

# **Rasp Mine**

Zinc – Lead – Silver Project

Project Approval No. 07-0018

## **Statement of Environmental Effects**

### **Modification 5**

### **Warehouse Extension, Cement Silo & Adjustment of Air Quality Monitoring**

August 2018

Broken Hill Operations Pty Ltd

BROKEN HILL



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## SUBMISSION OF ENVIRONMENTAL ASSESSMENT

This Statement of Environmental Effects (SEE) is prepared as required for a State Designated Development in accordance with the *Environmental Planning and Assessment Act 1979*

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### PROJECT APPROVAL MOD4

Applicant Name: Broken Hill Operations Pty Ltd  
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Proposed modification: Approval is sought to modify the Rasp Mine Project Approval 07\_0018 to install an extension to increase storage capacity at the Stores Warehouse located on Western Lands Lease 2638 and 2639, to install a cement silo at the Backfill Plant located within Consolidated Mine Lease 7 to allow the addition of cement in the material to fill underground voids and to adjust air quality monitoring requirements.

### ENVIRONMENTAL ASSESSMENT

*This document provides the environmental impact assessment and mitigation measures for this Modification.*

### CERTIFICATION

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

- It is in accordance with the Environmental Planning and Assessment Act 1979;*
- Contains all available information that is relevant to the environmental assessment of the activities to which this Modification SEE relates; and*
- The information contained in this Modification SEE is neither false nor misleading.*

Signature:

Name: Gwendalynn Wilson  
Group Manager – Safety Health Environment Community  
CBH Resources Ltd

Date: August 2018



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## EXECUTIVE SUMMARY

### OVERVIEW

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).

Mining has been undertaken within CML7 since 1885. The existing operations at the Rasp Mine Project include underground mining operations, a processing plant producing zinc and lead concentrate, a rail siding for concentrate dispatch and various supporting infrastructure. These operations are undertaken in accordance with Project Approval (PA07\_0018) 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 is seeking approval for a minor modification (MOD5) to the Project Approval to:

- Extend the current Stores Warehouse;
- Install a cement silo at the current Backfill Plant; and
- To adjust air quality monitoring requirements.

This Statement of Environmental Effects (SEE) supports this application and demonstrates that:

- There are no significant environmental key issues;
- There would be no additional land disturbance;
- Noise meets the construction guidelines, and
- Dust can be managed with current control measures.

### MODIFICATION DESCRIPTION AND REASON FOR MODIFICATION

The Stores Warehouse is located centrally and to the south of the Project Area and is separated from Eyre Street by large water tanks (not owned by BHOP). The proposed extension to the west of the facility would be 17 m by 12 m. A self-storage facility is located in Eyre Street opposite the proposed extension with residential housing on each side (114 m to 120 m). A small section of the extension would be visible from Eyre Street.

The proposed extension is required to house critical spares and stock items which are currently stored outside the Warehouse building. The proposed extension would provide better security and protection for these items.

The proposed cement silo would be located at the Backfill Plant, central and to the north of the Project Area. The cement silo would be situated near the Concrete Batching Plant which is surrounded by a noise abatement bund (6 m in height). These facilities, together with the Indian Pacific rail line and Broken Hill rail yards, separate the proposed silo from its nearest residential neighbours, located 355 meters (m) to the north. The Mt Hebbard historic tailings storage facility separates the silo from Broken Hill residents to the south.

The proposed cement silo would be 18 m in height and would be visible from the Café and Miners Memorial, both located on CML7 and some areas of Crystal Street. Annual cement consumption is expected to be approximately 5,000 t and would arrive in ISO containers, predominantly by rail however if rail is not available by road, and be transported on average 3 to 4 times per week to the silo on sealed roads. The proposed silo would store cement to be used in the material mix with tailing to fill underground voids created from mining. This would increase ore reserves that would otherwise be sterilized and would improve current mining grades and concentrate volumes.

Construction of the extension to the Warehouse would take approximately 4 weeks, and construction of the proposed cement silo would take approximately 3 weeks. Construction may occur concurrently and the recommended Interim Construction Noise Guideline (ICNG) would apply to construction activities - 7 am to 6 pm Monday to Friday, 8 am to 1 pm Saturdays and no construction works on Sundays or public holidays.



The air quality monitoring Point 6 (at Shaft 6), is no longer an exhaust airway for underground blast firings and is now a fresh air intake airway, therefore monitoring is no longer required. The Rasp Mine Environment Protection License states discharge criteria for the Crusher Baghouse Stack and for consistency BHOP request that Table 5 of the PA be updated.

**Table 1-1** provides a summary of the existing approved project components compared to the proposed modifications outlined in this SEE.

**Table 1-1 Comparison of Existing Approval and Proposed MOD6**

Component	Approved Rasp Mine	Proposed MOD5
Mine Life	15 years (includes construction and closure) from 2011 to 2026.	No change (mine life is based on the 'approval to mine' and not on the resource or reserve).
Tenement Status	CML7 – Incorporates the Rasp Mine. Western Lands Leases 2368 and 2369 – within original Project Area and held by BHOP, permitted use is for "Storage Purposes".	No change 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.
Mining Rate and Total Production	750 000 tpa ore. Total production over life of Project: Approximately 8,450,000 t	No change No change
Waste Rock Disposal	Underground: Backfill. Surface: Material (<0.5% Pb) to be used for road repair and bunding and rehabilitation at closure	No change
Underground Ventilation	2 x 450 kW primary fans located 160 m below ground and exhausting centrally within CML7, Point 1. 2 x 110 kW fans located 160 m below ground and exhausting centrally within CML7 at Shaft 6, Condition 4 Monitoring Point 6.	No change  To remove the requirement for air quality monitoring at Shaft 6 as this is now a fresh air intake airway.
Processing Methods	Crushing, grinding, flotation, thickening and filtration at on-site processing facilities.	No change to operations. Discharge criteria to be added for the Crusher Baghouse Stack.
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 (via Backfill Plant) and finer stream to be directed to TSF1 (capacity of 960,000 t) and/or TSF2 (capacity 3.12 Mt)	No change
Facilities	Other associated facilities such as Backfill Plant, Concrete Batching Plant, Rail Loadout, Warehouse, core preparation and storage and workshops.	Installation of a cement silo at the backfill Plant and extension of the Stores Warehouse.
Services	Extensions to existing substations, water lines and phone lines. New 22kV overhead power lines to be constructed.	No change
Water Supply / Extraction	Potable / treated water 9 ML/a Raw untreated water 139 ML/a	No change



Component	Approved Rasp Mine	Proposed MOD5
	Reclaimed / recycled water 300 ML/a Extraction up to 390 ML/a.	
External Roads	No changes to external road network.	No change.
Employment Numbers	Full Production: 150	Current numbers are: Employees: 225 <sup>1</sup> Not effected by MOD5 Contractors: 35
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
Disturbance Footprint	CML7 consists of 342.66 Ha Current land disturbance due to Rasp Mine activities is 28.6 Ha (MOD4).	No change

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

## 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 of the EP&A Act, the Rasp Mine Project has been transitioned to a 'State Designated Development'. This Modification is considered minor as there is minimal environmental impact and it is consistent with the original development application, therefore, the application for this Modification is made pursuant to Section 4.55(1A) of the EP&A Act. This Statement of Environmental Effects (SEE) supports the application.

## 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. 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, along with commercial and some residential properties.

The proposed Warehouse extension would be located on already disturbed land currently used for delivery vehicle access, no vegetation would be disturbed. Heritage items are located approximately 20 m from the extension and would not be impacted. There would be no change to the traffic route of current deliveries.

The proposed cement silo would be located on already disturbed land currently used for parking at the Backfill Plant, no vegetation would be disturbed. There are no heritage items located in this area.



## IMPACTS, MANAGEMENT AND MITIGATION

The proposed MOD5 has the potential to result in minor impacts to a number of environmental aspects; noise, air quality, transport and visual amenity to those already approved. The level of environmental risks associated with these potential impacts was assessed as not significant. The following provides a summary of the risks and mitigation measures as identified by BHOP. Although no formal Environmental Assessment Requirements were issued by the Department of Planning and Environment (DPE) for the MOD5, the key areas for consideration were provided and are addressed in this SEE – noise and vibration, air quality and dust, and community consultation.

### **Noise and Vibration**

During site preparation and construction for MOD5 projects some additional noise would be generated by earthworks and the erection of the facilities. The Stores Warehouse extension and the silo would be fabricated off-site. Construction activities, including site preparation would occur over a period of approximately 4 weeks. To manage potential noise impacts, construction activities would be restricted to construction hours (ICNG) and all vehicles used in construction would have 'squawker' type reversing beepers. In addition the 6 m noise abatement bund, installed as part of the Concrete Batching Plant (MOD4), would mitigate noise from the installation of the cement silo.

BHOP engaged EMM Consulting Pty Ltd (EMM) to conduct a noise and vibration assessment for construction works, a conservative approach was taken with both installations constructed concurrently and all equipment in use. EMM concluded that *"Modelling has shown that construction noise levels from proposed construction works are predicted to satisfy the ICNG noise management levels during standard hours at all assessment locations. Vibration levels from the proposed construction works are unlikely to cause adverse human response or cosmetic damage at the nearest residences and commercial premises."*

There would be no additional noise impacts during operation of the Warehouse extension.

In the operation of the cement silo noise would be generated by the transfer of cement from the ISO container to the silo (via compressed air or a blower, to occur on day shift only) and from the silo to the mixing tank (via electric motor, to occur anytime), motors would be enclosed. The 6 m high noise abatement bund, installed for the Concrete Batching Plant, would assist in mitigating noise from the operation of the silo. This would be verified during annual independent noise monitoring following commissioning. Noise would also result from the additional traffic movements transporting the cement from the rail / site entrance to the silo, these movements are minor (3 to 4 internal traffic movements per week, up to 10 additional external road movements per annum, 4 additional train movements per annum) all are within current traffic flow variations. The majority of internal truck movements are behind noise abatement bunding.

### **Air Quality**

There is the potential for dust to be generated during earthworks at each of the project sites. During construction dust would be managed with the use of water sprays (in-situ at the Warehouse, mobile at the cement silo) and a water truck. In addition prior to excavation the area and material would be watered down.

There would be no additional air quality impacts from the use of the proposed Warehouse extension.

In the operation of the cement silo there is potential for dust generation from the transfer of cement to the silo and from transfer of cement into the mixing tank. Cement would be transferred to the silo via an air compressor or blower attached to tubing from the ISO container to the bottom of the silo where the cement would be discharged internally. A filter would be fitted to the silo outlet to capture any dust during venting. Transferring of cement through the screw conveyor to the mixing tank will be directed through a pipe which is attached to the cover of the tank. Both operations are fully enclosed.



**Visual Amenity**

The proposed extension to the Warehouse would be 2 m lower than the current Warehouse building with only a small section of the roofline visible to Eyre Street. The extension would be consistent with other buildings in the area and no additional mitigation measures are proposed.

The proposed cement silo would be 18 m in height and although it is set back 50 m from the current 6 m noise abatement bund will be visible from Crystal Street. However it is consistent with other mining infrastructure in the area.

**Transport**

During construction additional heavy vehicle movements would occur with the delivery of prefabricated infrastructure and cranes (5), these are within the current variation of traffic movements in Eyre Street. During operation of the cement silo there would be an increase of 3 to 4 internal truck movements per week to transport cement from the Rail Loadout, these would be within the normal internal traffic variations and are unlikely to be discernible. On rare occasions cement may be transported by road, a conservative assessment of five percent of all deliveries has been used for the impact assessment which would equate to an additional ten vehicles per annum. This increase is within the normal variation of heavy vehicle traffic on Eyre Street. Rail movements would also increase with the cement ISO containers displacing concentrate containers resulting in up to 4 additional train movements per annum, again it is unlikely that these would be discernible with the current level of train movements per annum (42 train movements July to June 2017/18).

**Other Potential Impacts**

Other potential environmental impacts that were considered included:

- Heritage – the closest heritage items are located 18 m from the Warehouse extension and will not be impacted.
- Land disturbance – there would be no addition to the current land disturbance footprint and no vegetation is required to be removed for these modifications.
- Rehabilitation – the Warehouse extension is located on a Western Lands Lease and at mine closure if no other purpose can be identified for this structure it would be demolished, the cement silo located on CML7 would be demolished at mine closure along with other infrastructure in the area.

**BENEFITS OF MODIFICATIONS**

The proposed minor Modification would result in a range of benefits these include:

- Security for critical spares and stock items currently stored unsecured outdoors;
- Improve resource recovery of high grade pillars that would not be able to be mined safely without the use of cement in the backfill;
- Increase current ore reserves that would otherwise be sterilized and improve mining grades and concentrate volumes;
- Improve safety of underground fill, and
- Gain consistency between government agencies in regards to air quality monitoring.



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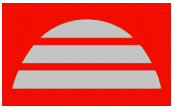


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Appendix B	MOD5 Community Consultation Information Paper, BHOP, July 2018
Appendix C	MOD5 Community Consultation – Summary Report, BHOP, August 2018
Appendix D	MOD5 Key Issues for Consideration, DPE – Email 23 July 2018
Appendix E	Rasp Mine Modification 5 - Construction noise and vibration assessment, EMM Consulting Pty Ltd, 31 July 2018



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## 1.0 BACKGROUND

*This Section provides an introduction to the Rasp Mine Project, the proponent, consultation undertaken and regulator requirements for assessment. It summarises the Modification, its benefits and provides a consideration of alternative options.*

### 1.1 introduction

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 it dispatches via rail to Port Pirie in South Australia and Newcastle in New South Wales.

The Mine is located centrally within the City of Broken Hill and is surrounded by transport infrastructure, areas of commercial and industrial development and some residential housing. The Mine is bounded by Eyre Street and Holten Drive to the south and east, Perilya's Broken Hill North Mine to the east and South Mine to the west, and the commercial centre of Broken Hill to the north. The Mine site is dissected by two major State roads, including South Road (Silver City Highway SH22) to the southwest and Menindee Road (MR66) to the northeast. The Broken Hill railway station is located directly to the north of the Mine and lies on the main Sydney – Perth railway line. Residential and commercial areas surround the Mine with pasture land to the southeast, **Figure 1-1**.

The land within CML7 has several surface exclusion zones, which contain rail lines and stock yards to the north, along with commercial and some residential properties.

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

### 1.2 Project and Proposed Modification

The Rasp Underground Lead-Zinc-Silver Mine Project (07\_0018) (the Project) was declared a Major Project under the State Environment Planning Policy (SEPP) *Major Development 2005* (now repealed) requiring the approval of the then NSW Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Approval was granted on 31 January 2011 for underground mining, the construction and operation of a processing plant to produce lead and zinc concentrates and a rail siding for concentrate dispatch. The Project Approval (PA) has subsequently been modified on four occasions:

- MOD1: to accommodate the relocation of the main ventilation shaft;
- MOD2: to allow crushing of ore to occur at any time;
- MOD3: to extend underground mining into Block 7; and
- MOD4: to install a Concrete Batching Plant and three embankments and a retaining wall at Blackwood Pit Tailings Storage Facility (TSF2).

BHOP seeks a minor modification to its Project Approval to extend the current Stores Warehouse, install a cement silo at the Backfill Plant and adjust air quality monitoring requirements. The level of environmental assessment completed for this Modification is considered appropriate given that the Modification is of minimal environment impact and the activities are consistent with mining operations as proposed in the original Environment Assessment (EA), refer **Section 3.2**. Following repeal of Part 3A and Section 75W (transition provision) of the EP&A Act, the Rasp Mine Project has been transitioned to a State Significant Development (SSD) and MOD5 would be considered under the assessment pathway for SSD. This Statement of Environmental Effects (SEE) supports the application.

All activities for the proposed Modification 5 (MOD5) would be located on land previously disturbed by historic mining operations, there would be no addition to the current land disturbance footprint and no





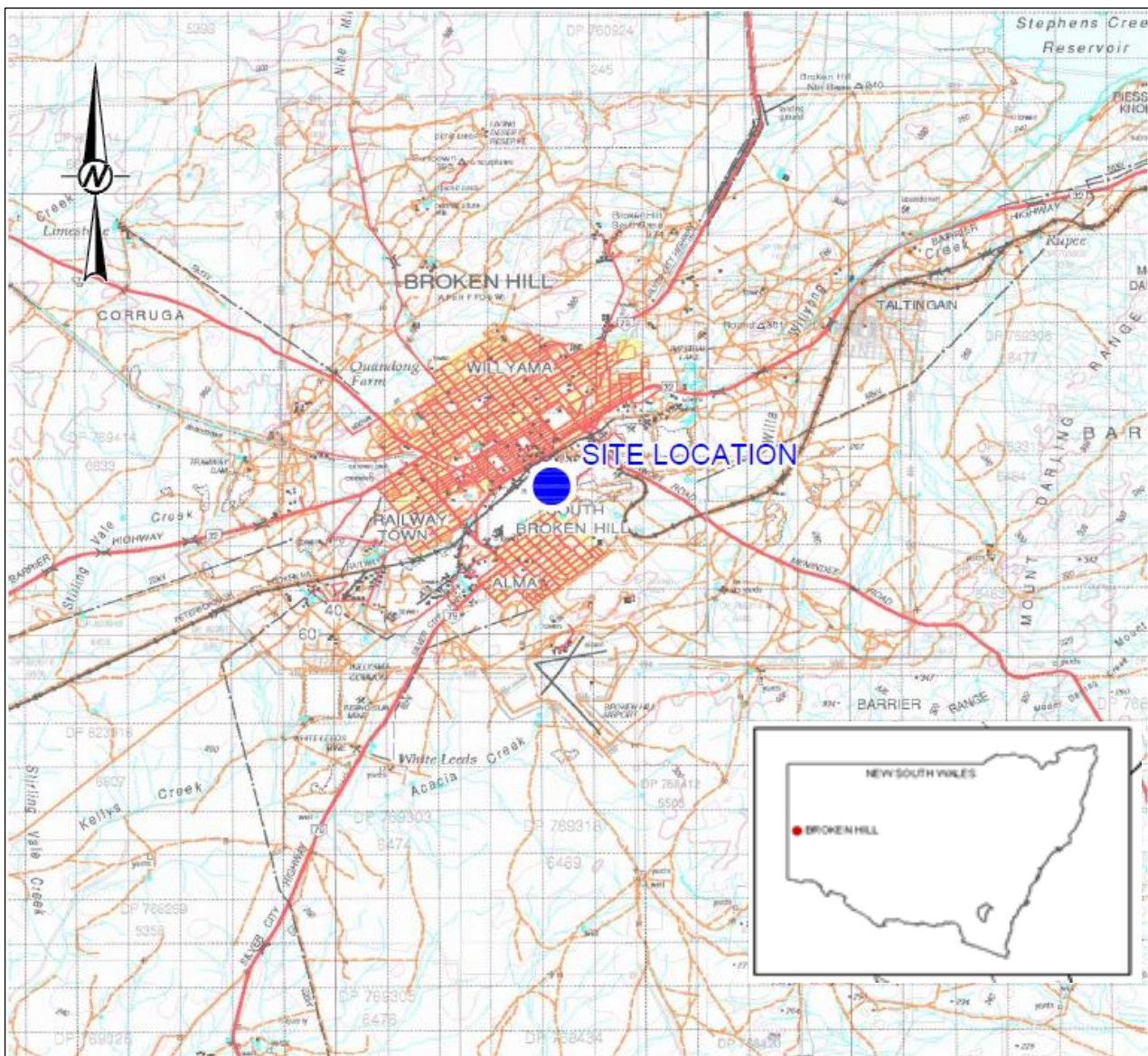
vegetation is required to be removed, **Figure 1-2**. The new surface structures would be consistent with current mining infrastructure.

Summary of proposed MOD5:

- Extend the current Stores Warehouse;
- Install a cement silo at the current Backfill Plant; and
- Adjust air quality monitoring.

The modifications lay within the Project Area as outlined in the original EA with the Stores Warehouse located on Western Lands Leases 2638 and 2639, the cement silo Shaft 6 and Crusher Baghouse Stack located on Consolidate Mine Lease 7. Lease details are provided in **Table 2.4** and copies are provided at **Appendix A**.

**Figure 1-1 Locality Map**







### 1.3 Reason for the Proposed Modification

#### ***Warehouse Extension***

An additional area is required to securely store critical spares and stock items as some items are currently required to be stored outside the Warehouse, which is not practical for long term storage. The proposed extension would provide secure storage for these items and protection against inclement weather conditions.

#### ***Cement Silo***

The proposed silo would enable the use of cement in the material mix with tailing to fill underground voids that remain after ore extraction. This would provide additional strength to the mix allowing ore reserves to be increased that would otherwise be sterilized improving ore grades and concentrate volumes. Thus by using cement in the backfill we can retrieve pillars that would otherwise be left in situ. This has no impact on the ore resource however the reserve (ie economically mineable ore) increases. The reserve is that part of the resource that is economically feasible to mine in the foreseeable future, and is dependent on metal price and mining methods; it is subject to change over the life of a mine.

#### ***Air Quality Monitoring Adjustment***

Shaft 6 is no longer used as an exhaust vent and no longer requires air quality monitoring. BHOP also seeks to include discharge criteria for the Crusher Baghouse Stack in Table 5 of the PA.

### 1.4 Alternatives to the Proposed Modification

#### **1.4.1 Stores Warehouse Extension**

An investigation was undertaken for the use of a number of existing site buildings, however, none proved to be suitable:

- The historic Changehouse at Thompsons Shaft heritage item I299 on the Broken Hill City Council (BHCC) Local Environment Plan 2013 (LEP) was considered as it was of sufficient size for the purpose. Investigations found that the building required a new roof to ensure safety for personnel and protect stored items. It was also located some distance (2 km) from the current Stores Warehouse and would require additional personnel to operate the facility.
- A number of smaller buildings were considered in and around the historic precinct of Shaft 7. Upon investigation it was found that forklift access was restricted and there were concerns for personnel with exposure to asbestos sheeting used in some of the buildings construction.
- An area within the current workshop was also considered, however, there were concerns in isolating the items as store stock and lack of security. The distance of this location from the current Stores Warehouse would also require additional personnel.

#### **1.4.2 Cement Silo**

The alternatives for suitable binders is outlined in **Section 5.2.6**, all considered binding agents have a percentage of cement content. The alternative to binding and strengthening the tailing is to use tailing only as backfill. This would result in some ore not being able to be mined safely and therefore could not to mined and would be left in-situ. Without the use of a binder these sections of the orebody would be sterilised.

### 1.5 Consultation

Discussions regarding the proposed MOD5 have been undertaken with the BHCC, Division of Resources and Geoscience (DRG), the Environment Protection Authority (EPA) and Department of Planning and Environment (DPE). None of these government agencies have raised any additional key issues to be





Figure 1-2 Location of Warehouse Extension and Cement Silo







addressed in the environment assessment, from those already identified and considered in the risk section of this SEE. **Table 1-1** provides a summary of the outcomes of these discussions.

Consultation was also undertaken with local community members in the vicinity of the proposed projects. BHOP personnel conducted a doorknock campaign along a section of Eyre Street (Warehouse extension) and Crystal Street (cement silo) outlining the proposed projects and seeking feedback. An information paper was also provided, **Appendix B**. There were no issues raised in relation to the proposed projects for MOD5. **Appendix C** provides a report detailing this community consultation.

## 1.6 Agency Requirements for Environment Assessment

BHOP consulted with several government agencies in the preparation of this SEE and the following issues were identified to be addressed in the environment assessment for this Modification. These requirements, and the section in the SEE where they are addressed, are summarised in **Table 1-1**.

**Table 1-1 Summary of Agency Requirements**

Government Agency	Issues Identified	Response in SEE
BHCC Meeting: 25 June 2018	The BHCC does not have any initial concerns with the proposed projects 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.	Section 5.2.1 Noise and Appendix E Section 5.2.2 Air Quality Section 5.2.3 Heritage Section 5.2.4 Visual Amenity
EPA Meeting: 27 June 2018  Email 10/8	No additional issues were raised. Need to address noise and dust issues. Due to the short construction timeframe the use of construction noise guidelines should be sufficient. Need to provide details on the size and location of silos. Recommend including the silo filter in the relevant air quality monitoring maintenance program.	Sections 5.2.1 and 5.2.2 Section 4.2.2  Section 5.2.2
DPE Meeting: 28 June 2018	No issues were raised. Due to legislative changes BHOP need to wait to submit modification until Project is recognised as a State Significant Development. (Also refer Table 1-3).	Section 3.2.1
DRG Meeting: 29 June 2018	No issues were raised. MOP would require amendment.	Section 3.2.2 Table 3-1

The DPE also provided (by email 23 July 2018, **Appendix D**) key areas for consideration by the Department for the assessment of the Modification. These are listed in **Table 1-2**.

**Table 1-2 Key Considerations by DPE for Assessment of MOD5**

Government Agency	Key Area	Response in SEE
Email: 23 July 2018 Appendix D	Noise and vibration: construction of the stores extension and cement silo are classified as construction activities. The SEE should include an assessment of the likely construction noise impacts of these activities under the <i>Interim Construction Noise Guideline</i> and be developed in consultation with the EPA.	Sections 5.1 and 5.2.1
	Air quality and dust: include detailed management measures that would be used to prevent generation of dust and exceedances of particulate matter and diesel emissions resulting from the modification activities. The measures proposed and presented in the SEE should be developed in consultation with the EPA.	Sections 5.1 and 5.2.2
	Consultation: the local community as well as the relevant agencies should be informed about the proposed modification, and evidence of consultation documented in the SEE.	Section 1.5 Table 1-1 Appendix C



## 1.7 Document Purpose and Structure

This Statement of Environmental Effects (SEE) has been prepared to support the Project Approval Modification Application, which will be lodged with the DPE for determination by the Minister for Planning (or delegate). A description of the activities proposed in this Modification Application (MOD5) is provided in **Section 4** of this SEE. The Modification sought is otherwise consistent with the BHOP original EA, Preferred Project Report (PPR) and PA 07\_0018 (as Modified). The schedule of land to which this SEE applies is also consistent with the BHOP EA, PPR and PA 07\_0018.

The Executive Summary provides an overview of the proposed modification and the potential impacts and mitigation measures. The following sections of the SEE include:

- Section 1 -** Introduction and details of the proponent, consultation and regulator requirements for assessment, summarises the Modification, its benefits and alternatives;
- Section 2 -** Details the existing approved operations at BHOP;
- Section 3 -** Discusses the regulatory framework relevant to the Modification;
- Section 4 -** Provides a description of the Modification its location and surrounding land users, its construction and operation;
- Section 5 -** Summarises the potential environmental issues for the proposed Modification and their mitigation measures;
- Section 6 -** Lists management commitments to be implemented as a result of the Modification;
- Section 7 -** Outlines the conclusion and provides a justification for the Modification as sought;
- Section 8 -** Provides a list of abbreviations referenced in this SEE.



## 2.0 EXISTING OPERATIONS

*This section provides detail on the existing approved operations at BHOP including land tenure and ownership, consents and licences and operations.*

### 2.1 Project Approval

#### 2.1.1 Environment Assessment and Preferred Project Report

##### 2.1.1.1 Environmental Assessment

An *Environmental Assessment* (EA) (BHOP, July 2010) supported the Project application for the original Rasp Underground Lead-Zinc-Silver Mine Project (07\_0018) and described the following elements of the Project:

- Mining of 8,450,000 t of ore until 31 December 2026;
- Construction and/or extension of associated infrastructure, plant and equipment, including upgrade of internal roads and construction of an on-site noise abatement barrier;
- Transport of ore to the surface in haul trucks;
- Ore processing using crushing, milling and flotation;
- Tailings management, to be deposited into Blackwood Pit (TSF2), and used as back fill for underground mining voids (this has yet to be implemented);
- Works for surface water management; and
- Construction of a rail siding and transport of concentrate in covered rail wagons to a smelter and/or port.

##### 2.1.1.2 Preferred Project Report

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

These amendments involved:

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

#### 2.1.2 Approved Project and Current Mining Activities

On 31 January 2011 the Project Approval (07\_0018) for the Rasp Underground Lead-Zinc-Silver Mine Project was granted under Part 3A of the EP&A Act. The key features of the Rasp Mine are provided in **Table 2-1**.

**Table 2-1 Key Features of the Rasp Mine**

Item	Description
Mine life	15 years to 31 December 2026
Tenement status	CML7 – Incorporates the Rasp Mine.
Mining methodology	Underground mining using various methods including long-hole open stoping (benching, uphole retreat and modified Avoca), room and pillar or cut and fill.



Item	Description
Mining Area	Western Mineralisation, Centenary Mineralisation, Main Lode Pillars (Blocks 8 to 12)
Mining rate and total production	750,000 tpa ore.
Total production over life of Project:	Approximately 8,450,000 t
Waste rock disposal	Underground: Backfill Surface: Inert material to be used for road repair and bunding and rehabilitation at closure
Processing methodology	Crushing, grinding, flotation, thickening and filtration at on-site processing facilities.
Processing rates	250 tph in crushing plant and 93.8 tph in grinding plant.
Concentrate production	Lead: 44,000 tpa (concentrate 73% Pb and 985 g/t Ag) Zinc: 87,000 tpa (concentrate 50% Zn)
Tailings disposal	Tailings disposal to TSF2 Blackwood Pit and to be used as backfill in underground stopes. Provision for some tailings to go underground as backfill over the next 4 to 5 years.
Services	Extensions to existing substations, water lines and phone lines. 22kV overhead power lines.

All mining extraction is conducted underground. Current mining activities extend between and include Blocks 7-12 in the old Main Lode orebody (comprising 2 and 3 lens material and includes the Zinc Lodes) and the Western Mineralisation orebody. The Main Lode has been mined since the late 1800's and BHOP now conducts remnant mining in these areas to extract pillars and narrow remnants that have been left over the course of 100 years of mining. In addition, this Main Lode ore is supplemented by mining of the Zinc Lodes on the southern boundary of CML7 and bulk mining of the medium grade Western Mineralisation. Production rates are currently approximately 720,000 t per annum which is a combination of the above three separate mining lodes.

BHOP is currently serviced by surface facilities including administration offices, washhouse and change rooms, electrical and maintenance workshops, laboratory, stores facilities, core work and storage, crusher plant, processing plant and rail siding facilities. A Concrete Batching Plant is currently being installed with commissioning planned for mid-August and work will commence later in the year on construction of Embankment 2 at the north-east end of Blackwood Pit TSF2.

### 2.1.3 Project Approval Modifications

Since approval of the Project, four separate Modifications to the original Project Approval have been approved. The nature of these modifications is described in **Table 2-2**.

**Table 2-2 Rasp Mine Project Summary of Approval Modifications**

Modification	Purpose	Date Approved
MOD1	Relocation of the ventilation shaft and installation of the ventilation fans underground.	16 March 2012
MOD2	Allow crusher to be operated at any time (24 hours per day 7 days per week).	29 August 2014
MOD3	Extension of underground mining to include Block 7 (also included the Zinc Lodes).	17 March 2015
MOD4	Installation of a Concrete Batching Plant Construction of three embankments and a retaining wall at Blackwood Pit TSF2	4 September 2017

## 2.2 Current Consents, Authorisations and Licences

### 2.2.1 Current Consents

**Table 2-3** lists the consents held by BHOP for the Rasp Mine Project.

**Table 2-3 Development Consents**

Approval	Date Issued	Duration	Purpose
DA 125/2001	5 Sept 2002	Work completed	Surface drilling on CML7 in surface exclusion zone (near rail), supported by a Statement of Environmental Effects (SEE).
MOP 06/6463	26 Oct 2006	31 Aug 2008	Construct exploration decline, conduct drilling and obtain bulk sample.
DA 101/2007	26 April 2007	Work completed	Undertake temporary mining in the Kintore Pit, supported by a SEE.
MOP 06/6436 Amendment	5 May 2008	31 Oct 2008	Extend the exploration decline.
MOP 06/6463	1 Sept 2009	31 Dec 2010 Extended to 31 March 2011 Works not undertaken	For underground mining and stockpiling 120,000 of ore to be transported to Endeavor for processing, supported by a REF.
DA 264/2009	19 Jan 2010	2 Feb 2011	For ancillary surface mining activities including crushing, stockpiling and transport of ore, supported by a SEE.
PA 07_0018 (Part 3A)	31 Jan 2011	31 Dec 2026	Mining production of 750,000 tpa from Western Mineralisation, Centenary Mineralisation and Main Lode Pillars. Construction and operation of a minerals processing plant and rail loadout facility. Supported by an Environmental Assessment (EA).
MOP 06/6483	1 April 2011	31 Mar 2014 Extended to 31 Oct 2014	Mining production of 750,000 tpa from Western Mineralisation, Centenary Mineralisation and Main Lode Pillars. Construction and operation of a minerals processing plant and rail loadout facility.
PA 07_0018 MOD 1	16 March 2012	31 Dec 2026	Relocation of ventilation shaft.
MOP 06/6463	30 March 2012	31 Mar 2014 Extended to Jun 2014, Aug 2014, Oct 2014	Relocation of ventilation shaft.
PA 07_0018 MOD 2	29 August 2014	31 Dec 2026	Allow 24 hour crusher operation.
MOP 06/6463	Nov 2014	Oct 2015	New MOP for underground mining, ore processing and dispatch of concentrates, including ancillary activities.
PA 07_0018 MOD3	17 March 2015	31 Dec 2026	Extension of underground mining to include all of Block 7 and the Zinc Lodes.
MOP 06/6463 Amendment	March 2015	Oct 2015	Extension to allow MOD4 to be incorporated into new MOP.
PA 07_0018 MOD3	4 Sept 2017	31 Dec 2026	To allow the installation of a Concrete Batching Plant and construction of embankments and a retaining wall for Blackwood Pit TSF2.
MOP 06/6463	Nov 2015	30 Sept 2017	New MOP for underground mining, ore processing and dispatch of concentrates, including ancillary activities, Concrete Batching Plant and Blackwood Pit TSF2 embankments and retaining wall.
Dam Safety Committee	9 Dec 2017	-	Endorsement for Blackwood Pit TSF2 extension design for embankments and retaining wall, conform to DSC requirements.
MOP 06/6463	1 Oct 2017	30 Sept 2019	New MOP for underground mining, ore processing and dispatch of concentrates, including ancillary activities.

### 2.2.2 Placement of Backfill Underground

The placement of backfill underground was included in the original EA including the addition of some form of binder, the exact combination of materials was unknown at the time of the EA however, all recommended binders used cement. The Backfill Plant was constructed however it was not commissioned. Plans are underway to commission the Plant late 2018. No material has been placed underground due to the need to use excess waste rock from underground workings to fill underground voids. Chapter 2 Section 2.7 of the original EA provided an overview of the Backfill Plant indicating that some mix in the tailing material would be required:

*“The back fill plant will consist of cyclones to split the tailings feed. The coarser underflow stream from the cyclones will be **mixed with suitable materials** and redirected underground to use as stope fill. The finer overflow (slimes) will be directed to a high rate thickener, allowing thickened slimes to be sent to the TSF1 or TSF2.”*



The suitable materials were provided by Golder who conducted a laboratory analysis for the use of binders to enhance the strength of the tailing was provided in the *Report on Laboratory Evaluation of Rasp Mine Tailing for Use as Hydraulic Backfill*, Golder Associates February 2008 Appendix B, of Annexure F – *Tailings Storage Facility Feasibility Study*, Golder Associates, February 2010. Section 6 of this Report provided a summary of the analysis of various binder combinations all included cement:

- 1 5% application with Type 10 Normal Portland Cement (NPC)
- 2 5% application with 70% NPC and 30% C1 Fly Ash
- 3 5% application with 10% NPC and 90% Blast Furnace Slag (BFS)

Golder concluded that a binder mix was required to enhance the strength of the cyclone underflow tailing. Testing indicated that Combination Three (10% NPC / 90 % BFS) proved the best in strength and further testing showed a mix of 4% slag/cement application could be used.

### 2.2.3 Leases

**Table 2-4** presents the mineral authorities held by BHOP for the Mine. For the purposes of this document, the area covered by CML7 and MPLs 183, 184, 185 and 186 within the surface area rights of BHOP, is referred to as the Rasp Mine which also includes various Western Land Leases and properties owned by BHOP.

**Table 2-4 Mineral Authorities and Leases**

Mineral Authority / Lease	Grant Date	Last Renewed	Renewal Date	Purpose
CML7	8 Oct 1987	17 Apr 2007	31 Dec 2026	As per Schedule 2 of the Lease - Open cutting, shaft sinking, stoping, tunnelling, building of dams, extraction and obtaining minerals, generation of electricity, erecting dwellings, storage of fuels, dumping of ore, treatment and dumping of tailing, development of roads
MPL 183	4 Feb 1981	24 Apr 2007	31 Dec 2026	Dumping of ore and mine residues, treatment of tailing
MPL 184	4 Feb 1981	24 Apr 2007	31 Dec 2026	Dumping of ore and mine residues, treatment of tailing
MPL 185	4 Feb 1981	24 Apr 2007	31 Dec 2026	Dumping of ore and mine residues, treatment of tailing
MPL 186	4 Feb 1981	24 Apr 2007	31 Dec 2026	Dumping of ore and mine residues, treatment of tailing
WLL 2547	15 Jan 1913	14 Jun 1973	In perpetuity	Storage and erection of machinery.
WLL 2638	13 May 1914	14 Jun 1973	In perpetuity	Storage purposes.
WLL 2639	13 May 1914	14 Jun 1973	In perpetuity	Storage purposes.
WLL 2649	8 Jul 1914	14 Jun 1973	In perpetuity	Storage and erection of machinery.
WLL 2650	8 Jul 1914	14 Jun 1973	In perpetuity	Storage and erection of machinery.
WLL 3183	1 Jan 1925	14 Jun 1973	In perpetuity	Storage and erection of machinery.

This modification applies to CML7 (cement silo and Shaft 6) and WLL 2638 and 2639 and will have no impact on any of the other MPLs or WLLs listed. Copies of CML7 and WLLs 2638 and 2639 are appended at **Appendix A**.

### 2.2.4 Licences/Permits

**Table 2-5** presents the licences held by BHOP in relation to the Mine.

**Table 2-5 Licences / Permits Held**

Licence / Permit	Issued By	Date of Expiry/ Renewal	Purpose
EPL 12559	EPA	Upon surrender, suspension or revocation.	Authorises the carrying out of scheduled activities: Crushing , grinding or separating >500,000 – 2,000,000T processed. Mining for minerals >500,000 – 2,000,000T produced.





Licence / Permit	Issued By	Date of Expiry/ Renewal	Purpose
Dangerous Goods Explosives	Work Cover	24 Oct 2022	Store and Manufacture
Refrigerant	Refrigerant Trading Council	7 Jan 2019	Use of refrigerant
Water extraction 85WA752823	DPI-Water	29 Mar 2027	To extract 370 ML for use on site or to send to Perilya Broken Hill Operations Pty Ltd.
Radiation	EPA	26 Jul 2018	Sell and/or possess radiation apparatus. Sell and/or possess radioactive or items containing radioactive substances.

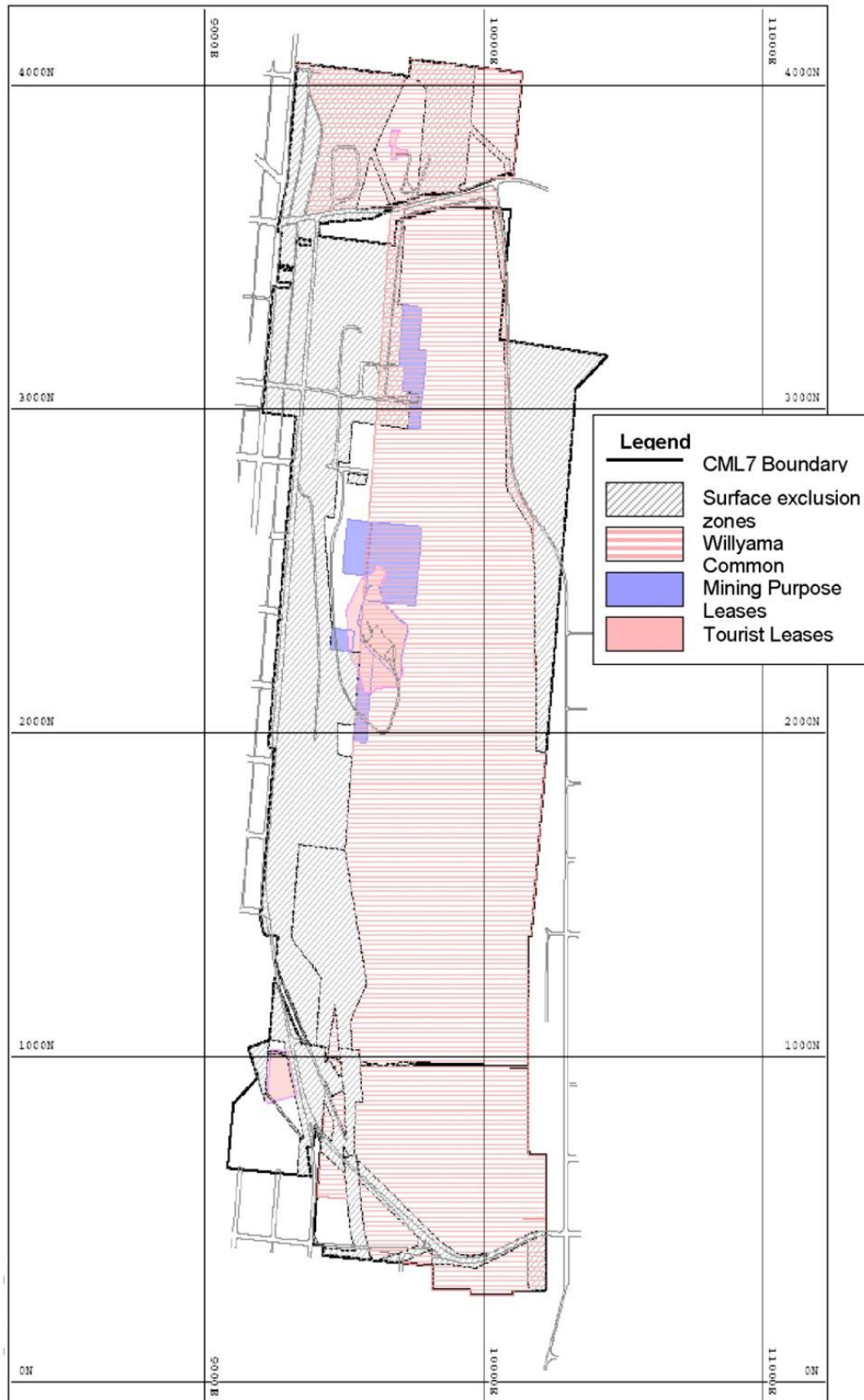
## 2.3 Land Ownership

The majority of the land on which the CML7 and MPLs are located is designated as "WILLYAMA COMMON Reserve 2421" (refer to **Figure 2-1**). The Lease was originally gazetted on 4th September 1886. Only a small portion of the Lease area is freehold and this land is identified in Certificate of Title 4635/757298. The land within CML7 upon which BHOP has surface rights is leased from the Crown through a series of Mining and Western Land Leases, with the exception of one freehold block (Block 10) located towards the centre of CML7.

All activities associated with this Modification would be located on CML7 and within Willyama Common or on WLL held by BHOP and leased from the Crown.



Figure 2-1 Consolidated Mine Lease 7





## 3.0 REGULATORY FRAMEWORK

*This section discusses the regulatory framework relevant under which the Rasp Mine is approved to operate relevant to the Modification.*

### 3.1 Commonwealth Legislation - Environmental Protection

#### 3.1.1 Environmental Protection and Biodiversity and Biodiversity *Conservation Act* 1999 (EPBC Act)

##### 3.1.1.1 Controlled Actions

The proposed Modification is not considered a 'controlled action' as it is consistent with the original Project Approval, is unlikely to impact matters of National Environmental Significance (NES) as listed in the EPBC Act and would not impact water resources. Therefore the proposed Modification does not require referral to the Commonwealth.

##### 3.1.1.2 Heritage

Pursuant to Section 324JJ of the EPBC Act, the entire city area of Broken Hill was listed on the National Heritage List (ID 105861) in January 2015, primarily for the geological significance of the ore body, its mining history and technical achievements, the area is protected under the Act.

*"The City of Broken Hill has outstanding significance to the nation for its role in creating enormous wealth, for its long, enduring and continuing mining operations, and the community's deep and shared connection with Broken Hill as the isolated city of the desert, its outback landscape, the planned design and landscaping of the town, the regeneration areas and particularly the physical reminders of its mining origins such as the Line of Lode, the barren mullock heaps, tailings, skimps and slagheap escarpment and relict structures. It exhibits historic qualities in its ongoing mining operations since 1883, the current and relict mining infrastructure and its landscape setting. ...*

*It has significance as a place where outstanding technical achievement has occurred in refining ore for its minerals including the froth flotation process and the computer controlled on-stream analysis of slurries. ...*

*The Broken Hill zinc-lead-silver ore deposit is one of the world's largest ore bodies and contains an extraordinary array of minerals. It is geologically complex and has national scientific significance. ..."*

The national listed boundary comprises the whole of the Broken Hill City Council local government area, depicted in **Figure 3-1** and encompasses the whole of the Project Area.

BHOP does not consider a referral to the Commonwealth for environmental assessment is required for this Modification as it would be unlikely to have a significant impact on any of the matters of environmental significance; no heritage items will be impacted and the activities associated with the Modification are consistent with mining processes.

### 3.2 NSW Legislation –

#### 3.2.1 Environment Planning and Assessment Act 1979

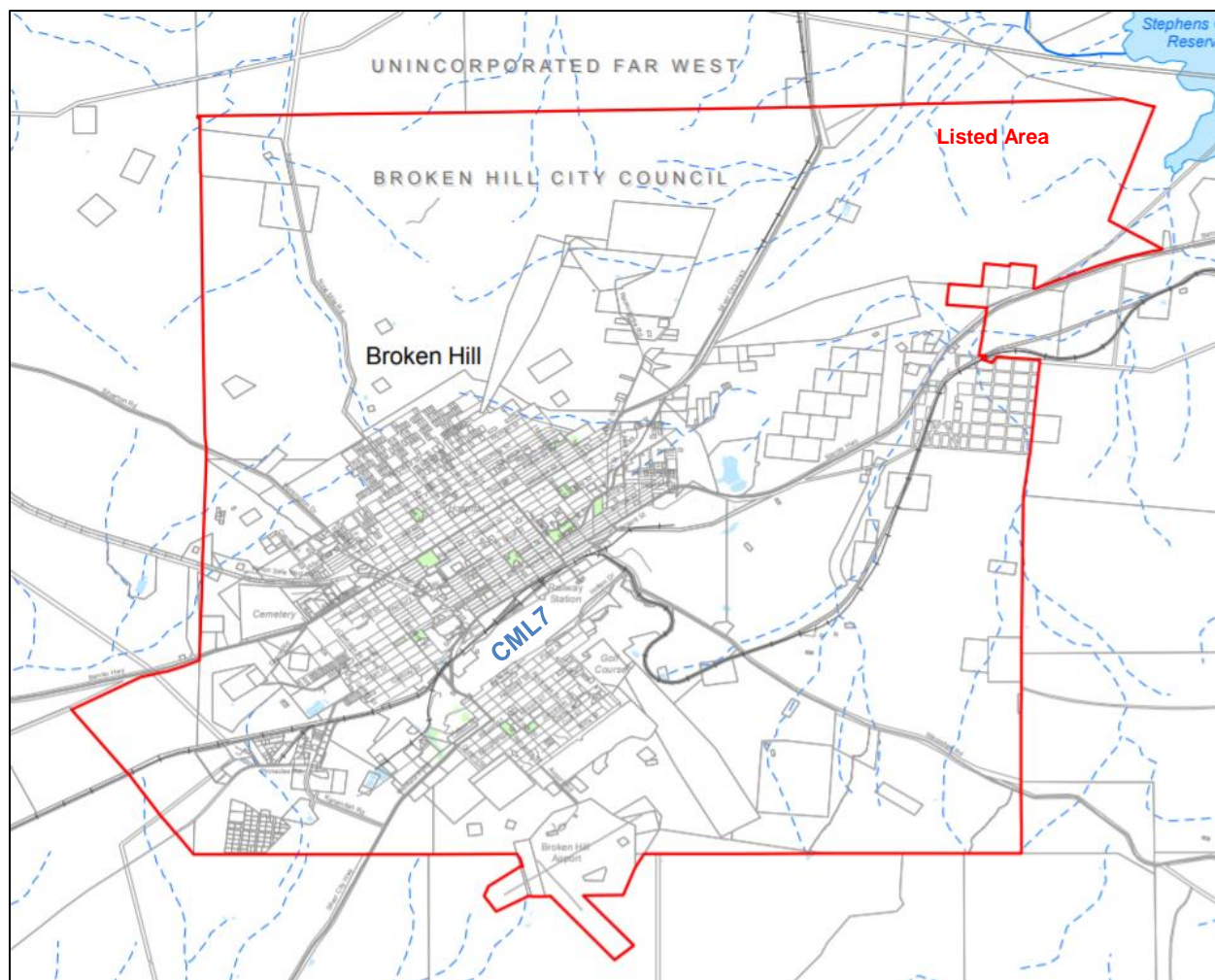
The Project was declared a Major Project under the SEPP *Major Development 2005* (now repealed) and was approved in January 2011 by the then NSW Minister for the Department of Planning and Infrastructure under Part 3A of the EP&A Act. With the repeal of Part 3A of the Act and the transitional arrangements under Section 75W, the Project has been transitioned to a State significant Development.

This Modification application is made under Section 4.55 of the EP&A Act which provides for the modification of consents and Sub-Section (1A) which provides for modifications involving minimal environmental impact.



The level of environmental assessment completed for this Modification is considered appropriate given that

**Figure 3-1 Boundary for National Listing of Broken Hill**



the Modification is of minimal environment impact and the activities are consistent with mining operations as proposed in the original consent, and that:

- There is no change to the current approved mining and/or production rates;
- There is no change to the disturbance footprint;
- Potential impacts, predominantly from construction works, would occur over a very short time frame 5 to 8 weeks;
- There would be no environmental impacts from the operation of the proposed Warehouse extension;
- Current environmental controls would mitigate potential impacts, use of construction hours, noise abatement bund at the Concrete Batching Plant would mitigate noise from the cement silo construction and operation, current dust management practices including water sprays and water truck; and
- Proposed changes to the surface landform would be consistent with the current mining landscape of Broken Hill.

### 3.2.2 Other NSW Legislation

The existing approvals, licences and authorities relevant to the Project are described in **Section 2**. Existing approvals, licences and/or authorities under various other pieces of NSW State legislation would continue to apply to the proposed Modification operations. **Table 3-1** lists the key relevant pieces of NSW State legislation and indicates the implications, if any, for the Modification and Project as a whole.

**Table 3-1 Relevant NSW State Legislation**

NSW State Legislative Act	Project Implications to Approvals, Licences and/or Authorities
<i>Protection of the Environment Operations Act 1997 (POEO Act)</i>	The proposed Modification would continue to operate under the approved limits and scheduled activities within the current EPL 12559. No variation required.
<i>Mining Act 1992</i>	CML7 permits the extraction of zinc and lead (among others) ore within the Project Area, the Modification does not result in any changes to mining production totals or processing. Therefore there is no need for any amendments to authorities under this Act. Environmental protection and rehabilitation are also regulated under this Act by conditions of mining leases, including requirements for the submission of a Mining Operations Plan (MOP). The current MOP will require amendment to include the activities outlined in the Modification.
<i>Water Management Act 2000</i>	No additional water licences under the <i>Water Management Act 2000</i> are required for the Modification. Water resources will not be affected by this Modification.
<i>Work Health &amp; Safety (Mines &amp; Petroleum) Act 2013</i>	BHOP will utilise for this Modification its current standards, plans and procedures in accordance with the <i>Work Health &amp; Safety Act 2011</i> .
<i>Heritage Act, 1977</i>	The heritage items in the vicinity of the Stores Warehouse will not be affected by this Modification.
<i>Threatened Species and Conservation Act 1995</i>	Not relevant to this Modification.
<i>National Park and Wildlife Act 1974</i>	Not relevant to this Modification.
<i>Aboriginal Lands Rights Act 1983</i>	Not relevant to this Modification.

### 3.3 SEPP - Mining, Petroleum Production and Extractive Industries

The State Environment Protection Policy (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP), aims to provide for the proper management and development of mineral, petroleum and extractive material resources for the social and economic welfare of NSW. Part 3 of the Mining SEPP stipulates matters for consideration by the consent authority before determining an application for consent in respect of development for the purposes of mining. Specifically, Clauses 12 to 17 (inclusive) requires consideration to be given to the significance of the resource, the compatibility of projects with other surrounding land uses, including the existing and potential extraction of minerals, natural resource management and environmental management, resource recovery, transportation and rehabilitation.

The information presented in this SEE addresses each of the matters for consideration prescribed in the abovementioned clauses. Emphasis has been placed on anticipation and prevention of potential environmental and social impacts, with various mitigation measures, management strategies, and monitoring activities proposed to minimise adverse impacts.

Under Clauses 12 and 14 the consent authority is required to consider the compatibility of the Project with other nearby land uses and impacts on significant water resources, threatened species and greenhouse emissions.

Existing and approved land uses in the vicinity of the Modification consist of:

- Current mining operations of BHOP;
- Café and Miners Memorial located on CML7;
- Railway and rail yards;
- Commercial properties; and
- Residential housing.

The Modification would not change these existing uses and would operate without impacting these users beyond the impacts currently approved.

The Modification would optimise the economic viability of the Mine by the installation of the cement silo which will allow cement to be mixed with tailing for use in the backfill for underground voids; this in turn would allow access to resource areas that would otherwise be sterilized, improving mining grades and concentrate volumes.



BHOP has considered that current environmental mitigation measures used for dust and noise control would be sufficient to avoid or minimise potential impacts of the Modification. These measures are listed in **Section 5** of this SEE.

### **3.4 Local Council Environment Planning Instruments**

#### **3.4.1 Broken Hill Local Environment Plan 2013**

The majority of the Mine, including the areas proposed for the Stores Warehouse extension and cement silo are within Special Purpose Zone 1 (SP1) Special Activities – Mining [BHCC Local Environment Plan (LEP), 2013].

#### **3.4.2 Broken Hill Control Plan No 11 Management of Lead Contamination**

Development Control Plan (DCP) 11 provides guidelines for the management of issues relating to lead contamination. There are no changes to lead contamination anticipated with the construction or operation of this Modification.





## 4.0 DESCRIPTION OF PROPOSED MODIFICATION

*The following section describes the location of the proposed modification and details methods of construction and operation.*

### 4.1 Stores Warehouse Extension

An additional area is required to securely store critical spares and stock items as some items are currently required to be stored outside the Warehouse, which is not practical for long term storage. The proposed extension would provide secure storage for these items and protection against inclement weather conditions. The proposed extension would hold larger items as it would be predominately pallet racking (eg. mill gear box, major components for mobile fleet etc). Hazardous items are currently stored in the main Warehouse building, aerosol cans are locked in specifically designed metal cupboards and gas bottles are located at the other end of the store in a designated area. Oils and greases have their own compound outside the Warehouse building. No hazardous items would be stored in the proposed extension.

#### 4.1.1 Location

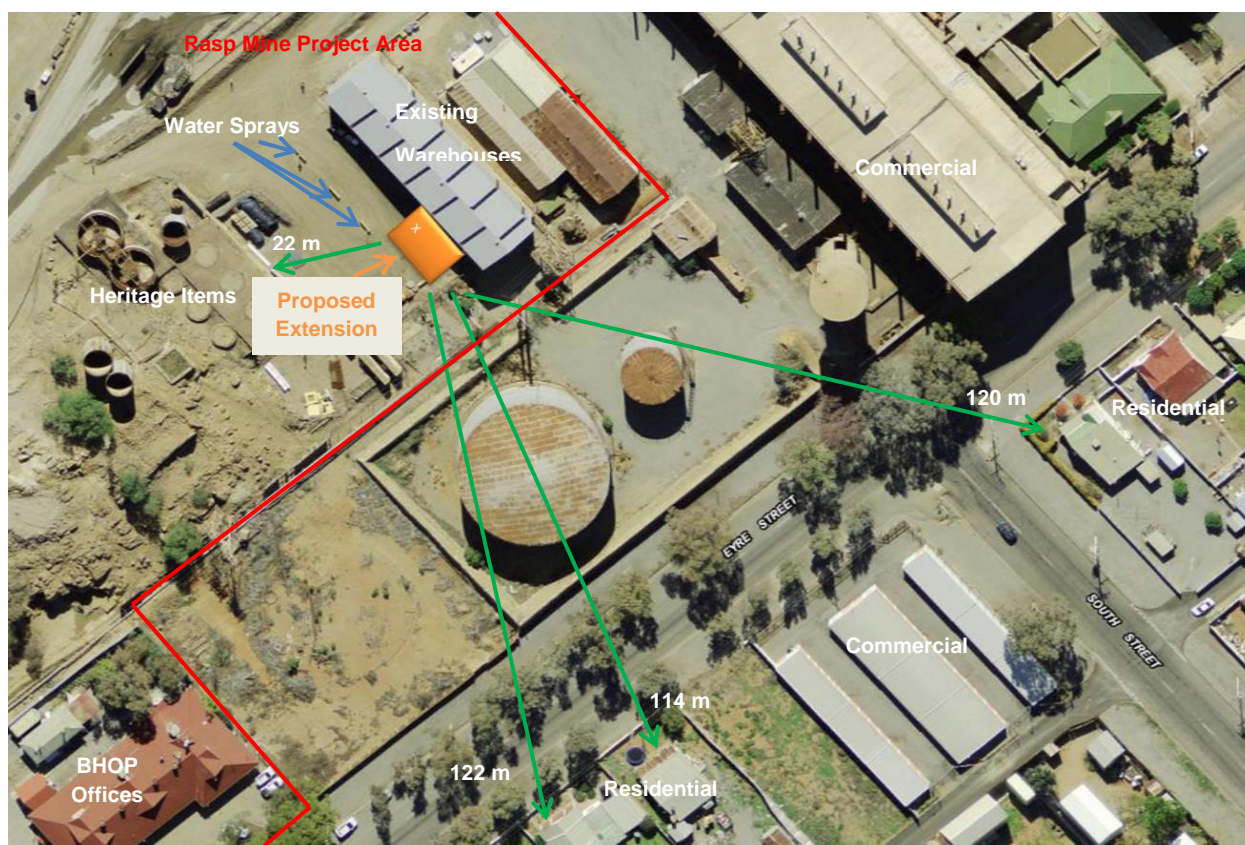
The Stores Warehouse is located centrally and to the south of the Project Area within Western Lands Leases 2638 and 2639 (**Appendix A**) allotted for “Storage Purposes” (**Figure 1-2**). The extension would be positioned along a section at the western side of the Warehouse on an area currently used for delivery vehicle access, **Figure 4-2**.

The Warehouse is surrounded by the Rasp Mine Project Area to the north and west and commercial properties to the south and east. The Warehouse extension will be partially visible (**Figure 5-2**) from Eyre Street, 80 m to the south. Across Eyre Street are commercial storage facilities and residential housing (114 m to 122 m).

There is no vegetation in this area and there would be no impact to flora or fauna, **Figure 4-1**. The closest heritage items, as listed in the BHCC Local Environment Plan 2013, are located approximately 18 m and 22 m from the extension and would not be affected.

**Figure 4-1 Photograph of Proposed Extension Location Looking Towards Eyre Street**



**Figure 4-2 Location for Proposed Warehouse Extension**

#### 4.1.2 Construction

Site preparation for the proposed extension would consist of leveling the area to provide a base for the installation of footings and a concrete slab. An excavator and loader would be used. Material, approximately 22 t, would be back-loaded into a haul truck (50 t) and placed on the waste rock stockpile in Kintore Pit. Approximately 45 m<sup>3</sup> of concrete would be required for the slab foundation (17 m x 12 m x 0.02 m) and footings (2.1 m x 0.4 m x 10 m, 3.5 m<sup>3</sup>) and would be sourced from the new BHOP Concrete Batching Plant. Delivery transport for construction would be on sealed roads from with the exception of the final few metres into the Warehouse delivery area, **Figure 4-4**. There will be 3 heavy vehicles required, one for the crane and two for the prefabricated structure, although considered wide loads no police escort is required.

The length of the proposed extension is 17 m with a width of 12 m, and would be divided into 3 bays of 5.67 m. The structure would be fabricated off-site and arrive on site as a kit to be assembled on the concrete base. The roof and walls would be made from COLORBOND steel with TRIMCLAD sheeting a motorized roller door would provide access for the forklift with a separate entrance / exit for pedestrians. A proposed building layout is provided in **Figure 4-3**. The colour of the sheeting would be consistent with the current Warehouse. Site assembly would be undertaken using battery operated rattle gun and screw guns, an elevated work platform and / or scissor lift and crane would also be utilised.

There would be no change to the storm water drainage and collection.

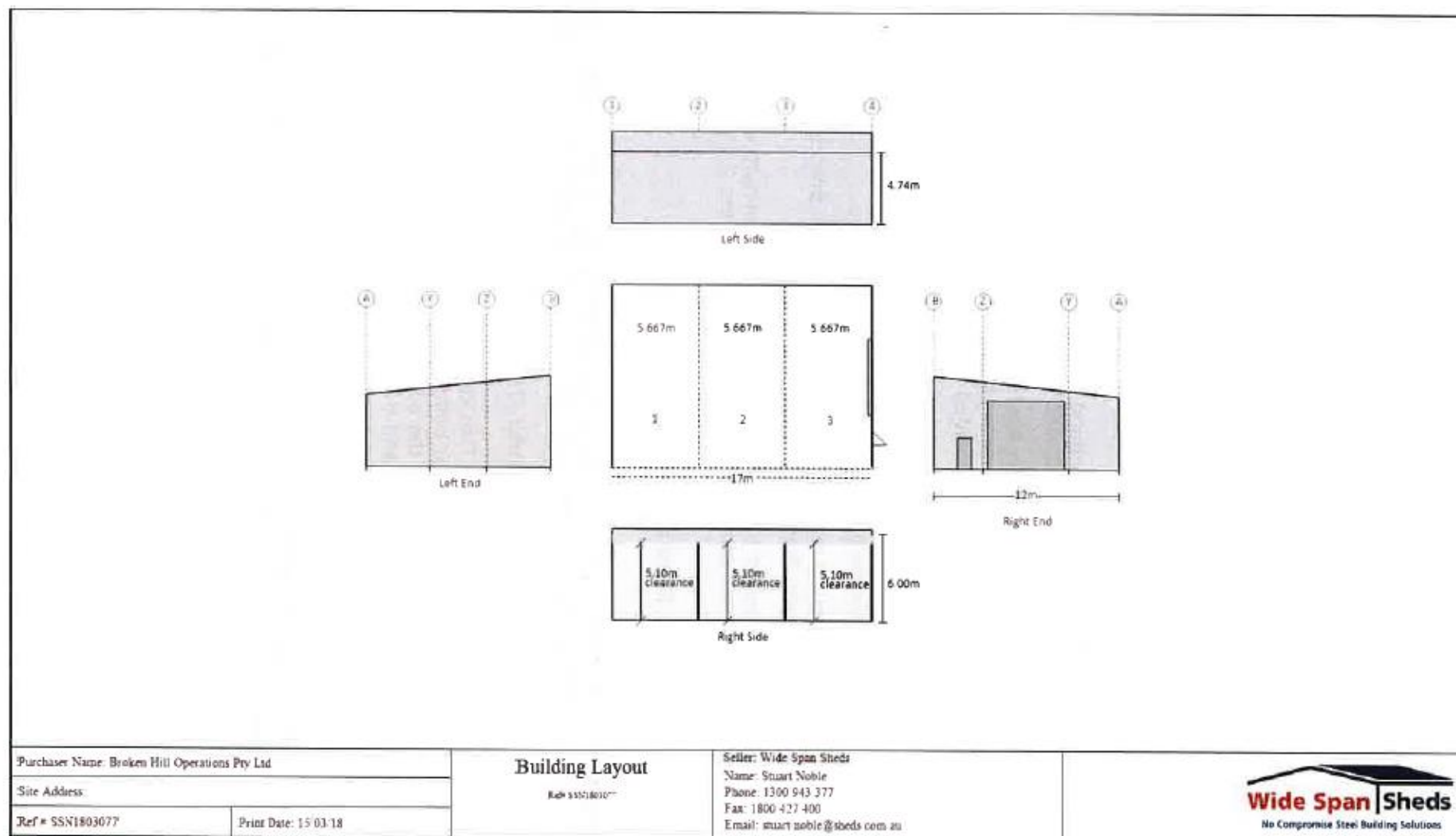
The anticipated construction timeframe is:

- Site preparation - 3 to 4 days
- Installation of concrete slab and footings – 4 to 5 days (includes curing)
- Assembly of building – 18 to 20 days

All construction activities would occur during construction work times – 7 am to 6 pm Monday to Fridays, 8 am to 1 pm Saturdays with no works on Sundays or public holidays.



**Figure 4-3 Details for Proposed Warehouse Extension**





### 4.1.3 Operation

There would be no change to operation of the Stores Warehouse.

There are no changes proposed to the current delivery transport access detailed in **Figure 4-4**, parking areas for delivery vehicles are also detailed.

**Figure 4-4 Delivery Access Route**



## 4.2 Cement Silo

The proposed silo would enable the use of cement in the material mix with tailing to fill underground voids that remain after ore extraction. This would provide additional strength to the mix allowing ore reserves to be increased that would otherwise be sterilized improving ore grades and concentrate volumes and ultimately extended the operating Life of Mine.

### 4.2.1 Background to Placement of Backfill Underground

The placement of backfill underground was included in the original EA and the Backfill Plant was constructed. No material has been placed underground due to the need to use excess waste rock to fill underground voids. Chapter 2 Section 2.7 of the original EA provided an overview of the Backfill Plant indicating that some mix in the tailing material would be required:

*“The back fill plant will consist of cyclones to split the tailings feed. The coarser underflow stream from the cyclones will be **mixed with suitable materials** and redirected underground to use as stope fill. The finer overflow (slimes) will be directed to a high rate thickener, allowing thickened slimes to be sent to the TSF1 or TSF2.”*

Laboratory analysis for the use of binders to enhance the strength of the tailing was provided in the *Report on Laboratory Evaluation of Rasp Mine Tailing for Use as Hydraulic Backfill*, Golder Associates February 2008 Appendix B, of Annexure F – *Tailings Storage Facility Feasibility Study*, Golder Associates, February 2010. Section 6 of this Report provided a summary of the analysis of various binder combinations all included cement:

- 1 5% application with Type 10 Normal Portland Cement (NPC)
- 2 5% application with 70% NPC and 30% C1 Fly Ash
- 3 5% application with 10% NPC and 90% Blast Furnace Slag (BFS)





These mixes are commonly used for this purpose, usually with applications of 5 percent or less. Cement binders are used extensively throughout the mining industry to strengthen tailing used for filling underground voids.

#### 4.2.2 Location

The proposed cement silo would be located adjacent to the Backfill Plant situated central and to the north of the Rasp Mine Project Area and within Consolidated Mine Lease 7 (CML7) (**Appendix A**) (**Figure 1-2**). The proposed silo would cover an area of approximately 25 m<sup>2</sup> and would be positioned to the east of the Backfill Plant on an area currently used for vehicle parking, **Figure 4-5**.

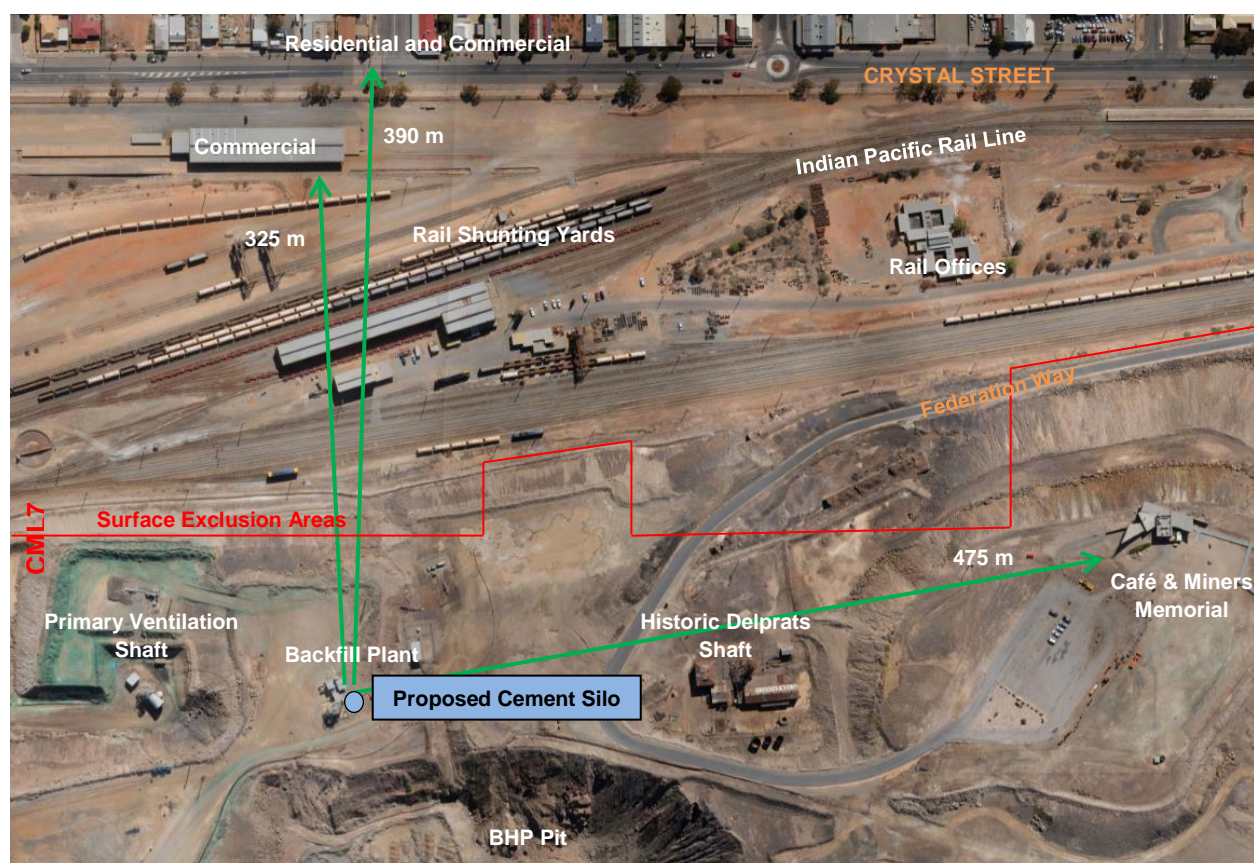
The area is surrounded by the Rasp Mine Project Area on all sides with residential housing located approximately 390 m to the north with commercial and rail yards in between these and the cement silo.

The cement silo will be visible from Crystal Street and the Red Earth Café and Miners Memorial both located on CML7.

There is no vegetation in this area and there would be no impact to flora or fauna. There are no heritage items in this area or in the vicinity of the Backfill Plant.

All the area shown in **Figure 4-5** lies within CML7 underground mining area, there are numerous surface exclusions with varying depths in this area for residential and commercial properties and the rail yards. The red line delineates these areas. The Café and Miners Memorial are located on CML7 within an area designated as the Line of Lode Reserve Trust, managed by Crown Lands.

**Figure 4-5 Location of Proposed Cement Silo**



#### 4.2.3 Construction

Site preparation for the proposed cement silo would consist of levelling the area to provide a base for the installation of footings and a concrete slab. An excavator and loader would be used. Material, approximately



25 t, would be back-loaded into an ore haul truck (50 t) and placed on the waste rock stockpile in Kintore Pit. Approximately 40 m<sup>3</sup> of concrete would be required for the foundations (5 m x 5 m x 1.0 m) and mixing tank base (5 m x 5 m x 0.2 m) and would be sourced from the on-site Concrete Batching Plant.

The cement silo would be fabricated off-site and would be of steel construction. It would have a capacity for 300 t of cement and would be 18 m high and 4.6 m in diameter. It would be transported to site and placed in position using a crane. The top of the main section of the cement silo body, including dust filter, would be 18 m off the ground, the top of the silo cone would be 4.2 m from the ground and the bottom of the silo cone 1.0 m off the ground, **Figure 4-6**. **Figure 4-7** provides an indicative layout for the cement silo within the Backfill Plant. Transport of construction materials would be on sealed roads. There will be 2 heavy vehicles required, one for the silo and one for the crane, although considered wide loads no police escort is required.

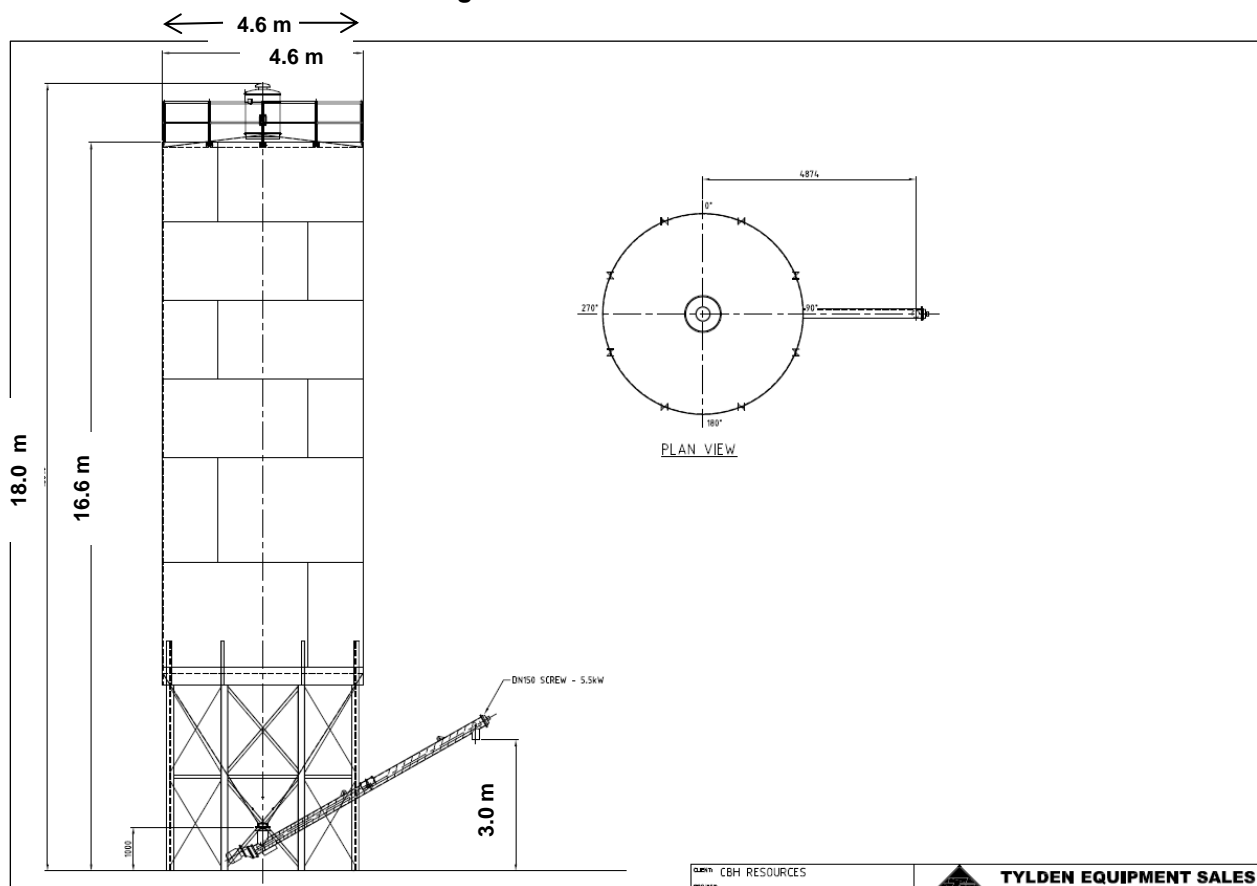
There would be no change to the current storm water drainage and collection system in this area.

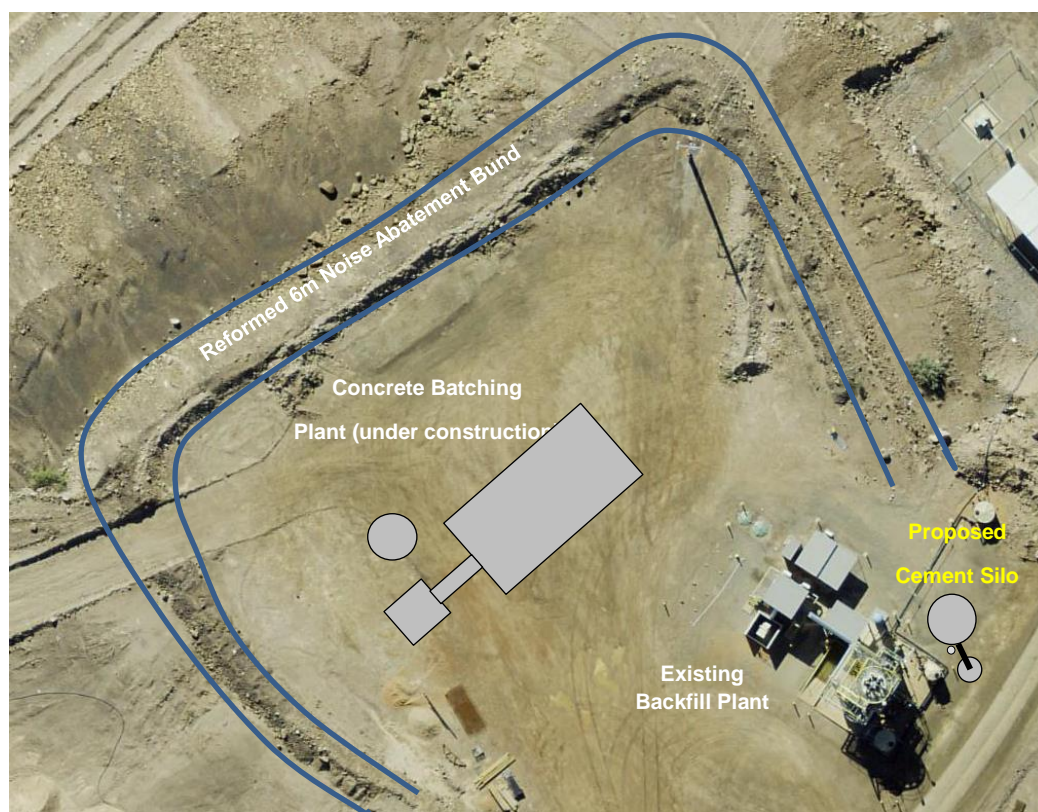
The anticipated construction timeframe is:

- Site preparation - 3 to 4 days
- Installation of concrete slab and footings – 4 to 5 days (includes curing)
- Assembly of building and infrastructure – 5 days

All construction activities would occur during construction work times – 7 am to 6 pm Monday to Fridays, 8 am to 1 pm Saturdays with no works on Sundays or public holidays.

**Figure 4-6 Outline of Cement Silo**



**Figure 4-7 General Layout of the Cement Silo**

#### 4.2.4 Operation

Cement would be transported to site on trains, back-loaded on returning concentrate wagons, in 25 t ISO containers, these would be offloaded and stored at various locations (as indicated in **Figure 4-8**) until required at the silo. Returns would also be stored prior to back-loading on rail wagons and returning to the supplier. This would displace concentrate containers and would require some additional train movements (up to four per annum). Production requirements are estimated at approximately 5,000 tpa, however this is dependent on the percentage required in the binder mix and the size and number of the areas where placement would be required underground. This would equate to approximately 3 to 4 ISO container deliveries per week which would occur during dayshift hours 7 am to 7 pm. Containers would be transported to the silo by truck using sealed roads on-site. Alternatively when cement is not available by rail road transport to the Mine site would be used, the on-site transport route from Eyre Street to the silo is on sealed roads. Rail is the more efficient and preferred option and Pacific National has advised that there is excess capacity on this line. These internal traffic routes are indicated in **Figure 4-8**.

In the operation of the cement silo noise would be generated by the transfer of cement from the ISO container to the silo (via compressed air or a blower, to occur on day shift only) and from the silo to the mixing tank (via electric motor, to occur anytime), motors would be enclosed

The cement would be transferred into the silo via compressed air or a blower through a sealed tube connection from the ISO container to the base of the silo where it would be internally discharged, the blower motor (30 kW Power-Pack operating a 580 m<sup>3</sup>/h) will be enclosed. Transfer to the silo would occur on dayshift only. A screw conveyor (5.5 kW) would transfer cement to the mixing hopper where it would be mixed into tailing and used to fill underground voids as part of the current Backfill Plant operation, this would occur at any time over a 24 hour period.

There are three proposed locations for ISO container storage (**Figure 4-8**), all are located on already disturbed land free of vegetation. There are no site preparation works required at any of these locations.





Storage Site 1 is located near Thompson Shaft complex and will be used for empty containers, which will be placed behind a 4 m noise abatement bund. Approximately 5 containers will be stored in this area. Another 5 containers will be stored at Storage Sites 2 and 3 located adjacent to the rail where concentrate containers are currently stored prior to loading.

The size of the ISO container is width - 2.50 m, length - 6.05 m, height - 2.80m.

Storage times will vary depending on train movements however there will always be approximately the same number of full and empty containers on site, albeit different containers, it is expected that up to 10 ISO containers will be stored (5 containing cement and 5 empty) which will provide a buffer for any train delays. Turnaround of ISO containers would align to train movements which on average would be every 8 days. However train movements can vary greatly from week to week, from zero to four in any week.

### 4.3 Amendment to Air Quality Monitoring

There are two conditions on the current PA that require amendment in regards to monitoring requirements at Shaft 6 and discharge criteria for the Crusher Baghouse Stack.

#### 4.3.1 Shaft 6, Monitoring Point 6

Schedule 3 Condition 4 Monitoring Point 6 in the PA currently requires BHOP to sample air quality quarterly for exhaust air from underground mine blasting. This ventilation shaft was changed to an exhaust vent in MOD3. This ventilation shaft is no longer used to exhaust air and has been returned to an intake airway therefore, there is no longer any need to monitor air quality at this point. This was agreed with the EPA during their February 2018 visit and BHOP are awaiting confirmation for a variation application to remove this requirement from the Rasp Mine EPL12559. There have been no changes to the Primary Ventilation system monitored at Point 1 in the PA.

Modification:– To remove Point 6 from the requirement for air quality monitoring in Condition 4 of the PA.

#### 4.3.2 Discharge Criteria for Crusher Baghouse Stack

BHOP has been in consultation with the EPA and have agreed discharge criteria for the Crusher Baghouse Stack. This criterion has been included at Condition L2.2 of the Rasp Mine EPL12559 which states the following concentration limits for discharges from the Crusher Baghouse Stack, **Table 4-1**.

**Table 4-1 Rasp Mine EPL12559 Discharge Criteria for Crusher Baghouse Stack**

Pollutant	Units of Measure	Concentration Limit
Total solid particles (TSP)	Milligrams per cubic metre	20
Type 1 and Type 2 substances	Milligrams per cubic metre	1

Schedule 3 Condition 4 Table 5 of the PA does not include these criteria and requires the Secretary's agreement in consultation with the EPA for these to be inserted.

Modification:– BHOP requests that the discharge criteria as agreed with the EPA and included in EPL12559 be inserted into Table 5 of the PA.



**Figure 4-8 Proposed Transport Route and Storage for ISO Cement Containers**





## 5.0 ENVIRONMENTAL REVIEW AND ASSESSMENT

This Section describes the environmental risk review and summarises the mitigation measures to reduce any potential environmental impacts.

### 5.1 Environment Risk Review

The proposed MOD5 has the potential to result in some additional environmental impacts to noise, air quality and visual amenity to those already approved. However none of these impacts have been identified as key issues. Due to the very minor nature of these impacts and their short duration BHOP has conducted an assessment and determine proposed control management measures. **Table 5-1** provides a summary of these potential impacts with those highlighted discussed in further detail in **Section 5.2**.

**Table 5-1 Review of Potential Environmental Impacts**

Issue	Relevance	Key Issue
<b>Noise</b>	<p>Noise would be generated during construction by:</p> <ul style="list-style-type: none"> <li>- the use of an excavator, loader and truck to prepare the sites for the installation of the concrete slabs</li> <li>- erection of infrastructure</li> </ul> <p>Noise would be generated during operations by:</p> <ul style="list-style-type: none"> <li>- trucks transporting cement from storage to the silo (Rail Loadout to Silo or site entrance to silo)</li> <li>- loading the silo</li> <li>- loading the mixing hopper</li> </ul>	<p>No</p> <p>No</p> <p>No</p> <p>No</p> <p>No</p>
<b>Air Quality</b>	<p><i>Dust emissions</i></p> <p>Dust would be generated during construction by:</p> <ul style="list-style-type: none"> <li>- earthworks for site preparation</li> </ul> <p>Dust would be generated during operations by:</p> <ul style="list-style-type: none"> <li>- trucks transporting cement from storage to the silo</li> <li>- loading the silo</li> <li>- loading the mixing hopper</li> </ul> <p><i>Diesel emissions</i></p> <p>Diesel emissions would be generated during construction by earth moving equipment and delivery vehicles transporting the prefabricated structures and during operation of the cement silo by trucks transporting cement to the silo.</p>	<p>No</p> <p>No</p> <p>No</p> <p>No</p> <p>No</p>
<b>Heritage</b>	<p>Heritage items are located 20 m from the proposed Stores Warehouse extension and would not be disturbed.</p> <p>There are no heritage items in the vicinity of the proposed cement silo.</p>	<p>No</p> <p>No</p>
<b>Visual Amenity</b>	<p>A small portion of the proposed Warehouse extension would be visible from Eyre Street.</p> <p>The cement silo would be visible from Crystal Street and other areas of the city.</p>	<p>No</p> <p>No</p>
<b>Erosion and sediment control</b>	<p>There will be no change to the current water management arrangements and erosion and sediment control as outlined in the Site Water Management Plan.</p>	<p>No</p>
<b>Water use</b>	<p>BHOP currently uses a water truck (cement silo area) and water sprays (area of Warehouse extension) to assist in dust management in these areas as well as the application of chemical dust suppressant. It is anticipated that the additional use of water for dust management will be minimal and could be handled within current water usage capacities. Raw water is used for dust suppression.</p>	<p>No</p>
<b>Transport</b>	<p><i>Traffic flows</i></p> <p>There will be some increase in traffic flows both internal and external:</p> <p>Construction – an additional 5 heavy vehicles, entering the site.</p> <p>Operations – an additional 3 to 4 truck movements per week from the Rail Loadout to the silo internally. And occasionally (5 % (nominal) of cement truck deliveries by road.</p> <p><i>Rail movements</i></p> <p>In operation of the cement silo there will be some increase in rail movements with up to 4 additional trains per annum.</p>	<p>No</p> <p>No</p>





Issue	Relevance	Key Issue
Land Disturbance	No vegetation to be removed, no additional land disturbance would be required at either site (refer Figures 4-2 and 4-7 which depict the areas for the modifications).	No
Rehabilitation	The proposed extension to the Stores Warehouse and the cement silo would be demolished and either sold and removed from site or disposed in site in underground voids.	No

## 5.2 Discussion of Potential Impacts and Proposed Mitigation Measures

There were no significant key issues identified for MOD5 during construction or operations. The following reviews the potential environmental impacts identified and their proposed control measures.

### 5.2.1 Noise

Noise would be generated during construction by the use of an excavator and loader to prepare the sites for the installation of the concrete slabs and the erection of infrastructure, and a truck to remove excess material. The excavator would be used to level the site, with a loader placing excess material into a mine haul truck. The amount of material is minimal consisting of approximately half a truck load at each site (up to 25 t). The haul truck would then transport this material to the waste rock stockpile within Kintore Pit.

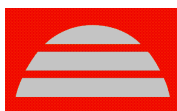
In addition some noise would be generated erecting the pre-fabricated Warehouse extension from the use of power tools. The use of a crane may incur some noise in the placement of the cement silo.

BHOP engaged EMM Consulting Pty Ltd (EMM) to conduct a noise and vibration assessment for construction works in accordance with the NSW Department of Environment and Climate Change (DECC), *Interim Construction Noise Guideline*, 2009 (ICNG). A conservative approach was taken with both installations occurring concurrently with all equipment in use. Quantitative modelling of construction noise was completed using Brüel & Kjær Predictor Version 11 noise prediction software. Three-dimensional digitised ground contours of the site and surrounding land were incorporated to model topographic effects. Equipment was modelled at locations and heights representative of proposed construction activities. Meteorological conditions used for the noise modelling were based on the meteorological data used for the previous noise assessment (MOD4), recorded between January 2014 and September 2016, no wind conditions were identified as 'significant' during the day period (consistent with the ICNG standard hours), therefore calm meteorological conditions were adopted for the noise modelling of construction noise. Acoustically significant plant and equipment items for worst case activities from each construction site were modelled as operating concurrently. The construction noise modelling is therefore considered to represent an acoustically worst case scenario. The 6 m noise abatement bund installed at the Concrete Batching Plant was included in the noise model.

The construction noise management levels (NMLs) for residential assessment locations were based on background noise levels (RBLs) determined during previous noise assessments for the Rasp Mine which are considered to be relevant to the assessment of the proposed construction works. The NMLs for construction standard hours adopted for this assessment were derived in accordance with the ICNG for all assessment locations and are presented in **Table 5-2**.

**Table 5-2 Construction Noise Management Levels for Standard Hours**

Assessment location	Representative logging location <sup>1</sup>	RBL, dB(A)	NML, LAeq(15-min), dB
Assessment locations on Eyre St	A3, A4	39	49
Assessment locations on Crystal St	A9, A11	41	51
Commercial places on Eyre St and north of Crystal St	N/A <sup>2</sup>	N/A <sup>2</sup>	70



Notes: 1. Referenced from EMM report Rasp Mine Modification 4 – Concrete batching plant and TSF2 (Blackwood Pit) extension – Noise impact assessment (2017).

2. Determination of the NML for commercial receivers is not dependent on existing background noise levels.

Noise modelling results show that site noise from the proposed construction works is predicted to satisfy the ICNG residential NMLs at all assessment locations, **Table 5-3**.

**Table 5-3 Construction Noise Results for Residences**

Assessment location	Standard hours NML <sup>1</sup> LAeq,15min, dB	Predicted (worst case) construction LAeq,15min noise levels, dB	Exceedance of NML, dB
Assessment locations on Eyre St	49	46 <sup>2</sup>	Nil
Assessment locations on Crystal St	51	31 <sup>2</sup>	Nil

Notes: 1. Most stringent NML (residential).

2. Level predicted at residential and commercial locations.

In addition an assessment of the potential impacts from vibration found that the proposed construction activities are not expected to include any vibration intensive plant, therefore, given the nature of the proposed construction activities and the distances to the nearest residences (ie >100 m) and other building structures, intermittent vibration levels are unlikely to cause adverse human response or cosmetic damage.

EMM concluded that “Modelling has shown that construction noise levels from proposed construction works are predicted to satisfy the ICNG noise management levels during standard hours at all assessment locations. Vibration levels from the proposed construction works are unlikely to cause adverse human response or cosmetic damage at the nearest residences and commercial premises.”

During operations there would be no additional noise generated by the use of the Stores Warehouse extension as items currently stored in this area would now be housed within a secure facility at the same location.

The operation of the cement silo would generate noise from motors loading cement into the silo and mixing tank and by transport deliveries of the cement. BHOP has been advised by EMM that noise generated from these motors would be insignificant given the current approved noise sources located in this area. In addition both motors would be enclosed and the current noise abatement bund installed for the Concrete Batching Plant, will be extended to allow some coverage for the cement silo. The number of truck movements transporting cement from the Rail Loadout to the silo is minimal (3 to 4 per week) and will occur during daytime only. The current variability of the numbers of truck movements related to mine haul trucks along this route, varies hourly from zero to 3 trucks per hour (5 haul trucks per hour was used in the original noise assessment). The additional truck delivering cement would be within this variation and it is unlikely that the noise from cement truck movements would be discernible.

Similarly in the small number of instances when cement deliveries might arrive by road and travel through the Eyre Street entrance to the silo. In the worst case scenario would be if these trucks arrived at the same time (3 to 4 trucks for a week's supply of cement). It is not expected there would be any additional impact from these vehicles and with the current variability of vehicle movements (site vehicles, contractor vehicles and other delivery vehicles) it is unlikely from these additional truck movements would be indiscernible from general site and road traffic.

### **Proposed Mitigation Measures**

- Use of construction hours for all construction activities.
- Use of ‘squawker’ type reverse alarms on vehicles used on site.
- Loading of the silo to occur during dayshift only (7 am to 7 pm).
- Transport of cement to the silo to occur during dayshift only (7 am to 7 pm).
- Current noise abatement bund (6 m) surrounding the city side of the proposed cement silo.
- Enclosure of motors used to transfer cement from the truck to the silo and silo to the mixing tank.



- Noise verification monitoring post commissioning.

And in addition as recommended by EMM BHOP will adopt the following measures:

- Regular reinforcement at pre-starts and toolbox talks of the need to minimise noise.
- Regular identification of noisy activities and adoption of improvement techniques, where possible.
- Machinery shall not be permitted to 'warm-up' before the nominated working hours.
- Where possible, queuing of vehicles shall not occur adjacent to residential receivers.
- Deliveries and access to the site will be planned to occur quietly and efficiently.

## 5.2.2 Air Quality

### 5.2.2.1 Dust

Dust would be generated at both proposed locations by earthworks during construction to level the areas in preparation for the installation of concrete slabs and footings, and some vehicle movements. The amount of material is minimal; approximately 22 to 25 t at each site, and the activity would occur over a short duration, 3 to 4 days. Dust generated at the proposed Warehouse extension would be managed by in-situ water sprays and at the proposed cement silo via mobile spray units, the water truck would also be utilized at either location when required. There are two water trucks in use on site.

There are no additional activities during the operation of the Warehouse extension and therefore no additional dust impacts.

The cement silo would have the potential for dust generation during operations from loading the silo, loading into the mixing hopper and transport of cement filled ISO containers to the site. The cement silo would be filled from the ISO container by attaching a tube from the container to the bottom of the silo and using air pressure to pump the cement through the tube which would discharge internally within the silo. A filter at the top of the silo would capture dust particles allowing clean air to escape during the filling process; this unit would be included on the maintenance schedule for air quality monitoring equipment. The cement would be transported to the mixing hopper via a screw conveyor. Cement that exits the outlet of the screw conveyor, transferring the cement to the mixing tank, would be directed through a pipe which is attached to the cover of the tank.

Vehicle movements may also generate dust and this would be managed using current dust mitigation measures – water sprays and water truck.

#### ***Proposed Mitigation Measures***

- Water sprays (in-situ at the Warehouse and mobile units at the cement silo) and water truck.
- Management of potential dust generating activities on windy days would be addressed via current procedures which include suspension of works if required (ie exceeding 40 kph).
- Short construction period.
- Use of chemical dust suppressant.
- The transport route for cement delivery to the silo would be on sealed roads.
- Enclosed transfer system for cement delivery from the ISO container to the silo.
- Enclosed transfer system for cement delivery from the silo to the mixing tank.
- Dust filter on top of the silo, to be included on preventive maintenance schedule.

### 5.2.2.2 Diesel Emissions

BHOP has reviewed the potential impact of diesel emissions in relation to MOD5. Diesel emissions can be caused during construction by earth moving equipment preparing the sites and delivery vehicles transporting the prefabricated structures. These activities are anticipated to take 3 to 4 days for site preparation and 1 day for deliveries. There would be no change to site deliveries in regards to the operation of the Stores Warehouse extension. The operation of the cement silo would require cement deliveries to occur 3 to 4 times per week, a trip of 2.3 km (motors for transferring the cement from the truck to the silo and from the silo to the mixing tank are powered from electricity). BHOP maintains its vehicles on a regular



basis to maintain efficiency which includes minimising emissions. BHOP also operates a Diesel Emissions Management Plan (BHO-PLN-MTC-007) which monitors on-site vehicle emissions testing exhausts for diesel particulate matter. BHOP also operates an exhaust technology that uses a fluid known as **AdBlue™** (DEF) to reduce the nitrous oxides present in emissions. Therefore it is unlikely that diesel emissions would significantly impact air quality.

### **Current Mitigation Measures**

- Diesel Emissions Management Plan (BHO-PLN-MTC-007)
- Mobile fleet maintenance program
- **AdBlue™** process

### **5.2.3 Heritage**

There is some heritage infrastructure located adjacent the Warehouse and would be approximately 18 m to 22 m to the west of the proposed extension, **Figure 5-1**.

**Figure 5-1 Heritage Items - Warehouse**



These Heritage items are listed in the BHCC Local Environment Plan 2013. It would appear that these heritage items are foundations and infrastructure for a roasting plant installed by the Barrier Roasting Company in 1917. All are now extant ruins consisting of:

- I254 Roaster Plant Foundations
- I257 Two Steel Tanks
- I258 Concrete Tank Stand
- I259 Concrete square Foundation
- I260 Two water tanks

A standoff distance of 5 m shall be maintained from heritage items and these items will not be impacted by the Warehouse extension construction works or its operation.

### **5.2.4 Visual Amenity**

It is not anticipated that there would be any significant impacts to visual amenity from the installation of the proposed Stores Warehouse extension. This extension is smaller than the Warehouse and would be





partially visible from Eyre Street. The extension structure would be consistent with the rest of the infrastructure in this area, **Figure 5-2**.

**Figure 5-2 View of Proposed Extension from Eyre Street**



The cement silo would be visible from Crystal Street and other areas within the residential and commercial areas of Broken Hill, **Figure 5-3**. It is consistent with other mine infrastructure across the site and located in an area consisting of rail infrastructure and industrial services. It is not anticipated to adversely impact visual amenity.

**Figure 5-3 View of Proposed Cement Silo from Crystal Street (East & West)**



## 5.2.5 Transport

### 5.2.5.1 Traffic flows

In the original EA a study was completed for traffic flows in the surrounding areas of the Project. This study was based on data from the late 1990's and early 2000's supplemented by a traffic survey in 2007 by





Environmental Resources Management Pty Ltd (ERM). Traffic flows, particularly heavy vehicle traffic, have increased since this time with further mining and other industrial developments in Broken Hill. However, BHOP have used this data as a conservative estimate to assess potential traffic impacts from MOD5 as current traffic flows would be higher. **Table 5-4** outlines the traffic volumes identified for the EA. The data shows general traffic flows, including heavy vehicles that travel on Eyre Street, Holten Drive, South Road and Bonanza Street. The data also shows the proportion and daily variation of heavy vehicles that pass the Rasp Mine entrance (Eyre Street east of Comstock Street), a total of 2232 vehicles daily of which 1.6 % to 4.6 % are classed as heavy vehicles. Eyre Street is used as one of the main trucking routes, including road trains, from the north to the south of Broken Hill.

Table 5-4 **Traffic Volumes Original Environment Assessment**

Location	Daily traffic				Peak 1 hour flow	
	1997 (Council)	1999 (RTA)	2002 (RTA)	2005 (Council)	2001 (ERM)	2007 (ERM)
Eyre St east of Bonanza St	1864	-	-	-	191	173 (4.0)
Eyre St east of Comstock St	2009	-	-	2232(1.6-4.6)	-	153 (13.7)
South Rd north of Eyre St	-	-	-	-	775	659 (3.6)
Bonanza St south of Eyre St	-	8273	8254	-	657	571 (4.4)
Menindee Rd north of Holten Dr	-	2656	-	-	195	-

Note: Bracketed figures are heavy vehicle percentage.

During construction there will be minimal traffic flows from the combined projects. It is estimated that the Stores Warehouse would result in additional truck movements of three (one truck for the crane delivery and two trucks for delivery of the prefabricated structure). The cement silo would result in additional truck movements of two (one for the crane delivery and one truck for the silo delivery). The arrival of these vehicles would not occur on the same day however, to provide a conservative assessment for potential traffic impacts the assessment has considered all of these vehicles arriving on the same day. This would result in a combined increase of 5 trucks. The EA reported that heavy vehicle traffic on Eyre Street varied from 36 trucks (1.6 %) per day to 103 trucks (4.6 %) per day. The additional 5 heavy vehicles proposed would be within this variation and as such it is unlikely this increase would be discernible, particularly given the variability of traffic at the Rasp Mine.

There will be no additional vehicle movements in the operation of the Stores Warehouse extension.

During operations of the cement silo the number of internal truck movements transporting cement from the Rail Loadout to the silo is minimal (3 to 4 truck movements per week). With the variability of truck movements related to mine haulage trucks along this route, from zero to three trucks per hour, it is not likely that the cement truck movements would be discernible from normal traffic. Similarly were cement deliveries to arrive by road and travel through the Rasp Mine Eyre Street entrance to the silo the variability of site vehicles, contractor vehicles and other delivery vehicles would again make these truck movements indiscernible from general traffic. It is anticipated that road deliveries would be rare and is conservatively estimated at 5 percent of all deliveries and would occur spasmodically. In any given year this would equate to an additional 10 delivery vehicles. Using a conservative estimate of four ISO containers (one week's supply) arriving on one day. The additional heavy vehicles proposed would be within the normal heavy vehicle traffic variation per day (36 to 103 trucks per day) and it is not expected that this increase would be discernible from normal traffic.

#### 5.2.5.2 Rail Movements

During operation of the cement silo, cement supplies would arrive predominantly on trains back-loaded onto wagons returning empty concentrate containers. This activity would be consistent with current rail activity. The number of displaced concentrate containers would change month to month however over the year using the maximum of three ISO containers per week, 200 containers would be displaced. This will result in additional trains. The rail operator Pacific National has advised that this would equate to up to 4 trains per



annum. Current train movements vary widely from zero to four movements per week, on average there is a train movement every 9 days with the additional train movements this will change to every 8 days. It is unlikely that this would be discernible.

Pacific National also advised that there was spare capacity on this line (Newcastle to Broken Hill) and can manage the required additional train movements. Currently this line has the capacity for 104 trains per year and in the last year the Rasp Mine used 42 trains for concentrate. This leaves a capacity of 62 trains to accommodate the additional displaced containers reducing the unused capacity from 62 trains to 58 trains per annum.

### 5.2.6 Cement Binder for Tailing Mix

The original EA provided that the tailing from the coarser underflow stream from the cyclones would be mixed with suitable materials for use as underground backfill for voids to strengthen the tailing mix if required. Golder considered some examples of these materials, provided below, all contain some cement content:

- 1 5% application with Type 10 Normal Portland Cement (NPC)
- 2 5% application with 70% NPC and 30% C1 Fly Ash
- 3 5% application with 10% NPC and 90% Blast Furnace Slag (BFS)

These mixes are commonly used for this purpose, usually with applications of 5 percent or less. The following provides information from the relevant Safety Data Sheets for these products:

#### **Normal Portland Cement**

General Purpose or Portland Cement is used as a binder in concrete, concrete masonry, mortar and grouts. It is also used in the manufacture of fibre cement products, in soil stabilisation, in building construction and civil engineering projects. It is chemically stable and has a slight solubility and forms an alkaline slurry when mixed with water. It is not expected to bio-accumulate, is persistent having a low degradability and is expected to have low mobility in a landfill setting. It can be treated as a common waste for disposal or dumped into a landfill site, in accordance with local authority guidelines.

#### **Fly Ash**

Fly ash is supplementary cementitious material for concrete. It is also used in soil stabilisation and as a fine filler in asphalt and other products. It is chemically stable and essentially insoluble. It is unlikely to have a negative impact on plant life or animals. The product is persistent and would have low degradability and is expected to have low mobility in a landfill setting. It can be disposed as trade waste and land fill in accordance with local authority guidelines.

#### **Blast Furnace Slag**

Ground slag, Blast Furnace Slag or Ecocem, is supplementary cementitious material for concrete manufactured by inter-grinding selected granulated iron blast furnace slag with optimized quantities of gypsum to a controlled particle size.

Cement binders are used extensively throughout the mining industry to strengthen tailing used for filling underground voids. The presence of cement in the stabilised backfill may make contact with water on the outside of the stabilised fill only, so there would be minimal contact with low cement content in the backfill material. Therefore any resulting impact would be minor or not measureable.

### 5.2.7 Rehabilitation

The Stores Warehouse, is not located on CML7, however at mine closure consideration would be given to demolishing the infrastructure if no other purpose can be identified. BHOP would consult with NSW Crown Lands on this matter.



The cement silo is located on CML7 and along with other mining infrastructure in the area would be demolished at mine closure. The land area would be rehabilitated by placing waste rock over the area to prevent lead-bearing dust being taken by wind into the local atmosphere. Alternatively, consideration would be given to any recommendation of the inter-government group working on options for the Line of Lode final landform and rehabilitation for this area. The Rehabilitation Calculation Estimate would be updated and included in the Mining Operations Plan amendment.



## 6.0 PROPOSED STATEMENT OF COMMITMENTS

*This Section lists management commitments to be implemented as a result of the Modification; these are **in addition** to the current Statement of Commitments.*

The proposed mitigation measures to control potential impacts associated with the projects in MOD5 are outlined in **Table 6-1**. Some of these measures are already included in site mitigation measures and are not additional to the current Statement of Commitments.

**Table 6-1 Proposed Mitigation Measures**

Mitigation Measure	New Measure	Already Included in Statement of Commitments
<b>NOISE</b>		
Use of construction hours for all construction activities.		✓
Use of 'squawker' type reverse alarms on vehicles used on site.		✓
Loading of the silo to occur during dayshift only (7 am to 7 pm).	✓	
Transport of cement to the silo to occur during dayshift only (7 am to 7 pm).	✓	
Current noise abatement bund (6 m) surrounding the city side of the proposed cement silo.		✓
Enclosure of motors for the loading of cement into the silo (blower) and into the mixing hopper (screw conveyor).	✓	
Noise verification monitoring post commissioning.	✓	
Regular reinforcement at pre-starts and toolbox talks of the need to minimise noise.		✓
Regular identification of noisy activities and adoption of improvement techniques, where possible.	✓	
Machinery shall not be permitted to 'warm-up' before the nominated working hours.	✓	
Where possible, queuing of vehicles shall not to occur adjacent to residential receivers.	✓	
Deliveries and access to the site will be planned to occur quietly and efficiently.	✓	
<b>DUST</b>		
Water sprays (in-situ at the Warehouse and mobile units at the cement silo) and water truck.	✓	
Management of potential dust generating activities on wind days would be addressed via current procedures which include suspension of works if required (ie exceeding 40 kph).	✓	
Use of chemical dust suppressant.		✓
The transport route for cement delivery to the silo would be on sealed roads.	✓	
Enclosed transfer system for cement delivery from the ISO container to the silo.	✓	
Enclosed transfer system for cement delivery from the silo to the mixing tank.	✓	
Dust filter on top of the silo, to be included on preventive maintenance schedule.	✓	
<b>HERITAGE</b>		
A standoff distance of 5 m shall be maintained from heritage items	✓	



## 7.0 CONCLUSION

*This section provides a justification for the Modification as sought and concluding comments.*

BHOP is seeking approval for a minor Modification (MOD5) to the Project Approval to:

- Extend the current Stores Warehouse;
- Install a cement silo at the Backfill Plant, and
- Adjust air quality monitoring requirements to remove Shaft 6 monitoring point and include discharge criteria at the Crusher Baghouse Stack.

BHOP has committed to continue implementing existing mitigation and management measures and, where required, implement additional measures to minimise potential impacts as a result of this Modification. This SEE has demonstrated that, with these measures in place, the proposed Modification can be undertaken within acceptable standards and with no significant impacts to the environment or the community.

The proposed minor Modification would result in a range of benefits, including:

- Security for critical spares and stock items currently stored unsecured outdoors;
- Improve resource recovery of high grade pillars that would not be able to be mined without the use of cement in the backfill;
- Increase current ore reserves that would otherwise be sterilized and improve mining grades and concentrate volumes;
- Improve safety of underground fill, and
- Provide consistency between government agencies in regards to air quality monitoring.

It is considered that the proposed modification could be implemented with minor additional impacts that can be managed through simple design features and current control measures.





## 8.0 ACRONYMS

BFS	Blast Furnace Slag
BHCC	Broken Hill City Council
BHOP	Broken Hill Operations Pty Ltd
CBH	CBH Resources Ltd
CML7	Consolidated Mine Lease 7
dB	Decibels – (A) = expression of the relative loudness of sounds in air as perceived by the human ear
dB L Aeq (15 min)	Equivalent continuous noise level over a 15 minute period
DCP	BHCC Development Control Plan
DEF	Diesel exhaust fluid (relates to <i>Adblue</i> used to <i>reduce nitrous oxide emissions</i> )
DPE	NSW Department of Planning and Environment
DPI-Water	NSW Department of Industry - Water
DRG	NSW Division of Resources and Geoscience
EA	Original Environment Assessment
EMM	EMM Consulting Pty Ltd
EP&A Act	NSW <i>Environment Planning &amp; Assessment Act 1979</i>
EPA	NSW Environment Protection Authority
EPL	Environment Protection License
ERM	Environmental Resources Management Pty Ltd
g	grams
Ha	hectare
ICNG	NSW DECC Interim Construction Noise Guideline, 2009
ISO containers	Intermodal containers used to transport freight that meets the International Organisation for Standardisation (ISO)
kg	kilogram
km	kilometres
kph	kilometres per hour
kW	kilowatts
kV	kilovolts
L	litre
LEP	BHCC Local Environment Plan 2013
m	metre
M	million
m <sup>2</sup>	metres squared
m <sup>3</sup>	cubic metres
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.
MOP	Mining Operations Plan
MPL	Mining Purpose Lease
NEPM	National Environment Protection Measure
NES	National Environmental Significance
NMLs	Noise Management Levels
Normandy	Normandy Mining Investments
NPC	Normal Portland Cement
NSW	New South Wales
PA	Project Approval 07_0018
Pb	lead
Perilya	Perilya Broken Hill Operations Pty Ltd
POEO Act	NSW <i>Protection of the Environment Operations Act, 1997</i>
PPR	BHOP Preferred Project Report, 2010
Rasp Mine	the Mine
RBLs	Background Noise Levels
SEE	Statement of Environment Effects
SEPP	State Environment Planning Policy
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
U/G	Underground
WLL	Western Lands Lease
Zn	zinc



## **Appendix A**

Consolidated Mining Lease 7

Western Lands Lease 2638

Western Lands Lease 2639



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## **Appendix B**

### **MOD5 Community Consultation Information Paper** July 2018

Broken Hill Operations Pty Ltd





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## **Appendix C**

### **MOD5 Community Consultation – Summary Report** August 2018

Broken Hill Operations Pty Ltd



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## **Appendix D**

### **MOD5 Key Issues for Consideration**

Email Correspondence to G Wilson

23 July 2018

Department of Planning and Environment



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## **Appendix E**

### **Rasp Mine Modification 5**

Construction noise and vibration assessment

31 July 2018

EMM Consulting Pty Ltd

