Broken Hill Operations Pty Ltd ABN 95 103 555 862

Name of Operation:	Rasp Mine
Name of Operator:	Broken Hill Operations Pty Ltd
Development consent / project approval:	PA 07_0018 (MOD1, MOD2, MOD3)
Name of holder of development consent / project approval:	Broken Hill Operations Pty Ltd
Mining Titles / Leases:	Consolidated Mining Lease 7 Mining Purpose Leases 183, 184, 185, 186
Name of holder of mining lease:	Broken Hill Operations Pty Ltd
Water licence:	85BL256102
Name of holder of water licence:	Broken Hill Operations Pty Ltd
MOP Commencement Date: 1 November 2015	**MOP Completion Date:** 30 September 2017
AEMR Commencement Date: 01/01/2016	**AEMR End Date:** 30/12/2016
I, Rick Muller, certify that this audit report is a true and accurate record of the compliance status of the Rasp Mine for the period 1 January 2016 to 30 December 2016 (Reporting Period) and that I am authorised to make this statement on behalf of Broken Hill Operations Pty Ltd.	
Name of authorised reporting officer:	Rick Muller
Title of authorised reporting officer:	Environment & Community Liaison Officer
Signature of authorised reporting officer:	
Date:	31-Mar-17

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1. STATEMENT OF COMPLIANCE

Table 1.1 summarises conditions of approval outlined in the development consent and mining leases and confirms compliance with relevant approval conditions as at the end of the reporting period.

Table 1.1 Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	(Yes/No)	Risk Level
Project Approval 07_0018 (Consolidated MOD3)	No	Administrative non-compliance
Consolidated Mining Lease 7	Yes	
Mining Purpose Lease 183	Yes	
Mining Purpose Lease 184	Yes	
Mining Purpose Lease 185	Yes	
Mining Purpose Lease 186	Yes	

Table 1.2 lists conditions that were identified as non-compliant and provides a comment outlining actions undertaken and where appropriate addressed in this Annual Report.

Table 1.2 Non-Compliances

Relevant Approval	Condition description (summary)	Comment	Addressed in AEMR
PA07 _0018 Sched 3 Cond 30	Preparation of a Conservation Management Plan for heritage items located on CML7.	BHOP and DRE are continuing to negotiate regarding the fate of heritage items on CML7. However until the final land use and responsibilities are agreed for the whole of the Line of Lode, given that Broken Hill is a Nationally listed item, this work is on hold.	10. Activities Proposed in Next Period
PA07 _0018 Sched 3 Cond 34	Among other things rehabilitation is to achieve the following objectives: • sealing and/ or treating 'free areas' of the site and other potential sources of wind-blown dust to prevent the emission of dust following closure; • preserving the heritage value of the site; and • making the site suitable for commercial and/ or educational uses, to the satisfaction of NSW Trade & Investment.	BHOP and DRE are continuing to negotiate regarding the fate of heritage items on CML7. However until the final land use and responsibilities are agreed for the whole of the Line of Lode, given that Broken Hill is a Nationally listed item, this work is on hold.	10. Activities Proposed in Next Period
PA07 _0018 Sched 3 Cond 35	The Proponent shall prepare and implement a Rehabilitation Management Plan for the project to the satisfaction of NSW Trade & Investment.	BHOP and DRE are continuing to negotiate regarding the fate of heritage items on CML7. However until the final land use and responsibilities are agreed for the whole of the Line of Lode, given that Broken Hill is a Nationally listed item, this work is on hold.	10. Activities Proposed in Next Period

2. INTRODUCTION

2.1 Purpose

This Annual Environment Management Review (AEMR) documents the environmental performance of the Rasp Mine located in Broken Hill (**Figure 2.1**) for the reporting period from 1 January 2016 to December 31 2016. It has been prepared in accordance with the NSW Government *Post-approval requirements for State significant mining developments - Annual Review Guideline*, October 2015 to meet the requirements of the relevant mining leases and Project Approval (07_0018 March 2015 MOD3 – Block 7 Extension).

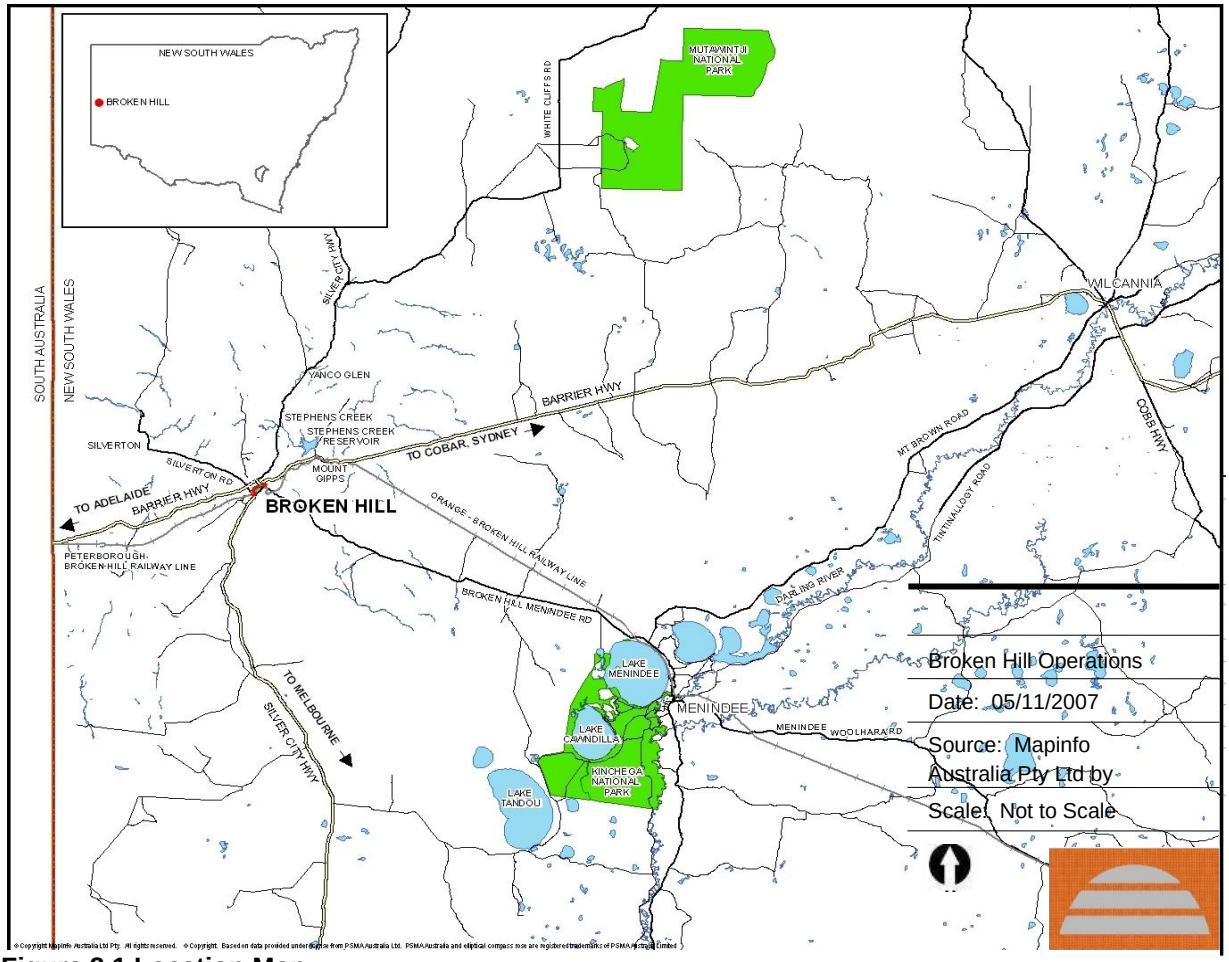

Figure 2.1 Location Map

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The Rasp Mine is owned and operated by Broken Hill Operations Pty Ltd (BHOP), a wholly owned subsidiary of CBH Resources Ltd (CBH). The Mine is located on Consolidated Mining Lease 7 (CML7) within the City of Broken Hill and includes several Mining Purposes Leases (183,184,185 and 186). The Rasp Mine includes underground mining operations, a processing plant producing zinc and lead concentrates, a rail siding for concentrate dispatch to shipping facilities at the Port of Newcastle NSW, or smelter operations in Port Pirie SA, as well as other mining ancillary facilities. It is approved to produce 750,000 tpa of ore and 8,450,000 tonnes of ore over the life of the Project to December 2026.

The Rasp Mine is bounded by Eyre Street and Holten Drive to the south and east, Perilya Broken Hill Operations Pty Ltd (Perilya) North Mine to the northeast, Perilya's South Mine to the southwest, and

Mawson's Quarry lies to the south of the Mill. CML7 is dissected by two major State roads - South Road (Silver City Highway SH22) to the southwest and Menindee Road (MR66) to the northeast. These roads form part of the existing road train and B-double routes through Broken Hill. The Broken Hill railway station is located within CML7 on a surface exclusion with the main Sydney – Perth railway line also located within the Lease on various surface exclusions. Residential and commercial areas surround the mine with pasture land to the south east. An aerial view of the Rasp Mine is provided in Error! Reference source not found..

The mining leases occupy a central region of the historic Broken Hill Line of Lode ore body incorporating the original mine areas that commenced operations in the 1880s including a substantial amount of mining infrastructure from various mining phases. This past mining has left the Rasp Mine area highly modified and disturbed. The original landform has been significantly altered, the majority of native vegetation has been removed and soils have been degraded and covered with waste rock.

There are a number of heritage items on the site relating to historic mining activities and the site is recorded on the Register of National Estate for its heritage values. The people of Broken Hill consider the mine as an important historic site for its role in Broken Hill's history. The Broken Hill Miners Memorial and Broken Earth Café are located centrally within CML7.

The CML7 boundary is shown in **Plan 2**Error! Reference source not found.**,** which also indicates surface exclusion areas and MPLs. The Project Area includes the additional area highlighted in orange. Located in this area are the current Rasp Mine administration offices and stores which are on free hold land owned or leased by BHOP.

The AEMR is distributed to a range of stakeholders that include government authorities, the Broken Hill Lead Reference Group and is available on the CBH website at: www.cbhresources.com.au.

2.2 Mine Contacts

Table 2.1 outlines the contacts for the Rasp Mine.

Table 2.1 Mine Contacts

Name	Title	Contact Details
Visko Sulicich	BHOP Director CBH Chief Operating Officer	**T: 08 8088 9106** **viskosulicich@cbhresources.com.au**
Robert Williamson	BHOP General Manager	**T: 08 8088 9157** **robwilliamson@cbhresources.com.au**
Costa Papadopoulos	BHOP Manager of Health, Safety & Environment	**T: 08 8088 9125** **costapapdopoulos@cbhresources.com.au**
Rick Muller	Environment & Community Liaison Officer	**T: 08 8088 9126** **rickmuller@cbhresources.com.au**
Gwen Wilson	Group Manager – Safety Health Environment Community	**M: 0431 483 825** **gwenwilson@cbhresources.com.au**
Complaints Line	**Health, Safety and Environment Office**	**T: 08 8088 1211**

3. APPROVALS, LICENCES AND PERMITS

3.1 Approvals

Table 3.1 provides a list of all current development consents, mining leases and licences held by the Rasp Mine. There have been no changes to these approvals during the reporting period.

Table 3.1 Rasp Mine - Current Approvals

Approval Number	Date Issued	Expiry	Purpose
Part 3A Application 07_0018	31st Jan 2011	31st 2026	**Mining production of 750,000 tpa from Western Mineralisation, Centenary Mineralisation and Main Lode Pillars. Construction and operation of minerals processing plant and rail load out facility. Supported by an EAR and PPR.** **MOD1 – relocation of primary ventilation shaft** **MOD2 – 24 hour operation of crusher** **MOD3 – Mining of Block 14 (Zinc & Main Lodes)**
MOP 06/6463	Nov 2015	30 Sept 2017	**New MOP for underground mining, ore processing and dispatch of concentrates, including ancillary activities.**
CML7	17 Jan 2007	31 Dec 2026	**Granted 8 Oct 1987. As per Schedule 2 of the Lease - Open cutting, shaft sinking, stoping, tunneling, 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	24 Apr 2007	31 Dec 2026	**Granted 4 Feb 1981. Dumping of ore and mine residues, treatment of tailing**
MPL 184	24 Apr 2007	31 Dec 2026	**Granted 4 Feb 1981. Dumping of ore and mine residues, treatment of tailing**
MPL 185	24 Apr 2007	31 Dec 2026	**Granted 4 Feb 1981. Dumping of ore and mine residues, treatment of tailing**
MPL 186	24 Apr 2007	31 Dec 2026	**Granted 4 Feb 1981. Dumping of ore and mine residues, treatment of tailing**
EL 5818	**7 Mar 2009**	**Approval pending, applied for extension to 2023**	**Granted 8 Mar 2001. Surface disturbing works such as drilling and soil sampling**

3.2 Mining Operations Plan

The Rasp Mine has an approved Mining Operations Plan (MOP) currently in place for the period 1 November 2015 to 30 September 2017. The AEMR, as required by the mining leases, incorporates reporting against MOP compliance.

3.3 Licences / Permits

Table 3.2 presents the licences and/or permits held by BHOP in relation to the Rasp Mine.

Table 3.2 Licences/Permits

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.**
Dangerous Goods Explosives	Work Cover	Pending 24 Oct 2017	**Store** **Manufacture**
Water extraction **85WA752823**	DPI Water	29 Mar 2017 (Renewal pending)	**To extract 370 ML for use on site or to send to Perilya Broken Hill Operations Pty Ltd.**
Radiation	**EPA**	**26 Jul 2017**	**Sell and/or possess radiation apparatus.** **Sell and/or possess radioactive or items containing radioactive substances.**

3.4 Management Plans

The Rasp Mine has developed a number of environmental management plans as required by PA07_0018 and EPL12559. **Table 3.3** provides a list of these Plans together with the date last updated.

Table 3.3 Status of Environmental Management Plans

Environmental Management Plan	Condition	Updated
Environment Management Strategy	Sched 4 Cond 1	08-Nov-16
Air Quality Management Plan	Sched 3 Cond 11	27-Jan-17
Air Quality Monitoring Program	Sched 3 Cond 11	09-Nov-16
(Community) Lead Management Plan	Sched 3 Cond 13	01-Mar-16
Noise and Blast Management Plan:	Sched 3 Cond 20	
- **Noise Management Plan**		04-Nov-16
- **Vibration, Overpressure and Subsidence Management Plan**		04-Nov-16
- **Ground Control Management Plan**		31-Oct-14
- **Technical Blasting and Vibration Management Plan**		04-Nov-16
- **Noise Monitoring Program** - **Blasting Monitoring Program**		07-Nov-16
(Site) Water Management Plan	Sched 3 Cond 23	26-Nov-16
Traffic Management Plan	Sched 3 Cond 29	03-Mar-16
Conservation Management (Strategy) Plan	Sched 3 Cond 30	Pending
Waste Management Plan	Sched 3 Cond 33	01-Apr-16
Rehabilitation Management Plan (Mining Operations Plan)	Sched 3 Cond 35	22-Mar-16

4. OPERATIONS SUMMARY

During the reporting period there were no material changes to the operations at the Rasp Mine. This section provides a description of activities undertaken in 2016.

Table 4.1 outlines the production summary for the reporting period. The information in this table is a result of a review of data inputs for the years 2012 to 2016 and has been amended to improve accuracy. Predictions for the next reporting period are taken from the planned 2017 budget.

Table 4.1 Production Summary – Cumulative

Material	Approved Limit	Start of reporting period	At end of reporting period	End of next reporting period
Waste rock	NA	1,368,241	1,730,498	2,218,460
Ore	750,000	2,173,104	2,836,251	3,539,133
Processing waste	NA*	1,883,291	2,439,128	3,059,793
Product	NA*	243,462	317,433	399,650

4.1 Exploration

4.1.1 Surface Exploration

(E) Browne's Potential

Consistent with the drilling programs proposed in the MOP, the Rasp Mine completed a series of costeans in the area of Browne Shaft followed by the commencement of a drilling program. This program will test the upper remaining virgin ore above the North Junction Mine stoping. The purpose is to acquire geotechnical data and assess the economic prospects of commencing an open pit to extract shallow surface ore and further to install a portal to extract any underground resource.

The program is located on land already disturbed by historic mining and no vegetation was removed. Top soils had already been removed from the area. The drill pads were installed off existing tracks with minimal earthworks required. No heritage structures at Browne's Shaft were affected.

Four costeans were constructed at the beginning of the reporting period and were approximately 3 m deep, 4 m wide and 6 to 10 m in length with the exception of a longer trench of 20 m. they were constructed using an excavator along existing tracks. The majority of the trenches have been back filled and partially rehabilitated with the exception of the areas where drill pads were installed.

The drill program required the installation of 11 drill pads 20 m by 12 m each totalling an area of 2,640 m^2. In 2016, 348.5 m was completed over 5 drill holes. It is planned to continue this program into 2017 with the installation of a further three drill holes and the completion of 870 drilled metres.

In total land disturbance of previous mining areas, including access over surrounding areas, was approximately 3,900 m^2 or 0.39 ha. On completion of the program rehabilitation will be completed as required.

The Rasp Mine also intends to undertake other surface drilling programs in the next reporting period as proposed in the MOP.

4.1.2 Underground exploration

During the reporting period, 31,794.8 m on 324 holes were drilled underground from the following areas:

- Underground Diamond Drilling Western Mineralisation – 17,407.4m
- Underground Diamond Drilling Main Lodes – 14,387.4m

Metres Planned for the next reporting period is 51,810 m across 3 drilling rigs – Main Lodes 14,715 m and Western Mineralisation: 37,095 m.

4.2 Construction

4.2.1 New buildings / structures

No new buildings were constructed during the reporting period.

As a consequence of upgrading the site Traffic Management Plan a new Go Pad (30 m by 60 m) for heavy vehicles awaiting repair, was installed in the laydown area adjacent to Ventilation Shaft 6. This required the construction of ramps to allow access by heavy vehicles. This area was already highly disturbed from previous mining and current mining infrastructure and no soils or vegetation were removed. Approximately 13,000 t of waste rock from the Kintore Pit stockpile was used to construct the ramps. Testing of this material showed the lead content at an average of 0.15%.

Minor structural modifications were completed during the reporting period, no heritage values were affected:

- Enclosed veranda at Radford House to accommodate storage for cap lamps and self-rescuers.
- Installed an office inside the workshop building.

In accordance with PA07_0018 MOD3, ventilation equipment was installed in the existing Shaft 6 and monitoring of this unit commenced in July 2016. As this was installed into an existing mine shaft no earthworks were required and no new land disturbance occurred.

4.2.2 Roads and fencing

No new roadways or fencing were constructed during the reporting period. Routine maintenance of roads was undertaken as required. Boundary fencing was also inspected and repaired. In particular a higher grade mesh (mining ground control grade) has been installed to areas damaged by members of the public, mainly juveniles, to gain entry to the Lease (at British Flats and north of No 4 Headframe).

4.3 Mining

4.3.1 Mine Access

All mining for ore is undertaken underground, which is accessed through the existing portal located at the northern end of the Kintore Pit. Mining activities include mining of the Western Mineralisation, Main Lode Pillars and Zinc Lode.

Mining activities were undertaken as follows and met the requirements of the Project Approval:

- Truck haulage from underground to ROM pad 24 hours per day, 7 days per week
- Production rock blasting between 6.45 am to 7.15 pm, 7 days per week
- Development blasting concurrently with production blasting where practicable
- Ventilation fans, 24 hours per day, 7 days per week
- Underground operations, 24 hours per day, 7 days per week

4.3.2 Mining Method and Sequence

The mining of mineral ore is limited to underground workings.

A variety of production methods are utilised, including long-hole open stoping (LHOS), uphole benching, room and pillar and uphole pillar retreat mining. LHOS is the most prevalent method used in the Western Mineralisation, uphole stoping, with room and pillar and uphole pillar retreat in the Main Lode Pillars.

The ore was blasted using a bulk emulsion explosive and extracted using load haul dump vehicles (LHD's) either conventionally or under remote control. Ore and waste was excavated using load haul dump (LHD) equipment and transported to loading points where mine trucks transported ore to the ROM pad.

A total of 42 stopes have been mined with 658,773t of ore coming from those stopes. **Plan 3** provides a longsection indicating location of the stopes mined. **Table 4.2** lists the stopes mined during the reporting period.

Table 4.2 Mined Stopes 2016

Western Mineralisation Stopes	Zinc Lode Stopes	Main Lode Stopes
WM_11_173 UH	ZL 408 UH	B11 9Sub SSill Floor Strip
WM_11_9_Nth_UH	ZL L2 XC4 Backstrip	ML_1630(1715)_134_DH Stope
WM_11_9_Sth_UH	ZL Lift 1 Floor Strip	ML_B11_1300_167_UH
WM_12_172	ZL Lift 1 Sth Sill DR XC4 Floor Strip	ML_B11_1300_170_UH
WM_12_7a UH	ZL Lift 1 Xcut 2	ML_B11_9_144 DH
WM_13L 159a	ZL Lift 1 Xcut 3	ML_B11_9s_146 DH
WM_13L 159b	ZL Lift 2 Floor Strip	ML_B11_9s_148 DH
WM_13L 171a	ZL Sth Sill Backstrip	
WM_13L 171b	ZL Xcut 6 Back strip	
WM_13L_162 UH		
WM_14L _162A UH		
WM_14L _173 UH		
WM_14L _175 UH		
WM_14L_154 UH		
WM_14L_156 UH		
WM_14L_163 NTH UH		
WM_14L_163 STH UH		
WM_15_170 UH		
WM_7_193 UH		
WM_7_239		
WM_7_240		
WM_7_243		
WM_7L_206_UH		
WM_8 Sub_179		
WM_8s_172		
WM_8s_173		

4.3.3 Void Backfilling

Waste rock was used to backfill mined out stopes. The backfill plant was not operational during the reporting period. As the long-hole stopes planned in PA-Mod3 were not undertaken in the Zinc Lodes during the reporting period waste rock could to be used to fill voids in this area. A vertical distance of 64 m was maintained from South Rd/Bonanza Street.

4.3.4 Waste Rock

Waste rock generated from the underground mine is generally reused immediately underground as backfill. During the reporting period 265,369t of waste rock was returned underground as void fill. Waste rock was also stockpiled in Kintore Pit and during the reporting period 96,888t was deposited on this stockpile. At the end of the reporting period the waste stockpile in Kintore Pit held approximately 789,134t.

Waste rock is also used for road making/repair, noise bunds or rehabilitation. When used for these purposes the waste rock is tested to ensure that only material with less than 1% lead is used. During the reporting period approximately 13,000t was taken from the Kintore Pit Stockpile and used to install ramps for truck access to the maintenance 'Go Bay' where vehicles await repair. The testing of this material showed the lead content at an average of 0.15%.

4.3.5 Underground decline development

The current Rasp Decline provides access to stopes for mining and during the reporting period the Decline was extended by 285m providing access to the Western Mineralisation 15 and the first 16 Level stopes.

4.3.6 Ore and Waste Stockpiles

Ore (658,773 t) was transported by truck and stored on the ROM Pad before being processed. The ROM Pad is 32 m by 80 m and is surrounded by 5 m wind breaks, water sprays were used to control dust. No more than a week's processing was stored on the ROM stockpile at any one time.

The amount of ore produced during the period was slightly more than that indicated in the MOP, an increase of 48,773 t. This was the result of a planned increase in the last quarter to take advantage of the higher metal prices. There was a reduction in waste rock of 97,743 t.

In anticipation of the continuing higher metal prices production rates are planned to increase in 2017 to 702,882 t of ore, which is below the approved maximum rate of 750,000 tpa.

Ore and waste production in 2016 is shown in **Table 4.3**.

Table 4.3 Ore and Waste Summary

Item	Total Production Tonnes
Topsoil Stripped	N/A
Topsoil Spread	N/A
Ore Tonnes Mined: Dry Tonnes	663,147
Waste Backfill (UG Rock Places): Tonnes	265,369
Waste Trucked to Surface: Tonnes	96,888

4.4 Mineral Processing

4.4.1 Processing Methods and Rates

All mined ore was processed on site in the Rasp Mine processing plant. This consists of a single stage crushing circuit with a two stage Semi-Autogenous Grind (SAG) – Ball milling circuit capable of processing ore at the required rate and to the required grind size. Material then passes through differential flotation which incorporates conventional roughing, scavenging and multi-stage cleaning and includes concentrate regrind, to produce separate lead and zinc concentrates. Concentrates are dewatered using thickeners and pressure filtration, the filtered concentrates are conveyed directly into concentrate containers for rail transport to a shipping port. Concentrate is stored in these sealed containers in readiness for loading onto the rail system for transport to the CBH shiploader in

Newcastle, NSW or to the Nystar Pty Ltd smelter at Port Pirie, SA. In 2016 all zinc concentrate was sent via rail to the shiploader, and all lead concentrate was sent via rail to the smelter.

Reagents used in the process included pulp pH modifier, flotation frothers, collectors, activators and depressants, used in various combinations in the lead and zinc flotation circuits. Flocculants are used in concentrate and tailing dewatering.

A summary of mineral processing production rates for the reporting period is presented in **Table 4.4**.

Table 4.4 Mineral Processing Summary

Activity	Total 2016
Milled	627,811t
Lead concentrate	26,938t
Zinc concentrate	47,033t
Tailings deposited	555,837t
Tailings Storage Facility (TSF)2 storage capacity as at end of period	2.75 years

4.4.2 Mill Operating Hours

The processing plant operates 24 hours per day in accordance with the Project Approval. The restriction to activities, Schedule 3 Condition 16 (b) shunting of concentrate wagons shall only occur between 7:00am and 6:00pm on any day, no shunting of concentrate wagons occurs during the loading or unloading of concentrate containers. Concentrate trains are moved into and out of the loading area by Pacific National operators as one unit and no reordering of wagons occurs. Pacific National conducts this activity twice per week taking 10 to 15 minutes, following inspection of the connection and state of the wagons. Once loaded, the train departs in the same direction as arrival. During the reporting period there were no community complaints related to this activity.

During the reporting period the processing plant operated on a campaign basis with processing occurring three weeks of the month with the fourth being a shutdown week for routine maintenance.

4.4.3 Mineral Waste - Tailings

All tailings generated from the processing plant are deposited into Blackwood Pit (TSF2). Tailings from the flotation process are pumped to and deposited at the south-western end of TSF2 via a duty/standby configuration of centrifugal pumps. Particle solids settle out of the slurry stream along the length of TSF2 in a north-easterly direction. Any excess water collects at the northeast end of the facility and is pumped back into the process water tank via a mobile diesel water pump.

During the reporting period 555,837t of tailings were pumped to TSF2, on average the tailings contained the following elements; zinc (0.36%), lead (0.31%), silver (11g/t), copper (0.01%), iron (3.15%), sulphur (1.2%), arsenic (460ppm), bismuth (70ppm), cadmium (trace) and antimony (45ppm).

In the initial Project Approval BHOP underestimated the amount of mine development that was required to access the Main Lode and Western Mineralisation ore bodies. The need to undertake more underground mining development than anticipated has reduced the capacity of underground voids to accept both waste rock and tailings material from the Backfill Plant. In the original EA it was predicted that approximately 250,000t of waste rock would be produced each year for a production

rate of 750,000t of ore, this has since increased to 300,000t to 360,000t per year for an average production rate per year of 650,000t of ore. BHOP has chosen to place the additional waste rock underground to fill voids and stopes, as it is more economic to dispose of waste rock underground if possible rather than transporting waste to the surface. Hence, there is no void space underground for the backfill of tailings. BHOP also opted to deposit tailings in TSF2 only as this facility had greater capacity and was economically more viable.

Table 4.5 shows past and proposed tailings deposition and waste rock production rates.

Table 4.5 Summary of Proposed (EA) and Actual Placement of Waste Rock and Tailings

Year (to 30 June)	EA Tailings in Underground back fill per year (t)	EA Tailings deposited in TSF1 (t)	EA Tailings deposited in TSF2 (t)	EA Waste Rock U/G (t)	Actual[1]/ Predicted[2] Tailings in TSF2 (t)	Actual waste rock placed underground (t)	Actual waste rock stored Kintore Pit (t)	Actual Total waste rock (t)
2012	97,969	273,281	0	250,000	322,111[1]	47,527	150,000[3]	197,527
2013	195,938	195,138	0	250,000	574,833[1]	230,607	150,000[3]	380,607
2014	195,938	195,138	0	250,000	486,749[1]	223,473	163,304	386,777
2015	216,563	216,563	0	250,000	499,598[1]	223,611	228,942	452,553
2016[1]	247,500	88,281	159,219	250,000	555,837[1]	265,369	96,888	362,257
2017[1]	278,438	0	278,438	250,000	530,000[2]	-	-	-
2018[1]	309,375	0	309,375	250,000	530,000[2]	-	-	-
2019[1]	309,375	0	309,375	250,000	530,000[2]	-	-	-
2020[1]	309,375	0	309,375	250,000	530,000[2]	-	-	-
TOTALS	**3,397,969**	**968,401**	**2,413,291**	**2,250,000**	**4,533,291**	**990,587**	**789,134**	**2,057,855**

Note[1]: Actual tailings deposited.
Note[2]: Predicted tailings deposition.
Note[3]: Estimated

The Rasp Mine is currently compiling a modification to its Project Approval to infill some dips around the perimeter of the Pit to increase the life of the facility by an additional 2 years. This will provide sufficient time to locate and seek approval for either a new site facility for tailings deposition or an off-site location.

4.5 Water Usage

Raw water and potable water are supplied by Essential Water with take off valves at the Eyre Street entrance to the Rasp Mine. Raw water, water from the town supply, is supplied untreated to the mine site via existing connections. Potable water is supplied direct from the town supply and is used for drinking, safety showers and in the crib rooms and change houses.

BHOP are required to dewater the mine workings to ensure the safety of both the employees at the adjacent Perilya South Mine and its own employees. This water is extracted under licence and can be used on the Rasp Mine site or transferred for use at the Perilya operations.

Reclaimed water from operations is also used on-site. Water from the processing area, including tailings facility, are treated and recycled for use in the processing plant.

The Rasp Mine has installed a number of water meters to monitoring water supplies and movements these are listed in **Table 4.6**.

Table 4.6 Flow Meters and Recording Frequency

Flow Meter	Recording Frequency
Underground supply	Weekly
Mill supply	Weekly
Concentrate shed	Weekly
Raw water supply	Weekly
Mine water (U/G water & Shaft 7)	Weekly
Evaporation dam pump well	Weekly
Decant dam pump well (Blackwoods Pit TSF)	No flow meter installed

Raw water used during the period was 277ML, down from 284ML used in the previous period due to improved water treatment for extracted water which has decreased the demands of raw water use.

Potable water used during the period was 8.8ML, is down from 9.2ML used in the previous period.

BHOP has a water extraction licence, to extract by active pumping 370ML pa. **Table 4.7** and **Table 4.8** provide details for this licence and water pumping. The level of pumping is required to maintain the safety of personnel working underground at both the Rasp Mine and the adjacent Perilya South Mine.

Table 4.7 Water Licence Details

Water Licence #	Management Zone	Entitlement	Passive take / inflows	Active pumping	TOTAL
85BL256102	NSW MURRAY DARLING BASIN FRACTURED ROCK GROUNDWATER SOURCES	370ML	NA	370ML	370ML

Table 4.8 Water Extraction and Return During the Period 1 July 2015 to 30 June 2016

Location	Total extracted (L)	Storage Location	Total Stored as at 30 June 2016
Shaft 7	411,085,000	**S22**	9,900,000
U/G Dewatering	450,614,600[1]	**S22A**	3,500,000
Used U/G	131,580,000	**TSF Decant**	1,500,000
Used Mill	401,476,000		
Perilya	22,150,774		

1 Suspect over estimate due to intermittent pumping which results in the pipe where the meter is installed not awalys being full, however, both flow meters install in this pipe (mechanical and ultrasonic) continue to record even under low / insufficient flows. BHOP is currently investigating an alternative location for these meters.

In accordance with the Licence water was transferred to Perilya South Mine Operations on the 09/04 (21,416,774L) and the 04/09 (734,000L).

4.6 Mining Fleet

There were no major changes to the mining fleet during the reporting period with some trucks and light vehicles replaced and/or scrapped. No major changes are planned for the next reporting period. **Table 4.9** lists the mining fleet as at the end of the reporting period.

Table 4.9 Mining Fleet 2016

Type	Number
Jumbo drill	3
Production Drill	1
Haul Truck	5
Load Haul Dump	5
ANFO Charger	1
Forklift,IT	9
Grader	1
Excavator	1
Service Vehicle	9
Wheel Loader	2
Prime Mover	2
Light Vehicle	25

4.7 Next Reporting Period

4.7.1 Exploration

- Exploration will continue on surface and underground consistent with that outlined in the MOP.
- Surface drilling programs will include continuation of the Browne's Shaft program and possibly the commencement of (A) Footwall Drilling, (B) North Central shaft and footwall drilling, (C) Wilsons Drilling and Blackwoods Northern Zinc Lodes and East Vein Potential.
- Underground drilling will continue in line with mine plans.

4.7.2 Operations

Table 4.10 outlines the planned production rates for 2017**. Plans 4a** and 4**b** show mining areas and stopes. It is planned to increase production in 2017 to take advantage of the current increased metal prices, tailings deposition will increase to 620,665 t leaving the facility with a life of 1.8 years at the end of 2017.

Table 4.10 Planned Production for 2017

Activity	January to December 2017
Ore Mined	702,882
Waste Backfill (UG Rock Places)	132,681
Waste Trucked to Surface	355,281
Milled	702,882
Lead concentrate	25,585
Zinc concentrate	56,632
Tailings deposited	620,665
TSF2 storage capacity as at end of period	1.7 years

5. ACTIONS REQURIED FROM PREVIOUS ANNUAL REVIEW

The 2015 AEMR review and site visit was held at the Rasp Mine on 29 April 2016. The Division of Resources and Energy (DRE) reviewed the AEMR and determined that the report generally satisfies the requirements of the relevant conditions of the company's mining leases. No additional actions were requested. **Table 5.1** outlines the feedback from the Department of Planning & Environment (DPE) and lists the request for additional information.

Table 5.1 Actions from the Previous AEMR

Actions required from 2015 AEMR	Section in AEMR
1 Graphical representation and discussions of trends and comparisons with previous years.	Section 6 various
2 Identify any trends in the monitoring data over the life of the development.	Section 6 various
3 Comparison of all results with the predictions in the Environment Assessment.	Section 6 various
4 Identification of any discrepancies between the predicted and actual impacts of the development, and analysis of the potential cause of any significant discrepancies.	Section 6 various
5 Describe what measures will be implemented over the next year to improve the environmental performance of the project.	"Activities proposed in next AEMR Period"
6 The mine's environmental targets and strategies for the next year, taking into account identified trends in monitoring results compared over time.	Section 6 Table 6-1

6. ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

During 2016, an Independent Environmental Audit was completed. The audit reported "a high level of compliance with PA 07_0018 MOD3, EPL 12559 and CML 7", concluding that significant work had been carried out in the three years preceding the audit to improve statutory compliance. A total of 172 conditions were examined, identifying 138 compliances, 11 non-compliances, 8 potential non-compliances and 15 not applicable findings. The next independent audit will be carried out in 2019. The non-compliances and potential non-compliances found during the audit are shown in **Appendix 1**
Table 6.1 summarises environmental performance in 2016.

Table 6.1 Environmental Performance Summary

Aspect	Met Approval / criteria (yes/no)	Performance during the reporting period (EA Prediction)	Trend/key management implications	Implemented/proposed management actions
Air Quality - Dust Deposition	Yes	Performance is consistent with EA predictions and EPL conditions	Dust deposition is decreasing in most sites, including all offsite monitoring points	Lignosulphonide dust suppressant to be trialled on site roads and bare areas Waste rock to be spread on some waste dump tops Air quality "traffic lights" to be developed
Air Quality - Dust	Yes	Performance is consistent with EA predictions and EPL conditions	Airborne dust at all offsite receptors is lower than before operations commenced	
Air Quality - Stack emissions	Yes	Performance is consistent with EA predictions and EPL conditions	Crusher Baghouse monitoring showed an increase over the year, however this has been addressed in early 2017.	Maintenance strategy reviewed by third party, to be implemented in 2017
Noise	Yes	Performance is consistent with EA predictions and EPL conditions	No breaches of limits were reported	
Blasting - vibration	Yes	Performance is consistent with EA predictions and EPL conditions		
Blasting - overpressure	Yes	Performance is consistent with EA predictions and EPL conditions		
Blasting - subsidence	Yes	No subsidence has been detected.		Monitoring will continue
Heritage	Yes	No activities have been conducted that are not consistent with the EA.		Funding to be sought for the stabilisation of the No 4 headframe Continued discussions regarding closure

6.1 Meteorological

While temperatures in 2016 remained consistent with historical records, rainfall was significantly higher than the BoM's long term average of 259mm, shown in **Table 6.2**. Wind speeds and direction are displayed in **Figure 6.1**.

Table 6.2 2016 Meteorological Summary

	Min	Max	Average
Daily Minimum (°C)	-0.2	31.1	12.1
Daily Maximum (°C)	9.1	42.6	24.6
Wind Gust (km/h)	17	100	43.5
Rainfall (mm)	0	36.4	Total 382.6

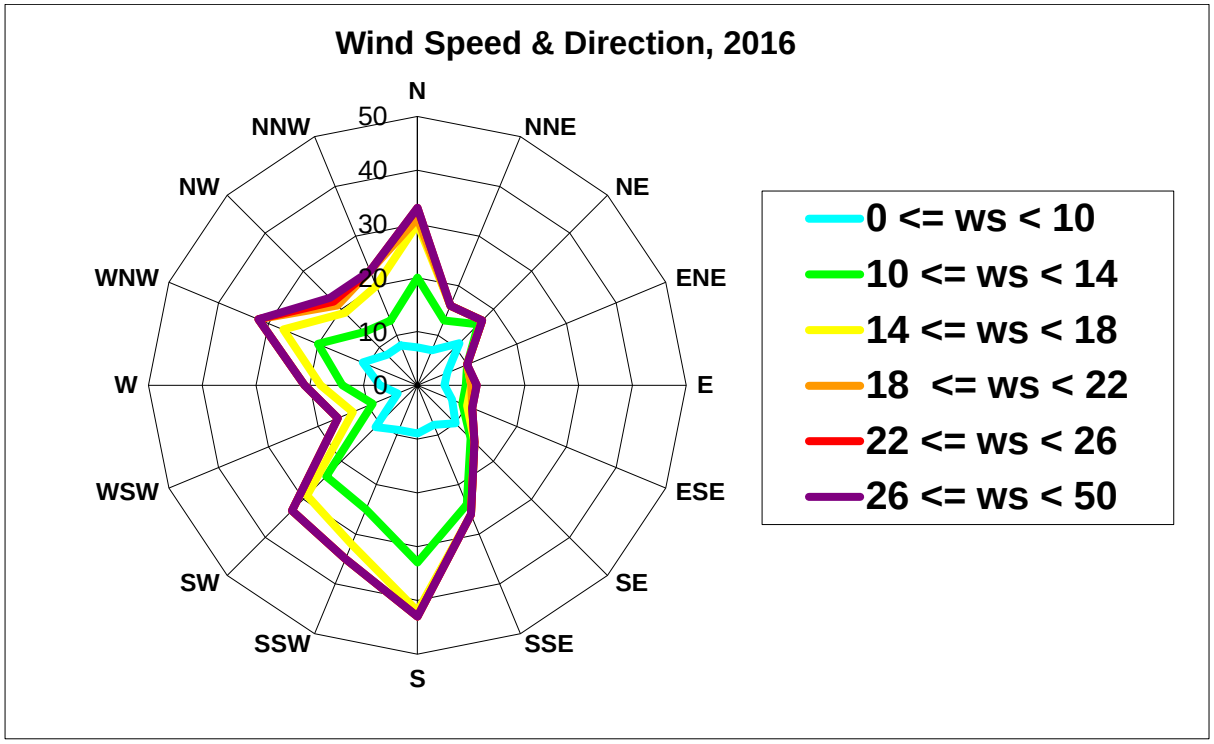

Figure 6.1 2016 Wind Speed & Direction

6.2 Air Quality

6.2.1 Dust Criteria

Project Approval 07_0018 specifies two types of air quality impact assessment criteria relating to dust deposition and particulate concentration levels. Dust deposition levels refer to the quantity of dust particles that settle out from the air as measured in grams per square metre per month (g/m^2/month) at a particular location. Particulate concentration refers to airborne dust and is measured in micrograms per cubic metre of air ($\mu g/m^3$). Criteria are provided for both long term – **Table 6.3**, and short term impact assessment – **Table 6.4**.

Table 6.3 Long Term Impact Assessment Criteria for Particulate Matter

Pollutant	Averaging Period	Criterion
Total suspended particulate (TSP) matter	Annual	90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	30 µg/m^3

Table 6.4 Short Term Impact Assessment Criterion for Particulate Matter

Pollutant	Averaging Period	Criterion
Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3

Dust deposition criteria are provided in terms of both an acceptable increase in dust deposition over the existing background levels and an absolute maximum value. These impact assessment criteria are summarised in **Table 6.5**.

Table 6.5 Dust Deposition Criteria

Pollutant	Averaging Period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

In 2016, a report was completed comparing 2016 monitoring data to Preferred Project Report (PPR) predictions. Air quality performance was equal to or better than predicted at all modelled receptors, both on and off site.

Table 6.6 displays the predicted and measured dust. **Figure 6.2** displays the location of the modelled receptors.

Table 6.6 2016 Air Quality Results Compared to PPR Predictions

	TSP Annual			PM10 Annual			Deposited Lead Annual			Deposited Dust Monthly Average		
Receptor	**2016 Measured**	**PPR Modelling**	**Change**	**2016 Measured**	**PPR Modelling**	**Change**	**2016 Measured**	**PPR Modelling**	**Change**	**2016 Measured**	**PPR Modelling**	**Change**
R1	0.30	1.5	-1.2	0.3	0.4	-0.1	0.01	0.04	-0.03	0.07	0.19	-0.1
R2	0.36	1.4	-1.0	0.3	0.5	-0.2	0.02	0.05	-0.03	0.09	0.18	-0.1
R3	0.63	2.1	-1.5	0.5	0.8	-0.3	0.02	0.09	-0.07	0.16	0.32	-0.2
R4	0.35	1.4	-1.1	0.3	0.5	-0.2	0.02	0.06	-0.04	0.09	0.25	-0.2
R5	0.29	1	-0.7	0.2	0.4	-0.2	0.01	0.04	-0.03	0.07	0.16	-0.1
R6	0.32	1.2	-0.9	0.2	0.6	-0.4	0.01	0.04	-0.03	0.07	0.17	-0.1
R7	0.13	0.5	-0.4	0.1	0.2	-0.1	0.00	0.01	-0.01	0.03	0.04	0.0
R8	0.30	0.9	-0.6	0.3	0.4	-0.1	0.01	0.03	-0.02	0.07	0.12	-0.1
R9	0.23	0.8	-0.6	0.2	0.3	-0.1	0.01	0.02	-0.01	0.05	0.09	0.0
R10	0.22	0.8	-0.6	0.2	0.2	0.0	0.01	0.02	-0.01	0.05	0.09	0.0
R11	0.20	0.7	-0.5	0.2	0.3	-0.1	0.01	0.02	-0.01	0.04	0.08	0.0
R12	0.14	0.5	-0.4	0.1	0.2	-0.1	0.01	0.02	-0.01	0.03	0.06	0.0
R13	0.13	0.5	-0.4	0.1	0.2	-0.1	0.00	0.01	-0.01	0.03	0.05	0.0
R14	0.14	0.5	-0.4	0.1	0.2	-0.1	0.00	0.01	-0.01	0.03	0.05	0.0
R15	0.05	0.2	-0.2	0.1	0.1	0.0	0.00	0.01	-0.01	0.01	0.02	0.0
R16	0.06	0.2	-0.1	0.1	0.1	0.0	0.00	0.01	-0.01	0.01	0.03	0.0
R17	0.11	0.4	-0.3	0.1	0.1	0.0	0.00	0.01	-0.01	0.02	0.05	0.0
R18	0.11	0.3	-0.2	0.1	0.1	0.0	0.00	0.01	-0.01	0.02	0.02	0.0

	TSP Annual			PM10 Annual			Deposited Lead Annual			Deposited Dust Monthly Average		
Receptor	**2016 Measured**	**PPR Modelling**	**Change**	**2016 Measured**	**PPR Modelling**	**Change**	**2016 Measured**	**PPR Modelling**	**Change**	**2016 Measured**	**PPR Modelling**	**Change**
R19	0.04	0.2	-0.2	0.0	0.1	-0.1	0.00	0.01	-0.01	0.01	0.02	0.0
R20	0.04	0.2	-0.2	0.0	0.1	-0.1	0.00	0.01	-0.01	0.01	0.02	0.0
R21	0.31	1.8	-1.5	0.3	0.6	-0.3	0.01	0.05	-0.04	0.07	0.28	-0.2
R22	0.31	1.9	-1.6	0.4	0.6	-0.2	0.02	0.06	-0.04	0.07	0.32	-0.2
R23	0.32	2	-1.7	0.4	0.6	-0.2	0.02	0.08	-0.06	0.08	0.31	-0.2
R24	0.34	2.2	-1.9	0.3	0.7	-0.4	0.02	0.11	-0.09	0.09	0.37	-0.3
R25	0.21	1.2	-1.0	0.2	0.4	-0.2	0.01	0.04	-0.03	0.05	0.17	-0.1
R26	0.42	2.3	-1.9	0.4	0.8	-0.4	0.03	0.15	-0.12	0.12	0.43	-0.3
R27	0.63	2.9	-2.3	0.5	1	-0.5	0.04	0.2	-0.16	0.23	0.47	-0.2
R28	0.50	2.3	-1.8	0.5	0.8	-0.3	0.03	0.15	-0.12	0.17	0.37	-0.2
R29	0.39	2.2	-1.8	0.4	0.7	-0.3	0.03	0.14	-0.11	0.12	0.34	-0.2
R30	0.34	1.7	-1.4	0.3	0.6	-0.3	0.02	0.1	-0.08	0.11	0.26	-0.2
R31	0.21	1.1	-0.9	0.2	0.4	-0.2	0.01	0.06	-0.05	0.05	0.16	-0.1
R32	0.19	1	-0.8	0.2	0.3	-0.1	0.01	0.05	-0.04	0.05	0.15	-0.1
R33	0.18	0.9	-0.7	0.2	0.3	-0.1	0.01	0.05	-0.04	0.05	0.15	-0.1
R34	0.30	1.2	-0.9	0.3	0.4	-0.1	0.01	0.04	-0.03	0.08	0.15	-0.1
R35	0.28	1.2	-0.9	0.3	0.4	-0.1	0.01	0.04	-0.03	0.07	0.16	-0.1
R36	0.26	1.2	-0.9	0.2	0.4	-0.2	0.01	0.04	-0.03	0.06	0.16	-0.1

	TSP Annual			PM10 Annual			Deposited Lead Annual			Deposited Dust Monthly Average		
Receptor	**2016 Measured**	**PPR Modelling**	**Change**	**2016 Measured**	**PPR Modelling**	**Change**	**2016 Measured**	**PPR Modelling**	**Change**	**2016 Measured**	**PPR Modelling**	**Change**
R37	0.23	1.2	-1.0	0.2	0.4	-0.2	0.01	0.05	-0.04	0.05	0.16	-0.1
R38	0.12	0.4	-0.3	0.1	0.1	0.0	0.00	0.01	-0.01	0.02	0.03	0.0
R39	0.12	0.4	-0.3	0.1	0.2	-0.1	0.00	0.01	-0.01	0.02	0.04	0.0
R40	0.24	0.9	-0.7	0.2	0.3	-0.1	0.01	0.03	-0.02	0.06	0.11	-0.1
R41	0.30	1.1	-0.8	0.3	0.3	0.0	0.01	0.03	-0.02	0.07	0.13	-0.1
R42	0.33	1.2	-0.9	0.3	0.4	-0.1	0.01	0.04	-0.03	0.08	0.15	-0.1

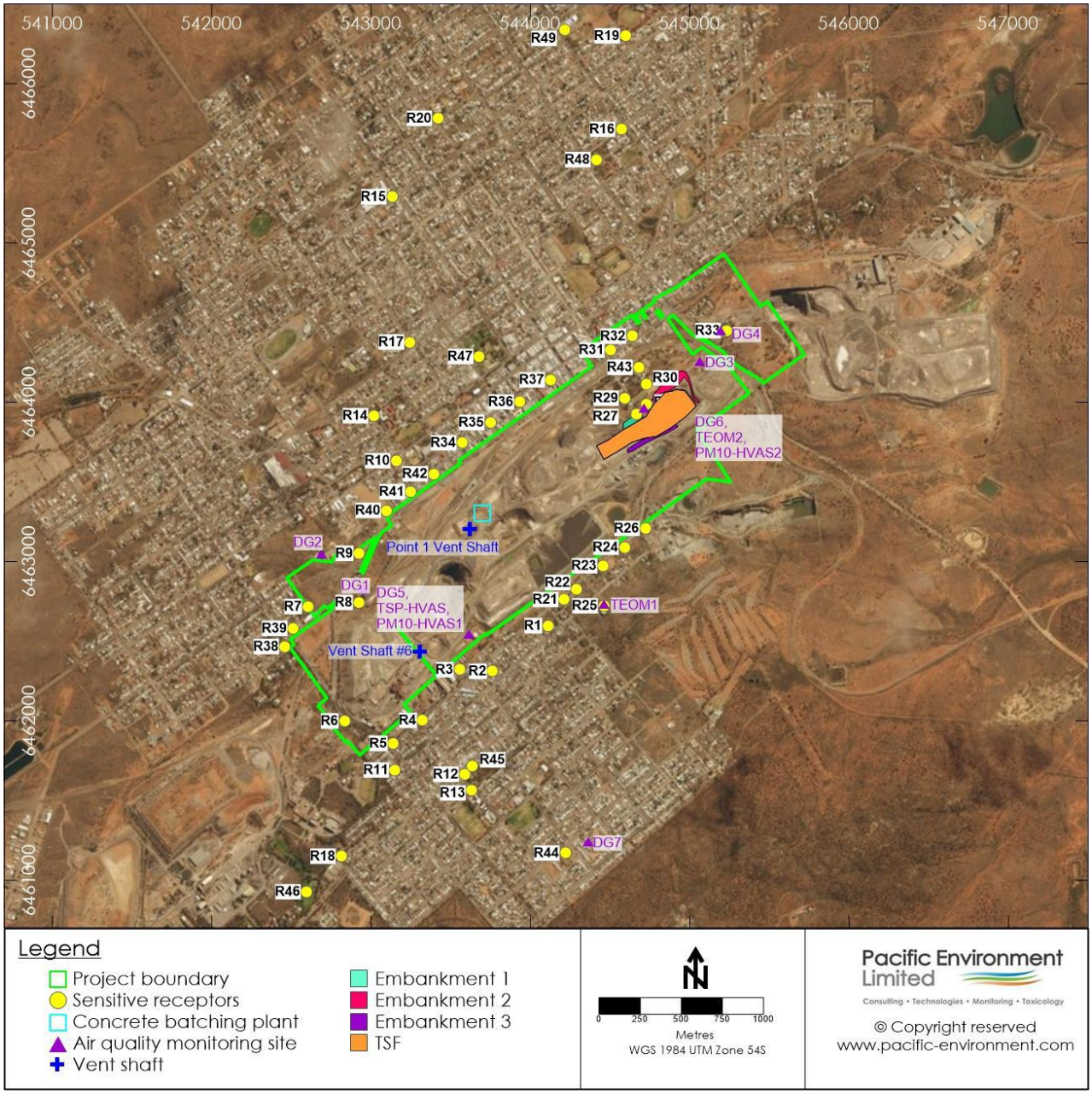

Figure 6.2 Location of modelled receptors

6.2.2 Management Controls – Total Dust

Air Quality Management Plan BHO-PLN-ENV-001 lists the controls that were in place during the reporting period. In summary the major controls include:

- The use of chemical dust suppressant on non-active mining areas and roads
- Sealing of all major roads and the use of a street sweeper and water truck
- Wing walls and roof over the ROM Bin and water sprays on the apron feeder to the crusher
- Fully enclosed conveyors and transfer points prior to the Sag Mill with installed dust collectors
- Restricted access to non-active mining areas

- Use of water sprays on the ROM Pad
- Concentrate loading into containers occurs in an enclosed building and containers are covered prior to exiting the building
- All vehicles leaving site are washed, including trucks taking containers to the rail loadout area.

Monitoring results indicate that controls have been adequate to manage dust levels during the reporting period.

6.2.3 In-Stack Air Quality Criteria

The EPL Condition L2.1 specifies the in-stack performance criteria for the two ventilation exhaust units - Primary Ventilation Shaft and Shaft 6 (**Table 6.7**), and the crusher Bag-house (Table 6.8).

Table 6.7 Discharge Criteria for Ventilation Shafts

Pollutant	Units of Measure	Concentration Limit
Oxides of nitrogen (as NO_2)	Milligrams per cubic metre	350
Total solid particles (TSP)	Milligrams per cubic metre	20
Type 1 and Type 2 substances	Milligrams per cubic metre	1
Volatile organic compounds (as n-propane)	Milligrams per cubic metre	40

Table 6.8 Discharge Criteria for Baghouse

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

6.2.4 Management Controls – In-Stack

Air Quality Management Plan BHO-PLN-ENV-001 lists the controls that were in place during the reporting period. In summary the major controls include:

- Fully enclosed primary crusher operating under negative pressure to a baghouse.
- Automatic watering sprays on the ventilation shafts.

6.2.5 Monitoring Results

The Air Quality Monitoring Management Plan BHO-PLN-ENV-010 lists the monitoring locations and requirements for the Rasp Mine. The following provides a summary of these monitoring requirements together with the results for the reporting period. A discussion of any identified trends and a comparison with predictions in the original EA/PPR are also provided. The sampling locations for all air quality monitoring are depicted on **Figure 6.3**.

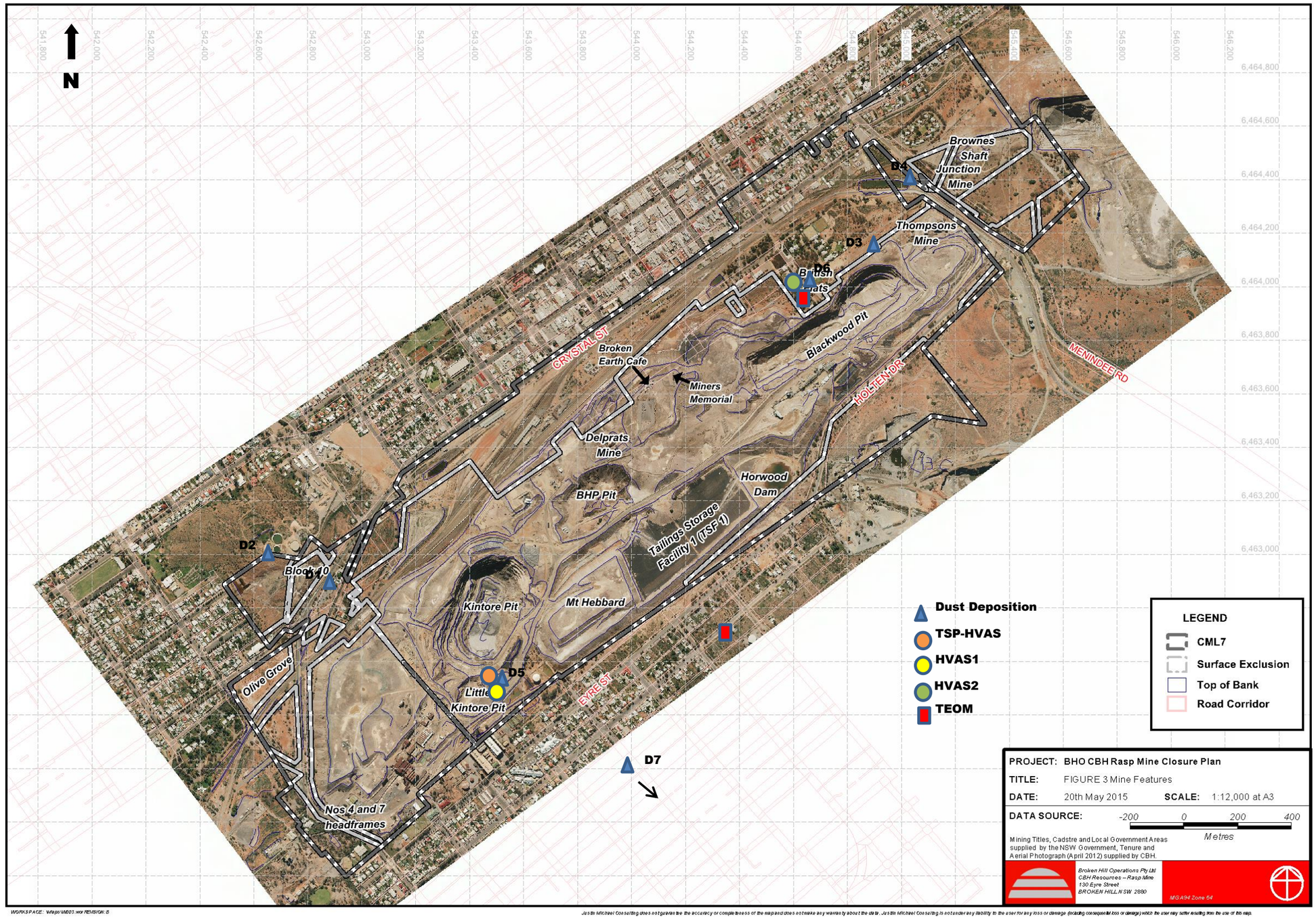

Figure 6.3 Air Quality Sampling Locations

Dust Deposition

Total fallout dust (depositional dust) is sampled monthly. A total of seven deposition gauges are in use. Two gauges are located on site and five off site, one control site is located at Casuarina Avenue. Sampling locations are shown on Figure 6.3. Samples are sent to ALS Laboratory in Newcastle for NATA accredited analysis. A summary of dust deposition is provided in **Table 6.9** which provides results for the last three years and includes the background mean from the June 2010 EA. **Figure 6.4** provides a summary of the 2016 results. A summary of the lead content of dust deposition is provided in **Table 6.10** which provides results for the last three years and includes the background mean from the June 2010 EA. **Figure 6.5** provides a summary of the 2016 results.

Table 6.9 Dust Deposition Results - Overview

	EA 2010	2016			2015			2014		
Site	**Background[1] MEAN**	**MEAN[1]**	**MIN[1]**	**MAX[1]**	**MEAN[1]**	**MIN[1]**	**MAX[1]**	**MEAN[1]**	**MIN[1]**	**MAX[1]**
D1 St Johns	4.0	0.78	0.28	1.75	1.02	0.28	2.43	1.64	0.17	7.92
D2 Block 10	3.01	0.41	0.06	1.02	0.50	0.06	1.02	0.84	0.11	2.55
D3 Thompson's	4.3	1.02	0.57	1.75	1.66	0.51	2.55	2.19	0.34	5.49
D4 Browne's	5.7	1.17	0.28	2.94	1.30	0.11	1.98	2.19	0.28	5.83
D5Silver Tank	N/A[2]	1.41	0.28	2.83	1.20	0.34	1.98	1.41	0.51	2.72
D6 Casuarina Ave	5.8	2.79	0.34	8.71	2.78	0.23	6.68	3.07	0.23	10.24
D7 Blackwood Pit	N/A[2]	0.95	0.28	1.92	0.90	0.06	1.92	1.32	0.40	2.55

1 Particulates – deposited matter (g/m^2/m).

2 Not available as not included in original EA.

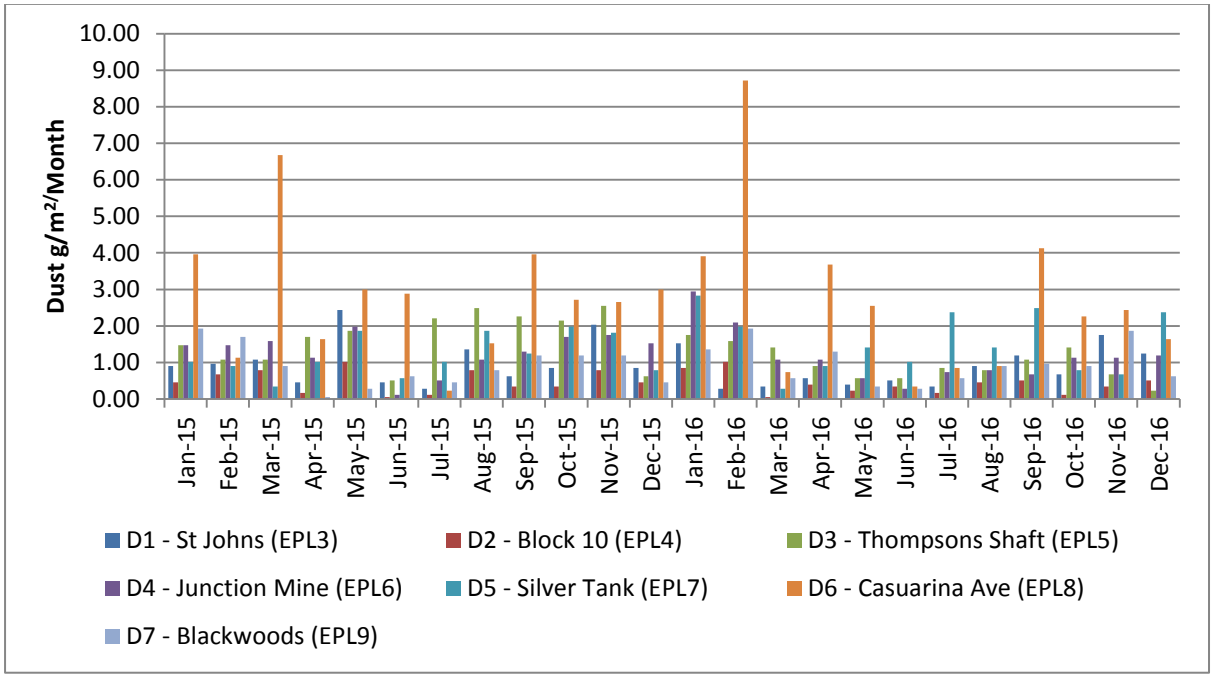

Figure 6.4 Monthly Total Deposited Dust for 2016

Dust deposition results have continued to decrease and remain below background levels. The two sites that recorded an increase D5 Silver Tank (1.41) and D7 Blackwood Pit (0.95) are both located on CML7 and remain equal to or below the levels recorded in 2014 of 1.41 and 1.32 respectively. D6 located at Casuarina Avenue continues to record the highest result (2.79) overall with Block 10 D2 recording the lowest (0.41).

In the EAR predicted results for R27 receptor for deposited dust was 4.7, this is considerably higher than the recorded results (0.95) at the D7 Blackwood Pit gauge which is located approximately 30 m away.

Table 6.10 Total Monthly Deposited Lead Overview

	EA 2010	2016			2015			2014		
Site	**Background[1] MEAN**	**MEAN[1]**	**MIN[1]**	**MAX[1]**	**MEAN[1]**	**MIN[1]**	**MAX[1]**	**MEAN[1]**	**MIN[1]**	**MAX[1]**
D1 St Johns	0.0034	0.003	<0.001	0.010	0.005	0.000	0.008	0.003	0.00	0.010
D2 Block 10	0.0045	0.002	<0.001	0.007	0.002	0.001	0.005	0.002	0.000	0.003
D3 Thompson's	0.0046	0.011	<0.001	0.037	0.018	0.005	0.033	0.006	0.002	0.013
D4 Browne's	0.0060	0.008	<0.001	0.031	0.009	0.020	0.018	0.004	0.001	0.007
D5Silver Tank	N/A[2]	0.009	<0.001	0.028	0.004	0.004	0.006	0.008	0.001	0.015
D6 Casuarina Ave	0.0036	0.002	<0.001	0.007	0.002	0.000	0.005	0.003	0.001	0.006
D7 Blackwood Pit	N/A[2]	0.012	0.003	0.0029	0.009	0.002	0.020	0.003	0.002	0.006

1 Particulates – deposited lead (g/m^2/m).
2 Not available as not included in original EA.

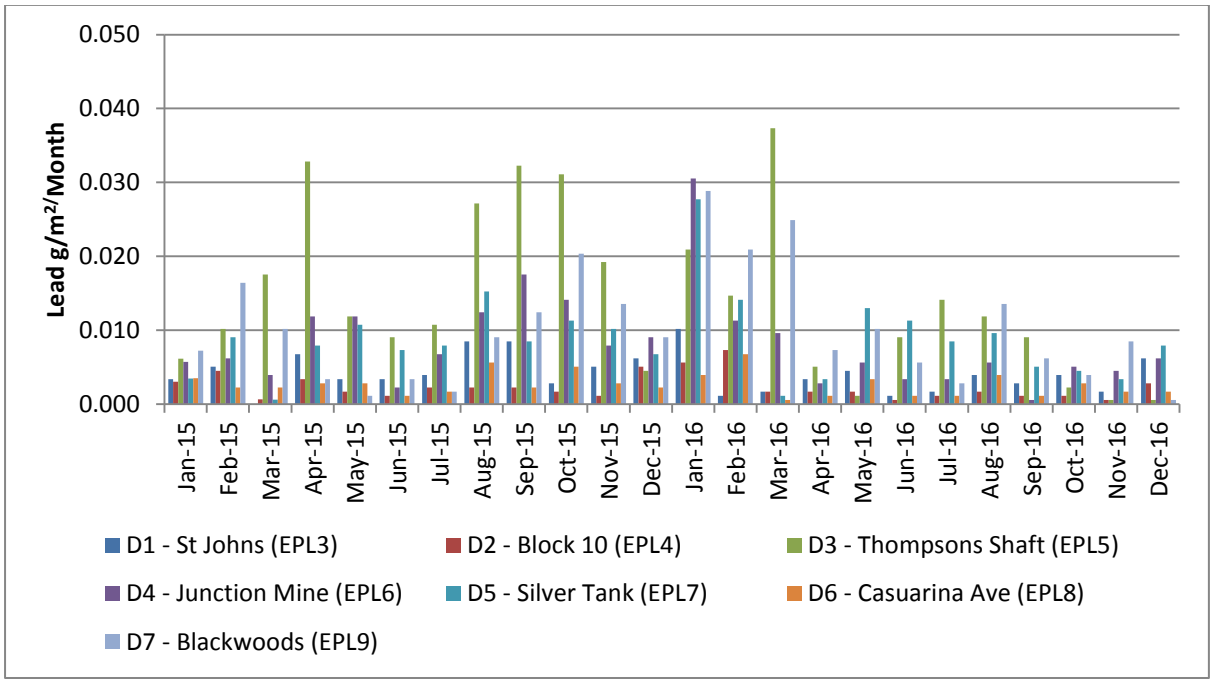

Figure 6.5 Monthly Lead Deposition 2015 and 2016

While the results have decreased overall from 2015, high results have been noted at Silver Tank and Blackwood's monitors, which are both on site, during early 2016. This was likely caused by dry, hot

conditions and frequent strong winds. In 2017, a new lignosulphonide dust suppressant will be used on roads and bare areas on site, and bare areas on the top of two waste dumps will have inert waste rock spread to reduce dust generation.

In the EAR predicted results for R27 receptor for lead dust was 0.2046, this is considerably higher than the recorded results 0.12 at the D7 Blackwood Pit gauge which is located approximately 30 m away.

Dust deposition trends are described in **Table 6.11**.

Table 6.11 Dust Deposition Trends

Site	2015/16 Trend	Long term trend	Comment
D1 St Johns	Stable	Decrease	
D2 Block 10	Stable	Decrease	
D3 Thompson's	Falling	Decrease	
D4 Junction Mine	Falling	Decrease	
D5Silver Tank	Stable	Decrease	
D6 Casuarina Ave	Stable	Decrease	High results in deposited dust do not correlate with lead results. It is therefore unlikely that the dust in this monitor originated from the project. Lead results are low and consistent with 2015 results.
D7 Blackwood Pit	Stable	Decrease	

6.2.6 Dust Particulate Concentration - High Volume Air Samplers

There are three high volume air samplers – TSP-HVAS, HVAS1 and HVAS2 installed by the Rasp Mine, all located on site - two are located at the Silver Tank and sample for TSP/Pb and one is located adjacent Blackwood Pit and monitors for and PM_{10}/Pb. The location of the monitors are shown on **Figure 6.3**.

TSP-HVAS (EPL10)

The annual average TSP level recorded for the reporting period was 33.88$\mu g/m^3$ a slight increase from the previous period of 27.2$\mu g/m^3$ however remains below the background annual average of 56.4$\mu g/m^3$ and the criteria of 90$\mu g/m^3$. The annual average TSP total lead increased (0.20$\mu g/m^3$ up from 0.15$\mu g/m^3$) but remains below the level recorded in 2014, 0.39$\mu g/m^3$. The Rasp Mine Project Approval does not stipulate any criteria for lead, however the recorded annual average of TSP lead is below the NSW EPA guideline of 0.5$\mu g/m^3$, DECCW, 2005 *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.*

Total suspended particles is only monitored at TSP-HVAS located at the Silver Tank on CML7, at the closest receptor to this location, R3, the predicted level for annual average TSP was 66.9$\mu g/m^3$, almost half the recorded level. The predicted level for annual average TSP lead at R3 was 0.054$\mu g/m^3$.

Due to a transformer failure in June 2016, the HVAS monitor was moved to an area closer to operations. The increased TSP coincides with this move. The monitor was moved back in December 2016. It is anticipated that TSP will return to previous levels in 2017.

Results for PM_{10} and Lead are shown in **Table 6.12**, **Figure 6.6** and **Figure 6.7**.

Table 6.12 TSP-HVAS Results Overview

PERIOD	TSP (µg/m³)			Total Lead (µg/m³)		
	MIN	MAX	MEAN	MIN	MAX	MEAN
1 Jan to 31 Dec 2016	5.00	81.00	33.88	0.02	0.68	0.20
16 Dec 2014 to 31 Dec 2015	3.30	73.80	27.20	0.01	0.68	0.15
1 Apr to 16 Dec 2014	3.04	78.39	22.08	0.00	0.41	0.13
1 Mar 2013 to 30 Apr 2014	2.02	152.44	26.83	0.04	4.33	0.39
Background EA 2010	**3.2**	**415.3**	**56.4**	**N/A[1]**	**N/A[1]**	**N/A[1]**

1 Not available as not included in original EA.

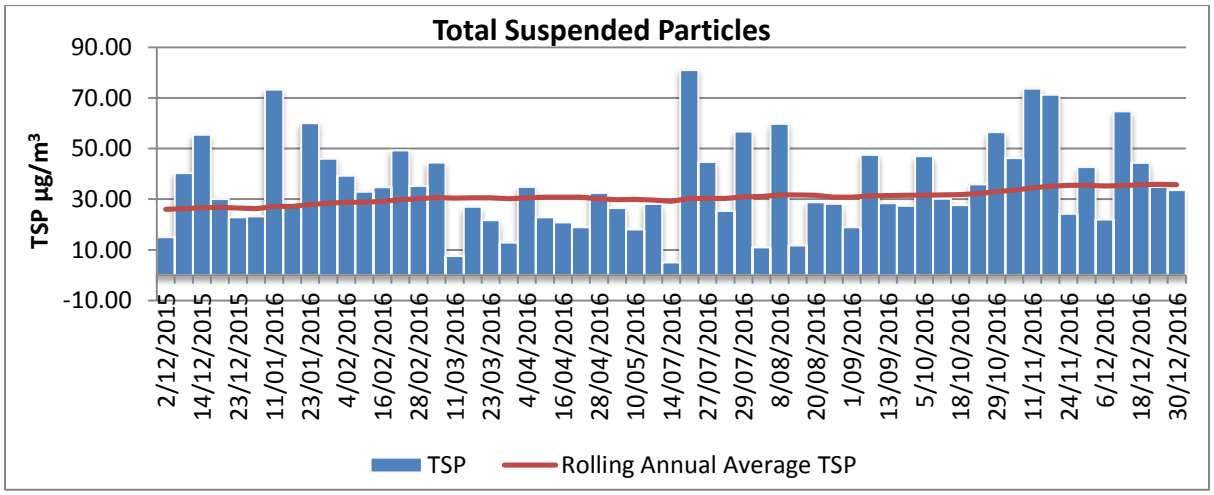

Figure 6.6 TSP-HVAS TSP Summary Results for 2016

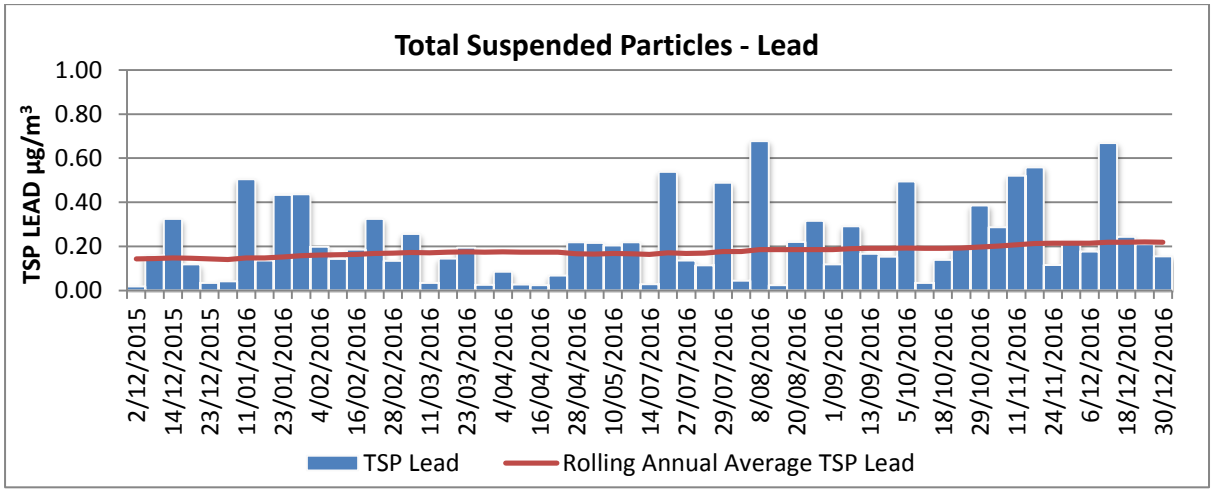

Figure 6.7 TSP-HVAS Lead Summary Results for 2016

HVAS1 (EPL11)

The average annual PM10 level recorded at this monitoring point was 15.19 μg/m^3 which has increased when compared to the previous reporting period however it remains below the background level reported in the EA of 29.1 μg/m^3. This result remains well below the criteria of 30 μg/m^3 and within the normal range of results from the operation's history.

The annual average lead concentration has slightly increased from 0.05 μg/m^3 to 0.06 μg/m^3 however remains well below the level recorded in 2014 of 0.29 μg/m^3.

The recorded PM10 result at HVAS1 (15.19 μg/m^3) is well below the prediction for R3, the closest receptor to this monitoring point reported in the EA at 28.5 μg/m^3.

Due to a transformer failure in June 2016, the HVAS monitor was moved to an area closer to operations. The increased PM_{10} coincides with this move. The monitor was moved back in December 2016. It is anticipated that PM_{10} will return to previous levels in 2017.

Results for PM_{10} and Lead are shown in **Table 6.13**, **Figure 6.10** and **Figure 6.11**.

Table 6.13 HVAS1 Results Overview

PERIOD	PM10 (μg/m^3)			Total Lead (μg/m^3)		
	MIN	MAX	MEAN	MIN	MAX	MEAN
1 Jan to 31 Dec 2016	0.9	47.50	15.19	0.01	0.49	0.06
16 Dec 2014 to 31 Dec 2015	1.50	31.0	11.52	0.00	0.17	0.05
1 Apr to 16 Dec 2014	0.06	54.34	8.04	0.00	0.22	0.08
1 Mar 2013 to 30 Apr 2014	1.72	83.33	15.80	0.04	2.80	0.29
Background EA 2010	**0.9**	**281.2**	**29.1**	**N/A[1]**	**N/A[1]**	**N/A[1]**

1 Not available as not included in original EA.

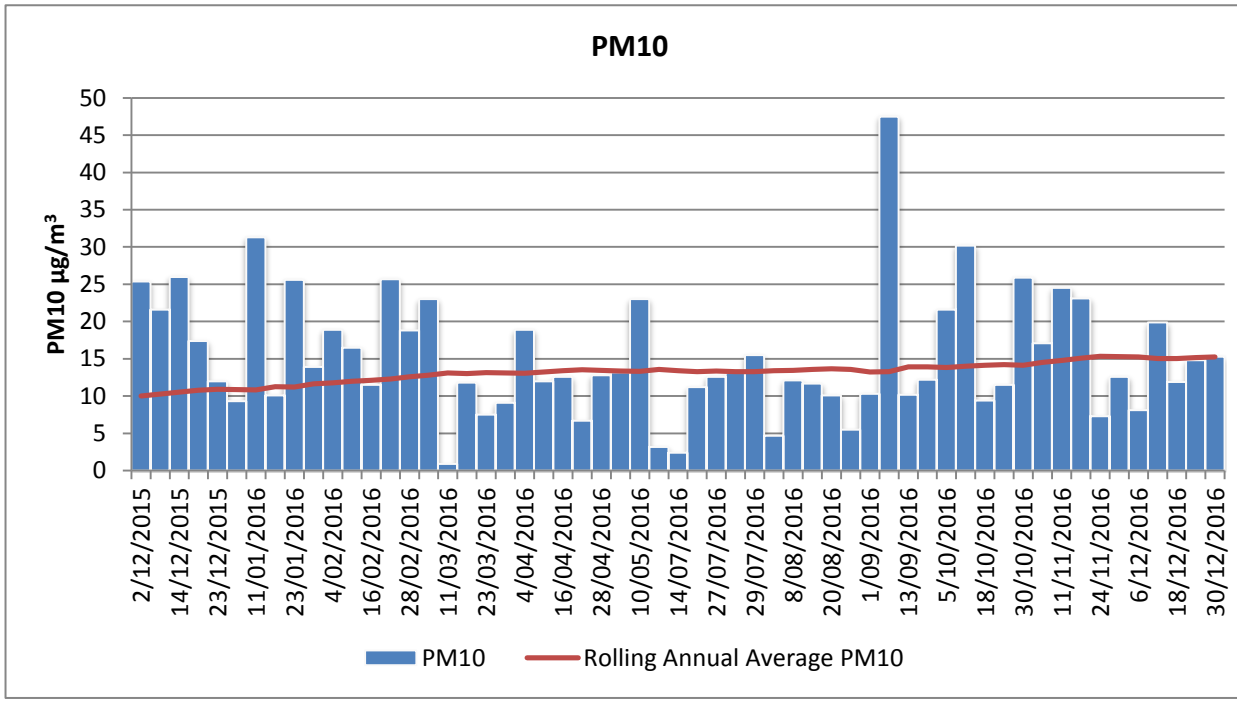

Figure 6.8 HVAS1 PM10 Summary Results for 2016

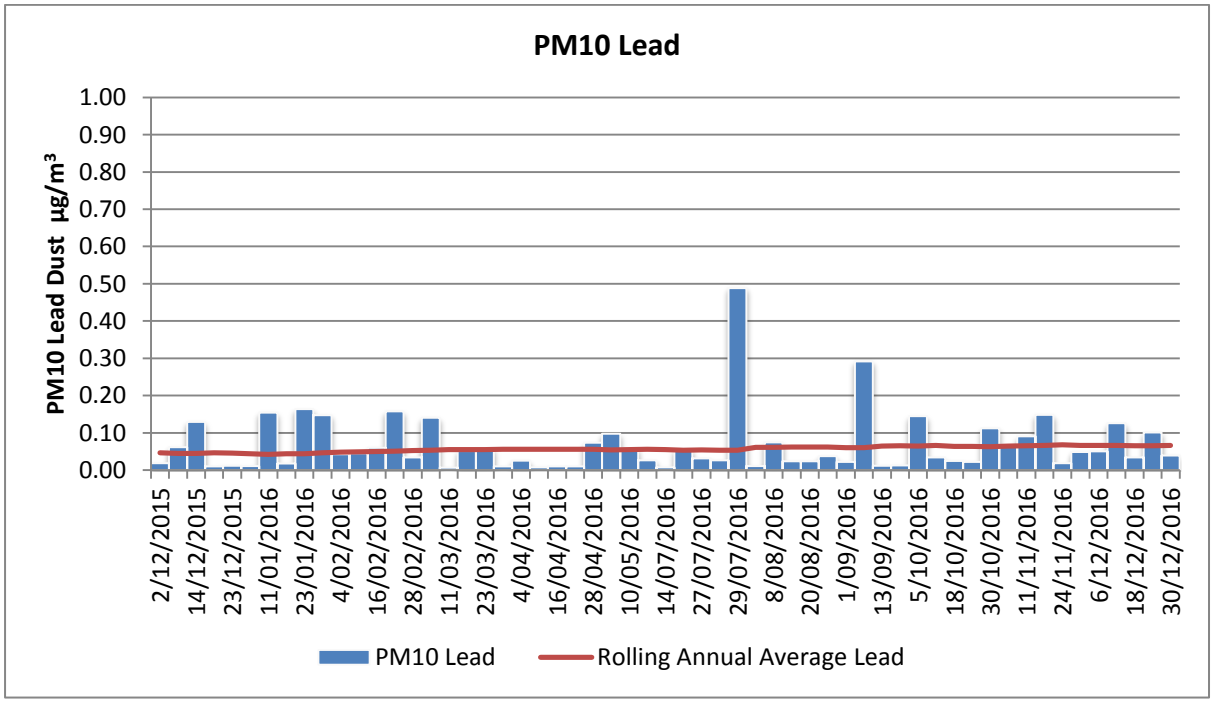

Figure 6.9 HVAS1 Lead Summary Results for 2016

HVAS 3 (EPL12)

The average annual PM_{10} level recorded at this monitoring point was 11.8µg/m^3 which has increased slightly when compared to the previous reporting period however it remains below the background level reported in the EA of 29.1µg/m^3. This result remains well below the criteria of 30µg/m^3 and within the normal range of results from the operation's history.

The annual average lead concentration has increased from 0.05μg/m^3 to 0.08μg/m^3 however remains well below the level recorded in 2014 of 0.26μg/m^3 and within the normal range of results from the operation's history.

The recorded PM_{10} result at HVAS2 (11.8 μg/m^3) is well below the prediction for R27, the closest receptor to this monitoring point reported in the EA at 28.6μg/m^3.

Results for PM_{10} and Lead are shown in **Table 6.14**, **Figure 6.10** and **Figure 6.11**.

Table 6.14 HVAS3 Results Overview

PERIOD	PM10 (μg/m^3)			Total Lead (μg/m^3)		
	MIN	MAX	MEAN	MIN	MAX	MEAN
1 Jan to 31 Dec 2016	1.00	32.50	11.18	0.01	0.32	0.08
16 Dec 2014 to 31 Dec 2015	0.05	28.57	8.44	0.01	0.24	0.05
1 Apr to 16 Dec 2014	0.05	75.1	10.40	0.00	0.41	0.09
1 Mar 2013 to 30 Apr 2014	0.59	70.47	14.26	0.04	1.39	0.26
Background EA 2010	**0.9**	**281.2**	**29.1**	**N/A[1]**	**N/A[1]**	**N/A[1]**

1 Not available as not included in original EA.

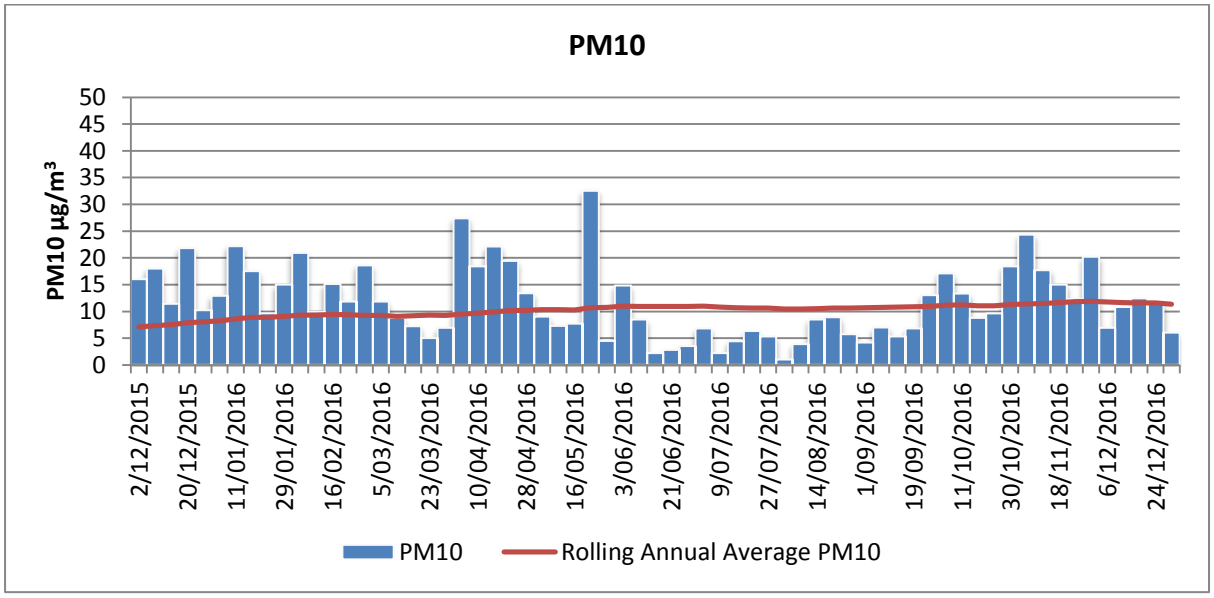

Figure 6.10 HVAS3 PM10 Summary Results for 2016

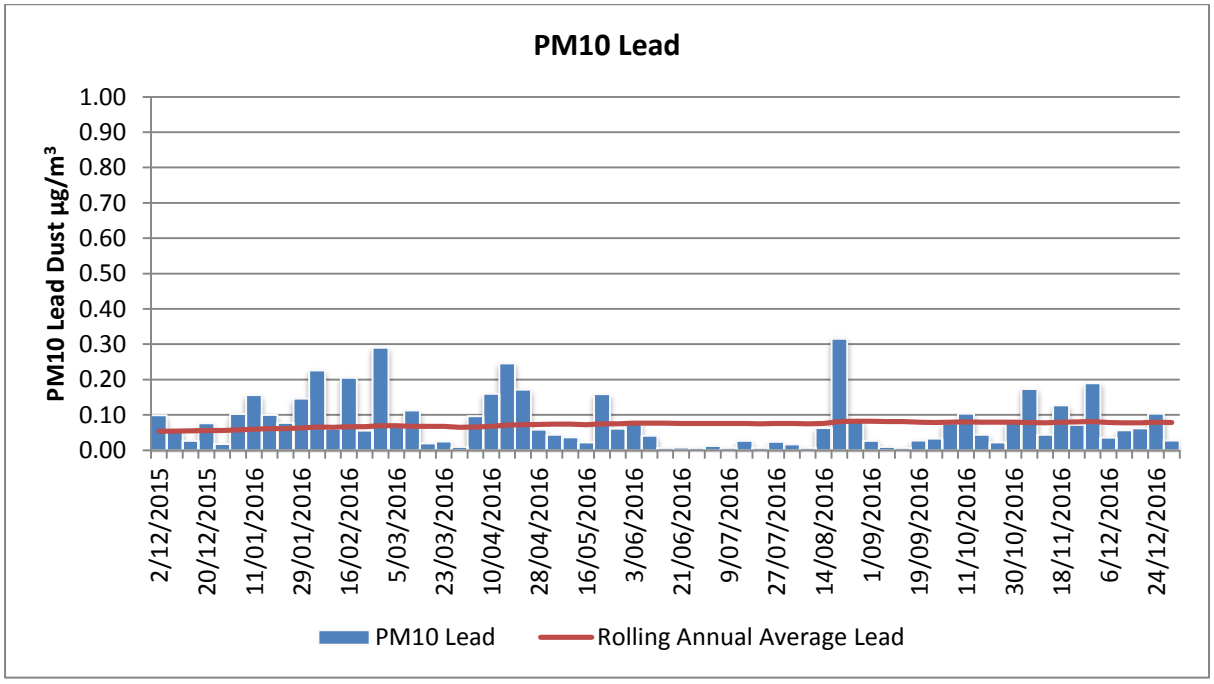

Figure 6.11 HVAS3 PM10 Lead Lummary Results for 2016

6.2.7 Dust Particulate Concentration – TEOM Monitors

The Rasp Mine has two Tapered Element Oscillating Microbalance (TEOM) air quality monitors, which record real time PM_{10} data. The location of these monitors is shown on **Figure 6.2**. This data is used to manage dust emissions during the day. The monitors provide a real time read out on a kiosk computer in the HSE office which is monitored by HSE personnel. When the level exceeds 50ug/m3, the cause is investigated and where possible controlled by use of the water truck or by modifying work methods. During the reporting period the annual rolling average did not exceed criteria at either monitoring point.

Dust concentrations at both TEOM monitors remains well within guidelines and displays a slight downward trend over the last three years.

Table 6.15 and **Table 6.16** summarise the TEOM data from 2013-2016 compared to EA predictions. **Figure 6.12** and **Figure 6.13** display monthly averages.

Table 6.15 TEOM 1 Results Overview

PERIOD	TEOM1 PM10 (µg/m^3)		
	MIN	MAX	MEAN
1 Jan to 31 Dec 2016	5.32	54.04	13.68
16 Dec 2014 to 31 Dec 2015	0.00	91.74	4.94
1 Apr to 16 Dec 2014	0.00	147.92	15.9
1 Mar 2013 to 30 Apr 2014	0.00	76.17	15.79
Background EA 2010	**0.9**	**281.2**	**29.1**

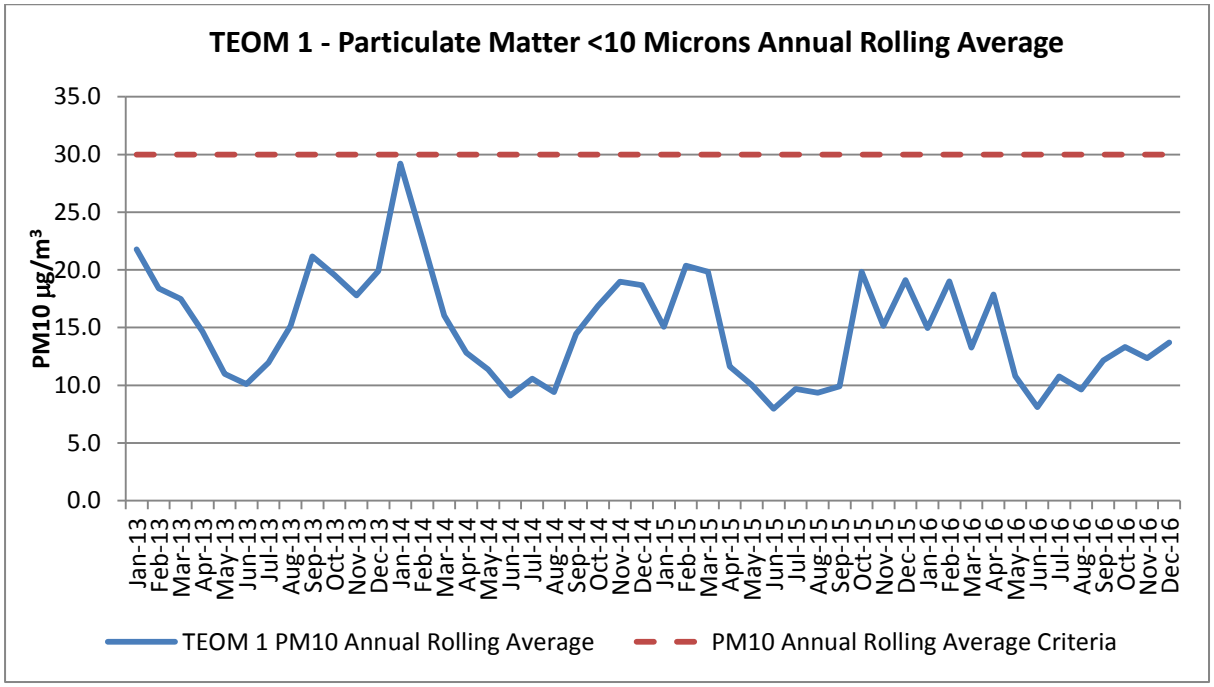

Figure 6.12 TEOM 1 Summary 2013 - 2017

Table 6.16 TEOM 2 Results Overview

PERIOD	TEOM2 Total Lead (µg/m^3)		
	MIN	MAX	MEAN
2016	0.00	45.97	13.69
2015	9.0	22.0	15.1
2014	9.3	32.0	18.5
2013	7.8	32.6	19.4
Background EA 2010	N/A[1]	N/A[1]	N/A[1]

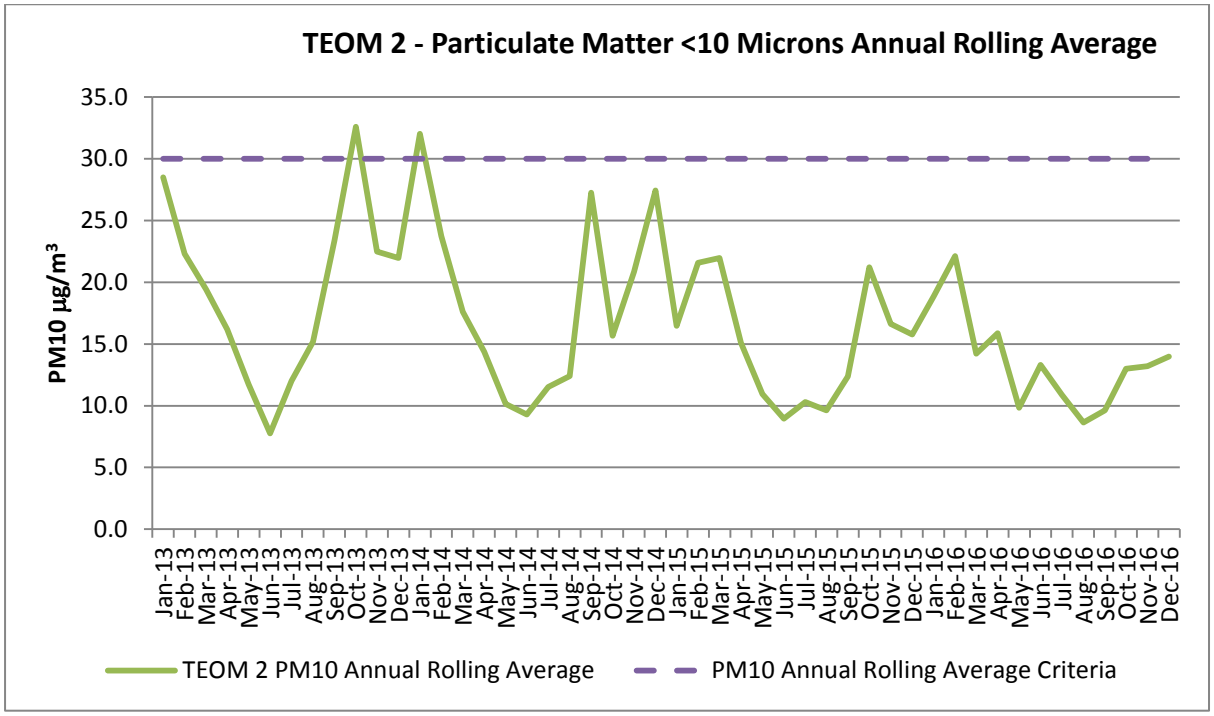

Figure 6.13 TEOM 2 Summary 2013 - 2017

6.2.8 In-Stack Air Quality

The Rasp Mine monitors point stack emissions from three sources:

- Primary Ventilation Shaft (EPL1)
- Crusher Baghouse (EPL2)
- Ventilation Shaft 6 (EPL56)

Stack testing is conducted quarterly. The sampling on the primary ventilation shaft is timed to coincide with blasting activities in the mine. To perform representative sampling on a release point of this size and to achieve reasonable detection limits, the sampling time is calculated to 80 minutes and the sampling is started immediately following the start-up of the sprinklers just prior to the blast. Water sprays have been installed in the ventilation rise and are used during blasts to maximise suppression of dust.

Table 6.17 and **Table 6.18** provide the results of emission testing compared with the criteria during the reporting period.

Table 6.17 In-Stack Sampling Results for Ventilation Shafts 2016

		Primary Vent Shaft				Vent Shaft 6			
Element	**EPL Limits**	**QTR1**	**QTR2**	**QTR3**	**QTR1 2017**	**QTR1**	**QTR2**	**QTR3**	**QTR1 2017**
Total Solid Particles (mg/Nm3)	20.00	5.4	11	6	6.67		3.37	3.02	2.8
Nitrogen Oxides (NOx as NO2)(mg/Nm3)	350.00	2.1	2.5	5	3.2		2.1	9.1	2.1
Volatile Organic Compounds (mg/Nm3)	40.00	0.7	0.7	0.6	0.49		0.7	0.7	0.49
Type 1 and Type 2 substances in aggregate	1	0.04	0.1	0.06	0.26		0.04	0.02	0.03

Table 6.18 In Stack Sampling Results for Crusher Baghouse

		Crusher Baghouse			
Element	**EPL Limits**	**QTR1**	**QTR2**	**QTR3**	**QTR1 2017**
Total Solid Particles (mg/Nm3)	20.00	9	11	18	14.5
Type 1 and Type 2 substances in aggregate	1	0.52	0.24	0.98	0.56

The crusher baghouse loading increased during 2016. Maintenance inspection revealed that the filters were worn. The filter was replaced, and following consultation with the original equipment manufacturer, maintenance procedures were updated to prevent a recurrence.

Due to staff changes, stack testing was not completed in Q4 2016, but was completed as soon as practicable in 2017.

6.3 Erosion and Sediment

The majority of the existing batters were constructed during former mining operations and consequently the surfaces of the batters consist predominantly of weathered rock. It is not practical to reshape the slopes, as most of the slopes are steep, on the mine lease boundary and predominantly comprise of large rock aggregate. The process of erosion over the years since the slopes were formed has removed most of the finer materials and the existing surface now comprises relatively large and coarse rock resulting in a self- armoured surface with limited erosion potential.

Storage ponds effectively serve as sediment control ponds and limit the movement of sediment throughout and off site. Ponds are routinely inspected quarterly and after significant rain events. Inspections consist of a visual assessment for erosion, flooding, rubbish, algal growth or significant sediment build up.

Regular inspection and maintenance of the stormwater management works will be carried out. Due to the low rainfall in this region, inspections of stormwater management works will be carried out on a quarterly basis and after each significant rainstorm event. An action response plan will be developed where repairs are required. Erosion activity within drains and sediment ponds becomes greatest at

times of high water flow resulting from a corresponding increase in flow velocity. BHOP will carry out an inspection following rainfall events resulting in 30 mm or more of rain falling in up to 2 hours or 75 mm or more over any 3 consecutive days.

6.4 Surface Water Monitoring Results

There are no natural water courses or creeks flowing through the site.

The Rasp Mine has a large number of stormwater collection ponds design to hold a 1 in 100 year 72 hour rainfall event from active mine areas. The EPL requires surface water monitoring from a number of these ponds, there are no criteria listed in the EPL or PA. These ponds include Point 29 - S31-1, Point 31 - S49, Point 32 - S1-A, Point 33 - S9B-2 and Point 34 – Horwood Dam. BHOP are also required to take samples from ephemeral creeks upstream (Point 35) and downstream (Point 36) from the Lease. Two samples are required to be collected from these monitoring points a year six months apart, when they contain water.

Surface water analysis for the reporting period was compared to the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 – livestock water quality.* Samples are couriered to ALS, a NATA accredited laboratory for analysis. The results are provided in Table 6.19that when water is present, it's quality is highly variable, but generally unsuitable for irrigation or stock water.

Table 6.19 Stormwater Pond Water Quality

Site	Date	Cd	Cl	EC	Pb	Mn	pH	Na	SO4	TDS	Zn
		mg/L	mg/L	µs/cm^3	mg/L	mg/L		mg/L	mg/L	mg/L	mg/L
Point 29 S31-1		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Point 31 S49	09-May-16	0.429	7	629	0.272	18.4	6.32	11	287	436	58
	21-Jul-16	0.352	8	754	0.449	18.9	6.12	12	312	605	48.1
	05-Oct-16	1.33	22	1960	0.684	60.1	6.04	35	1010	1720	220
Point 32 S1-A	09-May-16	0.0203	6	207	0.179	1.01	6.91	6	63	110	3.31
	21-Jul-16	0.0586	6	429	0.436	2.68	6.4	8	163	300	8.92
Point 33 S9B-2	09-May-16	0.0512	21	414	0.557	2.26	6.81	22	137	254	8.57
	21-Jul-16	0.0879	29	508	1.01	4.4	6.32	25	168	326	12.5
Point 34 Horwood Dam	11-Jan-16	2.84	2310	15800	1.65	550	6.53	2140	6700	16000	1090
	10-Feb-16	3.75	3330	19800	2.28	596	6.18	2790	9080	16000	1230
	09-May-16	2.19	1390	11200	2.24	318	6.5	1540	4190	11000	545
	21-Jul-16	2.14	1390	10600	2.74	363	6.2	1520	3890	9610	552
	19-Oct-16	**2.6**	1540	11200	1.59	339	6.4	1400	4160	9560	487

A multi-agency dams audit was completed in October 2016. The audit reports have been provided in 2017 and will be presented in the 2017 AEMR.

Following storms in the beginning of October, a member of the public notified the EPA of seepage from the toe of Dam S49, on Ryan St. S49 captures runoff from a catchment contaminated by historic mining activities. The resulting small area of contamination was cleaned up using a bobcat. To prevent future recurrences, a solar pump will be installed, connected to a pipeline to send water back onto site. This will be completed by the end of June 2017.

6.5 Water Management Water Supply

The water supply to the site comes from the Stephen's Creek Reservoir, Umberumberka Reservoir, Imperial Lake (emergency supply only) and Menindee Lakes Scheme on the Darling River. The following water supplies will be utilised over the life of the Project:

6.5.1 Clean Water

The only clean water structures on site are the raw water tank and potable water tanks. There are no permanent watercourses within the mine's leases. All clean water runoff is diverted around the mine operations via bunding and drains as detailed in **Plan 5**, to ensure that clean water quality is not degraded with potential contaminants.

6.5.2 Processing plant water management

Runoff from the processing plant is directed to a 'first flush' plant water pond in catchment 42B, with overflows into a second pond (Plant Event Pond) located at the toe of the embankment within this catchment. Both ponds are lined facilities.

Blackwood Pit is used to retain the tailings from the processing plant. Supernatant water from this storage facility is transferred directly to a lined pond at the plant (Plant Water Pond) located in, but not part of, catchment 42B for subsequent reuse in the processing plant.

These ponds allow for the storage of supernatant water from Blackwood Pit, plant upsets and a 1:100 24 hour rainfall event. Any overflow from the Plant Event Pond (in excess of a 1:100 year rainfall event) is directed to Horwood Dam.

6.5.3 Shaft 7 Water

The storage area S22 (**Figure 6.14**) is a large gully with a storage capacity in excess of 40,000m3. The gully is used as catchment storage for runoff from surrounding catchments including TSF 1. It is also used for the separate storage and settling of water from the operating underground mine workings and the shaft7. This water is reused for mining activities underground.

The area of S22 is divided into 5 compartments with the northern and southern ends available for surface water runoff (figure). For a 1:100 year rainfall event, runoff into the northern compartment of the gully will be from TSF 1 of approximately 10,304 m3. The runoff into the southern compartment of the gully will be from catchments 18, 19, 21A, 21B and 22 and will approximate to 10,185m3.

The central three compartments are lined and comprise of two settling ponds and a storage pond with installed pumping capacity.

The volume of stored water in northern and southern compartments is kept to a minimum. Any collected stormwater is either evaporated or added to the central compartments for reuse underground or in the processing plant.

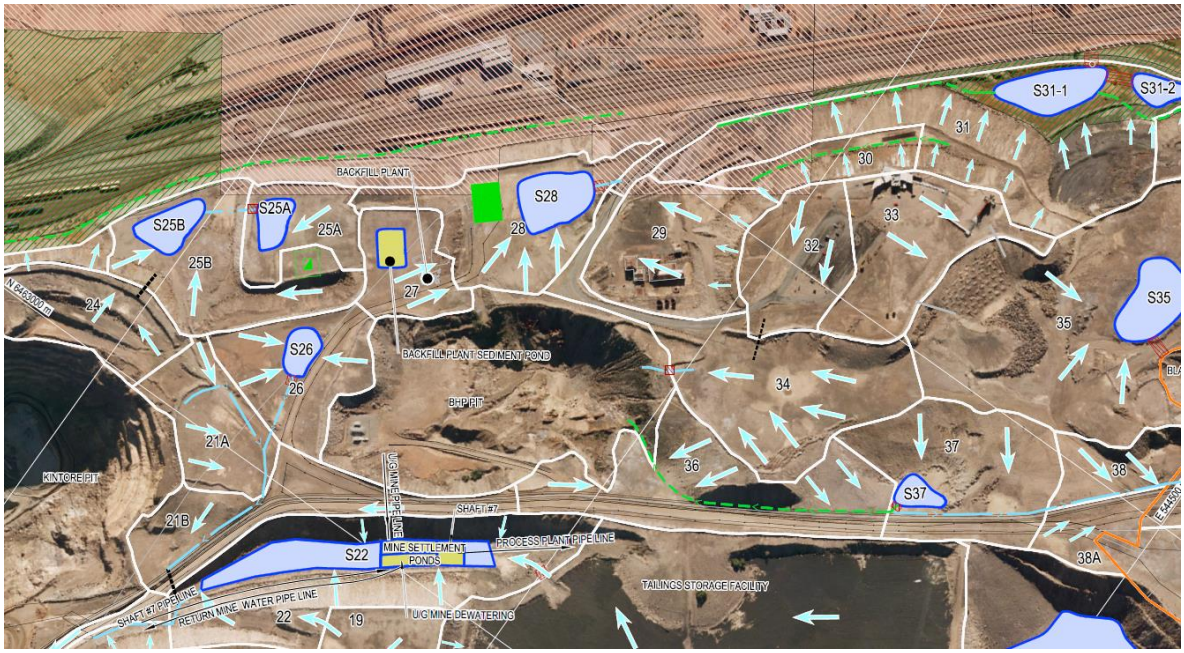

Figure 6.14 Storage Area S22

6.5.4 Controlled Discharge

There was no controlled surface discharge of contaminated water.

6.5.5 Water Containment Structures

All surface runoff on site is captured by diversion trenches or berms and channelled to site water storage structures. Water catchments and containment structures are presented in **Plan 5**. Capacities and estimated stored water volumes for the reporting period are provided in **Table 6.20.** Detailed surveying of the water storage structures is planned for the next reporting period. Surveys will be used to develop staged storage curves that will enable more accurate capacities and volumes to be determined.

Markers have been placed in water ponds to indicate the maximum level to which water may be stored in the facilities to maintain sufficient free board to accommodate a 1:100y 72 hour storm event.

Table 6.20 Water Containment Structures

		Volumes held (cubic metres)			
	Pond Identification	**Start of reporting period (1-Jan-16)**	**At end of reporting period (31-Dec-16)**	**Storage Capacity m^3**	
Clean Water	Workshop	9	9	14	
	Boom Gate	22.5	22.5	2	
	Mill	22.5	22.5	8000	
	Delprat's Shaft	22.5	22.5	9	
	Kintore Pit	14	14	18	
	Silver Tank	8000	8000	8000	
Dirty Water	S2	0	0	5003	
	S14	0	0	7813	
	S17	0	0	4265	
	S31	0	0	225	
	S49	0	0	1951	
	S35	0	0	6092	
Controlled discharge	N/A			N/A	
Contaminated water	Horwood Dam	4000	3000	7663	2000
	Plant Water Pond	2000	2000	2000	1000
	S22 Mine Settlement Ponds	1000	1000	1000	1500
	S22-A	2000	2000	2000	1500
	Vehicle Wash	9	9	20	800

6.6 Ground Water

The regional groundwater near the site is depressed due to long term pumping from the underground mines in the area. This results in the depressed groundwater level below the site being more than 100m below the surface level, with a hydraulic gradient into the site at depth. The groundwater monitoring program is undertaken with the purpose of recording perched groundwater movement. Perched groundwater refers to surface water that has infiltrated into the near surface moderate to high permeability material generally comprising of granular soils and rock dill. The perched ground water exists for short periods of time after rainfall events and generally seeps laterally over the low permeability bedrock surface below the near surface permeable material. The rainfall events at Rasp mine site indicate that the perched groundwater has the potential to surface seep rather than seep into the regional groundwater. Considering the depth of the regional groundwater it is concluded that there is little interaction between the shallow perched groundwater and the regional groundwater.

Rasp's ground water monitoring plan is outline in the Site Water Management Plan. The objective of the ground water monitoring program is to;

- Provide a program to monitor seepage movement within and adjacent to the tailings storage facility;

- Provide details of parameters and pollutants to be monitored and background local perched groundwater parameters
- Establish a contingency measure in the event that an unacceptable impact is identified.

The existing monitoring bore holes provide an early warning sign if seepage is occurring near the CML7 lease boundry. Water from mine dewatering at Shaft 7 and from the mine decline will form part of the groundwater monitoring program. Samples of groundwater are collected every three months, water permitting.

The location and function of each borehole is listed in **Table 6.21**.

Table 6.21 Location and function of Mine Dewatering Samples and Groundwater Monitoring Boreholes

Bore ID	Location	Function
GW01, GW02	Southeast of Mt Hebbard	Monitor potential seepage from Mt Hebbard
GW03 – GW09	East of TSF1	Monitor potential seepage from TSF1 towards CML7 boundary
GW10	Downstream of Horwood Dam	Monitor potential seepage north of Eyre St Dam
GW11, GW12	East of Blackwood Pit	Monitor perched groundwater mounding from TSF
GW13-GW15	Adjacent to storage areas S44, S31-1 and S31-2	Monitor potential seepage west of S49
GW16	West of S49	Assess quality of water from Shaft 7
Shaft 7	Shaft 7	Assess water quality at decline
Mine dewatering	Kintore Pit decline	

The location of the shallow groundwater monitoring bores are presented in **Figure 6.15**.

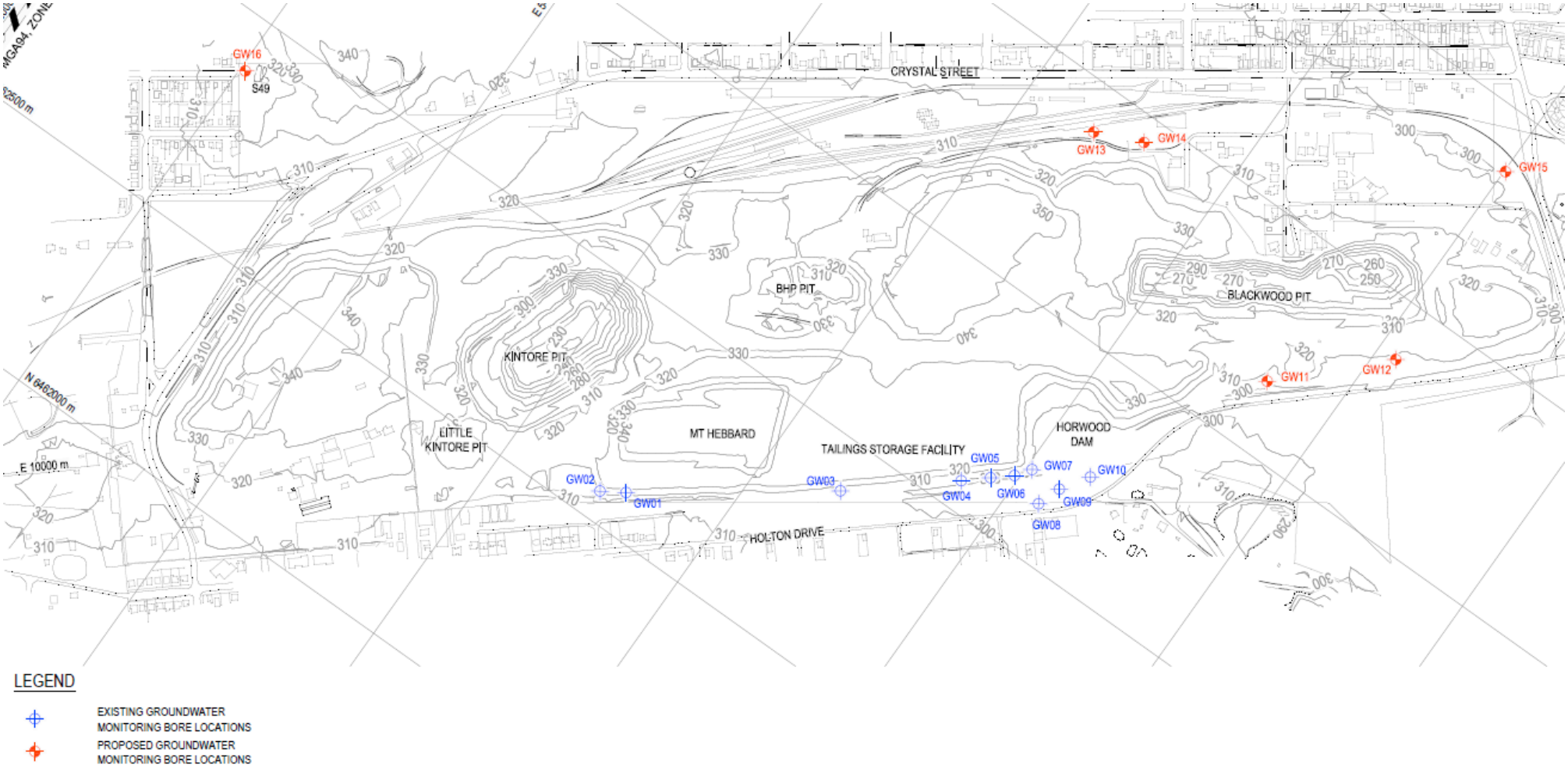

Figure 6.15 Groundwater Monitoring Bores

6.6.1 Piezometer monitoring

The piezometers are sampled quarterly when there is sufficient water quantity to enable sampling. Groundwater bores GW11-GW16 were installed to target seepage from TSF1 and monitor the surface water pond S49. There are a total of 16 monitoring bores across the CML7 and are presented in **Figure 6.15.** The majority of piezometers showed a steadying or very slight decrease in levels during the reporting period (**Table 6.22**). Levels in the piezometers can be attributed to low rainfall during the reporting period. A summary of chemical analysis is given in **Table 6.23**.

Table 6.22 Bore Piezometer Depths

	Depth TOC					
Sample	**Min 2016**	**Max 2016**	**Avg 2016**	**Avg 2015**	**Avg 2014**	**Trend**
GW01	6.87	7.9	7.39	7.25	7.25	Stable
GW03	3.59	3.7	3.64	3.62	3.61	Stable
GW04	2.91	2.97	2.94	2.9	2.83	Stable
GW05	3.34	3.72	3.53	3.5	3.4	Stable
GW06	2.75	2.9	2.85	2.76	2.66	Stable
GW07	2.56	2.81	2.74	2.8	2.54	Stable
GW08	1.24	2.17	1.81	1.87		Stable
GW09	2.59	3.37	2.94	3.07	1.79	Variable
GW10	1.01	1.86	1.49	1.725	0.83	Variable
GW11	8.78	10.73	10.10	10.4	10.69	Stable
GW12	28.63	36.96	34.49	37.1	21.6	Potentially falling
GW16	1.55	1.55	1.55	Dry	Dry	Stable, only one sample since installed

Table 6.23 Piezometer Monitoring Results

Site		OH as CaCO3	Cd	Ca	Cl	EC	Fe	Pb	Mg	Mn	pH	Na	SO as SO4	TDS	Zn
GW1	Min	1	0.187	266	1030	10700	0.05	0.252	497	278	4.79	1590	4870	10100	228
	Ave	1	0.199	280	1125	10800	0.13	0.283	517	303	4.83	1600	5340	10150	248
	Max	1	0.21	293	1220	10900	0.21	0.313	536	328	4.86	1610	5810	10200	268
GW2	Min														
GW3	Min	1	0.646	569	2940	14700	0.05	1.37	391	274	5.17	2260	4210	12400	260
	Ave	1	1.51	575.25	3092.5	15025	13.79	2.71	424.5	387.25	5.57	2322.5	4912.5	12925	329
	Max	1	1.99	587	3230	15600	46.3	4.08	500	563	5.98	2440	5710	13600	395
GW4	Min	1	0.043	568	2560	14000	0.05	0.01	483	23.3	6.87	2240	4030	7040	14
	Ave	1	0.15	583.25	2735.0	14425	0.50	0.14	545.3	55.23	7.05	2360.0	4517.5	9670	23
	Max	1	0.288	598	2880	14900	1.84	0.385	603	110	7.17	2500	4860	11700	36.6
GW5	Min	1	0.679	511	2650	16400	0.05	0.096	664	321	6.25	2600	6450	15300	279
	Ave	1	0.74	524.75	2907.5	16650	4.35	0.69	693.0	347.75	6.52	2692.5	6807.5	15575	308
	Max	1	0.812	545	3280	17400	16	2.31	731	411	7.17	2810	7620	16000	374
GW6	Min	1	0.65	525	1890	13300	0.05	0.076	431	242	6.29	1990	4280	11700	148
	Ave	1	0.81	545.50	2352.5	13600	9.99	0.38	470.5	280.00	6.38	2080.0	4890.0	12100	180
	Max	1	0.936	567	2670	14200	39.8	1.22	530	351	6.46	2130	5950	12600	212
GW7	Min	1	3.5	528	1620	12400	0.05	0.194	330	302	6.21	1760	4010	11100	275
	Ave	1	6.82	535.00	1905.0	12925	0.06	0.36	373.8	334.00	6.32	1860.0	4577.5	11600	317
	Max	1	16.1	545	2300	14200	0.09	0.789	426	388	6.39	1950	4900	12400	370
GW8	Min	1	1.47	571	1140	8410	0.05	0.449	211	317	6.1	726	3150	8070	394
	Ave	1	1.81	575.75	1542.5	9988	1.86	0.75	264.8	473.75	6.18	1055.5	3960.0	9703	589
	Max	1	1.96	582	1900	11300	7.3	1	318	586	6.31	1410	4720	11100	703
GW9	Min	1	0.012	757	1770	10900	0.05	0.001	514	0.178	7.39	1210	2830	6730	1.1

	Ave	1	0.02	806.50	2252.5	11375	0.23	0.01	568.0	0.29	7.50	1292.5	3245.0	8573	2
	Max	1	0.018	935	2980	12000	0.76	0.025	604	0.435	7.57	1380	3610	9340	2.18
GW10	Min	1	0.54	560	1540	13000	0.05	0.001	480	37.2	6.98	1980	3870	10900	50.5
	Ave	1	0.71	580.25	2292.5	13500	0.07	0.02	524.8	47.43	7.09	2087.5	4407.5	11325	70
	Max	1	0.923	622	2690	14100	0.11	0.048	555	63.6	7.27	2240	4800	11600	93.8
GW11	Min	1	0.0009	183	450	4330	0.05	0.001	146	33.7	6.92	581	1480	3400	32
	Ave	1	0.02	199.75	480.0	4458	0.41	0.04	156.0	45.53	7.04	590.8	1715.0	3498	39
	Max	1	0.0384	239	536	4640	1.3	0.131	178	50.9	7.11	600	1870	3560	50.2
GW12	Min	1	1.05	396	1370	11300	0.05	0.019	497	51.8	6.18	2000	4410	10200	139
	Ave	1	1.26	443.00	1580.0	12950	0.33	0.05	552.8	61.25	6.39	2055.0	5452.5	11550	166
	Max	1	1.49	461	1880	14100	1.18	0.109	598	73.5	6.62	2170	6750	12000	192
GW13	Min														
GW14	Min														
GW15	Min														
GW16	One sample only	1.55	1	1.04	474	281	5320	0.05	0.08	272	12.2	5.01	426	2890	4960
Shaft 7	Min	14	1.57	434	1210	11200	0.05	1.69	222	328	6.29	1290	4360	7220	768
	Ave	23	2.49	504	1418	12142	0.13	2.33	313	458	6.59	1467	5698	12135	1038
	Max	49	4.62	556	1590	14100	0.64	2.93	401	630	6.85	1670	8100	14200	1500
Underground Dewater	Min	6	1.59	370	1130	9730	0.05	0.11	182	191	6.11	1040	3820	7870	613
	Ave	17	2.24	469	1236	10513	2.13	1.93	229	271	6.48	1273	4528	10269	827
	Max	47	3.18	528	1800	14000	20.60	17.00	286	468	6.75	1640	5050	13700	1130

GW01 and GW2 Located Downstream of Mt Hebbard

These water bores are intended to monitor the sub-surface water fluctuations south of Mt Hebbard. Ground water levels fluctuated within historic trends throughout 2016, with some increase recorded due to high annual rainfall. GW02 remained dry.

GW03, GW04, GW05, GW06, GW07, GW08 and GW09 Located Adjacent to TSF1

Groundwater bores are located near the eastern side of TSF1. The intent of the monitoring bores is to monitor perched seepage from the TSF1 area and Eyre Street Dam. The monitoring is in response to surface seepage noted in the area during intense 2011 rainfall events. TSF 1 is a decommissioned TSF and will not be recommissioned.

Ground water levels fluctuated within historic trends throughout 2016, with some increase recorded due to high annual rainfall

GW10 Located Downstream of Horwood Dam

The monitoring bore located downstream of Horwood Dam was installed to monitor water flows in the area. An investigation in 2011 indicated that the perched water seepage measured at this bore was not related to water from Horwood.

Ground water levels fluctuated within historic trends throughout 2016, with some increase recorded due to high annual rainfall

GW11 and GW12

Blackwood pit forms part of the mining area with underground mine working to the west, north and south of the pit. Due to existing workings, seepage from the Blackwood pit will be intercepted and collected by the underground mine water management system and therefore the installation of groundwater monitoring bores at this location is of not benefit, as not water table is expected to exist or develop within the old mine workings.

The ground conditions to the south east of Blackwood pit are relatively intact with no or limited mine workings in the area. Due to the north east and south west length of the pit there is a possibility for the formation of a perched aquifer as a result of groundwater mounding around the south east site of the pit once it receives tailings.

Ground water levels fluctuated within historic trends throughout 2016, with some increase recorded due to high annual rainfall

GW13, GW14 and GW15 Located Adjacent to S44,S31-1 and S31-2

As perched seepage may occur from ponds located near the CML7 boundary when these ponds store water, these bores were installed at the EPAs request. During construction of these ponds the permeability of the basin material was assessed to decide if a liner was required to reduce the risk of perched water seepage from the pond into the near surface soils. Water quality in the bores was unable to be compared to water quality in the ponds as no samples were able to be collected.

GW16 Located Adjacent to S49

A monitoring bore located west of S49 was installed to monitor potential perched seepage from this storage. Ground water levels fluctuated within historic trends throughout 2016, with some increase recorded due to high annual rainfall

Water from Mine Dewatering

Sampling of mine dewatering from shaft 7 and the mine decline forms part of the groundwater monitoring program. Sampling is carried out at the mine water pond in S22, where water from underground is discharged in to individual storage pond compartments. The central three compartments in S22 are lined for storage of underground water and to limit the risk of possible mixing of underground water with surface water runoff also being stored in S22. Samples taken at the central compartments in S22 are representative of the decline and Shaft 7 samples. Sampling from mine dewatering is completed out monthly.

6.7 Contaminated Land

The majority of the surface land area that makes up the Rasp Mine is ***highly contaminated*** historic mining waste material including waste rock emplacements and tailings.

The storage and handling of diesel fuels, lubricants and oils, and waste rock material are the only aspects of the operation which have the potential to contribute to contaminated land.

6.8 Hydrocarbon Management

The main streams of hydrocarbons managed on site include:

- Fuel (diesel); storage and distribution
- Grease oils and lubricants; storage distribution and recovery for recycling
- Solvents used in the parts washer

6.8.1 Fuel

Diesel is stored in two tanks each with a capacity of 68,000L. These self bunded transtanks are located adjacent to the workshop and are sitting on a constructed concrete re-fuelling station. The facility has been designed and manufactured in accordance with AS1940 and AS1692. BHOP has provision for diesel storage on its Dangerous Goods Licence, UN 00C1 Diesel 150,000 L. Surface distribution of diesel is by direct collection from the fuel browser. The tanks operate on a float and cut-off system that prevents overfilling of the tanks.

Rasp's fuel management system enables monitoring of fuel usage by each vehicle and piece of plant. This assists with maintenance and security as well as providing an accurate reporting mechanism for the collecting of data for NPI and NGERS reporting.

6.8.2 Grease, oils and lubricants

Lubricants and oils are stored in individual pods located on a portable bund. A storage facility for these lubricants and oils has been constructed on the western side of the main workshop. It consists of a raised concrete pad incorporating drainage to a sump to facilitate cleaning.

6.8.3 Solvents

Oil solvent used for cleaning of mechanical parts at the workshop is removed by a contractor on a fixed maintenance schedule.

6.8.4 Processing Reagent Storage

All reagents are stored in a purpose built storage facility designed to prevent contamination and capture spillage.

The reagents stored here include:

- Hydrated Lime
- Copper Sulphate
- Methyl isobutyul carbinol
- Sodium metabisulphite
- Sodium ethyl xanthate
- Sodium isopropyl xanthate
- Flocculant

All quantities and map with locations are reference in the Pollution Incident Response Management Plan.

6.9 Hazardous Material Management

6.9.1 Licensing

Rasp holds Licence XSTR100095 for the storage and handling of dangerous goods. Rasp also holds a Radiation Management Licence 5063802, which is valid until 26-Jul-17.

6.9.2 Dangerous Goods Management

Site dangerous goods management is managed according to the site Chemical Management Procedure BHO-PRO-SAF-020.

A Safety Data Sheet (SDS) database for each chemical is maintained. SDS's are kept at each location where chemicals are stored and in the mines rescue room. SDS's are also electronically available on the mine intranet using the *ChemAlert* database program. All SDS's across site are continually updated.

General and contractor inductions outline the required actions in the event of a spill, including completing an Incident Report.

All quantities and map with locations are referenced in the Pollution Incident Response Management Plan.

6.9.3 Lubricants and oils

Lubricants and oils are stored in individual pods located on a portable bund. A storage facility for these lubricants and oils has been constructed on the western side of the main workshop. It consists of a raised concrete pad incorporating drainage to a sump to facilitate cleaning.

6.9.4 Processing Reagent Storage

All reagents are stored in a purpose built storage facility designed to prevent contamination and capture spillage.

All quantities and map with locations are reference in the Pollution Incident Response Management Plan.

6.10 Waste Management

Waste management at the mine is classified into two broad categories: mineral wastes (mining and mineral processing wastes discussed above), and non-mineral wastes which include recyclables and non-recyclables.

Waste generated is summarised in **Table 6.24**.

6.10.1 Non-Mineral Waste Recyclables

Rasp Mine has four main laydown areas where used parts and equipment are stored for future use.

The recyclable area is sign posted with dedicated sections for scrap metal, timber, batteries, rubber, electronic goods and used pods.
During 2016, 1700t of materials were recycled.

6.10.2 Hydrocarbons

Used hydrocarbons are handled and processed at the waste hydrocarbon depot. The facility handles used oil, grease, oily rags, oil filters and hydrocarbon contaminated items.

6.10.3 Other Recyclables

Other recyclables include office paper, cardboard, printer cartridges and scrap metal. Standard practices/procedures are in place for paper, cardboard and printer carriages.

Exact figures for recycling cannot be provided as material is taken off site “co-mingled”.

Used 1000L pods are returned to the manufacturer for reconditioning and reuse.

Table 6.24 Waste Management Summary

Waste	**Recycled***
Oil	55,200L
Oily water	6,360L
Scrap metal	1700t
Grease	68 x 205L drums

Oil filters, hoses, rags	63 IBCs
Printer cartridges	6 bags
Empty oil drums	2 IBCs
E-waste	1 IBCs

6.10.4 Non-Mineral Waste Non-Recyclables

6.10.5 Tyre Disposal

No tyres were disposed in underground workings during the reporting period. Tyres for heavy mobile equipment have been stored or reused around the mine site for barricades on roadways and within the laydown yards. All other LV and light truck tyres are removed from site under arrangement with the tyre supplier.

6.10.6 Landfill

The Broken Hill City Council on a weekly basis empties rubbish bins containing general site rubbish into a garbage truck. The rubbish is taken to the Broken Hill rubbish dump where it is deposited.

6.11 Flora and Fauna

The site is a highly disturbed environment that provides little value as native flora and fauna habitat. There have been no threatened flora, fauna or species habitat identified at the Rasp Mine.

6.12 Weeds

Weeds are managed on an as needs basis with a contractor engaged to spray any weed infestations.

There have been no reported outbreaks during the reporting period.

6.13 Blasting

Blast monitors are installed at five locations around site as per Project Approval and EP Licence requirements **(Figure 6.16)**. A roving blast monitor is also utilised for determining more information about ground conditions and vibration movement at various locations. When a blast complaint is received, the person is given the opportunity to have the roving monitor placed at their location. The aim of this is to assess community impact and also to gather information for future blast design.

Figure 6.16 Locations for Vibration Monitors

The criteria for blasting vibration and overpressure limits are provided in **Table 6.25** and **Table 6.26.**

Table 6.25 Overpressure Sound Level and Ground Vibration (excluding Block 7)

Location	Airblast Overpressure (dB – Lin Peak)	Ground Vibration (mms)	[a] Allowable Exceedence
Residence on privately owned land	115	5	[b] 5% of the total number of blasts in any 12 month annual return reporting period
Residence on privately owned land	120	10	0%

Table 6.26 Overpressure Sound Level and Ground Vibration (Block 7, Zinc Lode)

Location	Airblast Overpressure (dB – Lin Peak)	Ground Vibration (mm/s)	[a] Allowable Exceedence
Residence on privately owned land	115	3 [c] (interim)	[b] 5% of the total number of blasts in any 12 month annual return reporting period
Residence on privately owned land	120	10	0%

The Project Approval provides the following notes to these **Table 6.25** and **Table 6.26**:

- [a] The allowable exceedance must be calculated separately for development blasts and production blasts;
- [b] The 5% allowable exceedance does not apply to production blasts until the Proponent has successfully completed a Pollution Reduction Program aimed at achieving this goal, as required by the EPA under the Proponent's EPL (No. 12559), or as otherwise agreed with the EPA;
- [c] The interim criteria applies unless and until such time that the Proponent has written consent from the Secretary to apply site specific criteria in accordance with condition 19 of this approval; and
- [d] The Proponent must close South Road to pedestrians if blasts are expected to exceed a peak particle velocity ground vibration of 65 mm/s at the road reserve surface, while the blast firing occurs.

In accordance with Project Approval and EP Licence conditions production blasting times occurred between 6.45am and 7.15pm on any day.

Table 6.27 summarises the number and average blasts during the reporting period.

Table 6.27 Summary of Blasts During the Reporting Period

	Production		Development	
	Criteria (averaged over a calendar year)	**Average for 2016**	**Criteria (averaged over a calendar year)**	**Average for 2016**
Day	1	0.332	6	4.56
Week	6	2.33	42	32.04

Table 6.28 summarises the total number of blasts for each area and type of blast with their resultant peak particle velocity.

Table 6.28 Percentage of PPV for Each Mining Area

Mining Area	Prod	PPV (mm/s) **>5 WM/ML >3 Block7**	%	Dev	PPV (mm/s) **>5 WM/ML >3 Block7**	%	TOTAL	PPV (mm/s) **>5 WM/ML >3 Block7**	%
WM/ML	107	6	5.6	1520	0	0	1627	6	0.37
Block 7 (ML/ZL)	122	6	4.9	24	0	0	146	6	4.1
TOTAL	121	13	61.9	1666	2	0.12	1787	15	0.84

Table 6.29 lists the highest recorded results for peak particle velocity at each of the vibration monitors required on the EP Licence.

Table 6.29 Highest Values Recorded at Vibration Monitors

Vibration Monitor/Location	PPV (mm/s)
V1 Silver Tank (located on CML7)	4.02
V2 Hire yard	5.15
V3 Air Express	8.37
V4 123 Eyre St	5.79
V5 80 Eyre St	5.72
V6 South Road (Core Shed on site)	12.42

A total of 1787 blasts were fired during the reporting period with 1666 for development and 121 for production.

No blasts exceeded the criteria of 10 mm/s.

In the Western Mineralisation / Main Lodes mining areas (external to Block 7) a total of 1627 blasts were fired of these, 1520 were for development and 107 were for production. Six blasts exceeded 5 mm/s, all recorded from production blasts. The percentage of all blasts, excluding Block 7, exceeding 5 mm/s was 0.37%, which was well within the criteria of 5%. The percentage of development blasts was 0% and the percentage of production blasts was 5.61% (the criteria does not apply to production blasts until the completion of the EP Licence Pollution Reduction Program, 2 November 2017).

The PRP U1 Blast compliance management program requires BHOP to implement a production blast management program directed at achieving compliance with licence condition L5.1 - where the limit allows a 5% exceedence of the 5 mm/s ground vibration impact at any sensitive receptor outside the premises. The improvements resulting from the implementation of the plan are presented in **Table 6.30**.

Table 6.30 Production Blasts Western Mineralisation/Main Lodes

2015		2016	
Blasts >5 mm/s	%	Blasts >5 mm/s	%
9	7.4	5	4.6

The plan will continue during 2017 however the incremental improvements are now less and it is yet unknown if the criteria as listed in the EP Licence can be achieved for production blasts.

In Block 7 (Zinc Lodes and Main Lodes) mining area a total of 146 blasts were fired of these 24 were for development and 122 were for production. Seven blasts exceeded 5 mm/s, all of which were recorded from production blasts. The percentage of all blasts in Block 7, exceeding 3 mm/s was 5.63%, which exceeded the criteria of 5%. The percentage of development blasts was 1.37% and the percentage of production blasts was 50%.

There were no exceedences of criteria for overpressure levels at residential locations. There were 5 exceedences recorded at the V1 Silver Tank vibration monitor located on CML7, however none of these were related to blasting events. All exceedences are shown in Table 6.31**.**

Table 6.31 Recorded Overpressure Exceedences of Criteria

Date	Vibration Monitor	PPV (mm/s)	Overpressure (dB(linPeak)	Comment
3 Jan 2016	V1	0.22	118.6	High reading post blast, 4 sec, no direct correlation to blast event
9 May 2016	V1	0.31	117.6	High reading prior to and after blast, no direct correlation to blast event
12 Nov 2016	V1	0.70	121.4	High reading prior to and after blast, no direct correlation to blast event
13 Nov 2016	V1	0.69	131.0	High reading post blast, 3 sec, no direct correlation to blast event
27 Dec 2016	V1	0.29	121.6	High reading prior to and after blast, no direct correlation to blast event

6.14 Operational Noise

During the reporting period noise was generated by operation activities, movement of heavy vehicles and delivery trucks leaving and entering site.

The final noise monitoring report was received at the end of August. Attended noise monitoring was carried out by BHOP on the night periods of 14 and 18 July 2016. Also, three measurements were taken during the day period; one on 19 July 2016 and two on 20 July 2016. The monitoring assessment found that noise from RASP Mine operations satisfied the relevant noise limits at all locations. Furthermore, site noise was inaudible at three of the 15 locations. In summary, no non-compliances were observed during this session of monitoring.

6.14.1 Operational Noise Criteria and Control Measures

Noise control measures which have been introduced include insulating the crusher house with noise abatement material. Noise monitoring identified emission from the washcloth recirculating line. To reduce the noise level the existing 150mm OD (poly-HDPE) pipe work which housed the orifice plate

was removed, along with numerous flanges and 3 90° bends. The recirculation line actuated butterfly valves were moved as close as practical to the cloth wash pipe work that feeds the filter press. Then to maintain an acceptable head on the pump and eliminate the electric motor tripping the ID of the cloth wash, the recirculation line after the valve was reduced in 3 stages from 140mm down to 50mm. This has eliminated the need to have the orifice plate in the line and reduced the noise being omitted from the pumps/pipework.

Several noise attenuation measures were put in place recently these measures include:

- Plant and equipment operator training. This included correct gear selection to minimize noise emission, retraining in travelling haul road procedure and educating personnel of the noise criteria for site.
- The use of an “ice-creaming” technique when loading the crusher allows the crusher to be loaded to maximum capacity at all times reducing the noise generated by rockfall onto the grizzly. Ice-creaming is where the crusher bin volume is maintained at a high level by the ROM front end loader.
- Optimisation of haul truck speed and gear changing via the use of intermediate markers along haulage route
- Reduction in haul truck movements
- Extension of both length and height of the existing earth bund along the southern haul road (from Kintore Pit to ROM pad)
- Installation of noise abatement material in the crusher house
- A 2.5 m high by 6 m long tyre wall was constructed to reduce noise transition from the filtration area of the processing plant.

Operational Noise Monitoring

Noise monitoring is completed annually at noise monitoring locations shown in **Table 6.32** as per noise monitoring protocol. Noise readings were also completed on a ‘as need’ basis when a community complaint was received. **Table 6.33** shows noise monitoring results for 2016.

Three noise complaints were received in the reporting period. The details of these complaints are listed in **Section 9.1 Environmental Complaints**.

Table 6.32 Operational Noise Criteria

Location	[a]Day (dB(A))	[b]Evening (dB(A))	[c]Night (dB(A))
A1 – Piper Street North	38	37	35
A2 – Piper Street Central	38	37	35
A3 – Eyre Street North	44	41	39
A4- Eyre Street Central	44	41	39
A5 – Eyre Street South	44	41	39
A6 – Bonanza and Gypsum Streets	48	41	39
A7 – Carbon Street	35	35	35
A8 – South Road	48	39	39
A9 – Crystal Street	46	39	39
A10 – Barnet and Blende Streets	42	41	35
A11 – Crystal Street	46	39	39
A12 – Crystal Street	46	39	39
A13 – Eyre Street North 2	38	35	35
A14 – Piper Street North	35	35	35

Table 6.33 Noise Monitoring Results

Location	Date	Start	LA_{EQ}	LA_{MAX}	Rasp contribution $LA_{EQ(15\text{-}min)}$	Criteria	Compliant?
A1	15-Jul	03:11	38	61	<32	35	Y
A2	15-Jul	00:55	44	70	<25	35	Y
A3	15-Jul	01:34	50	74	Inaudible	39	Y
A4	15-Jul	01:57	47	69	<28	39	Y
A5	15-Jul	02:49	51	70	<30	39	Y
A6	19-Jul	04:18	49	68	<29	39	Y
A7	15-Jul	03:57	33	48	<31	35	Y
A8	19-Jul	01:02	33	48	<28	39	Y
A9	19-Jul	00:39	41	61	<21	39	Y
A10	19-Jul	00:13	37	53	<27	35	Y
A11	20-Jul	07:35	57	70	Inaudible	46	Y
A12	20-Jul	07:59	54	71	Inaudible	46	Y
A13	15-Jul	00:22	47	73	<27	35	Y
A14	14-Jul	23:56	36	56	<35	35	Y
PS	19-Jul	09:18	41	54	<40	NA	NA

6.15 Visual, Stray Light

All light towers around machinery have been designed to face light away from residents. There were no light complaints for the reporting period.

6.16 Indigenous Heritage

There are no known significant indigenous sites within CML7.

6.17 Natural and Social Heritage

6.17.1 Conservation Management Strategy

In accordance with the Project Approval, BHOP compiled and submitted a Conservation Management Strategy to BHCC and DRE in 2016. Due to the strategy's potential impact on closure strategies, the strategy has been forwarded to the Minister for approval. No response has yet been received.

6.17.2 Carpenter's Paint Store

In 2016, BHOP applied to BHCC to remove parts of the Carpenter's Paint Store due to safety concerns with the old, degraded structure. This application was rejected. BHOP will apply for a review of this decision in 2017,

6.18 Spontaneous Combustion

Products with high sulphur content (tailings, ore and concentrate) are prone to spontaneous combustion. Combustion is caused by the oxidation of the sulphides, which is an exothermic chemical reaction that causes heat build-up, and the remaining sulphides to start smouldering. In extreme cases the sulphides may burn producing a flame. Requirements for combustion to occur are high sulphur material, oxygen, moisture and sufficient material to generate heat build up.

No incidences occurred during the period.

6.19 Bushfire

No bushfires affected the site during the reporting period. Broken Hill and surrounding areas have a limited potential for bushfires due to the lack of suitable fuel.

6.19.1 Fire Control

Hydrants supplied with town water are located on site have fireboxes with hoses located nearby. Rasp has a fully equipped fire truck available at all times to respond to fires. Rasp also has a trained mines rescue team for the purpose of fire fighting.

6.20 Mine Subsidence

Monitoring occurs on Bonanza St/South Tce to ensure that mining activities do not affect the public road.

No subsidence was detected in the reporting period.

6.21 Methane Drainage/Ventilation

Methane is routinely monitored for underground workings and during underground drilling. No methane ventilation issues occurred during the reporting period.

6.22 Public Safety

The mine site is clearly signposted and fenced to restrict any unauthorised access. The majority of the BHOP surface area of CML7 is fenced and secured by locked gates or is bunded to discourage access. Therefore, the only significant public safety exposures will be if there is illegal or unauthorised public access to the CML7.

The control plan for such exposures are:

- Public access to the lease will be strictly controlled via security gates.
- All visitors accessing the site will be required to report to the administration office prior to entering and after existing the lease.
- All visitors to the lease will undergo a visitor's induction before entering the lease and will be accompanied by a fully inducted employee or contractor at all times.
- All contractors will have to undergo the appropriate induction prior to commencing any work on site.
- Regular inspections are undertaken of the lease boundary to check that the site fences are fit for purpose and that site access gates are secure.

Visitors to the mine are only allowed on site with management approval and are required to undertake a visitor briefing (induction), and are accompanied by a site representative at all times. Visitor briefing cards are distributed to ensure key information is readily at hand for visitors. Visitors must follow site policies and conform to personal protective equipment (PPE) requirements.

All employees and contractors complete a general induction and work area specific inductions where required (e.g. underground, mill).

No trespassing incidents occurred in 2016.

6.23 Radiation

BHOP has a Radiation Management Licence, RML5063802 current until 26 July 2017. The Licence permits BHOP to "sell, possess, store or give away regulated material (including radiation apparatus, radioactive substances or items containing radioactive substances)".

Radiation is used in gauges in the processing plant to measure material flows and in technical services to identify the percentage of lead/zinc or other materials. The Rasp Mine Radiation Management Plan outlines how radiation and radiation equipment must be used, stored and disposed. An external contractor conducts six monthly inspections of the individual radiation gauges on site. During the reporting period no issues were identified by the contractor during inspections and audits in relation to their use.

The Rasp Mine Radiation Store meets the requirements for storage of fixed radiation gauges, Code of Practice for the Safe Use of Fixed Radiation Gauges, ARPANSA. The Radiation Store is of solid construction (historically in the early 1900's it was used as an explosives magazine store) and is located on the side of a hill so it is not prone to flooding, it is clearly signed and is not accessed by the public.

During the reporting period the Lime Density Gauge (Unit 130 containing a Caesium-137 source), was removed from service and returned to the Radiation Store. No radiation apparatus was dismantled during the reporting period.

Table 6.34 lists the regulated materials (fixed radiation gauges) that make up the schedule to the licence.

Table 6.34 Regulated Radiation Equipment

Location	Rasp Mine Asset Number	Type	Equipment	Components	Purpose
Mill - Flotation building	2321727346	Radiation apparatus	X-RF/X-RD	- Control console / generator - X-ray tube insert	Analysis of materials
Primary cyclone feed	1566643388	Sealed source device	Fixed Radiation Gauge	- Container - Sealed source	Density gauge
Backfill plant-transfer pump discharge	1570661547	Sealed source device	Fixed Radiation Gauge	- Container - Sealed source	Density gauge
Admin Bld, Geological vault	2321727385	Radiation apparatus	X-RF/X-RD	- Control console / generator	Analysis of materials
Radiation Store **'REMOVED FROM SERVICE'**	1570661354	Sealed source device	Fixed Radiation Gauge	- Container - Sealed source	Density gauge

7. REHABILITATION

7.1 Buildings

There were no buildings erected or demolished during the year.

7.2 Rehabilitation and Disturbed Land

During the reporting period, the following rehabilitation activities were completed:

- A small unused area was capped with waste rock as a trial for using this material to stabilise areas and suppress dust. Further capping is planned for the tops of historic waste stockpiles in 2017.
- Confined Air Burst Chamber (CABC) testing was completed on Rasp tailings. The testing has established that wet tailings has a control efficiency of 100% when compared to a baseline of dry, disturbed tailings. Dry, crusted tailings has a control efficiency of 99.7%. This will prevent dust evolution from the TSF until rehabilitation is completed.

Table 7.1 and **Table 7.2** detail disturbed areas. No new areas were disturbed during the reporting period.

Table 7.1 Rehabilitation Summary

	Area Affected / Rehabilitated (hectares)		
	To date **16/4/2014-31/12/2015**	**Last Report** **1/4/2014-16/12/2014**	Next Report 1/1/2016 – 31/12/2016
A: MINE LEASE AREA			
A1 Mine lease(s) Area	226.4	226.4	**226.4**
B: DISTURBED AREAS			
B1 Infrastructure area **(other disturbed areas to be rehabilitated at closure including facilities, roads)**	64.5	64.5	**64.5**
B2 Active Mining Area **(excluding items B3 – B5 below)**	11.5	11.5	**11.5**
B3 Waste emplacements, **(active / unshaped / in or out-of-pit)**	1.92	1.70	**2.27**
B4 Tailings emplacements **(active / unshaped / uncapped)**	3.8	3.8	**3.8**
B5 Shaped waste emplacement **(awaits final vegetation)**	0.0	0.0	**0.0**
ALL DISTURBED AREAS	77.2	77.2	**77.2**
C REHABILITATION			
C1 Total Rehabilitated area **(except for maintenance)**	149.1	149.1	**149.1**
D REHABILITATION ON SLOPES			
D1 10 to 18 degrees	4.1	4.1	**4.1**
D2 Greater than 18 degrees	14.7	14.7	**14.7**
E SURFACE OF REHABILITATED LAND			
E1 Pasture and grasses	N/A	N/A	**N/A**
E2 Native forest / ecosystems			
E3 Plantations and crops	2.6	2.6	**2.6**
E4 Other **(include non-vegetative outcomes)**	**151.3**	**151.3**	**151.3**

Table 7.2 Maintenance Activities on Rehabilitated Land

	Area Treated (ha)		
NATURE OF TREATMENT	**Report Period**	**Next Period**	Comment / control strategies / treatment detail
Additional erosion control works **(drains re-contouring, rock protection)**	0	0	**N/A**
Re-covering **(detail further topsoil, subsoil, sealing etc)**	0	0	**N/A**
Soil treatment **(detail – fertiliser, lime, gypsum etc)**	0	0	**N/A**
Treatment / Management **(detail – grazing, cropping, slashing etc)**	0	0	**N/A**
Re-seeding / Replanting **(detail – species density, season etc)**	0	0	**N/A**
Adversely Affected by Weeds **(detail – type and treatment)**	0	0	**N/A**
Feral animal control **(detail – additional fencing, trapping, baiting etc)**	**0**	**0**	**N/A**

8. ENVIRONMENTAL INCIDENT MANAGEMENT

Health, safety and environmental incidents are reported using the Rasp Incident Reporting Procedure BHO-SAF-PRO-101. A summary of the incidents for the reporting period presented **Table 8.2**. BHOP maintains a Pollution Incident Response Management Plan BHO-ENV-PLN-002 on the CBH website in accordance with EPA requirements.

There were three externally reportable incidents during the reporting period these are discussed in **Table 8.1**.

Table 8.1 2016 Externally Reportable Environmental Incidents

Date	Type	Brief Description
21-Mar	Vibration	Resident was not notified prior to blast. This was caused by a late notification to the Environment Department of blasting that night.
26-Jul	Air Quality	The transformer supplying power to TSP-HVAS and HVAS1 failed, causing the air samplers to shut down. The generator installed to replace the transformer also failed, and contaminated the filters with diesel emissions. The units were then moved to a nearby location until the transformer was replaced.
5-Oct	Water Quality	Seepage from the toe of Ryan St Dam (S49) following heavy rainfall contaminated soil at toe of dam.

A total of 33 internal environmental incidents (including complaints) were registered during the reporting period. The majority of incidents related to the management of hydrocarbons, or leaks and spills on site. As a result of the Rasp Mine's good reporting culture, these types of incidents are promptly reported and can be addressed quickly.

The Pollution Incident Response Management Plan was tested in May 2016, in accordance with the requirements of EPL 12559.

Table 8.2: Environmental Related Incidence for Reporting Period

Date	Incident Number	Brief Description
28-Feb-16	1228	Zinc Sulphate spill, approx 20kg
21-Mar-16	1242	Failure to notify resident of significant blast
02-Apr-16	1247	Lime sock blockage reulting in 8kg lime spill
12-Apr-16	1257	Mine water spill
14-Apr-16	1259	Grinding slurry spill, approx. 50L
15-May-16	1277	Slurry spill due to blackout, approx. 150L
24-May-16	1286	Zinc concentrate spill, approx. 100L
09-Jun-16	1295	Zinc concentrate spill, approx. 100L
21-Jul-16	1316	Grinding slurry spillage, approx. 100L
26-Jul-16	1321	HVAS failure due to transformer failure
31-Jul-16	1325	Grinding scat spill, approx. 30L
03-Sep-16	1417	Water discharged off site to Perilya
05-Oct-16	1469	Seepage from Ryan St Dam, reported to EPA
13-Oct-16	1480	Pond overtopped with treated groundwater, approx. 200L
25-Oct-16	1497	Excessive dust from conveyor
23-Nov-16	1550	Sewage pipe between Admin Building and Eyre St damaged by tree roots
06-Dec-16	1566	Grinding slurry spill, approx. 100L
06-Dec-16	1565	Copper Sulphate spill in reagent area, approx. 25kg
25-Dec-16	1582	Tailing spill in plant area due to blocked line, approx. 200L
27-Dec-16	1588	Heritage building damaged by storm

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9. COMMUNITY RELATIONS

9.1 Environmental Complaints

During the period of the AEMR BHOP has maintained a register for community complaints and concerns (**Table 9.1**). A total of 13 complaints were received over the reporting period with 10 of these related to blasting vibration. All complainants were contacted and any improvements were discussed with them.

Table 9.1 Complaints register

Date	Complaint	Information
28-Apr-16	Vibration	Blast complaint
06-May-16	Vibration	Blast complaint
10-May-16	Noise	Noise complaint due to evacuation siren test
19-May-16	Vibration	Blast complaint
10-Jul-16	Noise	Noise complaint due to generator
07-Aug-16	Vibration	Blast complaint
12-Aug-16	Vibration	Blast complaint
13-Aug-16	Vibration	Blast complaint
19-Aug-16	Vibration	Blast complaint
01-Sep-16	Vibration	Blast complaint
11-Sep-16	Vibration	Blast complaint
11-Oct-16	Noise	Noise complaint due to diesel pump
21-Oct-16	Vibration	Blast complaint

Several events were reported from a residence in Eyre St in August 2016. All blasts were found to be compliant with the applicable licence limits. The finalised data was distributed to the EPA and the affected resident. Following this series of events BHOP will inform the resident of any blasts that may affect them.

9.2 Community Liaison

During the period of the AEMR BHOP has conducted direct and indirect consultation with neighbours, members of the public, local community organisations, state government agencies and local council.

The major stakeholders include:

- Broken Hill City Council (BHCC)
- Department of Industry Resource and Energy (DIRE)
- Environment Protection Authority (EPA)
- Department of Industry Crown Lands (DICL)
- Essential Energy
- Essential Water
- Australian Rail Track Corporation Ltd (ARTC)
- Roads and Traffic Authority (RTA)
- Broken Hill Health Service, Environment Lead Centre

The following community communication activities occurred during the period:

- BHOP were represented at all meetings of the BHCC Lead Reference Group.
- Organised a stall in coordination with Child Health Centre to promote Lead Week.

9.3 Community Support

During the reporting period, Rasp provided financial support to:

- South Football Club, supplying uniforms
- The Child and Family Health Centre lead program ($50,000), also donating produce and for their lead awareness week
- World's Greatest Shave, raising money for leukaemia and blood cancer research.

10. ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD

Rehabilitation and other activities proposed for the next AEMR period are listed in **.**

10.1.1 Construction

No major construction works are proposed for 2017.

10.1.2 Heritage Repairs

- Stage 1 of the stabilisation program for the No 4 Headframe (LEP I403) was completed in late 2015 and was successful in rectifying the alignment of the frame. However this was a temporary measure and BHOP are now in the process of completing a submission to the Federal Government Department of Environment, for a grant to implement Stage 2 of the stabilisation program. If successful the work will be completed in 2017 with the installation of additional racing and the removal or lessening of tension from the guys and ropes to assess the integrity of the structure.
- A development consent application was submitted to the BHCC to demolish a heritage building (Carpenter's Workshop LEPI283) that has suffered severe storm damage and has become a serious safety risk. This application was ultimately unsuccessful. BHOP will appeal this decision in 2017.
- General repairs to heritage buildings as a result of storm damage will be undertaken as required.

10.1.3 Administration

- Complete and submit PA07_0018 Modification 4 to construct a concrete batching plant and embankments on Blackwood Pit TSF2.
- Complete and submit new MOP and RCE, following negotiation and agreement with DRE, currently the RCE is inconsistent with the MOP and Project Approval.
- The Site Water Management Plan BHO-ENV-PLN-004 will be reviewed and amended.

PLANS

Plan 1a

Mine and Context - Location

Plan 1b

Mine and Context – Detail

Plan 2

Leases

Plan 3

2016 Mining Longsection

Plan 4a

2017 Planned Mining Longsection

Plan 4b

2017 Planned Mining Longsection – Zinc Lodes

Plan 5

Surface Water Management Plan

Plan 6
Final Rehabilitation Domains

APPENDICES

Appendix 1

Compliance Audit Findings and Responses

Appendix 2
Controlled Air Burst Chamber Report