Rasp Mine

Zinc – Lead – Silver Project
Project Approval No. 07_0018

Project Brief

Kintore Pit TSF3

February 2019

Broken Hill Operations Pty Ltd
BROKEN HILL

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EXECUTIVE SUMMARY

Broken Hill Operations Pty Ltd (BHOP) [a wholly owned subsidiary of CBH Resources Limited (CBH)] owns and operates the Rasp Mine (the Mine), located centrally within the City of Broken Hill on Consolidated Mine Lease 7 (CML7). The Mine produces zinc and lead concentrates which it dispatches via rail to Port Pirie in South Australia and Newcastle in New South Wales.

Mining has been undertaken within CML7 since 1885. The existing operations at the Mine include underground mining operations, a processing plant producing zinc and lead concentrates, a rail siding for concentrate dispatch and other associated infrastructure. These operations are undertaken in accordance with Project Approval PA07_0018 (as modified) (PA) granted from the then Minister for Planning on 31 January 2011, under Part3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Pursuant to Section 4.22 of the EP&A Act, BHOP seeks to modify its Project Approval to allow for tailing to be deposited into Kintore Pit which will also require relocation of the underground mine access portal and new locations for waste rock storage.

The purpose of this document is to provide preliminary information, including an overview of the proposed Modification (MOD6), its location and setting within the environment, to assist with identifying the potential key issues to be addressed in the Environment Impact Statement to support the application. Results from the preliminary risk review and early consultation with regulators are also provided.

Proposed Modification

Summary of proposed MOD6:

- Deposit tailing into Kintore Pit;
- Relocate the mine portal; and
- Provide for waste rock storage.

Predictions for the life of TSF2, following installation of the embankments, is now early 2022. The extended life of the facility is due to improved tailing settling rates. Mining will cease at that time if no other tailing storage facility is available.

Summary of Potential Key Risks

A risk review workshop was facilitated by HMS Consultants Australia Pty Ltd (HMS) on the proposed conversion of Kintore Pit to a tailing storage facility. The objective of this risk review was to assist in determining a safe and suitable option for converting the Kintore Pit into a TSF. In addition BHOP sought feedback from regulators to identify their requirements for the development of the Project. Risks were considered for both construction activities and future operations of the Project.

The main potential key risks identified that require further investigation, information and assessment were:

Inrush – from tailing deposition and potential for liquefaction entering the workings of the Mine beneath Kintore Pit, and the potential for liquefaction of tailing contained in TSF1 and TSF2 with the development of the new portal and decline. BHOP has opted to dewater the tailing prior to deposition into Kintore Pit and will include a stand-off distance from the portal and decline to the other site tailing storage facilities. A number of studies have been commissioned to inform the design and assess and advise on the implementation of strategies to protect safety of personnel, these include liquefaction and seismic assessments.

Ground failure – from the load of tailing placed within Kintore Pit given the removal of crown pillars and depth to the base of the Pit (10 m). Suitably qualified consultants will be engaged to undertake a geotechnical study and stability analysis to determine potential risks and recommendations to provide safety assurance.

Dust – primarily from earthworks and truck movements, dust from the site has the potential to contain lead. Suitably qualified consultants will be engaged to undertake a comprehensive air assessment conducted together with a human health risk assessment.

Noise, vibration and overpressure – noise from mobile equipment, truck movements and vibration and overpressure from blasting activities. Suitably qualified consultants will be engaged to undertake a noise assessment and a vibration and overpressure assessment. An assessment of flyrock from surface blasting for the proposed new portal will also be undertaken and a stand-off distance determined.

Water – surface water management around waste stockpiles and water quality. Water management around the stockpiles will form part of the scope of works for the design engineer for the waste rock stockpiles. An assessment of the impacts to the current Site Water Management Plan will also be undertaken together with potential impacts to water quality from tailing placement in the Pit.

A number of other studies will also be undertaken including a long term assessment for contamination from waste rock stockpiles, visual amenity assessment and review and other options for material coverage on site to reduce dust entrainment via wind.

There will be no further land disturbance as all Project activities are located in mining areas that are already highly disturbed. No vegetation will be disturbed. No heritage items will be impacted.

Benefits of the project

The proposed modification would:

- Permit mining at the Rasp Mine to continue post 2022 with additional storage of tailing;
- Significantly reduce the surface distance of hauling ore from underground to the ROM Pad thereby reducing impacts from noise and dust;
- Ensure continued employment of 226 full-time employees, 35 full-time contractors and indirectly over 200 casual contractors that provide specialist services when required;
- Engagement of approximately 60 contractors during construction and an additional 5 full time employees for operations,
- Allow the resource to be fully utilised, and
- Allow BHOP to continue to support the economic growth of Broken Hill.

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1.0 INTRODUCTION

This Section provides an introduction to Broken Hill Operations Pty Ltd and the Rasp Mine, and outlines the purpose of this document and the proposed modification, the need for the modification and highlights changes from the current Project Approval. Future consultation commitments are also outlined.

1.1 Background

Broken Hill Operations Pty Ltd (BHOP) [a wholly owned subsidiary of CBH Resources Limited (CBH)] owns and operates the Rasp Mine (the Mine), which is located centrally within the City of Broken Hill on Consolidated Mine Lease 7 (CML7). The Mine produces zinc and lead concentrates which are dispatched via rail to Port Pirie in South Australia and Newcastle in New South Wales.

Mining has been undertaken within CML7 since 1885. The existing operations at the Mine include underground mining operations, a processing plant producing zinc and lead concentrates, a rail siding for concentrate dispatch and other associated infrastructure. These operations are undertaken in accordance with Project Approval PA07_0018 (as amended) (PA) granted from the then Minister for Planning on 31 January 2011, under Part3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

BHOP will seek to modify, pursuant to Section 4.22 of the EP&A Act, its Project Approval to allow for tailing to be deposited into Kintore Pit as TSF3 which will also require relocation of the mine portal and new locations for waste rock storage.

The purpose of this document is to provide preliminary information, including an overview of the proposed Modification (MOD6), its location and setting within the environment, to assist with identifying the potential key issues to be addressed in the Environmental Impact Statement (EIS) to support the application.

1.2 Proposed Modification

Summary of proposed MOD6:

- Deposit tailing into Kintore Pit;
- Relocate the mine portal; and
- Provide for future waste rock storage.

1.3 Proposed Changes to the Project

The current Project Approval permits underground mining of the Western Mineralisation, the Centenary Mineralisation and Main Lode from Blocks 7 to 12 until 31 December 2026 extracting up to 750,000 tonnes of ore per annum and 8,450,000 tonnes of ore over the life of the Project. It also permits the processing of ore and the dispatch of concentrate products from the Mine by rail. There are a number of auxiliary facilities including maintenance workshops, inventory, chemical and explosives storages, backfill and concrete batching plants and a rail siding.

Table 1-1 provides a summary of existing approved project components compared to the proposed modifications.

Table 1-1 Comparison of Existing Approval and Proposed MOD6

Component	Approved Rasp Mine	Proposed MOD6
Mine Life	15 years (includes construction and closure) from 2011 to 2026.	No change, however operations will cease in early 2022 without approval for additional capacity for tailing storage.
Tenement Status	CML7 – Incorporates the Rasp Mine.	No change
Mining Methods	Underground mining using various methods including long hole, benching, modified Avoca, room and pillar or uphole retreat. Within Western	No change to mining methods. MOD6 proposes a new access portal to the underground mine, within a boxcut, and

Component	Approved Rasp Mine	Proposed MOD6
	and Centenary Mineralisation and Main Lodes Blocks 7 to 12.	access decline.
Mining Rate and Total Production	750 000 tpa ore. Total production over life of Project: Approximately 8,450,000 t	No change
Waste Rock Disposal	Underground: Backfill. Surface: Material (<0.5% Pb) to be used for road repair and bunding and rehabilitation at closure	MOD6 proposes that excess waste rock from U/G mining and material from construction of the boxcut and decline be stored at various locations.
Underground Ventilation	2 x 450 kW primary ventilation fans located 160 m below ground and exhausting centrally within CML7.	No change
Processing Methods	Crushing, grinding, flotation, thickening and filtration at on-site processing facilities.	No change
Processing Rates	250 tph in crushing plant and 93.8 tph in grinding plant.	No change
Concentrate Production	Lead: 44,000 tpa (concentrate 73% Pb and 985 g/t Ag) Zinc: 87,000 tpa (concentrate 50% Zn)	No change
Tailing Disposal	Course stream returned to mine void and finer stream to be directed to tailing storage facilities.	MOD6 proposes to establish a tailing storage facility at Kintore Pit – TSF3 with an approximate 10 year life and using a new deposition method.
Facilities	Other associated facilities such as Backfill Plant including a cement silo, Concrete Batching Plant, Rail Loadout, Warehouse, core preparation and inventory storage and workshops.	MOD6 proposes to install a dewatering plant for tailing prior to its deposition into Kintore Pit TSF3.
Services	Extensions to existing substations, water lines and phone lines. New 22kV overhead power lines to be constructed.	MOD6 may require some additional services and the relocation of services from within Kintore Pit that currently support the mine..
Water Supply / Extraction	Potable / treated water 9 ML/a Raw untreated water 139 ML/a Reclaimed / recycled water 300 ML/a Extraction up to 390 ML/a.	MOD6 may require some changes which will be confirmed with a new water balance.
External Roads	No changes to external road network.	No change.
Employment Numbers	Current numbers are: Employees: 226[1] Contractors: 35	MOD6 proposes increases in personnel: During construction: Employees – 0 Contractors – 60 For operations: Employees – 5 Contractors – 0
Hours of Operation	Underground Operations: 7 days per week, 24 hours per day Shunting 7 days per week, 7am to 6pm (not conducted). Construction hours 7am to 6pm Mon-Fri and 8am to 1pm Sat, no construction work on Sundays or Public holidays. Activities not listed above – 7 days per week, 24 hours per day.	No change to operating hours of current activities. MOD6 proposes to operate the dewatering plant 24 hours per day. MOD6 proposes to construct the boxcut – 7am to 6pm Monday to Saturday and 8am to 6pm Sundays (with low impact works only inside the boxcut on Sundays)
Disturbance Footprint	CML7 consists of 342.66 Ha Current land disturbance due to Rasp Mine activities is 28.4 Ha	MOD6 will require review to clarify disturbance areas in line with new waste rock stockpiles.

Note 1: Employee numbers have increased from original EA. After underground stoping commenced and more extensive diamond drilling of the ore body was competed it was identified that the geometry of the ore body changed with depth. This meant that the tonnages of ore per vertical metre reduced significantly which has required the mine to develop at a much higher rate than originally planned to sustain the current mining rate of 60,000 tpm (720,000 tpa). Development is very labour intensive increasing the number of employees required for the same amount of ore mined.

1.4 Regulatory Framework

The Rasp Mine was declared a Major Project under the *State Environment Planning Policy (SEPP) (Major Development) 2005* (now repealed) and was approved in January 2011 by the then NSW Minister for the Department of Planning and Infrastructure under Part 3A of the EP&A Act. Following repeal of Part 3A and Section 75W (transition provision) of the EP&A Act, the application for this Modification is made pursuant to Section 4.55 of the EP&A Act. The Rasp Mine Project has been transitioned to a State Significant Development and MOD6 will be considered under the assessment pathway for State Significant Development (SSD).

1.5 Existing Environment

The Mine 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 Mine is bounded by Eyre Street and Holten Drive to the south and east, Perilya's Broken Hill North Mine to the east and South Mine to the west, and the commercial centre of Broken Hill to the north. The Mawsons Quarry lies adjacent to the Mine on Holten Drive. The Mine site is dissected by two major State roads, South Road (Silver City Highway SH22) to the southwest and Menindee Road (MR66) to the northeast. 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 surround the Mine with pasture land to the southeast, **Figure 1-1**.

The land within CML7 has several surface exclusion zones, which contain rail lines and stock yards to the north, Perilya employee housing to the north east, the Italo International (Bocce) Club and previous bowling club to the south west and other commercial and residential properties.

The site has been mined for over 130 years leaving the site highly disturbed with a number of heritage buildings and structures. The majority of the site is covered with historic waste rock or tailing material, there is little topsoil and vegetation.

1.6 Reason for the Proposed Modification

At current tailing deposition and following installation of the TSF2 embankments, the life of this facility will be completed in early 2022. In MOD4 it was identified that under current volumes storage capacity within TSF2 would cease in mid-2021. Actual experience has indicated that the tailing is settling with a higher density, increasing the maximum volume for deposition and this, together with new survey data, has extended the life of the facility to early 2022.

In the original Environment Assessment (EA) for the Project it was planned for tailing to be placed both in an above ground tailing storage facility and underground, via the Backfill Plant, to fill mining voids. The tailing waste stream from ore processing has been approved to be deposited in the historic tailing facility (TSF1) and in the disused Blackwood Pit (TSF2). BHOP chose to deposit tailing in TSF2 and not use TSF1. This decision was based on the greater capacity of TSF2 (3.1 Mt) compared to the capacity of TSF1 (970,000 t) and the significant construction costs associated with the use of TSF1 ($7.196 M) compared to the cost of extending TSF2 ($3.5 M).

In the initial EA BHOP underestimated the amount of mine development that was required to access the Main Lode and Western Mineralisation ore bodies. The need to undertake more underground mining development has impacted the amount of waste generated. In the original EA it was predicted that approximately 250,000 t of waste rock would be produced each year for a production rate of 750,000 t of ore. Actual total waste rock produced has averaged 361,000 t per year since commencement of operations peaking in 2015 and 2018 with 452,000 t. BHOP has chosen to place the additional waste rock underground to fill voids and stopes, as it is more economic to dispose of waste rock underground where possible rather than transporting waste to the surface. Thus there has been no void space underground for the backfill of tailing**. Table 1-2** summarises tailing and waste rock placement as predicted in the original EA (at a production rate of 750,000 t) and what has actually been placed since commencement of operations.

Figure 1-1 Location of Kintore Pit within CML7

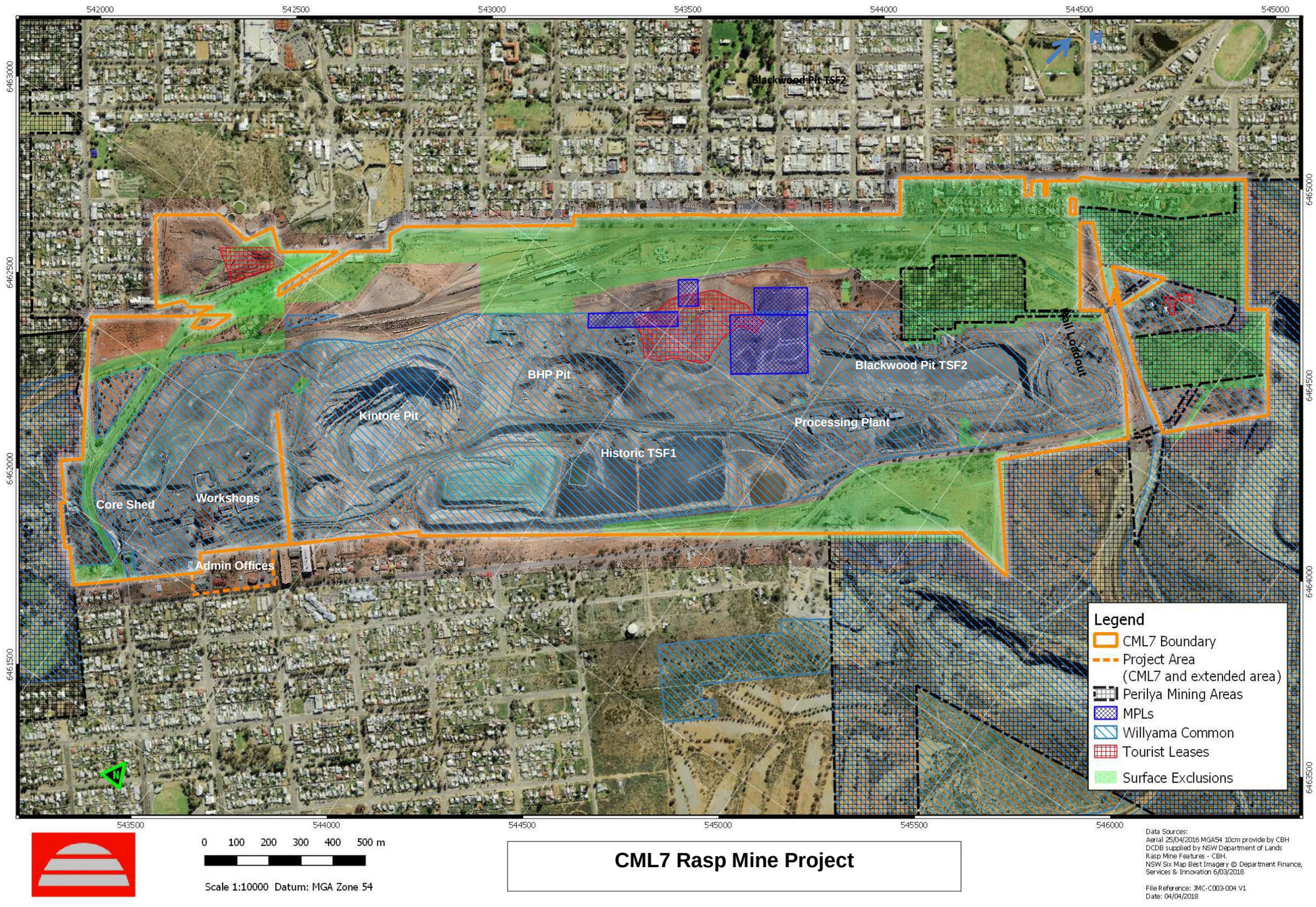


Table 1-2 Summary of Proposed (EA) and Actual Placement of Waste Rock and Tailing

Year (to 30 June)	EA Tailing in Underground backfill per year (t)	EA Tailing deposited in TSF1 (t)	EA Tailing deposited in TSF2 (t)	EA Waste Rock U/G (t)	Actual/ Planned[2] Tailing in TSF2 (t)	Actual waste rock placed underground (t)	Actual waste rock stored Kintore Pit (t)	Actual Total waste rock (t)
2012	97,969	273,281	0	250,000	322,111	47,527	150,000[1]	197,527
2013	195,938	195,138	0	250,000	574,833	230,607	150,000[1]	380,607
2014	195,938	195,138	0	250,000	486,749	223,473	163,304	386,777
2015	216,563	216,563	0	250,000	499,598	223,611	228,942	452,553
2016	247,500	88,281	159,219	250,000	555,837	265,369	96,888	362,257
2017	278,438	0	278,438	250,000	622,161	215,897	76,578	292,475
2018	309,375	0	309,375	250,000	644,828	330,577	121,864	452,441
2019	309,375	0	309,375	250,000	623,456[2]	332,702[2]	86,751[2]	419,453[2]
2020	309,375	0	309,375	250,000	628,883[2]	332,702[2]	132,569[2]	465,271[2]
TOTALS	**2,160,471**	**968,401**	**1,365,782**	**2,250,000**	**4,958,456**	**2,202,465**	**1,206,896**	**3,409,361**

Note[1]: Estimated
Note[2]: Planned

Following a review by Golder Associates Pty Ltd (Golder) of potential locations for tailing storage off-site and around the vicinity of the Mine (within 10 kms), BHOP has determined to use Kintore Pit (the Pit) as TSF3, which will necessitate the relocation of the Mine access portal and new storage location(s) for excess waste rock, both currently located within the Pit. A summary of this review will be included in the EIS.

1.7 Consultation and Key issues

Meetings have been held with the relevant regulators to discuss the proposed modification - Department of Planning and Environment (DPE), the Broken Hill City Council (BHCC), Division of Resources and Geoscience (DRG) and the Environment Protection Authority (EPA). Requirements suggested by these regulator meetings are summarised in **Table 1-3**. This document details the aspects of the proposed modification and will be used to formalise consultation with these agencies. Further consultation with the community will be undertaken during the formulation of the EIS and a community briefing meeting will be held to outline the proposed project and seek feedback.

Once the proposed concepts are developed consultation will also be undertaken with the Resources Regulator in regards to safety matters.

Table 1-3 Summary of Agency Requirements

Government Agency	Issues Identified
Broken Hill City Council Meeting: 25 June 2018	The BHCC does not have any initial concerns with the proposed project however dust and noise should be controlled and heritage structures avoided. There is no issue with visual amenity as it was considered an already disturbed mine site.
EPA Meeting: 27 June 2018	• Provide a description of waste rock to be transported to stockpiles including, particle size and metals content. • Human health risk assessment and in particular an assessment of potential impact on children's blood lead levels and describe air quality control measures used to ensure there is no net increase in blood lead levels. • Air quality assessment. • Noise assessment. • Provide groundwater assessment following tailing placement in Kintore Pit. • Provide seepage analysis for Kintore Pit. • Clarify and justify construction hours and describe the process to provide breaks from noise

Government Agency	Issues Identified
	and activities for local residents. • Assessment of vibration and overpressure from new portal and decline development. • Provide summary of community consultation with local residents particularly in regards to noise and working hours. • Provide details in rehabilitation plan of methods to ensure minimum dust emissions from the site.
DP&E Meeting: 28 June 2018	• Project to follow the assessment pathway for a State Significant Development with MOD3 as the baseline. DPE to provide further information, include summary of assessment pathway in EIS. • Clarify and justify why waste rock stockpile capacities exceed requirement. • Consult with Resource Regulator re safety issues for underground mine workers. • Seepage analysis for Kintore Pit. • Groundwater quality assessment for Kintore Pit. • Air quality assessment. • Human Health Risk Assessment, indicating impact to children's blood lead levels. • Describe the dewatering/filtering system for tailing and its location. • Provide a summary of BHOP contributions to Health NSW. • Provide an assessment of blasting vibration and over pressure at portal and decline. • Provide assessment of the requirement for controlled actions under the EPBC Act, in relation to Broken Hill status on the National Heritage List (BH). • Provide an assessment for fauna (bats) habitat in old shafts / adits within Kintore Pit. • Provide an assessment of any visual impacts from the modification.
DRG Meeting: 29 June 2018	• Provide stability analysis of TSF1 (from collapse beneath) and TSF2 (from batter/embankment failure) for safe storage of waste rock. • Provide details for stormwater management on stockpiles. • Provide information on the geochemical characteristics of the boxcut material, variation within the material, and waste rock generally, this includes all relevant metals. Also its homogeneity. • Provide details of potential impact of tailing on ground water. • Provide an assessment of slumping of tailing in Kintore Pit at closure (also Blackwoods). • Justify the use of waste rock armouring against other dust mitigation measures. • Provide details of water management including seepage management, water expression through the pit walls and excess water from dewatering tailing. • Provide seepage analysis for Kintore Pit and detail methods to eliminate/minimise seepage. • Provide a noise assessment with modelling particularly in relation to the development of the boxcut. • Provide details for heritage within BHP Pit and how it will be protected. • Outline how noise and dust will be managed and any impacts to visual amenity. • Provide details of the design of the boxcut and entry point to Haul Road, e.g. final height of exit from boxcut to the ROM. • Provide assessment of potential liquefaction of Blackwood Pit tailing and the required stand-off distance for new underground workings. • Show sizing of materials – waste rock and from boxcut and if fines show how they will be removed prior to covering 'free areas'. • Provide details for monitoring – air, water, slumping or subsidence (post closure). • Provide any details of waste generation e.g. fines from dewatering and how they will be treated. • Provide an assessment of long term geochemical degradation i.e. 100 to 500 years of waste rock used on surface coverings. • Provide assessment of alternatives for rehabilitation (for dust suppression). • Explain what the final landform will be.

2.0 LOCATION OF PROPOSED MODIFICATION

This Section describes the location for tailing placement in Kintore Pit, and locations for the new mine access portal and waste rock storage.

2.1 Kintore Pit

Kintore Pit (the Pit) is a large open pit mined in the 1970s currently used for underground mining access via a mine portal and decline. The Pit is approximately 210 m deep (RL310) on the southern perimeter and approximately 480 m (north to south) by 360 m (east to west), **Figure 2-1**. Waste rock is used to fill underground voids and is stored in the Pit when there are no voids available. On average 141,000 t per year has been stored in the Pit since mining commenced in 2012 to the end of 2018 (**Table 1-2**). An additional 219,320 t is planned to be placed during 2019 and 2020 bringing the total stored in Kintore Pit to 1,206,896 t. This material will be left in-situ and new location(s) identified for the storage of future excess waste rock. The current Haul Road will remain to provide access to the Pit.

No vegetation is required to be removed, there are no heritage items located in the vicinity and there will be no additional land disturbance. There are no known fauna (e.g. bats) living in the old adits and shafts visible within the Pit. As part of operations of TSF3, voids will be inspected and an assessment of habitats conducted as they become safely accessible within the Pit. This will be outlined in the EIS.

Figure 2-1 Kintore Pit

2.2 New Portal

It is proposed to access underground mine workings via a new portal to be located adjacent to the Haul Road north of TSF1, **Figure 2-2**. This will require the construction of a boxcut to obtain the required depth to connect to competent rock. An Armco tunnel will be installed over the entry to the portal and extend up to 20 m from the portal entrance. It is proposed to cover the Armco tunnel with material reclaimed from the boxcut construction. The Haul Road will be realigned to meet the boxcut.

This location will allow underground access to northeast areas of the Mine and will be closer to the ROM Pad which is used to stockpile ore prior to crushing, reducing the surface haul road route, from 2 km to 500 m. The area contains an historic waste rock dump and is already disturbed; no vegetation or heritage items are in the vicinity. It was included as a 'free area' in the original EA. There will be no additional land disturbance.

Figure 2-2 Indicative Proposed Portal Location

2.3 Waste Rock Storage

Since the commencement of mining operations BHOP has placed approximately 987,576 t of waste rock from underground workings into Kintore Pit (end 2018). This waste rock will remain in-situ. However as this Pit will no longer be available for storage of waste rock, alternative stockpile locations need to be identified.

Current mine plans have calculated total waste rock from mining operations to be brought to the surface from 2021 (when the Pit will no longer be available for waste rock storage) to the end of 2026 (current approved mining) as approximately 1,146,000 t. This waste rock will be taken to surface stockpiles.

In addition the development of the Boxcut may generate 1,081,000 t of waste material, 550,000 t will be replaced as covering for the Armco and 531,000 t to be placed in stockpiles. The new section of decline, which will be installed to join underground workings, may generate 32,000 t of waste material. This additional waste rock cannot be accommodated in underground voids and will need to be placed in stockpiles on the surface of the Mine.

The total required capacity for waste rock storage within surface stockpiles from construction and operations from 2021 to 2026 is 1,709,000 t.

Table 2-1 provides a summary of the proposed options for waste rock stockpiles with their capacities and **Figure 2-3** indicates the proposed locations.

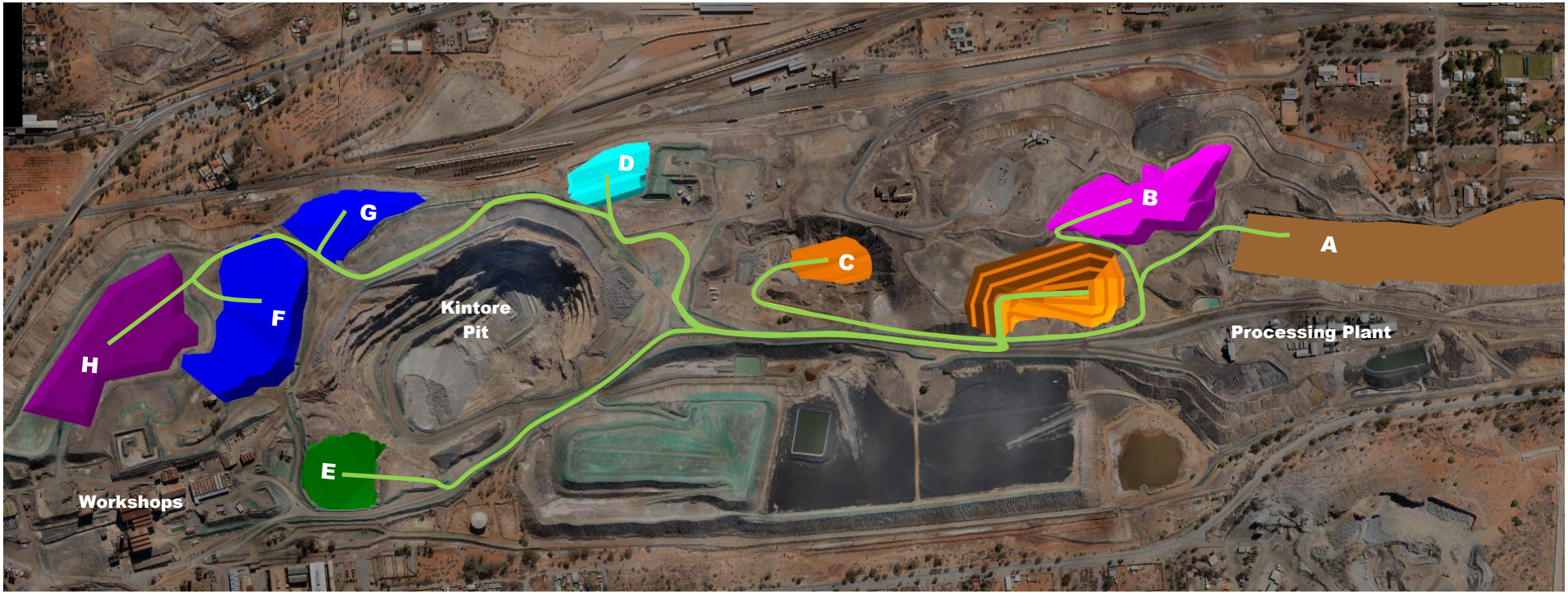
Table 2-1 Options for Waste Rock Placement

Option	Location	Dimensions (at widest points) (m)	Area (m^2)	Lift Height (m)	Capacity (kt)
A	Atop tailing in Blackwood Pit TSF2	D Varies W 172 m L 665 m	82,192	1 (conservative estimate)	200
B	Area north of new Boxcut (Armco Tunnel Reclaim) this material will be reused as coverage for the Armco tunnel.	W 110 m L 345 m	28,773	17	690
C	BHP Pit, infill area only	D 14 W 80 L 135	8,620	Infilled to current surface level within Pit	195
D	Area north of Kintore Pit	W 90 m L 144 m	10,425	16	185
E	Little Kintore Pit	D 17 m W 125 m L 130 m	15,248	Infilled to current surface level	329
F	Infill area between Kintore Pit and Stockpile H	W 141 m L 281 m	38,461	15	578
G	Infill area adjacent Railyards	W 88 m L 208 m	16,548	9	194
H	Atop existing waste dump	W 166 m L 348 m	37,934	2.5	62
				TOTAL STORAGE CAPACITY	2,433

Note: 1 Waste Rock Loose density 2.2 g/cm^3
2 Final tonnages are indicative only and will be refined during final design, accuracy of final waste tonnage ±20%

The additional storage capacity (724 kt) is to provide for the safe storage of material identified to contain greater than 0.5% lead.

Figure 2-3 Indicative Location Options for Waste Rock Placement



Legend

A Atop Blackwood Pit TSF2
B Area north of new Boxcut
C Infill within BHP Pit
D Infill area north of Kintore Pit
E Within Little Kintore Pit
F Infill area between Kintore Pit and Comms Tower
G Infill area adjacent Railyards
H Atop existing waste dump

It is proposed to place material with an elevated lead content (>0.5%) in BHP Pit (C) and Little Kintore Pit (E) which have a combined capacity to store 524,000 t. The results from the XRF readings for lead of waste rock material used for the construction of a recent noise bund found that 93% of readings detected lead less that 0.5% lead with 62.4% detecting no lead. Therefore it is proposed that these two facilities have the capacity to store this material. It is also proposed that these Pits shall only be filled with this material and any remaining capacity shall be left available for future mining operations.

All locations are within the Mine site on disturbed land primarily; disused pits, fill on tailing storage facilities and/or waste dumps. No vegetation is required to be removed and there will be no additional land disturbance. Location A will form the rehabilitation for Blackwood Pit TSF2. Locations C and E are disused pits; locations B, D, F, G and H are elevated and may be visible from some areas of the town. The heritage items located within BHP Pit (C) will not be affected by the stored waste rock. There are no other heritage items within the proposed areas.

3.0 DESCRIPTION OF PROPOSED MODIFICATION

This Section outlines details for the placement of tailing in Kintore Pit, installation of a new mine access portal and stockpiling of waste rock.

3.1 Tailing Deposition in Kintore Pit

Tailings are currently deposited into Blackwood Pit TSF2 which will reach capacity in early 2022.

BHOP engaged Golder to undertake an investigation of both on-site and off-site opportunities for tailing storage. Golder identified several off-site possibilities all requiring land acquisition and extensive earthworks. The placement of tailing into the Pit was the preferred option as there is no increase to the disturbance footprint, less impact to public and private land with the installation of pipe-works and access tracks and, it was the most cost effective option. Filling the Pit also provides a safer option at mine closure. An alternative analysis of these options will be provided in the EIS.

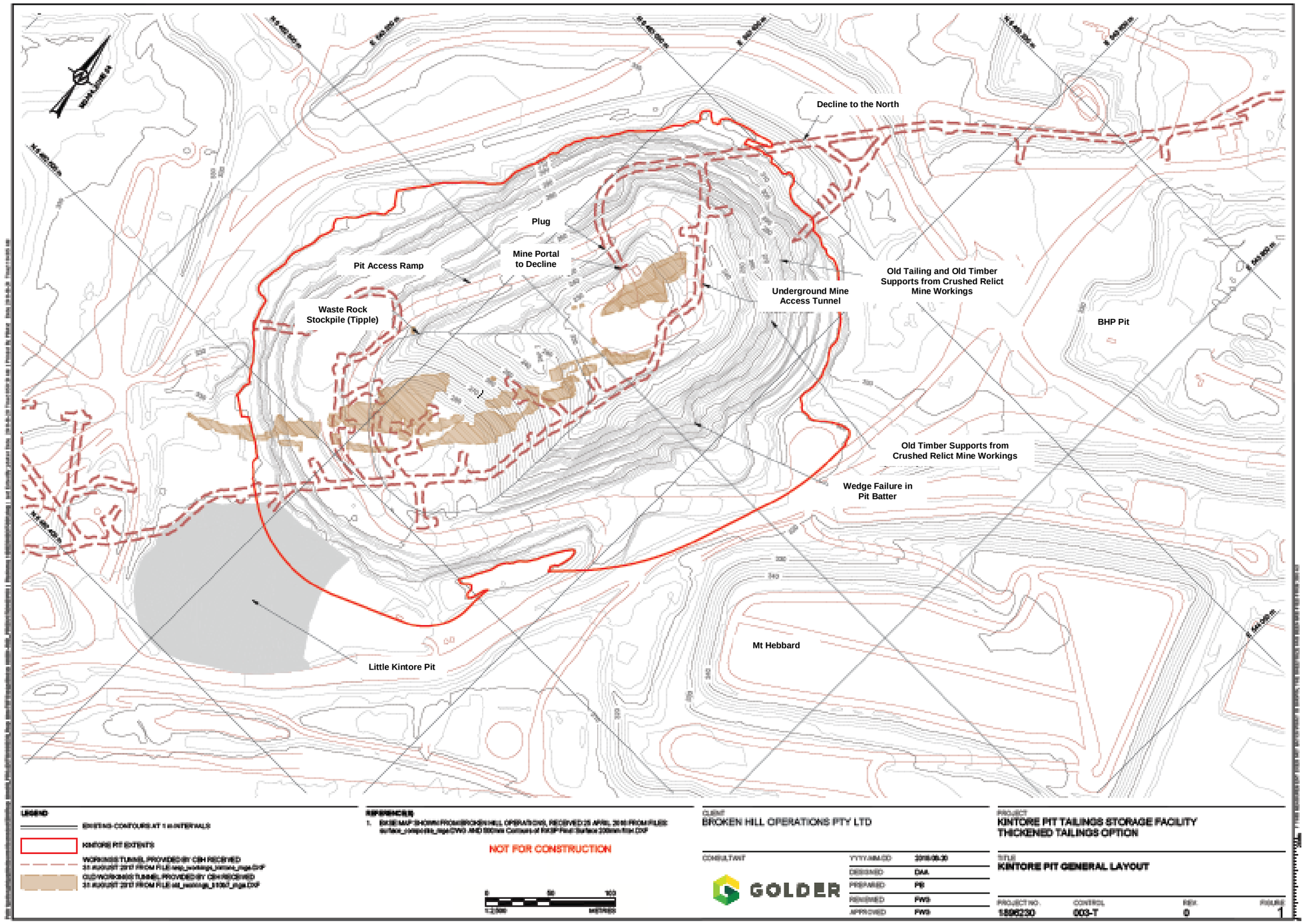
Without additional tailing storage capacity the Mine will cease operation in early 2022.

Investigations undertaken by Golder identified a number of issues that need to be considered in the design of the Pit as a storage facility. These include:

- Open cut excavations of the Pit have exposed tailing within an old storage facility in the northern batter of the Pit,
- Old timber supports from crushed relict mine workings,
- Adits and shafts to old workings are present in the batters on each side of the Pit, including behind the waste rock storage pile.
- Mine records show old mine workings below the Pit floor have minimum rock cover thickness to the old workings (approximately 10 m) and to the current access decline (about 15 m).
- Crown pillars separating the Pit floor from the old workings were removed either during open pit mining or by previous underground remnant mining.
- A slope wedge failure has occurred in the eastern batter of the Pit where the intersection of discontinuity planes in the rock slope have day-lighted in the batter slope. Failure of the wedge occurred in 2014 following a period of heavy rain.

Access to the current underground mine workings is via a portal and decline located at the base of the Pit into the toe of the western batter slope. The lower slopes of the western batter above and around the decline portal have been supported by a combination of resin bolts, split sets, cable bolts and fibre reinforced shotcrete. A plan of the decline and access ramps is presented in **Figure 3-1** and shows the decline branching at about 160 m with one ramp continuing to the northern mine workings and one turning back under the pit floor and connecting to the southern mine workings (Block 7).

Figure 3-1 Kintore Pit General Layout



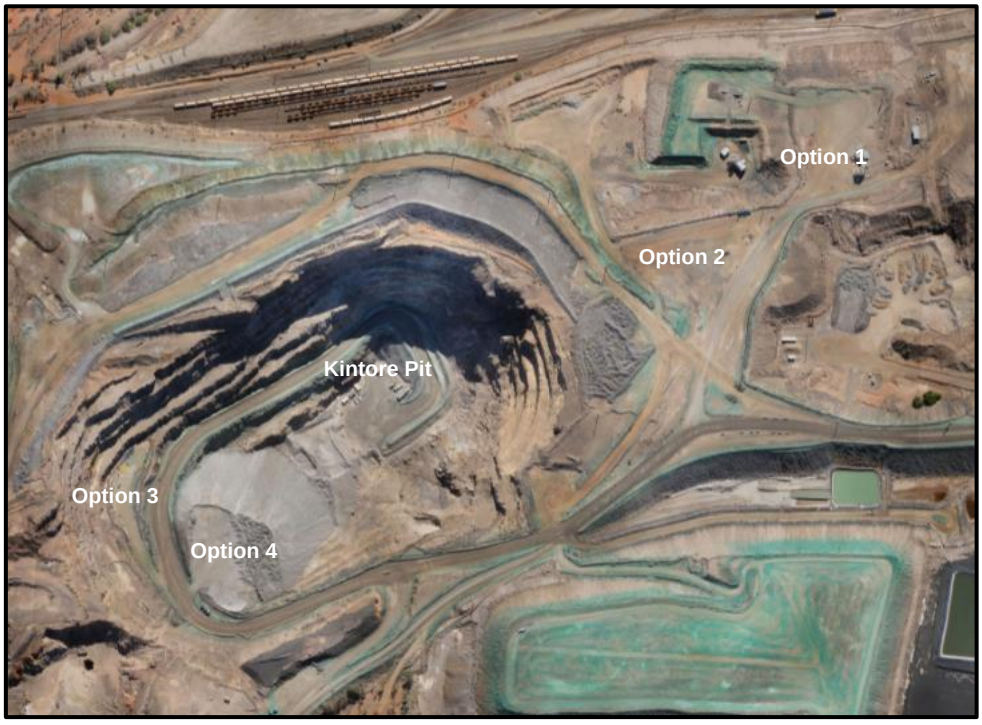
The storage capacity of the Pit has been estimated by Golder and based on a 1.5 percent grading (north to south) on the tailing surface, the capacity of the Pit is approximately 4.2 Mm^3. At current production rates this provides approximately 10 years of capacity which may be extended by tailing placement underground (to commence in late 2019) and/or wall raises to the perimeter of the Pit (not required under current development consent volumes).

The use of Kintore Pit as a tailing storage facility requires closing the current underground mine access portal and decline. This will require managing old workings and recent mine workings beneath and around the Pit, to ensure tailing is contained within the Pit and address the risk of inrush to the underground workings.

An assessment workshop was held to address the risk of tailing inrush and concluded that the tailing would need to be dewatered prior to deposition within the Pit, **Section 4.0**. The options of how best to undertake the dewatering including the equipment required, its location and tailing moisture level, are currently under investigation by BHOP in conjunction with Golder and GR Engineering Services Limited (GRES). The outcome of these studies will be outlined in the EIS.

It is proposed to hydraulically deliver tailing to a dewatering plant to be installed at one of four possible locations (**Figure 3-2**); (1) adjacent the existing Backfill Plant, (2) close to the northern rim of the Pit, (3) within the Pit on a side ledge or (4) on top of the tipple stockpile. Location at the Backfill Plant or northern rim would require trucking or conveying of the dewatered tailing for deposition into the Pit, location in-pit would utilise a conveyor or other mechanical feed delivery arrangement. The Pit placed tailing would be spread and compacted in the Pit with a bulldozer.

Figure 3-2 Indicative Locations for the Dewatering Plant



The concept of dewatered tailing is to reduce the water content of the tailing to below the threshold for liquefaction thereby reducing the risk for inrush into the mine. Dewatering of the tailing must achieve a moisture content such that the material cannot slump or liquefy from any credible static or dynamic loading circumstances or event, including seismic or mining blast activity. Currently the targeted moisture content is approximately 12

percent with an average dry density of 1.8 t/m^3. This results in a tailing that is sufficiently moist that it will not be dust generating but dry enough to be immediately trafficable.

Testing is currently being concluded to determine the maximum moisture content which the dewatering plant must achieve, the result will then be assessed further with respect to loading from compaction, rate of filling of the Pit, air drying and consolidation effects.

Based on current knowledge Golder have provided a concept design to install a concrete monolithic plug seal (20 m length) down the decline from the portal, followed by 50 m of waste rock backfill into the current decline. The plug seal will be designed as an additional safety measure against uncontrolled flow of seepage water or tailing into the mine workings thereby permitting continued safe access along the decline to both north and south mining areas. The final design of the plug will be made following a detailed geotechnical and risk assessment of the portal and decline rock conditions and will be provided in the EIS.

Other preparations required within the Pit to deposit the tailing will be determined once process and drainage systems are designed and again will be outlined in the EIS.

3.2 New Portal Construction

The construction of the proposed new underground access portal will require a boxcut to reach competent hard rock material prior to the development of the new decline. The current design concept for the boxcut is 280 m long and 150 m wide and up to 58 m deep at its lowest point prior to entry into the decline. The overall range for the side slope angles are 35^o to 60^o with 7 m wide benches and 12 m high batters. This current design is the result of additional geotechnical information and improves geotechnical stability; the angle of the benches has been flattened, the benches have been made wider and the batters higher, the boxcut has been made deeper and access has been moved slightly to the south to align better with the ROM Pad. The design may be further refined and this will be detailed in the EIS. The design has also been turned 180^o to support future exploration programs and to improve access to mining areas.

It is also proposed to install an Armco tunnel over the entry to the proposed portal. The Armco tunnel will bring a higher level of safety to the Project. It will extend from inside the rock face outward for approximately 20 m and includes steel arch sets, rock bolts, mesh, shotcrete and steel sets clad with corrugated steel. The Armco cover will reduce the risk of water ingress into the sides of the boxcut, eliminating erosion and potential for wall failure. Replacing the waste material also reduces the waste rock to be transported and placed in surface waste rock stockpiles.

The boxcut will require the removal of approximately 1,081,000 t of material made up of predominately competent rock, waste and mixed rock fill, with small amounts of tailing (16,000 t) and slag (17,000 t). Approximately 550,000 t of material will be reclaimed to backfill the Armco tunnel within the boxcut. It is proposed to stack this material temporarily in Waste Rock Stockpile B located adjacent and to the north of the boxcut, providing the shortest transport route (650 m). The remaining material will be stored in the proposed waste rock stockpiles. Drill core samples will be tested for a suite of metals, including lead, to determine stockpile placement.

A new decline will be installed from the proposed new portal and extend 400 m to meet mine workings from the 6 Level. The total waste from this new section of decline is estimated as 32,000 t. This material will be allocated to a surface stockpile.

The proposed construction of the boxcut will be undertaken utilising a 100 t excavator, 50 t excavator, grader, water cart, a Cat D9 size dozer and four 100 t dump trucks. The 100 t trucks will be under-filled to 90 t to minimise spillage and dust exposure. The construction period has been extended to approximately 6 months to include the installation of the Armco tunnel and placement of reclaimed material to cover the tunnel. This will require, over approximately 160 days, 6,256 truck movements taking waste rock to stockpiles (average 1,665 m distance) and 12,222 truck movements to place and return reclaim material from/to the boxcut (650 m distance). Using four 100 t trucks loaded to 90 t this equates to approximately 12.3 truck movements per hour. This

anticipates utilising shift times of 7 am to 6 pm, 7 days per week. It is proposed to undertake work on Sundays that will not impact on neighbours, particularly from machinery/truck generated noise.

Figure 3-3 Indicative Proposed Boxcut, Portal and Area for Material Replacement

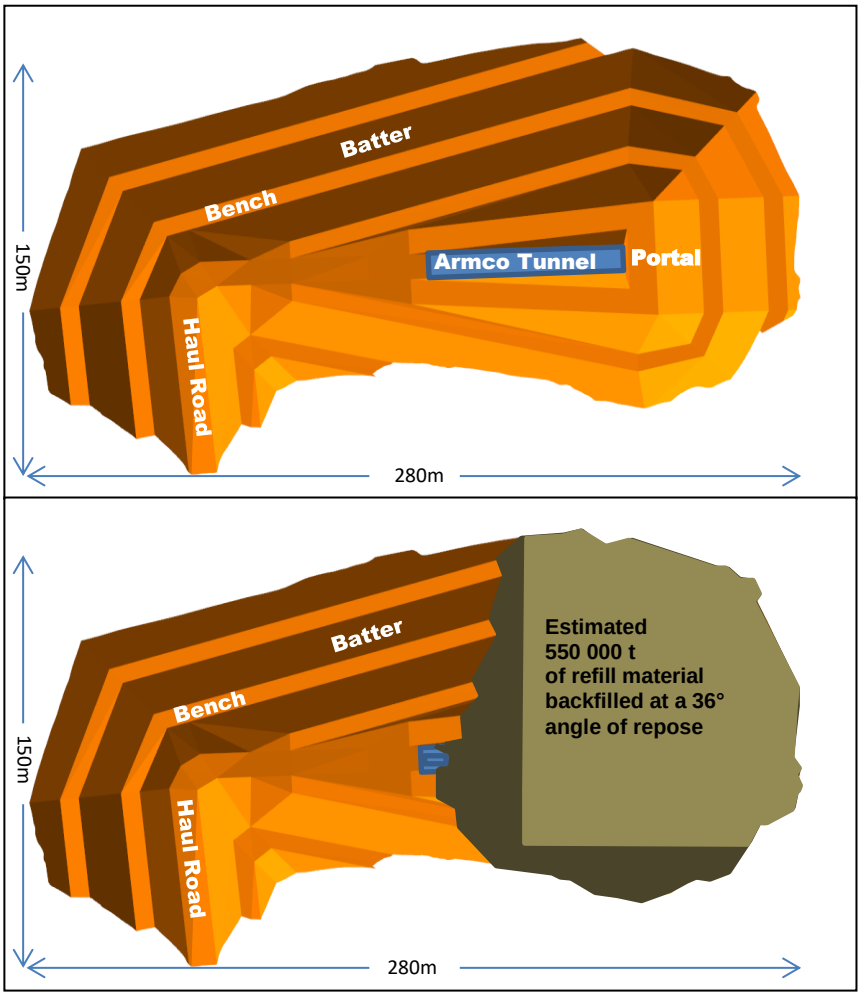


Figure 3-4 Cross-cut for Indicative Boxcut Design

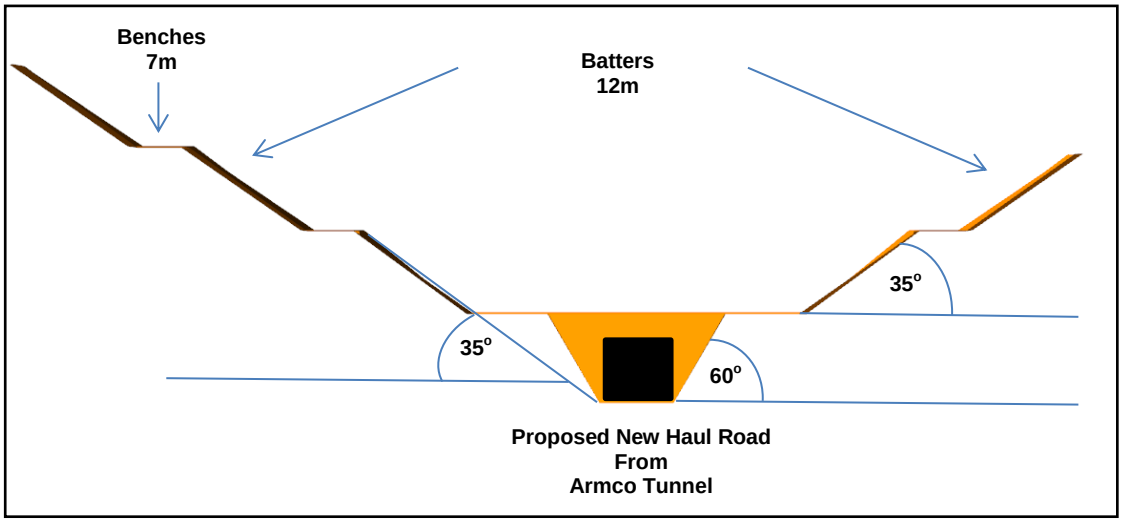
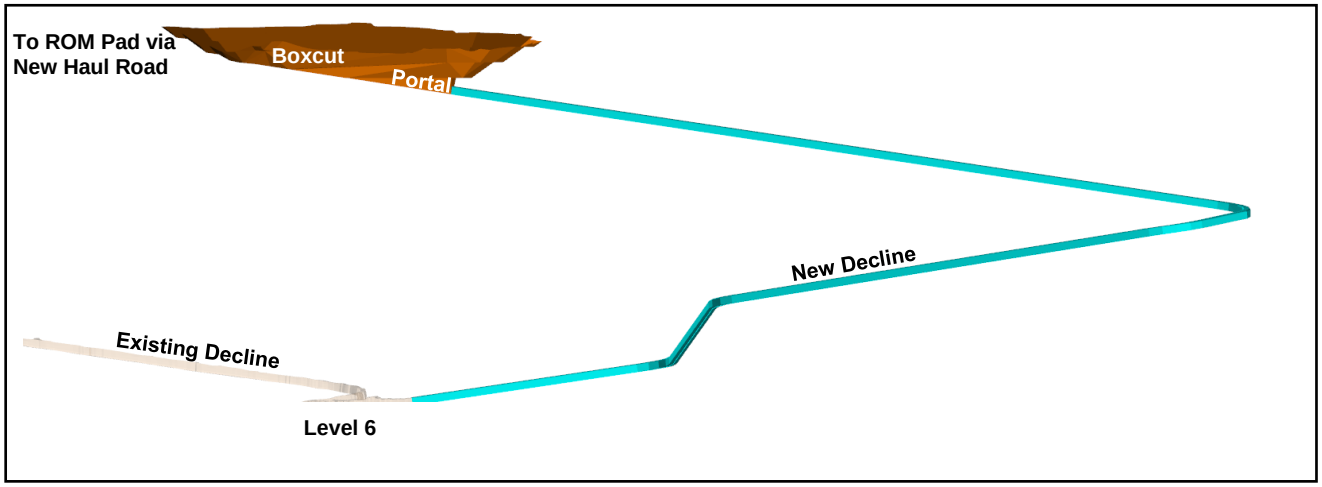


Figure 3-5 Indicative Boxcut and Decline Design



The decline will be completed over an estimated period of 3 months, working normal mine shifts over 24 hours per day, 7 days per week. Blasting methods will be designed by a mining specialist to minimise potential impact from vibration or overpressure, particularly in relation to the portal development. It is proposed where possible to mine the decline from underground to minimise surface impacts. Flyrock may be a potential risk with the development of the portal face and will be assessed as part of the EIS.

In operation there will be no change to the number and type of haul trucks used transporting ore to the ROM Pad. The haulage distance to the ROM Pad will reduce from approximately 2 km to 500 m.

3.3 Waste Rock Stockpiles

3.3.1 Waste Rock Characteristics

A waste rock study was undertaken in 2017 by Pacific Environment Ltd (PEL) for PA 07_0018 MOD4, Appendix K *Waste Rock Classification, March 2017*. PEL found that the bulk of the waste rock is composed of Garnet Pelite (GPE) and Psammopelite (PM), then Garnet Spotted Psammopelite (SPM) with very minor quantities of dolerite (DOL) and Garnet Quartzite (GQ) present. All of these rock types are described as hard and competent units with the exception of Garnet Pelite (GPE) 1 and 2, which is noted as a softer rock type that has been more susceptible to accommodating shearing. Conversely, DOL1 and DOL2 is rated as extremely hard rock with very high uniaxial compressive strength (UCS). An explanation of these geological rock description terms was contained within the report and will be described in the EA. The following discussion provides some highlights from the Report.

3.3.2 Particle size and moisture content

The waste rock composition was analysed for particle size and moisture content, and these results are presented in **Table 3-1**. PEL found that the moisture content of all samples was very low. Moisture content has a significant effect on rock strength, lower moisture contents are typically linked to increased rock strength which will impact how much weathering of the rock may occur over time.

PEL also found that the waste rock samples showed a consistent trend with a low proportion of small particle sizes. Laboratory reports showed that 4 of the 5 samples had 1% of the sample passing a 75 µm sieve; while one sample had 2% passing the 75 µm sieve. Significant volumes of dust are unlikely to be generated from particle sizes greater than 75 µm.

Table 3-1 Size and Moisture Characterisation

Sample ID	Moisture Content	Sieve sizes - Percentage Passing				
		75 mm	53 mm	19 mm	2.36 mm	75 µm (silt and clay)
1	3.1%	100%	52%	23%	8%	**2%**
2	1.6%	68%	49%	14%	3%	**1%**
3	3.1%	85%	47%	15%	5%	**1%**
4	3.4%	70%	47%	16%	5%	**1%**
5	3.4%	71%	49%	11%	3%	**1%**

Note - Results in **bold** represent particle sizes that are potentially 'dust producing'

Furthermore PEL found that the greatest percentage of any sample passing a 2.36 mm sieve was only 8%, with 2.36 mm considered to be the geotechnical cut-off point for fine grained soils. Silt is classed as particles of less than 75 µm, but greater than 2 µm; particles of less than 2 µm are classed as clay.

Therefore, the average silt content of the five samples is 1.2%, which may include some proportion of clay particles and may be dust generating.

PEL also commented that "*importantly, it is also noted that the proportion of small or fine grained material in the waste rock pile is likely strongly influenced by the method of mining (blasting) rather than being reflective of the rock's natural degradation and erosion (which will be slow).*"

A review of particle sizing for the domains within the Boxcut material will be provided as part of the EIS.

3.3.3 Metals Content

It is known that the waste rock comprises a number of different rock types, in varying quantities**.** The waste rock samples were crushed prior to metals analysis was undertaken in order to homogenize the sample and eliminate or reduce the possibility that sampling of the finer material, that may constitute a particular rock type, may bias analytical results. Samples were taken in August and September 2016.

The analytical results have been summarised in **Table 3-2** and the National Environment Protection Measure (NEPM) Health Investigation Level (HIL) guidelines are provided for comparison. PEL concluded that the "Recreational' guidelines would be the most relevant given potential future land use.

The concentrations of all metals analysed, with the exception of lead, are within the NEPM HIL-C (recreational) and HIL-D (industrial/commercial) guideline criteria. Four of the six samples exceed the NEPM HIL-C (recreational) criteria for lead in soil, and two of the samples (samples 3 and 5) exceed HIL-D (industrial/commercial) lead criteria. The mean lead concentration of all six samples was 2,371.5 mg/kg exceeding the NEPM HIL-C guideline value of 600 mg/kg and the HIL-D guideline value of 1,500 mg/kg.

Table 3-2 Summary of Laboratory Analysis Results, Moisture and Heavy Metals

Analyte	NEPM Guidelines			Sample ID (results in mg/kg)					
	HIL A (Residential)	**HIL C** (Recreational)	**HIL D** (Commercial)	**Initial** (Composite)	**1**	**2**	**3**	**4**	**5**
Arsenic	100	300	3,000	13	9	241	34	26	75
Barium	ND	ND	ND	40	30	30	30	30	20
Beryllium	60	90	500	<1	<1	<1	<1	<1	<1
Boron	4,500	20,000	300,000	<50	<50	<50	<50	<50	<50
Cadmium	20	90	900	6	<1	5	57	4	17

Chromium	100	300	3,600	17	22	13	10	20	17
Cobalt	100	300	4,000	8	9	16	14	10	11
Copper	6,000	17,000	240,000	93	15	55	240	45	141
Lead	300	600	1,500	543	57	**905**	**9010**	**684**	**3030**
Manganese	3,800	19,000	60,000	78	91	258	405	174	188
Nickel	400	1,200	6,000	12	18	18	12	19	18
Selenium	200	700	10,000	<5	<5	<5	<5	<5	<5
Vanadium	ND	ND	ND	15	22	18	14	28	22
Zinc	7,400	30,000	400,000	1780	222	1420	21500	973	4060
Mercury	10	13	180	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Moisture Content (%)	-	-	-	1.3	3.1	1.6	3.1	3.4	3.4

During the original Human Health Risk Assessment completed by Dr Roger Drew, Toxikos 2010, sampling was undertaken from various areas across the Mine and tested for lead content and its bioaccessibility. It was found that lead content alone did not determine how much was taken up into the human body and that the older more weathered material had the highest bioaccessibility, **Table 3-3**.

Table 3-3 Bioaccessibility of Lead in Surface Soils – Rasp Mine

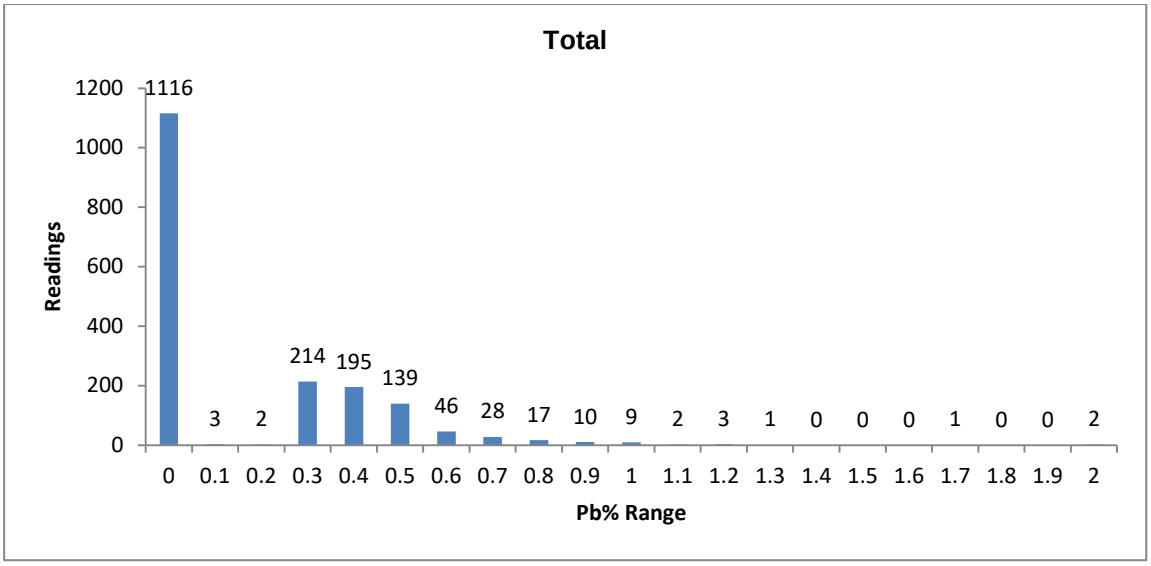
Sampling Point	Lead Concentration (mg/g)	Lead Concentration (mg/kg)	Lead Concentration (%)	Bioaccessibility (Bac) (%)
1	31	31,000	3.1	**14.6**
2	8.8	8,800	0.88	**3.6**
3	7.1	7,100	0.71	**8.5**
4	11.8	11,800	1.18	**6.1**
5	18.7	18,700	1.87	**3.7**

These results are well above the lead levels found in waste rock sampling from the tipple with the exception of one sample (9,010 mg/kg) with the next closest result, 3,030 mg/kg.

Figure 3-4 shows a summary of results of lead in waste rock from the Kintore Pit tipple and wall undertaken for the Concrete Batching Plant. The results were obtained in the field using an XRF unit and maintaining a conservative approach by adopting the data at the highest end of the error margin. The number of readings taken was 1788 of which 1116 or 62.4 percent could not detect any lead, 93.3 percent (1669) of readings detected lead levels below 0.5 percent which is consistent with the findings above of 0.237% lead content.

The waste rock has very low concentrations of pyrite and there is no evidence of acid drainage on the site. Some salts were evident in sampling and samples were high in calcium (major neutralising agent) however, there is insufficient information to draw any conclusions and further studies will be undertaken with the analysis reported in the EIS.

Figure 3-4 Waste Rock Sampling for Concrete Batching Plant



3.3.4 Description and Construction of Stockpiles

As indicated a number of locations are being considered for waste rock storage

The Waste Rock Stockpiles will be designed by an appropriately qualified consultant giving consideration to geological and geotechnical characteristics to ensure stability, surface water management will also be addressed. An outline of the conceptual design for all above ground stockpiles will be included in the EIS. In-pit placement of waste rock into Kintore Pit will cease with relocation of the portal and commencement of tailing deposition.

The material from the proposed new portal that will be placed in the stockpiles is 531,000 t removed from the boxcut and 32,000 t removed from the proposed new portal (563,000 t). Four contracted trucks (100 t filling to a nominal 90 t) will be used to transport this material and will result in 4,109 truck movements over 160 days, equating to 4.6 truck movements per hour (operating during daylight hours 6 days per week, not Sundays).

Current mine trucks (50 t filling to nominal 43 t) will be used to transport excess waste rock material (estimated at 1,146,000 t 2021 to 2016) from underground and will result in 26,651 truck movements over this 6 year period, equating to 1.2 additional truck movements per hour (operating during daylight hours).

In addition 550,000 t of material from the boxcut will be transported to Location B and temporarily stored until the boxcut and works for the portal and Armco tunnel are complete. The material will then be returned to cover the Armco tunnel. Four contracted trucks (100 t filling to a nominal 90 t) will be used to transport this material and will result in 8,029 truck movements over 160 days, equating to 8.9 truck movements per hour (operating during daylight hours 6 days per week, not Sundays).

Progressive rock armoring will be placed around the edges of the stockpiles during placement of the waste rock. At the completion of each stockpile after capacity is attained, rock armoring will be placed over the stockpile to minimise the potential for wind entrainment of dust.

Location A - Atop tailing in Blackwood Pit TSF2

Location A Blackwood Pit TSF2 lies to the north east of the Mine site and is currently used for tailing deposition, it is 1,200 m from the proposed new portal. Blackwood Pit TSF2 (TSF2) covers an area of approximately 82,192 m^2, it is 172 m (w) and 665 m (l) and at its widest points covering 11 Ha. TSF2 is currently used for tailing

storage with deposition to be completed in early 2022. The availability of the facility for waste rock placement will depend on production rates and placement of tailing underground.

In MOD4 it was proposed to place waste rock on the surface of the TSF2 as part of the rehabilitation strategy, BHOP proposes to increase the volume to be placed and raise the height of the facility in line with the surrounding terrain.

No vegetation will be removed and there will be no addition to land disturbance.

A water spray system is being installed around the perimeter of the facility as part of the works to construct perimeter in-fill embankments (MOD4). It is proposed to place waste rock with higher levels of lead within this facility and use the water spray system to control dust. Waste rock would be placed in batches and encapsulated with low lead level waste rock (less than 0.5%) on a progression basis across the facility.

On completion of tailing deposition the surface of TSF2 will fall from south-west to north-east by approximately 1.5 percent. The capacity in the south-west with the higher walls will be greater than in the northeast, however a conservative estimate has been made at 1 m across the facility to store 200,000 t of waste rock.

Location B Area north of new Boxcut

Location B lies in a low lying area to the north of the new Boxcut central to the Mine, it is 650 m from the proposed new portal. It may be visible from some elevated areas of the town. The area is an old waste dump with no vegetation or heritage items in the area. The area is 110 m (w) by 345 m (l) at its widest points.

It is proposed to use this area to temporarily store the material from the Boxcut that will be used as covering for the Armco tunnel, 550,000 t. This is the closest location to the Boxcut with the shortest transport route. It will also be used to store waste rock from operations.

It is proposed to infill the area to a height of 17 m which will store approximately 690,000 t.

Location C – Within BHP Pit, infill area only

BHP Pit is located centrally on the Lease near Delprats Mine and was in operation by BHP Pty Ltd in the 1890's through to the early 1900's, mining within the Pit ceased around 1907. No vegetation remains within the area and the area has been highly disturbed. Location C is approximately 1,680 m from the proposed new portal. There are a number of heritage items from this era listed on the Broken Hill Local Environment Plan 2013, including building foundations, rock made wall, parts of an original headframe and a timber race, these will not be impacted.

BHP Pit is 180 m by 340 m and houses the Rasp Mine explosives magazine and ANE storage. The area proposed for waste rock storage lies to the north where the Pit is deeper. This proposed infill area is approximately 80 m (w) by 135 m (l) and 14 m deep.

BHOP proposes to place waste rock containing higher levels of lead within BHP Pit and cover with waste rock containing lead levels less than 0.5%. The capacity for waste rock storage at BHP Pit is 195,000 t.

Location D Area north of Kintore Pit

Location D lies north of Kintore Pit and is adjacent the current Mine primary ventilation shaft and the Broken Hill rail line and rail yards, it is 1,090 m from the proposed new portal. The area is 90 m (w) by 144 m (l) at its widest points and has a current perimeter bund of approximately 4 m. This is a mine disturbed area with no vegetation.

It is a low lying area between two old waste dumps and it is proposed to infill the area to 16 m bringing the area to the level of the adjacent dumps. It will contain approximately 185,000 t.

Location E – Within Little Kintore Pit

Little Kintore Pit is located adjacent and to the south-west of Kintore Pit. It is approximately 130 m in diameter and 17 m deep. It is 2,020 m from the proposed new portal. Little Kintore Pit contains an old shaft that was

proposed to be used as the primary ventilation shaft until storm damage made rehabilitation of the shaft too costly. The shaft will be capped prior to material placement. There are no heritage items within Little Kintore Pit and there is no vegetation. The land is already disturbed by previous mining.

BHOP proposes to place waste rock containing higher levels of lead within Little Kintore Pit and cover with waste rock containing lead levels less than 0.5%. The capacity for waste rock storage at Little Kintore Pit is 329,000 t.

Location F - Infill area between Kintore Pit and Stockpile H

Location F is a low lying area which lies closer to the centre of the Mine site between Kintore Pit and the existing waste dump running along South Road. It is 1,940 m from the proposed new portal. The area is infill material and there is no remaining vegetation. The area is approximately 141 m (w) by 281 m (l).

BHOP propose to infill this area and raise the height to 15 m in line with surrounding areas and has capacity for 578,000 t. This was a 'free area' identified in the original EA and the rock armoring will minimise the potential for wind entrainment of dust.

Location G Atop waste dump and adjacent rail line and yards Waste Dump

Location G lies to the north and west of the Mine site and is on top of an old waste dump adjacent to the rail line and rail yards. It is 1,940 m from the proposed new portal. The area is approximately 88 m (w) by 208 m (l) and has a current perimeter bund of 4 m. This is a mine disturbed area with no vegetation.

BHOP propose to infill this area and raise the height of the stockpile and bund to 9 m in line with surrounding waste dumps. This was a 'free area' identified in the original EA and the rock armoring will minimise the potential for wind entrainment of dust.

The capacity for waste rock storage at this disused waste rock dump is 194,000 t.

Location H - Atop existing waste dump

Location H lies on top of a large waste dump located to the west of the Mine site and adjacent South Road, which currently houses the communications tower. There is no vegetation in this area. It is a large elevated level area (166 m by 348 m at its widest points) covering approximately 37,934 m^2. It is 1,100 m from the proposed new portal.

The original Human Health Risk Assessment identified this area as a high lead risk area with a lead content of 3.1% with bioaccessibility of 14.6%, **Table 3-3**. It was also identified as one of the largest 'free areas' of the Mine site where dust entrainment can occur. BHOP currently cover the area with chemical dust suppressant annually and this is a priority area for long term dust management.

BHOP propose to cover this area with low level lead waste rock (less than 0.5%) to a height of 2.5 m which will also assist in the reduction of risk from lead bearing dust entrainment and form part of a rock armoring program for final rehabilitation.

The capacity for waste rock storage at this disused waste rock dump is 62,000 t.

4.0 PRELIIMINARY ENVIRONMENTAL REVIEW

4.1 Preliminary Risk Review

In April 2018, HMS Consultants Australia Pty Ltd (HMS) was engaged by BHOP to facilitate a risk assessment on the proposed conversion of Kintore Pit to a tailing storage facility. The objective of the Kintore Pit TSF risk review was to assist in determining a safe and suitable option for converting the Kintore Pit into a TSF. This was attended by relevant BHOP management and consultants covering the fields of metallurgy, tailing storage

design, mining engineering, geotechnical engineering, environment and safety **Tables 4-1** and **4-2** identify the potential relevant matters and key issues identified in the preliminary environment assessment for the proposed Kintore Pit tailing storage, new portal and waste rock stockpiles.

In addition BHOP conducted consultation meetings with regulators to identify their requirements for the development of the Project. These are summarised in **Table 1-3** and are addressed in **Tables 4-1** (potential risks during construction) and **4-2** (potential risks during operations).

The proposed MOD6 has the potential to result in additional environmental impacts to noise (vibration and overpressure), air quality, community health, visual amenity and require a modification to surface water management to those already approved. There is also a potential additional risk to mine safety from inrush and pit wall collapse associated with the depositing tailing above current mine workings and decline. In addition with the construction of the proposed new portal there is a potential risk of flyrock. BHOP will engage specialist consultants to provide assessments of potential significant impacts and advise on recommended measures to control any risks and inform detailed design. A summary of their conclusions and recommendations will be provided in the EIS.

Table 4-1 Review of Relevant Matters - Construction

Issue	Relevance	Key Issue
KINTORE PIT TAILING STORAGE FACILITY		
Noise	Noise will be generated by: - closing portal and installing cement plug. Not considered a key issue as this work will be undertaken at the bottom of the Pit (210 m deep). - transport of cement for concrete plug. Not considered a key issue as cement trucks already enter the mine 24 hours/day for shotcrete, consistent with current practice. - installation of dewatering system for tailing. It is not yet known where this facility will be located, however noise from construction activities will be included in the noise assessment.	No No No
Dust	Dust will be generated by: - cement trucks to construct plug, not considered a key issue as there will be no increase in truck movements as haul trucks will cease from this location so no additional traffic in this area - minor earthworks for platform to locate tailing dewatering system. Not considered a key issue as the works will be less than one week duration and managed by using water sprays where necessary, as per current practice. However any potential for dust generation from construction activities will be included in the air assessment.	No No
Community Health	The extent of preparatory works required is not yet determined however works will be minor and managed by using water sprays where necessary, as per current practice. However any potential for dust generation will be included in the air assessment as part of construction works.	No
Traffic & Transport	There will be some increased traffic on public roads due to delivery of supplies and equipment but these will not be discernable from current deliveries.	No
Water	Additional water will be used for: - cement to construct plug, not considered significant as recycled water is proposed to be use - dust suppression, not considered significant as recycled water is proposed to be use	No No
Heritage	No heritage items are located in the proposed project locations.	No
Land Disturbance	No vegetation to be removed, no additional land disturbance will be required.	No
NEW PORTAL – MINE ENTRANCE		
Noise	Noise will be generated by: - earthworks using bulldozer and excavator to construct boxcut - truck movements to remove waste rock	 Yes Yes

Issue	Relevance	Key Issue
Vibration and Overpressure	Vibration and overpressure will be generated by: - blasting to construct the portal and decline	 Yes
Flyrock	Flyrock may be generated during surface blasting for the portal opening.	Yes
Dust	Dust will be generated by: - earthworks using bulldozer and excavator to construct boxcut - blasting activities for portal and decline - truck movements to remove waste material and reclaim for Armco tunnel	 Yes Yes Yes
Community Health	The amount of material to be removed and its lead content is not yet known. Requires further information to determine.	Yes
Traffic & Transport	There will be some increased traffic on public roads due to delivery of supplies and equipment, it is not expected that these will be discernable from current deliveries.	No
Water	Additional water will be used for: - cement to shotcrete sides of portal and decline not considered significant as recycled water is proposed to be used - dust suppression, not considered significant as recycled water is proposed to be use	 No No
Heritage	No heritage items are located in the proposed project locations.	No
Land Disturbance	No vegetation to be removed, no additional land disturbance will be required.	No
WASTE ROCK STOCKPILES		
Noise and Dust	None, or minimal, construction or preparation activities required.	No
Heritage	There are heritage items in BHP Pit, it is not proposed to place the waste rock that it will affect these items. To be demonstrated in EIS.	Yes
Land Disturbance	No vegetation to be removed, no additional land disturbance will be required.	No

Table 4-2 Preliminary Risk Review - Operation

Issue	Relevance	Key Issue
KINTORE PIT TAILING STORAGE FACILITY		
Inrush	Inrush could occur from: - moisture content of tailing, rapid rise of tailing, plant/Mill feed problems - tailing liquefaction from seismic event, mine blasting, subsidence of old workings, Pit wall failure - water migration along major fault lines, unknown connection from underground workings to TSF - seepage or perched water table accumulation - old workings provide pathway for water flow - erosion of pit walls, particularly old tailing slope	 Yes Yes Yes Yes Yes Yes Yes
Ground Failure	Ground failure could occur from: - Pit wall failure - Fault zones and geological structures - Stress change during filling - Failure of ground support in current drives - Failure of Pit floor	Yes Yes Yes Yes Yes Yes
Noise	Noise will be generated by: - the operation of the dewatering plant, only when located at side of Pit, will operate 24 hours/day - earthmoving equipment spreading and compacting the tailing, only as tailing reaches closer to the surface - pumping water from the sump to the mill, consistent with current activities and not considered a key issue	 Yes Yes No

Issue	Relevance	Key Issue
Dust	Dust may be generated by: - operation of the dewatering plant, yet to determine plant and design will eliminate or minimise dust generation - earthmoving equipment spreading and compacting the tailing, only an issue as the tailing rises - as the level of tailing rise closer to the surface and the tailing further dries out	 Yes Yes Yes
Community Health	Dust, which may contain lead, may be generated as the tailing rises closer to the surface	Yes
Water	Water may collect in a sump within the Pit, particularly with rainfall events (this will be used for dust suppression within the Pit or recycled to the Mill as current practice) Tailing may impact groundwater water quality	No Yes
Visual Amenity	The dewatering plant will not be seen from the town, not considered a key issue	No
Traffic & Transport	There will be no changes to traffic or transport from tailing deposition	No
Waste Management	There are no wastes generated from the tailing deposition	No
Land Disturbance	Activities will be undertaken on already disturbed land	No
Rehabilitation	Rehabilitation of the filled Kintore Pit will need to be considered	Yes
NEW PORTAL – MINE ENTRANCE		
Inrush	From liquefaction from tailing stored in TSF1 and / or TSF2, requires safe standoff distance.	Yes
Noise	Although the Haul Road will be shortened a new section of road will be used exiting from the boxcut to the Haul Road requiring noise modelling to be updated	Yes
Dust	Although the Haul Road will be shortened a new section of road will be used out of the boxcut requiring dust modelling to be updated	Yes
Surface Water	There will be no additional water used, management of rainwater runoff and collection around the boxcut and portal will be addressed in the Site Water Management Plan	Yes
Community Health	There will be no additional impacts to community health with reduced haulage route some reduction may occur	No
Historic Tailing	May be potential for liquefaction of old tailings in TSF1 and TSF2 from new decline development	Yes
Traffic & Transport	The surface Mine Haul Road taking ore to the ROM Pad will be shortened and will be sealed ex-boxcut, not considered a key issue.	No
Waste Management	No additional waste generated	No
Land Disturbance	There will be no additional land disturbance	No
Rehabilitation	The boxcut will need to be rehabilitated	Yes
WASTE ROCK STOCKPILES		
Noise	Noise will be generated by: - haul trucks delivering waste rock from new portal to stockpile - dumping of waste rock - earthmoving equipment managing stockpile	 Yes Yes Yes
Dust	Dust will be generated by: - haul trucks delivering waste rock - dumping of waste rock - earthmoving equipment managing stockpile - wind entrainment from waste rock stockpiles	 Yes Yes Yes Yes
Water	There will be some changes to water management: - additional water used for dust suppression, - management of rainwater runoff and collection around the waste rock stockpiles	Yes

Issue	Relevance	Key Issue
Community Health	Waste rock will contain some lead	Yes
Geotechnical and Geochemical Characteristics	Stockpiles to be made safe, stable and non-polluting	Yes
Traffic & Transport	There will be no affects to off-site traffic or transport It is not expected that additional truck movements (1 movement per hour) transporting waste rock to stockpiles will increase on-site traffic risk.	No
Spontaneous Combustion	The waste rock has very low concentrations of pyrite and therefore the material is not considered to have a risk of spontaneous combustion	No
Waste Management	No additional waste generated	No
Heritage	There are some heritage items located in BHP Pit however these will not be impacted by the placement of waste rock. Confirmation will be sought to confirm if a controlled action under the EPBC Act. Details shall be outlined in the EIS	No
Visual Amenity	Waste rock stockpiles (Locations B, E, F, G and H) will be seen from the town and will be consistent with the current mining landscape, needs to be demonstrated In EIS	Yes
Land Disturbance	There will be no additional land disturbance	No
Rehabilitation	Waste rock stockpiles will need to be rehabilitated	Yes

4.2 Kintore Pit Tailing Storage Facility – Discussion of Key Issues

There were no key issues identified for the construction phase for tailing deposition. However, noise and dust will be included in relevant assessments.

The use of old adits or shafts within the Pit walls by fauna is not considered likely due to difficult access. However to address the issue of fauna habitats within old adits and shafts an inspection (when safe access is available) and assessment shall be included in the EIS. It is proposed that these inspections and assessments occur during the life of the facility as tailing levels rise and access to old voids/workings becomes available. There are no known fauna currently in these old workings.

The key issues identified during operations of Kintore Pit as TSF3 and the new dewatering plant are discussed in the following sections.

4.2.1 Inrush

Potential key issue

BHOP operate a portal and decline from the bottom of Kintore Pit to access underground mine workings. The decline runs beneath the Pit allowing access to both the south-west and north-west workings. The Main Lode also runs beneath and around the Pit where historic underground workings are located. Not all of these historic mine areas are known and/or logged. Any crown pillars that may have been below the Pit have been removed by previous mining. The portal access and a number of exposed and unknown voids, shafts, adits and geological faults are within the Pit. Not all possible water pathways are known.

Inrush poses a credible risk to underground workings where water can find its way via various pathways:

- Tailing contains water which may pose an inrush risk (current process retains about 40% of water within the tailing). The major contributions to the level of water that may penetrate underground are the; moisture content of the tailing, rapid rise of tailing particularly in the initial stages where the surface area of the tailing is less and there is less evaporation, dewatering problems where tailing are sent to the Pit with a higher level of contained moisture and rainwater entering the Pit.
- A further contribution to the risk of inrush is the possible liquefaction of the tailing which may occur from a seismic event, mine blasting, subsidence of old workings, Pit wall failure which can trigger the event.

- Water could also enter underground workings from migration along major fault lines, unknown connections between underground workings to the TSF, seepage or perched water table accumulation which suddenly releases and erosion of pit walls, particularly the old tailing slope.

Proposed management measures and studies

Measures to minimise the risk of inrush will be determined during the detailed design however the preliminary risk assessment has identified the following measures to be considered and studies to be undertaken:-

- Dewatering of tailing, a description and location for the process will be included in the EIS together with:
  - Methods for reducing the moisture content of tailing to approximately 12% to prevent liquefaction. Tailing will be trafficable and will be spread and compacted by a bulldozer.
  - Dewatering system for the tailing, BHOP has engaged GRES to investigation optimal dewatering process options.
- Install engineered plug seal to portal to be designed to withstand full hydrostatic head and possible dynamic loads.
- Confirm critical state moisture content required for stability (tests currently being undertaken by Golder).
- Complete seismic study.
- Sealing adits and old mine workings in the Pit walls where required (steel caps / concrete addition to tailing), compacted tailing will provide a base from which to treat these openings.
- Underground drive seepage diversion strategies, as required, to be identified.
- Collect and pump excess water from the Pit and recycle to the Mill.

4.2.2 Ground Failure

Potential key issue

The decline beneath the Pit will continue to be used to access underground workings. The material above this decline to the Pit floor is approximately 10 m to 15 m and crown pillars have already been removed.

Proposed management measures and studies

Engage a suitably qualified consultant to provide an assessment of ground conditions and geotechnical aspects within and around the Pit together with current ground support and its ability to cope with the additional load from tailing placement. The consultant will provide recommendations to provide safety assurance.

4.2.3 Noise

Potential key issue

Construction works will be undertaken within the Pit and any noise generated will be managed through normal operating practices. Although noise is not considered a key issue due to the duration for construction activities and the depth of works within Kintore Pit, construction aspects will be included in the overall site assessments for noise.

The dewatering plant will operate 24 hours per day when the Mill is operating. Noise has the potential to become an issue when the dewatering plant is located at the side of Pit.

A dozer will be used within the Pit to spread and wheel compact the tailing, the potential for noise to be an issue will only be evident when the tailing reaches closer to the surface.

Proposed management measures and studies

- Include noise reduction technologies in dewatering system design.
- Select tailing equipment to minimise noise.

- Conduct noise modelling when dewatering process is known and type of dozer is selected; include construction activities outside of Pit in construction noise assessment and include noise generated during operations in the cumulative noise assessment for total operations.
- Update of the site's Noise Management Plan.

4.2.4 Dust

Potential key issue

Pit preparation and construction works will be undertaken within the Pit and any dust generated will be managed through normal operating practices. Although dust is not considered a key issue due to the duration of construction activities and the depth of works within Kintore Pit, construction aspects will be included in the overall site assessments for dust.

The type of dewatering plant is currently under investigation, it is expected that the tailing material will remain moist and not generate dust until further dried. The delivery system to the bottom of the Pit is also unknown. Dust generation during the operation of the bulldozer working on the tailing is unknown. It is anticipated that dust issues may only arise when the level of tailing rises closer to the surface (Kintore Pit is 210 m deep).

Proposed management measures and studies

- Build dust mitigation measures into the dewatering plant design, as required.
- Method for tailing deposition to minimise dust.
- Review dust monitoring requirements for Kintore Pit.
- As tailing rises closer to the surface install dust suppression sprays, as required by relocating system from Blackwood Pit TSF2.
- Use of chemical dust suppressant, where required.
- Conduct air quality modelling and include potential for dust generation during construction and operation of the dewatering plant, include operations in the cumulative air quality assessment.
- Update of the site's Air Quality Management Plan.

4.2.5 Community Health

Potential key issue

Dust, which may contain lead, may be generated as the tailing rises closer to the surface.

Proposed management measures and studies

- Model the potential for lead bearing dust to lift off tailing storage facility.
- Include the potential for lead bearing dust from tailing in Human Health Risk Assessment and predictions for Broken Hill community blood lead levels.
- Assess and determine dust monitoring requirements for Kintore Pit.
- As the tailing rises closer to the surface install dust suppression sprays (system to be relocated from Blackwood Pit TSF2).
- Conduct dust modelling and include potential for dust generation in cumulative air quality assessment.

4.2.6 Water Assessment and Management

There may be some mixing of tailing and groundwater which may impact groundwater quality.

Proposed management measures and studies

- Provide groundwater assessment following tailing placement in Kintore Pit and the potential impact on groundwater quality.

- Provide seepage analysis for Kintore Pit, including water expression through the Pit walls.
- Provide details of water management including seepage management and stormwater management in the Pit and management of excess water from dewatering tailing.
- Underground drive seepage diversion strategies, as required, to be identified.

4.2.7 Rehabilitation

The rehabilitation of Kintore Pit will be required and needs to be developed in consultation with DRG and BHCC. The following items will be addressed:

- Details of rehabilitation plans and methods to ensure minimum dust emissions from the site.
- An assessment of slumping of tailing in Kintore Pit at closure.
- Justification for the use of waste rock armouring against other dust mitigation measures.
- Details for monitoring – air, water, slumping or subsidence post closure.
- Assessment of alternatives for rehabilitation (for dust suppression).
- Description of the final landform (subject to advice from DRG).

Studies

Identify a rehabilitation strategy for Kintore Pit in consultation with DRG and include in the EIS.

4.3 New Portal – Discussion of Key Issues

The key issues identified during the construction and operations of the new portal are discussed in the following sections.

4.3.1 Noise

A number of potential key issues for noise were identified during the preliminary risk review resulting from construction activities. There were no key issues identified during operations as the surface Haul Road taking ore to the ROM Pad for processing will be shortened. A new section of road (50 m to 100 m) will be installed exiting from the proposed portal to the Haul Road, the current Haul Road will then be used to the ROM Pad. Noise modelling will be updated. Details of the final design of the boxcut and entry point to Haul Road, eg final height of exit from boxcut to the ROM Pad will be included in the EIS.

In addition community consultation will be undertaken via a presentation which will provide details of predicted noise levels, work hours together with noise mitigation measures.

Potential key issue

During construction noise will be generated by:

- Earthworks using bulldozer and/or excavator to construct boxcut
- Loader and truck movements to remove waste materials and to reclaim material for the Armco tunnel

Proposed management measures and studies

Measures to minimise noise will be determined following noise modelling as part of the EIS, however the following will be considered:-

- Current 4 m noise bunds installed along the Haul Road.
- Construction of boxcut and portal to be during daytime hours only, with plans to identify what equipment will be in use and its location over the weekly period.
- Schedule of works to minimise potential noise impacts to surrounding neighbours on Sundays.
- Identification and assessment of all feasible and reasonable mitigation measures that can be implemented.

- Use of 'squawker' type reverse alarms on vehicles used on site.
- Development of Construction Environment Management Plan – New Portal.
- Modelling of noise for construction and operations activities, including cumulative noise levels with current operations.
- Update of the Noise Management Plan.

4.3.2 Vibration and Overpressure

Potential key issue

Vibration and overpressure will be generated during construction from blasting to create the portal and decline. There were no potential key issues identified for vibration and overpressure during operations

Proposed management measures and studies

BHOP will engage the services of a specialist to undertake an assessment of potential vibration and overpressure risks to identify issues for surrounding residential and sensitive receptors, and will adopt recommendations as appropriate which may include:

- Blasting methods, parameters and timing.
- Size and duration of blasts.
- Monitoring requirements during blasting.
- Vibration and overpressure modelling will be undertaken to predict potential impacts for portal and decline development.

4.3.3 Flyrock

Potential key issue

Flyrock will be generated during the construction of the portal.

Proposed management measures and studies

The blast plans shall assess and indicate an exclusion zone which will be signed off by a competent person. The establishment and management of the exclusion zone shall be conducted via a formal procedure which explains the boundaries, evacuation, clearance checking methods, and requirements for removing the exclusion zone.

Summary details will be outlined in the Construction Environment Management Plan – New Portal.

4.3.4 Dust

Potential key issue

During the construction phase dust will be generated by earthworks using dozer and excavator to construct the boxcut and truck movements to remove waste material. Increase in traffic with heavy and light vehicles using the Haul Road during construction of the boxcut and new portal.

During operations dust will be generated by haul trucks taking ore to the ROM Pad, this is not identified as a key issue as the shorter Haul Road will reduce dust levels from truck movements.

During operations dust will be generated by truck movements transporting waste rock to waste rock stockpiles. These vehicles will travel on both sealed and unsealed roads on site and are estimated at 1.2 truck movements per hour.

These activities will be included in proposed dust modelling which will include a cumulative assessment with operations.

Proposed management measures and studies

- During construction water sprays and water trucks will be used to minimise dust. Dust management will be outlined in the Construction Environment Management Plan – New Portal.
- Management of potential dust generating activities on windy days will be addressed via current procedures which include suspension of works if required (where winds exceed 50 kph).
- Use of chemical dust suppressant.
- The majority of the route, waste rock stockpiles to/from the new portal, will be on sealed roads.
- The section of the Haul Road down the boxcut will have water sprays installed (as current practice used in Kintore Pit) and a grate to remove any excess material prior to entering the sealed section of the Haul Road.
- Conduct safety assessment for vehicle mix on the Haul Road, including identification of control measures.
- Formulate Traffic Management Plan for Construction.
- Boxcut and waste rock material study will be undertaken to provide:
    - a description of waste rock to be transported to stockpiles including, particle size and metals content.
    - information on the geochemical characteristics of the boxcut material, variation within the material, and waste rock generally, and
    - content of fines material and its management
- An air quality assessment will be undertaken by a specialist and will include modelling to identify other areas for dust mitigation measures including a cumulative assessment with operations.
- Update of the Air Quality Management Plan.

4.3.5 Community Health

Potential key issue

Dust, which may contain lead, may be generated with removal of materials for the boxcut, portal and decline and transport of these materials to waste rock stockpiles.

Proposed management measures and studies

- Undertake analysis of the chemical properties of waste materials.
- Assess the potential for lead bearing dust from material removal and ongoing waste rock placement and assess the bioaccessibility of these materials.
- Identify and describe the air quality control measures used to ensure there is no net increase in blood lead levels.
- Review dust monitoring requirements for construction of the boxcut and portal, and road transport of this material, including ongoing waste rock removal via the portal to waste stockpiles.
- Determine dust suppression measures including the use of water sprays, misting and water truck or other as identified.
- Complete a Human Health Risk Assessment (including a cumulative assessment with current operations).

4.3.6 TSF1 and TSF2 Liquefaction

Potential key issue

The new portal and decline will be located close to TSF1 and / or TSF2. During construction blasting activity or truck movements may result in liquefaction of the tailing within these facilities. The propensity for historic tailing material (TSF1 and TSF2) to liquefy as a result of the development of the decline and mining activities is unknown.

These facilities require a liquefaction assessment from blasting activities and in the case of TSF2, surface truck movements.

Proposed study

- Test and assess the potential for liquefaction of TSF1 and TSF2 and subsequent stand-off distance for new underground workings.

4.3.7 Surface Water

There will be no additional water used for the construction or operation of the boxcut and portal that will impact current supply needs.

Rainwater runoff and collection of surface waters around the boxcut and portal will be addressed in an update of the Site Water Management Plan.

4.3.8 Rehabilitation

At the time of mine closure the boxcut and portal will require rehabilitation. This will require some reshaping of the batters around the portal and backfill of the portal. Details will be outlined in the EIS following consultation with DRG.

4.4 Waste Rock - Discussion of Key Issues

There were no key issues identified for site preparation of the waste rock stockpiles.

Details for the design of the waste rock stockpiles will be included in the EIS and where the capacity of the stockpiles exceeds requirements clarification and justification will be provided for the excess.

The heritage items in BHP Pit will not be impacted by the placement of waste rock in this area and this will be addressed in the EIS. An assessment of the requirement for controlled actions under the EPBC Act, in relation to Broken Hill status on the National Heritage List (BH) will be addressed in the EIS.

The key issues identified for the development of the waste rock stockpiles are discussed in the following sections.

4.4.1 Noise

Potential key issue

Noise will be generated during the operation of waste rock stockpiles by:

- Haul trucks delivering waste rock to the stockpiles.
- Dumping of waste rock at the stockpile.
- Earthmoving equipment managing the stockpile, spreading and wheel compacting the material.

Proposed management measures and studies

Measures to minimise noise will be determined following noise modelling as part of the EIS, however the following will be considered:-

- Design of stockpiles by an appropriate engineering consultant.
- Identification and assessment of all feasible and reasonable mitigation measures that can be implemented.
- Placement activities to occur during daylight hours only.

- Use of 'squawker' type reverse alarms on vehicles used on site.
- Modelling of noise, including cumulative noise levels with current operations.

4.4.2 Dust

Potential key issue

Dust during the operation of waste rock stockpiles will be generated by:

- Haul trucks delivering waste rock to the stockpiles.
- Dumping of waste rock at the stockpile.
- Earthmoving equipment managing the stockpile, spreading and wheel compacting material.
- Wind entrainment of dust from the waste rock stockpile.

Proposed management measures and studies

Measures to minimise dust will be determined following air quality modelling as part of the EIS, however the following will be considered:-

- Use of a water truck and water sprays.
- Management of potential dust generating activities on windy days including suspension of works if required (winds exceed 50 kph).
- Waste rock will be sampled and tested for its characteristics and metals including lead, and a placement system developed.
- Use of a chemical dust suppressant.
- An air quality assessment will be undertaken by a specialist and will include modelling to identify other areas for dust mitigation measures including a cumulative assessment with operations.
- Update of the site's Air Quality Management Plan.

4.4.3 Community Health

The waste rock will contain low levels of lead and there is the potential, where dust is generated, to impact community health. BHOP will engage a suitably qualified specialist to assess any potential for health impacts and will provide the findings and recommendations in the EIS.

4.4.4 Geotechnical and Geochemical Characteristics

The design of the waste rock stockpiles will be completed in accordance with geotechnical design criteria which will address - slope stability, loading assessments, waste rock shear strength parameters, particle size distributions, compacted porosity, subsidence and geotechnical monitoring as required. Assessment of the materials (waste rock and boxcut) will be undertaken to provide a design that is safe, stable and non-polluting.

Proposed Studies

- Assessment of long term geochemical degradation ie 100 to 500 years of waste rock used on surface coverings.
- Waste rock and boxcut material study to provide information on the geochemical characteristics of the boxcut material, variation within the material, and waste rock generally, including all relevant metals. Comment will also be provided on its homogeneity.

4.4.5 Water Management

There will be no additional water used for the construction or operation of the waste rock stockpiles with the exception of using recycled water for dust management. No increases in water usage is anticipated.

Rainwater runoff and collection of surface waters will not impact stockpiles located within disused pits (Stockpiles A, C and E). All other Stockpiles will rise above surface level and will require further information and assessment to address drainage consideration within the stockpiles, phreatic surface, compacted porosity and other matters as identified. Some of the proposed above surface stockpiles will be placed over current surface water storage ponds and the design of the stockpiles will address this. The Surface Water Management Plan will be updated to reflect these changes.

Proposed Studies

- The scope of works for the consultant engaged to design the waste stockpiles will address water management.

4.4.6 Visual Amenity

It is not anticipated that there will be any significant impacts to visual amenity from the installation of the waste rock stockpiles. Stockpiles A, C and E within disused pits. Stockpiles B, D, F, G and H may be visible from some elevated areas of the town and will be consistent with the current mining landscape. A description of the visual nature of the waste rock stockpiles will be included in the EIS.

4.4.7 Rehabilitation

The waste rock stockpiles would require rehabilitation following their completion. Details will be outlined in the EIS following consultation with DRG and will address:

- Measures to minimise dust emissions from the site.
- Justification for the use of waste rock armouring against other dust mitigation measures.
- Details for monitoring – air, water, slumping or subsidence (post closure).
- An assessment of alternatives for rehabilitation (for dust suppression).
- Description of final landform.

4.5 Cumulative Environmental Impacts

The potential for cumulative impacts, that is impacts from construction and new operations with current operations, will be considered in the EIS, particularly in relation to potential noise and dust impacts.

It is also intended to hold a presentation event for the community of Broken Hill prior to finalisation of the EIS and details of this consultation will be included in the final EIS report.

5.0 BENEFITS OF THE MODIFICATION

The proposed modification would:

- Permit mining at the Rasp Mine to continue post 2022 with additional storage of tailing;
- Significantly reduce the surface distance of hauling ore from underground to the ROM Pad thereby reducing impacts from noise and dust;
- Ensure continued employment of 226 full-time employees, 35 full-time contractors and indirectly over 200 casual contractors that provide specialist services when required;
- Engagement of approximately 60 contractors during construction and an additional 5 full time employees for operations
- Allow the resource to be fully utilised, and

- Allow BHOP to continue to support the economic growth of Broken Hill.

It is considered that the proposed modification could be implemented with appropriate management of the increased risk of noise and dust generated primarily during the short construction period.

Placing tailing on the Lease in a disused pit results in no additional land disturbance, no interruption to local land use and farmers, no dust and noise that would result from off-site road traffic (from an off-site location) reduced costs for design, construction and operation.

Without approval of the MOD6 the Rasp Mine will cease operation in 2022 when current capacity for tailing storage is attained.

6.0 APPROVAL REQUIREMENTS

In addition to the application to the Department of Planning and Environment to modify the Project Approval 07_0018, BHOP will also seek to modify its Mining Operations Plan and will consult with the EPA to determine if any variation to its Environment Protection License 12559 is required.

7.0 ADDITIONAL INFORMATION

For additional information please contact:
Gwen Wilson
Group Manager – Safety health Environment Community
CBH Resources Ltd
Broken Hill Operations Pty Ltd
M: 0431 483 825

8.0 ACRONYMS

BHCC	Broken Hill City Council
BHOP	Broken Hill Operations Pty Ltd
CBH	CBH Resources Ltd
CML7	Consolidated Mine Lease 7
DOL	Dolerite
DRG	NSW Division of Resources and Energy
EA	Environment Assessment Report
EIS	Environment Impact Statement
DPE	NSW Department of Planning and Environment
EP&A Act	NSW *Environment Planning & Assessment Act 1979*
EPA	NSW Environment Protection Authority
g	grams
Golder	Golder Associates Pty Ltd
GPE	Garnet pelite

GQ	Garnet quartzite
GRES	GR Engineering Services Ltd
Ha	hectare
HIL	Health Investigation Level
kg	kilogram
km	kilometres
kph	kilometres per hour
kW	kilowatts
kV	kilovolts
(l)	Long
L	litre
LEP	BHCC Local Environment Plan 2013
m	metres
M	million
m^3	cubic metres
mg	milligram
MOD1	Relocation of the main ventilation shaft
MOD2	Crushing of ore permitted to occur at any time
MOD3	Extend underground mining into Block 7 (includes the Zinc Lodes)
MOD4	BHOP Modification for the erection of a Concrete Batching Plant and the construction of embankments to extend the life of TSF2
MOD5	Proposed modification for a Stores Warehouse extension, installation of a cement silo and adjustments to air quality monitoring requirements.
MOD6	Proposed modification to the PA for placing tailing in Kintore Pit and relocation of the mine access portal and waste rock stockpiles
MOP	Mining Operations Plan
NEPM	National Environment Protection Measure
Normandy	Normandy Mining Investments
NSW	New South Wales
PA	Project Approval 07_0018
Pb	lead
PEL	Pacific Environment Ltd
Perilya	Perilya Broken Hill Operations Pty Ltd
the Pit	Kintore Pit
PM	Psammopelitic
PM10	Particulate matter with equivalent aerodynamic diameter of 10 micrometres
Rasp Mine	the Mine

ROM Pad	Run of Mine Pad (for ore storage prior to crushing)
SEPP	NSW State Environment Planning Policy
SPM	Garnet spotted psammopelite
SSD	State Significant Development
t	tonnes
tpa	tonnes per annum
tph	tonnes per hour
TSF1	Historic tailing storage facility
TSF2	Blackwood Pit tailing storage facility
TSF3	Proposed Kintore Pit storage facility
UCS	Uniaxial Compressive Strength (measure of rock strength)
U/G	Underground
µg	microgram
µm	micrometre
(w)	Width
XRF	X-Ray Fluorescence Analyzer
Zn	zinc