# Rasp Mine Zinc-Lead-Silver Project

## Modification 2 - Environmental Assessment

Prepared for CBH Resources Limited| 5 February 2014

Planning + Environment + Acoustics

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# Rasp Mine Zinc-Lead-Silver Project

Final

Report J13054RP1 | Prepared for CBH Resources Limited | 5 February 2014

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|---|---|---|---|---|
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| Date | 5 February 2014 | 5 February 2014 | Date | 5 February 2014 |



**Document Control**

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# 1 Introduction

## 1.1 Introduction

CBH Resources Limited (CBH), a wholly owned subsidiary of Toho Zinc Co Ltd, specialises in the safe, profitable extraction of silver, lead and zinc from mine sites in Cobar and Broken Hill. Project Approval 07_0018 (PA 07_0018) for the Rasp Zinc-Lead-Silver Mine (the Project) was granted by the Minister for Planning on 31 January 2011 under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to Broken Hill Operations Pty Ltd (BHOP), a wholly owned subsidiary of CBH. The approval permits BHOP to extract, process and transport zinc, lead concentrates from the Project site.

## 1.2 Proposed modification

BHOP is seeking a modification to PA 07_0018 (the proposed modification). The proposed modification involves a change to operating hours of the primary crusher from between 7:00 am and 7:00 pm, seven days a week, to 24 hours/day, seven days a week to allow the crusher flexibility to meet the operational requirements of the plant. Road transport of ore to off-site processing facilities was originally approved to occur during construction of the on-site processing plant. BHOP seeks approval for the continued road transport of a small portion (up to 60,000 tonnes per annum) of ore extracted from the Project site that is unsuitable for on-site processing.

It is not proposed to modify any other aspect of the Project, including hours of operation of other project elements (such as shunting of concentrate wagons and rock blasting), mine life or the approved ore extraction rate and therefore no additional ore will be crushed.

Key components of the Project and proposed modification are described in Table 1.1.

**Table 1.1 Existing operations**

| Project component | Approval condition | Existing approval (PA 07_0018) | Proposed modification |
|---|---|---|---|
| Mining operations | On site until 31 December 2026 | Schedule 2 Condition 5 | No change |
| Production | Extraction of no more than 750,000 tonnes of ore per annum | Schedule 2 Condition 6 | No change |
| | Extraction of 8,450,000 tonnes of ore over the life of the project | Schedule 2 Condition 6 | No change |
| Operational noise restrictions | Crushing between 7:00 am and 7:00 pm on any day | Schedule 3 Condition16 | Change to 24 hours on any day |
| | Shunting of concentrate wagons between 7:00 am and 6:00 pm on any day | Schedule 3 Condition16 | No change |
| | Rock blasting between 6:45 am and 7:15 pm on any day | Schedule 3 Condition16 | No change |
| Ore crushing | Fully enclosed structure, operating and maintained to ensure internal negative air pressure and ensure visible fugitive emissions are minimised. | Schedule 3 Condition 7 | No change |

**Table 1.1 Existing operations**

| Project component | Approval condition | Existing approval (PA 07_0018) | Proposed modification |
|---|---|---|---|
| Transportation method | Transportation of zinc and lead concentrates from the site by rail | Schedule 2<br>Condition 7 | No change to transport of concentrates.<br>Continuation of road transport of up to 60,000 tonnes per annum of ore, 7 am – 5 pm, Monday to Friday |

Transitional provisions were introduced to the EP&A Act (Schedule 6A) enabling 'transitional Part 3A projects' to continue to be subject to Part 3A of the EP&A Act as in force immediately before the repeal. Transitional Part 3A projects include certain projects that were the subject of an existing approval under Part 3A. Accordingly, the Project is a transitional Part 3A project.

The proposed modification is therefore sought under the repealed section 75W of the EP&A Act. This environmental assessment (EA) has been prepared by EMGA Mitchell McLennan Pty Limited (EMM) to support the proposed modification.

## 1.3 Site and surrounds

The Project consists of the Consolidated Mining Lease 7 (underground and surface lease areas with some surface exclusions) and Mining Purpose Leases 183, 184, 185 and 186. It occupies the central region of the historic Broken Hill Line of Lode orebody, approximately 3.8 km long by 1.2 km wide.

The Project area is surrounded by infrastructure, transport, commercial and residential land uses within the City of Broken Hill.

# 2 Legislative framework

## 2.1 Commonwealth legislation

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), actions that may have a significant impact on a matter of national environmental significance (MNES) are 'controlled actions' and require approval from the Commonwealth Government.

A search of MNES was undertaken for the original EA and this assessment; no threatened or migratory species or communities listed under the EPBC Act were identified, nor was the Project listed under any of the other MNES definitions. The original EA concluded that the Project would not significantly impact any MNES. The proposed modification will not change this assessment and therefore the modification will not be referred to the Commonwealth Government.

## 2.2 State legislative matters

State legislation which could apply to the proposed modification is listed in Table 2.1.

**Table 2.1 State legislative matters**

| Legislation | Relevant? | Approval condition/comment |
|---|---|---|
| *Environmental Planning and Assessment Act 1979* | Yes | As the Project has project approvals that were granted under Part 3A of the EP&A Act, the modification will be a transitional Part 3A project. A Part 3A project can be modified under Section 75W of the EP&A Act. |
| State Environmental Planning Policy (Major Development) | Yes | The Major Development SEPP previously defined classes of development to which Part 3A of the EP&A Act applied. The SEPP was amended by SEPP (State and Regional Development) 2011 in accordance with the repeal of Part 3A, though it is still relevant to the proposed modification as it continues to apply to transitional Part 3A projects.<br>Development for the purpose of mining related to works that is ancillary to or an extension of another Part 3A project (ie the modification) is considered to be a 'major development' under the Major Development SEPP. |
| State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 | Yes | Section 3.3.1 of the original EA provides a detailed review of considerations set out in clauses 5, 7, 12, 14-17 of the Mining SEPP.<br>The modification is consistent with the aims and controls of this policy as it will provide the proper management and development of extractive material resource for the social and economic welfare of the State. |
| State Environmental Planning Policy No. 33 – Hazardous and Offensive Development | Yes | BHOP has environmental protection license (EPL) 12559 as required by the SEPP to manage hazardous materials. The proposed modification does not alter the approval conditions required. |
| *Threatened Species Conservation (TSC) Act 1995* | No | No license or permit under the TSC Act is required as Project approval was granted under Part 3A of the EP&A Act. There will be no impact to threatened species. |
| *Native Vegetation Act 2003* | No | Not applicable as there will be no removal of native vegetation. |

**Table 2.1 State legislative matters**

| Legislation | Relevant? | Approval condition/comment |
|---|---|---|
| *Heritage Act 1977* | No | Not applicable as there will be no impact to heritage items.<br>Section 11 of the original EA provides a detailed review of European and Aboriginal heritage. No items or places within the Project area were recorded on the State Heritage Inventory, the National Heritage List or the Commonwealth Heritage List.<br>Due to more than a century of land disturbance, it was determined there would be no impact on any indigenous archaeological values in the Project area. |
| *National Parks and Wildlife Act 1974* | No | Not applicable as the modification will not result in impacts to native flora and fauna, or Aboriginal heritage items. |
| *Water Management Act 2000* | No | Not applicable to the proposed modification. |
| *Protection of the Environment Operations Act 1997* | Yes | BHOP is operating under environment protection licence (EPL) 12559. The EPL will be amended to reflect the modification if approved. |
| *Mining Act 1992* | Yes | Pursuant to section 75V of the EP&A Act, the authorisation of a mining lease under the Mining Act cannot be refused if it is necessary for carrying out a project approved under Part 3A and must be substantially consistent with the Part 3A project approval. |

## 2.3 Local planning instruments

As PA 07_0018 was granted under Part 3A of the EP&A Act, the proposed modification is defined as a transitional Part 3A project. Section 75R(3) of the EP&A Act provides that Environmental planning instruments (other than State environmental planning policies) do not apply to or in respect of a project approved under Part 3A. However, under s 75J(3) of the EP&A Act, the Minister for Planning may (but is not required to) take into account the provisions of any environmental planning instrument that would not (because of section 75R) apply to the modification. Therefore, the Minister for Planning may choose to consider the relevant local environmental plans (LEPs).

### 2.3.1 Broken Hill Local Environmental Plan 2013

The Project is within the Broken Hill Local Government Area (LGA). Under the Broken Hill Local Environmental Plan 2013 (LEP) the Project site is zoned predominantly SP1 – Special activities and SP2 – Infrastructure.

An objective of the SP1 zone is “to facilitate development that is in keeping with the special characteristics of the site or its existing or intended special use, and that minimises any adverse impacts on surrounding land”. Condition 3 in the LEP for zone SP1 states "the purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose" is permitted with consent. The land zoning map sheet LZN_005A identifies the SP1 zoned land in the Project area as “Mining” and therefore the proposed modification is consistent with the zone objective.

An objective of the SP2 zone is “to provide for infrastructure and related uses”. LEP condition 3 for zone SP2 states "the purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose" is permitted with consent. The land zoning map sheet LZN_005A identifies the SP2 zoned land in the Project site as “Rail Infrastructure Facility” and therefore the proposed modification is consistent with the zone objective.

### 2.3.2 Broken Hill DCP Plan No 11 Management of Lead Contamination

Development Control Plan (DCP) 11 provides guidelines for the management of issues relating to lead contamination. The original EA provided a health impact assessment which considered issues relating to lead and recommended appropriate management strategies. BHOP, in consultation with the Lead Reference Group, has developed and implemented the Community Lead Management Plan.

# 3 Project description

## 3.1 Project history

BHOP purchased the Project from Normandy Mining Investments in 2001. A Mine Operations Plan (MOP) was approved in November 2006 for the development of an exploration decline. The MOP has since been amended to include an extension to the decline, underground mining and stockpiling of ore.

In January 2011, PA 07_0018 was granted by the NSW Department of Planning and Infrastructure (DP&I) for the expansion of mining production to 750,000 tonnes per annum (tpa) and the construction and operation of a processing plant and rail load out facility for despatch of concentrates. This application was supported by the original EA (July 2010) and a Preferred Project Report (PPR) (September 2010). As part of the PPR, changes were made to the location, design and noise mitigation of the processing plant, which included:

- optimisation of the processing plant to include a single stage crushing circuit with a two stage SAG-Ball milling circuit capable of processing ore at the 750,000 tpa rate. This enabled removal of secondary and tertiary crushers which were originally proposed;
- relocating the processing plant (including the primary crusher) to the north-eastern end of the lease, away from more densely populated residential areas; and
- installation of noise abatement bunds around the ROM pad and on the north and south side of the primary crusher.

These changes resulted in reduced noise impacts during both the day time and night time periods. The operation hours of the primary crusher, from 7:00 am to 7:00 pm, were originally proposed to minimise noise impacts at night. Although the project changes in the PPR resulted in noise reductions that would allow night time criteria to be met, no changes to the operating hours of the primary crusher were sought.

A modification to PA 07_0018 was sought in November 2011 to accommodate the relocation of the ventilation shaft from Kintore Shaft in Little Kintore Pit to a central area north-west of the lease. This relocation was required as heavy rains in early 2011 damaged the Kintore Shaft and rehabilitation of the shaft to enable the construction of the ventilation shaft was no longer possible. The modification was granted by DP&I on 16 March 2012. An amendment to the MOP for the relocation of the ventilation shaft was approved on 30 March 2012 by the NSW Division of Minerals and Energy (DRE).

Relevant approvals and licences held by BHOP are presented in Table 3.1.

**Table 3.1 Relevant approvals and licences**

| Approval number | Date issued | Expiry/ anniversary date | Purpose |
|---|---|---|---|
| PA 07_0018 (as modified) | 31 Jan 2011 | 31 Dec 2026 | Mining production of 750,000 tpa from Western Mineralisation, Centenary Mineralisation and Main Lode Pillars. Construction and operation of a minerals processing plant and rail loadout facility. |
| MOP 06/6483 and MOP 06/6463 | 1 April 2011 | 31 March 2014 | Mining production of 750,000 tpa from Western Mineralisation, Centenary Mineralisation and Main Lode Pillars. Construction and operation of a minerals processing plant and rail loadout facility. |
| EPL 12559 | | 2 Nov 2016 | Crushing, grinding or separating >100,000-500,000 tonnes<br>Mining for Minerals >100,000-500,000 tonnes |

## 3.2 Proposed modification

The proposed modification involves changing the operating hours of the primary crusher from daytime operation only (7:00 am and 7:00 pm, seven days a week), to 24 hours/day, seven days a week.

No changes are proposed to the design or processing rate of the primary crusher or the amount of ore to be crushed. The primary crusher will continue to be a fully-enclosed structure that is operated and maintained to ensure internal negative internal air pressure, and includes cladding and noise abatement bunding to minimise noise and dust emissions. Particulate emissions are captured through hooded extraction to a bag house. All conveyors and transfer points prior to the grinding circuit are fully enclosed, and dust is controlled via insertable bag dust collection units. Strategically placed misting sprays assist in the control of fugitive dust emissions.

Noise abatement bunds are installed around the ROM pad and on the north and south side of the primary crusher. These provide shielding for the front end loader operating on the ROM pad, as well as the primary crusher.

BHOP is also seeking approval to continue road transport of ore to off-site processing facilities at a rate of up to 60,000 tonnes per annum. Road transport would be between 7 am and 5 pm, Monday to Friday. A portion of ore mined from the old main lode orebody is substantially weathered and cannot be separated using the on-site processing plant (see Section 3.3). This ore needs to be transported off-site for processing. It is expected that the weathered ore will be encountered sporadically (every two to three years) throughout the mine life. The current estimated volume of weathered ore to be mined is in the order of 20,000 tonnes, with approximately 500 tonnes currently stockpiled on site.

For the processing of this ore off-site to be economically viable, ore would need to be transported at an average rate of 5,000 tonnes per month. Therefore mining and transport of this ore is likely to occur when mining can occur at this rate. On average, this would equate to five trucks per day based on an average of 5,000 tonnes per month when this ore is being mined.

Heavy vehicles travelling to and from the Project site would use the existing road train route and sign-posted bypass route through Broken Hill to the Silver City Highway or Barrier Highway, depending on the destination of the weathered ore. A suitable processing plant is yet to be confirmed. BHOP is currently considering two processing plants which are on the western outskirts of Broken Hill, and operated by Pinnacles and Cristal Mining, respectively. Trucks would access these two processing plants from Kanandah Road and Pinnacles Road via the Silver City Highway.

No changes are proposed to any other aspects of the project, including:

- the approved mining method;
- hours of operation of other project elements (shunting of concentrate wagons and rock blasting, which will continue to operate within the hours specified in PA 07_0018);
- the approved ore extraction rate (750,000 tonnes per annum or 8,450,000 tonnes over the life of the mine); or
- the mine life.

## 3.3 Need for modification

The proposed modification will improve the overall efficiency of resource extraction at the Project site.

Due to the limitations on operating hours of the primary crusher to the daytime period (7:00 am to 7:00 pm), there are times when the remainder of the processing plant, which is approved to operate 24 hours, must be turned off as a consequence of a shortfall in crushed ore. The operating hours of the crusher from 7:00 am to 7:00 pm were originally proposed to minimise noise impacts at night. Although changes were made to the primary crusher under the PPR which resulted in reduced noise impacts (refer Section 3.1) that would allow night time criteria to be met, no changes to the operating hours of the primary crusher were sought.

Under current operations, there must be sufficient ore transported to the ROM pad during the day to enable crushing to be undertaken in the daytime period to provide sufficient feed to the mill to maintain processing through the night. Current mine scheduling cannot always achieve this which periodically results in a shortfall of crushed ore. The shortfall has a direct impact on the total tonnes milled which in turn impacts train scheduling, and flow-on effects down the supply chain (eg shipping scheduling).

Permitting the primary crusher to operate 24 hours/day seven days a week will:

- provide more opportunity for crushing, to counteract operational limitations due to shortfalls in ROM ore to the ROM pad during the daytime period, breakdowns, maintenance and train scheduling;
- improve flexibility of mine scheduling by enabling ore on the ROM pad to be crushed during the night time period, which will free space on the ROM pad and allow for continued extraction and placement of ore on the ROM pad during the night time period;
- improve the consistency of ROM feed to the mill/mitigate the risk of shortfalls, which is not achievable under the current operating hours. A more even feed of crushed ROM ore to the mill will improve operational efficiencies for the overall Project.

The transport of ore is required due to the processing requirement for a portion of ore mined from the old main lode orebody, which is substantially weathered. The ore is held in different minerals and cannot be separated using the on-site processing plant. Attempts at processing this ore on-site have been unsuccessful, with potential product lost to the tailings storage facility. It is anticipated that a plant with a gravity separation circuit be more successful separating and recovering the existing product in the weathered ore.

Due to the limited quantities of this type of ore at present, it is not feasible to install separation equipment at the Project site. Therefore the ability to transport ore off-site from the old main lode orebody will enable economically viable quantities of resource to be extracted, and then processed at an off-site processing facility. While there are suitable plants at operations on the outskirts of Broken Hill, BHOP has not yet entered into any contractual arrangements with other plant operators to process ore from the Project site. Therefore, as the destination for the ore is not yet known, transport routes from the Project site to both the Barrier Highway and the Silver City Highway have been assessed in this EA.

## 3.4 Modification to conditions

BHOP requests the following modification to Condition 16 of Schedule 3 of PA 07_0018:

Delete Condition 7 of Schedule 2:

> Until ore processing facilities have been constructed and commissioned on the site, the Proponent is permitted to transport crushed ore by road to the Endeavour Mine, or such other location approved by the Director-General, for processing. Following commissioning of the ore processing facilities, the Proponent shall only transport zinc and lead concentrates from the site by rail, except in an emergency situation and with the prior written approval of the Director-General.

and replace with:

> The Proponent is permitted to transport up to 60,000 tonnes per annum of ore by road for processing at off-site facilities.
>
> The Proponent shall only transport zinc and lead concentrates from the site by rail, except in an emergency situation and with the prior written approval of the Director-General.

Delete Condition 16 of Schedule 3:

> Operational activities associated with the project are permitted to occur at any time, subject to compliance with the noise limits specified in this approval, and subject to the following restrictions:
>
> (a) crushing shall only occur between 7:00am and 7:00pm on any day;
>
> (b) shunting of concentrate wagons shall only occur between 7:00am and 6:00pm on any day; and
>
> (c) production rock blasting shall only occur between 6:45am and 7:15pm on any day.

and replace with:

> Operational activities associated with the project are permitted to occur at any time, subject to compliance with the noise limits specified in this approval, and subject to the following restrictions:
>
> (a) shunting of concentrate wagons shall only occur between 7:00am and 6:00pm on any day; and
>
> (b) production rock blasting shall only occur between 6:45am and 7:15pm on any day.

# 4 Consultation

## 4.1 Engagement strategy

A stakeholder engagement strategy is in place for the Project. Consultation for the modification will use the following components of the existing stakeholder engagement strategy to communicate the proposed modification activities to stakeholders:

- BHOP (CBH) website – provides updates on current and future planned works and provides a means to contact CBH to discuss issues or aspects of the Project;
- community notice board – to disseminate information and to inform residents of upcoming works;
- BHOP complaints hotline – to record complaints and complaints follow up;
- door knock notification to directly affected people; and
- letters to agencies.

## 4.2 Resolution of complaints

BHOP maintains a register for community complaints and concerns, which are reported through the Annual Environmental Management Report (AEMR) process. The 2012 AEMR lists a total of 21 complaints over the reporting period with five of these related to dust, BHOP deployed a water truck to respond to each of these incidents. Water seepage complaints were also noted and a variety of management actions taken (pumping, expansion of water storage basins, trench installation) to resolve the issues. There was one noise complaint related to truck movements at night and two related to blasting. No visual or lighting issues were recorded.

The 2013 AEMR lists a total of 68 complaints over the reporting period with 55 of these related to blasting vibration. Five noise complaints were recorded, in all cases noise emissions were found to be below relevant criteria. Dust complaints were recorded twice, with additional dust suppression implemented. No visual or lighting issues were recorded.

## 4.3 Stakeholder engagement for the modification

Consultation relating to the proposed modification is ongoing. A summary of consultation with regulators to date is detailed in Table 4.1.

## Table 4.1 Proposed modification consultation

| Organisation | Method of consultation | Comments provided | Where addressed in EA |
|---|---|---|---|
| NSW Department of Planning and Infrastructure | Letter dated 14/06/13 | Main concern is the potential noise disturbance to nearby residents. | Section 5.2 |
| | | Assess the potential noise associated with the loader operation. | Section 5.2 |
| | | Look at ways to minimise noise such as reverse alarms, management actions regarding the timing of scheduled maintenance of the primary crusher plant (such that night time operation of the crusher is not used to enable routine maintenance during the day). | Section 5.2 |
| NSW Environment Protection Authority | Letter dated 14/06/13 | Letter detailing the proposed modification was submitted to the Environment Protection Authority inviting comments and issues to be considered in the EA. | Section 5.2 |
| | Phone call to Darren Wallett 20/06/13 | EA to provide assessment of noise impacts, in particular potential noise impacts to nearby residents. | Section 5.2 |
| | | Noise assessment to consider: | |
| | | • background noise levels at night; | Section 5.2 |
| | | • Actual (as opposed to modelled) measured sound power levels to be adopted in modelling; and | Section 5.2 |
| | | • ability of BHOP to demonstrate compliance with predicted noise levels with crusher and FEL operating at night. | Section 5.2 |
| | | EPA requested to be involved in the preparation of the noise impact assessment prior to lodgement of the EA. | Consultation ongoing |
| | Letter received from Darren Wallet 26/06/13 | Noise assessment to consider: | |
| | | • NSW Government's Industrial Noise Policy; | Section 5.2.1 |
| | | • Preference for 7 days (trial) of noise and vibration monitoring of the crusher and associated activities at night; | BHOP is corresponding with EPA and DP&I |
| | | • Assess potential air quality (dust) impacts from the proposal; and | Section 5.3 |
| | | • Identify additional vehicle movements and additional crushing and milling processes. | Section 3.2 |
| NSW Division of Resources and Energy | Letter dated 14/06/13 | Letter detailing the proposed modification was submitted to the Division of Resources and Energy inviting comments and issues to be considered in the EA. | Section 5.2 |
| | Phone call to Kathy Graham 20/06/13 | Raised request for modelling noise of the FEL for the 24 hours/day seven days a week scenario. | Section 5.2 |

## Table 4.1 Proposed modification consultation

| Organisation | Method of consultation | Comments provided | Where addressed in EA |
|---|---|---|---|
| Broken Hill City Council | Letter dated 14/06/13 | Letter detailing the proposed modification was submitted to Broken Hill City Council inviting comments and issues to be considered in the EA. | Section 5.2 |
| | Phone call to Peter Oldsen 20/06/13 | EA to provide assessment of noise impacts, in particular potential noise impacts to nearby residents. | Section 5.2 |
| | | Noise assessment to consider: | Section 5.2 |
| | | • temperature inversions at night time; | Section 5.2 |
| | | • hills/inclines that will exacerbate noise of front end loader; | Section 5.2 |
| | | • noise from ore being dumped from the FEL into the crusher - potential sleep disturbance; and | Section 5.2 |
| | | • ability of BHOP to demonstrate compliance with predicted noise levels with crusher and FEL operating at night. | Section 5.2 |
| | | Council expects consultation with the community regarding the modification to be undertaken. | Section 4.1 |

# 5 Environmental assessment and management

## 5.1 Screening risk assessment

The only change under the proposed modification is the changing of operating hours of the primary crusher to permit the crusher to operate at any time during a 24 hour period. A screening risk assessment (Table 5.1) identifies potential environmental impacts of the proposed modification.

**Table 5.1 Summary review of environmental assessments**

| Environmental aspect | Potential impact of proposed modification | Outcome |
|---|---|---|
| Noise and blasting | Noise from the operation of the primary crusher operating at any time with in a 24 hour period. | Updated quantitative assessment provided in Section 5.2 this EA. |
| Air quality | No impact from 24 hour operation of the primary crusher, as previous impact assessments were based on the maximum ore throughput of 750,000 tpa, which will not change. Continuation of heavy vehicle movements associated with ore transport from the Project site is proposed. | Consideration of air quality impacts is provided in Section 5.3 this EA. |
| Soil and water | No impact as there is no additional footprint and no increase in the extraction rate or processing of ore. | No change from original EA/PPR/Mod 1, therefore no further assessment required. |
| Heritage | No impact as there is no additional footprint. | No change from original EA /PPR/Mod 1, therefore no further assessment required. |
| Ecology | No impact as there is no additional footprint and no increase in the extraction rate or processing of ore. | No change from original EA /PPR/Mod 1, therefore no further assessment required. |
| Visual amenity | Negligible impact from 24 hour operation of the primary crusher as lighting already operates 24 hours/day. | Consideration of visual impacts is provided in Section 5.5 this EA. |
| Transport | No additional ore will be crushed. Continuation of heavy vehicle movements associated with ore transport from the Project site is proposed. | Consideration of transport impacts is provided in Section 5.4 of this EA. |
| Waste | No impact as there is no increase in the extraction rate or processing of ore. | No change from original EA /PPR/Mod 1, therefore no further assessment required. |
| Social and economic | No impact as there is no increase in the extraction rate or processing of ore. | No change from original EA /PPR/Mod 1, therefore no further assessment required. |
| Rehabilitation and final landform | No impact as there is no additional footprint and no increase in the extraction rate or processing of ore. | No change from original EA /PPR/Mod 1, therefore no further assessment required. |

The only potential impacts which require detailed assessment relate to noise impacts as a result of operating the primary crusher at any time in a 24 hour period. Potential impacts to air quality and visual amenity are also considered. There will be no change to other environmental aspects, which will remain consistent with previous assessment reports.

## 5.2 Noise assessment

EMM completed a noise impact assessment for the proposed modification (see Appendix A). Subsequent to the noise impact assessment, RASP undertook a trial of the crusher operation during the night-time period in consultation with DP&I. The trial was requested to qualify the operational noise modelling results and to further demonstrate PA operational noise criteria can be satisfied with the crusher operating during the night-time period (see Appendix B). The results of the noise impact assessment and subsequent trial are summarised in the following sections.

### 5.2.1 Operational noise limits

Condition 17 of Schedule 3 of PA 07_0018, 31 January 2011, provides operational noise limits for the Project. These noise limits are consistent with the Project specific noise levels (PSNLs) in previous noise assessments, derived in accordance with the NSW Environmental Protection Authority (EPA) *Industrial Noise Policy* (INP) (EPA 2000). Operational noise limits for the site from PA 07_0018 are provided in Table 5.2. Operational noise limits consider the average noise emission of a source over 15 minutes and are appropriate for assessing noise from relatively steady-state sources, such as engine noise from mobile plant and processing equipment. The night-time limits relevant to the proposed modification range between 35 and 39 dB(A). Noise assessment locations (receivers) are shown in Figure 5.1.

**Table 5.2 Operational noise limits**

| Receiver No | Location | Operational noise limit, $L_{eq,15minute}$ dB(A) | | |
|---|---|---|---|---|
| | | Day | Evening | Night |
| A1 | Piper St North | 38 | 37 | 35 |
| A2 | Piper St Central | 38 | 37 | 35 |
| A3 | Eyre St North | 44 | 41 | 39 |
| A4 | Eyre St Central | 44 | 41 | 39 |
| A5 | Eyre St South | 44 | 41 | 39 |
| A6 | Bonanza & Gypsum Sts | 48 | 41 | 39 |
| A7 | Carbon St | 35 | 35 | 35 |
| A8 | South Rd | 48 | 39 | 39 |
| A9 | Crystal St | 46 | 39 | 39 |
| A10 | Garnet & Blende Sts | 42 | 41 | 35 |
| A11 | Crystal St | 46 | 39 | 39 |
| A12 | Crystal St | 46 | 39 | 39 |
| A13 | Eyre St North 2 | 38 | 35 | 35 |
| A14 | Piper St North | 35 | 35 | 35 |

*Source: PA 07_0018*


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**Noise assessment locations**

RASP Mine - Modification 2

Figure 5.1

### 5.2.2 Noise modelling

#### i Sound power levels

Sound power level measurements were conducted to quantify the operating noise level of the primary crusher and front end loader (FEL) on the ROM pad. Noise measurements were made on the ROM pad near the crusher load point and at the rear of the primary crusher by BHOP site personnel (under the technical direction of EMM).

Acoustic treatments on the primary crusher include a corrugated metal enclosure, internal noise insulating lining and apron feeders. The crusher is also located within a 14 m deep cutting which significantly shields receptors to the south.

A sound power level (Lw) of 97 dB(A), $L_{eq,15min}$ was measured at the ROM pad crusher enclosure opening (ie south of the crusher). An Lw of 107 dB(A), $L_{eq,15min}$ was measured at the rear of the crusher enclosure (ie north of the crusher). These measured sound power levels were included in the noise model, replacing the previous sound power level (106 dB(A), $L_{eq,15min)}$. The updated noise model is therefore considered worst case.

A detailed review of the measured crusher sound power level spectrum also identified dominant low frequency energy. A plus 5 dB(A) modifying factor adjustment was therefore applied to the crusher in accordance with INP methods.

The FEL loading the crusher is fitted with noise suppression equipment. A sound power level of 127 dB(A), $L_{max}$ was also measured for the FEL loading the crusher. This level was adopted for the sleep disturbance assessment. Operation of the FEL was included in the noise model. The FEL operates on the ROM pad which is relatively flat which limits noise emissions from changing of gears associated with inclines.

All other plant and equipment positions and Lw data remains as previously assessed (*Noise and Vibration Assessment for the New Process Plant Location* (EMM 2010) and *RASP Mine Relocated Fan Noise Assessment* (EMM 2011).

Noise levels were predicted during calm and temperature inversion conditions for comparison with operational noise limits.

#### ii Mitigation and management

Operational noise mitigation and management applicable to night-time operations were included in the modelling:

- positioning the process plant in a natural depression on site;
- cladding of the primary crusher and installing noise abatement bunding to the north and south of the crusher;
- covered conveyors and transfer stations;
- building around the flotation facility providing shielding of the SAG and ball mills;
- noise suppression on the FEL;
- noise suppression on the forklift used at the wagon stockpile area and the rail loading;

- bunding along the southern side of the mine truck haul route and the perimeter of the ROM pad;
- two overlapping bunds at the northern side of the wagon stockpile area to shield Crystal Street residences; and
- limiting rail shunting and loading to daytime only.

The following additional noise mitigation and management measures are proposed by BHOP and were included in the modelling:

- haul trucks travelling to the ROM pad during the night time period will be automated to minimise engine revolutions by selecting a higher gear when travelling up ramp to the ROM pad; and
- defer the use of the high pitched reversing alarms when located on the ROM pad.

It is noted that haul trucks travel to and from, and operate on the ROM pad at night under current operations.

#### iii Noise modelling

The noise levels from site activities occurring during the night period were modelled. Night time operational 15 minute and maximum noise levels were predicted during calm and temperature inversion conditions for comparison with operational noise limits. The predictions include noise from all plant and equipment as previously assessed during the night-time period with the addition of the crushing plant and FEL.

### 5.2.3 Impact assessment

#### i Predicted noise levels

Predicted operational 15 minute and maximum noise levels are provided in Table 5.3 (see Appendix A for further detail).

**Table 5.3 Predicted night-time noise levels**

| Receiver No | Location | Operational noise | | | Sleep disturbance | | |
|---|---|---|---|---|---|---|---|
| | | Predicted noise level, dB(A), $L_{eq,15min}$ [1] | | Operational noise limit (night), dB(A), $L_{eq,15min}$ | Predicted noise level, dB(A), $L_{max}$ | | Sleep disturbance criteria, dB(A), $L_{max}$ |
| | | Calm | Temp. inv. | | Calm | Temp. inv. | |
| A1 | Piper St North | <35 | <35 | 35 | 35 | 38 | 45 |
| A2 | Piper St Central | <35 | 35 | 35 | <35 | 38 | 45 |
| A3 | Eyre St North | 37 | 38 | 39 | <35 | <35 | 49 |
| A4 | Eyre St Central | <35 | <35 | 39 | <35 | 35 | 49 |
| A5 | Eyre St South | <35 | <35 | 39 | <35 | <35 | 49 |
| A6 | Bonanza & Gypsum Sts | <35 | <35 | 39 | <35 | <35 | 49 |
| A7 | Carbon St | <35 | <35 | 35 | <35 | <35 | 45 |
| A8 | South Rd | <35 | <35 | 39 | <35 | <35 | 49 |
| A9 | Crystal St | <35 | <35 | 39 | <35 | <35 | 49 |

### Table 5.3 Predicted night-time noise levels

| Receiver No | Location | Operational noise | | | Sleep disturbance | | |
|---|---|---|---|---|---|---|---|
| | | Predicted noise level, dB(A), $L_{eq,15min}$ [1] | | Operational noise limit (night), dB(A), $L_{eq,15min}$ | Predicted noise level, dB(A), $L_{max}$ | | Sleep disturbance criteria, dB(A), $L_{max}$ |
| | | Calm | Temp. inv. | | Calm | Temp. inv. | |
| A10 | Garnet & Blende Sts | <35 | <35 | 35 | <35 | <35 | 45 |
| A11 | Crystal St | <35 | <35 | 39 | <35 | <35 | 49 |
| A12 | Crystal St | <35 | 39 | 39 | 35 | 38 | 49 |
| A13 | Eyre St North 2 | 35 | 35 | 35 | 38 | 42 | 45 |
| A14 | Piper St North | <35 | <35 | 35 | 36 | 40 | 45 |

*Notes: 1. Predicted noise levels include a plus 5 dB modifying factor penalty adjustment to the crusher to account for low frequency noise.*

The predicted $L_{eq,15min}$ noise levels from the proposed modification satisfy the PA 07_0018 operational noise limits at all assessment locations during calm and temperature inversion conditions with the primary crusher and FEL in operation.

The predicted $L_{max}$ noise levels from the site satisfy the sleep disturbance criteria at all assessment locations during calm and temperature inversion conditions with the primary crusher and FEL in operation.

#### ii Trial of night-time crusher operation

A trial of the primary crusher operation during the night-time period was undertaken in consultation with DP&I to further demonstrate that operational noise limits can be achieved. Full details of the trial are presented in Appendix B

The trial was carried out between 6 and 10 January 2014, and included on-site attended noise measurements to determine night-time noise levels from site operations at close distance (9 January 2014), and attended noise monitoring during four consecutive nights (6 to 10 January 2014) to quantify off-site noise levels from site at the most affected receivers (A1, A11, A12, A13 and A14) during the night-time period. The primary crusher (and FEL) were operating during the trial.

It is noted that several noise attenuation measures were implemented by BHOP prior to the trial (in addition to the measures in Section 5.2.2ii), including:

- plant and equipment operator training;
- new crusher ROM bin loading techniques requiring the bin to be full at all times of loading after hours, thereby minimising fall into ROM bin;
- optimisation of haul truck speed and gear changing via the use of intermediate markers along haulage routes;
- reduction in haul truck numbers;
- optimisation of the existing earth bund along the southern haul road (from Kintore Pit to ROM pad); and

- insulation of the walls of the primary crusher.

The noise monitoring results recorded during the first three nights between 6 and 8 January 2014, were dominated by milling and processing operations. No attended measurements were recorded at southern assessment locations A1, A13 and A14 during the first three nights of monitoring due to southerly winds rendering site noise inaudible at these locations based on our observations. It should be noted that the filtration shed was in operation during the first three nights of monitoring, and was turned off on 9 January 2014. This was done to simulate likely night-time noise emissions from site since the filtration shed could be modified to reduce its contribution (estimated to be 7 dB prior to attenuation).

Filtering operations remained switched off for the last night of the monitoring period on 9 January 2014, so site noise contribution without the filtration shed could be determined at the most affected receivers. This was not possible at northern assessment locations A11, A12 and Iodide St during the last night of monitoring due to northerly winds reducing site noise to inaudible levels.

The monitoring results show that all mine noise contributions recorded at southern assessment locations A1, A13 and A14 (Figure 5.1) were below the operational noise limits. The monitoring results at northern assessment locations A11, A12 and Iodide St (Figure 5.1) show that the majority of mine noise contributions recorded were above the operational noise limits; however, the wind speed during the majority of the measurements was above 3 m/s. To determine site noise levels at northern assessment locations (A11, A12 and Iodide St) without noise contribution from the filtration shed, noise monitoring results recorded at these locations were adjusted using on-site noise measurements (ie a reduction of 7 dB with the filtration shed off). This does not account for any noise attenuating topographic features present between the site and the assessment locations, and therefore is deemed conservative.

A summary of the attended monitoring results are presented in Table 5.4.

**Table 5.4 Attended monitoring results summary (excludes noise from filtration shed)**

| Location | Site $L_{eq(15min)}$ noise level, dB(A) | | Operational noise limits, dB(A) |
|---|---|---|---|
| | Crusher off | Crusher on | |
| **Northern locations** | | | |
| A12 | 35-38 | 37-39 | 39 |
| A11 | 34-36 | 36-37 | 39 |
| Iodide St | 38-39 | 38-39 | 39 (assumed) |
| **Southern locations** | | | |
| A1 | <35 | <35 | 35 |
| A13 | <35 | <35 | 35 |
| A14 | <35 | <35 | 35 |

*Note: The noise monitoring results for northern assessment locations A11, A12 and Iodide St are adjusted to exclude noise contributions from the filtration shed. The noise monitoring results for southern assessment locations A1, A13 and A14 are not adjusted as the filtration shed was not operating at the time of monitoring.*

The attended noise monitoring results (without the filtration shed) demonstrate that the site's noise contribution satisfies the operational noise limits at all assessment locations, inclusive of the operation of the crusher.

To satisfy the operational night-time noise limits, it is essential that noise emitted by the filtration shed is sufficiently managed. In order to mitigate offsite noise contribution from the filtration shed, BHOP will:

- modify pipeworks to the filtration shed operations; and
- relocate the source within the existing noise confined area.

Since completion of the trial, a tyre bund wall has been established around the filtration shed to minimise noise emissions from this source. With adequate minimisation of noise from the filtration shed, it is expected that operational noise limits will be met at all assessment locations with 24 hour operation of the primary crusher.

### 5.2.4 Summary

The noise impact assessment predicts that the proposed modification, including night-time operation of the primary crusher would not lead to exceedances of the operational noise limits. The existing mitigation and management measures will continue to be implemented, together with the additional mitigation measures proposed. Noise monitoring will continue to be undertaken in accordance with the site's existing noise monitoring program to ensure that operational noise limits are met.

## 5.3 Air quality

The original EA and subsequent PPR and vent shaft modification reports assessed total suspended particulates, deposited dust, particulates ($PM_{10}$) and greenhouse gas emissions as a consequence of the Project and recommended implementation of a dust monitoring program.

As the modification does not include any additional plant, ore processing, stockpiling or crushing, or any change to the maximum ore processing rate of 750,000 tpa, impacts on air quality as a consequence of the modification are expected to remain the same.

Dust control measures will continue to be carried out in accordance with Schedule 3 Condition 31 of PA 07_0018. This includes full enclosure of the crushing circuit enclosure to be kept under negative pressure and vented to a baghouse.

In accordance with dust control measures prescribed in the original EA, trucks transporting ore will be enclosed with tarpaulins, and will be washed through a vehicle washdown (all sides and underneath) prior to leaving the site.

## 5.4 Traffic and transport

The primary access point to the Project site is from Eyre St, which is also the approved access point for heavy vehicles. Heavy vehicles travelling to and from the Project site use the existing B-Double and road train route and sign-posted bypass route through Broken Hill. Vehicles travelling to the Silver City Highway use the existing bypass route along Comstock Street and Patton Street. Vehicles travelling east of Broken Hill travel east along Eyre Street, along Holten Drive, Menindee Road and on to the Barrier Highway. These heavy vehicle routes are shown on Figure 5.2, and are as described in the original EA.

The original EA assessed the impact of transportation of ore on the local road network during the construction period until the processing plant was commissioned. A total of 21 daily truck movements was assessed. Impacts to the local road network were predicted to be minimal compared to the available capacity of the local road network. The proposed modification seeks the continuation of transport of ore

during operations, but at a lower rate (10 movements per day) than originally assessed during construction and commissioning period.

The original EA predicted the total operational traffic generation (light and heavy vehicles) as 202 daily vehicle movements, including 30 heavy vehicle movements which was based on conservative estimates. The proposed modification would result in an additional 10 daily vehicle movements on the local road network travelling to either the Silver City Highway or Barrier Highway during operation, equating to a total of 212 movements.

As the predicted traffic generation is less than an additional 5% of the Project site's current daily traffic, and vehicles would use existing B-Double and road train routes approved in the original EA, impacts to the local road network are predicted to be negligible.

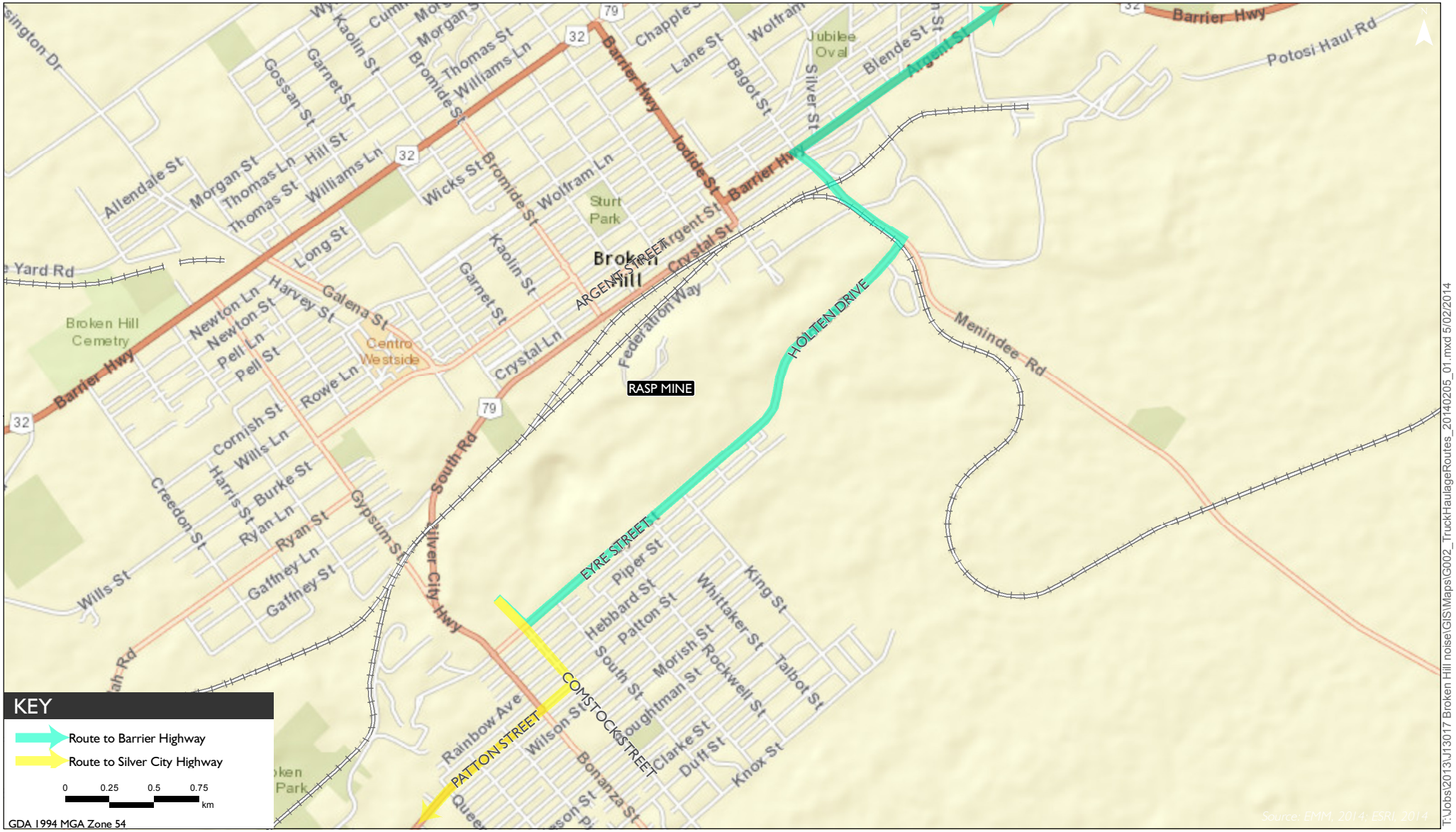
## 5.5 Visual

The original EA and subsequent PPR and vent shaft modification reports assessed the impact of the processing plant, associated infrastructure and mobile plant movements.

The proposed modification does not involve any additional above ground surface disturbance, any additional plant or lighting, and hence there will be no additional visual impacts as a consequence of the modification.

The following mitigation and management measures from the original EA are reproduced for their particular relevance to this modification:

- lighting being kept to a minimum necessary to safely carry out operations; and
- lighting being directed away from residences through the use of directional lighting equipment and shielding.




Source: EMM, 2014; ESRI, 2014

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EMM
EMGA Mitchell McLennan

**Truck haulage routes**

RASP Mine - Modification 2

Figure 5.2

# 6 Statement of commitments

The commitments made by BHOP to manage potential environmental and social impacts identified in the original EA, PPR and Mod 1 will continue to be applied. Given the relatively minor nature of the proposed modification, only one change to the statement of commitments is required.

Removal of the commitment:

> limiting crushing to dayshift (7:00 am to 7:00 pm) seven days a week.

Commitments pertinent to the proposed modification are described in Table 6.1.

**Table 6.1 Existing commitments pertinent to proposed modification**

| Item | Commitment |
|---|---|
| **Stakeholder engagement** | Rasp Mine information notice board to be located at the Café and Miner's Memorial. |
| | Continued implementation of the complaints procedure to address individual issues as they arise. |
| **Noise and vibration** | Silencer installed on haul trucks and noise suppression kits on the FEL(s) used on the ROM pad, container stockpile and rail loading areas. |
| | Cladding of the primary crusher and installing noise abatement bunding to the north and south of the crusher. |
| | Installing a building around the flotation facility providing shielding of the SAG and ball mills. |
| | BHOP will ensure that operational noise is within limits of the NSW Industrial Noise Policy. |
| **Air quality** | Maintain and operate all plant and equipment installed or used at the site in a proper and efficient manner. |
| | Maintaining the premises in a condition which minimises or prevents the emission of dust from the premises. |
| | Installation of wagon and vehicle wash facilities . |
| **Transport** | Heavy vehicles associated with deliveries to the mine to use approved B-Double routes. |
| **Visual amenity** | Lighting being kept to a minimum necessary to safely carry out operations. |
| | Lighting being directed away from residences through the use of directional lighting equipment and shielding. |

*Source: Project Approval number 07_0018 NSW Department of Planning (2012).*

# 7 Justification and conclusion

BHOP seeks approval from the Minister for Planning and Infrastructure to modify PA 07_0018 under Section 75W of the EP&A Act to extend the hours of operation of the primary crusher and associated plant from daytime operation only (7:00 am and 7:00 pm, seven days a week), to 24 hours/day, seven days a week. Operating hours were originally limited to reduce night time noise impacts. Although changes were made to the processing plant and primary crusher as part of the PPR which resulted in reduced noise impacts that would allow night time criteria to be met, no changes to the operating hours of the primary crusher were sought.

As detailed in this EA, due to limitations on the operating hours of the primary crusher, there are times when the remainder of the processing plant, which is approved to operate 24 hours, must be turned off as a consequence of a shortfall in crushed ore. Under current operations, there must be sufficient ore transported to the ROM pad during the day to enable crushing to be undertaken in the daytime period to provide sufficient feed to the mill to maintain processing through the night. Current mine scheduling cannot always achieve this which periodically results in a shortfall of crushed ore. The shortfall has a direct impact on the total tonnes milled which in turn impacts train scheduling, and flow-on effects down the supply chain. Permitting the primary crusher to operate at any time with a 24 hour period seven days a week will:

- provide more opportunity for crushing to counteract operational limitations;
- improve flexibility of mine scheduling; and
- improve the consistency of ROM feed to the mill/mitigate the risk of shortfalls improving operational efficiencies for the overall Project.

The noise assessment for the modification predicts that the operation of the primary crusher and associated plant during the night time will not lead to noise levels above operational noise limits in PA 07_0018, or exceedances of sleep disturbance noise criteria. The modification can be managed under the existing management systems.

The proposed modification also seeks to continue transport of a portion (up to 60,000 tonnes per annum) of ore from the Project site by road. Attempts at processing weathered ore from the old main lode orebody on-site have been unsuccessful, with potential product lost to the tailings storage facility. It is anticipated that a plant with a gravity separation circuit be more successful separating and recovering the existing product in the weathered ore. The ability to transport ore from the old main lode orebody off-site will enable economically viable quantities of resource to be extracted. The traffic generated by transport of ore was considered in the original EA. This EA predicts that the continuation of an average of five trucks per day transporting ore from the Project site would result in negligible impacts on the local road network.

The predicted impacts of the proposed modification are consistent with the approved project and objects of the EP&A Act. In conclusion, it is considered that on balance, the modification will not result in material impacts beyond the approved Project, and should be approved with the following modified conditions:

Delete Condition 7 of Schedule 2:

> Until ore processing facilities have been constructed and commissioned on the site, the Proponent is permitted to transport crushed ore by road to the Endeavour Mine, or such other location approved by the Director-General, for processing. Following commissioning of the ore processing facilities, the Proponent shall only transport zinc and lead concentrates from the site by rail, except in an emergency situation and with the prior written approval of the Director-General.

and replace with:

The Proponent is permitted to transport up to 60,000 tonnes per annum of ore by road for processing at off-site facilities.

The Proponent shall only transport zinc and lead concentrates from the site by rail, except in an emergency situation and with the prior written approval of the Director-General.

Delete Condition 16 of Schedule 3:

Operational activities associated with the project are permitted to occur at any time, subject to compliance with the noise limits specified in this approval, and subject to the following restrictions:

(a) crushing shall only occur between 7:00am and 7:00pm on any day;

(b) shunting of concentrate wagons shall only occur between 7:00am and 6:00pm on any day; and

(c) production rock blasting shall only occur between 6:45am and 7:15pm on any day.

and replace with:

Operational activities associated with the project are permitted to occur at any time, subject to compliance with the noise limits specified in this approval, and subject to the following restrictions:

(a) shunting of concentrate wagons shall only occur between 7:00am and 6:00pm on any day; and

(b) production rock blasting shall only occur between 6:45am and 7:15pm on any day.

# Abbreviations

The following acronyms or abbreviations have been used in this EA.

| | |
|---|---|
| ABS | Australian Bureau of Statistics |
| AEMR | Annual environmental management report |
| BHOP | Broken Hill Operations Pty Ltd |
| CBH | CBH Resources Limited |
| dB(A) | Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear |
| DCP | Development control plan |
| DP&I | NSW Department of Planning and Infrastructure |
| DRE | NSW Division of Minerals and Energy |
| EA | Environmental assessment |
| EMM | EMGA Mitchell McLennan Pty Limited |
| EPA | NSW Environment Protection Authority |
| EP&A Act | *NSW Environmental Planning and Assessment Act 1979* |
| EPL | Environmental Protection License |
| FEL | Front-end loader |
| INP | Industrial noise policy |
| LEP | Local Environmental Plan |
| $L_1$ | The noise level exceeded for 1% of the time. |
| $L_{10}$ | The noise level which is exceeded 10% of the time. It is roughly equivalent to the average maximum noise level |
| $L_{eq}$ | The energy average noise from a source. This is the equivalent continuous sound pressure level over a given period. The Leq (15min) descriptor refers to an Leq noise level measured over a 15-minute period |
| LGA | Local government area |
| $L_{max}$ | The maximum sound pressure level received during a measuring interval |
| LZN | Land zoning map |
| MNES | Matter of national environmental significance |
| MOP | Mine operations plan |
| POEO Act | *Protection of the Environment Operations Act 1997* |
| $PM_{10}$ | Notation used to describe particles of 10 micrometers or less |
| PPR | Preferred project report |
| PSNL | Project specific noise level |
| ROM | Run of mine |
| SEPP | State Environmental Planning Policy |
| Sound power level ($L_w$) | A measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment |
| tpa | tonnes per annum |
| TSC Act | *Threatened Species Conservation Act 1995* |

# References

Australian Bureau of Statistics (ABS), 2011 *Census QuickStats*, http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/LGA11250, viewed 19 June 2013.

Broken Hill Operations Pty Ltd, 2010 *Preferred Project Report*.

Broken Hill Operations Pty Ltd, 2010 *Environmental Assessment Report*.

Broken Hill Operations Pty Ltd, 2011 *Environmental Assessment Report Variation to Project Relocation of Ventilation Shaft*.

EMGA Mitchell McLennan Pty Ltd (EMM), 2013 Letter report: *RASP Mine - Noise Impact Assessment for Proposed 24 hour Crusher Operation*.

Environment Protection Authority (EPA), 1999 *Industrial Noise Policy.*

# Appendix A

Noise impact assessment for proposed 24 hour crusher operation

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12 August 2013

Ben Jones
Environment and Community Officer
Broken Hill Operations Pty Ltd
CBH Resources - Rasp Mine

Re: RASP Mine - Noise impact assessment for proposed 24 hour crusher operation

# 1 Introduction

EMGA Mitchell McLennan Pty Limited (EMM) has been engaged to review potential noise impacts associated with the proposed 24 hour operation of crushing plant at the RASP mine operations in Broken Hill, NSW.

It is understood operations in the early phases of the site's new stage has identified a critical need to extend the crusher's operating hours from daytime only (ie 7:00 am to 7:00 pm, as noted in Condition 16a, Schedule 3 of the project approval, 07_0018) to 24 hours, seven days per week.

# 2 Noise criteria

## 2.1 Project approval

Condition 17 of Schedule 3 of the project approval (PA 07_0018) dated 31 January 2011 provides noise limits the project must meet during its operational phase. These noise limits are consistent with the project specific noise levels (PSNL's) as derived in accordance with the NSW Environmental Protection Authority (EPA) 1999, *Industrial Noise Policy* (INP) in previous noise assessments. These limits are provided in Section 2.2.

## 2.2 Operational noise limits

Operational noise limits for the site reproduced from PA 07_0018 are provided in Table 2.1. The night-time limits range between 35 to 39 dB(A) and are of relevance to this noise impact assessment.

**Table 2.1 Operational noise limits**

| Receiver No | Location | Operational noise limit, $L_{eq,15minute}$ dB(A) | | |
|---|---|---|---|---|
| | | Day | Evening | Night |
| A1 | Piper St North | 38 | 37 | 35 |
| A2 | Piper St Central | 38 | 37 | 35 |
| A3 | Eyre St North | 44 | 41 | 39 |
| A4 | Eyre St Central | 44 | 41 | 39 |
| A5 | Eyre St South | 44 | 41 | 39 |
| A6 | Bonanza & Gypsum Sts | 48 | 41 | 39 |
| A7 | Carbon St | 35 | 35 | 35 |

### Table 2.1 Operational noise limits

| Receiver No | Location | Operational noise limit, $L_{eq,15minute}$ dB(A) | | |
|---|---|---|---|---|
| | | Day | Evening | Night |
| A8 | South Rd | 48 | 39 | 39 |
| A9 | Crystal St | 46 | 39 | 39 |
| A10 | Garnet & Blende Sts | 42 | 41 | 35 |
| A11 | Crystal St | 46 | 39 | 39 |
| A12 | Crystal St | 46 | 39 | 39 |
| A13 | 419 Eyre St | 38 | 35 | 35 |
| A14 | Piper St North | 35 | 35 | 35 |

## 2.3 Sleep disturbance criteria

Operational noise limits above consider the average noise emission of a source over 15 minutes and are appropriate for assessing noise from relatively steady-state sources, such as engine noise from mobile plant and processing equipment. Noise from sources such as reversing alarms and loading associated impacts are however intermittent (rather than continuous) in nature, and as such, needs to be assessed using the $L_1$ or $L_{max}$ noise metrics.

The most important impact of intermittent noises is the disturbance of the sleep of nearby residents. While the INP does not specify a criterion for assessing sleep disturbance, the EPA 2011, *Road Noise Policy* (RNP) indicates that levels below 50 to 55 dB(A) inside residences are unlikely to wake sleeping occupants. The likely number of noise events per night should also be considered. If bedroom windows are open, this corresponds to an external maximum noise level of approximately 60 to 65 dB(A) $L_{max}$ at a residence.

However, this is considerably higher than the previous position on sleep disturbance in the EPA 1994, *Environmental Noise Control Manual* which recommends that $L_1$ noise from a source should not exceed the existing background noise level by more than 15 dB(A). For the purpose of this assessment, the descriptors $L_{max}$ and $L_1$ may be considered interchangeable. This is the EPA's current position on sleep disturbance criteria.

As part of the background noise monitoring, it was established that background noise levels for some residences are as low as 30 dB(A). As such, the sleep disturbance criterion would be as low as 45 dB(A) $L_{max}$ for some residences.

The latter more conservative sleep disturbance criterion was adopted for this study, with proposed criteria for the adopted assessment locations listed in Table 2.4 and applies to the night time assessment period only.

### Table 2.2 Sleep disturbance noise criteria

| Receiver No | Location | Sleep Disturbance Criteria, $L_{max}$ dB(A) |
|---|---|---|
| | | Night |
| A1 | Piper St North | 45 |
| A2 | Piper St Central | 45 |
| A3 | Eyre St North | 49 |
| A4 | Eyre St Central | 49 |
| A5 | Eyre St South | 49 |
| A6 | Bonanza & Gypsum Sts | 49 |
| A7 | Carbon St | 45 |

**Table 2.2 Sleep disturbance noise criteria**

| Receiver No | Location | Sleep Disturbance Criteria, $L_{max}$ dB(A) |
|---|---|---|
| | | Night |
| A8 | South Rd | 49 |
| A9 | Crystal St | 49 |
| A10 | Garnet & Blende Sts | 45 |
| A11 | Crystal St | 49 |
| A12 | Crystal St | 49 |
| A13 | 419 Eyre St | 45 |
| A14 | Piper St North | 45 |

## 2.4 Noise modelling

This section provides the noise modelling inputs and results of noise predictions for the proposed 24 hour crushing plant operation.

### 2.4.1 Crusher sound power levels

Sound power level measurements were carried out by RASP mine site personnel under the technical direction of EMM to quantify the in-situ operating noise level of the crushing plant. A series of noise measurements were carried out on the ROM pad near the load point and at the rear of the crushing plant.

The crushing plant has been treated acoustically within a large corrugated metal enclosure, internal absorbent lining and apron feeders. The crusher is also located within a 14 m cutting which significantly shields receptors to the south.

A sound power level (Lw) of 97 dB(A), $L_{eq,15min}$ was derived from measurement for the ROM pad crusher enclosure opening (ie south of the crusher). An Lw of 107 dB(A), $L_{eq,15min}$ was derived for the rear of the crusher enclosure (ie north of the crusher). Crusher breakout noise from the enclosure was the dominant source of noise in both cases. These measured sound power levels were included in the noise model in replacement of previous sound power level which was set at 106 dB(A), $L_{eq,15min.}$ The updated noise model is therefore considered worst case.

A detailed review of the measured crusher sound power level spectrum also identified dominant low frequency energy. A plus 5 dB(A) modifying factor adjustment was therefore applied to the crusher in accordance with INP methods.

A front end loader (FEL) fitted with noise suppression loading the crusher (ie as previously assessed for day-time operations) was also included in the night-time noise model.

A sound power level of 127 dB(A), $L_{max}$ was also measured from the FEL loading the crusher and was the level adopted for the sleep disturbance assessment.

All other plant and equipment positions and Lw data remains as previously assessed in EMGA Mitchell McLennan 2010, *Noise and Vibration Assessment for the New Process Plant Location* and 2011, *RASP Mine Relocated Fan Noise Assessment*, including all operational noise mitigation and management applicable to night-time operations.

### 2.4.2 Noise level predictions

Night time operational 15 minute and maximum noise levels were predicted during calm and temperature inversion conditions for comparison with operational noise limits and sleep disturbance criteria. The predictions include noise from all plant and equipment as previously assessed during the night-time period with the addition of the crushing plant and FEL as discussed earlier. Results are provided in Table 2.3.

Noise contours from the current operations and the proposed modification have also been provided in Attachment A for comparison. The superposition of these two sets of contours depicts graphically the relatively subtle change in noise levels between the current and proposed night operations.

**Table 2.3 Predicted night-time noise levels**

| Receiver No | Location | Predicted Noise Level, dB(A), $L_{eq,15min}$ [1] | | PA 07_0018 noise limits, dB(A), $L_{eq,15min}$ | Predicted Noise Level, dB(A), $L_{max}$ | | Sleep disturbance criteria, dB(A), $L_{max}$ |
|---|---|---|---|---|---|---|---|
| | | Calm | Temp. Inv. | | Calm | Temp. Inv. | |
| A1 | Piper St North | <35 | <35 | 35 | 35 | 38 | 45 |
| A2 | Piper St Central | <35 | 35 | 35 | <35 | 38 | 45 |
| A3 | Eyre St North | 37 | 38 | 39 | <35 | <35 | 49 |
| A4 | Eyre St Central | <35 | <35 | 39 | <35 | 35 | 49 |
| A5 | Eyre St South | <35 | <35 | 39 | <35 | <35 | 49 |
| A6 | Bonanza & Gypsum Sts | <35 | <35 | 39 | <35 | <35 | 49 |
| A7 | Carbon St | <35 | <35 | 35 | <35 | <35 | 45 |
| A8 | South Rd | <35 | <35 | 39 | <35 | <35 | 49 |
| A9 | Crystal St | <35 | <35 | 39 | <35 | <35 | 49 |
| A10 | Garnet & Blende Sts | <35 | <35 | 35 | <35 | <35 | 45 |
| A11 | Crystal St | <35 | <35 | 39 | <35 | <35 | 49 |
| A12 | Crystal St | <35 | 39 | 39 | 35 | 38 | 49 |
| A13 | Eyre St North 2 | 35 | 35 | 35 | 38 | 42 | 45 |
| A14 | Piper St North | <35 | <35 | 35 | 36 | 40 | 45 |

*Notes: 1. Predicted noise levels include a plus 5 dB modifying factor penalty adjustment to the crusher to account for low frequency noise.*

The predicted $L_{eq,15min}$ noise levels from the site satisfy the PA 07_0018 noise limits at all assessment locations during calm and temperature inversion conditions with the crushing plant and FEL in operation, together with all other approved night time activities.

Attachment A shows residential properties within the 40 dB(A) noise contour (proposed modification) to the north of Crystal Street, adjacent to assessment location A12. These properties however will be acoustically shielded by industrial/commercial buildings located to the south of Crystal Street, which to provide a conservative result, are not currently accounted for in the noise model. In practice noise levels at these properties would be less than those depicted in the noise contours and likely to meet the noise limit of 39 dB(A) applicable to this area. CBH Resources will verify operating noise levels at these residential properties during the regular compliance noise monitoring at the site.

The predicted $L_{max}$ noise levels from the proposed night activities of the crushing plant and FEL satisfy the sleep disturbance criteria at all assessment locations during calm and temperature inversion conditions. It should also be noted the predicted $L_{max}$ noise levels from all other plant and equipment as presented in EMGA Mitchell McLennan 2010, *Noise and Vibration Assessment for the New Process Plant Location* remain valid given no other aspects of the site operation are being modified.

In summary, the 24 hour operation of the crushing plant is expected to generate noise levels within environmental noise limits as provided in PA 07_0018. It should be noted that the modelling undertaken includes a cross check of modelling versus measured noise levels at close range to the crusher. Modelling also includes the now present 5 m high earth bund around the ROM pad area.

CBH have committed to carrying out a trial of night-time crusher operation whilst measuring offsite noise levels to verify against operational noise level predictions and PA 07_0018 noise limits. EMM recommend the following approach for the crusher operation trial:

1. Conduct operator attended noise measurements at up to four assessment locations (A11, A12, A13 and A14) during the night-time period, for five consecutive nights. In addition, measurement at two locations will be conducted where the 40 dB(A) contour encapsulates residences near assessment location A12. One measurement should be conducted at the residents north of Crystal Street and one measurement to the south of commercial/industrial buildings to quantify the barrier loss provided (ie as discussed previously in Section 2.4.2).

2. The operator attended measurements will be for 15 minutes, one measurement with and one without the crusher and front end loader in operation. Background and ambient noise sources will be observed and recorded along with any contribution from mining activities.

3. Weather conditions during the measurements will be obtained from the onsite weather station and evaluated with measured noise levels.

4. A report will be provided following the monitoring outlining the methodology, instrumentation details, measurement results and weather conditions. The report will provide a comparison of measured mine noise levels with the crusher in operation against noise modelling results and operational noise criteria.

# 3 Conclusion

EMM has completed an updated assessment of operational noise for the proposed RASP mine activities, to include the 24 hour operation of the crushing plant (and ROM pad FEL) which is currently limited to 7.00 am to 7.00 pm. The assessment found that the night-time crushing plant operation including associated loading activates will not lead to noise levels above project approval (07_0018) operational noise limits and sleep disturbance noise criteria at all assessment locations.

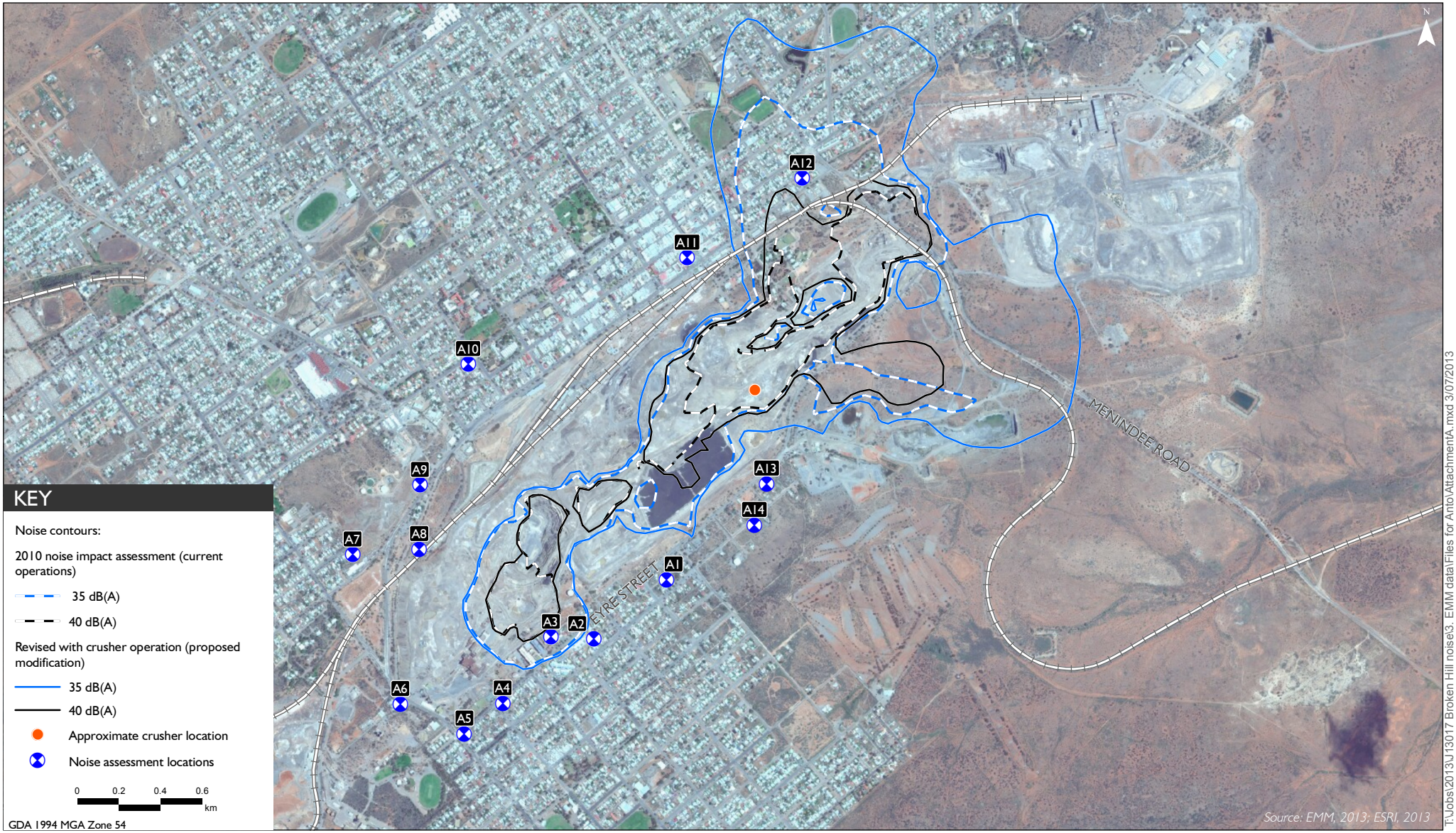
We trust this information meets your requirements and if you need any further clarifications please contact our office.

Yours sincerely

Daniel Weston (MDesSc, BEngTech, MAAS)
Senior Acoustic Consultant
dweston@emgamm.com
Reviewed by: NI, 3/7/13

# Attachment A

## Noise contours

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**Attachment A**

Night time operational $L_{eq,\ 15\ min}$ noise level contours, dB(A) - temperature inversion 3°C/100 m

# Appendix B

## Noise impact assessment – trial of night-time crusher operation

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20 January 2014

Paul Walson
Manager - Health Safety and Environment
Broken Hill Operations Pty Ltd
CBH Resources - Rasp Mine

Re: RASP Mine - Noise impact assessment for proposed 24 hour crusher operation

# 1 Introduction

EMGA Mitchell McLennan Pty Limited (EMM) has been engaged to review mine processing noise associated with the proposed 24 hour operation of crushing plant at the RASP Mine, Broken Hill, NSW.

A noise assessment for the proposed 24 hour crusher operation was prepared by EMM in July 2013 (ref: J13017L1V4_24 hour crusher operation). The assessment generally involved the measurement of in-situ noise levels from the crushing plant, and the inclusion of the noise measurement data into a revised acoustic model. The results of the assessment found the crusher to be an insignificant noise contributor in comparison to other operating plant and equipment. Furthermore, noise from the site with the crusher in operation satisfied the project approval (PA) limits.

The NSW Department of Planning and Infrastructure (DP&I) requested that a trial of the crusher operation be conducted during the night-time period, to verify the noise modelling results via direct noise measurements. This trial was carried out by EMM and CBH Resources between 6 and 10 January, 2014. It should also be noted that several noise attenuation measures were put in place by the proponent to manage site noise emissions. These measures include:

- Plant and equipment operator training;
- New Crusher ROM bin loading techniques requiring the bin to be full at all times of loading after hours, minimising fall into ROM bin;
- Optimisation of haul truck speed and gear changing via the use of intermediate markers along haulage route;
- Reduction in haul truck numbers;
- Optimisation of the existing earth bund along the southern haul road (from Kintore Pit to ROM pad); and
- Insulation of the crusher walls.

This report summarises the outcomes of the crusher operation trial and provides a determination of the offsite noise levels associated with night-time operations including the crusher.

# 2 Noise criteria

## 2.1 Project approval

Condition 17 of Schedule 3 of the project approval (PA 07_0018) dated 31 January 2011 provides noise limits the project must meet during its operational phase. These noise limits are consistent with the project specific noise levels (PSNL's) as derived in accordance with the NSW Environment Protection Authority (EPA) 2000, *Industrial Noise Policy* (INP) in previous noise assessments. These limits are provided in Section 2.2.

## 2.2 Operational noise limits

Operational noise limits for the site reproduced from PA 07_0018 are provided in Table 1. The night-time limits that are of relevance to this report range between 35 dB(A) to 39 dB(A).

**Table 1 Operational noise limits**

| Receiver no | Location | Operational noise limit, $L_{eq,15min}$ dB(A) | | |
|---|---|---|---|---|
| | | Day | Evening | Night |
| A1 | Piper St North | 38 | 37 | 35 |
| A2 | Piper St Central | 38 | 37 | 35 |
| A3 | Eyre St North | 44 | 41 | 39 |
| A4 | Eyre St Central | 44 | 41 | 39 |
| A5 | Eyre St South | 44 | 41 | 39 |
| A6 | Bonanza and Gypsum Sts | 48 | 41 | 39 |
| A7 | Carbon St | 35 | 35 | 35 |
| A8 | South Rd | 48 | 39 | 39 |
| A9 | Crystal St | 46 | 39 | 39 |
| A10 | Garnet and Blende Sts | 42 | 41 | 35 |
| A11 | Crystal St | 46 | 39 | 39 |
| A12 | Crystal St | 46 | 39 | 39 |
| A13 | 419 Eyre St | 38 | 35 | 35 |
| A14 | Piper St North | 35 | 35 | 35 |

Site locality, assessment and monitoring locations are presented in Figure 1.


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**Site locality plan**

RASP Mine crusher trial

Figure 1

# 3 Methodology

## 3.1 On-site attended noise measurements

On-site attended noise measurements were completed using a Brüel and Kjær 2250 one-third octave band integrating sound level meter. Field calibration of the instrument was undertaken using a Brüel and Kjær type 4230 calibrator. Measurements were undertaken in accordance with Australian Standard AS1055-1997 “Description and Measurement of Environmental Noise” Parts 1, 2 and 3.

The measurements were completed on 9 January 2014, to determine noise levels from site related operations at close distance. These consisted of a combination of relatively short term (1-minute or less) and relatively close range measurements and 15-minute attended measurements. The measurements identified the process plant’s filtration area (filtration shed) as the dominant source from site. Due to the position and orientation of the filtration shed as well as the surrounding terrain, it was concluded that northern assessment locations, including A11 and A12, would experience higher noise levels from the filtration process than southern assessment locations, including A1, A13 and A14.

To quantify noise emissions from all other plant and equipment situated within the milling and processing area, the filtration shed was turned off. The subsequent measurement identified a decrease of 7 dB in site noise levels. It is important to note that the filtration shed has been permitted operation since commencement and is a constant noise source. We understand that no complaints have ever been received with regard to this noise.

## 3.2 Attended noise monitoring at assessment locations

Attended noise monitoring was conducted during four consecutive night-time periods from 6 to 10 January 2014 to quantify offsite noise levels from site at the most affected receivers.

Assessment locations included A1, A11, A12, A13 and A14 (refer to Figure 1). One additional monitoring location (Iodide St) situated between assessment locations A11 and A12 was selected to obtain better resolution of noise in this area of the community. It should be noted that other assessment locations listed in Table 1 would experience lower noise levels from site operations than the aforementioned locations due to greater distance and intervening topography.

The noise monitoring trial consisted of 15-minute attended measurements, with the noise contribution from RASP Mine quantified where possible amongst ambient noise. Two scenarios were measured, and include:

1. crushing plant and front-end loader (FEL) not operating (crusher off); and

2. crushing plant and FEL operating (crusher on).

The purpose of the noise measurements was to quantify offsite noise contributions with the 'crusher on' and confirm whether noise levels are below the noise limits as predicted by the previous noise assessment. It should be noted that ‘crusher’ operation referred to herein generally relates to the collective operation of the crusher and the ROM pad FEL. The exception was during the last night of monitoring on 9 January 2010, where the FEL was not operating due to the crushing plant being loaded to its maximum capacity before attended monitoring commenced.

# 4 Noise monitoring results

The noise monitoring results recorded during the first three nights between 6 and 8 January 2014, were dominated by milling and processing operations. No attended measurements were recorded at southern assessment locations A1, A13 and A14 during the first three nights of monitoring due to southerly winds rendering site noise inaudible at these locations based on our observations. It should be noted that the filtration shed was in operation during the first three nights of monitoring, and was turned off on 9 January 2014. This was done to simulate likely night-time noise emissions from site since the filtration shed could be modified to reduce its contribution significantly.

Filtering operations remained switched off for the last night of the monitoring period on 9 January 2014, so site noise contribution without the filtration shed could be determined at the most affected receivers. However, this was not possible at northern assessment locations A11, A12 and Iodide St during the last night of monitoring due to northerly winds reducing site noise to inaudible levels.

The monitoring results show that all mine noise contributions recorded at southern assessment locations A1, A13 and A14 were below the PA noise limits. The wind speed was greater than 3 m/s during measurements at these southern locations, and the wind direction would have enhancing effects on site noise levels recorded at these assessment locations. Therefore it is anticipated that site noise levels would be of a lower magnitude during calmer or less enhancing meteorological conditions (eg F class temperature inversion or wind speed equal to or below 3 m/s).

The monitoring results at northern assessment locations A11, A12 and Iodide St show that the majority of mine noise contributions recorded were above the PA noise limits. However, the wind speed during the majority of the measurements was above 3 m/s. To determine site noise levels at northern assessment locations (A11, A12 and Iodide St) without noise contribution from the filtration shed, noise monitoring results recorded at these locations were adjusted using on-site noise measurements. The on-site noise measurements for the filtration shed indicated a drop of 7 dB to overall site noise with the filtration process off. This does not account for any noise attenuating topographic features present between the site and the assessment locations, and therefore is deemed conservative.

The noise monitoring results presented in Table 2 for northern assessment locations A11, A12 and Iodide St are adjusted to determine noise levels without the filtration shed. The noise monitoring results for southern assessment locations A1, A13 and A14 are not adjusted as the filtration shed was not operating at the time of monitoring. Site noise $L_{eq(15min)}$ contributions without the filtration shed were below the PA noise limits on all occasions. It should be noted that the wind speed was above 3 m/s for 26 out of 36 samples and therefore criteria did not apply for these samples according to the site's approval and the INP. Where extraneous noise interferences were observed during a measurement, the site $L_{eq(15min)}$ contribution was determined by filtering measured total $L_{eq(15min),}$ and excluding noise frequencies uncharacteristic to site noise. Further, noise level ranges associated with site operations were noted during each measurement. Short term $L_{eq}$ level (site only) was also noted prior to interference caused by significant extraneous noise sources such as car pass-bys.

## Table 2 Noise monitoring results - Scenarios 1 and 2

| Location | Scenario | Date | Time (hrs) | Total 15-minute noise level, dB(A) | | | Site $L_{eq(15min)}$, dB(A) | | Limits apply | Meteorological data[1] | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $L_{eq}$ | $L_{max}$ | $L_{90}$ | Adjusted | Noise limit | Y/N | Wind speed (m/s) | Wind direction (degrees) | |
| A12 | 2 - Crusher on | 6/1/14 | 23:27 | 53 | 75 | 45 | 38 | 39 | N | 3.8 | 148 | Processing plant audible and constant 43-47. Wind in trees and frequent car pass-bys. |
| A11 | 2 - Crusher on | 6/1/14 | 23:51 | 54 | 72 | 42 | 36 | 39 | N | 3.9 | 148 | Processing plant audible and constant 41-44, including FEL occasionally. Haul truck revs just audible briefly. Wind in trees and frequent car pass-bys. |
| A11 | 1 - Crusher off | 7/1/14 | 0:26 | 50 | 74 | 41 | 36 | 39 | N | 4.3 | 160 | Processing plant audible and constant 39-43 and occasionally higher. Haul truck revs audible for less than a minute. Wind in trees and frequent car pass-bys. |
| A12 | 1 - Crusher off | 7/1/14 | 0:59 | 46 | 53 | 43 | 38 | 39 | N | 4.2 | 157 | Processing plant audible and constant 40-45 and occasionally higher for the first 4 minutes, then constant 43-48 and occasionally higher thereafter. Wind in trees and distant traffic just audible. |
| A11 | 1 - Crusher off | 7/1/14 | 1:20 | 46 | 69 | 39 | 34 | 39 | N | 4.6 | 154 | Processing plant audible and constant 38-43 and occasionally higher. Wind in trees, dog nearby and car pass-bys. |
| A12 | 1 - Crusher off | 7/1/14 | 2:08 | 47 | 65 | 42 | 37 | 39 | N | 4.2 | 151 | Processing plant audible and constant 40-46 and occasionally higher. Haul truck revs audible for approximately 3 minutes. Wind in trees and frequent car pass-bys. |
| A11 | 1 - Crusher off | 7/1/14 | 2:50 | 50 | 70 | 41 | 36 | 39 | N | 3.6 | 152 | Processing plant audible and constant 39-43 and occasionally higher. Haul truck revs audible for approximately 4 minutes. Wind in trees and frequent car pass-bys. |
| A12 | 1 - Crusher off | 7/1/14 | 3:22 | 52 | 79 | 43 | 38 | 39 | N | 3.8 | 147 | Processing plant audible and constant 40-47 and occasionally higher. Wind in trees and bus pass-by. |
| A11 | 1 - Crusher off | 7/1/14 | 3:43 | 56 | 81 | 40 | 35 | 39 | N | 4.4 | 146 | Processing plant audible and constant 39-43. Haul truck revs just audible for approximately 2 minutes. Bus pass-by and nearby taxi idling. Measurement stopped after 9 minutes due to taxi idling nearby. |

## Table 2 Noise monitoring results - Scenarios 1 and 2

| Location | Scenario | Date | Time (hrs) | Total 15-minute noise level, dB(A) | | | Site $L_{eq(15min)}$, dB(A) | | Limits apply | Meteorological data[1] | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $L_{eq}$ | $L_{max}$ | $L_{90}$ | Adjusted | Noise limit | Y/N | Wind speed (m/s) | Wind direction (degrees) | |
| A12 | 2 - Crusher on | 7/1/14 | 22:20 | 48 | 69 | 45 | 38 | 39 | N | 3.3 | 145 | Processing plant audible and constant 44-46 and occasionally higher, including FEL occasionally. Haul truck revs just audible briefly. Other unidentified noise unrelated to site audible. Dog nearby and occasional car pass-bys. |
| A11 | 2 - Crusher on | 7/1/14 | 22:40 | 59 | 78 | 44 | 37 | 39 | N | 3.7 | 145 | Processing plant audible and constant 42-44 and occasionally higher, including FEL occasionally. Haul truck revs just audible briefly. Frequent car pass-bys. |
| Iodide St[2] | 2 - Crusher on | 7/1/14 | 23:00 | 58 | 81 | 46 | 39 | 39 | N | 3.7 | 143 | Processing plant audible and constant 43-49 and occasionally higher. Wind in trees and frequent car pass-bys. |
| A12 | 2 - Crusher on | 7/1/14 | 23:17 | 51 | 68 | 44 | 38 | 39 | N | 3.6 | 150 | Processing plant audible and constant 41-48 and occasionally higher, including FEL briefly. Other unidentified noise unrelated to site audible. Wind in trees and frequent car pass-bys. |
| Iodide St[2] | 1 - Crusher off | 8/1/14 | 0:16 | 46 | 65 | 43 | 39 | 39 | Y | 2.9 | 147 | Processing plant audible and constant 41-50 and occasionally higher. Wind in trees, distant traffic and bang from nearby rail work. |
| A12 | 1 - Crusher off | 8/1/14 | 0:36 | 49 | 71 | 42 | 37 | 39 | Y | 2.4 | 155 | Processing plant audible and constant 42-48 and occasionally higher. Wind in trees, distant traffic and occasional car pass-bys. |
| A11 | 1 - Crusher off | 8/1/14 | 1:34 | 53 | 76 | 39 | 34 | 39 | Y | 2.6 | 156 | Processing plant audible and constant 37-43 and occasionally higher. Haul truck revs audible for approximately 1 minute. Occasional car pass-bys. |
| Iodide St[2] | 1 - Crusher off | 8/1/14 | 1:53 | 49 | 73 | 43 | 39 | 39 | Y | 2.4 | 158 | Processing plant audible and constant 42-48 and occasionally higher. Wind in trees and car pass-by. |
| A12 | 1 - Crusher off | 8/1/14 | 2:11 | 43 | 72 | 39 | 35 | 39 | Y | 2.6 | 160 | Processing plant audible and constant 40-44 and occasionally higher. Dog just audible. |
| A11 | 1 - Crusher off | 8/1/14 | 2:32 | 46 | 65 | 40 | 36 | 39 | Y | 2.9 | 159 | Processing plant audible and constant 39-43 and occasionally higher. Haul truck revs audible for approximately 6 minutes. Occasional car pass-bys. |

## Table 2 Noise monitoring results - Scenarios 1 and 2

| Location | Scenario | Date | Time (hrs) | Total 15-minute noise level, dB(A) | | | Site $L_{eq(15min)}$, dB(A) | | Limits apply | Meteorological data[1] | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $L_{eq}$ | $L_{max}$ | $L_{90}$ | Adjusted | Noise limit | Y/N | Wind speed (m/s) | Wind direction (degrees) | |
| Iodide St[2] | 1 - Crusher off | 8/1/14 | 2:51 | 53 | 78 | 42 | 38 | 39 | Y | 2.8 | 149 | Processing plant audible and constant 41-47 and occasionally higher. Occasional car pass-bys. |
| A12 | 2 - Crusher on | 8/1/14 | 22:12 | 50 | 70 | 43 | 37 | 39 | Y | 2.9 | 153 | Processing plant audible and constant 42-46 and occasionally higher. Haul truck revs audible for approximately 2 minutes. Dog barking and frequent car pass-bys. |
| Iodide St[2] | 2 - Crusher on | 8/1/14 | 22:45 | 54 | 77 | 43 | 38 | 39 | Y | 2.7 | 154 | Processing plant audible and constant 43-48 and occasionally higher. Wind in trees and frequent car pass-bys. |
| A12 | 2 - Crusher on | 8/1/14 | 23:05 | 49 | 73 | 44 | 39 | 39 | Y | 2.8 | 158 | Processing plant audible and constant 43-47 and occasionally higher, including FEL occasionally. Haul truck revs audible for approximately 2 minutes. Frequent car pass-bys. |
| A11 | 2 - Crusher on | 8/1/14 | 23:30 | 54 | 76 | 43 | 36 | 39 | N | 3.1 | 154 | Processing plant audible and constant 41-45 and occasionally higher, including FEL occasionally. Haul truck revs just audible briefly. Frequent car pass-bys. |
| A11 | 2 - Crusher on | 8/1/14 | 23:47 | 59 | 82 | 42 | 37 | 39 | N | 3.1 | 156 | Processing plant audible and constant 43-47 and occasionally higher. Haul truck revs just audible briefly. Frequent car pass-bys. |
| Iodide St[2] | 1 - Crusher off | 9/1/14 | 0:30 | 50 | 73 | 44 | 38 | 39 | N | 3.1 | 155 | Processing plant audible and constant 43-48 and occasionally higher. Wind in trees and frequent car pass-bys. |
| A12 | 1 - Crusher off | 9/1/14 | 0:55 | 51 | 75 | 42 | 37 | 39 | N | 3.3 | 164 | Processing plant audible and constant 41-47 and occasionally higher. Haul truck revs audible for approximately 2 minutes. Occasional car pass-bys. |
| A11 | 1 - Crusher off | 9/1/14 | 1:20 | 50 | 73 | 39 | 34 | 39 | N | 3.1 | 160 | Processing plant audible and constant 37-44 and occasionally higher. Wind in trees, passing pedestrians and frequent car pass-bys. |
| Iodide St[2] | 1 - Crusher off | 9/1/14 | 1:45 | 50 | 69 | 44 | 39 | 39 | N | 3.5 | 153 | Processing plant audible and constant 42-47 and occasionally higher. Wind in trees and frequent car pass-bys. |
| A1 | 2 - Crusher on | 9/1/14 | 22:38 | 41 | 58 | 37 | <35 | 35 | N | 4.9 | 43 | Processing plant inaudible. Haul truck revs audible for approximately 4 minutes. Wind in trees, dog barking and occasional car nearby. |

## Table 2 Noise monitoring results - Scenarios 1 and 2

| Location | Scenario | Date | Time (hrs) | Total 15-minute noise level, dB(A) | | | Site $L_{eq(15min)}$, dB(A) | | Limits apply | Meteorological data[1] | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $L_{eq}$ | $L_{max}$ | $L_{90}$ | Adjusted | Noise limit | Y/N | Wind speed (m/s) | Wind direction (degrees) | |
| A1 | 2 - Crusher on | 9/1/14 | 23:02 | 46 | 68 | 40 | <35 | 35 | N | 4.8 | 37 | Processing plant inaudible. Haul truck just audible briefly. Wind in trees and frequent nearby traffic. |
| A14 | 2 - Crusher on | 9/1/14 | 23:25 | 43 | 57 | 38 | <35 | 35 | N | 4.5 | 37 | Processing plant inaudible. Haul truck audible for approximately 2 minutes. Wind in trees and frequent nearby traffic. |
| A13 | 2 - Crusher on | 9/1/14 | 23:44 | 49 | 71 | 36 | <35 | 35 | N | 6.0 | 27 | Processing just audible <35. Haul truck just audible for approximately 2 minutes. Wind in trees and frequent nearby traffic. |
| A1 | 1 - Crusher off | 10/1/14 | 0:34 | 41 | 53 | 36 | <35 | 35 | N | 5.5 | 28 | Processing plant just audible <35. Haul truck audible for approximately 3 minutes. Wind in trees and frequent nearby traffic. |
| A14 | 1 - Crusher off | 10/1/14 | 0:55 | 38 | 57 | 34 | <35 | 35 | N | 4.9 | 24 | Processing plant just audible <35. Wind in trees, dog barking and occasional nearby traffic. |
| A13 | 1 - Crusher off | 10/1/14 | 1:16 | 50 | 68 | 35 | <35 | 35 | N | 3.8 | 53 | Processing plant just audible ≤35. Wind in trees and frequent nearby traffic. |

*Notes:* *1. Meteorological data was obtained from RASP Mine site's Automatic Weather Station.*

*2. Additional monitoring location used to obtain better resolution of noise in this area of the community. $L_{eq(15min)}$ noise limit for this location is assumed to be 39 dB(A).*

# 5 Discussion

A summary of the attended monitoring results are presented in Table 3.

**Table 3 Attended monitoring results summary - without the filtration shed**

| Location | Site $L_{eq(15min)}$ range, dB(A) | | Site noise limits, dB(A) | Limits apply (due to mets) |
|---|---|---|---|---|
| | Crusher off | Crusher on | | |
| Northern locations | | | | |
| A12 | 35-38 | 37-39 | 39 | 4 out of 11 |
| A11 | 34-36 | 36-37 | 39 | 2 out of 11 |
| Iodide St | 38-39 | 38-39 | 39 (assumed) | 4 out of 7 |
| Southern locations | | | | |
| A1 | <35 | <35 | 35 | nil |
| A13 | <35 | <35 | 35 | nil |
| A14 | <35 | <35 | 35 | nil |

The attended noise monitoring results (without the filtration shed) demonstrate that the site's noise contributions satisfies the PA night-time noise limits at all assessment locations, inclusive of the operation of the crusher.

It is noted that a 5 dB modifying factor correction for potential low-frequency noise in accordance with the INP was considered in this assessment, although was found not relevant for the site.

To satisfy the PA night-time noise limits with the proposed night-time operation of the crushing plant, it is essential that noise emitted by the filtration shed is sufficiently managed. It is understood that the proponent is committed to eliminate offsite noise contribution from the filtration shed by either:

- modification of pipeworks to the filtration shed operations (already been scheduled; or
- moving the source within the existing noise confined area.

Since our visit and measurements, a tyre bund wall has been established around the key noise issue with regard to the filtration shed on 17 January 2014 to immediately start to minimise the effects of this area. All other scheduled works are likely to be completed within the next 90 days.

In summary, with adequate noise management of the filtration shed noise levels, the 24 hour operation of the crushing plant is expected to generate noise levels within environmental noise limits at all assessment locations as provided in PA 07_0018.

# 6 Conclusion

EMM has completed an updated assessment of operational noise for the proposed RASP mine night-time operations, to include the 24 hour operation of the crushing plant (and ROM pad FEL) which is currently limited to the hours 7 am to 7 pm. The assessment found that with the implementation of adequate noise management measures to the filtration shed, the night-time crushing plant operation including associated loading activities will not lead to noise levels above project approval (07_0018) operational noise limits.

We trust this information meets your requirements and if you need any further clarifications please contact our office.

Yours sincerely

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Reviewed by: NI, 20/01/14

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