Rasp Mine

Zinc – Lead – Silver Project

Project Approval No. 07-0018

Rasp Mine Project

Response to Submissions
Modification 3
Mining Extension

January 2015

Broken Hill Operations Pty Ltd
BROKEN HILL

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1 Background

Broken Hill Operations Pty Ltd (BHOP), a wholly owned subsidiary of CBH Resources Ltd, is seeking approval from the Minister of Planning for a minor modification to its Rasp Mine PA 07_0018 under Section 75W of the Environment, Planning and Assessment Act 1979, to extend underground mining to Block 7 and the Zinc Lodes located to the southwest of Consolidated Mine Lease 7 (CML7).

The Modification does not involve any significant changes to surface infrastructure or activities and does not require any additional land disturbance to that already approved.

An Environment Assessment (EA) providing a detailed description of these modifications and potential environmental impacts, was placed on public exhibition by the Department of Planning and Environment (DP&E) from 14 November to 12 December 2014. During this period, government agencies, non-government organisations, businesses and members of the public were invited to provide submissions on the EA to the DP&E.

Following exhibition of the EA, the DP&E received seven submissions. All submissions were made by government agencies. There were no submissions made by the community or special interest groups.

None of the submissions objected to the Modification.

2 Government Agency Submissions

Government agency submissions were received from:

- Department of Transport, Roads and Maritime Services (RMS)
- Environment Protection Authority (EPA)
- Department of Trade and Investment, Regional Infrastructure and Services, Division of Resources and Energy (DRE)
- Office of Environment and Heritage (OEH)
- Department of Primary Industries, Crown Lands (CL)
- Department of Primary Industries, Office of Water (NOW)
- Broken Hill City Council (BHCC)

Table 1.1 provides a summary of the matters raised in these submissions.

Table 1.1 Summary of Matters Raised

	Matters Raised								
Government Agency	**Subsidence**	**Damage/injury to Perilya operations**	**Damage to Public infrastructure**	**Blasting vibration**	**Air Quality**	**Noise**	**Water**	**Other**	**No Comment**
RMS	•		•						
EPA				•	•	•	•	•	
DRE	•	•	•	•				•	
OEH									•
CL									•
NOW							•		
BHCC								•	

Matters raised in the 'other' category included comments on waste management, requirements for amending the MOP, surface exploration requirements and support for the Modification.

3 Community Submissions

There were no submissions received from the community or from special interest groups. BHOP provided information to local residents regarding the Modification and contact details for making submissions to DP&E.

BHOP met with all major sensitive receptors including the Italio International Club (Bocce Club), the Broken Hill Bowling Club and residents on South Road and Eyre Street. At these meetings the proposed mining extension was outlined, potential impacts discussed and comments sought. Details of how to make a submission were also provided.

BHOP provided information to local residents via a letter drop outlining the proposed Modification and what changes they might experience. This was distributed to residents in the streets surrounding the mine that may be impacted (30 letter drops).

BHOP also held a public meeting (23 October 2014) which was advertised in the main local newspaper, the Barrier Daily Truth, providing a presentation on the proposed mining extension and potential impacts to local residents. Nine people attended.

The proposed Modification has been well publicised and has been discussed in the media particularly in relation for what it might mean for the ongoing economic future of Broken Hill. Senior management has also undertaken a number of local media interviews for radio (ABC and 2BH) and the local newspaper – Barrier Daily Truth.

4 BHOP's Response to Submissions

The following outlines BHOP's response to the submissions (requests for change are highlighted in blue)

(1) Submission by Roads and Maritime Services

The Department of Transport, Roads and Maritime Services (RMS) has indicated that it will not object to the proposed development, subject to entering into a Deed of Agreement with the proponent which will include the following:

- *The proponent's responsibility to prepare and implement a Ground Control Management Plan, Blasting Management Plan and survey controls demonstrating how the development will be carried out in a manner that does not adversely impact on South Road.*
- *The proponent's responsibilities in relation to monitoring and rehabilitating any impacts of the development on South Road.*
- *The proponent's obligation to take out adequate insurance coverage for any impacts of the development on South Road.*
- *The liability of the proponent for any damage of adverse impact to South Road.*
- *Relevant indemnities.*
- *The procedure for communicating any information relevant to the protection of South Road to Roads and Maritime Services.*

BHOP Response:

BHOP agrees to enter into a Deed of Agreement with RMS containing the items as listed, refer Statement of Commitments, 8.2 Dot Point 9:

"As a requirement of RMS BHOP will enter into a Deed of Agreement which outlines the risks and mitigation measures and final void controls, and any other matters appropriate. This Deed will also outline notification requirements for any incidents in relation to the road or road reserve."

(2) Environment Protection Authority

The Environment Protection Authority (EPA) indicated that it has no objections, based on the information provided, to the proposal in regards to air quality and noise impacts as long as the mitigation measures are implemented. The EPA comments that there are no expected surface water impacts or additional waste to be generated by the proposal and therefore does not provide any recommendations for these areas.

The EPA states that there is significant uncertainty about the potential impacts on sensitive surface receptors from blasting vibration and proposes a number of conditions. In its submission the EPA makes reference to the past performance of BHOP in relation to blasting. BHOP provides the following information regarding its performance in undertaking its blasting activities.

BHOP recognises there is a level of uncertainty regarding underground conditions, and therefore blasting requirements, in the areas of Block 7 and the Zinc Lodes.

This is due to the complexity of geology in Broken Hill and the limited geotechnical data available for these areas of CML7. BHOP will undertake exploratory drilling to gain an understanding of the geotechnical structures prior to production blasting. Geotechnical data will be obtained to confirm geological conditions as mining progresses which will assist and guide blast design.

BHOP also recognises that there have been difficulties experienced in determining blasting parameters given the local geological structures found in the Western Mineralisation orebody. As BHOP began production blasting in 2012 and 2013, a number of unknown dykes and structures were encountered and together with difficult ground conditions, resulted in some high blasting vibration readings. Blasting criteria outlined in the Project Approval and the Environment Protection Licence (12559) was exceeded which resulted in fines from the EPA. These high vibration readings also resulted in a number of community complaints and BHOP held a community meeting and a number of home visits with local residents.

BHOP's initial response to improving blasting vibration levels was to conduct slow firings with "Air Decking" any holes that had high charge volume that could exceed 5mm/s. This slow firing made the actual time of the blast last much longer. These slower blasts increased community complaints as the longer the blast the greater the experience by the person leaving them thinking the blast is bigger and worse. Complaints where received at low blast vibration levels even when the blast only registered a very low PPV (peak particle velocity), less than 3mm/s. It was decided to speed up the timing of the firings gradually to ensure no adverse effects. The complaints become less with quicker firings.

A consultant who specialises in blasting vibration was engaged to review practices and make recommendations. The following blasting management procedures were implemented:

- Review wave forms to see if the timing in the firing can be improved to ensure there is no overlap of waves which contributes to create a higher PPV;
- Filling the deck with other (non-explosive) material to ensure separation of charge within a single hole;
- Modifying the charge plan:-
  - To correctly calculate the PPV using kilograms of explosives instead of metres of charge.
  - Calculate PPV readings for each monitor location as well as the closest affected residents to the firing.
  - Identify blast where the PPV will be greater than 3mm/s, and make changes where required, and
  - Any blast hole greater than 5mm/s should be decked and so reduce that PPV below the limit allowed.
- To gain a more accurate prediction of the PPV more relevant K factors are now applied to each blast. In previous blast plans a nominal K factor was used, now with the improvement in data collection and review, a different and more relevant K factor can be used for each firing. This is determined by using the previous blast's actual data and back calculating what the K factor was. This K factor is then used in the next charge plan for that area to get a more accurate prediction of the PPV.

To further improve the management of blasts and gain consistency in approach by different engineers, a Technical Blast Management Plan (TBMP) was formulated with associated Standard Operating Procedures and Design Standards. These explain to the engineers step by step how to complete blasting tasks including:-

- How to read blast wave forms.
- How to do a blast analysis.

- How to do a charge plan and review each hole's PPV.
- What to do if a high PPV is predicted.

This has led to improvements in blasting results. In 2013 twenty-one per cent of production blasts were over 5 PPV and in 2014 this was reduced to fourteen per cent. There has been only one production blast over 5 PPV since 1 September 2014. A reduction in blasting complaints has also occurred with 51 recorded in 2013 and 13 in 2014.

The EPA also notes that the level of uncertainty is related to the lack of geotechnical information in the proposed mining areas, particularly in relation to unknown structures such as dolerite dykes and shear zones that may be encountered.

BHOP recognises that it has limited information regarding geotechnical conditions of the proposed mining area, data will be obtained as exploration drilling is undertaken in the area following development mining. This will enable access to geotechnical information regarding ground conditions, structures and dykes. BHOP recognises and understands the importance of gaining this information and has made the following commitments:

8.1 – Dot Point 5, 7, 8 and 11

- *Incorporate ongoing collection and review of geological and geotechnical conditions and stope performance data which will validate the design parameters and provide timely input into the mine design process.*
- *Increase the size and quality of the geotechnical database for the Zinc Lodes by collecting geotechnical information from future resource drilling programs.*
- *Collect and analyse structural information by conducting routine detailed geotechnical mapping to identify structures and to characterise the geotechnical environment during development mining and resource definition drilling and incorporate this information into the final stope designs and production sequence.*
- *Data collection and detailed characterisation of ground conditions in the hangingwall and crown of the ore lens;*
- *Sufficient and ongoing testing of representative samples of the rock mass to characterise the engineering properties;*

8.2 – Dot Points 1, 2 and 3

- *Implement a high level of control regarding data collection, vibration assessment and QA/QC of the blasting process, to be addressed in the Technical Blast Management Plan.*
- *Review the extent to which geological structures (dolerite dykes and shear zones) could influence vibration outcomes for blasts within the Main Lode and Zinc Lode areas.*
- *Gather additional data from both the development and production blasts monitored at close distances to validate the estimates made.*

All of the above Dot Points will lead to a more thorough, understanding of rock conditions in the area and allow modification in blasting designs to meet the blasting limits required.

The following outlines the recommendations/conditions proposed by EPA in relation to air quality, noise and blasting vibration and provides BHOP's response.

Air Quality

The EPA makes recommendations in relation to air quality to update the Project Approval Schedule 3:

- Condition 4 to include the new emission point at Shaft 6:

*Table 4: Discharge Criteria for **all operational ventilation exhaust shafts**.*

- Condition 4 to incorporate discharge criteria for the Process Enclosure/Baghouse Stack

"Table 5: Discharge Criteria for Point 2 - Process Enclosure/Baghouse Stack

Pollutant	***Unit of Measure***	***Concentration Limit***
Total solid particles (TSP)	*Milligrams per cubic metre*	*20*
Type 1 and Type 2 substances[a]	*Milligrams per cubic metre*	*1*

[a] *Total of Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, Sn and V."*

- Condition 11 to update the Air Quality Management Plan at (c) dot point one to reference '**all operational ventilation exhaust shafts**' (to include Shaft 6).

BHOP Response:

BHOP will update its Air Quality Management Plan in line with the EPA recommendations and will consult with the EPA in regards to these changes within 3 months of the approval of this Modification request.

BHOP has committed to meeting anticipated Environment Protection Licence conditions for air quality monitoring of Shaft 6, refer Statement of Commitments 8.3:

"It is not expected that the Modification will impact air quality levels however an air quality monitoring program for the air exhaust at Shaft 6 will be undertaken in line with the EPL and to validate predicted air quality results."

Noise

The EPA makes recommendations to update the Noise Management Plan as required and to undertake noise monitoring to confirm modelling results.

BHOP Response:

BHOP will review and where required update the Noise Blasting Management Plan in line with the EPA recommendations and will consult with the EPA in regards to these changes within 3 months of the approval of this Modification request.

As indicated in the Proposed Statement of Commitments at 8.4 Dot Point 3:

"A noise monitoring will be undertaken post fan and wall installation to check predictions are met."

Blasting Vibration

The EPA states that there is significant uncertainty about the potential impacts on sensitive surface receptors from blasting vibration and proposes the following conditions:

EPA Dot Point One:

- *Given the significant uncertainty about blasting impacts in this area we believe that consideration should also be given to requiring the proponent to submit a blast management plan for each "Sensitive Location" identified in the BVR (Blast Vibration Review).*

BHOP Response:

BHOP considers that having a number of blasting management plans will result in such complexity that it will cause confusion amongst operators and not achieve the required blasting management standards. Also the review of blasting parameters for each blast will be the same so this will result in unnecessary repetition.

BHOP proposes the one blasting management plan that will address each of the sensitive receptors as per the BVR and has committed to managing blasting through its Technical Blast Management Plan, refer 8.2, Dot Point 1:

"Implement a high level of control regarding data collection, vibration assessment and QA/QC of the blasting process, to be addressed in the Technical Blast Management Plan."

Therefore, BHOP proposes the following change to this proposed condition:

'Given the significant uncertainty about blasting impacts in this area we believe that consideration should also be given to requiring the proponent to submit a blast management plan that addresses each 'sensitive location' identified in the BVR.'

This suggestion was provided to the EPA who responded (refer Appendix 1, Email 16th January 2015, Mr Darren Wallett, EPA) that there was no objection to the change as the intent of the recommendation has not been altered by the amendment.

EPA Dot Point Two:

- *When blasting commences in any new "Blast Location" and any new "Sensitive Location" as identified in the BVR the most conservative blast parameters as identified in the BVR are to be used until such time as it can be demonstrated that there are no adverse impacts on sensitive receptors and an estimate of blast vibration levels that are acceptable so community amenity can be determined.*

BHOP Response:

BHOP have undertaken development blasting in Block 8, adjacent to Block 7 where the Zinc Lodes are located, and has achieved very low blasting results as indicated from the closest blasting monitor located on CML7 at the Silver Tank. These results ranged from 0.07 to 0.28 PPV over a 3 month period, refer attached results Appendix 2 – Results from Blast Hub – Main Lodes Block 8.

All development blasting events in Main Lode Block 8 have been completed using the highest blasting parameters as indicated in the BVR undertaken by Prism Mining Pty Ltd, including 12 holes per delay. On some occasions when two headings have been available these were fired at the same time, resulting in a doubling of the highest blasting parameters used. Even with using these blasting parameters the highest PPV recorded was 0.28 mm/s.

BHOP agrees with the need for a conservative approach to blasting parameters to enable data to be collected and the ground conditions understood feeding into blast management to allow the identification of the correct blasting parameters as mining progresses. This will allow trialling of different blast parameters to identify the most optimum for community amenity and economic return.

Given the very low blasting vibration results for development blasting in Block 8, BHOP requests that this approach, the most conservative blasting parameters, is limited to production blasting (cut & fill and benching) and not development blasting.

Therefore BHOP suggests the following:

"When blasting commences in any new 'Blast Location' and any new 'Sensitive Location' as identified in the BVR the most conservative blast parameters for production blasting (cut & fill, and benching) as identified in the BVR are to be used until such time as it can be demonstrated that there are no adverse impacts on sensitive receptors and an estimate of blast vibration levels that are acceptable for community amenity can be determined."

This suggestion was provided to the EPA who responded (refer Appendix 1 Email 16th January 2015, Mr Darren Wallett, EPA) that there was no objection to the change as the intent of the recommendation has not been altered by the amendment,

EPA Dot Point Three:

- *The proponent must have a complaints protocol for the investigation of and responding to any complaints about blast vibration. The complaints protocol should include a requirement that should any complaint be received about blasting then blasting operations cease in the area and the proponent undertake an assessment of the blast parameters used and the vibration trends to identify the most appropriate blast parameters to avoid adverse impacts on sensitive receptors in that area in future blasts.*

BHOP Response:

BHOP currently has a complaints protocol in place which requires production blasting to cease in the area when a community complaint is received and for the complaint to be investigated. This includes a review and assessment of the blast parameters in an attempt to identify how these may be altered to reduce blasting vibration. This information is used for both the blasting in this area and also for meeting similar conditions elsewhere.

BHOP agrees with the main points of this proposed condition however, seeks to restrict cessation of blasting to production blasting only. There have been no complaints in regards to development blasting which results in very low PPVs.

Therefore BHOP seeks the following change to this proposed condition:

- The proponent must have a complaints protocol for the investigation of and responding to any complaints about blast vibration. The complaints protocol should include a requirement that should any complaint be received about blasting then production blasting operations cease in the area and the proponent undertake an assessment of the production blast parameters used and the vibration trends to identify the most appropriate production blast parameters to avoid adverse impacts on sensitive receptors in that area in future blasts.

EPA Dot Point Four:

- *When blasting in any area subject of this modification should complaints be made about vibrations from any member of the community the proponent must apply the complaints protocol.*

BHOP Response:

BHOP agrees with this requirement.

EPA Dot Point Five:

- *Where the proponent receives more than 10 complaints form 10 different residents about blasting at any "Sensitive location" identified by the BVR the proponent must engage with the community (hold a Community Consultation meeting) prior to continuing blasting in that area.*

BHOP Response:

BHOP has held a community meeting when there were a large number of community complaints regarding blasting in the early days of the Western Mineralisation development. BHOP also at that time engaged the services of a consultant with blasting expertise to assist in determining blasting techniques and procedures to improve blasting practices (this consultant continues to review blasting data and provide advice).

BHOP agrees with this requirement.

(3) Department of Trade and Investment, Regional Infrastructure and Services, Division of Resources and Energy

The Department of Trade and Investment, Regional Infrastructure and Services, Division of Resources and Energy (DRE) provided two submissions dated 19/12/2014 and 14/1/2015. The first submission provides comments and conditions regarding the requirements for a Rehabilitation Management Plan/Mining Operation Plan and exploration activities. The second submission provides a review of the potential subsidence impacts assessment and conditions for approval.

Rehabilitation Management Plan/Mining Operation Plan

DRE recommends the following condition be incorporated into any development approval:

In summary, the proponent must prepare and implement a Rehabilitation Management Plan/Mining Operations Plan for the project area to the satisfaction of the Secretary DTIRIS [Department of Trade and Investment,]. This plan must be developed in consultation with relevant government agencies and in accordance with relevant DRE guidelines and be submitted to the Secretary of DTIRIS within 3 months of this approval.

BHOP Response:

BHOP will seek a modification to its Mining Operations Plan (MOP) in line with this requirement and consistent with the requirements of its Mining Lease.

Exploration Activities

DRE recommends the following condition be incorporated into any development approval:

In summary, exploration activities must be notified to, and approved by, DRE prior to commencement. Due diligence assessment and environment assessment reports must be completed providing details of the proposed activity, description of the site, existing environment, impact assessment and summary, conclusions and a Statement of Commitments. Details of exploration activities must be documented in the Annual Environmental Management Report.

BHOP Response:

Proposed underground exploration is consistent with the current and approved Rasp Mine MOP Section 2.3.1:

Continued underground exploration of the ore bodies will be carried out from the current and future development within the underground operations, fans of holes will be drilled to intersect the mineralisation at various depths below surface. The purpose of this drilling is for resource definition and infill drilling and will consist of diamond drilling from underground sites. Therefore, there will be no disturbance of the land surface from this activity during the term of the MOP.

No surface drilling will occur as a result of this modification, therefore this item is not applicable to this modification and no action is required by BHOP.

Mine Subsidence

DRE Mine Safety Operations (MSO) considers that the proponent has adequately assessed the risks to the proposed mine extension and recommends the following additional conditions:

1 Safety or Infrastructure Risk to the Adjoining Perilya Mine

The proponent must take appropriate actions to prevent the risk of damage or injury occurring at the adjoining Perilya Mine as a result of mining activities occurring within Block 7 of consolidated Mine Lease 7 (CML7). The actions are to:

a) be based on risk Assessment;
b) include consultation with Perilya Mine management and;
c) be maintained during any period that the Proponent or Perilya believes such a risk is extant.

BHOP Response:

BHOP agrees with these requirements.

BHOP recognises the potential risk to the adjoining Perilya Mine and has already undertaken consultation. A meeting was held (23 September 2014) with BHOP Technical Services Team at Perilya with its Engineering and Geological Superintendents outlining the proposed mine plans, particularly in relation to mining close to the border between the two mines. BHOP also took the opportunity to request information from Perilya of its experiences in mining the Zinc Lodes ore body (which extends across the two mines) and to gain any geotechnical data it may have of the area. It was also determined at this meeting that a series of risk assessments would be undertaken.

The first of these risk assessments with representation from management and technical personnel from both companies was undertaken at Perilya on 17 December 2014 and identified the following controls:

- When 30 m from the Lease Boundary establish a converging development procedure.
- When within 100 m from Lease Boundary updated survey data is to be sent to Perilya at set intervals.
- Probing to be done by a Long Hole Rig to test what material or voids are at the Lease Boundary.
- Operators to use gas monitors at all times to identify any potential atmospheric contaminants. TARP to be established
- A 3.5 m standoff from Perilya lease to be established.
- Orica to perform reactive ground testing from rock in the area.

- Once within 30m from Lease Boundary firing will only occur at designated firing times that have been agreed upon by both parties.
- Perilya to be given 48 hours' notice of any stope firing within 30m of the Lease Boundary.
- Contract Surveyor to check surface survey trig points used by BHOP to ensure Lease Boundary is accurate.
- BHOP Incident Management Plan to be reviewed to include immediate notification of a fire in the vicinity of the Zinc Lodes mining area to Perilya.
- Review ventilation pressures/modelling from both operations to confirm most likely direction smoke will flow. Ensure consultant reviews and confirms findings.

These meetings and risk assessments will be on-going during the mining of the Zinc Lodes in accordance with BHOP commitment:

Statement of Commitments 8.2, Dot Point 7:

- *Conduct risk assessments for mining works on each lease with Perilya, determine and implement measures to minimise any impacts.*

2 Risk of the underground workings failing to the extent that the surface is impacted

The proponent must take appropriate actions to prevent the risk of damage to Public Infrastructure occurring as a result of Mining Activities occurring within Block 7 of CML7. The actions must include:

a) ongoing risk assessment;

BHOP Response:

BHOP agrees to conduct on-going risk assessments which will include potential impacts to surface structures.

b) compliance with the recommendations of the Barnson Pty Ltd and Ground Control Engineering reports and;

BHOP Response:

BHOP has addressed the recommendations from the Ground Control Engineering Report in its Statement of Commitments at 8.1 Ground Failure – Subsidence and Settlement and recommendations from the Barnson Report at 8.2 Vibration (Dot Points 4, 5, 6 and 8). BHOP agrees to implement these recommendations.

c) development of a Void Management Plan that will in so far as is reasonably practicable:
1. preclude the ability for underground failure to reach the surface my minimisation of available voids;

BHOP Response:

BHOP agrees to take actions to minimise available voids and will review and update its Ground Control Plan. Without limiting its content the following items recommended in the report by Ground Control Engineering Pty Ltd, (*Zinc Lodes Geotechnical Assessment*, October 2014) will be included as per BHOP's Statement of Commitments:

8.1 – Dot Points 1, 2, 3, 4, 6 and 11:

- *Control potential ground failure in the bench stoping area by maintaining a 60 m crown pillar above South Road and utilising 10 m spans as indicated for Section 1 and 15 m spans as indicated for Section 2, and installing 5 m bridge pillars as required.*

- *Cablebolt the hangingwall and stope crown exposures according to the dimensions of the exposure and local conditions during development mining. Specific ground support designs have been prepared, Ground Control Management Plan – BHO-PLN-MIN-001.*
- *Incorporate a mining sequence within mine plans that will limit the number of open voids in the mining block to one stope at any one time.*
- *Backfill stopes and voids with either waste rock and / or hydraulic fill immediately following the completion of each cut and fill stope section.*
- *Develop a program to monitor stope stability and potential surface subsidence. The program will be implemented both before and during the extraction of the Zinc Lodes.*
- *To prevent large scale stope wall failure, although identified as a low risk, the following requirements will be incorporated into mine designs and ground control methods:*
  - *Data collection and detailed characterisation of ground conditions in the hangingwall and crown of the ore lens.*
  - *Sufficient and ongoing testing of representative samples of the rock mass to characterise the engineering properties.*
  - *Stope production spans do not exceed stable dimensions.*
  - *Conduct ongoing monitoring and back analysis of the performance of stope spans.*
  - *Record stope performance data and apply to stope design.*
  - *Complete a strategy to extract each stope that incorporates appropriate infrastructure to fill each stope after the completion of extraction.*
  - *Complete ground support designs to control stope overbreak.*
  - *Implement ground control strategies to protect the crown between surface infrastructure and the planned downhole benching stoping block.*

2. *include monitoring devices that will provide a warning of propagating failures and;*

BHOP Response:

BHOP agrees to install monitoring devices and has committed to the following:

8.1 Dot Point 9:

- *Install monitoring instruments in the 10250 level, in the crown pillar and on the 10225 level in the hangingwall prior to the commencement of extraction of the lower lift bench stopes which will be used to confirm the understanding of the rockmass response to mining and assess changes in the behaviour of the rockmass allowing design engineers to adjust mining dimensions and mining schedules if required.*

3. *include a Trigger and Action Response Plan (TARP) to respond quickly to any problems as they may develop.*

BHOP Response:

BHOP agrees with this requirement and has included a Trigger and Action Response Plan (TARP) as part of its Technical Blasting Management Plan.

3 Damage or nuisance to residents/structures from blasting vibrations

DRE was satisfied that the specialist consultants' reports (Prism Mining Pty Ltd and Barnson Pty Ltd) addressed the issues.

BHOP Response:

Noted.

(4) Office of Heritage and Environment

Having reviewed the information provided by BHOP the Office of Heritage and Environment had no comments to make regarding the proposal or the proposed conditions of approval.

BHOP Response:

Noted.

(5) Department of Primary Industries, Crown Lands

Crown Lands has no comments regarding the extension providing the mitigation measures described in the Environment Assessment are followed.

BHOP Response:

Noted.

(6) Department of Primary Industries, Office of Water

As there is no requirement for any additional water extraction and the mining is above the groundwater water table, the Office of Water makes no comment on the modification.

BHOP Response:

Noted.

(7) Broken Hill City Council

The Broken Hill City Council (BHCC) provided a submission on 15 January 2015. BHCC has no specific requirements or comments in regards to the Modification and is supportive of the proposal.

BHOP Response:

Noted.

5 Revised Statement of Commitments

BHOP requests the following amendments to its Statement of Commitments, noted in blue.

Ground Failure – Subsidence and Settlement

The following summarises the measures to be used by BHOP to control potential for mining induced subsidence and / or differential settlement:

- Control potential ground failure in the bench stoping area by maintaining a 60 m crown pillar above the mining area and below South Road and utilising 10 m spans as indicated for Section 1 and 15 m spans as indicated for Section 2, and installing 5 m bridge pillars as required. (For Sections refer EA MOD 3 November 2014, Figure 7.4.)
- Cablebolt the hangingwall and stope crown exposures according to the dimensions of the exposure and local conditions during development mining. Specific ground support designs have been prepared, Ground Control Management Plan – BHO-PLN-MIN-001.
- Incorporate a mining sequence within mine plans that will limit the number of open voids in the mining block to one stope at any one time.
- Backfill stopes and voids with either waste rock and/or hydraulic fill immediately following the completion of each cut and fill stope section.
- Incorporate ongoing collection and review of geological and geotechnical conditions and stope performance data which will validate the design parameters and provide timely input into the mine design process.
- Develop a program to monitor stope stability and potential surface subsidence. The program will be implemented both before and during the extraction of the Zinc Lodes.
- Increase the size and quality of the geotechnical database for the Zinc Lodes by collecting geotechnical information from future resource drilling programs.
- Collect and analyse structural information by conducting routine detailed geotechnical mapping to identify structures and to characterise the geotechnical environment during development mining and resource definition drilling and incorporate this information into the final stope designs and production sequence.
- Install monitoring instruments in the 10250 level, in the crown pillar and on the 10225 level in the hangingwall prior to the commencement of extraction of the lower lift bench stopes which will be used to confirm the understanding of the rockmass response to mining and assess changes in the behaviour of the rockmass allowing design engineers to adjust mining dimensions and mining schedules if required.
- Section 2 from northing 415m to 452m. Mine design will incorporate 15 metre hangingwall strike length stopes as recommended by the stope stability assessment. Please delete as repeat of dot point 1.
- To prevent large scale stope wall failure, although identified as a low risk, the following requirements will be incorporated into mine designs and ground control methods:
  - Data collection and detailed characterisation of ground conditions in the hangingwall and crown of the ore lens;
  - Sufficient and ongoing testing of representative samples of the rock mass to characterise the engineering properties;
  - Stope production spans do not exceed stable dimensions;
  - Conduct ongoing monitoring and back analysis of the performance of stope spans.
  - Record stope performance data and apply to stope design;
  - Complete a strategy to extract each stope that incorporates appropriate infrastructure to fill each stope after the completion of extraction;
  - Complete ground support designs to control stope overbreak; and

- Implement ground control strategies to protect the crown between surface infrastructure and the planned downhole benching stoping block.

Vibration

The following summarises the measures to be used by BHOP to minimise potential vibration impacts to local residents and on surface and surrounding infrastructure, and to ensure that blasting criteria can be met:

- Implement a high level of control regarding data collection, vibration assessment and QA/QC of the blasting process, to be addressed in the Technical Blast Management Plan.
- Review the extent to which geological structures (dolerite dykes and shear zones) could influence vibration outcomes for blasts within the Main Lode and Zinc Lode areas.
- Gather additional data from both the development and production blasts monitored at close distances to validate the estimates made.
- Install 3 vibration monitors at fixed residential locations and include a roving monitor to be used in the event of unexpected results or complaints.
- Place warning signs approaching the blasting area on South Road to warn motorists and pedestrians of the possibility of blast vibrations being felt while travelling that section of road.
- Include trigger limits in the BHOP Technical Blast Management Plan and agreed actions for these limits in regards to the condition of South Road (100 mm/s) and stopping pedestrians (65 mm/s).
- Conduct risk assessments for mining works on each lease with Perilya, determine and implement measures to minimise any impacts.
- Undertake a road condition study both prior to any mining in the vicinity of the road and post mining of the area.
- As a requirement of RMS BHOP will enter into a Deed of Agreement which outlines the risks and mitigation measures and final void controls, and any other matters appropriate. This Deed will also outline notification requirements for any incidents in relation to the road or road reserve.
- Consult with the tenant residing in the LOLRT property and formulate an agreement to accommodate mining operations and outline communication processes that will be implemented prior to blasting operations in the vicinity of the house, including processes for relocation if required.
- Undertake a structural assessment of the property (LOLRT) in relation to the predicted vibration levels for this area.
- Formulate and implement procedures for notification of blasting, specifying the approximate time and location of the blast to specific neighbouring stakeholders by either phone or email prior to each blast occurring.
- Formulate notification arrangements with the adjacent Perilya Southern Operations for each mine to notify the other prior to blasting events.

Air Quality

It is not expected that the Modification will impact air quality levels however an air quality monitoring program for the air exhaust at Shaft 6 will be undertaken in line with the EPL and to validate predicted air quality results. .

Noise

It is not expected that the Modification will impact noise levels however BHOP will undertake the following:

- Install ventilation fans underground to minimise noise levels at surface;

- Construct a brick wall at Shaft 5 to act as a noise barrier preventing fan and other mining noise from propagating up the Shaft; and
- Undertake a noise monitoring post fan and wall installation to check noise predictions are met.

Heritage

To manage potential impacts to heritage items the following will be implemented prior to the commencement of production mining:

- Implement a stabilisation project for the No 4 Headframe prior to the commencement of extended mining using slings for cross bracing (similar to steel ties currently in place) and continue current monitoring program.

  BHOP requests an alteration to this commitment. BHOP received an interim engineering report which has indicated that the No. 4 Headframe may not be able to be stabilised and saved. BHOP is currently seeking a second engineering opinion and will determine the appropriate course of action.

  BHOP requests the replacement of the current commitment with the following:-

  "Assess and determine whether if No. 4 Headframe can be safely stabilised and implement actions where reasonably practicable given current economic position".

- Undertake a regular inspection program for heritage items in the area that may be influenced by vibration.