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Ref: 05-115-625
8 July 2016

Stephen Shoesmith
Senior Planning Officer, Resource Assessments
NSW Department of Planning & Environment
23-33 Bridge Street, Sydney NSW 2001
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Dear Stephen

RE: BOGGABRI MOD5 - SUPPLEMENTARY INFORMATION REQUEST

We provide the following information in response to your supplementary information request dated 6th June 2016.

Haul Roads

1. *Please provide a breakdown (length) distinguishing between Primary Haul Roads (Long-Term) and Temporary Haul Roads for 2016.*

The length of the "in use" primary haul roads total 8km in 2016. The temporary "in use" haul roads total 18.5km in 2016.

2. *For Coal, Reject and Overburden Hauling, provide a detailed description confirming why there is a significant difference in predicted versus actual lengths (Reference is Table 4.1 of Additional Information)*

The 2016 (projected) haul road lengths column in Table 4.1 of the report "Boggabri Mine Project Approvals History Including Water Consumption Projections" (Boggabri Coal Operations Pty Ltd 2016) refers to total projected haul road network at BCM. Table 4.1 from this report (BCOPL 2016) is attached in appendix A.

When compared to the predicted haul road lengths in the 2010 EA a significant difference occurs as the 2010 EA lengths are from the Pae Holmes (2010) Air Quality Report and use a conceptual mine plan to present the return trip distance for a haul route (km/trip) for the purpose of calculating wheel generated dust emissions. The 2010 EA does not account for the 2016 projected total haul road network at BCM as shown in Table 4.1 (Appendix A).

For the purpose of measuring water consumption, Table 1 below is more relevant and was developed by measuring the haul roads "in use" at a single point in time, using an aerial photograph taken on 24th May 2016.

The Table 4.1 (BCOPL 2016) was produced to identify each category of haul road length but did not allow for roads categories that coincided with each other. Table 1 notes the lengths of the active haul road network that are currently "in use" (on 24th May 2016) and that are subject to the application of water for dust suppression. The "in use" haul road lengths will change depending on mine sequencing with additional haul roads activated within the existing haul road network.

The response to question four provides advice on the commercial reasons for changes to haul lengths.

Table 1: Road network

Category	2016 Projected Total Haul Road Network (BCOPL 2016)	24th May 2016 Measured "in Use" Haul Road Network
Topsoil	10.0	2.0
Overburden	10.0	15.0
Coal	23.1	9.8
Rejects	11.0	0.8
Ancillary*		6.1
Total	**54.1**	**33.7**

*** Ancillary includes dispatch, crib, park up, watercart fill points and workshop accesses**

3. *Describe the changes in assumptions for haul road intensity between the 2010 EA and MOD5?*

There are no changes in assumptions for haul road intensity between the 2010 EA and MOD5. The assumptions for the predicted haul road intensity in the 2010 EA Air Quality Impact Assessment (Pae Holmes 2010) are provided in the Table 2 (Year 5, 2016). The assumed source allocation and haul road routes in the 2010 EA Air Quality Impact Assessment (Pae Holmes 2010) for Year 5 (2016) are provided in Appendix B.

Table 2: 2010 EA haul road intensity assumptions (source Pae Holmes 2010)

Activity	Intensity (Material Handled)	Variable 1	Variable 2	Variable 3
Hauling topsoil to emplacement area	840,074 t/yr	150 t/truck load	9.0 km/trip	1.0 kg TSP/VKT
Hauling to emplacement area	136,446,192 t/yr	275 t/tuck load	5.5 km/trip	0.8 kg TSP/VKT
Hauling open pit coal to ROM pad	8,569,440 t/yr	150 t/truck load	7.5 km/trip	0.8 kg TSP/VKT
Hauling rejects from CHPP	1,601963 t/yr	150 t/truck load	6.0 km/trip	0.8 kg TSP/VKT

4. *Describe the operational or commercial purpose for increased haul road lengths (predicted versus actual).*

   The operational purpose for the increase in haul road lengths are a result of:

   - the dump sequencing, which formed the basis of the waste landform design, has lagged in moving material to the southern dump faces due to delays in infrastructure development.
   - the longer haul roads are also a required to achieve the current mining sequences and integration of the Tarrawonga dump, planning for which commenced following the 2010 EA.

   The commercial reason for the increase in the haul road lengths is to provide mining sequences that allow access to coal seams for production of higher quality coal to meet market demands.

   Further reference to the difference in predicted (2010 EA) versus the actual haul road network lengths are provided in the response to question two.

5. *Describe the changes in assumptions for ROM Hopper locations throughout LOM and how that relates to increase haulage lengths?*

   There are no changes in assumptions for ROM hopper locations throughout LOM. When comparing the “in use” haul road network and the predicted haul road lengths (2016) in the 2010 EA, it is noted that this concept plan does not take into account any traffic management or road network around the ROM hopper itself which is close to 1 km in total length.

6. *Describe the changes in assumptions for mine progression between the 2010 EA and MOD5 and how that relates to increase haulage lengths?*

   There are no changes in the assumptions for mine progression between the 2010 EA and MOD5 because MOD5 does not contain any assumption for mine progression.

7. *Describe the changes in assumptions for reject dumping throughout LOM and how that relates to increase haulage lengths?*

   There are no changes in assumptions for reject dumping throughout the LOM. The increase in actual reject haul road lengths from 2015 (7 Km) to 2016 (11 Km - projected) as shown in Table 4.1 (refer to Appendix A) is due to the addition of the western haul road constructed in 2016, thereby allowing rejects to be hauled along this road and the existing rejects haul road.
   Rejects will continue to be transport by haulage truck to in pit emplacement areas where they will be co-disposed, covered by spoil material and progressively rehabilitated.

8. *Describe further, how strip ratio relates to the differences in assumptions between 2010 and 2016 in terms of haul road length?*

   The strip ratios during this period have remained consistent year on year and have had no bearing on haul road lengths.

CHPP

1. *Please provide definitions and inclusions for each CHPP Water Demand Outputs (CPP Clarified, CHPP Dust Suppression, CHP Wash-Down, CPP Wash Down, MIA Washdown, Product Stockpile Dust Sup^). Include in the response clear assumptions and inclusions for each. Include a plan showing surface areas where appropriate.*

Definitions and assumptions for the provided water demands are outlined in Table 4.

Table 4: CHPP definitions and assumptions

Area	Definitions	Water Usage (m3/hr)	Assumptions
Coal Preparation Plan (CPP) Clarified Water Make up	Water addition to CPP system to make up the water loss from the product and reject streams.	60	8322 hours of CPP operation.
Coal Handling Preparation Plant (CHPP) Dust Suppression	Water addition to reduce dust on the coal handling systems, including CPP and Bypass.	67	8322 hours of CHPP operation.
Coal Handling Plant (CHP) Wash-down	Wash down water for Bypass system for housekeeping and maintenance.	2	8322 hours of CHP operation.
CPP Wash down	Wash down water for CPP system for housekeeping and maintenance.	27	50% recovery of water usage at 8322 hours of CPP operation.
Mine Infrastructure Area (MIA) Wash down	Wash down water for around MIA area, including offices and workshop.	18	8322 hours of MIA operation.
Product stockpile dust suppression	Water addition to reduce dust on the product stockpile.	15	Calculations have allowed for dust suppression assumed to be running 15% of annual hours.

2. *The excel spreadsheet provided suggests that the CHPP Dust Suppression, the largest component of water demand at 558 ML is required regardless of whether the CHPP is operating or not same usage figure for operating for 7000 or 8322 hrs. The 2014 WB figure in the same table indicates a lower demand of 268 ML based on 7,000 hrs operation. Similarly, the CHP Washdown & CPP Washdown do not change. In this regard, please confirm the conditions under which each for water demand output is required, particularly in regards change in water demand between Wash and Bypass coal circuits and why this is the case.*

The conditions under which each water demand output are required are noted in Table 4.

Table 5 outlines each water usage area, and how it is affected by an increase in CPP throughput. The only water usage that will increase will be the CPP clarified water make up, as this water usage is the only figure that is directly affected by an increase in CPP throughput.

Table 5: CHPP water usage area

Area	Is the Water Usage Influenced By Increasing CPP Throughput?
Coal Preparation Plan (CPP) Clarified Water Make up	**Yes** - Increasing the CPP feed throughput will mean that the CPP will require additional water.
Coal Handling Preparation Plant (CHPP) Dust Suppression	**No** - This water usage is influenced by change in total coal production, and as this figure is not changing (7 Mtpa) this water usage will stay the same.
Coal Handling Plant (CHP) Wash-down	**No** - This water usage is for housekeeping and maintenance, which will need to be conducted independently of throughput.
CPP Wash down	**No** - This water usage is for housekeeping and maintenance, which will need to be conducted independently of throughput.
Mine Infrastructure Area (MIA) Wash down	**No** - This water usage is for the MIA area, and is not influenced by throughput.
Product stockpile dust suppression	**No** - This water usage is influenced by change in total coal production, and as this figure is not changing (7 Mtpa) this water usage will stay the same.

Production Predictions Versus Actuals

1. *In Section 4.10 of BCO MOD5 RTS (Table E), mine production forecasts are provided. Given that a Site Water Balance is generally based on production forecasts and current water demand understanding and that the reported production totals for 2014 and 2015 are generally higher than those predicted for Overburden, ROM, Reject and Product – Describe the level of confidence in the current water demand calculations given the trend of higher than predicted production activities.*

The current water calculation in MOD5 considers a credible worst-case water usage scenario at Boggabri Coal Mine (BCM) based on historical water usage and dry weather conditions. Boggabri Coal is confident the water demand calculations in MOD5 will provide adequate water to BCM for the Mine's production activities.

Equipment

1. *In Section 4.4 of BCO MOD5 RTS (Page 96 and 97), it is suggested that using heavier trucks has resulted in an increased water demand. On the basis that particulate matter emissions are proportional to the vehicle kilometres travelled (VKT) and that larger capacity trucks can transport the same amount of material with a reduced number of hauls – please describe further why the conclusion provided within the RTS "As a result of changes in the equipment used, Boggabri Coals haul road dust suppression water demand has increased".*

BCM's National Pollution Inventory (NPI) indicates there is an increase in the Vehicle Kilometres Travelled (VKT) from 2013 to 2015 for overburden hauled by larger capacity trucks (Ultra Class haulage truck - 930E). In this instance, these larger capacity trucks are travelling more kilometres. The statement in the RTS also references an increase in the total number of mobile equipment at BCM as shown in Table 4.5 (Parsons Brinkerhoff, 2016), including an increase from 81 predicted in year 5 (2016) of the EA to 86 currently used in 2016 as, contributing to haul road dust suppression demand.

2. *In Section 4.4 of BCO MOD5 RTS (Page 97 and 98), it provides a comparison of predicted versus actual equipment lists. The lists provided suggest that whilst more ultra-class trucks are utilised the total number of trucks is greater than that increased and the total material moving capacity has significantly increased – In this regard please describe the consequences in terms of emissions and water demand of operating additional equipment (predicted in 2010 EA) and provide a detailed description confirming why there is a significant difference in predicted versus actual equipment (Particularly trucks and Excavators).*

Haulage quantities are in line with those in Table 8 in the 2010 EA. Overburden vary by 0.7 Mbcm (1%) based on last year's recorded actuals. The increase in demand for water for dust suppression is a function of haul road length rather than volume of material. With this increase in haul road lengths, the amount VKT for the ultra-class trucks has also increased. The difference in predicted versus actual equipment are further discussed in response to question three below.

3. *Please describe the contributions of ultra class trucks and increased equipment numbers on the trend of higher than predicted production activities (2014 and 2015).*

There is no major difference in the equipment utilised on a full time basis for production activities. The 2010 EA (table 9) refers to seven production loading units and two front-end loaders, which are currently used on a full time basis for production at BCM. The additional fleet on the actual equipment list includes plant that is only scheduled to be utilised to cover production machine down time.

The EA refers to 36 trucks. This is what is generally in operation on any given day. The five additional Hitachi electric drive trucks mobilised to site in recent years (total truck fleet now 42), are a more efficient truck that is utilised in place of the full time use of the CAT 785 fleet. The CAT 785's are only scheduled to be used to cover production truck downtime. Fleet and production activities are in line with the 2010 EA.

Dry Season Impacts

1. *Please describe the changes in assumptions for meteorological conditions (dry periods in particular) between the 2010 EA and MOD5?*

The 2010 EA meteorological conditions do not assume prolonged dry weather periods. The meteorological conditions assumed in MOD5 allow for four years of dry weather.

The MOD5 site water demand has been developed to account for all site water requirements being supplied from the bore field, an external source during dry periods. MOD5 assumptions for meteorological conditions are presented in section 6.1.4 of the MOD 5 Environmental Assessment. These are presented below.

"Statistical percentiles of below average annual rainfall quantities for the Boggabri rainfall station 055007 and a data drill interpolation of rainfall for Boggabri Mine from 1989 to 2015 (Parsons Brinckerhoff, 2015a) are provided in Table 6.2. The rainfall statistical percentiles of rainfall are higher for data drill interpolation at the Boggabri Mine and this may be due to either: a) the BOM data is missing rainfall data records for some periods or b) there is noticeably greater rainfall distribution within the hills at the Boggabri Mine compared to the flatter lower area of the township of Boggabri.

Table 6-2 Annual rainfall percentiles at Boggabri PO rainfall station

Percentile	Annual rainfall (mm/yr) data drill interpolation	Annual rainfall (mm/yr) BOM 055007
minimum	319	235
5th percentile	363	328
10th percentile	423	394
25th percentile	526	465
50th percentile	658	592

From a review of the rainfall records from BOM rainfall station (055007) at the Boggabri Post Office (PO) from 1884 to 2015, the longest extended period of dry conditions below the 25th percentile was from 1922 through to 1929. However, in this 8 year period there were three years with rainfall above the 25th percentile. This is a similar case with the drill interpolated data for Boggabri Mine for the period from 1922 to 1929, although the rainfall amounts for the percentiles are higher. The most noticeable rainfall deficit below 10% during this period was two consecutive years in 1918-1919 when rainfall is interpolated below the 5% percentile. Therefore, it can be deduced from historical rainfall records and Boggabri PO records that extreme extended dry (prolonged drought) conditions will be experienced at Boggabri when there are four sequential years of low rainfall (less than the 10th percentile). A worst case and conservative approach would assume little to no available water from runoff from the site and storages would be close to empty.

Following this, for the purposes of this groundwater assessment the conservative worst case scenario of extended dry period is defined as:

- A four year period where water supply for the project is sourced from the alluvium borefield with no input from surface site storage, no pit inflow contribution and additional requirements to meet evaporation from surface water storage. Therefore, a water supply requirement of 9.4 ML/day from the borefield will be required (which excludes site recycled water contribution)."

The meteorological data used in the site water balances for the 2010 EA Goldsim model consist of data from 1889-2004 historical rainfall/evaporation data. It is worth noting the MOD5 site water balance includes more recent rainfall data so it utilises 1889-2015 data as presented in the Table 6.

Table 6: 2010 EA and MOD5 Site Water Balance Meteorological Data

	2010 EA model Annual rainfall (mm)	MOD5 model Annual rainfall (mm)
minimum	319	319
10th percentile (dry year)	395	423
50th percentile (median year)	633	658
90th percentile (wet year)	800	831
maximum	1281	1287

The site water balance model is run for a 7 year window (or nominated simulation period) through all historical climate data and makes an everyday simulation of all defined processes within the model (including generated runoff and mining operations) based on the amount of rainfall on each day. The site water balance is not run solely for a dry period and thus there are no such assumptions embedded in the site water balance model.

MOD5 bore field Assessment assumes meteorological conditions deduced from historical rainfall records and Boggabri PO records that, extreme extended dry (prolonged drought) conditions will be experienced at Boggabri when there are four sequential years of low rainfall (less than the 10th percentile). A worst case and conservative approach would assume little to no available water from runoff from the site and storages would be close to empty.

2. *Please describe the assumptions within the MOD5 site water balance for dry periods?*

The assumptions within the MOD5 site water balance for dry periods are discussed in response to question one.

3. *Please describe the practical (operational) implications associated with the removal of "off-site" from PA Condition 30 for various mine activities.*

The operational implications associated with the removal of "off-site" dust emissions from PA condition 30 include, an increase in the water used for haul road dust suppression as shown the Table 3 (refer to question 4) to control wheel generated dust emission at the source during haulage activities. Additional water is now applied to haul roads to reduce visible dust being emitted from overburden, coal and reject haulage activities.

4. *Please quantify in terms of water demand the implications associated with the removal of "off-site" from PA Condition 30 for various mine activities.*

BC has quantified the water demand prediction of the main water using activity at the Mine, haul road dust suppression, based on actual water usage rates realised during the minimisation of dust emissions following the removal of "off site" from PA Condition 30 in 2015.

Table 7 indicates the total amount of water used to supress dust emissions from the haul roads has increased by 477 Ml from 2013 to 2015.

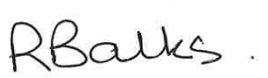
Table 7: Water Usage Haul Road Dust Suppression

Year	Water Used (Ml's)**
2013	699
2014	1016
2015	1176
2016	1461*

*estimated annual haul road dust suppression water demand
** historical usage record

Please contact Environmental Superintendent Mr Daniel Martin on ph 6749 6013 if you require any further information.

Yours sincerely



RAY BALKS
General Manager Operations

References

- Boggabri Coal Operations Pty Ltd, June 2016, Boggabri Mine Project Approvals History Including Water Consumption Projections.
- Hanson Bailey Pty Ltd, 2010, Continuation of Boggabri Coal Mine Environmental Assessment.
- PAE Holmes Pty Ltd, 2010, Air Quality Assessment Continuation Of Boggabri Coal Mine.
- Parson Brinckerhoff, 2016, Boggabri Coal Mine - Project Approval Modification Environmental Assessment (MOD 5) Response to Submissions Report

Appendix A

Table 4.1 Predicted and Actual Haul Road Distance (Source BCOPL 2016)

	Predicted			*Actual Figures*		
Haulage Category	**Yr 1 (2012)**	**Yr 5 (2016)**	**Yr 10 (2021)**	***2014***	***2015***	***2016 (Projected)***
Hauling topsoil to emplacement area	**6.0km**	**9.0km**	**10.0km**	**8.0km**	**8.0km**	**10.0km**
Hauling overburden to emplacement area	**5.0km**	**5.5km**	**7.5km**	**7.0km**	**8.0km**	**10.0km**
Hauling open pit coal to ROM pad	**6.5km**	**7.5km**	**8.5km**	**13.9km**	**19.1km**	**23.1km**
Hauling rejects from CHPP	**-**	**6.0km**	**8.0km**	**NIL**	**7.0km**	**11.0km**

Appendix B – 2010 EA Air Quality Assessment (Source Pae Holmes 2010)

Table D.2: Year 5 – source allocation

ACTIVITY	Source ID				
Topsoil Removal - Dozers/Excavators stripping topsoil	61 - 64				
Topsoil removal - Sh/Ex/FELs loading topsoil	61 - 64				
Topsoil removal - Hauling topsoil to emplacement area	61 - 65				
Topsoil removal - Emplacing topsoil at emplacement area	61	65			
OB - Drilling	44 - 46	52	56 - 60	71 - 74	
OB - Blasting	44 - 46	52	56 - 60	71 - 74	
OB - Excavator loading OB to haul truck	44 - 46	52	56 - 60	71 - 74	
OB - Hauling to emplacement area	34 - 38	44 - 60			
OB- Emplacing at emplacement area	34 - 38	47 - 51	55	66	69
OB - Dozers removing OB	44 - 46	52	56 - 60		
OB - Dozers on OB dumping in emplacement area	34 - 38	47 - 51	55	66	69
CL - Dozers ripping/pushing/clean-up	44 - 46	52	56 - 60		
CL - Hauling open pit coal to ROM pad	29	43 - 46	52	56 - 60	75 - 76
CL - Unloading ROM to ROM pad (20%)	28				
CL - Loading ROM directly to hopper to be crushed (80%)	26				
CL - Loading from stockpile to crusher using FELs (20%)	28				
CL - Crushing ROM (100%)	26				
CL - ROM hopper unloading coal (100%)	26				
CL- Loading coal from hopper for transfer to CHPP 2Mtpa	26				
CL - Hauling coal from hopper to CHPP	26	28			
CL - Unloading to CHPP	28				
CL- Handle coal at CHPP	28				
CL- Rehandle coal at CHPP	28				
CL- Dozers at CHHP / ROM Pad	26	28			
CL - Loading product coal to haul trucks	28				
CL - Hauling product coal to rail loop (from crusher to CHPP)	1 - 26				
CL - Unloading product coal at rail loop	1				
CL - Loading product coal to trains	1				
CL - Loading rejects and tailings to haul trucks	26	28			
CL - Hauling rejects from CHPP	29 - 44	47 - 51	53 - 54		
Cl - Unloading rejects	34 - 38	47 - 51	55		
WE - OB dump area	34 - 38	47 - 51	55	66	69
WE - Open pit	44 - 46	52	56 - 60		
WE - ROM stockpiles	27				
WE - Product stockpiles	27				
WE - Topsoil area and stockpiles	61 - 65				
WE - Product stockpiles at Rail loop	1				
Grading roads	29 - 60				
Tarrawonga Coal Mine	77 - 85				

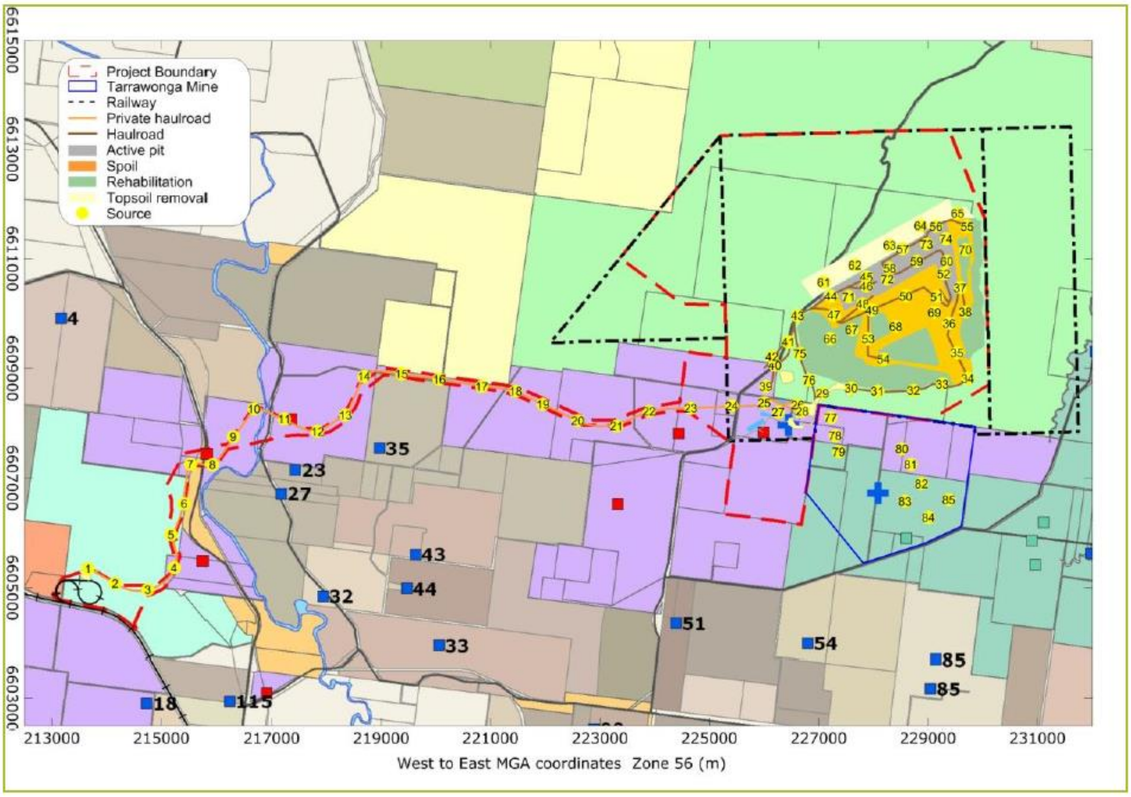


Figure 6.2: Modelling source locations for Year 5