Rasp Mine Mod 5 – Review of Statement of Environmental Effects

Matter	DPE Comment	DPE Request and BHOP Response
Evidence of consultation with the EPA	• Confirmed in SEE • Evidence provided in email format is sufficient	No action required.
Evidence of consultation with Council	• Confirmed in SEE	**BHOP Response:** Consultation as listed at Table 1-1 confirmed by email from Tracey Stephens, BHCC, sent to DPE 17/08. No change to MOD5.
Consultation with DRG	• Confirmed in SEE • Sufficient	No action required.
Consultation with the Resources Regulator		Did BHOP consult with the Resources Regulator? **BHOP Response:** Advised by DPE 22/08 (email E Donnelley) that this was not necessary for MOD5.
Noise and vibration assessment during construction	• Sufficient	*Appendix E includes a number of blank pages. Please remove these.* **BHOP Response:** Blank pages have been removed by consultant and new version will be submitted with on-line application.
Noise during construction	• Noise from transport of cement to the silo during operation has not been considered • Noise from operation of the silo has not been adequately considered	• *The operation of the cement silo would require cement deliveries to occur 2 to 3 times per week from eastern side of the site to the silo (if cement is delivered by train) or the southwest side of the site to the silo (if cement is delivered by road).* • *Please consider the impact (or lack of) these additional vehicle movements and the operation of the cement silo in section 5.2.1* **BHOP Response:** Refer discussion in Point 1 below. MOD5 updated in Section 5.1 Table 5-1 with potential noise impact risk from additional traffic flows and in Section 5.2.1 with noise assessment.
Air quality and dust	• Sufficient • Management measures provided	No action required.

Matter	DPE Comment	DPE Request and BHOP Response
	• EPA consulted	
Community consultation, and evidence of consultation documented in the SEE	• Sufficient	No action required.
Appendix A	• Not provided	*Provide a copy of this. (However, I'm not sure why this is needed? Are the modifications are located wholly within the approved project boundary?)* **BHOP Response:** Correct - The modifications lay within the original Project Area with the Warehouse located on Western Lands Leases 2638 and 2639, the cement silo is located on Consolidate Mine Lease 7. Appendices are provided for confirmation and reference only.
Transport	• Not provided	• *Consider transport in Table 5.1 and Section 5.2* **BHOP Response:** Refer discussion in Point 2 below. MOD5 updated with new line in Table 5-1 and assessment for Transport provided in Section 5.2.5. • *Detail how transport (road and rail) requirements would change with the modification and how this would be managed during construction and operation.* **BHOP Response:** Rail – It is proposed to backload the ISO cement containers onto the returned concentrate wagons displacing some containers. This will result in approximately 4 additional trains per annum. As these additional traffic movements would be spread throughout the year it is unlikely there would be any discernible impact and therefore no mitigation measures are proposed. Refer discussion in Point 6 below. MOD5 updated in Section 4.2.4. Road – the preferred option for transporting cement is back-loading on concentrate trains, on the rare occasion this is not possible, cement would be transported by road, conservatively estimated at 5% of deliveries annually. This relates to 10 additional vehicles per year, arriving at the Rasp Mine at different times. A conservative assessment has been made refer discussion in Point 2 below. MOD5 updated in Section 5.2.5.

Matter	DPE Comment	DPE Request and BHOP Response
		<u>On-site vehicle movements</u> • How many heavy vehicles are required to deliver the prefabricated warehouse and silo materials? Will any over-sized vehicles be required? **BHOP Response:** BHOP anticipates that 3 trucks will be required to deliver the prefabricated structure parts and crane for the Stores Warehouse extension (MOD5 updated in Section 4.1.2) and 2 trucks to deliver the silo (MOD5 updated in Section 4.2.3). In total 5 trucks, however not all will be attending site at the same time. These trucks will have wide loads, do not exceed road limits and will not require a police escort. Refer discussion in Point 2 below MOD5 updated in Section 5.2.5.1. • *How many additional vehicle movements are required to transport ISO Containers filled with cement to the silo? (Potential noise impacts?)* **BHOP Response:** During operations 3 to 4 additional internal truck movements per week during daytime only are required to transport cement from the Rail Loadout to the silo. Refer discussion Point 1 below, MOD5 updated in Section 5.2.1. *<u>Rail movements</u>* • *Has BHOP consulted with the ARTC? Confirm there is capacity in rail network*. **BHOP Response:** ISO containers will be backfilled on current trains returning empty concentrate containers. This will displace some containers and will result in an additional up to 4 trains per annum. National Pacific have confirmed the following: • PN holds 2 weekly paths between Broken Hill & Newcastle ○ Maximum train capacity of **104 trains per year** ○ Maximum production capacity of 104 * 1458 tonnes per train 152k tpa • **FY18** Rasp despatch to Newcastle rounded to 62k tonnes, or **42 trains** • Available **unused capacity of 62 trains** • To meet the concentrate displaced by Cement Rasp would require an additional 4 trains per annum • **The unused capacity** would reduce from 62 trains to **58 trains per annum**

Matter	DPE Comment	DPE Request and BHOP Response
		Refer discussion in Point 6 below. MOD5 updated in Section 5.2.5.2. *<u>Off-site vehicle movements</u>* • *How often would cement be transported to the site via road? How many additional heavy movements per week?* • *Will this impact the road network?* **BHOP Response:** Road – the preferred option for transporting cement is back-loading on concentrate trains, on the rare occasion this is not possible, cement would be transported by road, conservatively estimated at 5% of annual deliveries. This relates to 10 additional vehicles per year, arriving at the Rasp mine at different times. Refer discussion in Point 2 below. MOD5 updated in Sections 4.1.2, 4.2.3, 5.1 and 5.2.5.1.
Other minor issues that need to be considered in Table 5-1: • Erosion and sediment control • Water use	• Not provided	*Add a brief consideration of these matters in Table 5-1* • *Can the modification be accounted for by the existing erosion and sediment control system?* • *Is extra water required for dust suppression? Where will it be sourced from?* **BHOP Response:** Table 5-1 updated in MOD5, refer Point 3 below.
Installation of a new delivery route (Section 4.1.3 and Fig 4-4)	• Clarify or remove	*Include a statement in Section 4.1.3 to acknowledge that any new delivery access route is not the subject of this modification, and BHOP would lodge a separate mod application if negotiations are successful. (Note: BHOP would need to assess impacts i.e. intersection quality, potential road upgrades etc.)* **BHOP Response:** Discussion regarding new delivery access has been removed from this Modification.
Cement / tailings backfill	• When justifying the need for the cement silo, page 14 of the SEE says: *The proposed silo would <u>enable the use of cement in the material mix with tailing</u> to fill underground voids that remain after ore extraction. This would provide additional*	• *Is use of cement /tailings backfill currently approved? If not, the proposed modification description needs to include this proposed change.* **BHOP Response:** The use of binders for mixing with tailing in underground backfill was included in the original EA, refer discussion Point 4 below. MOD5 updated in Section 2.2.2.

Matter	DPE Comment	DPE Request and BHOP Response
	strength to the mix allowing ore reserves to be increased that would otherwise be sterilized improving ore grades and concentrate volumes and ultimately extended the operating Life of Mine.	• *Section 5.2 needs to confirm that the use of cement backfill would not result in additional impacts.* **BHOP Response:** The addition of cement to the tailing mix is unlikely to have any measurable additional impacts to the Project. Binder product mixes together with relevant SDSs have been provided, refer discussion below at Point 5. MOD5 updated in Section 5.2.6. • *Could you also please clarify how the use of cement backfill increases ore reserves? Does the increased stability allow BHOP to access additional areas that have not previously been assessed? And if ore reserves are increased, does this mean that the total volume of ore extracted over the project life will increase?* **BHOP Response:** The use of cement backfill is required to strengthen the tailing mix for underground backfill thereby allowing the removal of pillars and allow more ore to be extracted. These areas were included as part of the resource but not included in reserves as they would not have been mineable. It is difficult to confirm if overall mineable ore would increase. In the early stages of mining at Rasp several pillars that were to be mined were found to have collapsed and diluted, thus not economically mineable. BHOP reviews its reserves, typically every two years and is updated in the MOP. The reserves constantly change as they are dependent on metal price, mining methods and time. • *The SEE also needs to clarify that the mine life will not extend beyond the currently approved mine life.* **BHOP Response:** BHOP has approval to mine 8,450,000 t of ore at a rate of 750,000 t per year until 31 December 2026, as stated in Table 2-1 of the MOD5. Resource and reserves may extend beyond this period depending on further exploration and metal prices. However the 'approved' life of mine will end in 2026. So although there may be mineable ore unless a modification is sought and approved the life of mine will cease on 31 December 2026.
Formatting / typos		Please review the SEE for typos and spelling. I have highlighted some of these in the Pdf. **BHOP Response:**

Matter	DPE Comment	DPE Request and BHOP Response
		All known typos and spelling fixed.
Comments from SEE document		
Critical spares and Stock Items (used to describe what items will be stored in the extension)		*Clarify what these are and confirm they are not hazardous.* **BHOP Response:** The proposed extension would hold larger items as it would be predominately pallet racking (eg. mill gear box, major components for mobile fleet etc). Hazardous items are currently stored in the main Warehouse building, aerosol cans are locked in specifically designed metal cupboards and gas bottles are located at the other end of the store in a designated area. Oils and greases have their own compound outside the Warehouse building. No hazardous items would be stored in the proposed extension. MOD5 updated in Section 4.1.
Employee numbers		*Why are employee numbers so much higher that the approved project?* **BHOP Response:** After underground stoping commenced and more extensive diamond drilling of the ore body was competed it was identified that the geometry of the ore body changed with depth. This meant that the tonnages of ore per vertical metre reduced significantly which has required the mine to develop at a much higher rate than originally planned to sustain the current mining rate of 60,000 tpm (720,000 tpa). Development is very labour intensive increasing the number of employees required for the same amount of ore mined. MOD5 updated in Executive Summary Table 1-1.
ISO containers		*Confirm that the storage of these items will not result in additional disturbance or impacts. Provide size and how long will they be stored?* **BHOP Response:** There are three proposed locations for ISO container storage, all are located on already disturbed land free of vegetation. There are no site preparation works required. Storage Site 1 is located near Thompson Shaft complex and will be used for empty containers, which will be placed behind a 4 m noise abatement bund. Approximately 5 containers will be stored in this area. Another 5 containers will be stored adjacent to the rail where concentrate containers are currently stored prior to loading. The size of the ISO container is width - 2.50 m, length - 6.05 m, height - 2.80m.

Matter	DPE Comment	DPE Request and BHOP Response
		Storage times will vary depending on train movements however there will always be approximately the same number of full and empty containers on site, albeit different containers, it is expected that up to 10 ISO containers will be stored (half full and half empty) which will provide a buffer for train delays. Turnaround of ISO containers will align to train movements which would be on average every 8 days (currently every 9 days). MOD5 updated in Section 4.2.4.

Point 1 Assessment of Additional Traffic Related Noise

(1) MOD5 Section 5.1 – Table 5-1 updated to include traffic flows:

Issue	Relevance	Key Issue
Noise	Noise would be generated during construction by: - the use of an excavator, loader and truck to prepare the sites for the installation of the concrete slabs - erection of infrastructure Noise would be generated during operations by: - trucks transporting cement from storage to the silo (Rail Loadout to Silo or site entrance to silo) - loading the silo - loading the mixing hopper	 No No No No No

(2) MOD5 Section 5.2.1 – updated to provide discussion of potential traffic flow noise impacts:

The operation of the cement silo would generate noise from motors loading cement into the silo and mixing tank and by transport deliveries of the cement. BHOP has been advised by EMM that noise generated from these motors would be insignificant given the current approved noise sources located in this area. In addition both motors would be enclosed and the current noise abatement bund installed for the Concrete Batching Plant, will be extended to allow some coverage for the cement silo. The number of truck movements transporting cement from the Rail Loadout to the silo is minimal (3 to 4 per week) and will occur during daytime only. The current variability of the numbers of truck movements related to mine haul trucks along this route, varies hourly from zero to 3 trucks per hour (5 haul trucks per hour was used in the original noise assessment). The additional truck delivering cement would be within this variation and it is unlikely that the noise from cement truck movements would be discernible.

Similarly in the small number of instances when cement deliveries might arrive by road and travel through the Eyre Street entrance to the silo. In the worst case scenario would be if these trucks arrived at the same time (3 to 4 trucks for a week's supply of cement). It is not expected there would be any additional impact from these vehicles and with the current variability of vehicle movements (site vehicles, contractor vehicles and other delivery vehicles) it is unlikely from these additional truck movements would be indiscernible from general site and road traffic.

Point 2 Transport – Assessment of Traffic Flows

(1) MOD5 Section 5.1 – Table 5-1 updated to include - Transport

Issue	Relevance	Key Issue
Transport	*Traffic flows* There will be some increase in traffic flows both internal and external: Construction – an additional 5 heavy vehicles, entering the site. Operations – an additional 3 to 4 truck movements per week from the Rail Loadout to the silo internally. And occasionally (5 % (nominal) of cement truck deliveries by road. *Rail movements* In operation of the cement silo there will be some increase in rail movements with up to 5 additional trains per annum.	No No

(2) MOD5 Section 5.2.5.1 – updated to provide discussion of potential traffic flows

In the original EA a study was completed for traffic flows in the surrounding areas of the Project. This study was based on data from the late 1990's and early 2000's supplemented by a traffic survey in 2007 by Environmental Resources Management Pty Ltd (ERM). Traffic flows, particularly heavy vehicle traffic, have increased since this time with further mining and other industrial developments in Broken Hill. However, BHOP have used this data as a conservative estimate to assess potential traffic impacts from MOD5 as current traffic flows would be higher. **Table 5-4** outlines the traffic volumes identified for the EA. The data shows general traffic flows, including heavy vehicles that travel on Eyre Street, Holten Drive, South Road and Bonanza Street. The data also shows the proportion and daily variation of heavy vehicles that pass the Rasp Mine entrance (Eyre Street east of Comstock Street), a total of 2232 vehicles daily of which 1.6 % to 4.6 % are classed as heavy vehicles. Eyre Street is used as one of the main trucking routes, including road trains, from the north to the south of Broken Hill.

Table** Error! No text of specified style in document.**-1 Traffic Volumes Original Environment Assessment

Location	Daily traffic				Peak 1 hour flow	
	1997 (Council)	1999 (RTA)	2002 (RTA)	2005 (Council)	2001 (ERM)	2007 (ERM)
Eyre St east of Bonanza St	1864	-	-	-	191	173 (4.0)
Eyre St east of Comstock St	2009	-	-	2232(1.6-4.6)	-	153 (13.7)
South Rd north of Eyre St	-	-	-	-	775	659 (3.6)
Bonanza St south of Eyre St	-	8273	8254	-	657	571 (4.4)
Menindee Rd north of Holten Dr	-	2656	-	-	195	-

Note: Bracketed figures are heavy vehicle percentage.

During construction there will be minimal traffic flows from the combined projects. It is estimated that the Stores Warehouse would result in additional truck movements of three (one truck for the crane delivery and two trucks for delivery of the prefabricated structure). The cement silo would result in additional truck movements of two (one for the crane delivery and one truck for the silo delivery). The arrival of these vehicles would not occur on the same day however, to provide a conservative assessment for potential traffic impacts the assessment has considered all of these vehicles arriving on the same day. This would result in a combined increase of 5 trucks. The EA reported that heavy vehicle traffic on Eyre Street varied from 36 trucks (1.6 %) per day to 103 trucks (4.6 %) per day. The additional 5 heavy vehicles proposed would be within this variation and as such it is unlikely this increase would be discernible, particularly given the variability of traffic at the Rasp Mine.

There will be no additional vehicle movements in the operation of the Stores Warehouse extension.

During operations of the cement silo the number of internal truck movements transporting cement from the Rail Loadout to the silo is minimal (3 to 4 truck movements per week). With the variability of truck movements related to mine haulage trucks along this route, from zero to three trucks per hour, it is not likely that the cement truck movements would be discernible from normal traffic. Similarly were cement deliveries to arrive by road and travel through the Rasp Mine Eyre Street entrance to the silo the variability of site vehicles, contractor vehicles and other delivery vehicles would again make these truck movements indiscernible from general traffic. It is anticipated that road deliveries would be rare and is conservatively estimated at 5 percent of all deliveries and would occur spasmodically. In any given year this would equate to an additional 10 delivery vehicles. Using a conservative estimate of four ISO containers (one week's supply) arriving on one day. The additional heavy vehicles proposed would be within the normal heavy vehicle traffic variation per day (36 to 103 trucks per day) and it is not expected that this increase would be discernible from normal traffic.

Point 3 Erosion and Sediment, and Water for Dust Suppression

Table 5-1 of the MOD5 has been updated to consider potential impacts from erosion and sediment management and additional water for dust suppression.

Table** Error! No text of specified style in document.**-2 Review of Potential Environmental Impacts

Issue	Relevance	Key Issue
Erosion and sediment control	There will be no change to the current water management arrangements and erosion and sediment control as outlined in the Site Water Management Plan.	No
Water use	BHOP currently uses a water truck (cement silo area) and water sprays (area of Warehouse extension) to assist in dust management in these areas as well as the application of chemical dust suppressant. It is anticipated that the additional use of water for dust management will be minimal and could be handled within current water usage capacities. Raw water is used for dust suppression.	No

Point 4 Cement 'approved' for use as mix in tailing

(1) MOD5 Section 2.2.2 updated to provide discussion original EA reference to suitable materials for mixing with tailing

The placement of backfill underground was included in the original EA including the addition of some form of binder, the exact combination of materials was unknown at the time of the EA however, all recommended binders used cement. The Backfill Plant was constructed however it was not commissioned. Plans are underway to commission the Plant late 2018. No material has been placed underground due to the need to use excess waste rock from underground workings to fill underground voids. Chapter 2 Section 2.7 of the original EA provided an overview of the Backfill Plant indicating that some mix in the tailing material would be required:

> *"The back fill plant will consist of cyclones to split the tailings feed. The coarser underflow stream from the cyclones will be **mixed with suitable materials** and redirected underground to use as stope fill. The finer overflow (slimes) will be directed to a high rate thickener, allowing thickened slimes to be sent to the TSF1 or TSF2."*

The suitable materials were provided by Golder who conducted a laboratory analysis for the use of binders to enhance the strength of the tailing was provided in the *Report on Laboratory Evaluation of Rasp Mine Tailing for Use as Hydraulic Backfill*, *Golder Associates February 2008* Appendix B, of Annexure F – *Tailings Storage Facility Feasibility Study*, *Golder Associates, February 2010*. Section 6 of this Report provided a summary of the analysis of various binder combinations all included cement:

1 5% application with Type 10 Normal Portland Cement (NPC)
2 5% application with 70% NPC and 30% C1 Fly Ash
3 5% application with 10% NPC and 90% Blast Furnace Slag (BFS)

Golder concluded that a binder mix was required to enhance the strength of the cyclone underflow tailing. Testing indicated that Combination Three (10% NPC / 90 % BFS) proved the best in strength and further testing showed a mix of 4% slag/cement application could be used.

Point 5 Assessment of cement used in the mix with tailing for underground fill

(1) MOD5 Section 5.2.6 – updated to provide discussion of tailing binders:

The original EA provided that the tailing from the coarser underflow stream from the cyclones would be mixed with suitable materials for use as underground backfill for voids to strengthen the tailing mix if required. Golder considered some examples of these materials, provided below, all contain some cement content:

1 5% application with Type 10 Normal Portland Cement (NPC)
2 5% application with 70% NPC and 30% C1 Fly Ash
3 5% application with 10% NPC and 90% Blast Furnace Slag (BFS)

These mixes are commonly used for this purpose, usually with applications of 5 percent or less. The following provides information from the relevant Safety Data Sheets for these products:

Normal Portland Cement

General Purpose or Portland Cement is used as a binder in concrete, concrete masonry, mortar and grouts. It is also used in the manufacture of fibre cement products, in soil stabilisation, in building construction and civil engineering projects. It is chemically stable and has a slight solubility and forms an alkaline slurry when mixed with water. It is not expected to bio-accumulate, is persistent having a low degradability and is expected to have low mobility in a landfill setting. It can be treated as a common waste for disposal or dumped into a landfill site, in accordance with local authority guidelines.

Fly Ash

Fly ash is supplementary cementitious material for concrete. It is also used in soil stabilisation and as a fine filler in asphalt and other products. It is chemically stable and essentially insoluble. It is unlikely to have a negative impact on plant life or animals. The product is persistent and would have low degradability and is expected to have low mobility in a landfill setting. It can be disposed as trade waste and land fill in accordance with local authority guidelines.

Blast Furnace Slag

Ground slag, Blast Furnace Slag or Ecocem, is supplementary cementitious material for concrete manufactured by inter-grinding selected granulated iron blast furnace slag with optimized quantities of gypsum to a controlled particle size.

Cement binders are used extensively throughout the mining industry to strengthen tailing used for filling underground voids. The presence of cement in the stabilised backfill may make contact with water on the outside of the stabilised fill only, so there would be minimal contact with low cement content in the backfill material. Therefore any resulting impact would be minor or not measureable.

Point 6 Rail movements and capacity

(1) MOD5 Section 5.1 – Table 5-1 updated to include – Transport: *Rail movements,* refer point 2 above.

(2) MOD5 Section 5.2.5.2 – updated to provide discussion of additional rail movements

During operation of the cement silo, cement supplies would arrive predominantly on trains back-loaded onto wagons returning empty concentrate containers. This activity would be consistent with current rail activity. The number of displaced concentrate containers would change month to month however over the year using the maximum of three ISO containers per week, 200 containers would

be displaced. This will result in additional trains. The rail operator Pacific National has advised that this would equate to up to 4 trains per annum. Current train movements vary widely from zero to four movements per week, on average there is a train movement every 9 days with the additional train movements this will change to every 8 days. It is unlikely that this would be discernible.

Pacific National also advised that there was spare capacity on this line (Newcastle to Broken Hill) and can manage the required additional train movements. Currently this line has the capacity for 104 trains per year and in the last year the Rasp Mine used 42 trains for concentrate. This leaves a capacity of 62 trains to accommodate the additional displaced containers reducing the unused capacity from 62 trains to 58 trains per annum.