Appendix E

Air Quality Assessment

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23 June 2015

Jason Martin
Senior Environmental Scientist
Hansen Bailey
Via email: jmartin@hansenbailey.com.au

RE: Air Quality Assessment - Bengalla Modification 1

Dear Jason,
Todoroski Air Sciences has assessed the potential for air quality impacts to arise due to the proposed modifications to various water management infrastructure and other infrastructure components associated with the Bengalla Mine.

Overview
Bengalla is located approximately 4km west of Muswellbrook in the Upper Hunter Valley of New South Wales (NSW) and was recently granted approval on 3 March 2015 for the continuation of mining under State Significant Development Consent SSD-5170.

Bengalla Mining Company (BMC) is seeking approval for a modification to SSD-5170 for the following:

- Alterations to various water management infrastructure components including:
  - Utilisation of the Satellite Pit as a catchment dam;
  - Construction of clean water diversion drains;
  - Relocation of the Staged Discharge Dam release point; and
  - Revised location for the future relocated Hunter River and Washery Dam.
- Relocation of the existing Explosives Storage Facility and Reload Facility; and
- Placement of fill from the excavation of the Clean Water Dam 1 (CW1) immediately east of the dam (CW1 Emplacement Strategy).

This letter report provides a qualitative assessment of the potential change in air quality associated with the proposed modifications. The assessment focuses on the activity associated with the development and placement of excavated material from the CW1 immediately to the east of the dam, all other features

associated with this Modification are by comparison unlikely to generate a significant amount of dust emissions and therefore have not been considered further in this assessment. An overview of the proposed modifications are presented in **Figure 1**.

Assessment of potential air quality impacts

For the development of the CW1 dam, SSD-5170 provides that the excavated material removed would be transported using appropriate mining equipment across Wybong Road for emplacement within either the main overburden emplacement area (Main OEA) or in the western out of pit emplacement area (Western OEA). Further, any material emplaced within the Western OEA would later be required to be rehandled as operations progress west.

The modification is seeking approval to emplace this excavated material immediately adjacent to the CW1 (see **Figure 2**).

The development of the CW1 dam would involve the excavation of approximately 412,000 bank cubic meters (bcm) of material with construction proposed to commence in Q3 of 2015 and take approximately 12 months to complete. The construction activities would be conducted between the hours of 7:00am to 6:00pm, Monday to Friday, and 8:00am to 1:00pm on Saturday, with no works occurring on Sunday or Public Holidays.

A comparison of the estimated total dust emissions for the approved activity associated with the construction of CW1 and the CW1 Emplacement Strategy associated with this Modification is summarised in **Table 1**. The results in **Table 1** indicate that the estimated change in potential dust emissions associated with the emplacement of excavated material immediately adjacent to the CW1 would see a decrease of the potential amount of dust emissions from the development. A detailed emissions inventory is provided in **Table 2** and **Table 3**.

Table 1: Comparison of estimated TSP emission rate for the CW1 Construction Activity Modification (kg/year)

CW1 Construction Activity	Approved operations	Modification	% Change
Stripping topsoil material	1,339	1,339	-
Excavator loading topsoil material to haul truck	69	69	-
Hauling topsoil material to stockpile area	1,000	246	-75%
Emplacing topsoil at stockpile area	69	69	-
Excavator loading excavated material to haul truck	1,216	1,216	-
Hauling excavated material to overburden emplacement area	17,711	4,350	-75%
Emplacing excavated material at overburden emplacement area	1,216	1,216	-
Dozer activity	8,368	8,368	-
Wind erosion from active exposed areas	56,249	56,249	-
Total TSP emissions (kg/year)	**87,236**	**73,120**	**-16%**

By emplacing the excavated material immediately adjacent to the CW1, the required haulage distance would be reduced significantly when compared to the distance required for transporting material to the Western OEA or Main OEA and therefore the amount of dust generated would be significantly lower.

A comparison of the amount of estimated dust emissions for the modification with the estimated emissions for the assessed Year 1 in the Air Quality and Greenhouse Gas Impact Assessment for the Continuation of Bengalla (**Todoroski Air Sciences, 2013**), indicates that the quantity of dust would equate to approximately 1.3 per cent of the total dust generated by the entire operation. The implementation of the CW1 Emplacement Strategy will result in a 16 per cent reduction in air quality emissions when compared to the approved

operations. This translates to a reduction of 0.3 per cent in the total emissions. This change is considered minor and is unlikely to be discernible relative to the existing contribution from the site.

To ensure dust emissions from the development of the CW1 are minimised where possible, appropriate operational and physical dust mitigation measures should be implemented such as maintaining sufficient levels of moisture on the surface of trafficked surfaces, limiting vehicle speeds and rehabilitating completed sections as soon as practicable.

Summary and Conclusions

This assessment has examined the likely air quality effects resulting from the proposed placement of excavated material from the CW1 dam to a location immediately to the east of the dam. The assessment estimates that activities associated with the modification would see a potential reduction of approximately 16 per cent in the dust emissions associated with the CW1 Emplacement Strategy through reduced haulage distances.

Overall it can be expected that based on the comparison of estimated dust emissions for the modification with the approved operation, also with the entire mine operations and the ongoing active dust management measures in place, there is unlikely to be a noticeable change in the existing air quality surrounding the site associated with the proposed modifications.

On the basis of the above it can be expected that there would be a small improvement in air quality due to the modification. Therefore it is reasonable to conclude that the proposed modification is unlikely to cause any negative discernible impact at any surrounding sensitive receptor locations relative to the approved operations.

Please feel free to contact us if you need to discuss (or require clarification on) any aspect of this report.

Yours faithfully,

Todoroski Air Sciences

Philip Henschke

Aleks Todoroski

References

Todoroski Air Sciences (2013)

"Air Quality and Greenhouse Gas Impact Assessment Continuation of Bengalla Mine", prepared for Hansen Bailey by Todoroski Air Sciences, July 2013.

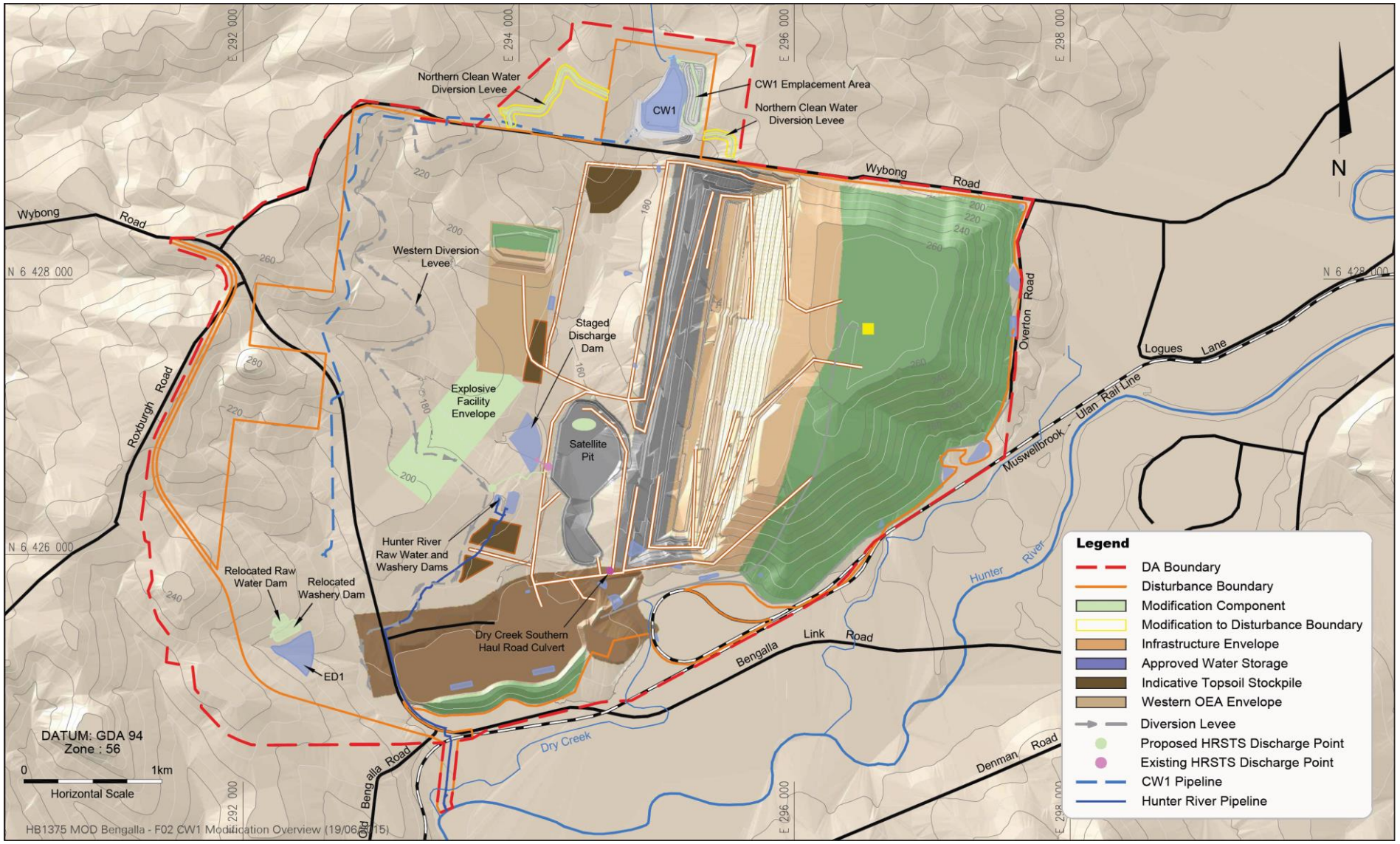

Figure 1: Overview of proposed modifications for Bengalla Mine

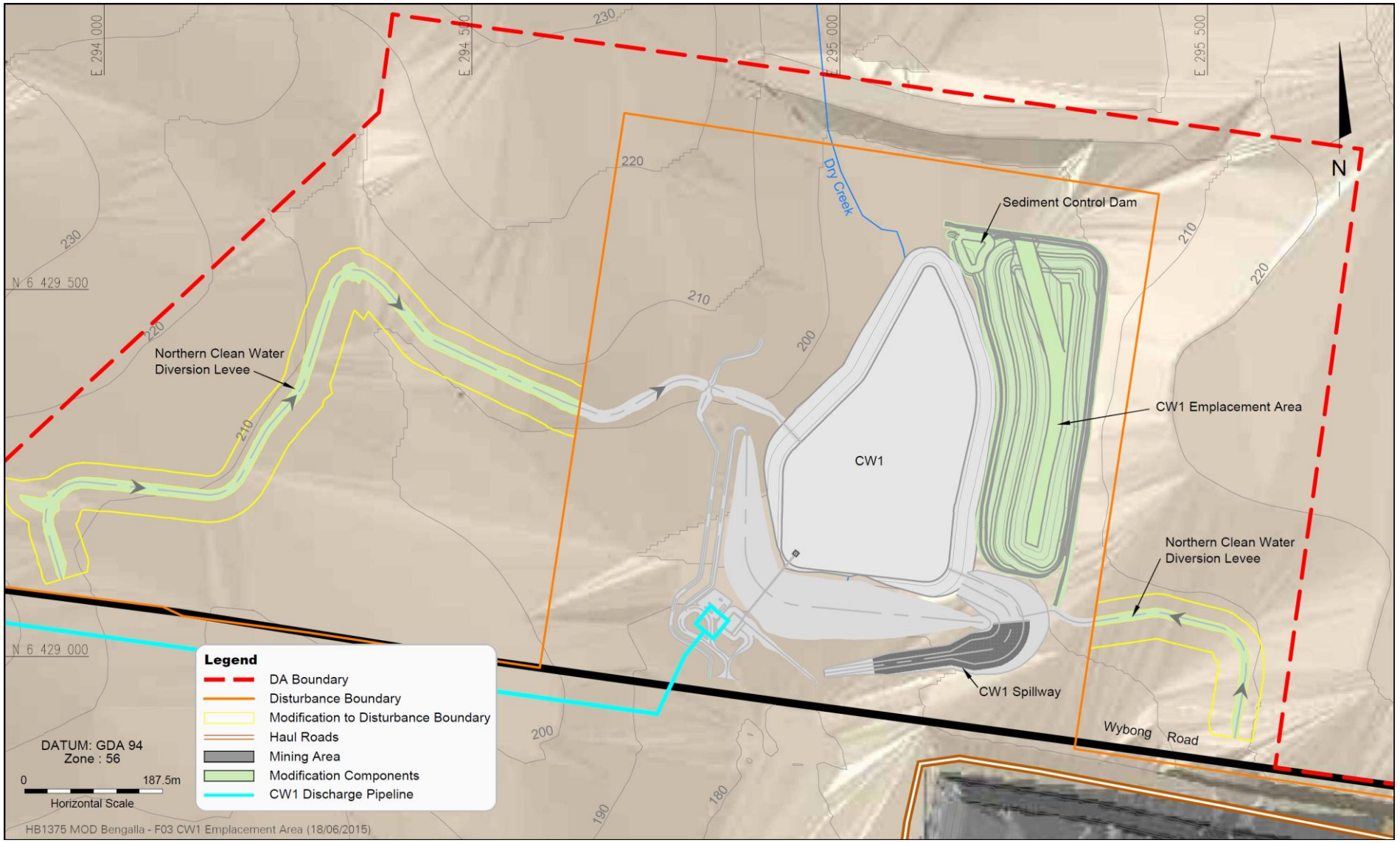

Figure 2: Proposed emplacement strategy for CW1

Table 2: Emissions Inventory for CW1 Construction Activity - Approved Operation

ACTIVITY	TSP emission (kg/y)	Intensity	Units	Emission Factor	Units	Variable 1	Units	Variable 2	Units	Variable 3	Units	Variable 4	Units	Variable 5	Units	Variable 6	Units
Stripping Topsoil (dozer)	1,339	80	hours/year	16.7	kg/h	10	silt content in %	2	moisture content in %								
Excavator loading Topsoil to haul truck	69	51,197	tonnes/year	0.00134	kg/t	1.133	average of (WS/2.2)^1.3 in m/s	2	moisture content in %								
Hauling to Topsoil dump	1,000	51,197	tonnes/year	0.130	kg/t	180	tonnes/load	5.7	km/return trip	4.1	kg/VKT	2.8	% silt content	296	Ave GMV (tonnes)	85	% Control
Emplacing at Topsoil dump	69	51,197	tonnes/year	0.00134	kg/t	1.133	average of (WS/2.2)^1.3 in m/s	2	moisture content in %								
Excavator loading OB to haul truck	1,216	906,400	tonnes/year	0.00134	kg/t	1.133	average of (WS/2.2)^1.3 in m/s	2	moisture content in %								
Hauling to dump	17,711	906,400	tonnes/year	0.130	kg/t	180	tonnes/load	5.7	km/return trip	4.1	kg/VKT	2.8	% silt content	296	Ave GMV (tonnes)	85	% Control
Emplacing at dump	1,216	906,400	tonnes/year	0.00134	kg/t	1.133	average of (WS/2.2)^1.3 in m/s	2	moisture content in %								
Dozer	8,368	500	hours/year	16.7	kg/h	10	silt content in %	2	moisture content in %								
WE - Overburden emplacement areas	56,249	16.1	ha	3,504	kg/ha/year												
Total TSP emissions (kg/yr)	**87,236**																

Table 3: Emissions Inventory for CW1 Construction Activity - Proposed Modification

ACTIVITY	TSP emission (kg/y)	Intensity	Units	Emission Factor	Units	Variable 1	Units	Variable 2	Units	Variable 3	Units	Variable 4	Units	Variable 5	Units	Variable 6	Units
Stripping Topsoil (dozer)	1,339	80	hours/year	16.7	kg/h	10	silt content in %	2	moisture content in %								
Excavator loading Topsoil to haul truck	69	51,197	tonnes/year	0.00134	kg/t	1.133	average of (WS/2.2)^1.3 in m/s	2	moisture content in %								
Hauling to Topsoil dump	246	51,197	tonnes/year	0.032	kg/t	180	tonnes/load	1.4	km/return trip	4.1	kg/VKT	2.8	% silt content	296	Ave GMV (tonnes)	85	% Control
Emplacing at Topsoil dump	69	51,197	tonnes/year	0.00134	kg/t	1.133	average of (WS/2.2)^1.3 in m/s	2	moisture content in %								
Excavator loading OB to haul truck	1,216	906,400	tonnes/year	0.00134	kg/t	1.133	average of (WS/2.2)^1.3 in m/s	2	moisture content in %								
Hauling to dump	4,350	906,400	tonnes/year	0.032	kg/t	180	tonnes/load	1.4	km/return trip	4.1	kg/VKT	2.8	% silt content	296	Ave GMV (tonnes)	85	% Control
Emplacing at dump	1,216	906,400	tonnes/year	0.00134	kg/t	1.133	average of (WS/2.2)^1.3 in m/s	2	moisture content in %								
Dozer	8,368	500	hours/year	16.7	kg/h	10	silt content in %	2	moisture content in %								
WE - Overburden emplacement areas	56,249	16.1	ha	3,504	kg/ha/year												
Total TSP emissions (kg/yr)	**73,120**																