Rasp Mine

Zinc – Lead – Silver Project
Project Approval No. 07-0018 (SSD-814)

Project Brief

Kintore Pit TSF3

September 2020

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 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, processing plant, 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 primarily to allow for tailing to be co-deposited with excess waste rock from underground mining operations into Kintore Pit. This would also require relocation of the underground mine access portal and decline. A number of minor modifications to the PA will also form part of the modification and these are summarised below.

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 (EIS). The EIS will be submitted to the Department of Planning, Industry and Environment (DPIE), to support the application. Results from preliminary risk reviews and early consultation with regulators are also provided.

Proposed Modification

Summary of proposed MOD6:

- Establish Kintore Pit as Tailing Storage Facility 3 (TSF3) for naturally dried tailing co-disposed with excess underground waste rock;
- Relocate the mine portal and access decline with associated infrastructure, to a new boxcut;
- Utilise Blackwood Pit TSF2 for harvesting solar and wind dried tailing;
- Conduct periodical crushing of non-ore material in Kintore Pit and/or BHP Pit;
- Utilise waste rock for rehabilitation capping; and
- Administrative amendments for annual reporting and noise criteria.

Predictions for the life of TSF2, following installation of the embankments (MOD4), is now late 2022. The extended life of the facility is due to improved tailing settling rates and reduction in mine production. Mining will cease at that time if no other tailing storage facility is available.

BHOP engaged Golder Associates Pty Ltd (Golder) to undertake a review of potential sites in and around the Rasp Mine and it was concluded that Kintore Pit would be the optimum location for tailing storage. Studies have shown that in establishing Kintore Pit as TSF3, tailing would need to be further dewatered from the current 35% moisture content achieved by the milling process, to reduce inrush / inundation risk to underground mining operations. BHOP propose to utilise the natural solar and wind drying process offered within Blackwood Pit TSF2 to harvest thin layers (up to 1m) of naturally dried tailing prior to stockpiling and transferring to Kintore Pit.

Excess waste rock from underground mining, in particular any material that is greater than 0.5% lead, would continue to be placed in Kintore Pit and be co-disposed with tailing. Some waste rock that has a lead content greater than 0.5% would also be permanently stored in the infill area of BHP Pit. Waste rock suitable for rehabilitation capping would be separated and placed on the current Kintore Pit Tipple or BHP Pit prior to confirmation testing of lead levels.

BHOP currently conduct crushing activities of non-ore materials in Kintore Pit (EA) and BHP Pit (MOD7) and propose to continue these activities using a mobile crusher when required to produce material for road base, bunding and / or other site requirements.

BHOP seek to commence progressive rehabilitation activities over 'free areas' (ie non-active mining areas) across CML7 by using excess waste rock from underground that has been tested and contains less than 0.5% lead.

BHOP also seek to adopt new noise criteria as identified during the noise modelling assessment for MOD6 in accordance with the NSW EPA *Noise Policy for Industry (2017)* and attended noise monitoring results. BHOP also propose to seek a change to the reporting period and submission date for the Annual Review (required under PA) to align reporting requirements with the annual Environment Management Report (required under the CML7).

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. Additional risks from new activities eg tailing harvesting, have been identified and included in this Brief.

A number of key potential risks have been identified that require further investigation. A summary of the main risks identified is provided below:

Inrush – From seepage and liquefaction of deposited tailing entering mine workings beneath Kintore Pit and from liquefaction of tailing contained in TSF1 and TSF2 as a result of blasting for the new portal and decline. BHOP has opted to further dewater the tailing prior to deposition into Kintore Pit and will include a stand-off distance from the portal and decline to TSF1 and TSF2. 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, tailing compaction testing, seepage modelling and seismic assessments.

Ground failure Kintore Pit – From the load of tailing / waste rock placed within Kintore Pit given the removal of crown pillars beneath the Pit and depth to the base of the Pit (10 m). Suitably qualified consultants have been engaged to undertake a geotechnical study and stability analysis to determine potential risks and recommendations for safety assurance.

Ground failure Blackwood Pit – From tailing harvesting activities potentially impacting the integrity of the embankment structures and from high rainfall events impacting Blackwood Pit tailing surface. Suitably qualified consultants have been engaged to provide a geotechnical study for tail harvesting activities which will also address water management and surface stability. Importantly the Dam Design Engineer for Blackwood Pit TSF2 MOD4 has been engaged to design the tailing harvesting process to assure integrity of embankment design.

Dust – Primarily from earthworks, truck movements, crushing and tailing harvesting. Dust from the site has the potential to contain lead. Suitably qualified consultants have been engaged to undertake a comprehensive air assessment and conduct a human health risk assessment to provide predictions for blood lead levels (BLL) in the community, in particular any impact on children's BLL.

Noise, vibration and overpressure – From mobile equipment, truck movements, trafficking the tailing surface and vibration and overpressure from blasting activities. Suitably qualified consultants have been 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 with stand-off distances identified.

Vibration Blackwood Pit – From trafficking on the tailing surface by trucks and mobile equipment, subsidence within cell structures causing vehicles to sink. Suitably qualified consultants have been engaged to assess vibration risks including the potential for liquefaction of the tailing.

Water – Surface water management around rehabilitation capping and water quality. Water management around the rehabilitation capping forms part of the scope of works for the design engineer for this capping. An assessment of the impacts to the current Site Water Management Plan is also part of this study. A consultant has also been engaged to assess potential impacts to water quality from tailing placement in TSF3 and waste rock used for rehabilitation capping.

Waste rock contamination – From waste rock used for progressive rehabilitation capping. A consultant has been engaged to conduct an assessment of the potential for contamination from the waste rock including a long term assessment.

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;
- Provide rehabilitation capping over free areas of the site with material lower in lead content;
- Ensure continued employment of 186 full-time employees, 32 full-time contractors and indirectly over 200 casual contractors that provide specialist services when required;
- Engagement of approximately 20 contractors during construction and an additional 6 full time employees for operations;
- Allows the filling of legacy open pits;
- Allow the resource to be fully utilised, and
- Allow BHOP to continue to support the sustainability and economy 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, processing plant, 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 its Project Approval, pursuant to Section 4.22 of the EP&A Act, primarily to allow for tailing to be co-deposited with excess waste rock from underground into Kintore Pit. This would also require relocation of the underground mine access portal and decline. A number of minor modifications to the PA will also form part of the modification and these are summarised below.

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 (EIS). The EIS will be submitted to the Department of Planning, Industry and Environment (DPIE), to support the application. Results from preliminary risk reviews and early consultation with regulators are also provided.

1.2 Proposed Modification

Summary of proposed MOD6:

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- Relocate the mine portal and access decline with associated infrastructure, to a new boxcut;
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- Conduct periodical crushing of non-ore material in Kintore Pit and/or BHP Pit;
- Utilise waste rock for rehabilitation capping; and
- Administrative amendments for annual reporting and noise criteria.

Predictions for the life of TSF2, following installation of the embankments (MOD4), is now late 2022. The extended life of the facility is due to improved tailing settling rates and reduction in mine production (July 2020 revised). Mining will cease at that time if no other tailing storage facility is available.

BHOP engaged Golder Associates Pty Ltd (Golder) to undertake a review of potential sites in and around the Rasp Mine and it was concluded that Kintore Pit would be the optimum location for tailing storage. Studies have shown that in establishing Kintore Pit as TSF3, tailing would need to be further dewatered from the current 35% moisture content achieved by the milling process, to reduce inrush / inundation risk to underground mining operations. BHOP propose to utilise the natural solar and wind drying process offered within Blackwood Pit TSF2 to harvest thin layers (up to 1 m) of dry tailing prior to stockpiling and transferring to Kintore Pit. This would allow continued fresh tailing to be deposited into this facility which would be naturally dried and removed, resulting in cyclical rotation of depositing, drying, harvesting and transferring of tailing to Kintore Pit TSF3.

Current underground mine access is via a portal located in Kintore Pit. It is proposed to establish a new portal to be located within a boxcut.

Excess waste rock from underground mining, in particular any material that is greater than 0.5% lead, would continue to be placed in Kintore Pit and be co-disposed with tailing. Waste rock suitable for rehabilitation capping would be separated and placed on the current Kintore Pit Tipple or BHP Pit prior to confirmation testing of lead levels. Waste rock that has a lead content greater than 0.5% would be permanently stored in Kintore Pit or in the in-fill area of BHP Pit.

Crushing of non-ore material is currently undertaken in Kintore Pit (EA) and BHP Pit (MOD7) and BHOP propose to continue these activities using a mobile crusher when required to produce material for road base, bunding and / or other site requirements. Crushing is undertaken on an ad hoc basis only when required typically 2 or 3 times per year over a few days during daytime hours only.

BHOP seek to commence progressive rehabilitation activities over 'free areas' (non-active mining areas), across CML7 by using excess waste rock from underground that has been tested and contains less than 0.5 percent lead (<0.5%Pb).

BHOP propose to adopt new noise criteria as identified during the noise modelling assessment for MOD6 in accordance with the NSW EPA *Noise Policy for Industry (2017)* and attended noise monitoring results.

BHOP also propose to seek a change to the reporting period and submission date for the Annual Review (AR) (required under PA conditions) to align reporting requirements with the annual Environment Management Report (EMR) (required under the CML7).

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 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 and Centenary Mineralisation and Main Lodes Blocks 7 to 12.	No change to mining methods. MOD6 proposes a new access portal to the underground mine, within a boxcut, and access decline.
Mining Rate and Total Production	750 000 tpa ore. Total production over life of Project: Approximately 8,450,000 t	MOD6 is based on a mine plan to the end of 2026 based on 500,000 tpa ore, 146,000 tpa of waste (to surface) and 480,000 tpa of tailing harvested and transferred to Kintore Pit TSF3.
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 be: - co-disposed with tailing in TSF3 and/or placed permanently in BHP Pit, - testing confirms <0.5%Pb and can be used for rehabilitation capping, and - material from construction of the boxcut and decline be permanently stored in Little Kintore Pit and BHP Pit.
Underground Ventilation	2 x 450 kW primary ventilation fans located 160 m	No change

Component	Approved Rasp Mine	Proposed MOD6
	below ground and exhausting centrally within CML7.	
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 - utilise the surface of TSF2 to naturally dried tailing which will be harvested and relocated to TSF3.
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.	Periodic surface crushing to continue in Kintore Pit (EA) and BHP Pit (MOD7) for road base and bunding requirements.
Services	Extensions to existing substations, water lines and phone lines. New 22kV overhead power lines to be constructed.	MOD6 proposes to relocate services currently within Kintore Pit that support the underground mining to an area adjacent the proposed boxcut. This would include portable buildings used for underground equipment, crib and substation.
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.	No change.
External Roads	No changes to external road network.	No change.
Employment Numbers	Current numbers are: Employees: 186[1] Contractors: 32	MOD6 proposes increases in personnel: During construction: Employees – 0 Contractors – 20 For operations: Employees – 6 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 campaign harvesting tailing from TSF2 over a roster basis which will occur only on day shift. MOD6 proposes to construct the boxcut – 7am to 6pm Monday to Saturday and Sunday 8am to 6pm.
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 the rehabilitation capping.

Note 1: New employee and contractor numbers reflect Rasp Mine restructure in July 2020.

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 (SSD-814) 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 **Figure 1-1**.

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 Concrete and Quarry Pty Ltd 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.

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 former Italo International (Bocce) Club (now Southern Cross Care Broken Hill Ltd) and previous lawns bowling club to the south west (now Silver City Removals) and other commercial and residential properties.

The site has been mined for over 135 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 (following installation of the TSF2 embankments (MOD4)), the life of Blackwood Pit TSF2 will be completed in late 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 extending the life of the facility. In addition the current mine plan has changed to a high grade lower tonnes strategy which results in less tailing production. This has resulted in an increase to the life of the current tailing storage facility with a new fill date to late 2022.

In the original Environment Assessment (EA) for the Project it was planned for tailing to be placed in both above ground tailing storage facilities 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 ($7.2 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 368,000 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 suitable 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.

A review was conducted by Golder Associates Pty Ltd (Golder) of potential off-site locations for tailing storage in and around the vicinity of the Mine (within 10 kms of the Rasp Mine site). A summary of this review will be included in the EIS. Acting on this review BHOP has determined to use Kintore Pit (the Pit) as TSF3, which will necessitate the relocation of the Mine access portal currently located within Kintore Pit.

Figure 1-1 Location of Kintore Pit within CML7

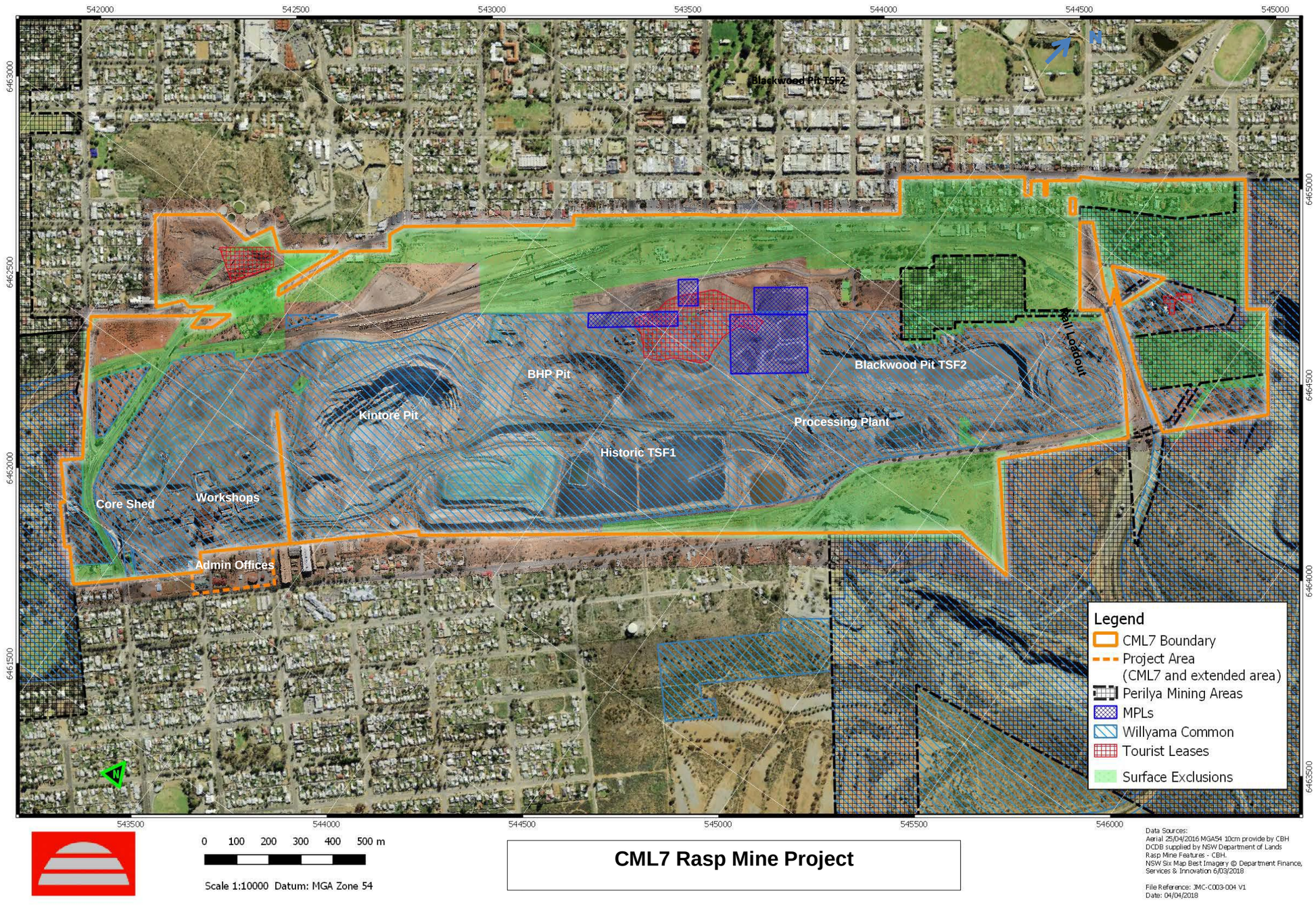


Table 1-2 Summary of Proposed (EA) and Actual Placement of Waste Rock and Tailing

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	588,407	242,626	28,841[3]	401,811[4]
2020	309,375	0	309,375	250,000	488,789[2]	199,637[2]	135,000[2]	389,637[2/4]
TOTALS	**2,160,471**	**968,401**	**1,365,782**	**2,250,000**	**4,783,313**	**1,979,324**	**1,410,989**	**3,316,085**

Note[1]: Estimated
Note[2]: Planned
Note[3]: Waste material to surface totaled 2019 - 159,185t with 28,841t was placed in Kintore Pit and 130,344t placed in BHP Pit due to safety issues re- use of tipple in Kintore Pit. Planned waste material to surface 2020 – 389,637t with 135,000t to be placed in Kintore Pit and 55,000t in BHP Pit.
Note[4]: Also includes waste material placed in BHP Pit.

Waste rock will continue to be generated from mining activities in excess of suitable voids underground and require surface storage. This has resulted in the placement of this waste rock for co-disposal with the tailing in TSF3 and for rehabilitation capping.

Crushing of non-ore material is currently undertaken in Kintore Pit (EA) and BHP Pit (MOD7) and BHOP propose to continue these activities using a mobile crusher to produce material primarily for underground road base, surface bunding and / or other site requirements. The alternative is to buy-in aggregate type material at considerable cost.

Requests for administrative changes are also included in this EIS to:

- Seek new noise criteria for operations. This is to address the results of additional noise monitoring identified during completion of noise modelling for MOD6 and requirements outlined in the NSW EPA *Noise Policy for Industry (2017)*; and
- Align reporting requirements for the annual Environment Management Report (EMR) required by the mining lease and Schedule 4 Condition 3 of the PA requirements for an Annual Review (AR). These reports although similar have different time periods requiring two separate reports to be written and submitted within months of each other. Aligning these reports will streamline their formulation by BHOP and review by the regulator, removing duplication.

1.7 Consultation and Key issues

Meetings have been held with the relevant regulators to discuss the proposed modification - DPIE, the Broken Hill City Council (BHCC), Resource Regulator (RR) 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. Consultation is planned with regulators to review the proposed tailing harvesting for the (naturally) drying, retrieval and transferring of tailing from Blackwood Pit TSF2 to Kintore Pit TSF3.

The Briefing Paper is being updated to alert regulators to proposed changes since the original Briefing Paper was first issued in June 2018, and to seek any changes, additions or amendments to issues to be addressed in the EIS (to those listed in **Table 1-3**).

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 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

Government Agency	Issues Identified
	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.

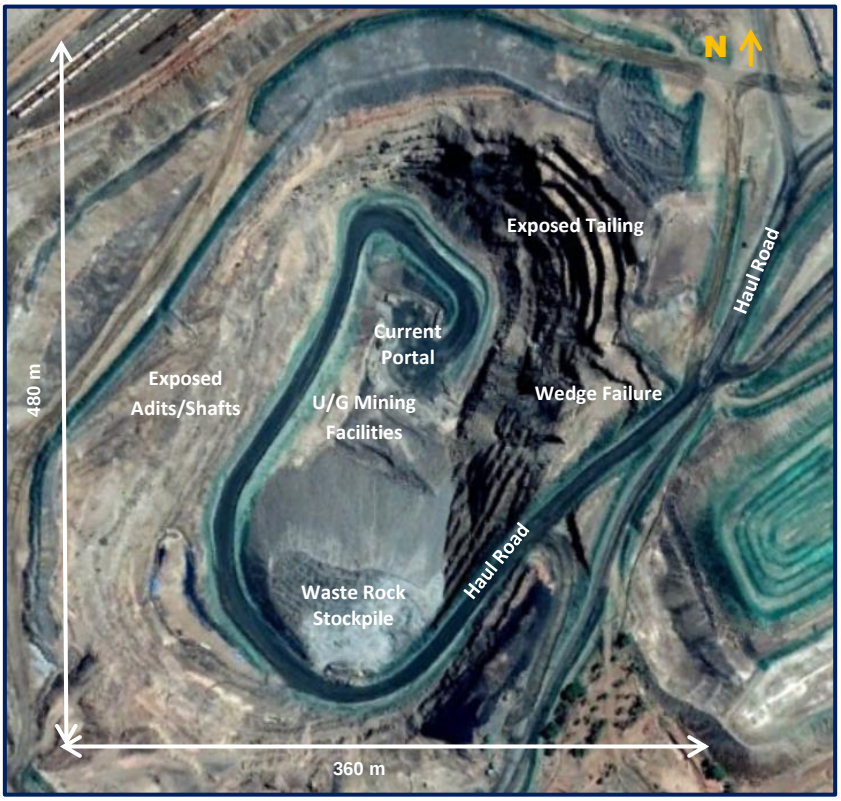
2.0 LOCATION OF PROPOSED MODIFICATION

This Section describes the location for tailing placement (Kintore Pit), the location for the new mine access portal and decline, tailing harvesting, non-ore crushing activities, waste rock placement and rehabilitation capping.

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 and is located to the west of CML7, **Figure 1-1**. The Pit is approximately 100 m deep (RL210 to 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 suitable voids available. On average 159,000 t per year has been stored in the Pit since mining commenced in 2012 to the end of 2019 (**Table 1-2**). An additional 135,000 t is planned to be placed during 2020 bringing the total stored in Kintore Pit to 1,410,989 t. This material will remain in the Pit. The current Haul Road will remain to provide access to the Pit.

Figure 2-1 Kintore 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 (eg 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 for bat habitats would be conducted as they become safely accessible within the Pit. This will be outlined in the EIS.

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-west of TSF1, **Figure 2-2**.

Figure 2-2 Indicative Proposed Portal Location

This will require the construction of a boxcut to obtain the required depth to connect to competent rock. The Haul Road will be realigned to meet this boxcut. The decline will be located to the northeast of the boxcut heading northwest to join existing and planned underground development.

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, resulting in a reduction of the surface haul road route, from 2 km to 200 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.

2.3 Periodic Crushing

Crushing activities are currently undertaken in Kintore Pit (EA) and BHP Pit (MOD7) and BHOP propose to continue these activities using a mobile crusher to produce material for road base, bunding and / or other site requirements. The location for these crushing activities is depicted in **Figure 1-1**.

2.4 Waste Rock Placement and Rehabilitation Capping

Since the commencement of mining operations BHOP has placed approximately 1,410,989 t of waste rock from underground workings into Kintore Pit (end 2019). Current mine plans (under the reduced production rates) have calculated total waste rock from mining operations to be brought to the surface from 2021 to the end of 2026 (current approved mining) as approximately 920,000 t.

It is proposed to co-dispose waste rock in Kintore Pit with the tailing (naturally dried that will be transferred from Blackwood Pit TSF2) with some material containing low or nil lead stored on the Kintore Pit Tipple or in BHP Pit where it would be tested and once its lead (Pb) content confirmed to be below <0.5%Pb used for rehabilitation capping.

In addition the development of the boxcut may generate approximately 440,000 t of waste material. This material has been deemed to be >0.5%Pb and will be permanently stored in Little Kintore Pit and in the infill area of BHP Pit, and then capped. Material from the new section of decline, to be installed to join existing and planned underground development, would be placed underground until the new portal opens and subsequently in the infill area of BHP Pit. All of this material is deemed to have a lead content >0.5%Pb.

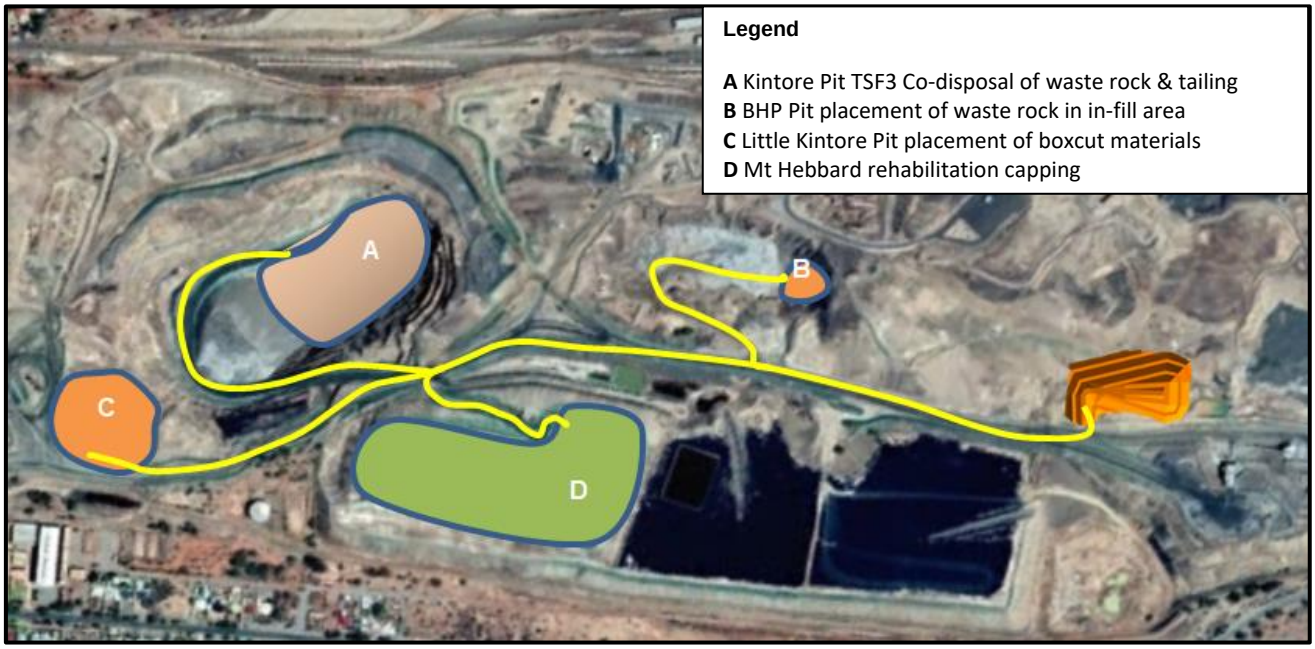
Table 2-1 provides a summary of the proposed placement for waste rock and quantities to be used for progressive rehabilitation capping. **Figure 2-3** indicates the proposed locations.

Table 2-1 Options for Waste Rock Placement and Rehabilitation Capping

Option	Location	Dimensions (at widest points) (m)	Area (m^2)	Lift Height (m)	Capacity (kt)
A	Kintore Pit co-disposed with tailing	W 360 L 480	NA	210	11,350
B	BHP Pit infill area only	D 14 W 80 L 80	NA	Infilled to current Pit floor level	197
C	Little Kintore Pit	D 17 W 125 L 130	NA	Infilled to current surface level	310
D	Atop Mt Hebbard historic tailing storage facility as rehabilitation capping.	L 320 W 130	32,000	NA	90
				TOTAL STORAGE CAPACITY	11,947

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%

Figure 2-3 Indicative Location Options for Waste Rock Placement and Rehabilitation Capping



3.0 DESCRIPTION OF PROPOSED MODIFICATION

This Section outlines details for the placement of tailing co-deposited with waste rock in Kintore Pit, installation of a new mine access portal and decline, tailing harvesting activities, non-ore crushing, waste placement and rehabilitation, and required administration changes.

3.1 Tailing and Waste Rock Co-disposal in Kintore Pit

Process tailing is currently deposited into Blackwood Pit TSF2 which will reach capacity in late 2022 when mining will cease if no alternative location has been approved for tailing disposal. Excess waste rock from underground mining is currently stored in Kintore Pit.

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 Kintore Pit was the preferred option as there is no increase to the disturbance footprint and less impact to public and private land with the installation of pipe-works and access tracks. It was also 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.

A general layout for the Pit is provided in **Figure 3-1**.

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 that have exposed tailing from 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 that are present in the batters on each side of the Pit, including behind the waste rock storage pile.
- Current Main Lode Drive (MLD) and old mine workings which are located below the Pit floor with a minimum rock cover thickness to the old workings of (approximately 10 m) and to the MLD (about 15 m). Once current mining operations are completed future access to the MLD will not be required and prior to commencement of tailing / waste rock disposal into the Pit, the MLD will be filled with waste material and barricaded to prevent access,

- Crown pillars separating the Pit floor from the old workings that were removed either during open pit mining or by previous underground remnant mining.
- A slope wedge failure that 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 view of the decline and access ramp is presented in **Figure 3-1** and shows the MLD 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).

The storage capacity of the Pit has been estimated by Golder at approximately 4.2 Mm^3. At current production rates for both waste rock generation and tailing placement, this provides approximately 12 years of capacity. There is the opportunity for this capacity to be extended by installing wall raises to the perimeter of the Pit however this will not form part of the MOD6 application.

The use of Kintore Pit as a tailing and waste rock 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 dried and compacted tailing is contained within the Pit and address the risk of inrush to the underground workings. It will also involve the filling of the MLD and installing barricades to prevent access as this drive will no longer be required.

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. There are a number of safety measures being considered for the Pit and the plug seal will be designed as an additional safety measure against uncontrolled flow of seepage water or tailing into the mine workings. 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 together with other required preparations within the Pit.

BHOP mining personnel are undertaking a review of all possible seepage / water flows through underground workings, including known historic workings, to identify any routes that may pose a risk to safety and require barriers. Where potential risks are identified Golder will design appropriate barriers with timing for their installation which will be reviewed by a geotechnical consultant.

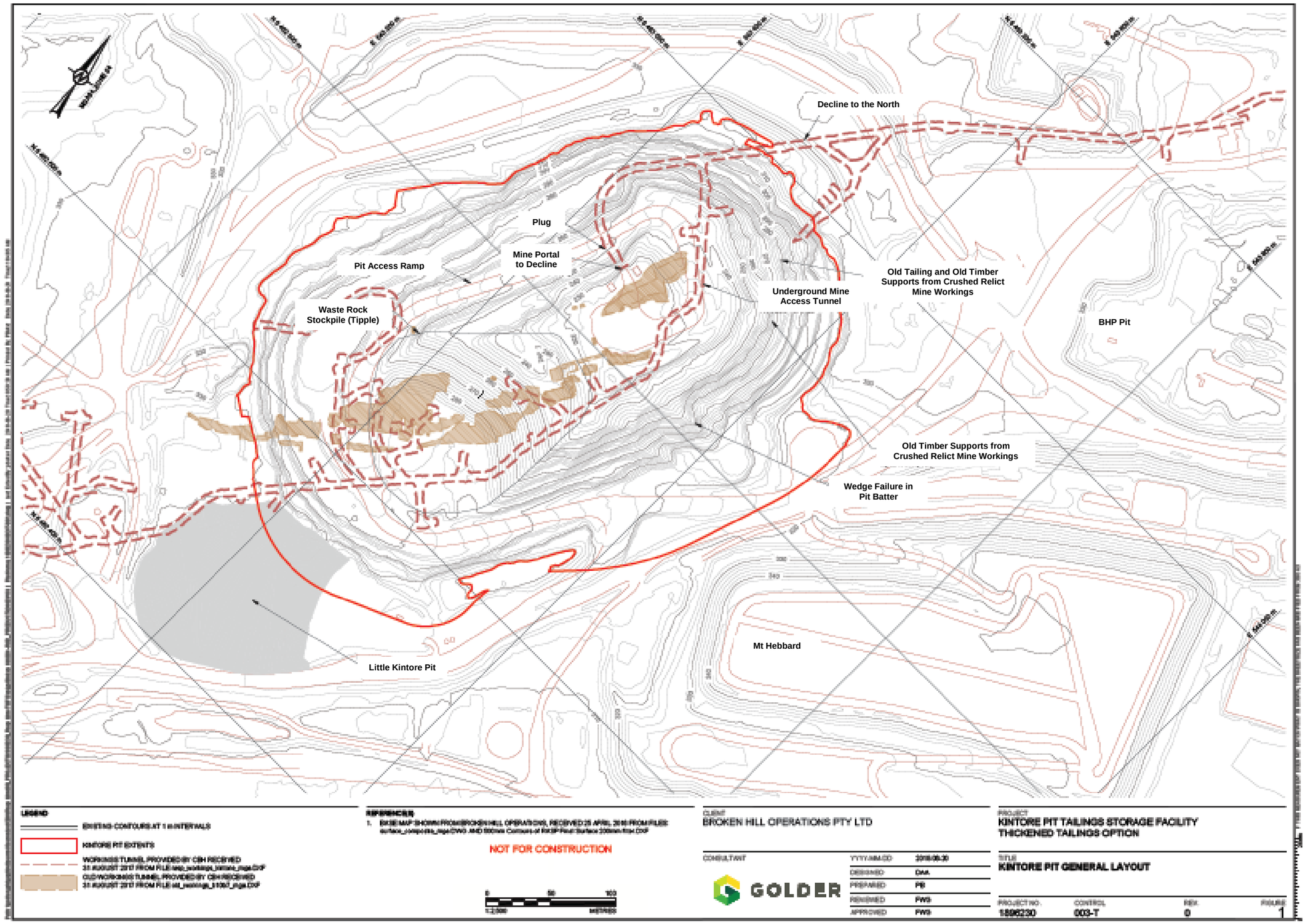
3.2 Tailing Harvesting

A risk assessment workshop held to address the risk of tailing inrush concluded that the tailing would need to be dewatered prior to deposition within the Pit, **Section 4.0**. BHOP engaged Golder to identify the maximum water content of the tailing to minimise the risk of inrush/inundation into underground mine workings. Golder concluded that to further minimise the potential for liquefaction of the tailing the optimal compaction moisture content was 10% for full stream tailing. This also results in a tailing that is sufficiently moist that it will not be dust generating but dry enough to be immediately trafficable. BHOP proposes to naturally (wind and solar) dry the tailing on the surface of Blackwood Pit TSF2 transferring the dried tailing for permanent storage into Kintore Pit TSF3.

Preliminary test results have shown that the current moisture content of the settled tailing in Blackwood Pit TSF2 varies between 9% to 12.5% therefore, where near surface tailing is removed, the required moisture level can be attained with no additional drying. The moisture content of the waste rock is approximately 3%.

The process for harvesting is currently under review with several options currently being assessed by Golder as the TSF2 Dam Engineer. With the installation of the embankments Blackwood Pit TSF2 was classified as a Declared Dam under the NSW *Dam Safety Regulations 2019* and once the harvesting methodology is known, consultation will be undertaken with Dam Safety NSW in accordance with these Regulations.

Figure 3-1 Kintore Pit General Layout



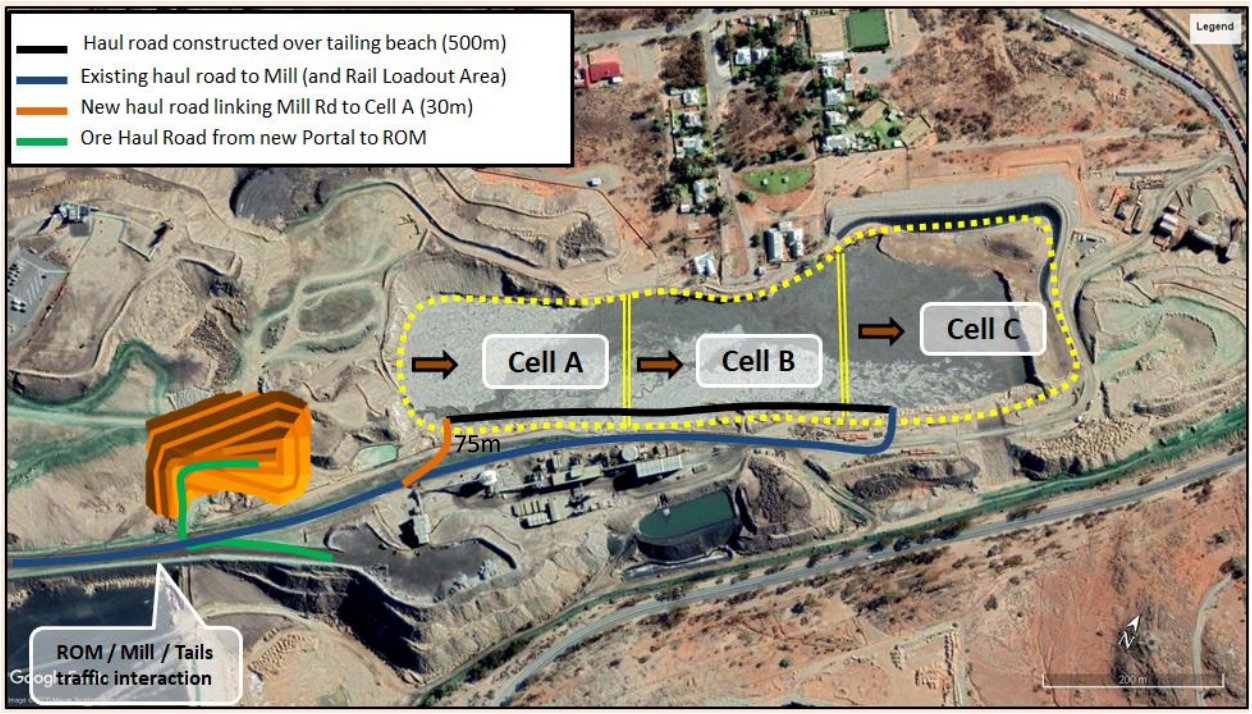
As a guide TSF2 would be divided into bays separated by bunding. Bunds will be constructed from waste rock material and are proposed to be approximately 1 m in height and 5 m wide to allow for access.

Figure 3-2 provides an indicative layout option for harvesting tailing. Tailing will be deposited alternatively between the bays keeping tailing beaching in the same direction without water pooling between the bays or tailing spilling from one bay to another. Any excess water will be directed (via natural gravity flow) to the northeast end of Blackwood Pit which will be kept to a minimum by pumping the water for reuse, in accordance with the current TSF Maintenance and Operations Manual.

Fresh tailing would continue to be placed in TSF2 and allowed to dry naturally (solar and wind), once sufficiently dried the tailing would be harvested and then transferred to Kintore Pit TSF3 continuing the cycle.

It is proposed to “shave” thin layers of the naturally dried tailing using specialised machinery such as a grader and dozers (D6) which will run along the length of a Bay scraping the tailing into windrows. These thinner layers are related to the drying time of hydraulically placed tailing allowing the layer to dry to the required moisture level.

Figure 3-2 Indicative Layout Option for Tailing Harvesting



Conceptual methodology proposes the use of two dozers to push the shaved tailing to the end of the Bay and form stockpiles in readiness for loading into trucks (60 t with 55 t payload) by an excavator and transferred to TSF3 or alternatively tailing may be pushed and directly loaded into trucks. Trucks would operate on an all-weather access track within TSF2 minimising the need for trucking directly on the tailing surface.

Tailing production within the mill operates 24 hours per day and may operate on a campaign basis or at current operating times (7 days per week). Tailing will be pumped to TSF2 as per normal methods with modified spigot locations. All other activities may occur on any day of the week, day shift only with operating hours 7 am to 6 pm Monday to Saturday and 8 am to 6 pm Sundays.

Under the current mine plan it is proposed to harvest a maximum of 480,000 tpa. **Table 3-1** indicates movements for the operation of mobile equipment for tailing harvesting activities and trucking to transfer tailing to TSF3.

Table 3-1 Indicative Mobile Equipment and Trucking Movements for Tailing Harvesting and Transfer

Equipment	Movements	
	Year	Day
2 D6 Dozers and 1 excavator	24,000	182
Trucks (55t payload)	8727	32

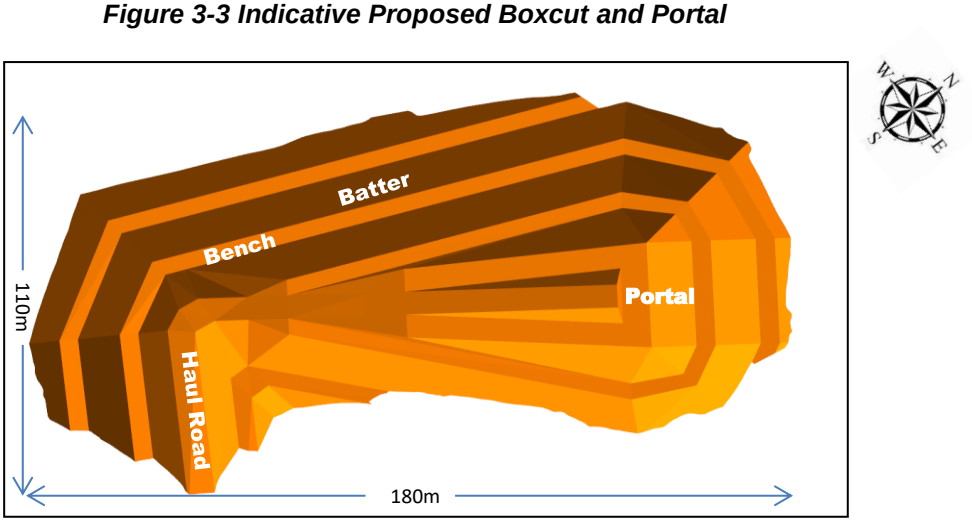
Full stream tailing will contains approximately 10% moisture and dusting is not expected however, a water spray system and water truck will be able to control any dust generation. In addition activities will be restricted to current site dust controls on windy days.

In addition the method for co-disposal of tailing with waste rock is currently under review by Golder.

3.3 New Boxcut, Portal and Decline Development

The construction of the proposed new underground access portal would require a boxcut constructed at a depth to reach competent hard rock material prior to the development of the new decline. The current design concept for the boxcut has been reduced, from that described in the previous Briefing Paper, to 180 m long and 110 m wide and up to 30 m deep at its lowest point prior to entry into the decline, **Figure 3-3**.

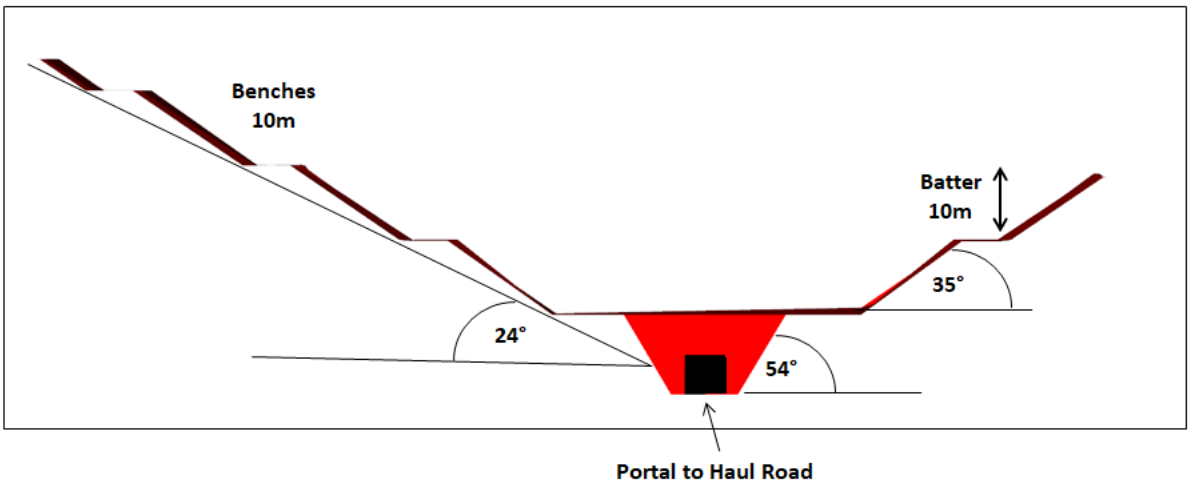
Figure 3-3 Indicative Proposed Boxcut and Portal



The overall slope angles for the boxcut would be 24^{o} with the Fill batter angle 35^{o} and the Rock batter angle 54^{o}, the benches would be 10 m wide and the batters 10 m high, **Figure 3-4**. 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 reduced in height and access has been moved slightly to the south to align better with the ROM Pad entry. The design may be further refined and this will be detailed in the EIS.

The boxcut will require the removal of approximately 440,000 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). This waste material has been deemed >0,5%Pb as it is considered too difficult to separate out the lower Pb material. This material will be transferred to Little Kintore Pit and BHP Pit for permanent storage. On completion these Pits will be capped with material that has been tested and confirmed to be <0.5%Pb.

Figure 3-4 Cross-cut for Indicative Boxcut Design



A new decline will be installed from the proposed new portal and extend 400 m to meet existing and planned underground development. The total waste from this new section of decline is estimated as 40,000 t. The decline will be excavated from underground where possible with waste material placed in underground voids, once access is gained through the new portal, the material will be taken to BHP Pit for permanent storage. Conservatively all of this material has been deemed to go to BHP Pit for air and noise assessment modelling.

The proposed construction of the boxcut would be undertaken in three stages utilising a 65 t excavator, grader (12 m), 3 water carts (40,000 L), two D9 size dozers and up to six 43 t dump trucks. The 43 t trucks will be under-filled to 40 t to minimise spillage and dust exposure. The construction period will be approximately six months. This will require, over approximately 104 days, 10,889 truck movements taking waste material to in-pit storage areas (average 1,665 m distance). Using six 43 t trucks loaded to 40 t equates to approximately 11 truck movements per hour. This anticipates utilising shift times of 7 am to 6 pm, 6 days per week. It is proposed to undertake work on Sundays that will not adversely impact neighbours, particularly from machinery/truck generated noise, for example, maintenance activities.

The decline will be completed over an estimated period of three months, working normal mine shifts from underground over 24 hours per day 7 days per week and working 7 am to 6 pm 6 days per week from the surface, once access is gained through the new portal. Blasting methods will be designed by a mining specialist to minimise potential impact from vibration and 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 currently for transporting ore to the ROM Pad. The surface haulage distance to the ROM Pad will reduce from approximately 2 km to 200 m.

3.4 Periodic Crushing

Surface crushing of ore is undertaken in a fully enclosed crusher building under negative pressure venting to a baghouse. BHOP do not propose any changes to this activity.

Crushing of non-ore material (waste rock) is currently undertaken in Kintore Pit (EA) and BHP Pit (MOD7) and BHOP propose to continue these activities. Crushing is periodically conducted using a hired mobile crusher to produce material for road base (predominantly for underground roads), bunding and / or other site requirements.

Where waste rock material is proposed for use on the surface it is tested to confirm it contains <0.5%Pb prior to its placement. It is initially moisture conditioned with a water truck then stockpiled using a dozer. Moisture of the

feed stockpile is maintained by use of a water truck equipped with sprays and high-pressure water cannon. An enclosed conveyor with water sprays is used to deliver crushed material to the stockpile. Following crushing the material is stockpiled for site use and dust is minimised using a water truck.

Crushing occurs periodically on a needs basis up to three times per year with the crushing activity occurring during day-time only, Monday to Friday, over a few days for each campaign.

3.5 Waste Rock Placement and Rehabilitation Capping

3.5.1 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.

3.5.2 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 3-2 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).*"

3.5.3 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 being undertaken in order to homogenize the sample. This eliminated or reduced the possibility of preferentially sampling of the finer material, that may potentially introduce a bias to analytical results. Samples (six) were taken in August and September 2016.

The analytical results have been summarised in **Table 3-3** 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 3-3 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 3-4**.

Table 3-4 Bioaccessibility of Lead in Surface Soils – Rasp Mine

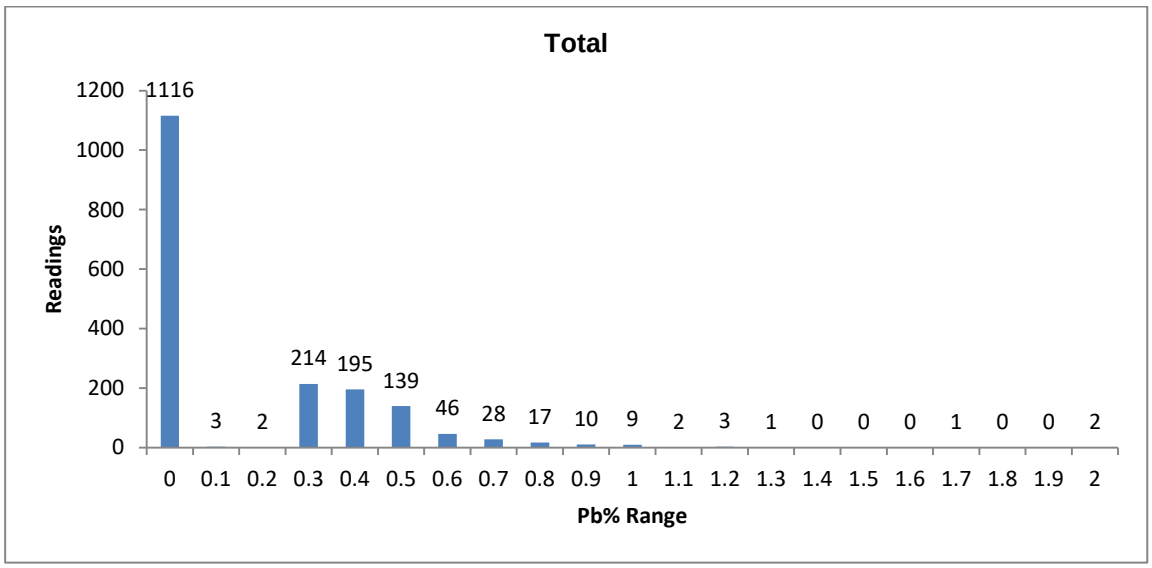
Sampling Point	Lead Concentration (mg/g)	Lead Concentration (mg/kg)	Lead Concentration (%)	Bioaccessibility (Bac) (%)
1	31	31,000	3.1	**14.6**
2	8.8	8,800	0.88	**3.6**
3	7.1	7,100	0.71	**8.5**
4	11.8	11,800	1.18	**6.1**
5	18.7	18,700	1.87	**3.7**

These lead concentration results are well above the levels found in waste rock sampling from the Kintore Pit Tipple with the exception of one sample (9,010 mg/kg) with the next closest result, 3,030 mg/kg. Therefore bioaccessibility of waste rock is expected to be low.

Figure 3-4 shows a summary of results of lead in waste rock from the Kintore Pit Tipple and the noise bund wall, undertaken for the Concrete Batching Plant. The results were obtained in-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% could not detect any lead, 93.3% (1669) of readings detected lead levels below 0.5% which is consistent with the findings by PEL of 0.237% lead content.

Broken Hill ore type is characterised for its very low pyrite content and the waste rock has even lower concentrations of pyrite, there is no visual 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



3.5.4 Waste Rock and Waste Material Placement

The material from the proposed new boxcut and decline is deemed to have a lead content greater than 0.5%. It is proposed that this material will be permanently stored in-pit within Little Kintore Pit and the in-fill area of BHP Pit. The volume of material is estimated at approximately 440,000 t from the boxcut and 40,000 t from the new decline (some of this material will be placed in underground voids prior to breakthrough and access is available to the surface via the new portal). The capacity of Little Kintore Pit has been estimated to hold 310,000 t and BHP Pit in-fill area 197,000 t.

It is also proposed to install waste rock with low lead content (<0.5%) as rehabilitation capping on the 'free areas' (non-active mine areas) of the site.

Location A – Kintore Pit TSF3

Location A Kintore Pit TSF3 has a capacity to hold approximately 9.4 Mt of tailing and it is proposed to co-deposit tailing with excess waste rock from underground mining.

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

Location B – 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 B is approximately 717 m from the proposed new portal. There are a number of heritage items from the BHP 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, none of these items would be impacted. Barricades and signage are in place to separate activities currently undertaken in BHP Pit (ie waste rock storage, crushing and explosives storage) from heritage items.

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 80 m (l) and 14 m deep and has a capacity of approximately 197,000 t.

Location C – 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 1,751 m from the proposed new portal. Little Kintore Pit contains an old shaft that 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 310,000 t.

Location D - Atop Mt Hebbard

Mt Hebbard is an historic tailing storage facility completed in the 1970s. It lies to the south of CML7 adjacent to residential housing located along Eyre Street. This area was identified as elevated in lead by the Human Health Risk Assessment in the original EA.

The area is approximately 320 m x 130 m and there are no vegetation or heritage items within the area.

Preparation works will be required to upgrade the road to Mt Hebbard to allow truck access. These activities are expected to be of short duration occurring during daytime hours only.

BHOP have engaged a consultant to design capping placement to provide a permanent solution to minimise dust from wind entrainment and address surface water management. This study will also confirm that the surface is suitable and trafficable for the waste rock placement activities.

3.6 Administrative Amendments

Requests for administrative changes are also included in this EIS.

Noise Criteria

BHOP propose to seek new noise criteria in line with the results of additional noise monitoring identified during completion of noise modelling for MOD6 and requirements outlined in the NSW EPA *Noise Policy for Industry (2017) (NPfI)*. The NPfI has increased the minimum day RBL from 30 dB to 35 dB and the noise modelling for MOD6 will be undertaken in accordance with the new requirements. In addition further attended monitoring has been undertaken and this will be used to inform noise criteria levels for MOD6.

Annual Review / Annual Environment Management Report – waiting for section from Devon

Currently BHOP are required to provide two separate reports detailing environmental management performance to the Department of Planning Industry and Environment (DPIE):

(1) PA07_0018 Schedule 4 Condition 3 requires submission to the DPIE Compliance Section of an Annual Review (AR), and
(2) CML7 Condition 3 requires submission to the DPIE Resource Regulator of an Environment Management Report annually (EMR).

The reports are similar in their content; the MER reports on activities in a calendar year and is due on March 1 each year, and the AR is required to be submitted by the end of June each year for the reporting period may to April. This requires considerable duplication of staff time for to both identify and collect information and produce the two separate reports.

BHOP propose to provide a consolidated report addressing all issues for the one reporting period and as current internal reporting requirements run from January to December efficiencies could be gained if these reports aligned. Therefore BHOP seek a change to the PA to require the submission of the Annual Review to be March 1 to align to the EMR.

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.

A risk review was also conducted by SP Solutions Pty Ltd in January 2020 and a further review is scheduled in September 2020. These assessments will further inform the EIS.

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 (including vibration and overpressure), air quality and community health. 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 TSF3 (Preparation Works)		
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 (110 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. - truck movements within the Pit transporting waste rock material from the Tipple to the floor of the Pit together with excavators and dozers. Given the depth of the Pit and the time duration for these activities noise was not considered a key issue. However construction noise within the Pit will be included in the noise modelling for operations as it is planned to be completed 7 days per week during daytime hours.	 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 - excavation and truck movements from relocation of waste rock from Kintore Pit Tipple to Pit floor. Although the majority of dust will be contained within the Pit, it is considered a key risk given the volume to be relocated and the number of truck movements.	 No Yes
Community Health	The extent of preparatory works required will involve earthworks and the relocation of waste rock within the Pit which will be dust generating and will be included in the air quality and health risk assessments.	Yes
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 used	 No No
Heritage	No heritage items are located in the proposed project locations.	No
Fauna	The use of old adits or shafts within the Pit walls by fauna is not considered likely due to difficult access. There are no known fauna currently in these old workings and there is no safe access to inspect any openings.	No
Land Disturbance	No vegetation to be removed, no additional land disturbance will be required.	No
PORTAL & DECLINE (New Boxcut & Little Kintore Pit Preparation Works)		
Noise	Noise will be generated by: - earthworks using bulldozer and excavator to construct boxcut - Installing access ramp and filling / capping old shaft in Little Kintore Pit (impacts not considered material due to short duration of activities - surface blasting - truck movements removing waste material	 Yes No Yes Yes
Vibration and Overpressure	Vibration and overpressure will be generated by: - blasting to construct the portal and decline - vibration impacts to TSF1 and/or TSf2 causes liquefaction of tailing	 Yes Yes
Flyrock	Flyrock may be generated during surface blasting for the portal opening.	Yes
Dust	Dust will be generated by:	

Issue	Relevance	Key Issue
	- earthworks using bulldozer and excavator to construct boxcut	Yes
	- Installing access ramp and filling / capping old shaft in Little Kintore Pit (impacts not considered material due to short duration of activities	No
	- blasting activities for portal and decline	Yes
	- truck movements removing waste material	Yes
Community Health	It has been assumed that the excavated/waste material will be >0.5%Pb and has been included in the air and health assessments.	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
	Increased traffic on internal roads will be addressed via the site's Construction Environment Management Plan.	Yes
Water	Additional water will be used for:	
	- cement for shotcrete at portal and decline not considered significant as recycled water is proposed to be used	No
	- dust suppression, not considered significant as recycled water is proposed to be use	No
Power	High voltage power line runs along the Haul Road adjacent to the proposed boxcut and portal access.	Yes
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
TAILING HARVESTING TSF2 (Preparation works)		
Noise	Noise will be generated by:	
	- earthworks using bulldozer and excavator to form dividing bund between bays and platform for harvested tailing stockpiles (if required)	No
	As these works will be conducted over one week it is not considered a key issue however noise will be included in the construction scenario for modelling.	
Dust	Dust will be generated by:	
	- minor earthworks to form dividing bund between tailing drying areas and platform for harvested tailing stockpiles	No
	As these works will be conducted over one week it is not considered a key issue however dust will be included in the construction scenario for modelling.	
Community Health	Tailing contains very low Pb levels (average <0.3%)	No
	As these works will be conducted over one week it is not considered a key issue however results from the air modelling will include any dust generated from this activity and will be used for the human health risk assessment.	
Traffic & Transport	There will be no increase in traffic movement due to these activities.	No
Water	Additional water will be used for:	
	- dust suppression, not considered significant as recycled water is proposed to be use	No
Heritage	No heritage items are located in the proposed project locations.	No
Land Disturbance	As these works will be completed within TSF2 on already disturbed land.	No
WASTE ROCK PLACEMENT & REHABILITATION CAPPING (Preparation works)		
Noise	Noise will be generated by earthworks using an excavator to upgrade the road to the top of Mt Hebbard to allow truck access. As it is expected that this will be of a short duration (less than 1 week) and conducted during daylight hours, it is not considered material to noise levels.	No
Dust	Dust will be generated by earthworks using an excavator to upgrade the road to the top of Mt Hebbard to allow truck access. As it is expected that this will be of a short duration (less than 1 week), it is not considered material to dust levels.	No
Land Disturbance	As these works will be completed within TSF2 on already disturbed land.	No

Table 4-2 Preliminary Risk Review - Operation

Issue	Relevance	Key Issue
KINTORE PIT TSF3 (Placement of tailing and waste rock)		
Inrush	Inrush could occur from: - moisture content of tailing, - 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 that may provide a pathway for water flow - erosion of pit walls, particularly old tailing slope	 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
Noise	Noise will be generated by: - earthmoving equipment spreading and compacting the tailing, primarily as tailing reaches closer to the surface - trucking of excess waste rock from underground mining	 Yes Yes
Dust	Dust may be generated by: - earthmoving equipment spreading and compacting the tailing and waste rock primarily as material rises in the Pit - as the level of tailing rise closer to the surface and the tailing further dries out - trucking of excess waste rock from underground mining	 Yes Yes Yes
Community Health	Dust, which may contain lead, may be generated from tailing and waste rock primarily as the surface of the material 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
Traffic & Transport	Transfer of harvested tailing from Blackwood Pit TSF2 to Kintore Pit TSF3 will be undertaken by trucks.	Yes
Waste Management	There are no wastes generated from the tailing deposition	No
Fauna	The use of old adits or shafts within the Pit walls by fauna is not considered likely due to difficult access. There are no known fauna currently in these old workings To address the potential for fauna habitats within old adits and shafts an inspection (when safe access is available) shall be undertaken. It is proposed that these inspections occur during the life of the facility as tailing levels rise and access to old voids/workings becomes available.	Yes
Land Disturbance	Activities will be undertaken on already disturbed land	No
Rehabilitation	Rehabilitation of the filled Kintore Pit will need to be considered	Yes
PORTAL & DECLINE		
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. Waste will be transferred from underground via the portal to Kintore Pit Tipple and Kintore Pit TSF3 by trucks. Vehicle movements for changeover will now be conducted in the Laydown Area adjacent the boxcut and not on Kintore Pit floor.	Yes Yes Yes
Dust	From new portal road to Haul Road. Waste will be transferred from underground via the portal to Kintore Pit Tipple and	Yes

Issue	Relevance	Key Issue
	Kintore Pit TSF3 by trucks. Vehicle movements for shift changeover will now be conducted in the Laydown Area adjacent the boxcut and not on Kintore Pit floor.	Yes Yes
Community Health	There will be no additional impacts to community health with reduced haulage route some reduction may occur. Waste will be transferred from underground via the portal to Kintore Pit Tipple and Kintore Pit TSF3 by trucks.	No 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
Traffic & Transport	The surface Mine Haul Road taking ore to the ROM Pad will intersect with trucks from harvested tailing and traffic from the Mill and Rail Loadout area.	Yes
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
TAILING HARVESTING		
Noise	Will be generated by mobile equipment within Blackwood Pit TSF2 and truck movements transferring tailing to Kintore Pit TSF3.	Yes
Dust	Will be generated by excavator and dozers scraping and collecting the tailing and placing in stockpiles, truck loading and trucking movements transferring tailing to Kintore Pit TSF3.	Yes
Community Health	Tailing contains some lead (average 0.3%Pb).	Yes
Ground Failure	Impacts to the integrity of the embankment structures could occur from: - Vibration of mobile equipment and trucking activities - Activities within the Pit that undermine the foundations of the embankments - High rainfall events impact surface integrity resulting in loss or roll-over of mobile equipment or trucks	 Yes Yes
Vibration	Vibration from mobile equipment and trucks operating within TSF2 impact surface stability and may result in subsidence.	Yes
Surface Water	Water sprays will be used for dust suppression however will be limited and recycled water to be used.	No
Traffic & Transport	Internal traffic with interaction between ore haul trucks and tailing transfer trucks.	Yes
Waste Management	No additional waste generated	No
Land Disturbance	Activities will be undertaken on already disturbed land within Blackwood Pit TSF2.	No
Rehabilitation	Rehabilitation of Blackwood Pit TSF2 will be delayed. A conceptual rehabilitation plan was provided as a part of MOD4.	No
PERIODIC CRUSHING		
Noise	There will be some noise generated from increased traffic and crushing activities however due to the short duration of these activities, which are to be conducted during daytime only, it is not expected to have a material impact on noise levels.	No
Dust	There will be some dust generated by increased traffic, stockpiling, crushing and material collection and placement. However due to the short duration and low instance during the year for these activities it is not expected to have a material impact.	No
Community Health	There will be some dust generated by increased traffic, stockpiling, crushing and material collection and placement. However due to the short duration and low instance for these activities it is not expected to have a material impact on community health.	No
Water	There will be some additional water used for dust suppression in regards to stockpiled material and crushing activity, however due to the short duration and low instance for these activities water demands are not expected to impact current water supplies.	No

Issue	Relevance	Key Issue
Traffic & Transport	There will be some increase in internal traffic taking material to stockpiles for crushing and removing and placing crushed material. However as these activities are for short periods no impact to current traffic systems are expected.	No
Heritage	There are no listed heritage items located in Kintore Pit, the listed heritage items located in BHP Pit have been barricaded for protection from all mining activities and will not be affected.	No
Visual Amenity	Crushing activities will be conducted in-pit and will not be visible from residential areas of Broken Hill.	No
Land Disturbance	There will be no additional land disturbance as crushing activities will be conducted in disused mine open pits.	No
WASTE ROCK PLACEMENT & REHABILITATION CAPPING		
Noise	Noise will be generated by: - haul trucks delivering waste rock for rehabilitation capping - dumping of waste rock	 Yes Yes
Dust	Dust will be generated by: - haul trucks delivering waste rock - dumping of waste rock - stockpiling waste rock and loading into trucks on the Tipple, for rehabilitation capping	 Yes Yes Yes
Water	There may be some changes to surface water management and this will be addressed in the updated Site Water Management Plan - water may be used for dust suppression during dumping - management of rainwater runoff and collection around capped area	Yes
Community Health	Waste rock will be confirmed at <0.5%Pb which is a reduction on the content of the current surface materials. A reduction in current dust from wind entrainment is expected removing the need for the application of chemical dust suppressant. Transport of waste from the Kintore Pit Tipple to the capping area may result in dust with elevated Pb levels.	No Yes
Geotechnical and Geochemical Characteristics	Waste material to be paddocked dumped. Surface stability may be impacted by waste rock placement activities. Long term impacts of material are unknown and will be addressed in a Long Term Waste Rock Study.	Yes Yes Yes
Traffic & Transport	There will be no affects to off-site traffic or transport Some increase in internal traffic only from Kintore Pit Tipple to capping area and is not expected to impact.	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
Heritage	There are some heritage items located in BHP Pit however these are separated with barricades from current mining operations and 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	The rehabilitation capping will be offset from the edge of the capping area and will not be visible from the town and will be consistent with the current mining landscape.	No
Land Disturbance	There will be no additional land disturbance, capping areas have no vegetation.	No

4.2 Kintore Pit Tailing TSF3 – Discussion of Key Issues

The key potential issues identified for pit preparation works and the storage of tailing and waste rock in Kintore Pit are discussed in the following sections.

4.2.1 Dust

Potential key issue

Pit preparation works include the movement of approximately 300,000 t of material with truck movements within the Pit taking the majority of this material from the Kintore Pit Tipple to the floor of the Pit. Although most of the activities will be undertaken 100 m from the surface over a period of 3 months, given the volume of material and number of traffic movements it was considered to include this as a key issue.

Dust generation during the operation of the dozer / roller working on the tailing is unknown. It is anticipated that potential dust issues may only arise when the level of tailing / waste rock rises closer to the surface.

Proposed management measures and studies

- Pit preparation and construction works will be undertaken within the Pit and any dust generated will be managed through normal operating practices. Dust generated from these activities has been included in the dust modelling under the construction scenario.
- The dust modelling results will inform the human health risk assessment.
- Method for tailing deposition to minimise dust and will be addressed in the Golder design report.
- Air modelling consultants will also review any additional requirements for dust monitoring.
- As tailing rises closer to the surface instigate additional dust mitigation measures.
- Use of chemical dust suppressant, where required.
- Conduct air quality modelling and include potential for dust generation during construction and operation, include operations in the cumulative air quality assessment. Model the potential for lead bearing dust to lift off tailing storage facility.
- Update of the Air Quality Management Plan.

4.2.2 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

- Conduct dust modelling and include potential for lead bearing dust generation in cumulative air quality assessment.
- 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 instigate additional dust mitigation measures.

4.2.3 Inrush

Potential key issue

BHOP operate a portal and decline from the base of Kintore Pit to access underground mine workings. The MLD runs beneath the Pit allowing access to both the south-west and north-west workings. Historic workings are also located beneath and around the Pit, 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 and waste rock contain water which may pose an inrush risk.

- Possible liquefaction of the tailing which may occur from a seismic event, mine blasting, subsidence of old workings or 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:-

- Fill the MLD with waste rock and barricade to prevent access prior to disposal of tailing / wast rock into Kintore Pit TSF3.
- Dewatering of full stream tailing to achieve the optimal compaction using naturally dried tailing from Blackwood Pit – tailing harvesting methods study and in-situ compaction testing.
- Adequate tailing compaction within Kintore Pit (critical state moisture content assessment).
- Design of tailing placement in TSF3 to address drainage and potential for seepage and will be addressed in the Golder concept design report.
- Installation of an engineered plug seal to portal to be designed to withstand full hydrostatic head and possible dynamic loads and other plugs/barriers as determined by further investigations.
- Undertake a seismic study.
- Undertake a mine water pathway study and assessment for further barriers if required.
- Sealing adits and old mine workings in the Pit walls where required (with waste rock) compacted tailing / waste rock will provide a base from which to treat these openings.
- Underground drive seepage water management.
- Surface water management - collect and pump excess water from the Pit and recycle to the Mill.
- Update the Tailing Maintenance and Management Plan.

4.2.4 Ground Failure

Potential key issue

The MLD is located beneath the Pit. The material above the MLD to the Pit floor is approximately 10 m to 15 m and crown pillars have already been removed.

Proposed management measures and studies

With the completion of current mining plans there access along this Drive will no longer be required, It is proposed to fill the Drive with waste rock and install barricades to stop access. BHOP will engage a suitably qualified consultant to confirm the methodology and provide safety assurance.

4.2.5 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 was not considered a key potential issue for pit preparation works, given the current level of truck movements within the Pit, as activities 7 days per week (during day time hours) BHOP has included noise generation in the noise modelling for operations.

During operations a dozer will be used within the Pit to spread materials and a roller to 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

- Conduct noise modelling for pit preparation works as part of operations noise assessment.
- Incorporate truck and mobile equipment movements in noise assessment.

- Conduct cumulative assessment for post MOD6 operations.
- Update of the Noise Management Plan.

4.2.6 Water Assessment and Management

Potential key issue

There may be some mixing of water from tailing with 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.
- Provide underground drive seepage water management.
- Update the Tailing Maintenance and Management Plan.

4.2.7 Rehabilitation

The rehabilitation of Kintore Pit will be required and needs to be developed in consultation with DRG, BHCC and the inter-government group reviewing closure and rehabilitation options for the whole of the Line of Lode. A preliminary closure concept shall be provided in the EIS for both Kintore Pit and Blackwood Pit tailing storage facilities. 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 received from DRG and the inter-government group).

4.3 Boxcut, Portal & Decline – 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

Potential key issue

A number of potential key issues for noise were identified during the preliminary risk review resulting from construction activities including noise from earthworks using bulldozer and excavator to construct boxcut, trucking of material to Little Kintore and BHP Pits and surface blasting.

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 crossed to gain access to the ROM Pad. Noise modelling will be updated to include these changes.

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:-

- 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.
- Timing of surface blasting to minimise impacts to surrounding neighbours.
- Development of Construction Environment Management Plan – New Portal.
- Modelling of noise for construction and operations, including cumulative noise levels with 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.

The new portal and decline will be located close to TSF1 and / or TSF2. During construction blasting activity or truck movements may have the potential to impact these facilities causing liquefaction. 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.

Proposed management measures and studies

- Design of blasting methods, parameters, blast size and during and the timing of blasts.
- Review monitoring requirements for blasting.
- Vibration and overpressure modelling will be undertaken to predict potential impacts for portal and decline development.
- Assess the potential vibration and overpressure impacts to surrounding residential and sensitive receptors.
- Assess the potential for liquefaction of TSF1 or TSF2 from blasting activities and in the case of TSF2, surface truck movements.
- Update the Technical Blasting Management Plan.

4.3.3 Flyrock

Potential key issue

Flyrock may 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 dozers and excavators 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, however, this is not identified as a key issue as the shorter Haul Road will reduce dust levels from truck movements.

During operations dust will also be generated by truck movements transporting waste rock to Kintore Pit TSF3 for co-disposal with tailing. Waste rock will also be taken to Kintore Pit Tipple and/or BHP Pit for testing of its Pb content prior for use as rehabilitation capping (expected average one truck per day, Monday to Friday only).

In addition vehicles entering the Laydown Area at shift change may also generate some dust.

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

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, if required.
- The majority of the route transporting waste material will be on sealed roads.
- The section of the new road from the portal to the Haul Road shall be sealed.
- Conduct safety assessment for vehicle interactions on the Haul Road, including identification of control measures.
- Formulate Traffic Management Plan for Construction.
- 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 proposed 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 storage areas.

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 Power

A high voltage power line (22kV) runs along the ore Haul and Mill Roads. An assessment will be conducted to determine safety risks associated with the interaction of both construction vehicles and operations traffic and determine any required control measures.

4.3.7 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. A conceptual closure landform will be proposed in the EIS.

4.4 Tailing Harvesting - Discussion of Key Issues

There were no key issues identified for preparation works for tailing harvesting. The following key issues were identified for operation of the tailing harvesting.

4.4.1 Noise

Potential key issue

Noise will be generated by mobile equipment operating within Blackwood Pit TSF2 and truck movements transferring harvested tailing to Kintore Pit TSF3.

Proposed management measures and studies

Noise modelling undertaken for MOD6 will include noise generated by tailing harvesting activities and trucking of tailing to Kintore Pit TSF3.

4.4.2 Dust

Potential key issue

Dust will be generated by excavator and dozers scraping and (trucks) collecting the tailing and placing in stockpiles, truck loading and trucking movements transferring tailing to Kintore Pit TSF3.

Proposed management measures and studies

Surface tailing has a moisture content of approximately 12% and is not expected to be dusty. Normal operating practices such as the use of a water truck and chemical suppressants will be applied to minimise dust emissions during operations. The water spray system will also assist to further minimise dust.

Dust modelling undertaken for MOD6 will include dust generated by all tailing harvesting activities including trucking of tailing to Kintore Pit. All relevant metals have been included in this modelling which will form the basis for the Human Health Risk Assessment.

4.4.3 Community Health

Potential key issue

The tailing has a smaller particle size than waste rock and contains an average of 0.3% Pb.

Proposed management measures and studies

- Dust generated from tailing harvesting will be included in the dust modelling which will form the basis for the Human Health Risk Assessment.

4.4.4 Ground Failure and Vibration

Potential key issue

There is potential for the integrity of the embankments to be impacted by the vibration of mobile equipment and trucks operating within Blackwood Pit TSF2 and harvesting activities that could undermine the embankments particularly at EMB1 and EMB3 which are located on the tailing surface. High rainfall events may impact surface integrity resulting in loss or roll-over of mobile equipment or trucks.

Proposed management measures and studies

Golder, the nominated Design Engineer for Blackwood Pit TSF2, have been engaged to provide a methodology for tailing harvesting and will address these risks in their design report. In addition BHOP will consult with Dam Safety NSW regarding the harvesting process methodology and the potential to impact embankment integrity.

4.4.5 Traffic & Transport

Potential key issue

BHOP has identified a potential risk for internal traffic with interactions between ore haul trucks and tailing transfer trucks and both of these trucks with light vehicles.

Proposed management measures and studies

- An assessment will be undertaken by BHOP to determine controls and from the outcome of this investigation the Traffic Management Plan will be updated.

4.5 Waste Rock Placement and Rehabilitation Capping - Discussion of Key Issues

The key issues identified for waste rock placement and rehabilitation capping are discussed in the following sections.

4.5.1 Noise

Potential key issue

Noise will be generated by:

- During construction, by waste material being transferred from the boxcut to Little Kintore Pit (LKP) and BHP Pit.
- During operations, by haul trucks delivering waste rock to Kintore Pit TSF3 for co-disposal with tailing, and Kintore Pit Tipple and BHP Pit for testing and use as rehabilitation capping once Pb content is confirmed to be <0.5%Pb.
- Paddock dumping of waste rock at the rehabilitation capping area.

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:-

- 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.
- Update of the Noise Management Plan.

4.5.2 Dust

Potential key issue

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

- Haul trucks delivering waste rock to the stockpiles in Kintore Pit tipple and BHP Pit.
- Truck loading and dumping of waste rock in pits and at rehabilitation capping areas.

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).
- 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.

4.5.3 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.

4.5.4 Geotechnical and Geochemical Characteristics

The design of rehabilitation capping will be completed by an experience engineer to provide the most appropriate structure and dumping method to minimise dust generation over time and address storm water management and acid mine drainage. In addition an assessment of the waste rock materials will be undertaken to provide a design that is safe, stable and non-polluting. Confirmation of the surface suitability and trafficability for the proposed waste rock placement activities will also be assessed.

Proposed Studies

- Assessment of long term geochemical degradation ie 100 to 500 years of waste rock used on surface coverings.
- Rehabilitation design report.

4.5.5 Rehabilitation

The waste material placement within LKP and BHP Pit will be capped with material containing <0.5% Pb and be shaped to align with the surrounding landform. Conceptual rehabilitation designs will be included in the EIS which will also 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.

4.6 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;
- Ensure continued employment of 186 full-time employees, 32 full-time contractors and indirectly over 200 casual contractors that provide specialist services when required;
- Engagement of approximately 20 contractors during construction and an additional 6 full time employees for operations
- Allows the filling of legacy open pits.
- Allow the resource to be fully utilised, and
- Allow BHOP to continue to support the sustainability and economy 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, Industry 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

AR	Annual Review required under PA07_0018
BHCC	Broken Hill City Council
BHOP	Broken Hill Operations Pty Ltd
CBH	CBH Resources Ltd
CML7	Consolidated Mine Lease 7
DOL	Dolerite
DPIE	NSW Department of Planning Industry and Environment
EA	Original Project Environment Assessment Report
EIS	Environment Impact Statement
EMR	Environment Management Report required annually under CML7
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
HMS	HMS Consulting Consultants Australia Pty Ltd
kg	kilogram
km	kilometres
kph	kilometres per hour
kW	kilowatts
kV	kilovolts
(l)	Long
L	litre
LEP	BHCC Local Environment Plan 2013
LKP	Little Kintore Pit
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
PA	Project Approval 07_0018
PM	Psammopelitic
PM10	Particulate matter with equivalent aerodynamic diameter of 10 micrometres
RR	NSW Division of Resources Regulator
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 tailing 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