



Rasp Mine

Zinc – Lead – Silver Project

Project Approval No. 07-0018
January 2011

Environmental Assessment

Variation to Project Relocation of Ventilation Shaft

November 2011

Broken Hill Operations Pty Ltd
BROKEN HILL



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SUBMISSION OF ENVIRONMENTAL ASSESSMENT

This EA is prepared under Part 3A of the *Environmental Planning and Assessment Act 1979*

EA PREPARED BY

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PROJECT VARIATION APPLICATION

Applicant Name: *Broken Hill Operations Pty Ltd*
Applicant Address: *Eyre Street PO Box 5073
Broken Hill Broken Hill
NSW 2880 NSW 2880*

Land to be developed: *Property description of land to be developed is contained in the EA.*

Proposed modification: *Approval is sought to modify the Rasp Mine Project pursuant to section 75W of Environmental Planning and Assessment Act 1979 and relocate the ventilation shaft from Kintore Shaft which has now collapsed to a site central and northwest within Consolidated Mine Lease 7 and place fans underground.*

ENVIRONMENTAL ASSESSMENT

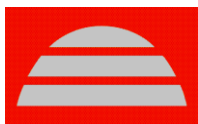
An EA is attached which addresses all matters listed in the Director Generals Requirements dated March 2009 and an email from Ms Georgia Ivancevic, Environmental Planning Officer, Major Development Assessment, Department of Planning & Infrastructure, dated 25th October 2011.

CERTIFICATE

I certify that the contents of this EA have been prepared and to the best of my knowledge:

- Contains all available information that is relevant to the environmental assessment of the development to which the EA relates; and*
- Is true in all material particulars and does not, by its presentation or omission of information, materially mislead.*

Name: *Gwendalynn Wilson*
Date: *November 2011*



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- Figure 1** Project site and surrounding area, below
- Figure 2** Ventilation rise alternate location, below
- Figure 3** Ventilation shafts indicated on CML7, below
- Figure 4** Design details for excavations, attached
- Figure 5** Vent Shaft Pad Detail, attached
- Figure 6** Indicative fan outlet and diffuser, below
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Photographs 1&2 Site for relocated ventilation shaft

Table 1 Summary of disadvantages identified in original EAR and new control measures proposed

Table 2 Summary of consultation with government agencies

Table 3 Summary review of environmental assessments

Appendix A - EGMA|Mitchell McLennan, Letter Report - *RASP Mine Relocated Fan Noise Assessment*, 26th September 2011

Appendix B - PAEHolmes, Letter Report - *Air Quality Assessment for Rasp Mine Revised Ventilation Stack Location*, 4th October 2011

Appendix C - *Rasp Mine - Site Water Management Plan*, Golder Associates, November 2011



EXECUTIVE SUMMARY

The Rasp Mine Project proposes to expand underground mining operations, construct and operate a processing plant to produce zinc and lead concentrate and to install a rail siding for concentrate dispatch. Project Approval (07_0018) was received 31st January 2011 under Part3A of the *Environmental Planning and Assessment Act 1979*.

As part of the development of the Rasp Mine a primary ventilation circuit is required to be constructed within the underground mine to draw air through the mine clearing exhaust fumes, dust and heat resulting from the mining operations and providing fresh air intake. It was proposed in the original Environmental Assessment Report (EAR) for the Rasp Project to locate the ventilation fans in the disused Kintore Shaft in Little Kintore Pit.

This location was discussed in Chapter 2 and in Table 2-19 *Summary of options assessed for major project components*. It was identified as the preferred location as it allowed for adequate fan function whilst providing the maximum reduction in potential air and noise impacts. It utilises an existing shaft providing an efficient alternative to developing a new shaft.

In March this year Broken Hill and the Rasp Mine experienced a high rainfall event that lead to the collapse of the Kintore Shaft. Investigations have found that the integrity of the Shaft cannot be restored and the ventilation rise and fans are required to be relocated.

Broken Hill Operations Pty Ltd proposes to relocate the ventilation shaft to a central location to the north-west of the mining lease and place ventilation fans underground. This location has been chosen as it is centrally located, a greater distance from the lease boundary than that currently proposed, with existing waste dumps providing a natural bund to the shaft. Fans are being located underground to minimise potential noise impacts.

An environmental review has been completed and found that several areas addressed in the Project's previous environmental assessment required further investigation. These included noise, air quality and storm water management. Consultants were engaged to provide updated assessments of their previous studies. A review of visual amenity was also conducted.

In summary the following actions are proposed to mitigate any potential impacts:

Noise

- relocate fans underground
- excavate area around shaft collar
- construct 8m embankment around duct/diffuser

Air quality

- diffuser to be directed in a downwards position

Storm water management

- redesign contours in the area to prevent water ingress into shaft



Visual amenity

- construct 8m embankment around duct/diffuser

The change in location from the already existing Kintore Shaft will result in additional costs to the Project. The majority of these costs are associated with the development of the new shaft, the purpose designed underground fans and the development of an underground chamber to house these fans. In total it is currently estimated that it will cost an additional \$6,600,000 for the relocation of the ventilation circuit.

It is anticipated that there will be negligible impacts to the environment or the community from the new location of the ventilation shaft and the installation of ventilation fans underground.

Pursuant to section 75W of the *Environmental Planning and Assessment Act 1979* BHOP seeks to modify its original Project Approval. The following information is provided to support the application request.



1 INTRODUCTION

The Rasp Mine (the Project) is located on Consolidated Mining Lease 7 (CML7), Broken Hill NSW and is owned by Broken Hill Operations Pty Ltd (BHOP). The Project was declared a Major Project under the State Environment Planning Policy (SEPP) (Major Development) 2005 and required the approval of the NSW Minister for the Department of Planning and Infrastructure under Part 3A of the *Environmental Planning and Assessment Act, 1979* (the Act).

1.1 Project Approval

Project Environmental Assessment

An *Environmental Assessment Report* (EAR) (BHOP, July 2010) supported the Project application and described the following elements of the Project:

- mining of 8,450,000 tonnes (t) of ore until 31 December 2026-
- construction and/or extension of associated infrastructure, plant and equipment, including upgrade of internal roads and construction of an on-site noise abatement barrier;
- transport of ore to the surface in haul trucks;
- ore processing using crushing, milling and flotation;
- tailings management, including deposition at an existing tailings storage facility (TSF1) and into Blackwood Pit (TSF2), and used as back fill for underground mining voids;
- works for surface water management; and
- reinstatement of a rail spur and transport of concentrate in covered rail wagons to a smelter and/or port.

Temporary crushing, stockpiling and transport of ore off-site to the Endeavor Mine was also described in the EAR, however there are no current plans for this.

Preferred Project Report

BHOP subsequently modified the layout and design of the Project in order to further minimise environmental impacts and streamline operations. A Preferred Project Report (PPR) was submitted in September 2010 outlining the proposed changes to the Project and the subsequent reductions in environmental impacts, updated environment assessments for air quality, noise and vibration, and storm water management were also submitted at this time.



These modifications involved:

- modifying the Project Area to include the new rail load-out area at the north-eastern end of the site;
- locating the processing plant to the north-eastern end of the lease (away from densely populated residential areas);
- removal of secondary and tertiary crushers and screens from the crushing circuit; and
- loading concentrate into containers on trucks and transporting them to a newly constructed rail siding located at the north-eastern end of the lease.

Project Approval

On 31st January 2011 BHOP received Project Approval (07_0018) under Part 3A of the Act for the activities as outlined above.

As part of this Approval BHOP are required to carry out the Project generally in accordance with the:

- Environmental Assessment Report;
- Response to Submissions and Preferred Project Report;
- Statement of Commitments; and
- Conditions of the Project Approval.

1.2 Modification requested

As part of the development of the Rasp Mine a primary ventilation circuit is required to be constructed within the underground mine to draw air through the mine clearing exhaust fumes, dust and heat resulting from the mining operations and providing fresh air intake. It was proposed in the original EAR for the Rasp Project to locate the ventilation fans in the disused Kintore Shaft in Little Kintore Pit utilising centrifugal fans.

In March this year Broken Hill and the Rasp Mine experienced a high rainfall event that lead to the collapse of the Kintore Shaft. Investigations have found that the integrity of the Shaft cannot be restored and the ventilation rise and fans are required to be relocated.



BHOP seeks approval to relocate the ventilation shaft to a central location to the north-west of CML7. This location has been chosen as it is closer to the mine workings and will allow the overall ventilation design to be simpler. It is also proposed to install the two primary ventilation fans underground utilising purpose design fans.

In accordance with section 75W of the Act BHOP requests the Minister to modify the Minister's approval of the Rasp Mine, a project to which Part 3A of the Act applies, and provide approval to accommodate the change in location for the underground ventilation shaft and circuit.

1.3 Requirements to be addressed in Environmental Assessment

Following discussions with Ms G Georgia Ivancevic, Environmental Planning Officer, Major Development Assessment, Department of Planning BHOP were advised (email dated 25th October 2011) that it was required to complete an Environmental Assessment which addresses:

- description of the approved project, including relevant figures of the approved project;
- description of the proposed modification, including relevant figures of the proposed modification;
- a simple, clear description of the nature of the site, including an aerial photo of the site; and
- assessment of all other relevant issues that were considered as part of the original Part 3A project approval. A simple table format about other relevant impacts (ie nil, negligible, etc) would suffice. However, in the event that the assessment identifies that some of the other relevant impact are potential, the EA must describe what measures would be implemented to avoid, minimise, mitigate, manage and/or offset these potential impacts.

This Environmental Assessment Report addresses these requirements.

BHOP has completed the "Request to modify a major project form" as required and submits these documents together with supporting information for the Minister's consideration.

The DoP&I do not require the proposal to be publicly exhibited. However, consultation is required with all affected government agencies, including the Office of Environment and Heritage, NSW Office of Water, Greater Western Area Health Service and Broken Hill City Council, during the preparation of the EA. BHOP will also consult with the Department of Primary Industries.



2 SITE SETTING

2.1 Project setting

The Project is located within CML7, including underground and surface lease areas (there are some surface exclusion areas within CML7 and these are not included in the Project and do not form part of the Rasp Mine). CML7 is within the local government area of Broken Hill and occupies a central region of the Broken Hill Line of Lode orebody, approximately 3.8 km long and 1.2 km wide. CML7 incorporates the original mine areas that commenced operations in the 1880s.

The Project is located centrally within the City of Broken Hill and is surrounded by transport infrastructure, areas of commercial and industrial development and some residential housing. The Project is bounded by Eyre Street and Holten Drive to the south and east, Menindee Road (MR 66) to the northeast, Crystal and Argent Streets to the north, and South Road (Silver City Highway SH 22) to the west. These roads form part of the existing trucking route through Broken Hill. The Broken Hill railway station is located directly to the north of the mine and lies on the main Sydney – Perth railway line. Residential and commercial areas are located to the west, north and south of the Project Area, Perilya Broken Hill Operations Pty Ltd mine developments to the east (North Mine) and west (Southern Operations) and the Blue Metal Quarry to the east. These features are shown on **Figure 1**.

Broken Hill is renowned as one of Australia's foremost mining cities and is the largest regional centre in the western half of NSW. In general, the region is dominated by urban development within the City of Broken Hill, cattle and sheep grazing beyond the city limits and extractive industries including mines and quarrying. With the exception of the Line of Lode and its associated waste dumps the surrounding landform is a rejuvenated undulating peneplain.

Mining and associated operations have been conducted at the site for over 125 years. As a result of the extensive mining history of the site, the site is highly modified and disturbed. The original landform has been significantly altered, all original native vegetation has been removed and soils have been degraded.

There are a number of heritage items within the Rasp Mine relating to historic mining activities and the site is recorded on the Register of National Estate for its heritage values. It is also considered by the people of Broken Hill as an important historic site for its role in Broken Hill's history with many of the heritage items listed on the local Broken Hill City Council Local Environment Plan.

2.2 Site setting

The area proposed to relocate the ventilation shaft has been modified by past mining activities. The original landform has been significantly altered, all vegetation has been removed and soils have been covered with waste rock. A view of the proposed site is presented in **Photograph 1**. There are no heritage items within the area or vicinity of the proposed location for the ventilation shaft.



2.3 Lease Area

The area proposed to relocate the ventilation shaft lies within CML7 (at MGA grid coordinates 543618mE and 6463202mS with a ground height datum of 331.6m). There are no surface exclusions detailed within the Lease in this area.



3 MODIFICATION APPLICATION

3.1 Ventilation circuit proposed in EAR and PPR

The EAR and PPR described the ventilation circuit with fresh air entering the underground workings via the decline and the existing Delprat Shaft and travel through the mine, getting pushed and pulled by various fans underground until finally connecting with the 1480' haulage drive. Exhaust or return air was proposed to leave the 1480' level via the existing Kintore Shaft located in Little Kintore Pit. This process was to be assured by twin 450 kW centrifugal fans located at the top of the Kintore Shaft. The top of the shaft located at the base of the Pit would be 20m below the natural surface in this area.

This site was selected as it is approximately central to the Project Area and away from the mining lease boundaries and surrounding neighbours. This type of fan was chosen because of its low noise level characteristics. Ventilation outlets including fans were to be suitably orientated with appropriate noise attenuation mechanisms and air quality control measures installed to minimise impacts to the local community.

3.2 Description of proposed modifications

In March this year Broken Hill and the Rasp Mine experienced a high rainfall event that lead to the collapse of the Kintore Shaft in Little Kintore Pit. Investigations have found that the integrity of the shaft cannot be restored and the ventilation rise and fans are required to be relocated.

It is proposed to relocate the ventilation shaft to a northwest central location an alternate location discussed in the EAR. It is now proposed to construct a new shaft, 400m deep and 5m wide constructed by reaming from the base upwards. In addition, to reduce noise levels, it is proposed to locate the two primary ventilation fans underground in a purpose built chamber. **Figure 2** provides an aerial view indicating the location outlined in the EAR and PPR and the proposed new location. **Figure 3** provides an aerial view of CML7 indicating both locations.

The ventilation shaft position at surface will be surrounded by a purpose built excavation/embankment with an opening to allow vehicle entry. The excavation/embankment will be 8m higher than the natural ground level at this location. This essentially provides acoustic shielding of the ventilation shaft (noise source at surface) to all surrounding residences off site.

In locating the ventilation shaft outside of a pit, as previously proposed, further consideration was given to minimising the potential impact of noise levels to the community. To reduce the potential for noise impacts it was decided to relocate the two primary ventilation fans underground. This location for the ventilation fans has been assumed in the noise assessment and the noise modelling.

The ventilation fans will be purpose designed for installation underground. The fans will be located approximately 400m underground and 160m from the base of the ventilation shaft. **Figure 4** provides details of these excavations and **Figure 5** provides details of the ventilation shaft pad. The



outlet shaft will be the 5m raise bore hole, with a diffuser installed on top which will be approximately 7m high with a 90 degree bend and a 6m diameter opening, refer **Figure 6**. The diffuser will not be visible from the town.

The proposed location was discussed in Table 2-19 of the EA as an alternative location to Little Kintore Pit – “*Ventilation fan located in the western section of the Project Area towards Crystal Street and adjacent to town centre*”.

In reconsidering this alternate location BHOP reviewed the disadvantages identified at this location in the EAR and identified a number of new measures to address any potential impacts. A review of the potential changes to the environmental assessments as per the Director General’s Requirements (March 2009) and the items addressed in the EAR was also undertaken and are outlined in Section 5 of this EA.

Table 1 outlines these ‘disadvantages’ and the measures to address potential impacts. BHOP engaged air quality (PAEHolmes) and noise (EGMA/Mitchell McLennan) consultants to assess these new measures and any potential impacts to the community. Their findings are summarised below and detailed in their reports attached.

Table 1 – Summary of disadvantages identified in original EAR and new control measures proposed

Disadvantages (EAR)	New Control Measures
<i>Ventilation fan location – Ventilation fan located in the western section of the Project Area towards Crystal Street and adjacent to town centre</i>	
Significant potential for adverse noise impacts.	The collar of the shaft will be cut into the side of the existing dump so that there is a rock wall between the town and the shaft. An 8m embankment will surround the fan and diffuser, providing further noise attenuation. The fan motors will be located 400m underground and 160m distance from the base of the shaft.
Fan clearly visible from off-site without considerable earth works.	Earthworks are planned which will house the ventilation outlet (fan duct/diffuser) and it will not be visible from the Broken Hill township.
Condensation on cold dry winter days may create alarm as some viewers may conclude that there is an underground fire.	The diffuser on the surface outlet of the shaft, as shown in Figure 2, is configured so that the warm air being exhausted from the underground is directed in a downwards direction. This arrangement will allow for the condensing water vapour to be contained within the excavated area, minimizing the likelihood that this can be seen from the Broken Hill township and misinterpreted as a fire in the underground workings.
Increased potential for dust emissions.	Potential for dust emissions will occur during the short period for earthworks, approximately 4 weeks. During this period a water truck will be in use



Disadvantages (EAR)	New Control Measures
	continuously to reduce the potential for dust emissions in the area.
Primary ventilation fan design – Underground primary fan installation	
Possible recirculation of exhaust air in the underground.	Redesign of the underground ventilation circuit to minimise the potential for recirculation of exhaust air, resulting in additional underground development and the installation of an air lock into the drive which accesses the exhaust ventilation drive.
Inaccessibility in the event of underground fire.	Dedicated borehole located near the ventilation shaft which will allow for power to be supplied to the fans and for remote telemetry and control of the fans from the surface.
Difficulties in accessing and servicing the fan installation.	Fans specifically designed to suit the underground environment to overcome the limitations in accessing and servicing of the fans.
Noise generated due to expansion of exhaust air.	The ventilation diffuser designed to minimise the noise generated due to expansion of the exhaust air. The collar of the shaft will be cut into the side of the existing dump so that there is a rock wall between the town and the shaft. An 8m embankment will surround the fan and the diffuser, providing further noise attenuation.

3.3 Additional costs

The change in location from the already existing Kintore Shaft will result in additional costs to the Project. The majority of these costs are associated with the development of the new shaft, the purpose designed underground fans and the development of the chamber underground to house these fans.

The additional costs include:

Geotechnical investigation	\$ 220,000
Raise boring and shaft ground support	\$ 4,000,000
Purchase of U/G suitable fans	\$ 1,500,000
Development of U/G fan chamber	\$ 250,000
Environmental assessments	\$ 30,000
10% contingency	\$ 600,000

TOTAL ADDITIONAL COSTS	<u>\$ 6,600,000</u>
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In total it is currently estimated that it will cost an additional \$6,600,000 for the relocation of the ventilation circuit.

3.4 Alternatives

Ventilation shaft

BHOP reviewed an alternative location for the ventilation shaft to the eastern side of the decline on top of the rock waste dumps. This location was determined as not suitable for the following reasons:

- Shaft would need to be installed through 50m to 60m of unconsolidated fill requiring slow and costly construction techniques to be used;
- The installation would result in an inefficient underground ventilation circuit which would increase costs and create difficulties in controlling ventilation underground;
- The fans would be clearly visible from receptors located off-site.

Ventilation fan

In the original EAR alternative designs for the design of the primary ventilation fans were discussed in Table 2-19. Options included centrifugal fans, the preferred option, axial fans and underground fan installation. At that time with the use of the Kintore Shaft located 20m below surface in Little Kintore Pit it was not considered necessary to place the fans underground as the noise assessment indicated that noise criteria would be met.

With the relocation of the ventilation shaft to the natural surface level it is considered necessary to place the fans underground to provide assurance that noise criteria will be met. Therefore the alternative surface options are no longer viable.



4 CONSULTATION

Consultation has been conducted with the relevant government agencies. Copies of the draft EA were distributed and comments sought, and meetings and telephone conferences were held. Table 2 summarises any issues raised by the agencies that are required to be addressed in this EA. BHOP's response is also outlined.

Table 2 – Summary of consultation with government agencies

Government Agency	Issues Identified	BHOP Response
Office of Environment & Heritage	No additional issues identified. OEH currently assessing the proposed modification.	No response required at this time.
NSW Office of Water	Require the following information to be included: <ul style="list-style-type: none">• Location of groundwater in relation to the proposed shaft.• Assessment of potential impact to groundwater by proposed shaft construction, associated groundwater inflow volumes and management requirements.• Assessment of potential impact to groundwater system via retention of abandoned shaft due to potential for shaft to act as a conduit for contaminants from the surface or from within the collapsed shaft.	Information has been provided in Section 5.3.
Far North West Local Health District	No request for additional information received.	No response required at this time.
Broken Hill City Council	No additional issues identified.	No response required at this time.
NSW Trade & Investment	Requirement for Mining Operations Plan to be amended once DoP&I approval received. Require details for rehabilitation of the new shaft. Require details for rehabilitation of any additional surface disturbance.	BHOP will provide updated plans to the DPI-MR with the application for the MOP amendment. There is no substantial change from the EAR/PPR, the ventilation shaft shall be capped and the area re-contoured as required to maintain stability and prevent erosion.

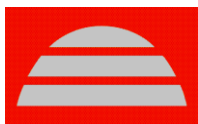


5 REVISED ENVIRONMENTAL ASSESSMENTS

In addition to a review of the disadvantages of the proposed location and fan design outlined in the original EAR, a review was also conducted of the potential changes to the environmental assessments as required by the Director General's Requirements (March 2009) and other items addressed in the EAR. **Table 3** summarises the outcomes of this review.

Table 3 - Summary review of environmental assessments

Environmental Issue	Potential Impact	Outcome
Noise and blasting	Impacts the original noise assessment and noise modeling results.	Updated noise assessment required.
Air	Impacts the original air quality assessment and air modeling results.	Updated air quality assessment required.
Soil and Water	Impacts the original Stormwater Management Plan.	Review of storm water management in the area of the new vent rise is required in the updated Site Water Management Plan. There were no potential impacts identified for groundwater refer discussion Section 5.3.
Heritage	There are no heritage items in this area and therefore no potential to impact current assessments.	No change from EAR/PPR.
Ecology	All vegetation has been removed from this area from historic mining. There are no habitats for fauna.	No change from EAR/PPR.
Visual Amenity	The fan duct/diffuser is the only equipment located above ground that may be seen from the town.	The fan duct/diffuser will be surrounded on three sides (town sides) by an 8m combined excavation and embankment that is higher than the natural ground level in this position. The embankment will be the same material as the surrounding area and will not be noticeable from the town.
Transport	There is no impact on transport of ore or materials.	No change from EAR/PPR.
Waste	Material excavated from the area is used to create bunding in the area for noise mitigation and for storm water management works. Use of excavated material for this purpose is consistent with the EAR.	No change from EAR/PPR.
Social and Economic	There is no impact on social or economic factors.	No change from EAR/PPR.
Rehabilitation and final Landform	The rehabilitation strategies applied to the ventilation rise located in Little Kintore Pit	There is no substantial change from the EAR/PPR, the ventilation shaft shall be



	will apply at the new location.	capped and the area re-contoured as required to maintain stability and prevent erosion.
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To support the request to modify the Project BHOP engaged consultants for air quality and noise to update their assessments, this also included remodeling. BHOP also requested a review and if required modifications to the Site Water Management Plan in line with the new location of the ventilation shaft. The following provides a summary of their findings.

5.1 Noise assessment

A noise assessment of the new ventilation circuit location was undertaken by Mr Najah Ishac, EGMA[Mitchell McLennan, who conducted the original noise assessments for the Rasp Project. This assessment is provided at Appendix A - Letter to Ms Gwen Wilson dated 26th September 2011 - *RASP Mine Relocated Fan Noise Assessment*.

In this assessment the three dimensional noise model used in all previous assessments for the RASP Mine Project was updated to include the ventilation fan in its new location. The results of predicted noise levels are shown in Table 3.2 of the attached report. These indicate little change to the previous results and show that the relevant noise criteria will be satisfied for all receivers for both the daytime and night time assessment periods. The assessment found that "... the contribution from the ventilation fan is insignificant by comparison with all site noise sources at receivers off site" and that the "new fan position does not materially alter the findings of our previous studies and that the project approval (07_0018) noise limits will be satisfied".

5.2 Air quality assessment

An air quality assessment of the new ventilation circuit location was undertaken by Mr Damon Roddis, PAEHolmes, who conducted the original air quality assessments for the Rasp Mine Project. This assessment is provided at Appendix B - Letter to Ms Gwen Wilson dated 4th October 2011 - *Air Quality Assessment for Rasp Mine Revised Ventilation Stack Location*.

Air modeling was conducted for a number of parameters and compared to the predicted results outlined in the EA and PPR. These included PM₁₀ (24 hour and annual), nitrogen dioxide (NO₂), volatile organic compounds (VOCs), sulphur dioxide (SO₂), carbon monoxide (CO) and polycyclic aromatic hydrocarbons (PAH)). With the exception of PM₁₀ all were modelled as being exclusively attributable to this source in the EA and PPR modelling.

The assessment found that predicted incremental impacts will reduce at receptor locations representative of groups of receptors, primarily located in residential areas and incremental impacts are predicted to increase relative to the previous air assessment predictions as contained in the EA and PPR, at locations representative of single dwellings / commercial properties. Additionally, locations with the highest predicted increases occur relative to the air assessment predictions represent single commercial properties.



Under normal operations, the revised vent-shaft incremental concentration of NO_2 is predicted to contribute up to 80% of the OEH criterion of $246\mu\text{g}/\text{m}^3$ for the worst case 1-hour period across all receptors. Original modelling predicts equivalent incremental contributions. The maximum predicted vent-shaft increment in annual NO_2 concentrations across all receptors is $2.2\mu\text{g}/\text{m}^3$ (the highest at Receptor 34 a commercial premises in Crystal Street), or 3% of the OEH criterion of $62\mu\text{g}/\text{m}^3$.

There were no predicted changes in the other parameters modelled with the exception of VOCs which had a negligible increase from $74\mu\text{g}/\text{m}^3$ to $75\mu\text{g}/\text{m}^3$. Notably Pb from shaft exhaust remained unchanged at $0.01\mu\text{g}/\text{m}^3$.

In relation to dust the greatest reductions for are predicted at residences located in Eyre Street at Receptors 3 and 4 where 24 hour PM_{10} is predicted to decrease by $2.9\mu\text{g}/\text{m}^3$ and $2.5\mu\text{g}/\text{m}^3$ respectively. The highest increases in 24 hour PM_{10} are predicted to occur at two commercial properties located along Crystal Street at Receptors 34 and 42 with increases of $3.1\mu\text{g}/\text{m}^3$ and $1.9\mu\text{g}/\text{m}^3$ respectively. There is negligible change in annual average PM_{10} predictions.

In summary the assessment concluded “... that compared to the original vent-shaft increment predictions, the maximum incremental increases for the revised location, for all key air quality indicators, are in the main either equivalent or are marginally reduced” and thus ‘... it is anticipated that the proposed relocation of the Rasp underground mine ventilation shaft will not cause any significant change to the conclusions made within either the EA or PPR’.

5.3 Water management

5.3.1 Storm Water Management

A review of the Draft Site Water Management Plan in line with the new ventilation circuit location was undertaken by Golder Associates, who formulated the original Storm Water Management Plan for the EAR, and update for the PPR for the Rasp Mine Project. The new Draft is provided at Appendix C Rasp Mine - Site Water Management Plan (SWMP), November 2011 (097626108-007-R-Rev6).

The arrangements for storm water management require minor modification. Previously the area was identified as one catchment (25) area with water directed into a single storage basin (S25). Catchment 25 is now divided into two catchments, 25A and 25B. Two smaller storm water storage basins are now proposed, S25A which diverts water away from the vent shaft and flows into S25B, **Figure 7**. Both are sized for a 100 year ARI event, Section 10.3.9 of the SWMP.

There is no requirement to make any modifications to the storm water management within Little Kintore Pit.



5.3.2 Groundwater Management

Geotechnical drilling was conducted to confirm that the area proposed for the new ventilation shaft was competent and thus suitable. The drilling depth was 399.1 m and no groundwater was intersected. It is anticipated that like other areas of the mine, groundwater would be intercepted at the 600 m level. Hence no potential groundwater impacts were identified at this location.

As there has been no contact in this area with groundwater potential impacts and management were not included in the Environment Assessment.

The Kintore Shaft was constructed in 1905 and closed in 1959, and has not been used by Broken Hill Operations Pty Ltd. BHOP has installed a fence around the opening to ensure safety. Given that this shaft is now not be used, consideration is being given to capping of the shaft. In regards to potential water contamination down the Shaft located in Little Kintore Pit, new stormwater management works have redirected water away from this area and only minimal water falling directly within Little Kintore Pit will enter the shaft.



6 CONCLUSION

The Modification sought relates to the relocation of the ventilation shaft from the disused Kintore Shaft in Little Kintore Pit to a location central and northwest within CML7. This is required due to the collapse of the Kintore Shaft in which the ventilation rise was to be originally located. This relocation will require the development of a new shaft.

The Modification also seeks approval for the design and installation of ventilation fans underground. This is to minimise any noise impacts to the neighbouring community.

Consultation was carried out with the relevant government agencies and items addressed within this EA as required.

Significant planning has been undertaken to locate and design the ventilation fans so as to minimise any potential impacts on the local community.

The review of the environmental impact assessments, including the Director General Requirements, has been completed for this Environmental Assessment have confirmed that the impacts from the activities described for the Modification are minor in nature and are consistent with those already approved by the Rasp Mine Project Approval 07_0018.



7 REFERENCES

Department of Planning & Infrastructure	Director General Requirements, March 2009
Department of Planning & Infrastructure	Project Approval Rasp Mine 07_0018 January 2011
Department of Planning & Infrastructure	Email: Ms G Ivancevic, Environmental Planning Officer, Major Development Assessment, Department of Planning 25 October 2011
Broken Hill Operations Pty Ltd	Completed Variation Application Form
Broken Hill Operations Pty Ltd	Environment Assessment Report, July 2010
Broken Hill Operations Pty Ltd	Response to Submissions Report (Environment Assessment Report), August 2010
Broken Hill Operations Pty Ltd	Preferred Project Report, September 2010
Broken Hill Operations Pty Ltd	Response to Submissions Report (Preferred Project Report), October 2010
EGMA Mitchell McLennan	Letter Report - <i>RASP Mine Relocated Fan Noise Assessment</i> , 26 th September 2011
PAEHolmes	Letter Report - <i>Air Quality Assessment for Rasp Mine Revised Ventilation Stack Location</i> , 4 th October 2011
Golder Associates	<i>Rasp Mine - Site Water Management Plan (SWMP)</i> , , November 2011



8 ACRYNOMS

ARI	Average recurrence interval
BHOP	Broken Hill Operations Pty Ltd
CML7	Consolidated Mining Lease 7
EA	Environment Assessment
EAR	Environment Assessment Report
DoP&I	Department of Planning & Infrastructure
km	kilometres
m	metres
MGA	Map Grid of Australia
NSW	New South Wales
OEH	Office of Environment and Heritage
PM ₁₀	Particulate matter with equivalent aerodynamic diameter pd 10 micrometres
PPR	Preferred Project Report
SEPP	State Environment Planning Policy
SWMP	Site Water Management Plan
t	tonnes
the Act	<i>Environmental Planning and Assessment Act 1979</i>
TSF	Tailings Storage Facilities
µg/m ³	microgram/cubic metre



Figure 1 Project site and surrounding area



Legend

- Rasp Mine/CML 7 Boundary
- Project Area

Broken Hill Operations Pty Ltd

Date: 24/09/07

Source: Aerial Dept of Lands by ERM
NSW by ERM

Scale: Not to scale





Figure 2 – Ventilation rise alternate location





Figure 3 – Ventilation shafts indicated on CML7

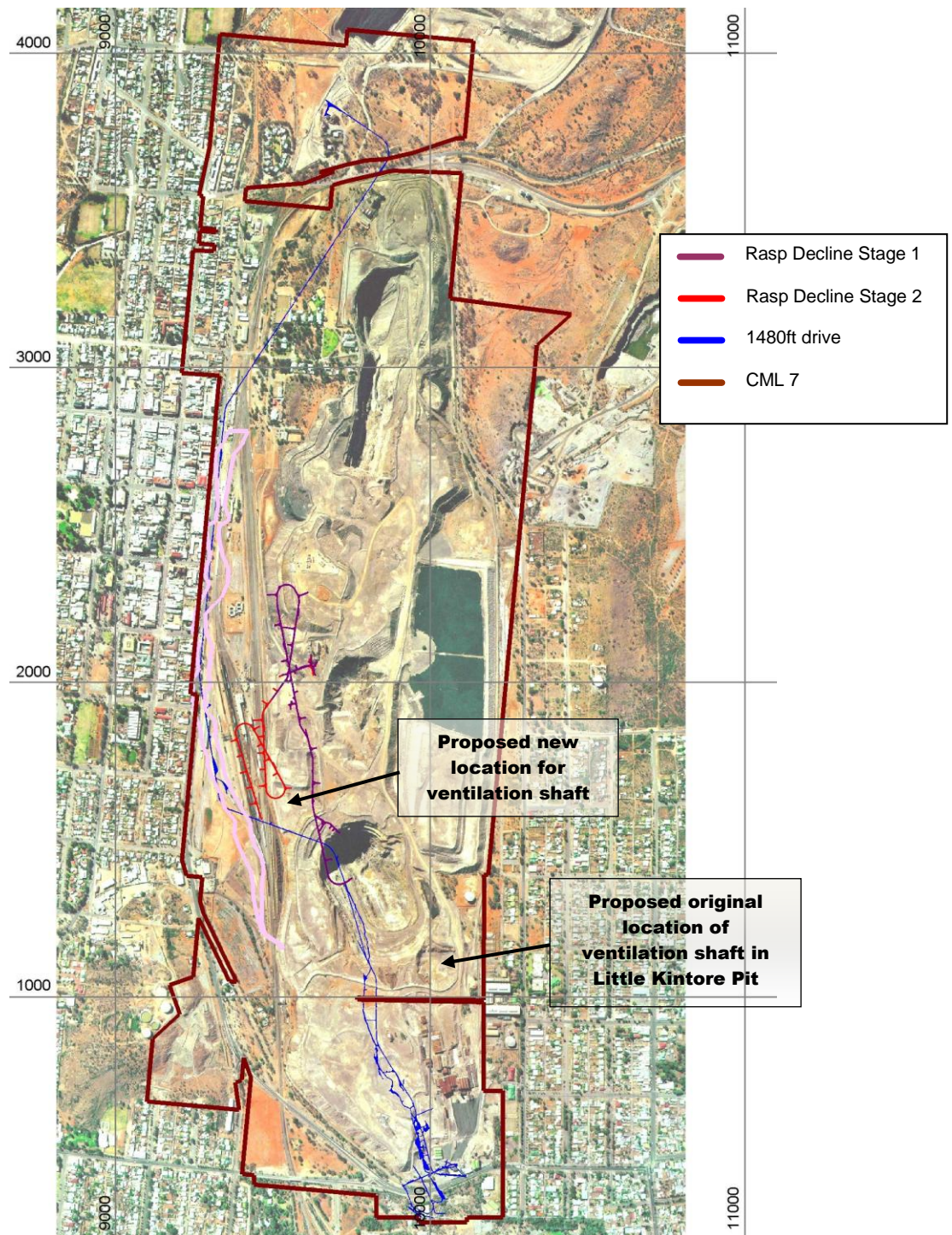




Figure 6 – Indicative fan outlet and diffuser



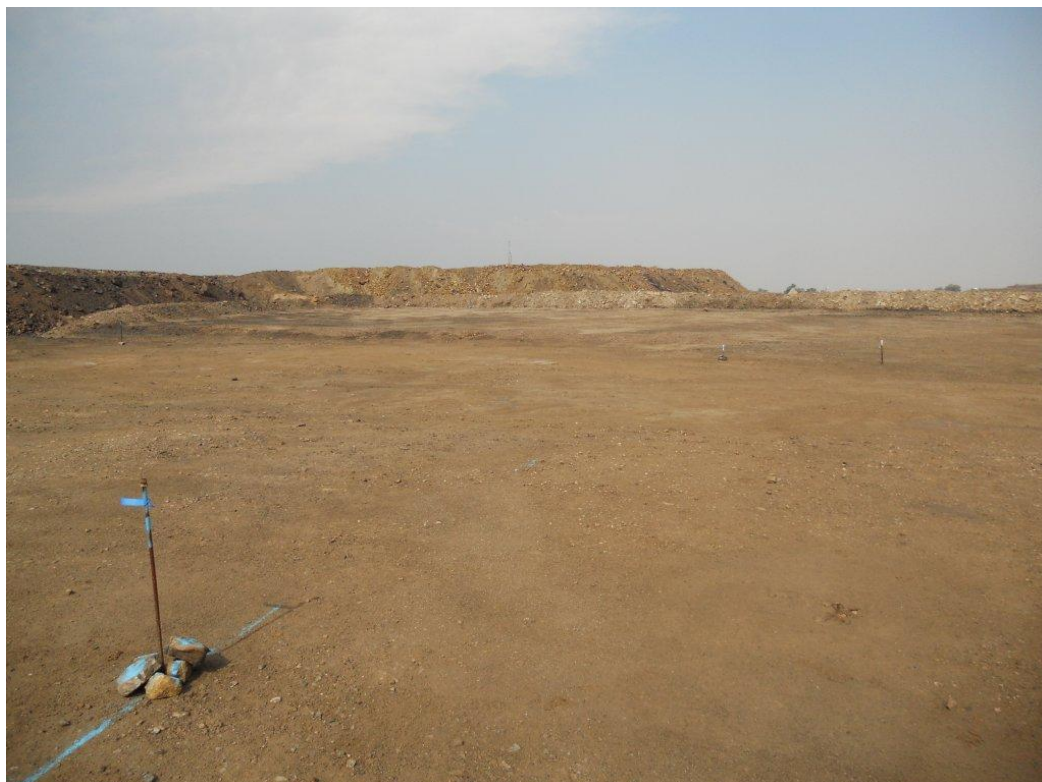


Figure 7 – Modification to storm water arrangements





Photographs 1 & 2 - Site for relocated ventilation shaft





Appendix A

RASP Mine Relocated Fan Noise Assessment,
EGMA|Mitchell McLennan
26th September 2011



Appendix B

Air Quality Assessment for Rasp Mine Revised Ventilation Stack Location

PAEHolmes

4th October 2011



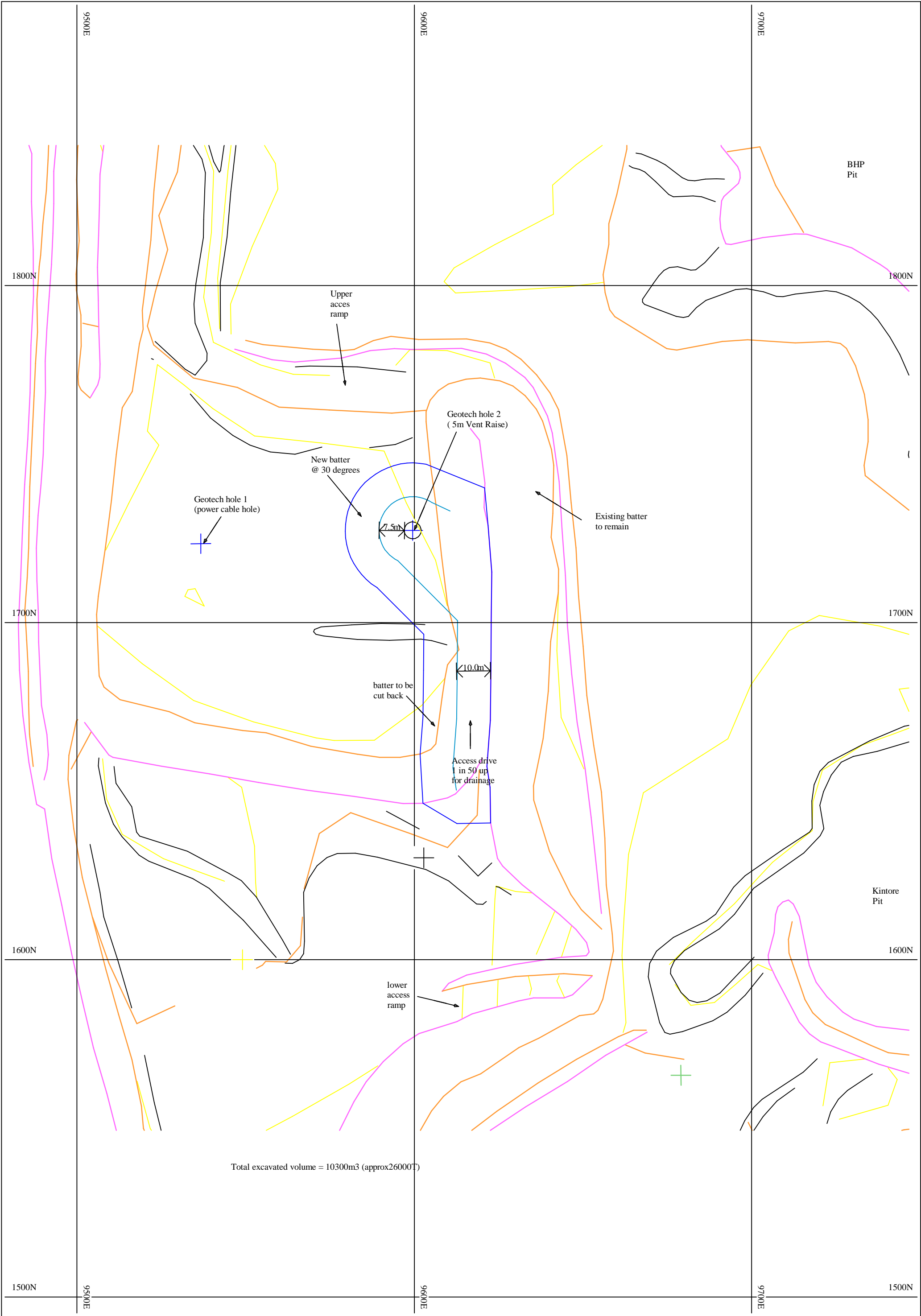
Appendix C

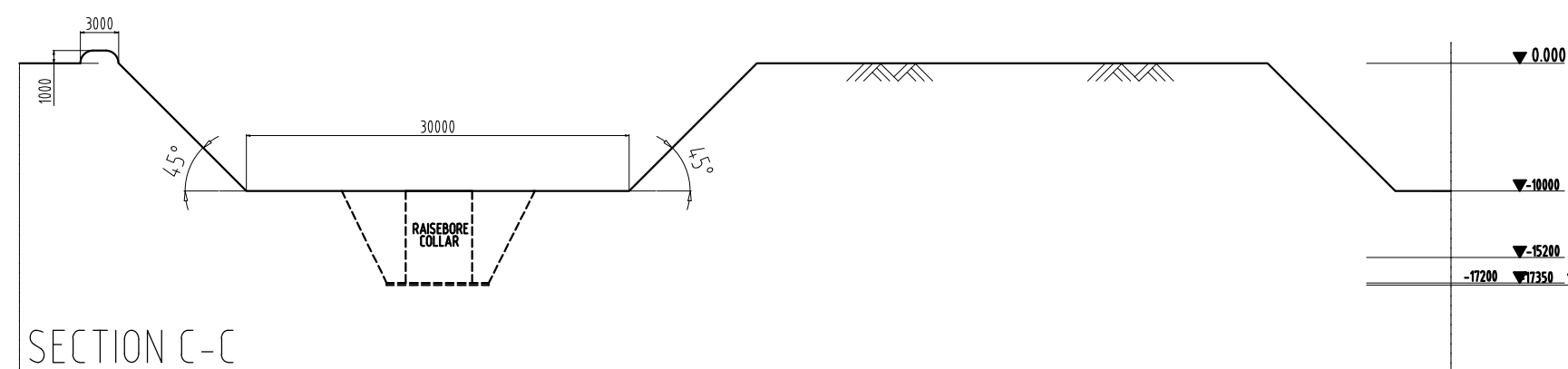
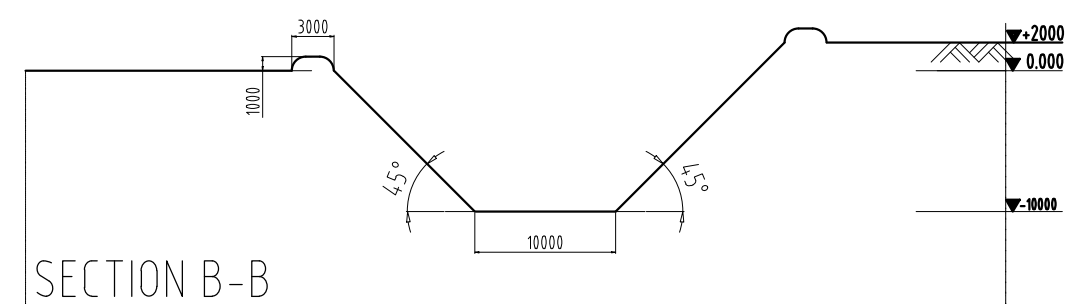
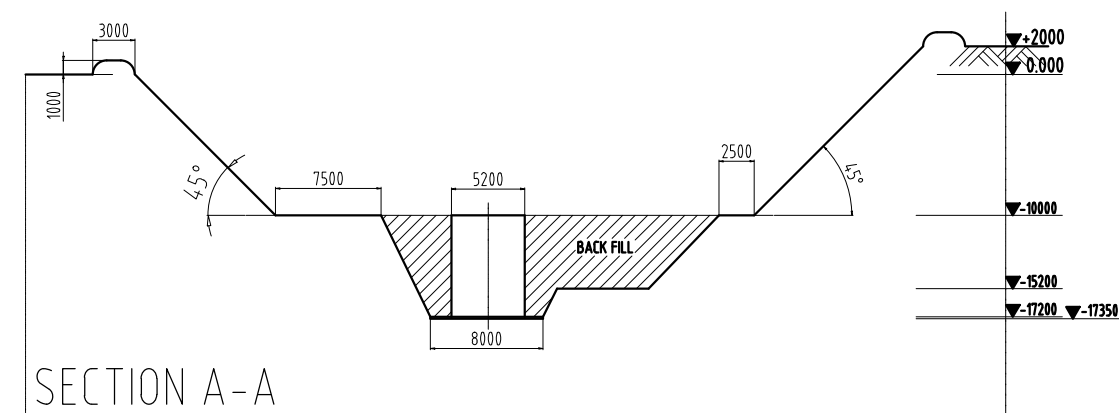
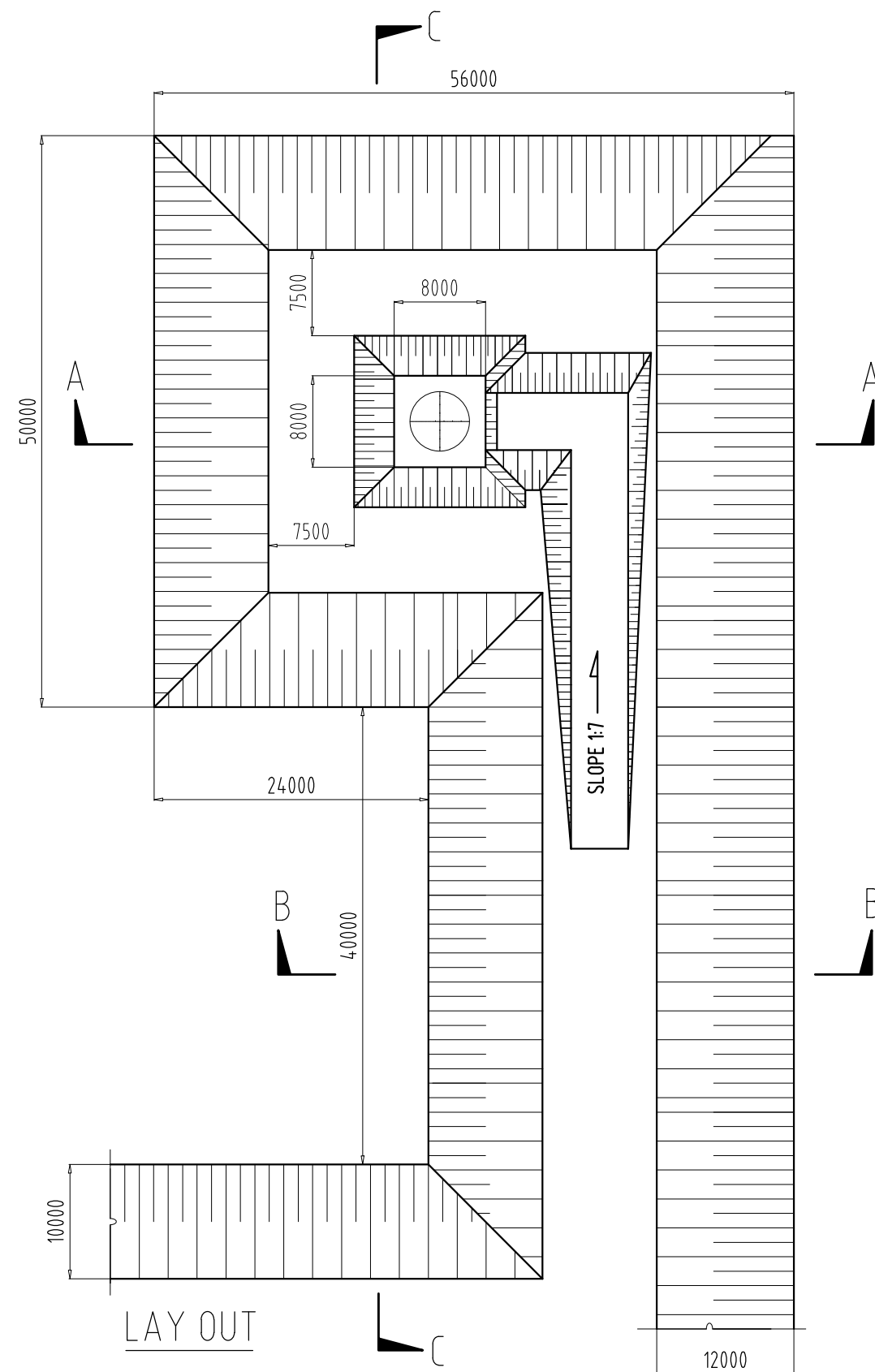
Rasp Mine - Site Water Management Plan

Golder Associates

November 2011

geotech_holes_mine_str



[illegible]

CBH RESOURCES
BHOP - RASP MINE PROJECT

	BY	DATE	TITLE PRIMARY VENTILATION SHAFT PAD DETAIL LAY OUT AND SECTIONS			
DRAWN	EBS	21.09.11				
CHECKED.	-	-				
DESIGNED	EBS	21.09.11				
CHECKED	RL	21.09.11				
APPROVED	DB	21.09.11	DRG. No.	BHOP-100-A-003B	DRG. Sheet 1 OF 1	REV. 0