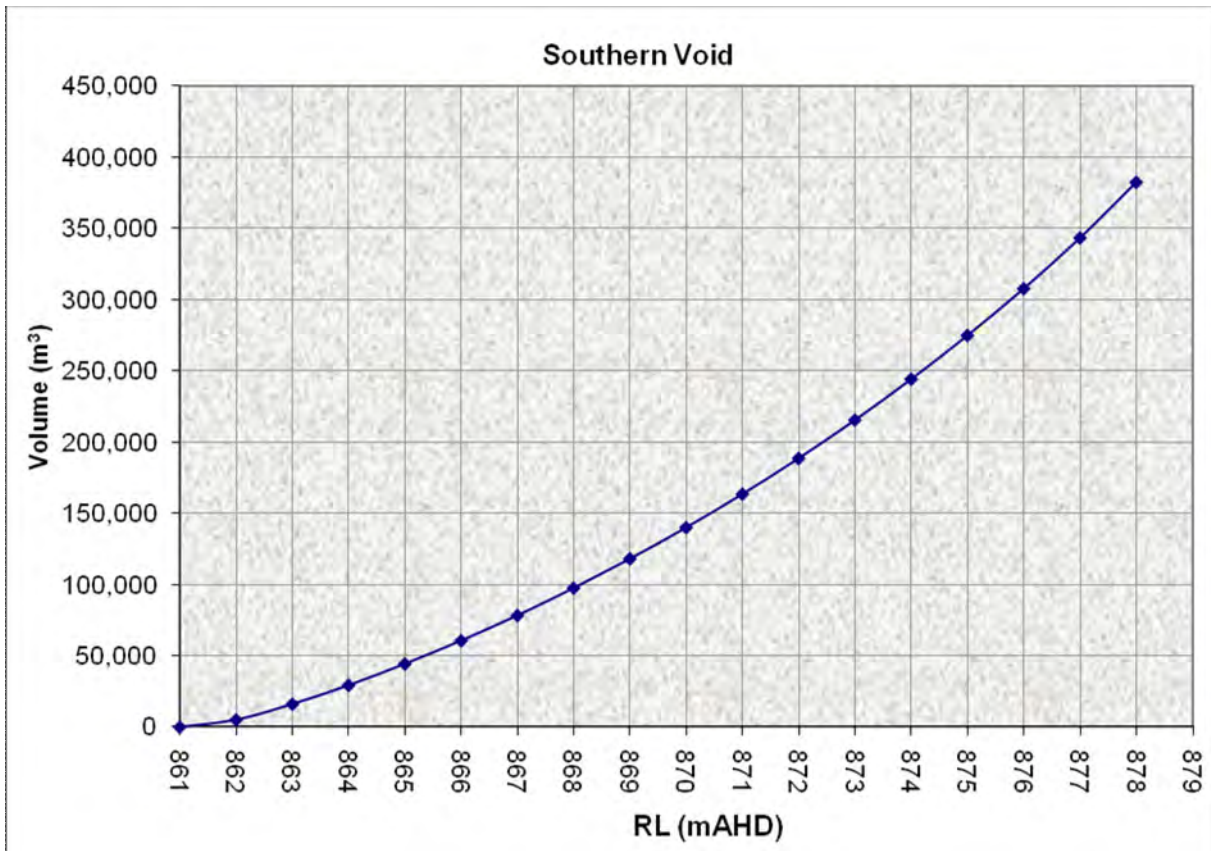
The following graph (**Figure 7**) shows the volume of the Southern Void against RL. The volume of the REA was calculated from the recent survey work (Baal Bone Colliery Rehabilitation Survey, May 2009, drawing number BBREH09, dated 22/5/09) by taking the volume of a slice at each RL and adding them to give a total volume. Survey was provided at 1m contours. The bottom and top of the pit are at 861mRL and 878mRL respectively.

Figure 3 shows the existing rejects emplacement areas in relation to the new proposed emplacement in the Southern Void.

Figure 6 – Southern Void, Looking North West



Figure 7 – Storage Volume versus Elevation (Southern Void)



2.4 Tailings Storage Timeline

The total remaining above ground tailings storage capacity at the Baal Bone Colliery is made up of the remaining volume in REA 6 and the unused open cut pit referred to as the Southern Void (refer Figure 3). The usable volume of REA 6 is 352,000m³ and the Southern Void is 383,000m³. Together, at the current emplacement rate, these dams can provide rejects emplacement area until at least the end of 2015.

Table 1 – Tailings Storage Timeline

Rejects Emplacement Area	Volume	Timeline
REA 6 (Cell 1)	352,000 m ³	Present – mid 2011
REA 6 (Cell 2)	102,000 m ³	Mid 2011 – mid 2012
Southern Void	383,000 m ³	Mid 2012 – End 2015

3.0 Conclusion

The Baal Bone Colliery site was investigated for potential rejects emplacement areas with the goal of determining the capacity of existing potential storage areas.

The volume of REA 6 was analysed based on recent survey data and it was found that sufficient capacity remains in it to service the process plant until mid 2012.

A further area, the Southern Void, was also identified as a rejects emplacement area. This was found to have sufficient capacity to service the mine to approximately the end of 2015.

If the mine intends to extend operations beyond 2014, and continues to produce tailings at the current rate, further investigation will be required into future suitable emplacement areas.

References

- Craven Elliston & Hayes (22 May 2009) *Baal Bone Colliery Rehabilitation Survey*, May 2009 (drawing number BBREH09)
- Umwelt (January 2008) *Construction and Operation of Reject Emplacement Area 6 (REA6) at Baal Bone Colliery*
- Umwelt (September 2005) *Construction and Operation of Reject Emplacement Area 5 (REA5) at Baal Bone Colliery*
- Xstrata Tailings Storage Management, HSEC STD 8.1

