Broken Hill Operations Pty Ltd **ABN 95 103 555 862**

Rasp Mine

Annual Environmental Management Report

REPORTING PERIOD

1 January 2021 - 31 December 2021

This page has been left blank intentionally.

Title Block

Name of Operation:	Rasp Mine
Name of Operator:	Broken Hill Operations Pty Ltd
Development consent / project approval:	PA 07_0018 (MOD1, MOD2, MOD3 MOD4, MOD 5, MOD7, MOD8, MOD9)
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:	85WA752823
Name of holder of water licence:	Broken Hill Operations Pty Ltd
MOP Commencement Date: 1 October 2021	**MOP Completion Date:** 30 September 2023
AEMR Commencement Date: 01/01/2021	**AEMR End Date:** 31/12/2021
I, Devon Roberts, certify that this audit report is a true and accurate record of the compliance status of the Rasp Mine for the period 1 January 2021 to 31 December 2021 (Reporting Period) and that I am authorised to make this statement on behalf of Broken Hill Operations Pty Ltd.	
Name of authorised reporting officer:	Devon Roberts
Title of authorised reporting officer:	Senior Environmental Advisor
Signature of authorised reporting officer:	
Date: 28 February 2022	

This page has been left blank intentionally.

CONTENTS

TABLES

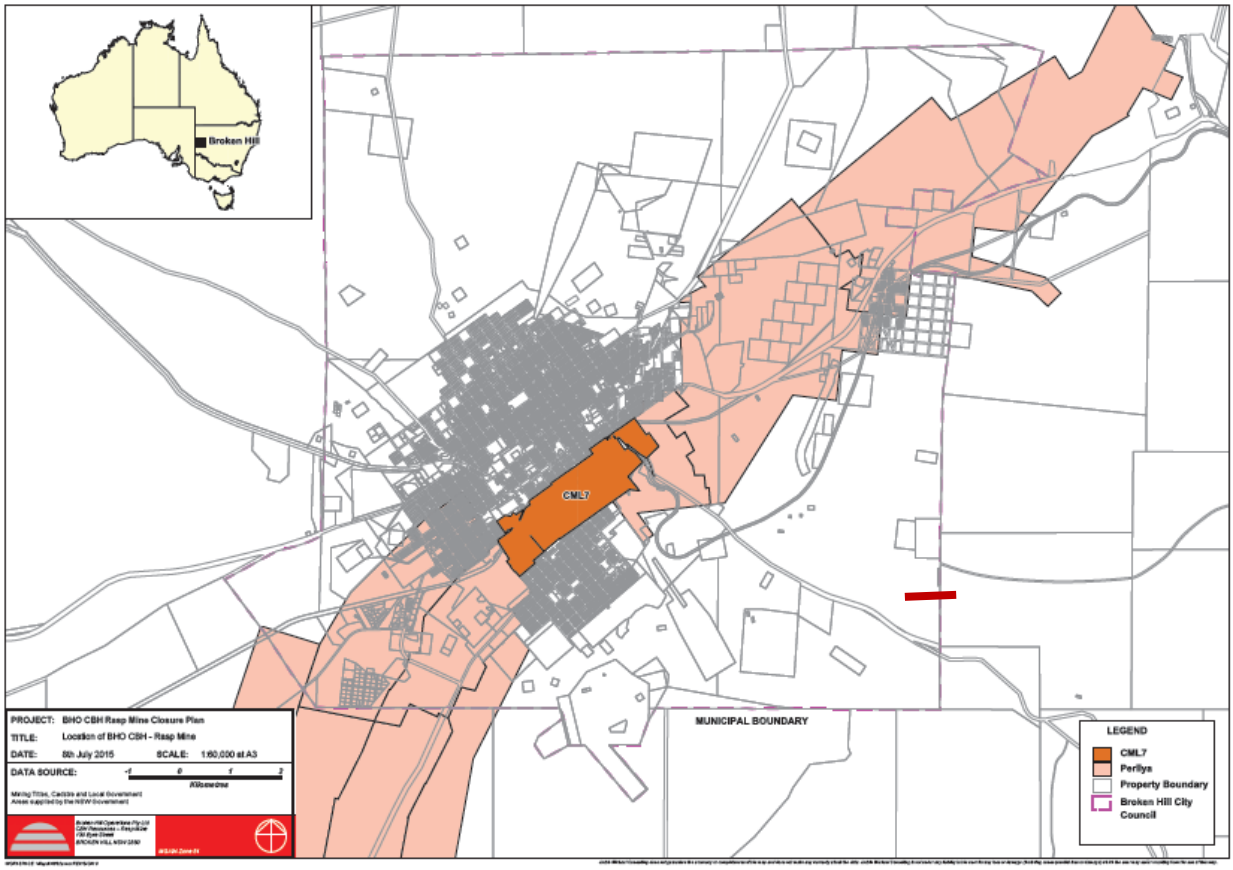
FIGURES

PLANS

1. INTRODUCTION

The Annual Environment Management Report (AEMR) documents the environmental performance of the Rasp Mine for the reporting period 1 January 2021 to 31 December 2021. It has been prepared in accordance with the NSW Government *EDG03 – Guidelines to the Mining, Environmental, Rehabilitation and Environmental Management Process*.

Figure 1-1 Location Map – Plan 1



2.2 Location

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 Mine Lease 7 (CML7) within the City of Broken Hill and includes several Mining Purposes Leases (183,184,185 and 186) with the entire Project extending over Western Land Leases and freehold properties.

The Rasp Mine consists of underground mining operations, a processing plant producing zinc and lead concentrates, a rail siding for concentrate dispatch to shipping facilities within Australia as well as other mining ancillary facilities. In the reporting period all concentrate product was placed in sealed containers and transported by rail to either the Port of Newcastle NSW or smelter operations in Port Pirie SA. Rasp Mine 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 Mine is located centrally within the City of Broken Hill (Figure 1-1) and is surrounded by transport infrastructure, areas of commercial and industrial development and some residential housing. The Mine is bounded by Eyre Street to the southeast, Perilya Broken Hill Operations Pty Ltd (Perilya) North Mine to the east and Perilya's South Mine to the west, and the commercial centre of Broken Hill to the north. Two major State roads dissect CML7 - 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. Mawson's Quarry lies to the east of the existing processing plant. 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 pastureland to the southeast. An aerial view of CML7 is provided in **Plan 1, Figure 1-1**.

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. The Mine was the birthplace of Broken Hill Pty Ltd (BHP) in 1885. Subsequently several mining companies, including Broken Hill South and Minerals Mining and Metallurgy Ltd (MMM), have operated the mine. This past mining has left the mining lease highly modified and disturbed. The original landform has been significantly altered; the majority of native vegetation 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**,** which also indicates surface exclusion areas and MPLs. The Project Area includes additional areas to the southeast located on Western Land leases or freehold properties owned or leased by BHOP (highlighted in orange). Located in this area are the current Rasp Mine administration offices and stores.

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

1.1 Mine Level

The Rasp Mine is classified as a Level 1 Mine and in 2018 it was transitioned to a State Significant Development under the *EP&A Act* with development consent determined and authorised by the Minister for the Department of Planning and Environment.

1.2 Approvals

Table 1-1 provides a list of all current development consents, mining leases and licences held by the Rasp Mine.

Table 1-1 Rasp Mine - Current Approvals

Approval Number	Date Issued	Expiry	Purpose
Project Approval 07_0018 (Part 3A)	31 Jan 2011	31 Dec 2026	Mining production of 750,000 tpa from Western Mineralisation, Centenary Mineralisation and Main Lode Pillars. Construction and operation of 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) MOD 4 – Installation of Concrete Batching Plant and Extension to TSF2 MOD5 – Warehouse Extension, Cement Silo and adjustment of air quality monitoring MOD7 – Utilise, crush and screen waste rock in BHP Pit for Embankments construction. MOD8 – Mining under a Perilya Sublease Arrangement for ML1249 MOD9 – Extension of Underground Exploration
CML7	17 Jan 2007	31 Dec 2026	Granted 8 Oct 1987. As per Schedule 2 of the Lease - Open cutting, shaft sinking, stoping, tunnelling, building of dams, extraction and obtaining minerals, generation of electricity,

Approval Number	Date Issued	Expiry	Purpose
			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
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	24 Oct 2022	Store Manufacture
Refrigerant	Refrigerant Trading Council	27 Mar 2022	Use of refrigerant
Water extraction 85WA752823	NOW	29 Mar 2027	To extract 370 ML for use on site or to send to Perilya Broken Hill Operations Pty Ltd.
Radiation #5063802	EPA	26 July 2022	Sell and/or possess radiation apparatus. Sell and/or possess radioactive or items containing radioactive substances.

The Rasp Mine has an approved Mining Operations Plan (MOP) currently in place for the period 1 October 2021 to 30 September 2023. The AEMR, as required by the mining leases, incorporates reporting against this MOP.

The Rasp Mine has developed a number of environmental management plans as required by PA07_0018. **Table 1-2** provides a list of these Plans together with the approval dates for each.

Table 1-2 Status of Environmental Management Plans

Environmental Management Plan	Condition	Approved
Environment Management Strategy	Sched 4 Cond 1	Jun-19
Air Quality Management Plan	Sched 3 Cond 11	Jun-19
Community Lead Management Plan	Sched 3 Cond 13	Mar-16
Noise and Blast Management Plan:	Sched 3 Cond 20	
- Noise Management Plan		Jun-19
- Technical Blasting and Vibration Management Plan		Jun-19
Site Water Management Plan	Sched 3 Cond 23	Jun-19

1.3 Mine Contacts

Table 1-3 outlines the contacts for the Rasp Mine.

Table 1-3 Mine Contacts

Name	Title	Contact Details
Visko Sulicich	BHOP Director CBH Chief Operating Officer	T: 08 8088 9106 viskosulicich@cbhresources.com.au
Giorgio Dall'Armi	BHOP General Manager	T: 08 8088 9102 giorgiodallarmi@cbhresources.com.au
Joel Sulicich	BHOP Health Safety Environmental and Training Manager	T 08 8088 9125 joelsulicich@cbhresources.com.au
Devon Roberts	BHOP Senior Environmental Advisor	T 08 8088 9126 devonroberts@cbhresources.com.au
Complaints Line	Health, Safety and Environment Office	T: 08 8088 1211

1.4 Actions required from previous AEMR

Item	Action	Status
1	Development of the rehabilitation strategy through evidence-based studies containing options analysis, involving use of innovative rehabilitation or best practice, to demonstrate the feasibility or not, of rehabilitation options for areas classed as 'non-vegetative outcomes.'	Incomplete

A rehabilitation strategy is under development as agreed with DPE as part of the PA07_0018 MOD6 discussion in 2021. A Dust Management Options Analysis report completed in 2021 included a revegetation assessment (with a review of previous revegetation programs) and recommendations for rehabilitation trials. BHOP was considering expanding the Options Study as a project with the Centre for Mined Land Rehabilitation, University of Queensland, however, BHOP has decided to put the project on hold due to the lack of feedback from the Minister for Cabinet Interagency Panel on the Line of Lode. Guidance from the Resources Regulator following the Department of Premier & Cabinet Broken Hill Post Mining Interagency meeting held in Broken Hill on 13 and 14 August 2019 is still forthcoming. During the Interagency meeting there was agreement that paddock dumping of waste rock on free areas may be a suitable method of capping them. Following the Resources Regulator Targeted Assessment Program (TAP) audit for Soils and Minerals in November 2020, BHOP have conducted and analysis of suitable waste rock required for free area coverage and other surface usage purposes.

BHOP have developed a procedure for-testing of waste rock samples by lab analysis alone and in support of employing a hand-held XRF device employed to classify waste materials used on the surface and in the TSF2 Embankment works. Material tested using an XRF are sub-sampled to form a composite sample which is sent to a lab for analysis. XRF analysis supported by lab analysis will enable BHOP to generate a model of XRF accuracy.

2. OPERATIONS SUMMARY

During the reporting period, the Project Approval was modified to permit the mining of ML1249 under a sublease arrangement with Perilya (MOD8) and to conduct underground exploration in the Blackwoods area (MOD9).

Table 2-1 outlines the production summary for the reporting period. Predictions for the next reporting period are taken from the planned 2022 budget.

Table 2-1 Production Summary – Cumulative

Material	Approved Limit	Start of reporting period	At end of reporting period	End of next reporting period
Waste rock	NA	2,939,819	3,193,203	3,549,959
Ore	750,000	5,496,850	5,956,534	6,410,528
Processing waste (Tailings)	NA	4,759,583	5,137,733	5,530,208
Product (Concentrates)	NA	638,153	704,144	765,665

2.1 Exploration

2.1.1 Surface exploration

Consistent with the drilling programs proposed in the MOP, the Rasp Mine completed a surface drilling program across CML7. During the reporting period, the primary exploration focus remained on underground diamond drill testing for continuations/extensions of both the Western Mineralisation and the Main Lode remnant zones. Surface exploration programs targeting the characterisation of various Main Lode Remnant and Extensional Targets were also completed early in the reporting period as well as 13,898 metres infilling the Blackwoods Resource Target.

In the Western Mineralisation, areas from the 20-26 Levels were targeted with the aim of upgrading parts of the Western Mineralisation Resource model into the indicated and / or measured categories. The drill holes intersected typical Western Mineralisation style lead–zinc mineralisation with the two distinct lenses determined by areas of higher grade.

In the Main Lodes, underground drilling was primarily focused on exploration/extensional drilling of Block 7, McCullochs, the Zinc Lode Remnants , the Blind Shaft and McBrydes. Drilling of the Main Lodes was characterised by high grade, lead-rich intersections that were often weathered or partially mined. Evidence of past production in the areas was common with stope timbers and backfill encountered.

The program was located on land already disturbed by historic mining and no vegetation was removed. Top soils had already been removed from the area by historic mining activities. The drill pads were installed off existing tracks with minimal earthworks required.

No surface rehabilitation activities were undertaken on CML7 during the reporting period as the drill pads were still operational, although drill holes have been capped.

2.1.2 Underground exploration

During the reporting period, underground diamond drilling was conducted in the Western Mineralisation and Main Lodes.

The 2022 program will continue to focus on the Western Mineralisation and Main Lodes 2 Lens and 3 Lens.

2.2 Land Preparation

Routine maintenance of roads was undertaken as required which includes the application of dust suppressant to infrequently used roads.

Boundary fencing was also inspected and repaired.

2.3 Construction

2.3.1 New buildings / structures

Construction woks for Stage 2 of the Blackwoods Pit TSF2 embankment raise were completed in July 2021. The Stage 2 works comprised of:

- Construction of Embankment 1 with retaining wall
- Construction of Embankment 3

Construction works for Stage 2 of the Blackwoods Pit TSF2 embankment raise were commenced in July 2020. As with Embankment 2, Embankments 1 and 3 were constructed of rock fill, select rock fill and screened rock fill, and the installation of HDPE liner on the upstream sides of the embankments.

During construction activities at Embankment 1, Jamieson House (managed by the Broken Hill Historical Society) was inspected weekly by BHOP staff for cracking and other damage as a result of construction activities, and a vibration monitor was situated next to the house to monitor vibration, particularly from the use of a vibrating roller. A structural engineer inspected the building prior to works and a closing inspection is scheduled for March 2022.

Blast monitors have been installed on concrete plinths atop each Embankment to monitor blast vibration as per Dam Safety NSW requirements. The trigger/action limit has been set at 30 mm/s.

Six piezometers (two per Embankment) were installed in the Embankments in 2021 and are monitored weekly.

Along with daily TSF inspections by Process personnel, movement monitoring using multiple survey points are also conducted on a monthly basis. These survey results, along with piezometer, blast, supernatant, and seepage monitoring results are reported to the Dam Safety NSW in a monthly report.

The works design was prepared and monitored by Golder Associates Pty Ltd (Golder). Golder are also the Geotechnical Inspection and Testing Authority overseeing quality assurance for the works.

2.4 Mining

2.4.1 Mine access

All mining is undertaken underground accessed via the existing portal located at the northern end of Kintore Pit. Mining activities included 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:

- Underground operations, 24 hours per day, 7 days per week;
- Truck haulage of ore 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;

2.4.2 Mining method and sequence

A variety of production methods are utilised, including open stoping (OS), uphole benching, room and pillar and uphole pillar retreat mining. OS 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 and transported to loading points where mine trucks transported ore to the ROM pad.

A total 459,684 t of ore was mined during the reporting period. This resulted in approximately 10,215 truck movements to the ROM pad. **Figure 2-2** (**Plan 3)** provides a long section indicating location of the stopes mined in 2021. A vertical distance of 64 m was maintained (in the Zinc Lodes) from South Rd/Bonanza Street.

Figure 4-2 provides a long section for planned stopes in 2022.

2.4.3 Void backfilling

Waste rock was used to backfill mined out stopes with a total of 148,216 t placed during the reporting period. The backfill plant did not operate during the reporting period and no tailings were placed underground.

2.4.4 Waste rock and void backfilling

Waste rock is generated from underground mining operations and is predominantly used underground for backfilling stopes and maintenance of underground roads. During the reporting period 253,384 t was extracted as waste, of which 148,216 t of waste rock was used underground as void fill, and 105,168 t stockpiled in Kintore Pit (to be used underground as rockfill) and BHP Pit (to be crushed and used in embankment construction and capping). At the end of the reporting period, the waste stockpile in Kintore Pit held approximately 1,200,000 t.

Waste rock is also used for road making and repairs underground.

Block modelling is used to identify underground waste material sources. Underground diamond drilling results and assays assist the geological technicians to identify waste materials earmarked for surface.

2.4.5 Underground decline development

The Rasp Decline provides access to stopes for mining. During the reporting period there was no decline work conducted.

2.4.6 Ore and waste stockpiles

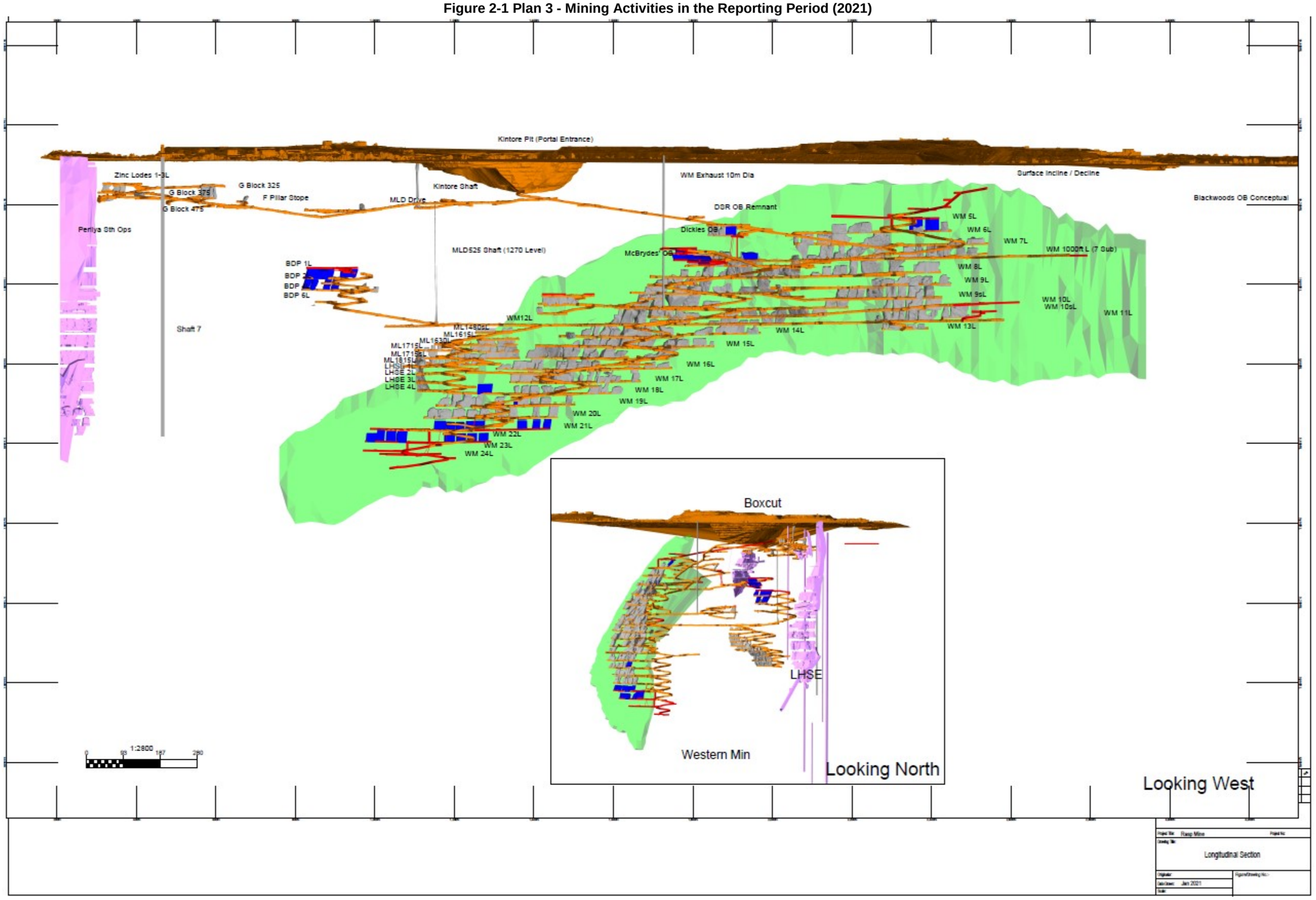
Ore was transported by truck and stored on the ROM Pad before being processed. The ROM Pad is 32 m by 80 m and is surrounded by 5 m windbreaks. Water application was used to control dust. No more than a week's processing was stored on the ROM stockpile at any one time. Mined ore was below the approved maximum rate of 750,000 tpa. Closing ore stockpiles on the ROM pad at the end of the reporting period totalled 15,544 t.

Ore and waste production for the reporting period is summarised in **Table 2-2** Ore and Waste Summary for the Reporting Period (2021).

Table 2-2 Ore and Waste Summary for the Reporting Period (2021)

Item	Total Production Tonnes
Topsoil Stripped	N/A
Topsoil Spread	N/A
Ore Tonnes Mined: Dry Tonnes	459,684
Waste Backfill (UG voids): Tonnes	148,216
Waste Trucked to Surface	105,168

Figure 2-1 Plan 3 - Mining Activities in the Reporting Period (2021)



2.5 Mineral Processing

2.5.1 Processing methods and rates

All mined ore is processed on site in the 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 separate lead and zinc concentrates. Concentrates are dewatered using thickeners and pressure filtration. The filtered concentrates are conveyed directly into containers and sealed. The concentrate is stored in these sealed containers in readiness for loading onto rail wagons for transport to the CBH ship loader in Newcastle, NSW or to the Nyrstar Pty Ltd smelter at Port Pirie, SA. In 2021 all zinc concentrate was sent via rail to the ship loader, 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 2-3.**

Table 2-3 Mineral Processing Summary for the Reporting Period (2021)

Activity	Total (t)
Milled	444,410
Lead concentrate	22,484
Zinc concentrate	43,507
Tailings deposited	378,150
Tailings Storage Facility (TSF2) storage capacity as at end of period	October 2022

2.5.2 Mill operating hours

The processing plant operates 24 hours per day in accordance with the Project Approval. Schedule 3 Condition 16 places a restriction on milling activities - (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.

In July 2020 due to operational changes the Mill began operating on a 8 day on/6 day off campaign.

2.5.3 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 southwestern 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 where it evaporates.

During the reporting period, 378,150 t of tailings were pumped to TSF2, on average the tailings contained zinc (0.74%), lead (0.37%) and copper (0.02%), Ag (8g/t), Fe (2.97%).

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 250,000 t of waste rock would be produced each year for a production rate of 750,000 t of ore. In 2021 with 459,684 t mined, waste rock produced was 253,384 t. BHOP has chosen to place the additional waste rock underground to fill voids and stopes, as it is more economical to dispose waste rock underground if possible rather than transporting waste to the surface. Hence, there is no void space underground for the backfill of tailings. Some waste rock is diverted to BHP Pit for testing to ensure it contains <0.5% Lead, crushed and used for TSF2 Embankment construction or stockpiled for capping of surface areas.

BHOP also opted to only deposit tailings in TSF2 as this facility had greater capacity and was economically more viable.

Table 2-4 shows past and proposed tailings deposition and waste rock production rates.

Table 2-4 Summary of Proposed (EA) and Actual Placement of Waste Rock and Tailings

Year (to 30 June)	2012 EA Tailings in Underground back fill per year (t)	2012 EA Tailings deposited in TSF1 (t)	2012 EA Tailings deposited in TSF2 (t)	2012 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	247,500	88,281	159,219	250,000	555,837[1]	265,369	96,888	362,257
2017	292,475	0	278,438	250,000	622,161[1]	215,897	76,578	292,475
2018	309,375	0	309,375	250,000	644,828[1]	332,702	121,864	444,566
2019	309,375	0	309,375	250,000	578,472[1]	357,792	134,706	492,792[1]
2020	309,375	0	309,375	250,000	469,049[1]	88,362	115,870	338,220
2021	309,375	0	309,375	250,000	378,150[1]	148,216	105,168	253,384
TOTALS	**2,483,883**	**968,401**	**1,675,157**	**2,250,000**	**5,016,960**	**2,352,023**	**1,211,719**	**3,600,864**

Note[1]: Actual tailings deposited.
Note[2]: Predicted .
Note[3]: Estimated from visual inspection at the time.

2.6 Mining Fleet

There were minor changes to the mining fleet during the reporting period, mainly with a reduction in the numbers of Jumbos and Haul trucks and an additional Service vehicle.

Table 2-5 Mining Fleet 2021

Vehicle Category	Number	Vehicle Category	Number
Jumbo drill	2	Grader	1
Production Drill	2	Excavator	1
Haul Truck	4	Service Vehicle	2
Load Haul Dump	4	Wheel Loader	2
Explosive Charger	2	Prime Mover	2
Forklift IT	4	Light Vehicle	33
Forklift Mill	2	Aux Mill Surface Plant	2
Forklift surface	3	Surface water trucks	2

2.7 Next Reporting Period

2.7.1 Construction

Construction of Stage 2 works, except for the TSF sprinkler system, was completed in 2021.These works consisted of Stage 2 of Embankment 1 and construction of Embankment 3.

2.7.1.1 Construction of the TSF2 Sprinkler System

Development consent (PA07_0018) MOD4 was granted to construct three embankments and a retaining wall at low points around the perimeter of the Blackwood Pit TSF (TSF2) in September 2017. The preliminary design was endorsed by the NSW Dam Safety Committee in December 2016. The EA and associated studies are available on the CBH website.

In 2018, BHOP held discussions with the EPA in regards to an air quality monitoring program for the construction period and operations, and part of the agreed management practices would be the installation of a sprinkler system to cover the TSF surface. In May 2021 it was agreed with the EPA and DPE that a revised design could be installed where sprinklers would be placed on the surface of the dam, to be moved during tailings harvesting operations proposed in MOD6.

Installation of the supply tank and pipework for the sprinkler system were planned for installation in January 2022 with the ring main and sprinklers to be installed in February and March.

Three portable PM10 monitors were purchased in 2019, with two placed at the western and northern side of TSF2 and one held as a spare. The northern PM10 monitor was installed in Proprietary Square in place of the TEOM, High Volume Air Samplers and Dust Gauge currently situated at Blackwood Pit, which were removed during the construction of Embankment 2. When the Blackwood Pit monitoring equipment was re-installed in early 2021 and Embankment 3 works completed, the PM10 monitor at Proprietary Square was no longer required but kept in place as a backup to the TSF2 TEOM. Video cameras were installed on the Mill Control Room overlooking TSF2 before the embankment works started as a means of monitoring and recording dust generation. The other operational PM10 monitor was installed at the lookout above the western end of TSF2 and remains in operation at this location.

2.7.1.2 Construction of the Blackwoods Boxcut and Decline

PA07_0018 MOD6 was submitted for approval in 2021. A summary of proposed MOD6 activities are:

Kintore Pit TSF3

- Preparation works including filling of mining access drives beneath the Pit, installation of an engineered plug to seal underground workings, installation of a seepage collection system at the base of the Pit, relocation of 260,000 t of material from the Waste Rock Tipple to the base of the Pit to act as a bridging layer upon which the tailings will be deposited, water management infrastructure and other minor works.

Relocation of Mine Access

- Excavation of a boxcut, mainly via earthworks with some surface blasting at the lower levels (30 m), to gain access to competent rock from which a new portal and decline would be installed. This would require relocating up to 490,000 t of excavated material to Little Kintore Pit and BHP Pit (all material has been deemed to be >0.5%Pb and would be stored in-pit).
- Establishment of a new mine portal (with some surface blasting required) and installation of appropriate ground control.
- Installation of a new decline (400 m) to join current underground mine workings, relocating up to 40,000 t to in-pit storage (as deemed >0.5%Pb). The decline would primarily be installed from underground however some blasting from the surface would be necessary for gaining access.

Tailings Harvesting in Blackwood Pit TSF2

- Preparation works including earthworks to construct bunding for tailings holding cells and an access way for trucks.
- Fresh tailings would continue to be placed into TSF2 into cells alternating between fresh, dried and harvested tailings. Thin layers of tailings (up to 1m) would be harvested once the material is sufficiently dry (average 10% moisture) using an excavator and dozer, and transported by truck to TSF3.

Periodic Crushing of Non-Ore Material

- No preparation works are required, it is proposed to contract a mobile crusher to operate two to three times per year for up to a week at a time providing crushed material for underground roadways, and some surface activities such as gravel capping and site bunding (tested and confirmed <0.5%Pb).

Rehabilitation Capping of Free Areas

- Excess waste rock from underground development would be taken to Kintore Pit and / or BHP Pit tested and sorted into stockpiles of <0.5%Pb which would be used for rehabilitation capping of Free Areas (non-active mining areas within CML7) on a progressive basis, and material >0.5%Pb would be co-placed with tailings in TSF3 or BHP Pit.

Administrative Amendments

- Noise criteria to be updated to align with recent attended noise monitoring and the NSW EPA *Noise Policy for Industry* (2017).
- Annual environmental reporting periods to be aligned (Annual Review and annual Environment Management Report).

With the approval of MOD6, decline development and boxcut construction would take place in 2022. With completion of the boxcut the preparation of Kintore Pit as a co-disposal facility will begin with the plugging of the portal and adit drive, forming of a waste rock seepage layer in the base of the pit, and installation of stormwater diversions. Preparation works for tailings harvesting including a TSF2 exit ramp and surface roads are also planned for later in the year.

2.7.2 Exploration

During the next reporting period, exploration on CML7 will continue to focus on:-

(a) Western Mineralisation:-
- Extension and infill from 23 through 26 Levels
- Centenary Mineralisation
- 15-16L WME Splay
- Far North Gap

(b) Main Lode Mineralisation:-
- Deep Lead Target
- McCullochs Extension
- Pattersons Splay Target
- Block 11 Close Off

(c) Surface Exploration: -
- Western Mineralisation (northern and southern extensions)
- Centenary Mineralisation
- Blackwood's North
- Thompson's North
- Northern Main Lode (Browne's)
- Main lode remnant exploration

2.7.3 Operations

Table 2-6 outlines the planned production rates for 2022**. Plan 3** (**Figure 2-3**) shows the mining areas and stopes. Planned mine production is 453,994 t, tailings deposition is estimated at 392,475 t. With the change in operational plan the TSF storage capacity has been extended to 2023.

Table 2-6 Summary of Planned Production for 2022

Activity	January to December 2022 (t)
Ore Mined	453,994
Waste Backfill (UG Rock Places)	134,231
Waste Trucked to Surface	222,525
Milled	453,996
Lead concentrate	17,095
Zinc concentrate	44,426
Tailings deposited	392,475
TSF2 storage capacity as at end of period	1 year

2.7.4 Water structures - maintenance

Surveying of the water storage structures were conducted in 2018. The development of staged storage curves enabling more accurate capacities and volumes to be determined will be completed in 2022.

Inspections of storages for sediment build-up were conducted in 2018 and sediment removal was conducted in sediment pond 17A and Horwood's Dam in 2019. The material recovered from Horwoods Pond was disposed of in the north-eastern end of TSF2 in 2020.

2.7.5 Modification applications

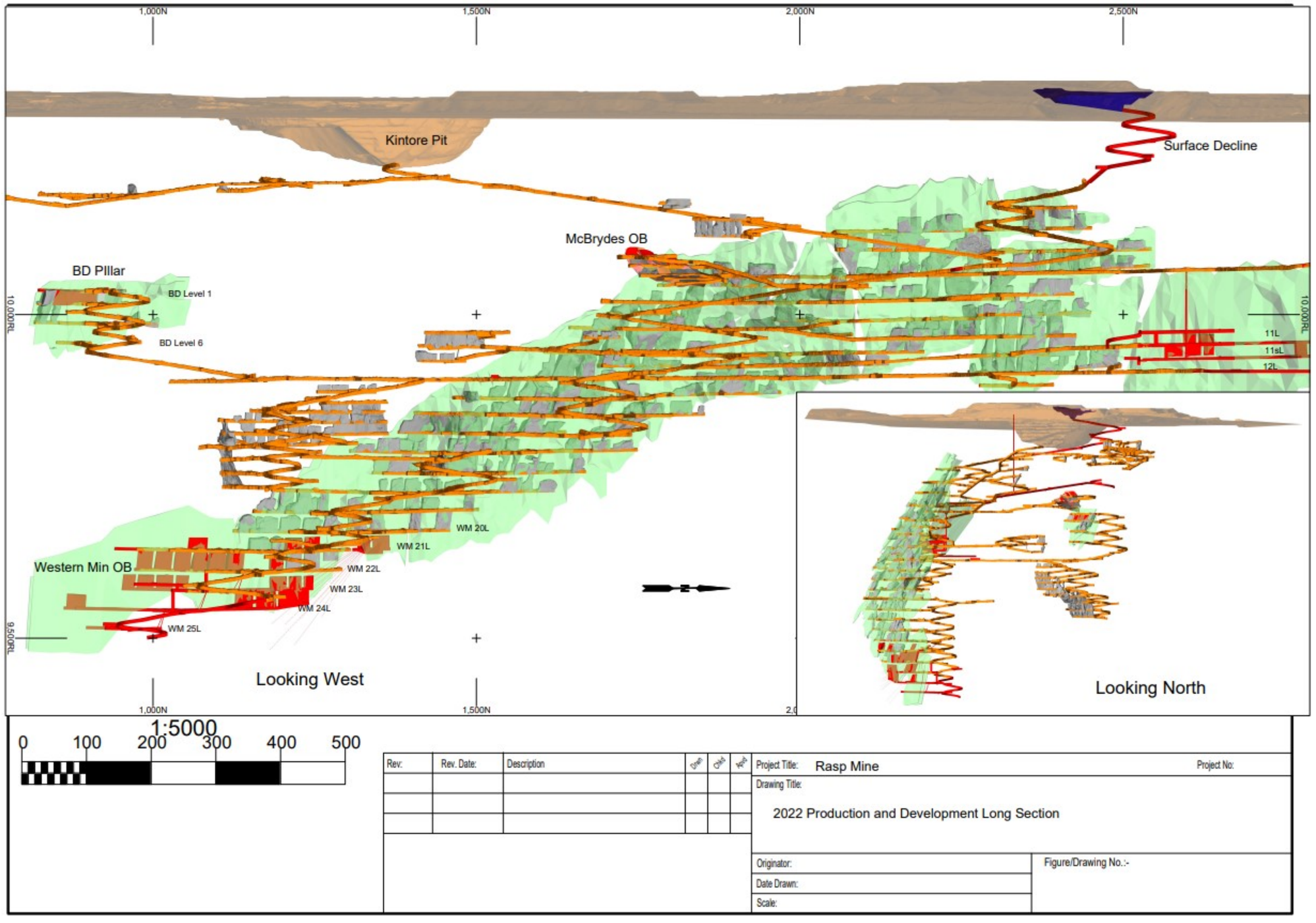
In 2021, BHOP applied for modification (MOD6) of the project approval to deposit tailings into Kintore Pit, relocate the mine portal, and provide for future waste rock storage.

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

In the initial EA BHOP underestimated the amount of mine development that was required to access the Main Lode and Western Mineralisation ore bodies. The need to undertake more underground mining development has impacted the amount of waste generated. In the original EA it was predicted that approximately 250,000 t of waste rock would be produced each year for a production rate of 750,000 t of ore. Actual total waste rock produced has averaged 416,397 t per year since commencement of operations peaking in 2019 with 490,000 t. BHOP has chosen to place the additional waste rock underground to fill voids and stopes, as it is more economic to dispose of waste rock underground where possible rather than transporting waste to the surface. Thus there has been no requirement to fill any underground void with tailings. **Table 2-4** summarises tailing and waste rock placement as predicted in the original EA (at a production rate of 750,000 t) and what has actually been placed since commencement of operations.

Meetings have been held with the relevant regulators to discuss the proposed modification - Department of Planning and Environment (DPE), the Broken Hill City Council (BHCC), Division of Resources and Geoscience (DRG) and the Environment Protection Authority (EPA).

Figure 2-2 Planned Stopes for the Next Reporting Period (2022)



3. ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

3.1 Meteorological

Figure 3-1 and

Table 3-1 provide summary weather data. This data is a combination of information from the Rasp Mine weather station and the Bureau of Meteorology station (for rain days and rainfall).

While temperatures in 2021 remained consistent with historical records, rainfall (116.9 mm) for the period was significantly lower than the BoM's long-term annual average of 259 mm. Winds were predominantly from the south with high winds experienced during July to January.

Figure 3-1 Weather Data for the Reporting Period (2020)

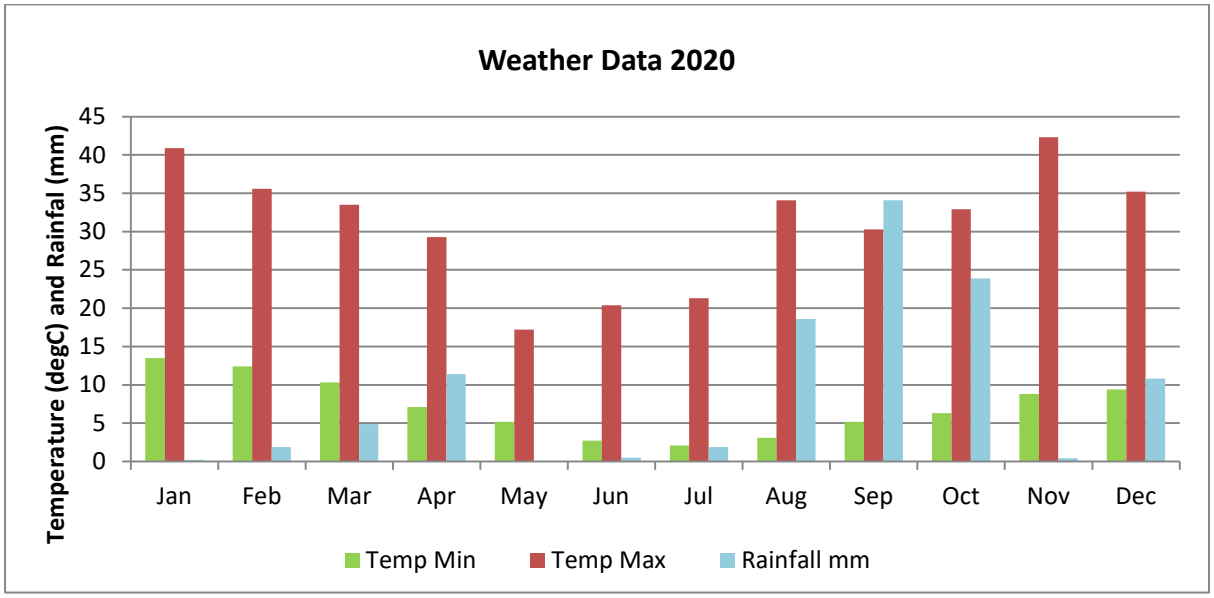


Table 3-1 Summary of Wind and Rain Days in Reporting Period (2021)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Predominant Wind Direction	S	S	S	S	S-SW	NW	NW	SW	S-SW	S	S-SW	S
Max wind speed (km/hr)	51.6	39.6	46.6	37.0	49.5	41.7	52.7	51.2	52.7	51.4	50.4	60.6
Days rained in month	3	3	5	0	3	5	7	3	0	4	7	1

3.2 Environmental Monitoring Locations

The BHOP site environmental monitoring program is summarised in **Table 3-2**, locations for sampling/monitoring points are shown in **Figure -3-2**. Shaft 6 was removed as an air quality monitoring location in MOD5, approved in November 2018, as Shaft 6 became an air intake point in April 2018. In April 2017, blast monitor V4 at 123 Eyre St was removed at the residents request and placed at the Eyre St Bowls Club. The site weather station was replaced in January 2019 as the previous weather station cannot calculate Sigma Theta, a requirement of EPL 12559.

Table 3-2 Summary of BHOP Environmental Compliance Monitoring Program

EPA ID	BHOP ID	Parameter	Frequency
AIR QUALITY			
1	Primary Vent Shaft	- Oxides of Nitrogen (as NO_2) -Total solid particles (TSP) - Volatile organic compounds - Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V	Quarterly (at blasting event)
2	Crusher Baghouse Stack	- Total solid particles (TSP) - Total - Sb, As, Cd, Pb, Hg, Be, Cr, Co, Mn, Ni, Se, V	Quarterly
3 - 9	D1 – D7	Insoluble solids, Lead	Monthly
10 & 57	HVAS & HVAS3	Total Suspended Particulate, Lead on filter paper	Every 6 days
11 & 12	HVAS1 & HVAS2	PM10, Lead on filter paper	Every 6 days
13 & 14	TEOM1 & TEOM2	PM10, Wind Speed/Direction	Continuous
SURFACE WATER			
29 - 36	S31-1, 44, 49, 1A, 9B-2, Horwood Dam, Upstream and Downstream	pH, EC, TDS, SO4, Cl, Na, Cd, Pb, Mn, Zn	When contain water (at least 2 per 12 months) April & October
GROUNDWATER			
37 - 52	GW01 – GW16	pH, EC, TDS, SO4, Cl, Ca, Mg, Na, Fe, Cd, Pb, Mn, Zn	Quarterly
53 & 54	Shaft 7 & Kintore Pit extraction	pH, EC, TDS, SO4, Cl, Ca, Mg, Na, Fe, Cd, Pb, Mn, Zn	Quarterly
NOISE & BLASTING VIBRATION			
15 - 28	A1 – A14	Leq, 15min/Day Leq, 15min/Evening Leq, 15min/Night	Annually
V1 – V5	V1 – V5	dB mm/ second	Continuous (when blasting)
-	V6	dB mm/ second	Continuous (when blasting)
-			
WEATHER			
55	Meteorological Station	Temperature, wind speed & direction, rainfall	Continuous (15 minute intervals)

The following sections provide 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 where available.

3.3 Air Quality

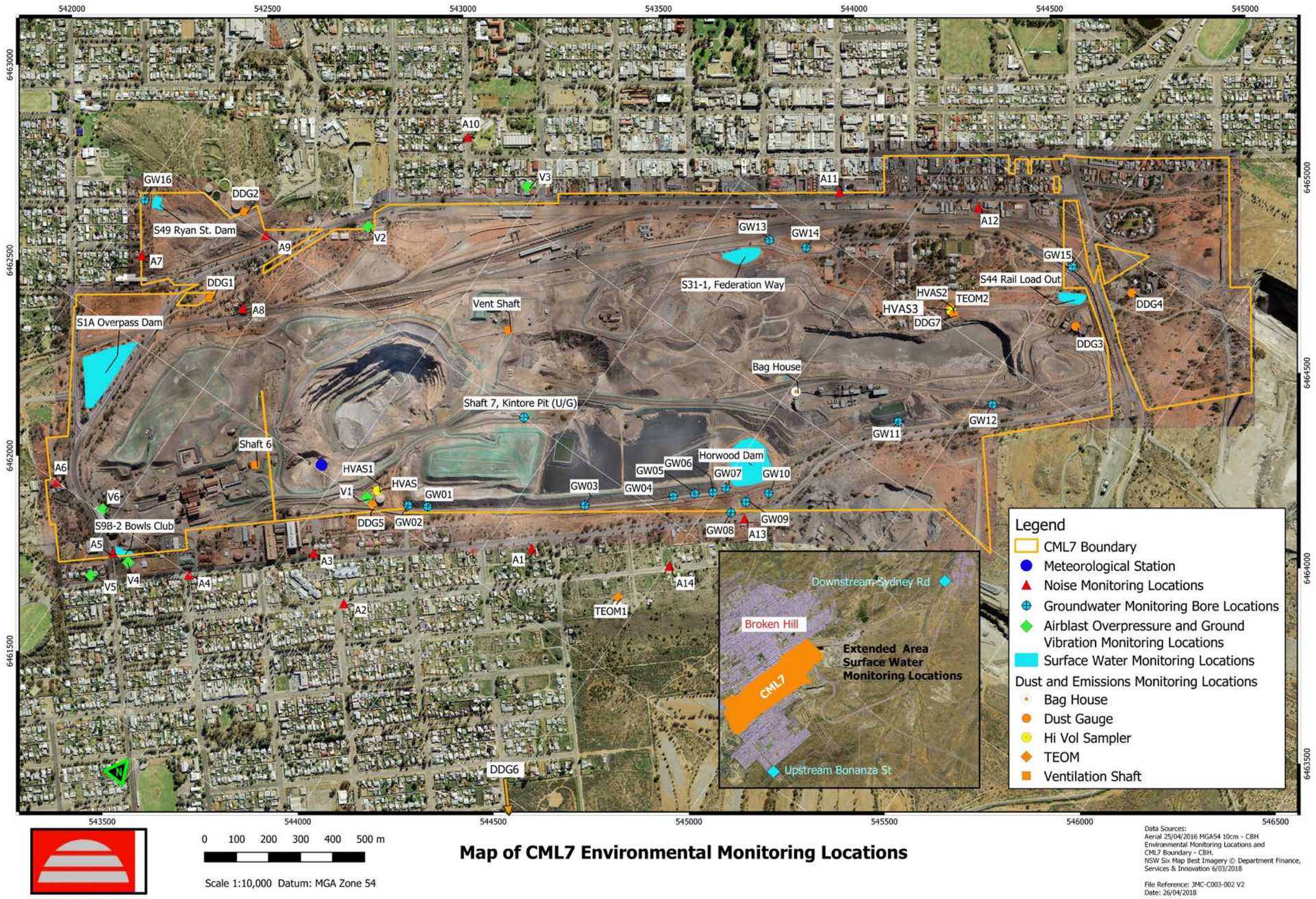
In accordance with the conditions of PA07_0018 and EPL12259 air quality is monitored:

- Air emissions from in-stack mine exhaust ventilation and the crusher baghouse are tested quarterly by an external contractor with specialised equipment;
- Ambient air quality is monitored by BHOP personnel via a combination of dust deposition gauges, high volumes air samplers (HVAS) and tapered element oscillating microbalance (TEOM) sampling units; and

Real-time information is downloaded and alerts automatically forwarded to assist in the day-to-day operational management of issues as well as long-term analysis of environmental data.

Figure 3-2 shows the sampling locations for all air quality monitoring units.

Figure 3-2 Location of Compliance Monitoring / Sampling Points



3.3.1 In-stack air quality

During the reporting period BHOP engaged Assured Monitoring Group (AMG) to conduct testing of the mine ventilation exhaust points and the crusher baghouse. Testing was performed each quarter in accordance with the EPL. AMG are NATA accredited to perform this testing. The EPL Condition L2.1 specifies the in-stack performance criteria for the two ventilation exhaust units - Primary Ventilation Shaft and the Crusher Baghouse. **Table 3-3** provides the results of the testing against the limits as set out in the EPL. All limits were met.

3.3.2 Dust deposition gauges

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. Total fallout dust (depositional dust) is continuously monitored from seven deposition gauges located on and around the Rasp Mine, as shown in **Figure 3-2**. D1 and D6 are located off-site, D1 near the St Johns training facility north of the Rasp Mine and D6 in Casuarina Avenue south of the Rasp Mine. D2 to D5 and D7 are located on the Mine lease in various locations. D7 was removed in June 2019 due to the construction of Embankment 2 at TSF2 and was reinstalled at TSF2 early in 2021.

Samples are collected monthly and are sent to ALS Laboratory (NATA accredited) in Newcastle and analysed for total deposited dust and deposited lead dust. Deposited dust is assessed as insoluble solids as defined by Standards Australia, 2003, AS 3580.10.1-2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.

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 3-3.**

Table 3-3 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

Provided below is a discussion of results for dust deposition during the reporting period 2021 and trends over the operational life of the Rasp Mine. Dust deposition results are reported and reviewed internally on a monthly basis.

Figure 3-3 and **Figure 3-4** show the monthly dust deposition and total deposited lead results for the reporting period.

There were three occasions where the monitoring location exceeded the depositional dust level of 4 g/m^2/month limit (red figures in **Table 3-5**) compared to fifteen the previous year. Dust deposition results are higher in the summer months at the beginning and end of the year due to the windy weather, high evaporation, and dust storms. Rainfall in each of the four previous years has been below the BOM's long-term average of 259 mm, with 92.2 mm falling in 2018, 34.76 mm in 2019, 108.6 mm in 2020, and 116.9mm in 2021.

Lead results were consistently above baseline levels throughout the period except for April at D3-Thompsons Shaft, which is adjacent to the rail loading facility and access road, as well as exposed areas situated on the northern side of the site. D3 may be impacted by haul road traffic at the rail-loadout but the water cart is employed whenever train loading is taking place and street sweeping occurs weekly.

Table 3-4 Vent and Baghouse Testing Results During the Reporting Period

Main Vent Shaft (EPL 1)													
Date	Dry Gas Density	Moisture	Molecular weight of stack gases	NO2	NO2 EPL Limit	Temp	Total Solid Particles	Total Solid Particles EPL Limit	Type 1 and Type 2	Type 1 and Type 2 EPL Limit	Velocity	Volatile Organic Compounds	Volatile Organic Compounds EPL Limit	Volumetric Flowrate
	kg/m^3	%	g/m^3	mg/m^3	mg/m^3	°C	mg/m^3	mg/m^3	mg/m^3	mg/m^3	m/sec	mg/m^3	mg/m^3	m^3/sec
13/04/2021	1.29	2.2	1287	2.05	350	25	4.59	20	0.0917	1	14.9	0.468	40	260
11/08/2021	1.28	0.9	1284	2.22	350	23	1.83	20	0.227	1	14.7	0.464	40	265
12/10/2021	1.29	2	1288	5.28	350	24	1.38	20	0.0102	1	15.2	0.438	40	260
23/11/2021	1.29	2.32		2.23	350	25	1.55	20	0.0104	1	13.4	2.91	40	227

Crusher Baghouse (EPL2)										
Date	Dry Gas Density	Moisture	Molecular weight of stack gases	Temp	Total Solid Particles	Total Solid Particles EPL Limit	Type 1 and Type 2	Type 1 and Type 2 EPL Limit	Velocity	Volumetric Flowrate
	kg/m^3	%	g/m^3	°C	mg/m^3	mg/m^3	mg/m^3	mg/m^3	m/sec	mg/m^3
13/04/2021	1.29	1.5	1288	26	5.49	20	0.197	1	23.2	9.59
11/08/2021	1.29	2.3	1287	21	3.74	20	0.479	1	22	9.6
12/10/2021	1.29	1.3	1288	18	2.96	20	0.0869	1	21.8	9.09
24/11/2021	1.29	1.72		23	1.5	20	0.0292	1	13.4	9.6

D4-Junction Mine also recorded elevated lead levels except from May to July but this is surrounded by the Junction Mine reserve and other exposed historical mining areas to the northeast and northwest.

Elevated results for TSP Dust at D6 Casuarina Avenue (EPL8) in January, October and November are likely due to strong winds and elevated regional dust levels as the predominant wind direction for the month was from the South.

Table 3-5 Dust Deposition Results for the Reporting Period (g/m$^{2/}$month)

	D1 EPL3 (off site)		D2 EPL4		D3 EPL5		D4 EPL6		D5 EPL7		D6 EPL8 (off site)		D7 EPL9	
2021	DD	LD	DD	LD	DD	LD	DD	LD	DD	LD	DD	LD	DD	LD
Jan	0.2	0.00077	1.4	0.00426	1	0.0151	3.8	0.022	2.1	0.0089	6.2	0.0025	0.4	0.00194
Feb	1.6	0.00267	0.2	0.00061	1.2	0.00528	2.7	0.009	1.4	0.00206	2.4	0.00061	0.6	0.00334
Mar	0.6	0.0171	2.9	0.0191	1	0.0442	2.3	0.013	0.8	0.00531	1.7	0.00318	0.4	0.005831
Apr	0.3	0.0015	0.1	0.00059	0.1	0.0009	0.9	0.007	1.1	0.006	1.6	0.0012	0.7	0.0089
May	0.4	0.00089	0.1	0.00087	2.6	0.0258	1.1	0.001	0.9	0.00349	1.2	0.00061	0.7	0.00528
Jun	0.2	0.00059	0.1	0.00037	0.5	0.0071	1.1	0.003	0.8	0.00277	0.9	0.00052	0.4	0.0012
Jul	0.8	0.00124	1.1	0.00093	0.6	0.007	2.0	0.003	3.3	0.0109	3.1	0.00188	0.7	0.0011
Aug	0.5	0.00081	0.8	0.00055	0.6	0.00735	2.5	0.007	2	0.00762	2.2	0.00212	0.4	0.00167
Sep	0.8	0.0023	1	0.00095	1.2	0.0127	2.6	0.0155	1.2	0.00689	1.7	0.00235	0.6	0.0035
Oct	1.8	0.0035	2.7	0.00148	2.2	0.0194	3.3	0.00708	3.2	0.0092	6	0.0024	1.4	0.00537
Nov	1.3	0.00119	1.5	0.00063	1.4	0.0059	2.6	0.00773	1.4	0.00207	6.1	0.00181	0.6	0.00246
Dec	1.8	0.00291	1.8	0.0017	2	0.00746	4.6	0.0093	3.2	0.0057	5.3	0.0023	1.1	0.00249
2010	**4.0**	**0.0034**	**3.1**	**0.005**	**4.3**	**0.005**	**5.7**	**0.006**	**N/A[1]**	**N/A[1]**	**5.8**	**0.004**	**N/A[1]**	**N/A[1]**

Note 1 = Background is not available for these locations.

Figure 3-3 Monthly Total Deposited Dust for 2021

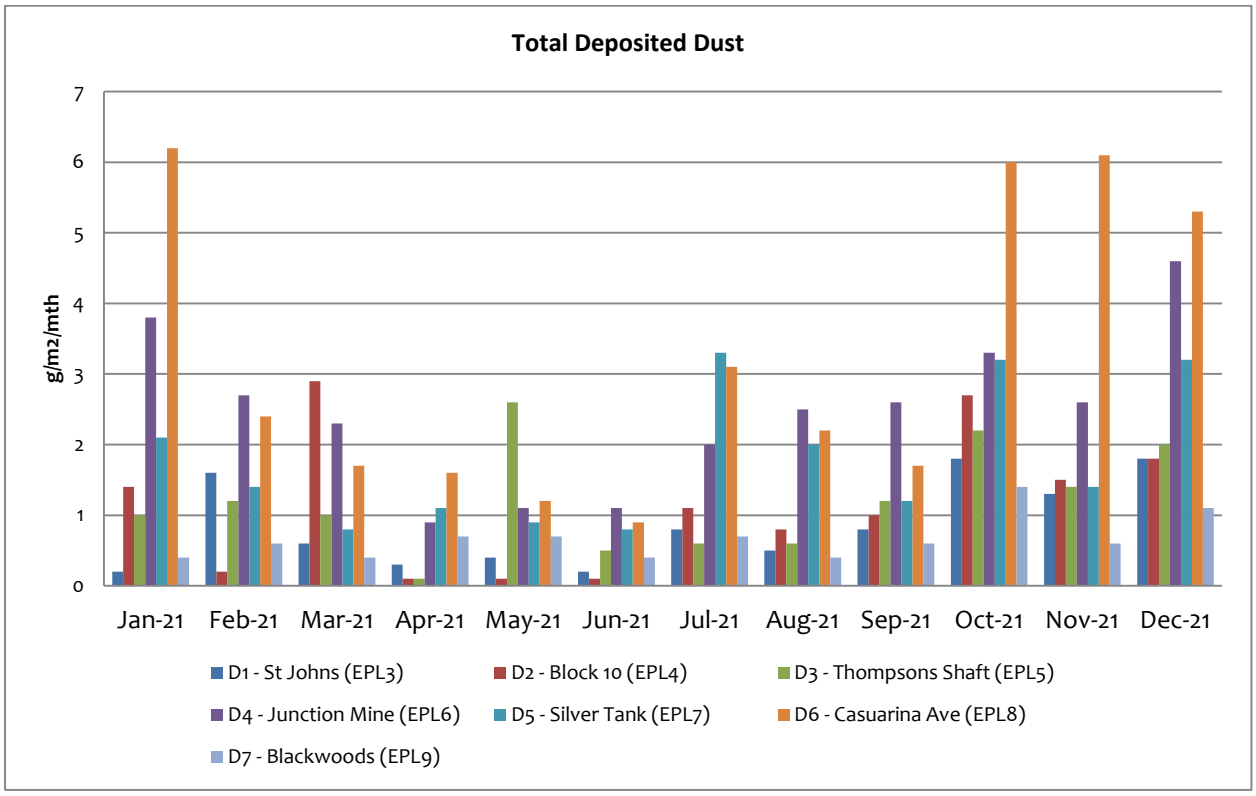


Figure 3-4 Monthly Lead Deposition for 2021

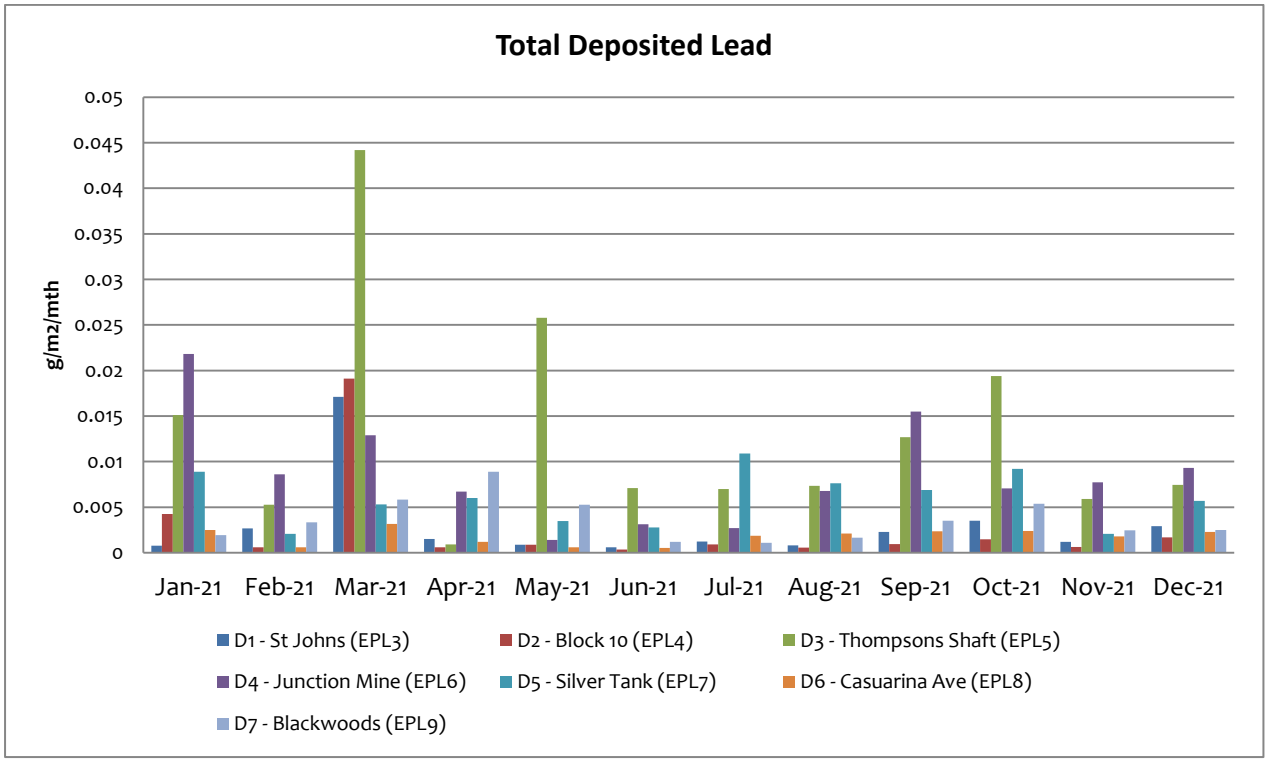


Figure 3-5 Total Deposited Dust 2007 – 2021

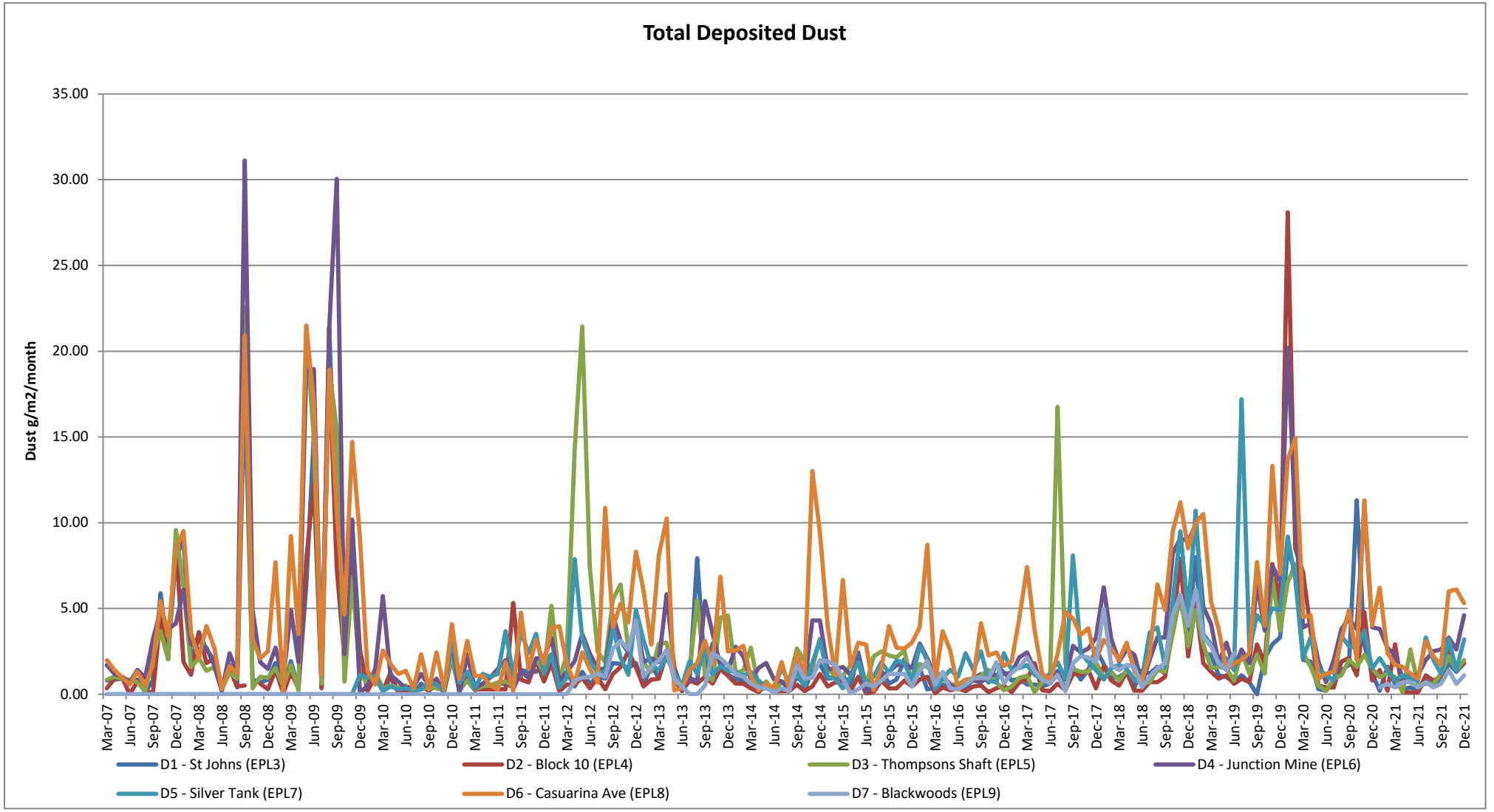
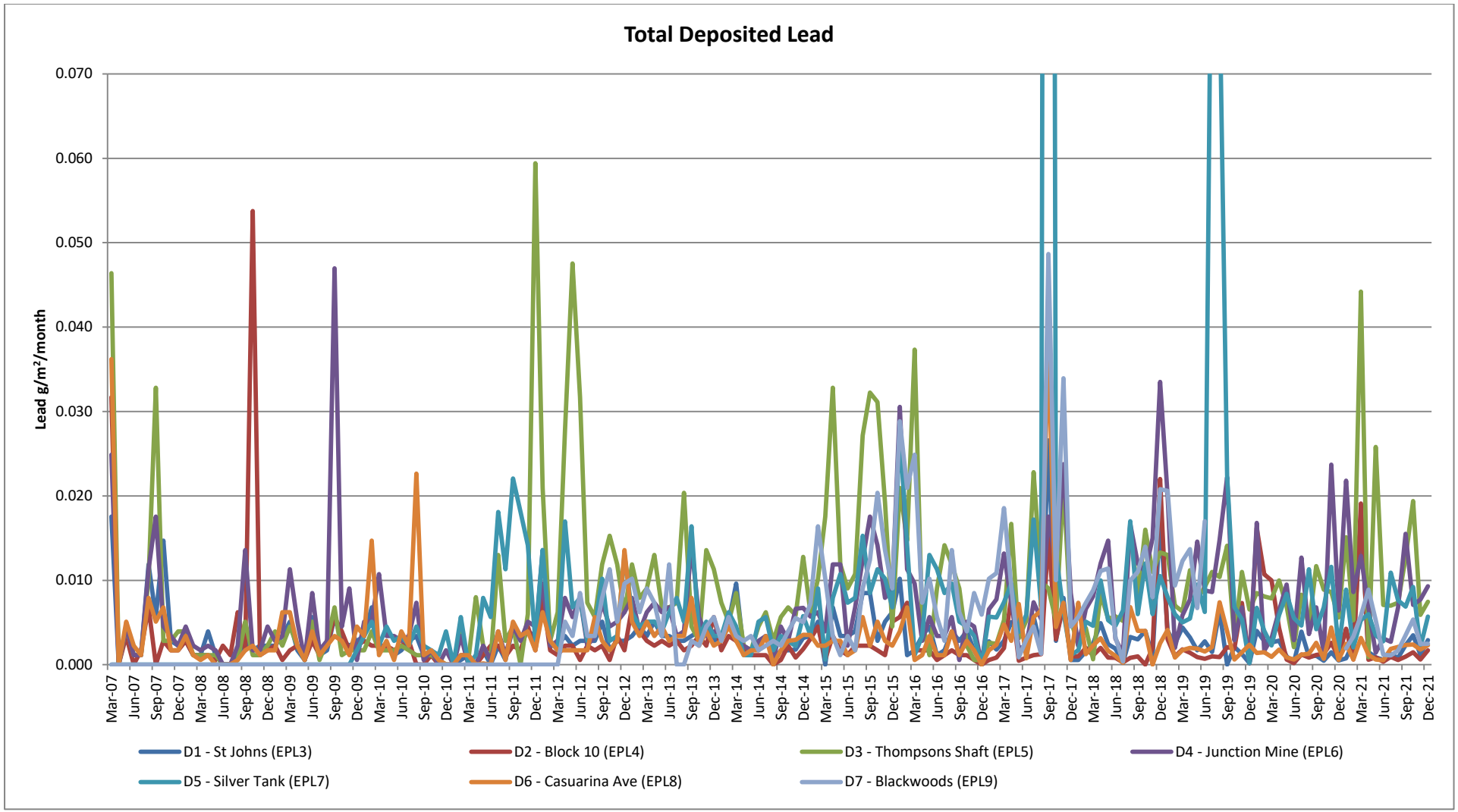


Figure 3-6 Total Deposited Lead 2007 to 2021



3.3.3 High volume air samplers

There are four high volume air samplers used to measure ambient air quality at the Rasp Mine – HVAS (EPL10) and HVAS1 (EPL11) are located at the Silver Tank, central and to the south of the mine lease, and HVAS2 (EPL12) and HVAS3 (EPL57) are located adjacent to and north of Blackwood Pit. Locations are shown in **Figure 3-2**. HVAS and HVAS3 sample for total suspended particulates (TSP) and lead dust, and HVAS1 and HVAS2 sample for particulate matter less than 10 microns (PM_{10}) and lead dust.

Samples are collected every six days and are sent to ALS Laboratory (NATA accredited) in Newcastle. **Table 3-6** outlines the impact assessment criteria as listed in PA07_0018.

In accordance with the PA07_0018 and the EPA air quality guidelines, from September 2017, the criteria for annual rolling average for PM_{10} criterion was reduced from 30 $\mu g/m^3$ to 25 $\mu g/m^3$. All other air quality criterion remains unchanged.

Table 3-6 Impact Assessment Criteria

Pollutant	Averaging Period	Criterion
Total suspended particulate (TSP) matter	Annual	90 $\mu g/m^3$
Particulate matter < 10 µm (PM_{10})	Annual	25 $\mu g/m^3$
Particulate matter < 10 µm (PM_{10})	24 hour	50 $\mu g/m^3$

Provided below is a discussion of results for each HVAS unit during the reporting period 2021 and trends over the operational life of the Rasp Mine. HVAS unit results are reported and reviewed internally on a monthly basis.

HVAS (EPL10)

TSP and TSP-lead results for 2021 recorded by HVAS are shown in **Figure 3-7** and **Figure 3-8.** These show the results have remained consistent over the reporting period.

The annual rolling average for TSP at this location is 32.29 $\mu g/m^3$ at the end of December 2021, significantly lower than the average at the beginning of January 2021 which was 69.25 $\mu g/m^3$. A reduction in extreme weather events and rainfall at the end of 2021 is likely responsible for the reduction.

As shown in the figures below, with the onset of high winds there is an increase in the TSP and TSP-Lead recorded.

The rolling annual average for TSP Lead in December 2021 was 0.17 µg/m3 which is slightly lower than the rolling annual average of 0.25 µg/m3 for TSP Lead in January 2021.

The Rasp Mine PA07_0018 does not stipulate any criteria for lead; however the recorded annual average of TSP-lead remains below the NSW EPA guideline of 0.50 µg/m3.

The highest TSP level recorded in the period was 88 $\mu g/m^3$ on 14 January, which is much lower than some of the elevated results recorded in 2020 on 1 February (258 $\mu g/m^3$), 14 March (288 $\mu g/m^3$), 7 May (490 $\mu g/m^3$) and 4 October (253 $\mu g/m^3$).

There were elevated TSP Lead levels of 0.85 $\mu g/m^3$ on 30 August when winds were predominantly from the NW and WNW. The contribution of TSP Lead was likely from on-site locations on site as similar increases in TSP Lead dust were not recorded in monitoring equipment sited on the northern boundary of the site. Haul roads and operational areas are serviced by water carts although some areas may dry out between applications.

Results for TSP are well below the EPA threshold of 90 $\mu g/m^3$ and 0.5 $\mu g/m^3$ for TSP-lead.

Figure 3-7 HVAS TSP Results for the Reporting Period (2021)

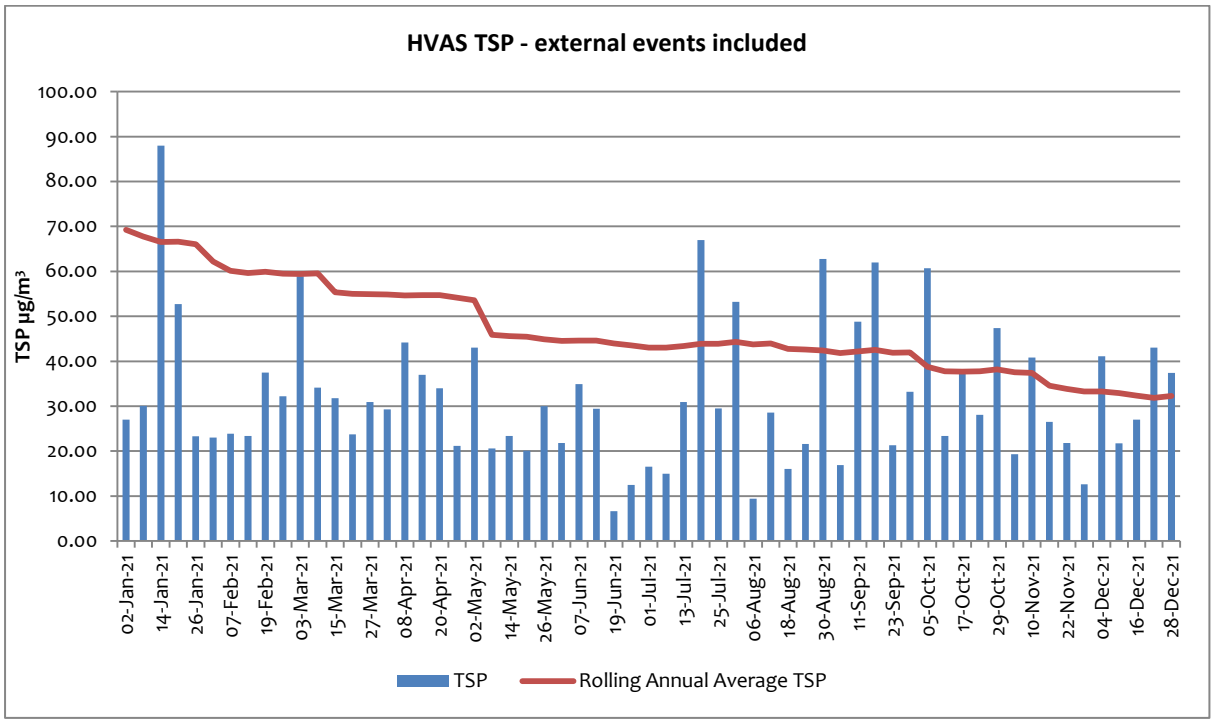
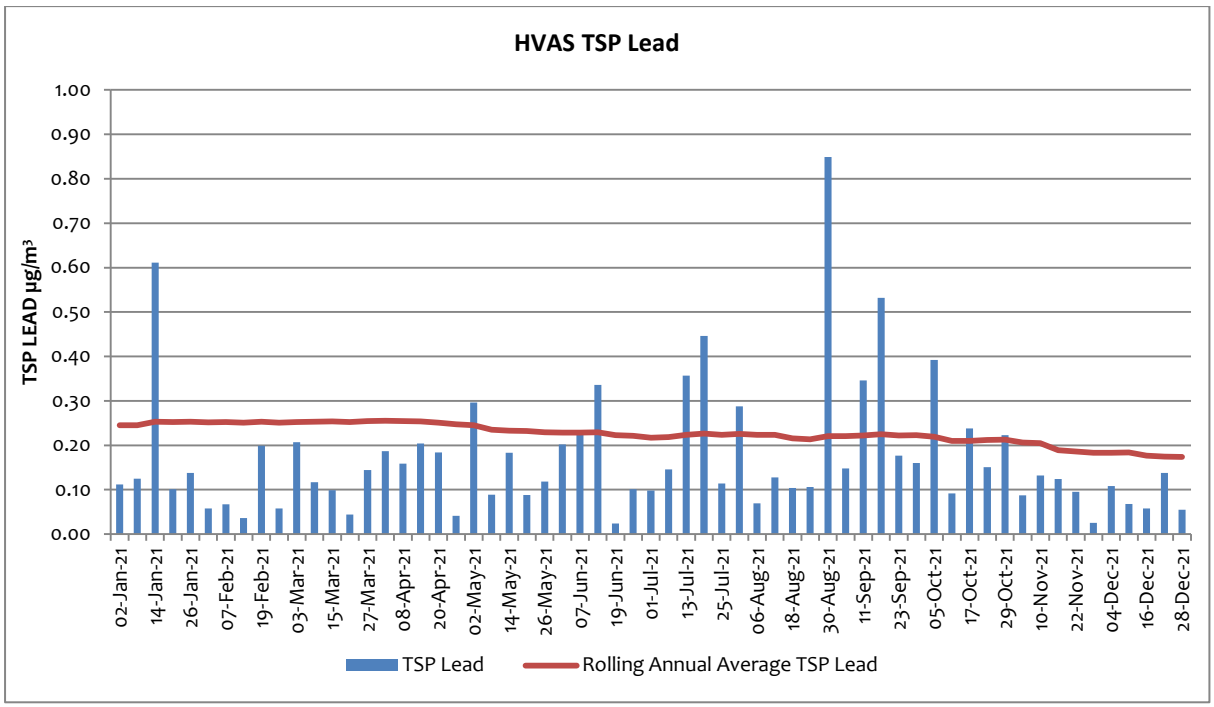


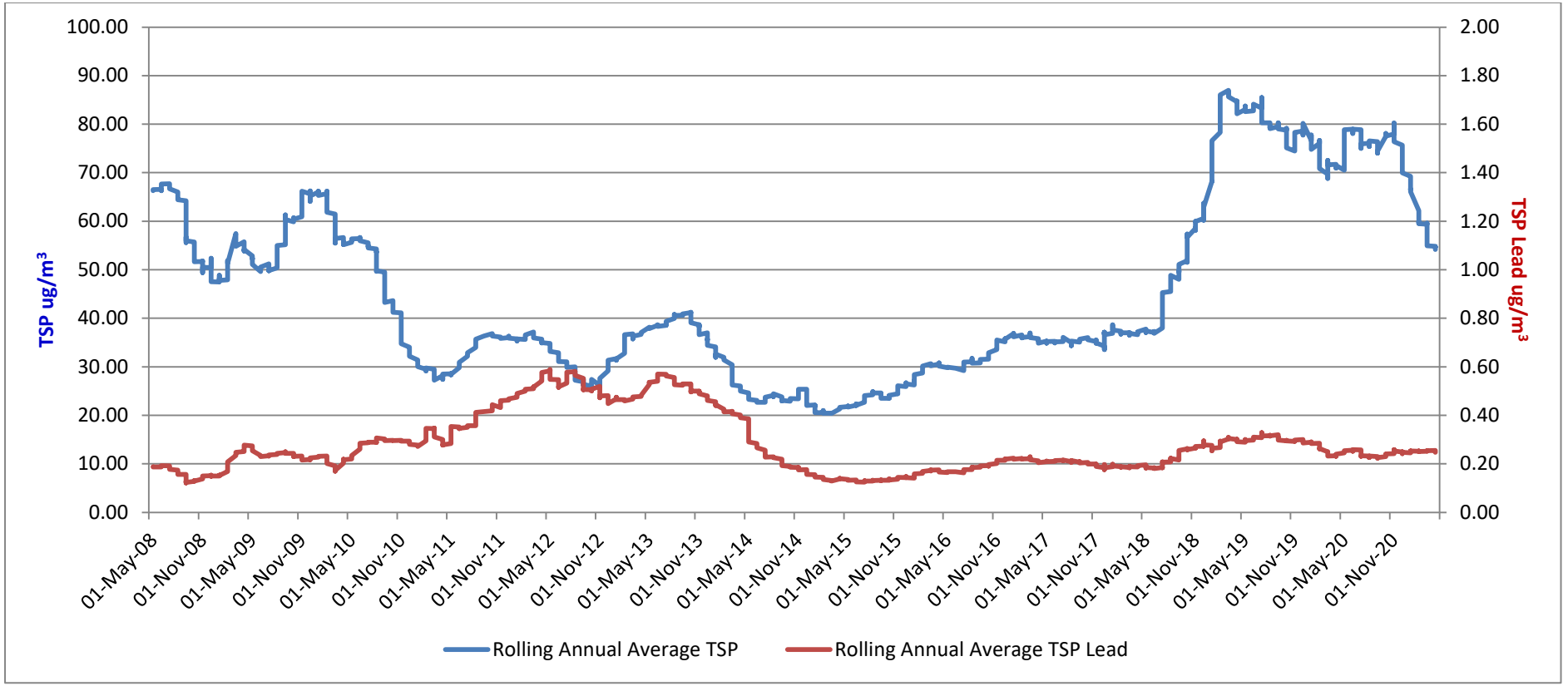
Figure 3-8 HVAS TSP-Lead Results for the Reporting Period (2021)



The original EA did not include a receptor close to HVAS in predictions for total suspended particles.

As can be seen in **Figure 3-9** there is an increase in dust levels recorded in HVAS since 2016 while Lead levels have remained stable, which suggests that much of the dust contributed is not from site and likely the result of drought conditions.

Figure 3-9 HVAS TSP and TSP-Lead Results for the Period 2008 to 2021



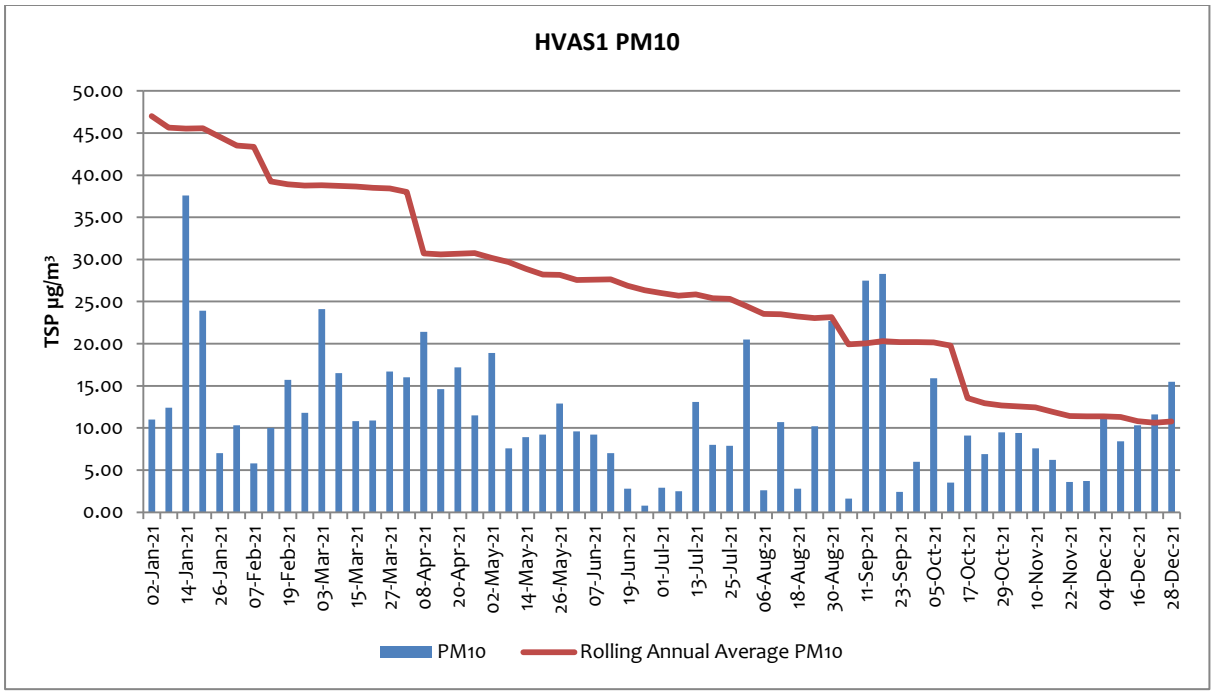
HVAS1 (EPL11)

HVAS1 is used for sampling PM_{10} and PM_{10}-lead. The annual rolling average for PM_{10} dust at this location is 10.8 µg/m^3 at the end of December 2021, significantly lower than the average at the beginning of January 2021 which was 45.6 µg/m^3 and below the background level reported in the EA of 29.1 µg/m^3. Results for the reporting period are shown in **Figure 3-10** which indicates that the rolling annual average for PM_{10} is below the criteria of 25 µg/m^3.

The highest PM_{10} level for HVAS1 in the period was 37.6 µg/m^3, recorded on 14 January. This is well below the elevated results recorded in the previous reporting period on 1 February (221 µg/m^3), 14 March (238 µg/m^3), 7 May (430 µg/m^3) and 4 October (359 µg/m^3).

Results for the period 2011 to 2021 are shown in **Figure 3-15**.

Figure 3-10 HVAS1 PM_{10} Results for the Reporting Period (2021)

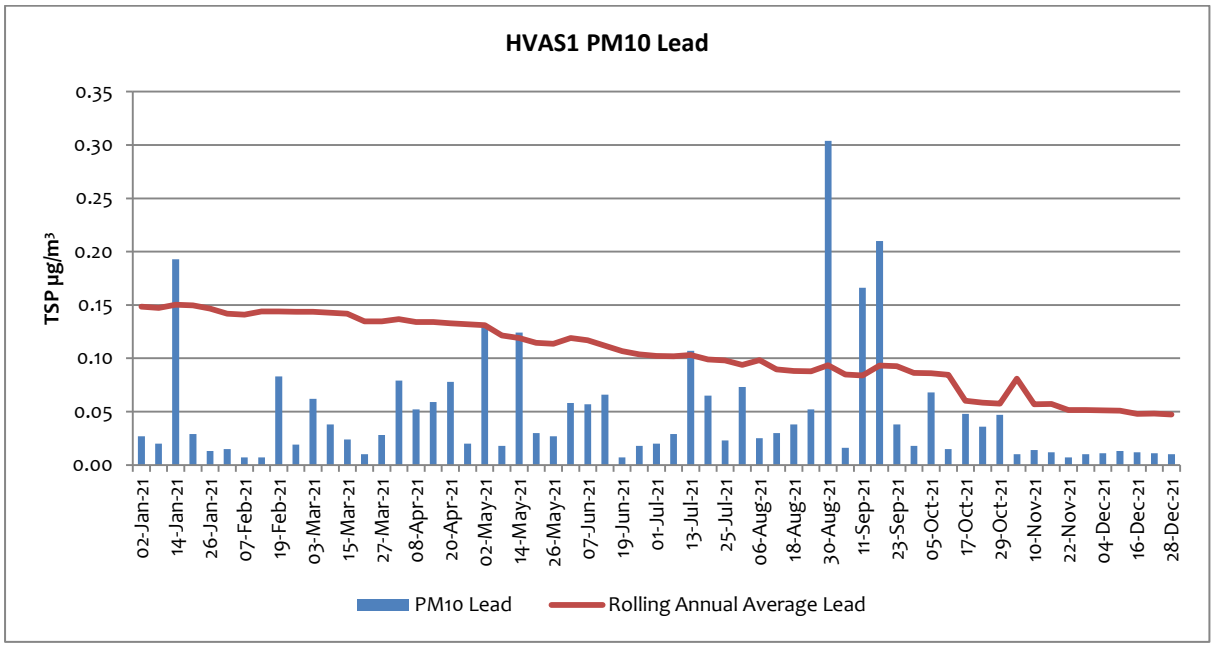


The rolling annual average for PM10 Lead in December 2021 was 0.05 µg/m^3, down from 0.15 µg/m^3 in January 2021, **Figure 3-11.** The highest HVAS1 PM_{10}-Lead level were on 30 August (0.30 µg/m^3). Elevated Lead results may have been due to the contribution from sources on site as monitoring equipment on the northern boundary of the site did not record elevated Lead levels to the same degree. Haul roads and operational areas are serviced by water carts although some areas may dry out between applications.

Since May 2011 when HVAS1 started operating dust levels have risen and fallen in the last few years due to the drought and then increased rainfall.

There is no criterion for PM_{10}-lead. Trends are discussed below and results for the period 2011 to 2021 are shown in **Figure 3-12**.

Figure 3-11 HVAS1 PM_{10}-Lead Results for the Reporting period (2021)

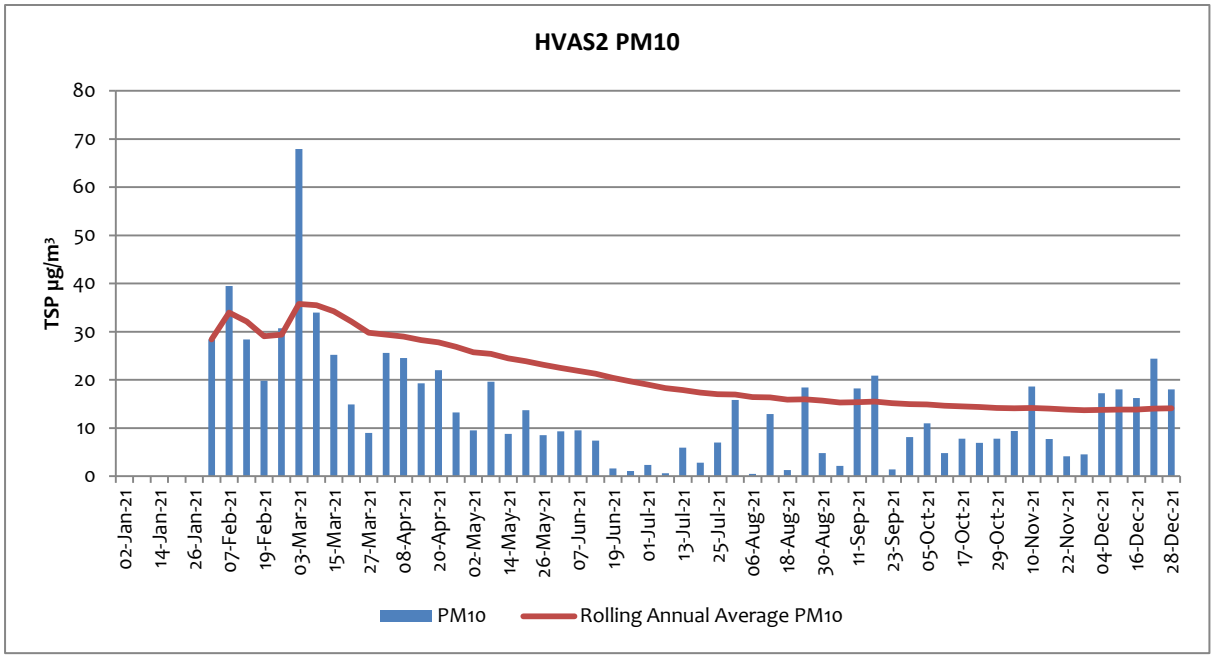


HVAS2 (EPL12)

HVAS2 was removed from Blackwoods Pit in June 2019 due to Embankment 2 construction works. HVAS2 was reinstalled at TSF2 early in 2021. The annual rolling average for PM_{10} dust at this location is 14.12 µg/m^3 at the end of December 2021, however due to the unit being reinstalled after 19 months decommissioned, annual rolling average is calculated using data from February to December 2021 only.

The highest PM_{10} level recorded at HVAS2 in the period was 67.9 µg/m^3 on 3 March. The predominant wind direction on 3 March was from the South which suggests there was contribution of lead dust from on-site sources as well as from a quarry to the south of the site, particularly as PM_{10} lead levels were not excessive.

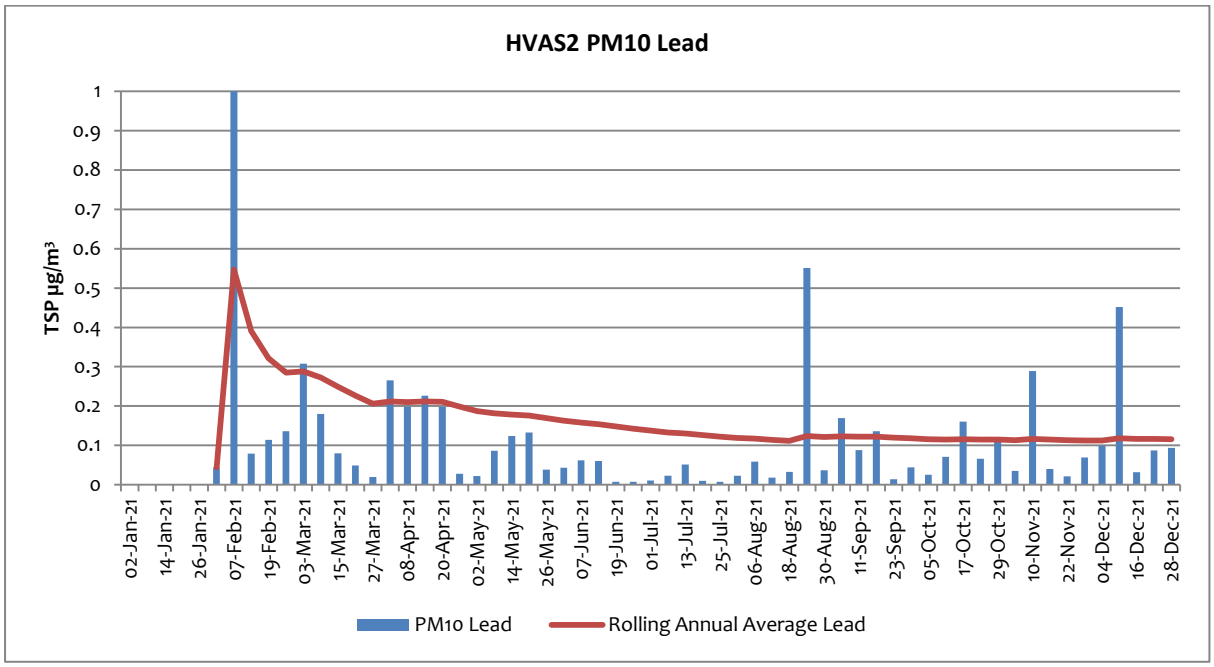
Figure 3-12 HVAS PM_{10} Results for the Reporting Period (2021)



The rolling annual average for PM_{10} Lead in December 2021 was 0.12 µg/m^3, however due to the unit being reinstalled after 19 months decommissioned, annual rolling average is calculated using data from February to December only.

There were elevated PM_{10} lead levels of 1.05 µg/m^3 on 7 February. The predominant wind directions on 7 February were from the South which suggests there was contribution of lead dust from on-site sources.

Figure 3-13 HVAS PM_{10} Lead Results for the Reporting Period (2021)



Results for the period 2011 to 2021 are shown in **Figure 3-16 and Figure 3-17**. Since May 2011 when HVAS1 started operating dust levels have risen then fallen in 2020 due to increased rainfall.

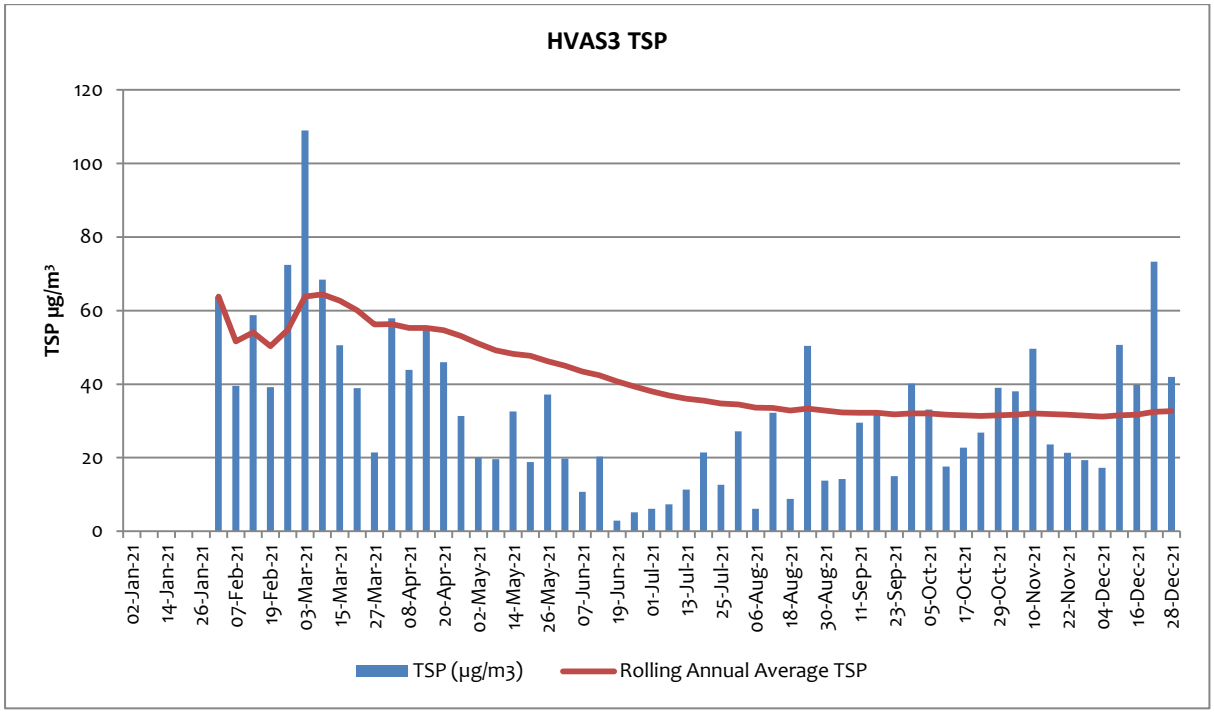
HVAS3 (EPL57)

HVAS3 (EPL57) was included in EPL 12559 on 14 March 2019 to provide for monitoring of TSP Dust on the northern boundary of the site at Blackwoods Pit TSF2. HVAS3 was decommissioned while Embankment 2 TSF2 construction works were undertaken and reinstalled at TSF2 early in 2021.

The annual rolling average for TSP dust at this location is 32.61 µg/m^3 at the end of December 2021, however due to the unit being reinstalled after 19 months decommissioned, annual rolling average is calculated using data from February to December 2021 only.

The highest TSP level recorded at HVAS3 in the period was 109 µg/m^3 on 3 March. The predominant wind direction on 3 March was from the South which suggests there was contribution of lead dust from on-site sources as well as from a quarry to the south of the site, particularly as TSP lead levels were not excessive.

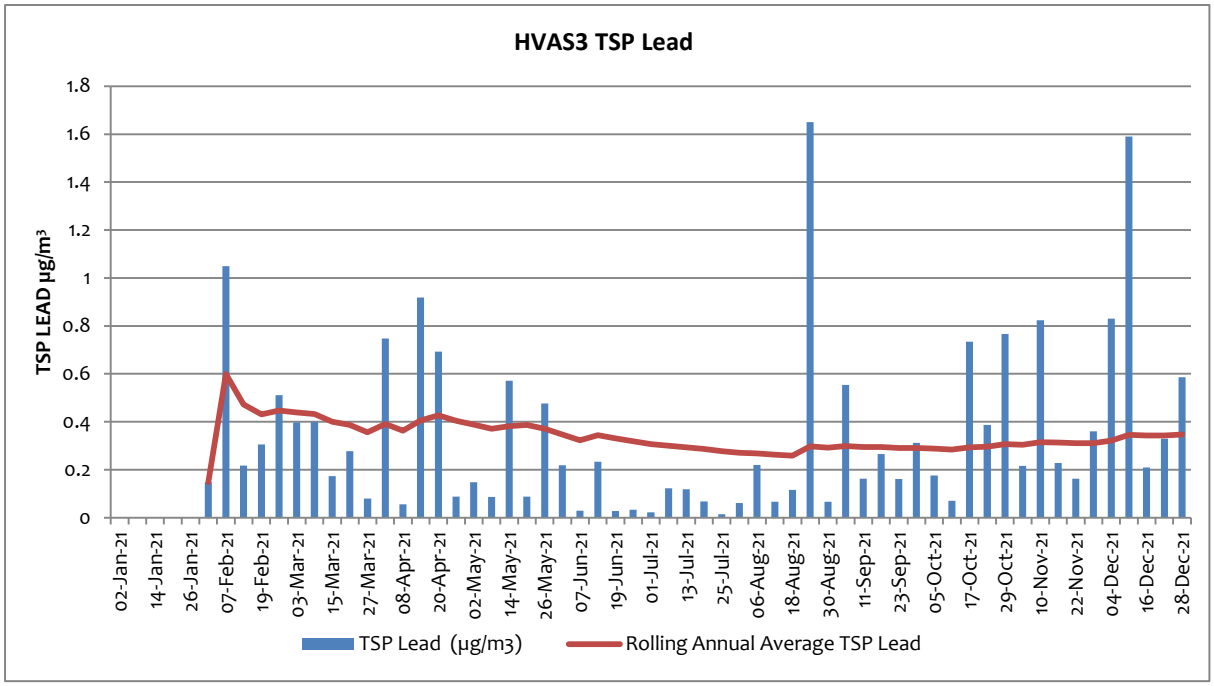
Figure 3-14 HVAS3 TSP Results for the Reporting Period (2021)



The rolling annual average for TSP Lead in December 2021 was 0.35 µg/m^3, however due to the unit being reinstalled after 19 months decommissioned, annual rolling average is calculated using data from February to December only.

There was an elevated TSP lead level of 1.65 µg/m^3 recorded on 24 August when winds were from the South and likely the result of site activities, and another high result of 1.59 µg/m^3 on 10 December when winds were from the South which suggests this too may have been due to a contribution of dust from site activities or Blackwoods TSF2.

Figure 3-15 HVAS3 TSP-Lead Results for the Reporting Period (2021)



.

Figure 3-16 HVAS1 &HVAS2 PM10 Annual Average Results for the Period 2011 to 2021

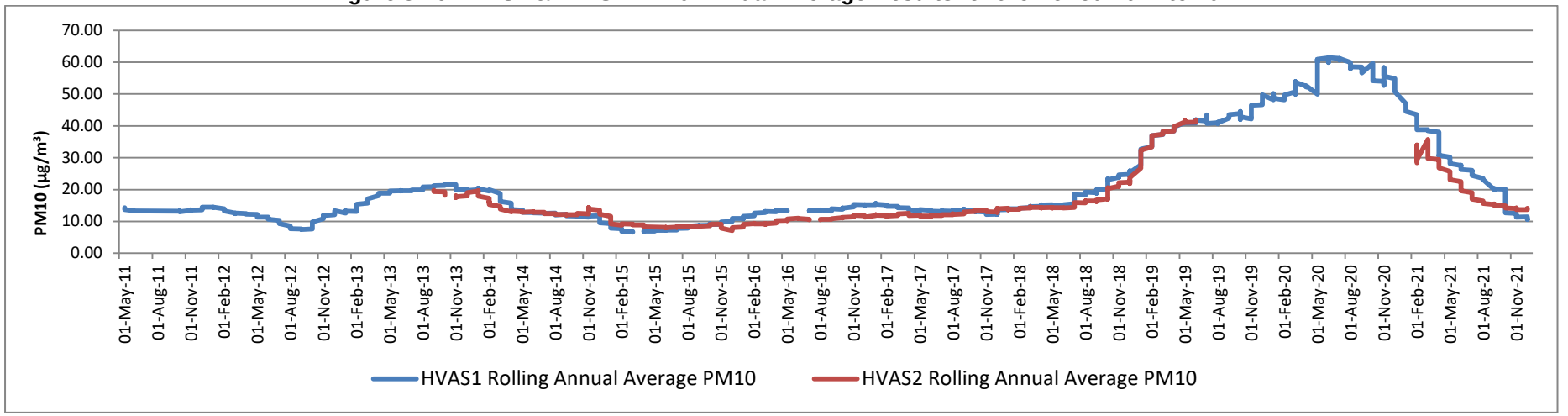
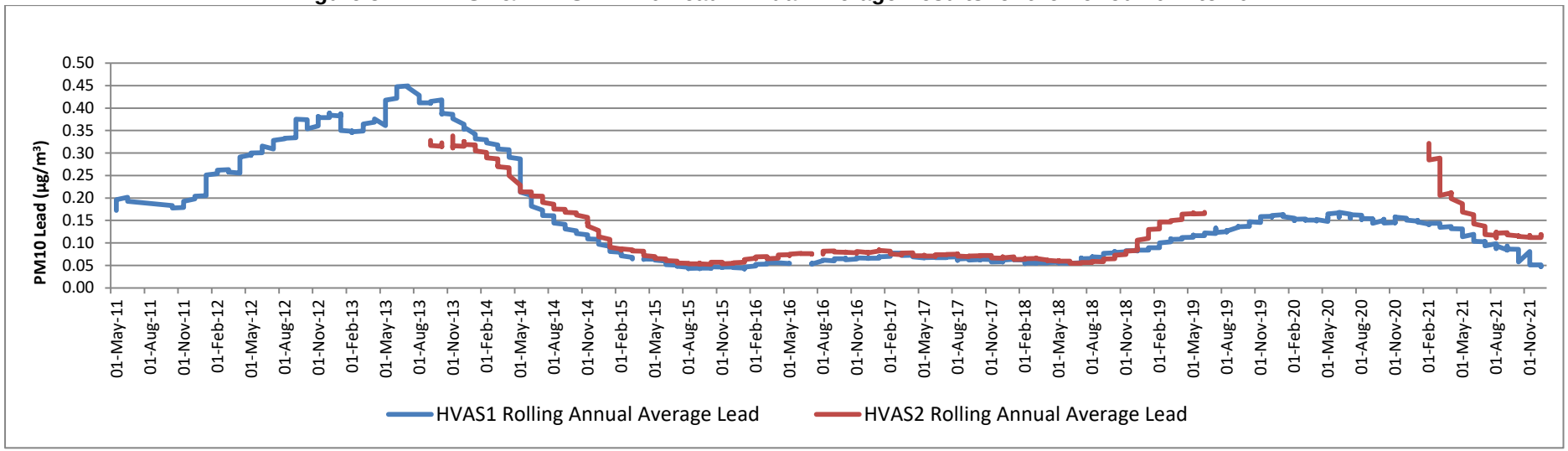


Figure 3-17 HVAS1 & HVAS2 PM10-Lead Annual Average Results for the Period 2011 to 2021



3.3.4 TEOM monitors

The Rasp Mine has two Tapered Element Oscillating Microbalance (TEOM) air quality monitors, which record real time PM10 data. **Figure 3-2** shows the location of these monitors.

Table 3-7 PM10 Assessment Criteria

Pollutant	Averaging Period	Criterion
Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	25 µg/m^3

The monitors operate continuously over a 24-hour period and provide a real time data read out on a kiosk computer in the HSE office. The monitors also provide auto-generated notifications and when triggers are exceeded the cause is investigated and controlled by the use of the water truck or by modifying work methods.

TEOM2 was decommissioned on 15 June 2019 and removed due to Embankment 2 construction works on the northern side of Blackwoods Pit and reinstalled at TSF2 early in 2021. During the reporting period the TEOMs were serviced by Ecotech technicians in February and September.

The validated results for TEOM1 and TEOM2 PM_{10} 24-hour average for the reporting period are shown in **Figure 3-18** and **Figure 3-19.** A number of dust storm events were recorded on TEOM 1 and TEOM 2 during the period which show as corresponding high results in both units. As can be seen in the graphs in high-dust events are captured in those months experiencing high evaporation rates, high temperatures, and extreme wind and dust events. Storm events are excluded from the application for criteria.

The PM10 annual average at the TEOM1 monitor at the end of the reporting period was 13.06 µg/m^3 (14.95 µg/m^3 in the previous year) and is below the listed criteria of 25 µg/m^3. The 24-hour average PM10 at TEOM2 at the end of the reporting period was 13.02 µg/m^3 which is below the criterion 25 µg/m^3 required at the nearest residential location. The 24-hour average results for TEOM1 and TEOM2 are provided in **Figure 3-20** and **Figure 3-21.**

Figure 3-19 TEOM2 Validated 24-hour Average Results for the Reporting Period (2021)Annual average PM10 results for TEOM1 and TEOM2 increased after early 2019, which is expected considering the severity of the drought over the past three years, but declined in 2020 due to the increase in rainfall in the months towards the end of the year,

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; and

- All vehicles leaving site are washed, including trucks taking containers to the rail loadout area.
- Traffic light system informing all staff and contractors of wind speeds.
- Wind speed alerts from the onsite weather station notifying of wind speeds greater than 35 km/hr

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

Figure 3-18 TEOM1 Validated PM10 24-hour Average Results for the Reporting Period (2021)

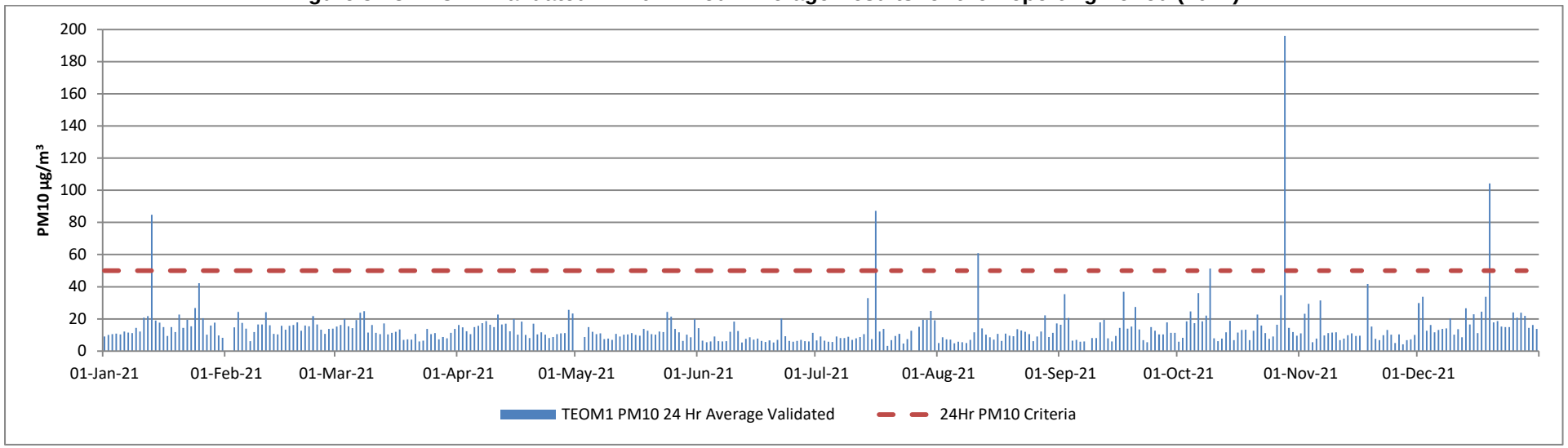


Figure 3-19 TEOM2 Validated 24-hour Average Results for the Reporting Period (2021)

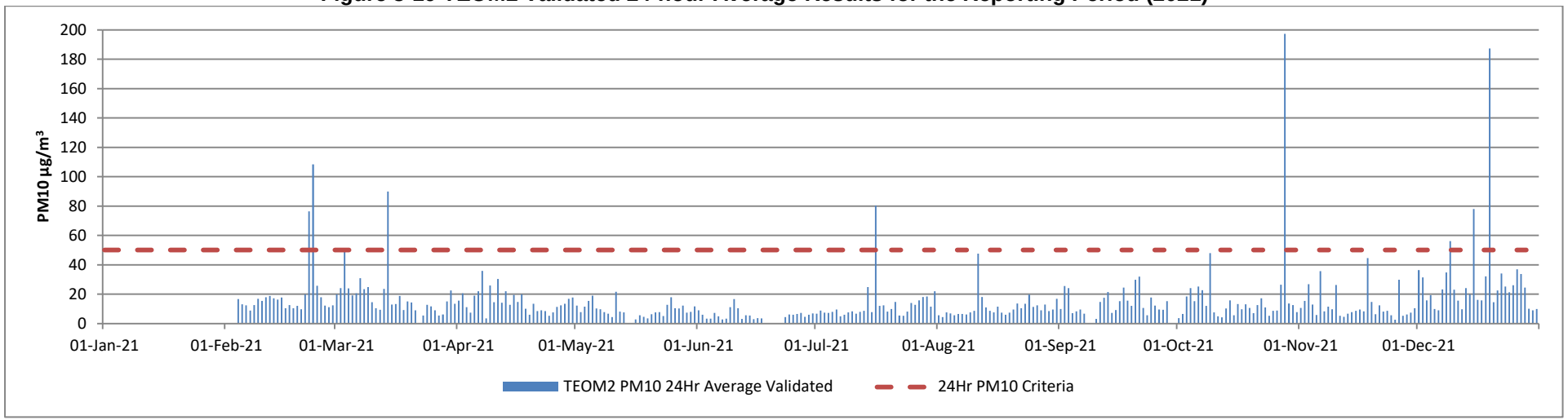


Figure 3-20 TEOM1 & TEOM2 PM10 24-hour Annual Rolling Average for the Reporting Period (2021)

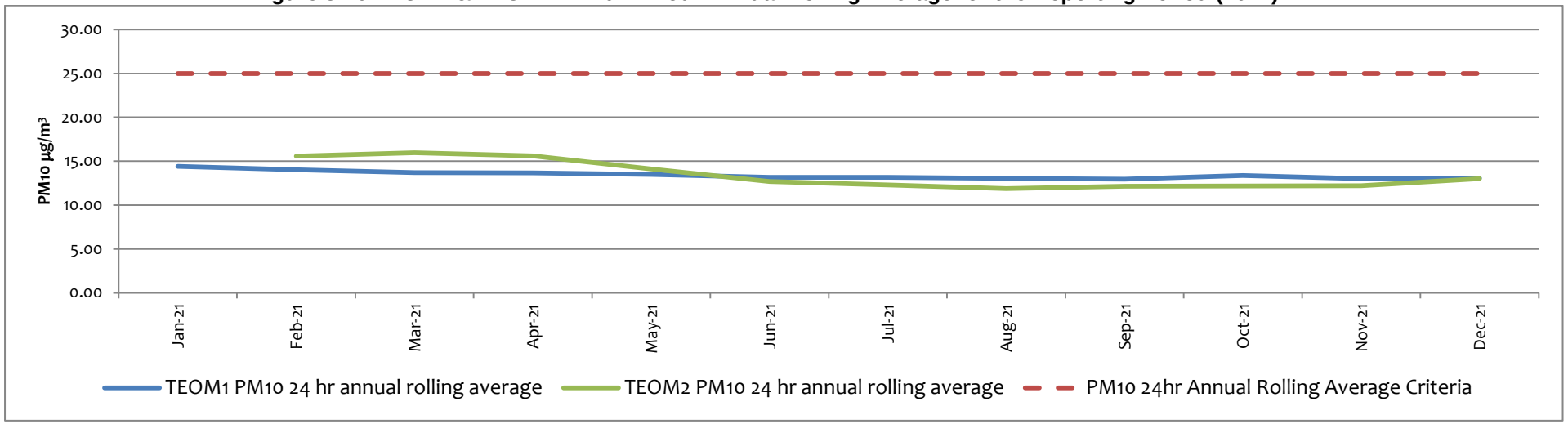
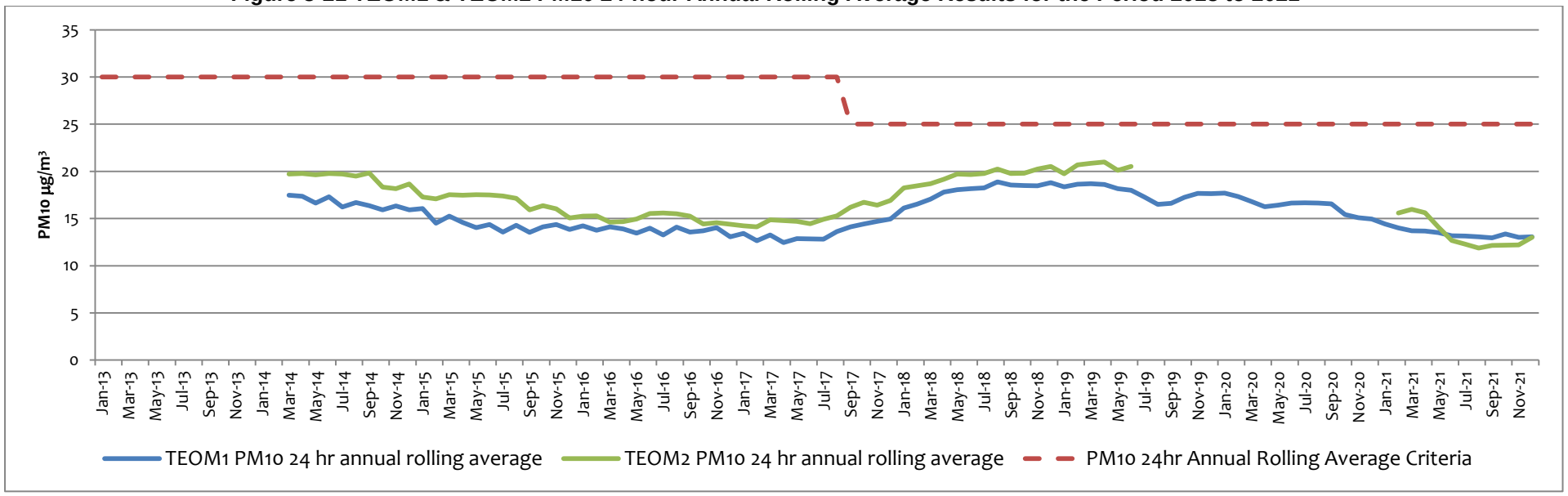


Figure 3-21 TEOM1 & TEOM2 PM10 24-hour Annual Rolling Average Results for the Period 2013 to 2021



3.4 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.

Inspections consist of a visual assessment for erosion, flooding, rubbish, algal growth or significant sediment build up. No major works were required as a result of these inspections.

3.5 Surface Water

There are no natural watercourses or creeks flowing through the site. The drainage network layout restricts runoff leaving active mine areas of the site for a 1 in 100-year 72-hour ARI rainfall event.

Surface water monitoring includes a weekly visual inspection of water storage facilities, freeboard and structural integrity. The tailings storage facility and the processing events dam are inspected and levels checked monthly. Samples are couriered to ALS, a NATA accredited laboratory for analysis.

There are seven sampling locations for surface water, these include surface water basins located on the mine lease to capture and retain rainfall and two locations up and down stream of an ephemeral creek located south of the mine lease boundary. Sampling requirements are provided in **Table 3-8** and locations of sampling points are shown in **Figure 3-2**.

Table 3-8 Surface Water Monitoring Requirements

Description	Frequency	Parameters to be Analysed
Federation Way Culvert EPL29/S31-1	2 x per year , six months apart	cadmium (Cd), chloride (Cl), electrical conductivity (EC), lead Pb), manganese (Mn), pH, sodium (Na), sulphate (SO4), total dissolved solids (TDS) and zinc (Zn)
Ryan Street Dam EPL31/S49	2 x per year , six months apart	
Adjacent Olive Grove EPL32/S1A	2 x per year , six months apart	
Adjacent Bowls Club EPL33 /S9-B2	2 x per year , six months apart	
Horwood Dam EPL34/Horwood Dam	2 x per year , six months apart	
Upstream Bonanza St EPL35	2 x per year , six months apart	
Downstream Sydney Rd EPL36	2 x per year , six months apart	

Ponds are sampled at least twice a year when the pond contains water for at least one week and the volume of stored water is at least 20% of the pond capacity. Sampling is expected to be undertaken in April and October, as these are the highest rainfall months as recorded by Bureau of Meteorology. Sufficient rain fell in January and November that sampling could be conducted from a few of the monitoring locations. Results of the surface water analysis for the reporting period are provided in **Table 3-9**.

No storage water overflowed from these ponds during the reporting period.

Results for most samples were within normal ranges. Horwood Dam recorded a number of elevated results which is to be expected as it captures water from a number of areas on site before the contained water is pumped to the Mill process pond.

Table 3-9 Stormwater Pond Water Quality Results for the Reporting Period (2021)

Sample Point	Sample Date	pH	EC	TDS	Alkalinity ($CaCO_3$)	SO4	Cl	Ca	Mg	Na	Cd	Pb	Mn	Zn	Fe
			(µS/cm2)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
S31-1	04-Jan-21	5.93	2220	2520	2	1460	34	154	20	42	4.23	1.79	108	424	<0.05
	25-Nov-21	6.83	1060	1060	4	562	11	88	8	15	1.53	1.56	40.5	143	<0.05
S49	04-Jan-21	6.54	641	486	11	306	7	77	7	11	0.228	0.142	12.2	31.4	<0.05
	25-Nov-21	7.03	571	469	6	265	5	65	6	7	0.269	0.187	10.4	31.1	<0.05
S1A	04-Jan-21	6.81	585	426	29	205	37	52	10	35	0.123	0.326	4.6	14.7	<0.05
	25-Nov-21	7.41	273	254	18	94	8	32	4	7	0.0633	0.362	2.14	7.86	<0.05
S9B-2	04-Jan-21	Dry													
	25-Nov-21	Dry													
Horwood Dam	04-Jan-21	6.41	13700	13200	9	5060	2520	492	422	2050	7.58	3.4	267	351	<0.05
	25-Nov-21	6.94	10100	8600	11	3560	1660	403	289	1460	2.78	2.38	190	186	<0.05
Upstream	04-Jan-21	Dry													
	25-Nov-21	7.61	212	175	30	46	17	22	3	14	0.0057	0.02	0.309	1.14	<0.05
Downstream	04-Jan-21	7.53	242	186	90	19	17	16	4	26	0.0007	<0.01	0.004	0.091	<0.05
	25-Nov-21	7.68	284	359	43	45	29	23	5	24	0.0005	0.002	0.004	0.38	<0.05

S49 Pump

S49 captures runoff from the Block 10 catchment contaminated by historic mining activities. In 2011 with the end of a long-term drought in Broken Hill, water escaped from this facility. A liner has since been installed on the upstream side of the levy bank and has not yet seen water levels high enough to test its effectiveness. In response to a seepage issue in 2016 a solar pump was installed within the Dam to remove water immediately from the dam to ensure a) water does not seep through the walls (which are lined), and b) to ensure capacity for catchment runoff is maintained. The solar pump was connected to a pipeline to sediment pond S31-1. The solar pump has since been removed as it is an electrical hazard and the BHOP Environment Department have purchased a dedicated mobile pump for use at S49.

It is difficult to undertake sampling of surface waters due to the low rainfall and high evaporation rates in Broken Hill. In particular, 2021 was a dry year (116.9 mm) with less than half the normal average rainfall (259 mm).

The quantity of water in the ponds at the time of sampling is unknown; this would have a major impact on the water quality results. All waters were contained within the containment structures with no off site discharges during the reporting period.

3.5.1 Water containment structures

All surface runoff on site is captured by diversion trenches or berms and channelled to site water storage structures. No changes were made to this system during the reporting period. **Plan 5** shows the water catchments and containment structures. **Table 3-10** provides the capacities and estimated stored water volumes at the end of the reporting period**.** 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.

Sediment was removed from the S17 pond and Horwoods Dam in 2019. Sediment from S17 was disposed of in TSF2 and the sediment from Horwoods Dam was stockpiled on site and disposed of in TSF2 in 2020.

Markers are 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 1:100 year 72 hour storm event.

Table 3-10 Water Containment Structures

	Pond Identification	Start of reporting period m^3 (1-Jan-2021)	At end of reporting period m^3 (31-Dec-2021)	Storage Capacity m^3
Potable and Raw Water	Workshop	9	9	14
	Boom Gate	22.5	22.5	22.5
	Mill	22.5	1400	1400
	Delprat's Shaft	22.5	22.5	22.5
	Kintore Pit	14	14	18
	Silver Tank	6500	6500	6500
Dirty Water (rain runoff)	S2	0	0	5003
	S14	0	0	7813
	S17	0	0	4265
	S31-2	0	0	225
	S49	0	0	1951
	S35	0	0	6092
Process, underground and used water	Horwood Dam	1000	100	7663
	Plant Water Pond	1000	1000	2000
	S22 Mine Settlement Ponds	3000	3000	20,489
	S22-A	2000	2000	2000
	Vehicle Wash	22.5	22.5	22.5

3.6 Groundwater

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 groundwater monitoring plan is outlined in the Site Water Management Plan.

The monitoring program includes eighteen sampling locations for groundwater, GW01 (EPL37) to GW16 (EPL52) are installed piezometers at various locations around the mine site and are sampled quarterly. There are also two sampling locations for water pumped from underground mining, Shaft 7 (EPL53) and Kintore Pit (EPL54), sampled monthly. The locations for these monitoring points are shown in **Figure 3-2**. Groundwater monitoring is scheduled for completion in March, June, September and December. A number of parameters are required to be analysed including: alkalinity (calcium carbonate ($CaCO_3$)), cadmium (Cd), calcium (Ca), chloride (Cl), electrical conductivity (EC), iron (Fe), lead Pb), magnesium (Mg), manganese (Mn), pH, sodium (Na), sulphate (SO4), total dissolved solids (TDS) and zinc (Zn). **Table 3-11** lists the location and function of each borehole.

Table 3-11 Location and Function for Groundwater Monitoring Points

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 movement of perched groundwater occurring from the storages
GW16	West of S49	Monitor potential seepage from S49
Shaft 7	Shaft 7	To maintain safety for underground mining at both the Rasp and Perilya South Mines
Kintore Pit - Mine dewatering	Kintore Pit decline	To maintain safety for underground mining at the Rasp Mine

Groundwater quality monitoring was undertaken in May 2007 and August 2011 at Shaft 7 to establish an initial baseline for parameters and trigger levels for the monitoring program (30% above 2011 results).

The site's groundwater is deep and is extracted as part of mining. The underground extraction system results in inward flow of the groundwater into the mine. Hence, groundwater at the mine is likely to be impacted by off-site sources due to the inward hydraulic gradient into the mine.

As shown in **Table 3-12** the majority of piezometers showed stable or decreasing water levels during the reporting period. For bores GW05 to GW10 this indicates there is less water seeping from TSF and Horwoods Dam, and the decrease in GW11 levels suggests less water is seeping from TSF2 as it fills the Blackwoods Pit and seals any fractures or shafts in the walls. GW12 was impacted by nearby exploration drilling, becoming dry in June, recovering to a lower depth in July, and remaining dry for the rest of the year. Once drilling in the vicinity is complete the potential for installing another bore to monitor deeper aquifers in the area will be investigated, although this may not be necessary if GW12 recovers. **Table 3-13** provides a summary of groundwater monitoring results for 2021.

Quarterly samples were obtained from 10 of the 16 bores, samples were obtained from ten bores, and no samples could be obtained from bores GW1, GW2, GW13, GW14, GW15, or GW16. This was due to dry conditions as a result of the low rainfall in Broken Hill for 2021. Elevated levels of Cadmium, Lead and Iron in the December round of monitoring may be due to contamination and resampling was conducted.

Otherwise, results remained within historic ranges and were consistent with the expectation of Golder as outlined in the Site Water Management Plan, that perched groundwater quality would contain significant concentrations of lead, manganese and zinc due to the seepage contact with the near surface materials on site and the surrounding areas.

The following provides a discussion of results.

GW01 and GW2 Located Downstream of Mt Hebbard

These water bores are intended to monitor the sub-surface water fluctuations south of Mt Hebbard. GW1 and GW2 were dry through the year. GW1 has been dry since 2019 and water levels for GW2 were not recorded for previous years except for 2017 but this was at bore depth.

Table 3-12 Bore Piezometer Depths

Bore		Depth mbTOC							
	Ave 2021	Ave 2020	Ave 2019	Ave 2018	Ave 2017	Ave 2016	Ave 2015	Ave 2014	Trend
GW01	Dry	Dry	8.42	8.35	6.85	7.39	7.25	7.25	Dry
GW02	Dry	Dry	Dry	Dry	3.33	Dry	Dry	Dry	Dry
GW03	3.78	3.66	3.83	3.6	3.58	3.64	3.62	3.61	Stable
GW04	3.08	3.42	2.99	2.73	2.87	2.94	2.9	2.83	Falling
GW05	3.68	4.16	3.76	3.65	3.49	3.53	3.5	3.4	Falling
GW06	3.58	3.21	3.16	3.10	2.96	2.85	2.76	2.66	Falling
GW07	3.63	3.80	3.14	3.15	2.58	2.74	2.8	2.54	Falling
GW08	2.68	3.08	2.53	2.36	1.88	1.81	1.87	2.11	Falling
GW09	4.03	4.31	3.89	3.84	3.50	2.94	3.07	1.79	Falling
GW10	4.65	5.2	4.20	3.46	1.90	1.49	1.725	0.83	Falling
GW11	12.24	13.30	12.17	12.00	10.00	10.10	10.4	10.69	Falling
GW12	26.3	21.52	21.53	20.47	19.19	34.49	37.1	21.6	Falling
GW13	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
GW14	Dry	Dry	Dry	Dry	1.3	Dry	Dry	Dry	Dry
GW15	Dry	Dry	Dry	Dry	2.8	Dry	Dry	Dry	Dry
GW16	Dry	Dry	Dry	Dry	Dry	1.55	Dry	Dry	Dry

GW03, GW04, GW05, GW06, GW07, GW08, GW09 and GW10 Located Adjacent to TSF1 and Horwood Dam

Groundwater bores are located near the eastern side of the unused historic TSF1 and extend to Horwood Dam. The intent of the monitoring bores is to monitor perched water in the area that may impact on Eyre Street Dam. The monitoring is in response to surface seepage noted in the area during intense 2011 rainfall events. All bores in the series were able to be monitored each quarter. Water levels are falling in all bores over time even though GW4, GW5,GW7, and GW8 made recoveries in 2021.

GW11 and GW12 located south east of Blackwood Pit

Blackwood Pit is used for the storage of tailings. It forms part of the mining area and is surrounded by historic mine workings. Due to these historic workings, any seepage from the Pit will be intercepted and collected by the underground mine water management system. 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. If a perched water table is measured in the two bores, consideration will be given to the installation of additional bores to assess the local hydrogeological conditions and risk of migration of seepage. On the advice of Golder, bores were installed to the south east of the facility in order to detect any seepage.

The ground water level in GW11 was slightly higher than the previous year while the the level of GW12 was stable before drying from what was expected to be the influence of drilling adjacent to the bore in June 2021. GW11 parameters were at normal levels after elevated Cadmium, Manganese, Magnesium, Calcium, Total Alkalinity, Sodium, Chloride, Sulphate, TDS and EC levels were recorded in September and December of 2019 and in March and June of 2020. The same pattern occurred in June and September 2018 and was likely due to the tailings level in TSF2 reaching a point where a

fault or crack has allowed water to escape. Levels have returned to normal as the fault or crack was sealed by tailings.

GW13) (adjacent 31-1), GW14 (adjacent 31-1) and GW15 (adjacent rail load out) and GW16 (adjacent S49)

As perched water seepage may occur from ponds located near the CML7 boundary when these ponds store water, bores have been installed adjacent these locations. All bores were dry in the period.

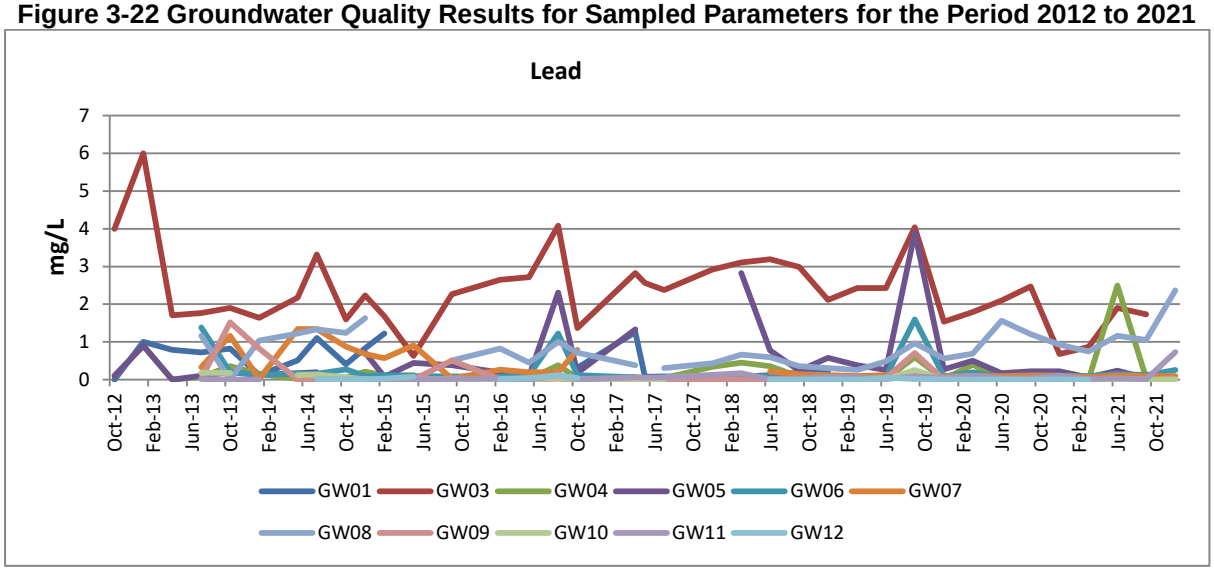
Table 3-13 Piezometer Monitoring Results for the Reporting Period (2021)

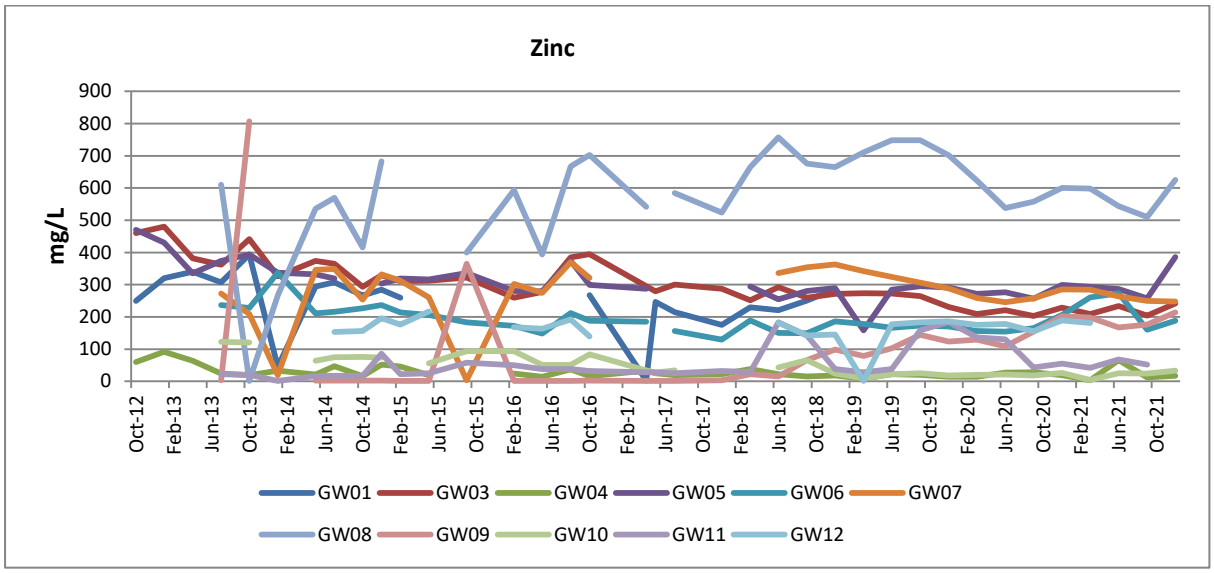
Site	Month Sampled	pH	EC	TDS	Alk	SO4	Cl	Ca	Mg	Na	Cd	Pb	Mn	Zn	Fe
GW01	Mar, Jun, Sep, Dec	Dry													
GW02	Mar, Jun, Sep, Dec	Dry													
GW03	Mar	5.96	14400	11800	5	4570	2950	489	354	2260	1.19	0.869	229	209	0.05
	Jun	5.83	13700	11800	7	4740	3000	504	348	2270	1.03	1.9	255	234	0.05
	Sep	6.02	14200	12000	2	4620	2990	508	340	2200	1.16	1.73	206	204	0.05
	Dec	5.61	14500	12400	7	4840	2420	554	349	2190	1.35	13.4	264	242	68.6
GW04	Mar	6.51	14200	11400	186	4690	2650	502	531	2340	0.0631	0.001	41.1	3.15	<0.05
	Jun	6.05	12200	10500	4	4630	2400	488	390	2050	0.258	2.5	132	65.6	<0.05
	Sep	6.65	14200	11500	295	4840	2750	518	557	2470	0.0659	0.038	26.8	12.7	<0.05
	Dec	6.53	14200	11700	203	4740	2750	559	534	2330	0.0399	11.8	27.3	17.2	41.8
GW05	Mar	5.82	16100	14600	97	6210	2710	446	634	2260	0.728	0.059	328	293	<0.05
	Jun	5.69	15200	14900	83	7090	2710	456	619	2570	0.677	0.235	353	286	<0.05
	Sep	5.95	15700	14500	118	6560	2740	458	647	2630	0.668	0.044	291	258	<0.05
	Dec	5.66	16600	17400	66	7280	3060	497	627	2490	6.74	13.8	332	386	84.4
GW06	Mar	5.88	14400	12700	47	5280	2610	457	480	2260	1.63	0.09	382	261	<0.05
	Jun	5.78	13800	13400	54	5910	2630	474	475	2260	1.53	0.152	413	274	<0.05
	Sep	5.84	14000	12200	58	5270	2620	481	468	2100	1.1	0.121	244	160	<0.05

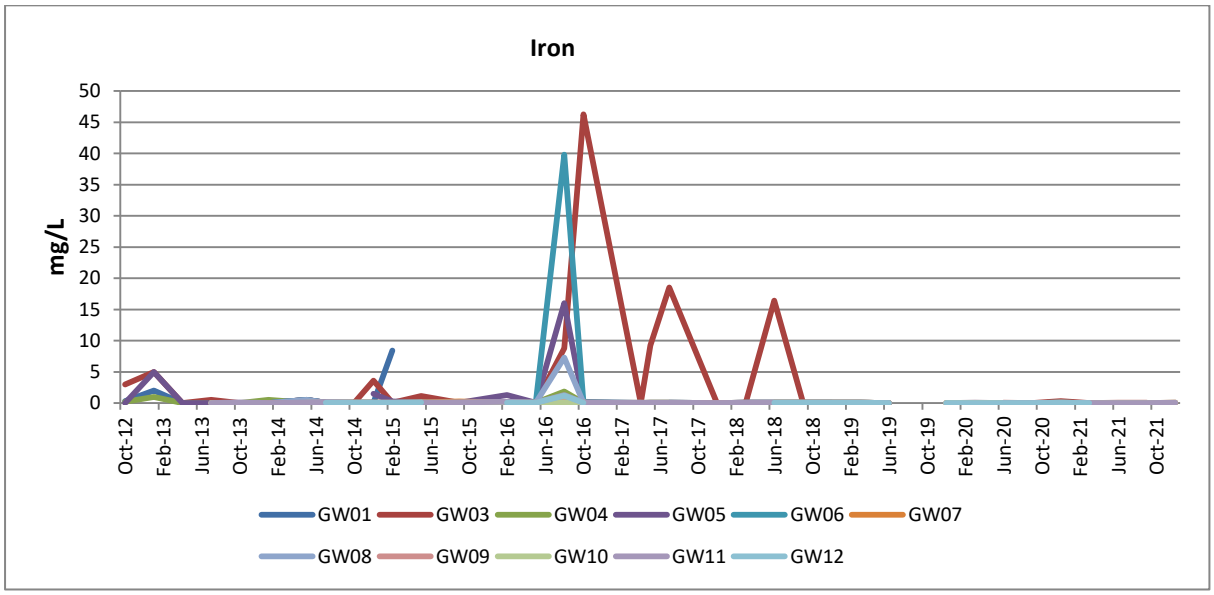
Site	Month Sampled	pH	EC	TDS	Alk	SO4	Cl	Ca	Mg	Na	Cd	Pb	Mn	Zn	Fe
	Dec	5.78	14500	13100	51	5800	2840	519	506	2210	1.14	0.253	316	188	1.42
GW07	Mar	5.94	12700	10900	31	4500	2370	472	329	1890	2.45	0.068	253	284	<0.05
	Jun	5.9	12300	11200	48	4770	2440	494	335	1930	2.19	0.108	259	264	<0.05
	Sep	6.08	12600	10900	46	4670	2340	483	319	1820	2.28	0.098	216	250	<0.05
	Dec	6.25	12000	11000	32	4860	1850	513	315	1790	1.8	0.097	242	248	0.06
GW08	Mar	5.64	12200	11600	12	4820	2200	465	336	1890	1.58	0.749	528	598	<0.05
	Jun	5.81	13300	13300	35	5680	2650	477	344	2030	1.34	1.16	542	544	<0.05
	Sep	5.85	14000	13300	42	5620	2700	481	353	2030	1.34	1.05	444	510	<0.05
	Dec	5.52	12600	13000	11	5440	2280	518	288	1660	1.79	2.37	566	625	6.4
GW9	Mar	6.06	11900	10400	55	4480	2130	528	524	1520	1.87	<0.001	127	198	<0.05
	Jun	6.2	11400	10800	82	4750	1850	544	527	1570	1.5	0.004	128	167	<0.05
	Sep	6.27	11900	10300	68	4700	2170	551	510	1490	1.76	0.003	113	176	<0.05
	Dec	6.21	12400	11500	47	4990	2470	581	519	1580	1.87	0.012	151	214	0.06
GW10	Mar	6.44	14000	11200	232	4520	2730	522	550	2260	0.181	0.001	7.15	3.96	<0.05
	Jun	6.49	13400	11400	276	4680	2780	534	547	2310	0.176	0.001	11.1	25.6	<0.05
	Sep	6.46	13900	11300	246	4710	2800	537	526	2120	0.189	0.001	8.86	24.2	<0.05
	Dec	6.76	14200	11700	212	4980	2940	583	548	2240	0.209	0.012	13.3	32.7	0.05
GW11	Mar	6.48	5850	4600	71	2550	637	284	196	786	0.626	0.019	35.5	41.7	<0.05

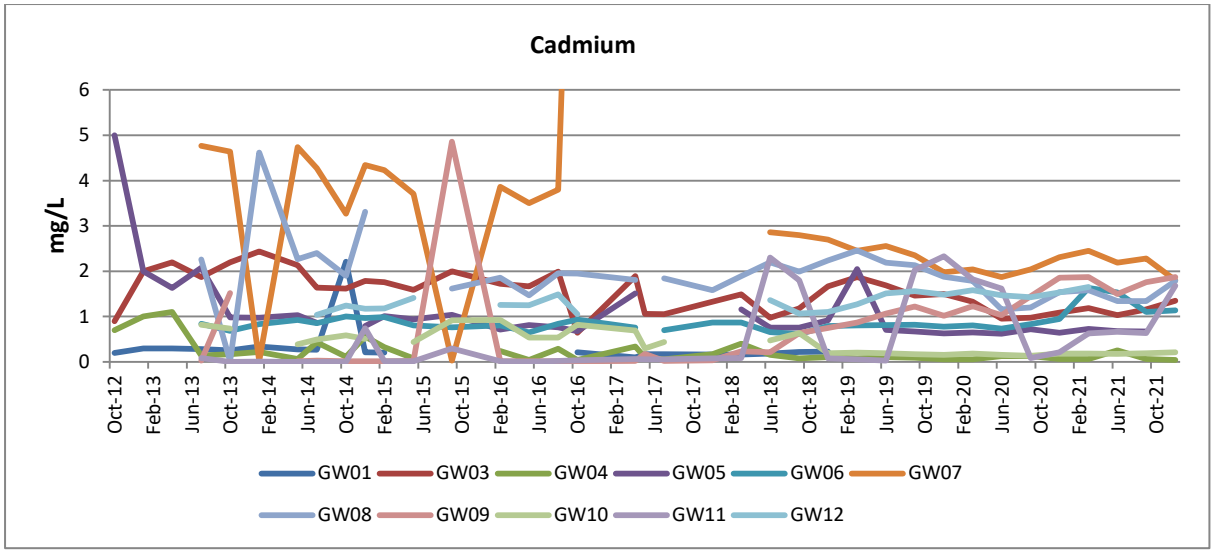
Site	Month Sampled	pH	EC	TDS	Alk	SO4	Cl	Ca	Mg	Na	Cd	Pb	Mn	Zn	Fe
	Jun	6.66	5620	4780	73	2420	623	299	194	799	0.662	0.037	40.5	67.4	<0.05
	Sep	7.06	5670	4840	73	2560	642	297	184	755	0.638	0.007	8.86	51.8	<0.05
	Dec	6.54	5740	5170	25	2630	637	368	140	734	1.68	0.734	48.2	112	0.05
GW12	Mar	5.68	13600	11800	73	5350	2150	414	606	2170	1.65	0.002	84.2	181	<0.05
	Jun	Dry													
	Sep	Dry													
	Dec	Dry													
GW13	Mar, Jun Sep, Dec	Dry													
GW14	Mar, Jun, Sep, Dec	Dry													
GW15	Mar, Jun, Sep, Dec	Dry													
GW16	Mar, Jun, Sep, Dec	Dry													

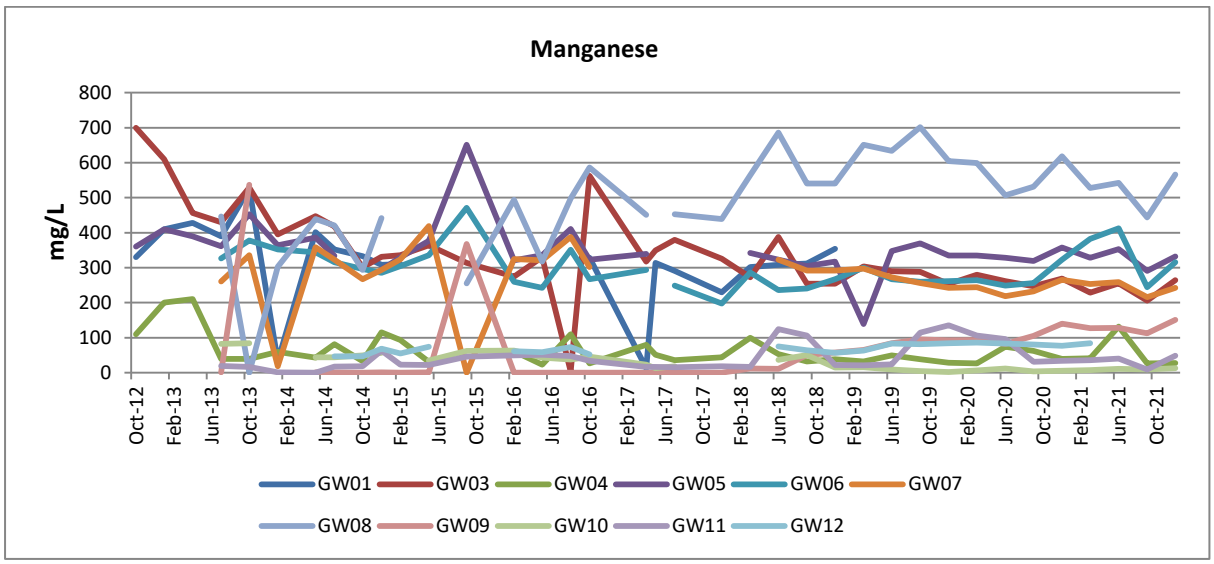
Figure 3-22 Groundwater Quality Results for Sampled Parameters for the Period 2012 to 2021

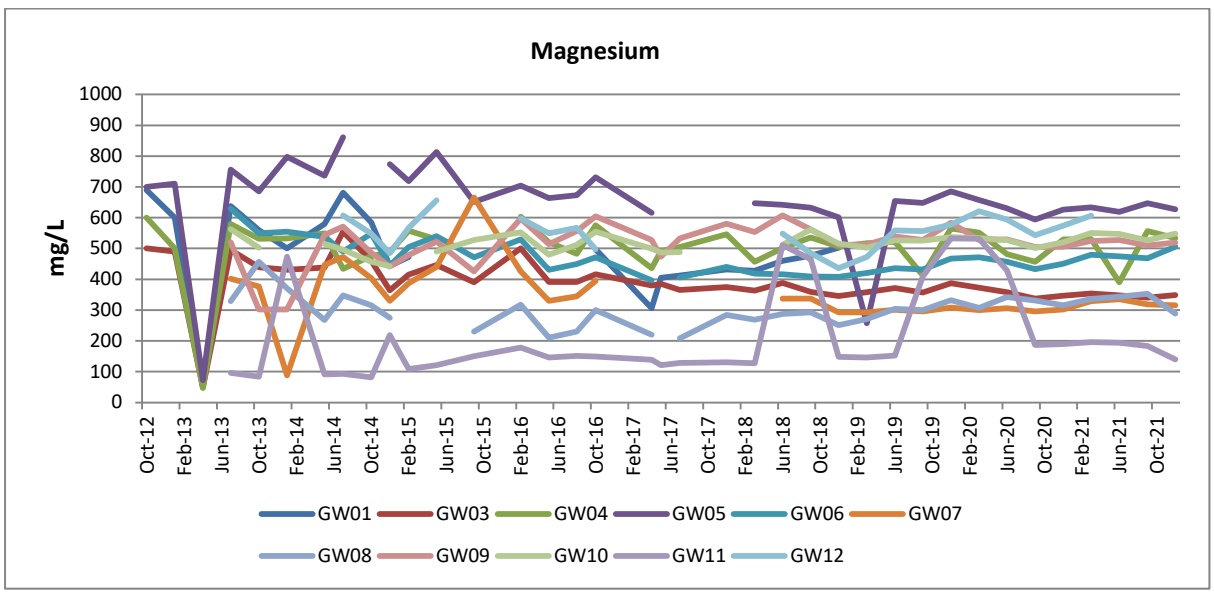


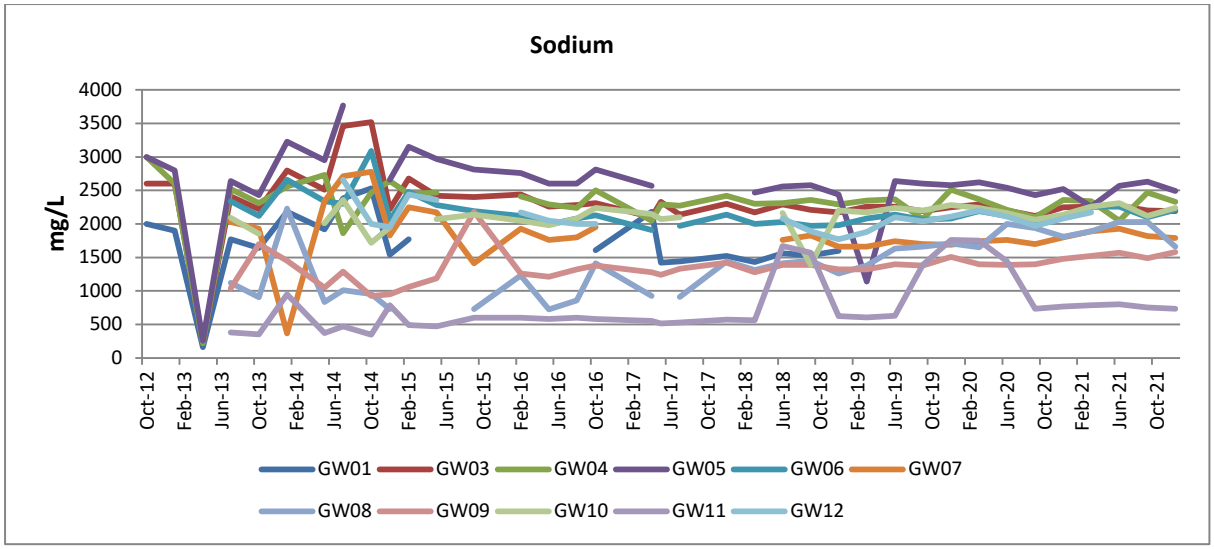


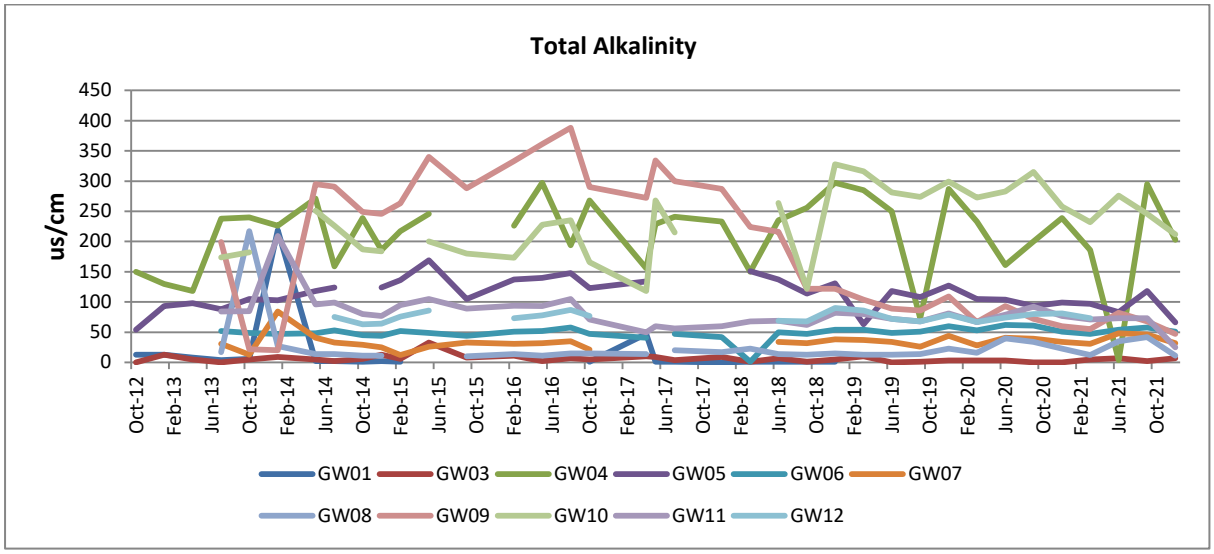


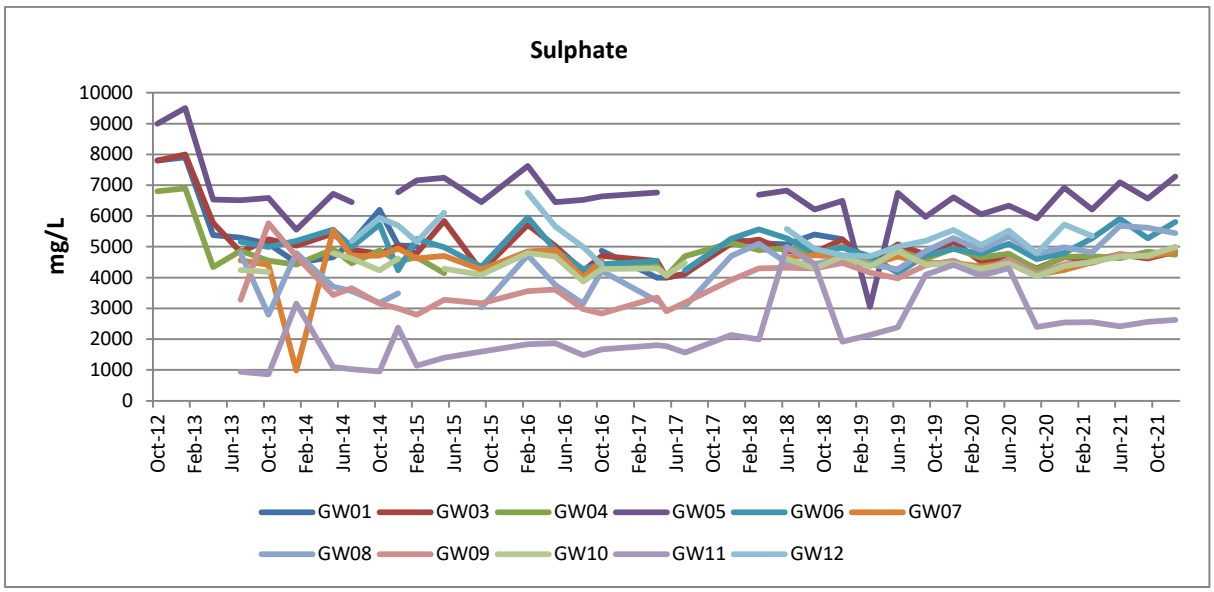

Cadmium
mg/L
0
1
2
3
4
5
6
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
GW01
GW03
GW04
GW05
GW06
GW07
GW08
GW09
GW10
GW11
GW12

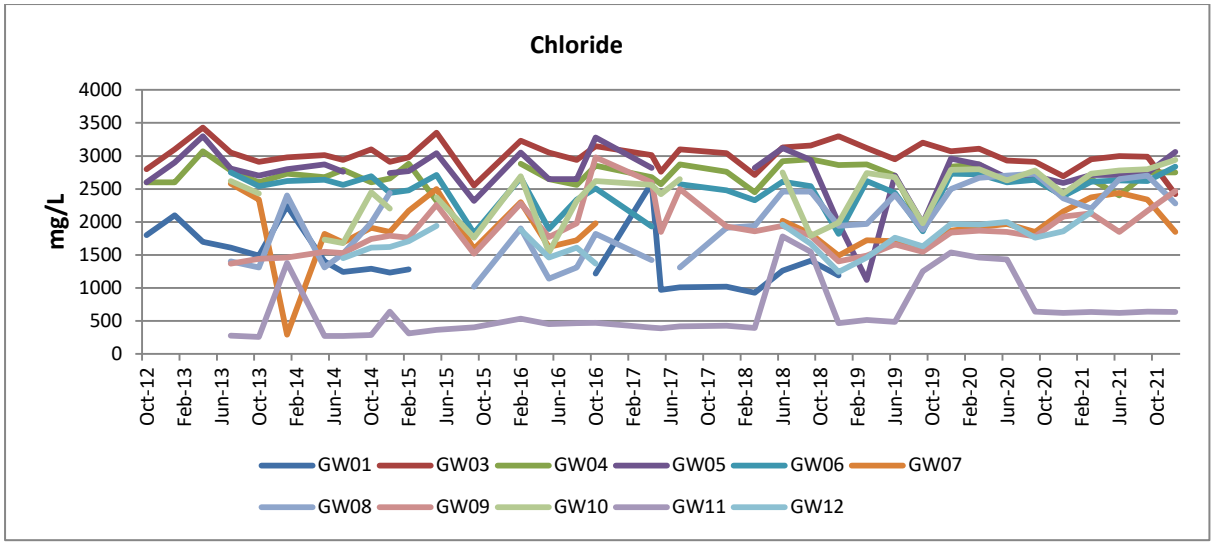

Manganese
mg/L
0
100
200
300
400
500
600
700
800
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
GW01
GW03
GW04
GW05
GW06
GW07
GW08
GW09
GW10
GW11
GW12

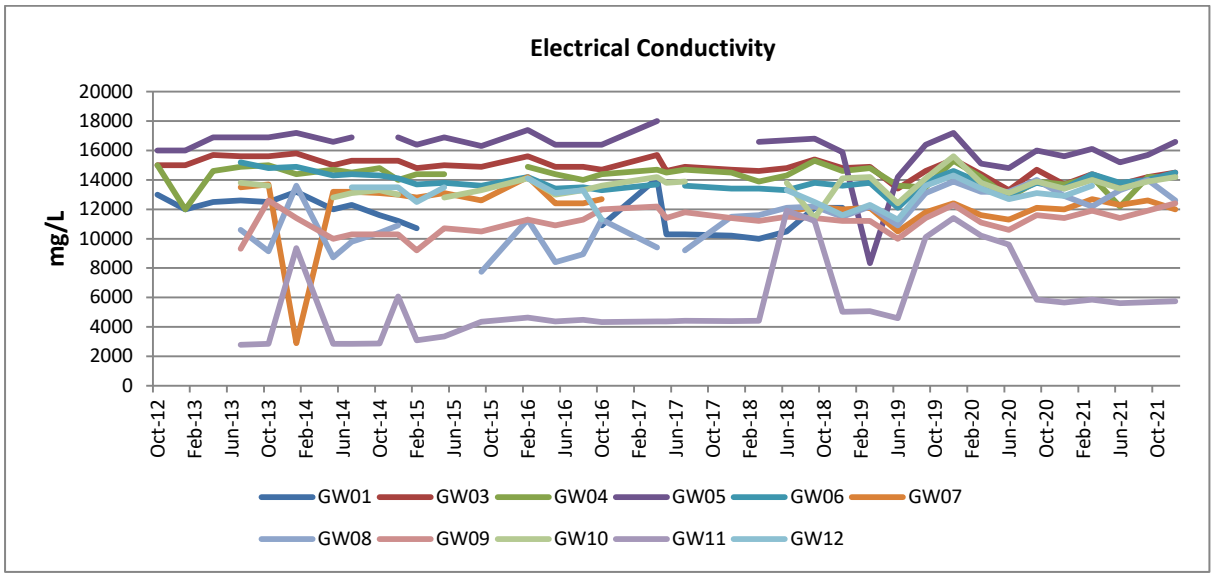

Magnesium
mg/L
0
100
200
300
400
500
600
700
800
900
1000
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
GW01
GW03
GW04
GW05
GW06
GW07
GW08
GW09
GW10
GW11
GW12

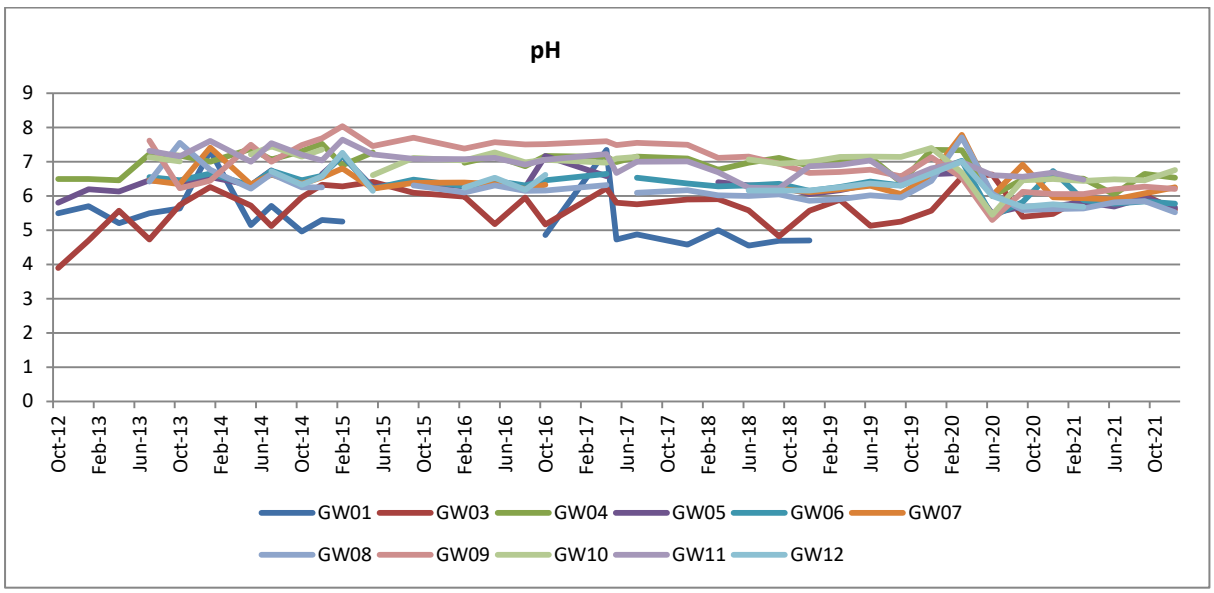

Sodium
mg/L
4000
3500
3000
2500
2000
1500
1000
500
0
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12


Total Alkalinity
us/cm
450
400
350
300
250
200
150
100
50
0
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12


Sulphate
mg/L
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12


Chloride
mg/L
4000
3500
3000
2500
2000
1500
1000
500
0
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12


Electrical Conductivity
mg/L
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12


pH
9
8
7
6
5
4
3
2
1
0
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12

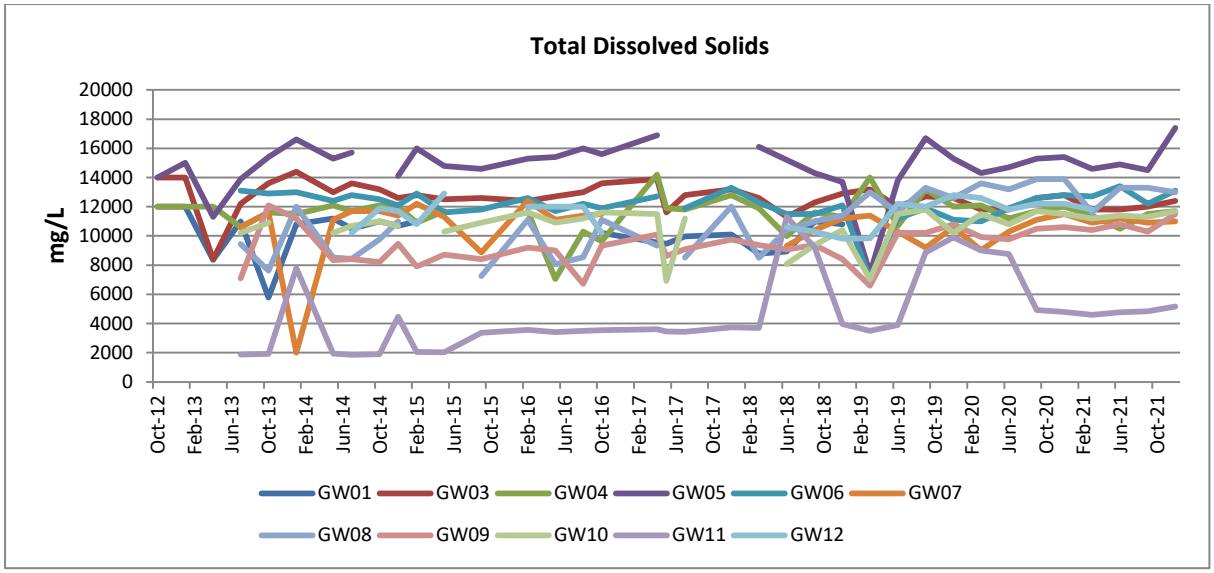

Total Dissolved Solids
mg/L
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
GW01
GW03
GW04
GW05
GW06
GW07
GW08
GW09
GW10
GW11
GW12

Table 3-14 Groundwater Monitoring Results for Shaft 7 and Mine Dewatering for the Reporting Period (2021)

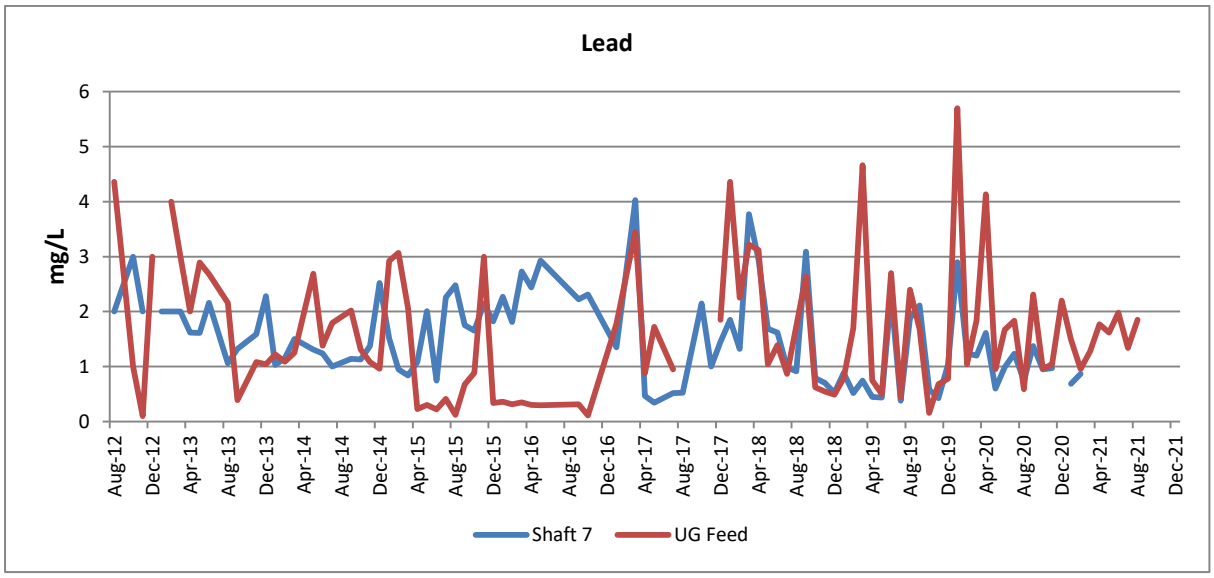
Site	Date	pH	EC	TDS	Alkalinity ($CaCO_3$)	SO4	Cl	Ca	Mg	Na	Cd	Pb	Mn	Zn	Fe
			(µS/cm2)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
Shaft 7	29/01/2021	5.64	13100	14400	1	6400	1720	473	265	1610	3.98	0.685	343	1140	0.33
	8/02/2021	6.03	12100	12200	30	5480	1600	502	298	1590	1.78	0.867	244	635	0.05
	23/03/2021	Shaft 7 pump not running													
	1/04/2021	Shaft 7 pump not running													
	28/05/2021	5.99	9740	9740	39	4940	1540	509	320	1620	1.72	0.644	258	595	<0.05
	24/06/2021	Shaft 7 pump not running													
	19/07/2021	Shaft 7 pump not running													
	9/08/2021	6.21	11400	11500	40	5340	1280	517	311	1560	1.54	0.77	242	600	0.12
	27/09/2021	Shaft 7 pump not running													
	27/10/2021	Shaft 7 pump not running													
	15/11/2021	6.06	11600	12600	20	5630	1550	505	278	1510	2.01	1.67	280	817	0.05
	14/12/2021	Shaft 7 pump not running													
UG Water	29/01/2021	5.39	12300	14000	1	6820	1720	412	297	1590	4.75	1.49	358	1450	0.19
	8/02/2021	6.05	13800	14900	6	6860	1830	489	301	1690	3.76	0.951	443	1150	0.08
	23/03/2021	5.94	13400	14900	6	6120	1710	478	320	1730	5.73	1.28	500	1590	0.54
	1/04/2021	5.6	14600	16600	5	7050	2220	455	368	1820	7.2	1.77	569	1440	4.31
	28/05/2021	6.02	11600	13800	<1	6220	1760	492	336	1750	4.5	1.62	471	1170	0.25
	24/06/2021	5.96	12700	14100	5	7020	1620	431	326	1740	5.56	1.98	490	1260	<0.05
	19/07/2021	5.84	13200	14000	2	6260	1760	550	319	1770	5.64	1.34	474	1260	1.14
	9/08/2021	6.17	14200	15800	5	7890	1540	492	351	1820	7.92	1.85	546	1460	<0.05
	27/09/2021	No pumping from Kintore Pit													
	27/10/2021	No pumping from Kintore Pit													
	15/11/2021	No pumping from Kintore Pit													
	14/12/2021	No pumping from Kintore Pit													
Baseline		5.8	13900	8000	40	9660	1360	472	395	3550	6.32	2.25	907	3330	1.57
Trigger		7.54	18070	10400	52	12558	1768	614	514	4615	7.58	2.93	1179	4329	2.04

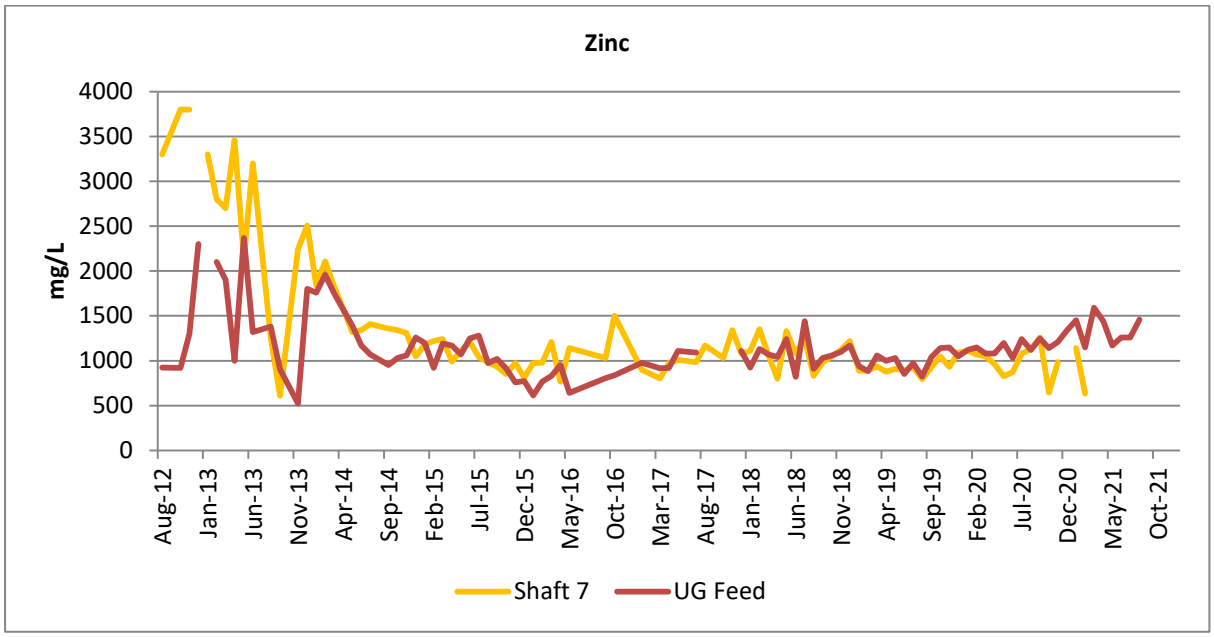
Trigger = Baseline + 30%

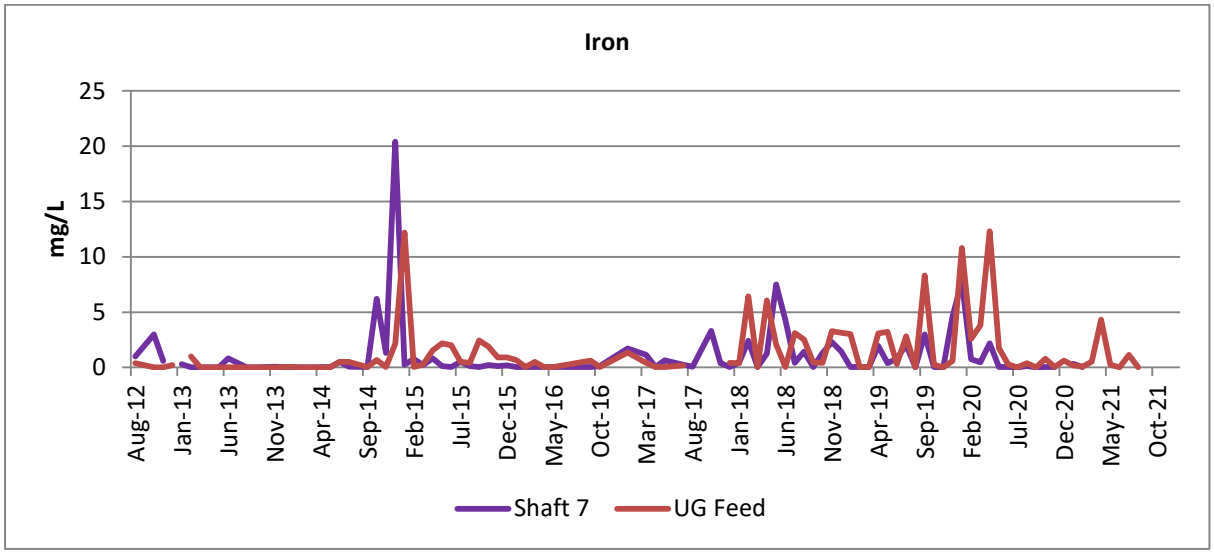
Results for both Shaft 7 and UG Feed occasionally exceeded trigger thresholds for Iron, Cadmium and Chloride, but are variable. This likely impacted by the area of the mine being developed and mined. Total dissolved solids (TDS) results were above the trigger threshold for all of the year as with previous years.

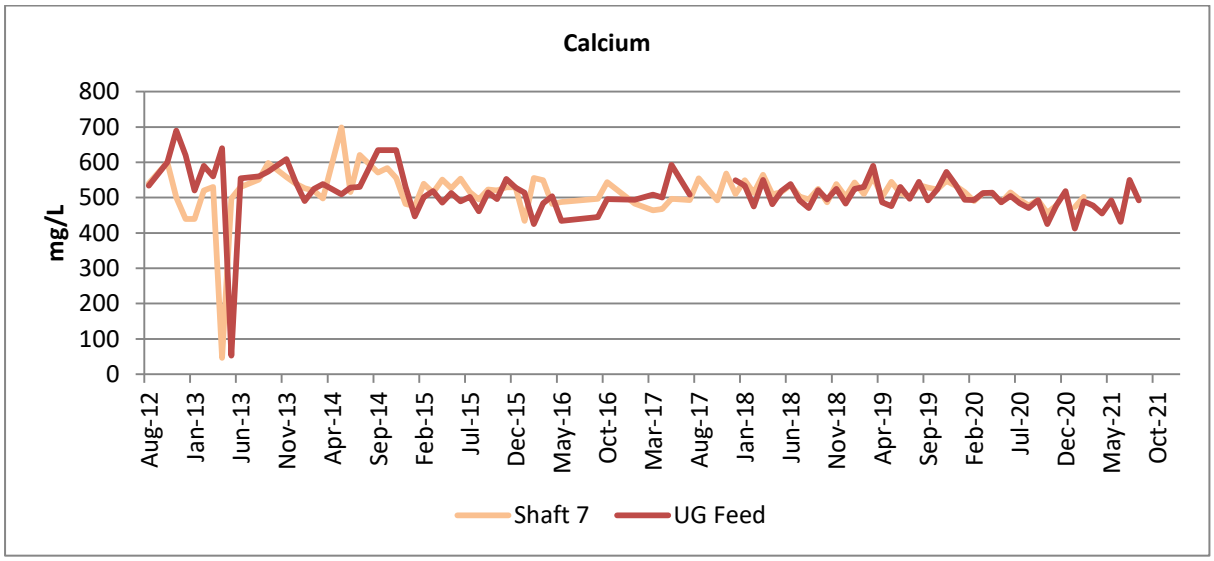
Figure 3-23 provides a series of graphs indicating results for the period 2012, commencement of operations, to 2021. Due to Perilya extracting water at the eastern end of their operations water extraction from Shaft 7 and underground dams via Kintore Pit was intermittent at the end of the period. Results are within the historic range for all parameters except for Lead and Iron and a potential trend upwards of Cadmium and Sulphate.

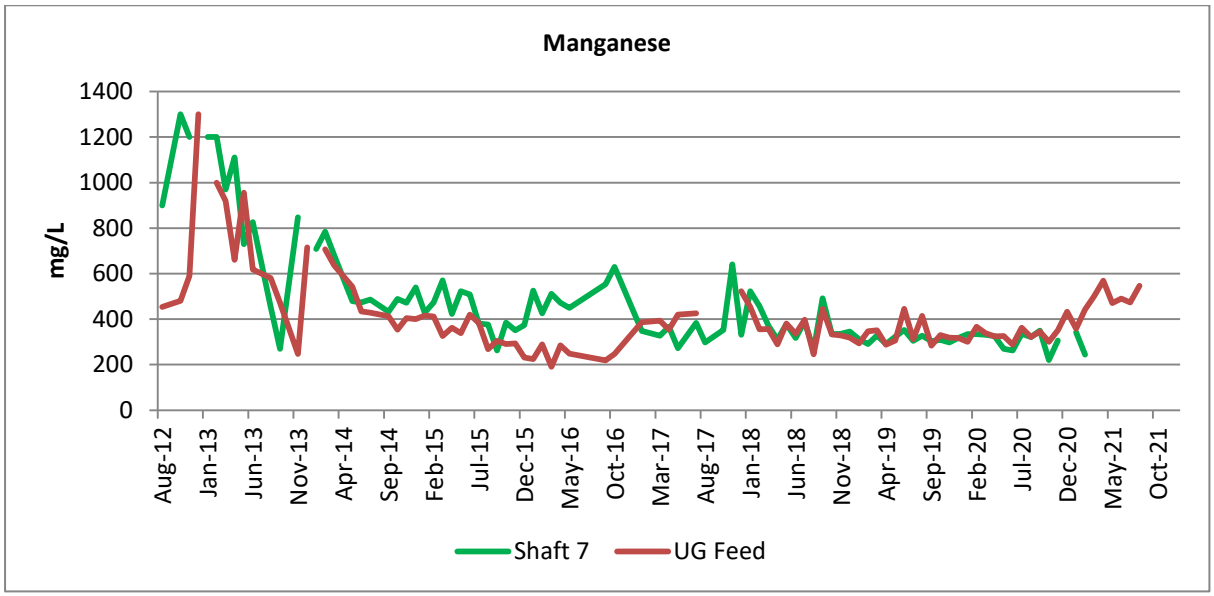
Figure 3-23 Shaft 7 & Mine Dewatering Results for Sampled Parameters - Period 2012 to 2021

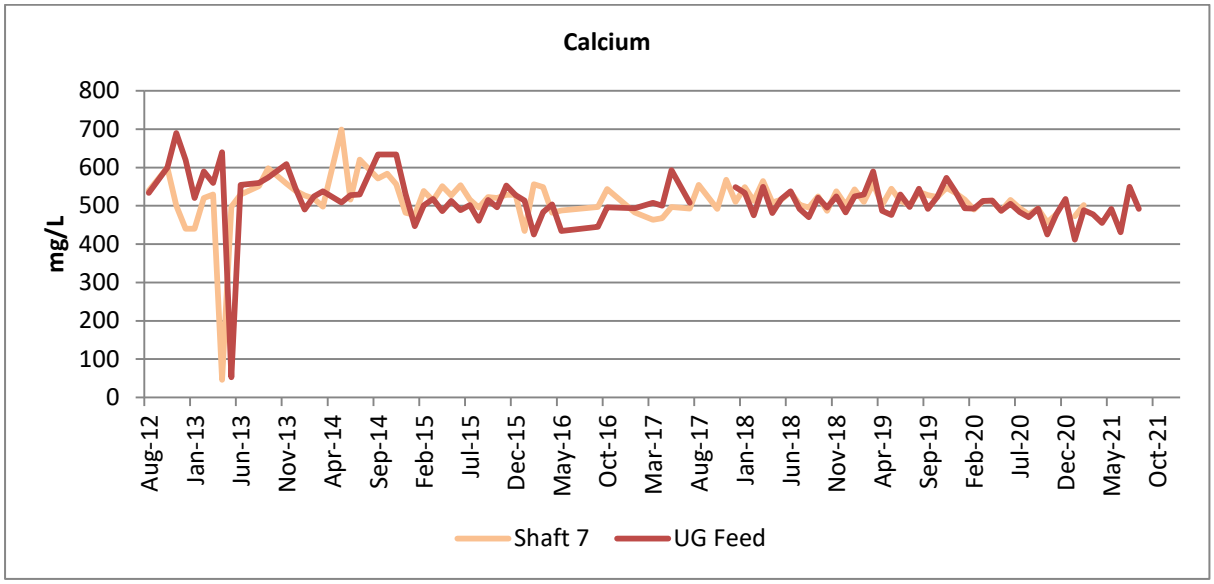


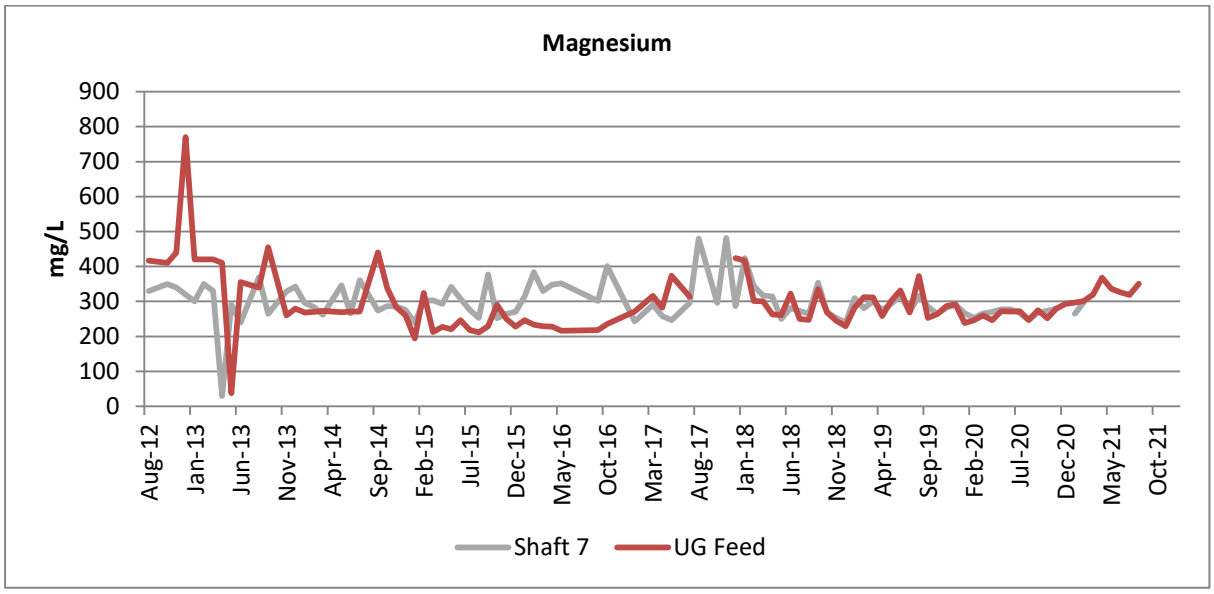


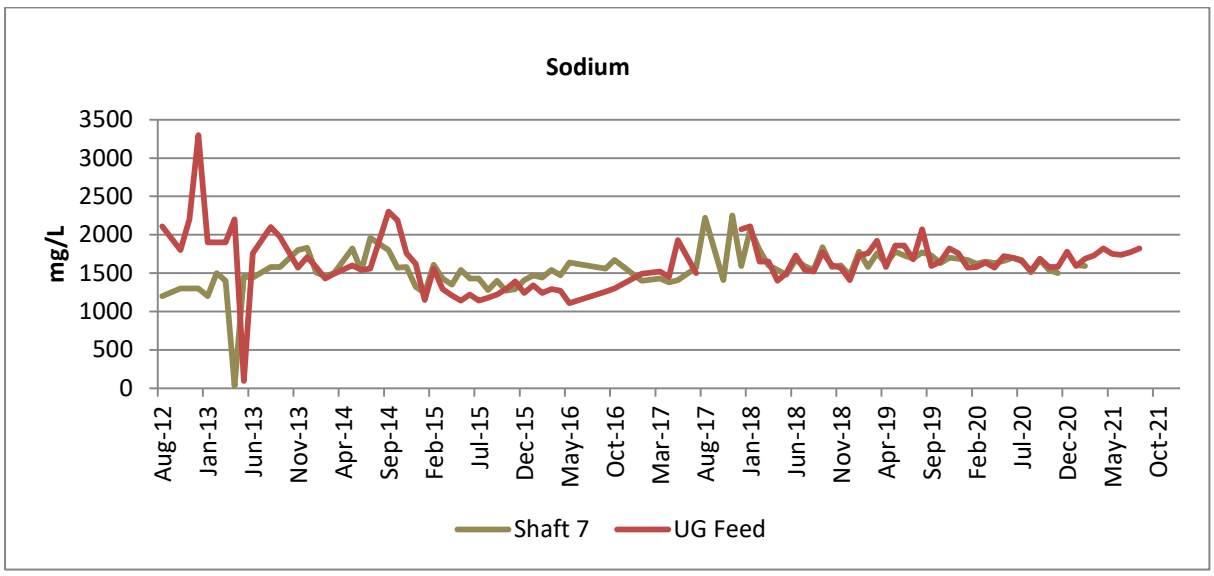

Iron
mg/L
25
20
15
10
5
0
Aug-12
Jan-13
Jun-13
Nov-13
Apr-14
Sep-14
Feb-15
Jul-15
Dec-15
May-16
Oct-16
Mar-17
Aug-17
Jan-18
Jun-18
Nov-18
Apr-19
Sep-19
Feb-20
Jul-20
Dec-20
May-21
Oct-21
Shaft 7
UG Feed

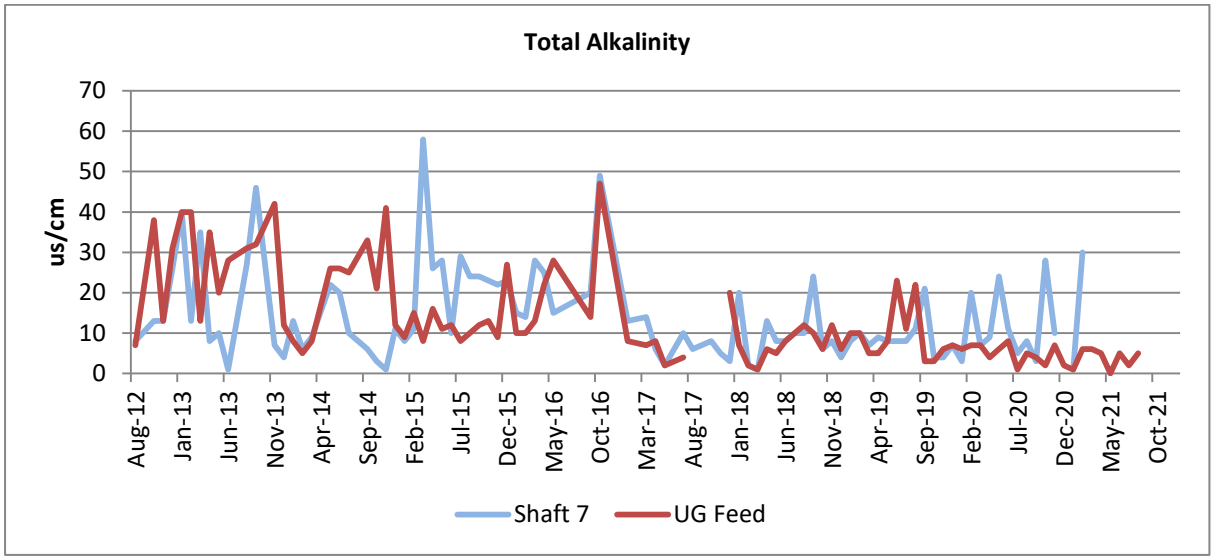

Calcium
mg/L
800
700
600
500
400
300
200
100
0
Aug-12
Jan-13
Jun-13
Nov-13
Apr-14
Sep-14
Feb-15
Jul-15
Dec-15
May-16
Oct-16
Mar-17
Aug-17
Jan-18
Jun-18
Nov-18
Apr-19
Sep-19
Feb-20
Jul-20
Dec-20
May-21
Oct-21
Shaft 7
UG Feed

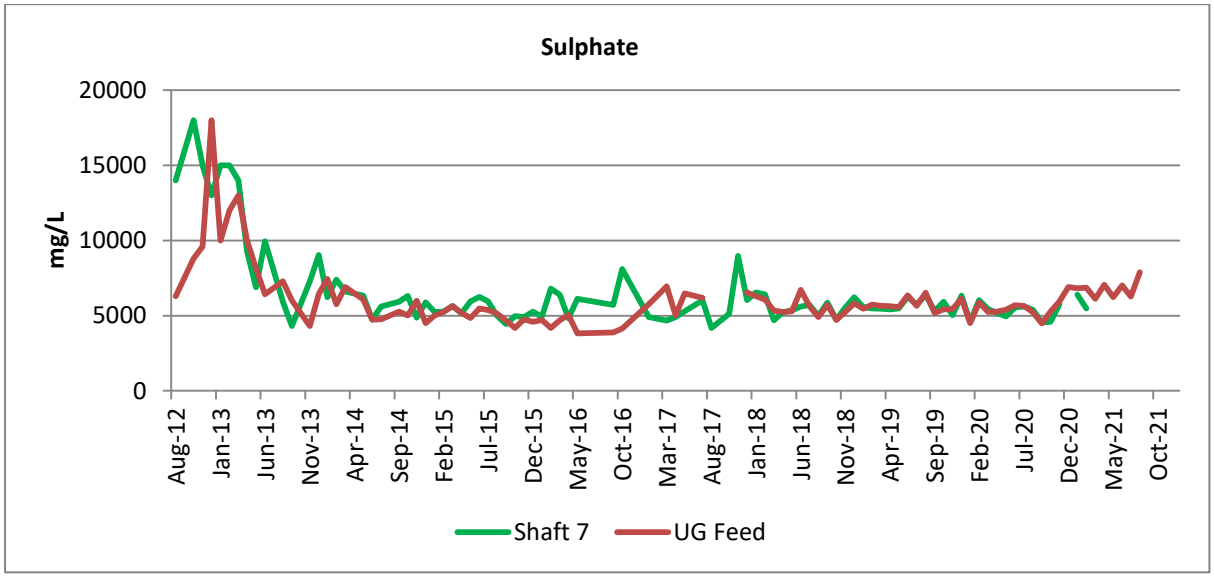

Manganese
mg/L
1400
1200
1000
800
600
400
200
0
Aug-12
Jan-13
Jun-13
Nov-13
Apr-14
Sep-14
Feb-15
Jul-15
Dec-15
May-16
Oct-16
Mar-17
Aug-17
Jan-18
Jun-18
Nov-18
Apr-19
Sep-19
Feb-20
Jul-20
Dec-20
May-21
Oct-21
Shaft 7
UG Feed

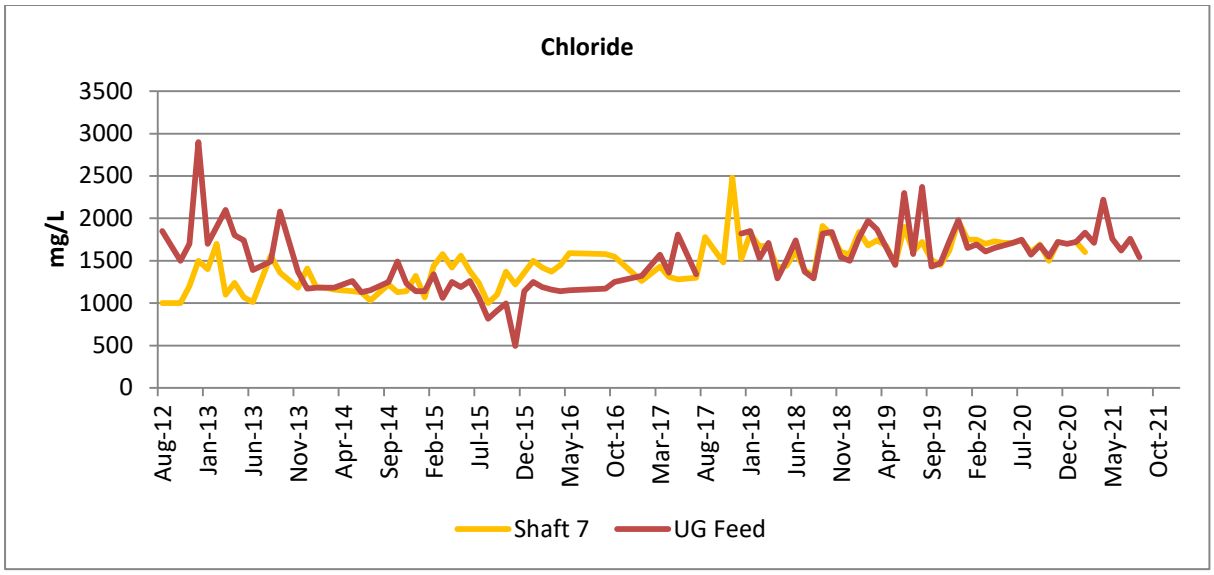

Calcium
mg/L
800
700
600
500
400
300
200
100
0
Aug-12
Jan-13
Jun-13
Nov-13
Apr-14
Sep-14
Feb-15
Jul-15
Dec-15
May-16
Oct-16
Mar-17
Aug-17
Jan-18
Jun-18
Nov-18
Apr-19
Sep-19
Feb-20
Jul-20
Dec-20
May-21
Oct-21
Shaft 7
UG Feed

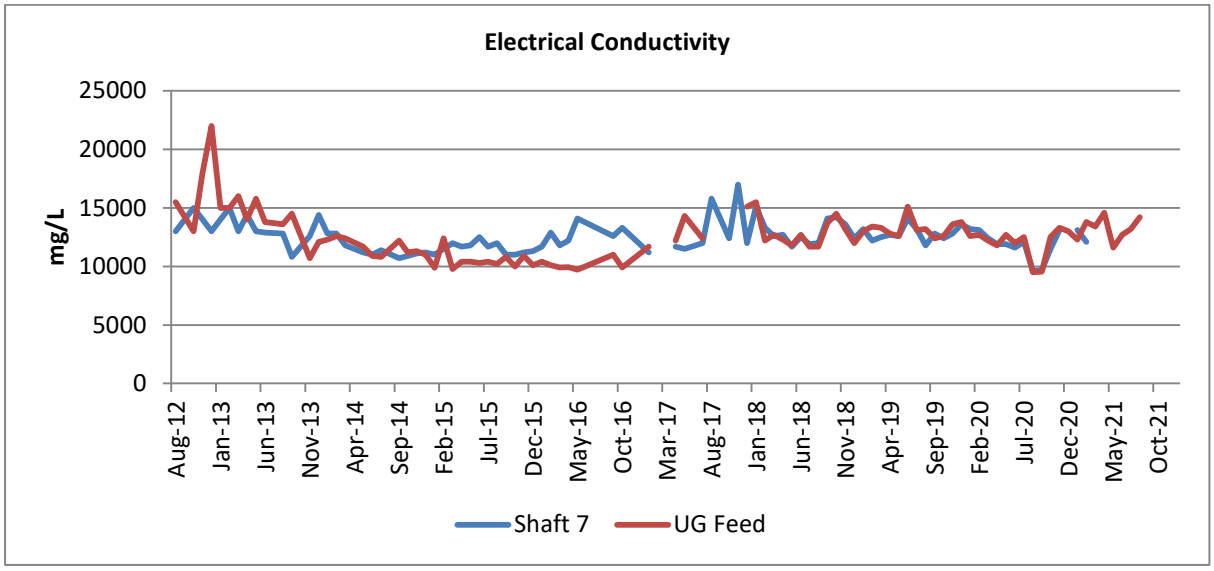

Magnesium
mg/L
900
800
700
600
500
400
300
200
100
0
Aug-12
Jan-13
Jun-13
Nov-13
Apr-14
Sep-14
Feb-15
Jul-15
Dec-15
May-16
Oct-16
Mar-17
Aug-17
Jan-18
Jun-18
Nov-18
Apr-19
Sep-19
Feb-20
Jul-20
Dec-20
May-21
Oct-21
Shaft 7
UG Feed

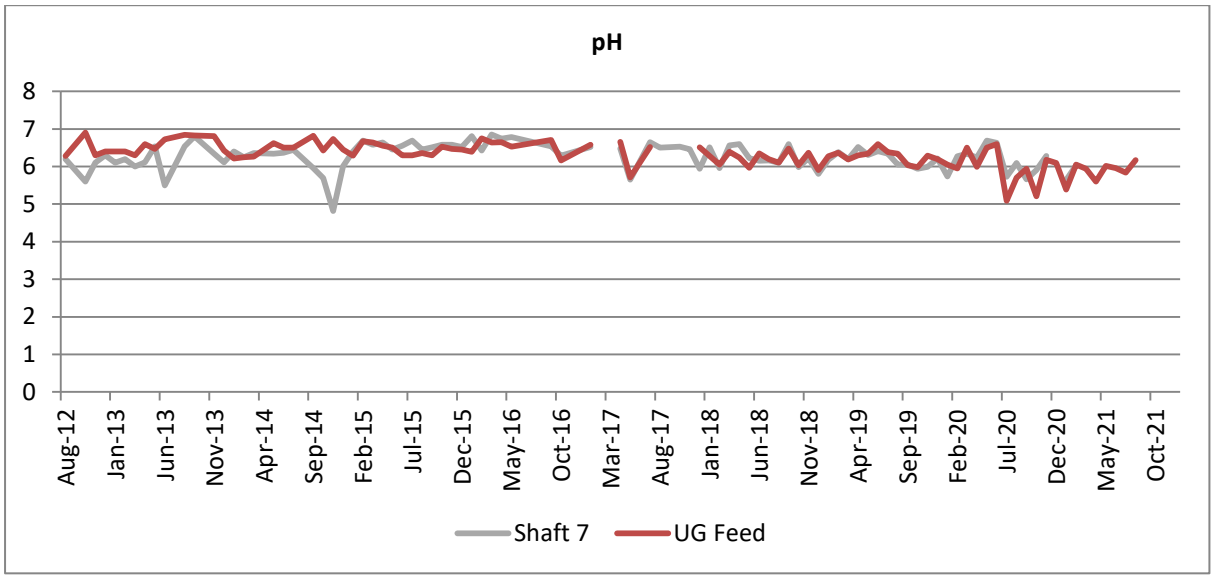

Sodium
mg/L
3500
3000
2500
2000
1500
1000
500
0
Aug-12
Jan-13
Jun-13
Nov-13
Apr-14
Sep-14
Feb-15
Jul-15
Dec-15
May-16
Oct-16
Mar-17
Aug-17
Jan-18
Jun-18
Nov-18
Apr-19
Sep-19
Feb-20
Jul-20
Dec-20
May-21
Oct-21
Shaft 7
UG Feed

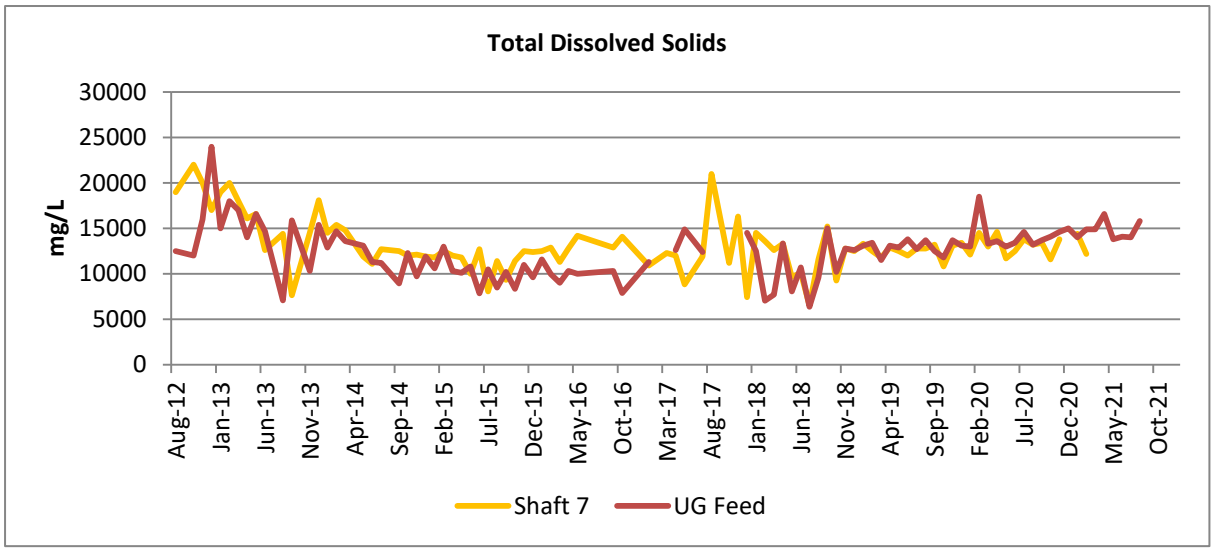

Total Alkalinity
us/cm
70
60
50
40
30
20
10
0
Aug-12
Jan-13
Jun-13
Nov-13
Apr-14
Sep-14
Feb-15
Jul-15
Dec-15
May-16
Oct-16
Mar-17
Aug-17
Jan-18
Jun-18
Nov-18
Apr-19
Sep-19
Feb-20
Jul-20
Dec-20
May-21
Oct-21
Shaft 7
UG Feed


Sulphate
mg/L
20000
15000
10000
5000
0
Aug-12
Jan-13
Jun-13
Nov-13
Apr-14
Sep-14
Feb-15
Jul-15
Dec-15
May-16
Oct-16
Mar-17
Aug-17
Jan-18
Jun-18
Nov-18
Apr-19
Sep-19
Feb-20
Jul-20
Dec-20
May-21
Oct-21
Shaft 7
UG Feed


Chloride
mg/L
3500
3000
2500
2000
1500
1000
500
0
Aug-12
Jan-13
Jun-13
Nov-13
Apr-14
Sep-14
Feb-15
Jul-15
Dec-15
May-16
Oct-16
Mar-17
Aug-17
Jan-18
Jun-18
Nov-18
Apr-19
Sep-19
Feb-20
Jul-20
Dec-20
May-21
Oct-21
Shaft 7
UG Feed


Electrical Conductivity
mg/L
25000
20000
15000
10000
5000
0
Aug-12
Jan-13
Jun-13
Nov-13
Apr-14
Sep-14
Feb-15
Jul-15
Dec-15
May-16
Oct-16
Mar-17
Aug-17
Jan-18
Jun-18
Nov-18
Apr-19
Sep-19
Feb-20
Jul-20
Dec-20
May-21
Oct-21
Shaft 7
UG Feed


pH
8
7
6
5
4
3
2
1
0
Aug-12
Jan-13
Jun-13
Nov-13
Apr-14
Sep-14
Feb-15
Jul-15
Dec-15
May-16
Oct-16
Mar-17
Aug-17
Jan-18
Jun-18
Nov-18
Apr-19
Sep-19
Feb-20
Jul-20
Dec-20
May-21
Oct-21
Shaft 7
UG Feed


Total Dissolved Solids
mg/L
30000
25000
20000
15000
10000
5000
0
Aug-12
Jan-13
Jun-13
Nov-13
Apr-14
Sep-14
Feb-15
Jul-15
Dec-15
May-16
Oct-16
Mar-17
Aug-17
Jan-18
Jun-18
Nov-18
Apr-19
Sep-19
Feb-20
Jul-20
Dec-20
May-21
Oct-21
Shaft 7
UG Feed

3.7 Contaminated Land

The majority of the surface land area that makes up the Rasp Mine is 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. The sections below outline how dangerous goods are handled onsite and procedures in place for managing and reporting spills.

3.8 Hydrocarbon and Chemical 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; and
- Solvents used in the parts washer.

3.8.1 Fuel

Diesel is stored in two tanks each with a capacity of 68,000L. These self-bunded trans-tanks 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.

A 10,000L diesel tank was commissioned in October 2017. The tank is situated at the 13L Service Bay underground. It is double skinned and self-bunded.

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.

3.8.2 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.

3.8.3 Solvents

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

3.8.4 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
- Sodium metabisulphite
- Sodium ethyl xanthate
- Flocculent
- InterFroth F228
- Cytec S9232 (zinc collector)
- Anti-scalant

- Defoamer
- Zinc Sulphate

All quantities and map with storage locations are reference in the Pollution Incident Response Management Plan which is tested annually and available on the CBH website.

3.9 Hazardous Material Management

3.9.1 Licensing

Rasp holds Licence XSTR100095 for the storage and handling of dangerous goods and Radiation Management Licence 5063802. Additionally, Rasp holds an explosives licence (licence number XMNF200003) to manufacture, possess, store explosives and ammonium nitrate emulsion on site.

3.9.2 Dangerous goods management

Site dangerous goods management is managed according to the site Chemical Management Plan.

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 intranet.

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

All quantities and a map with storage locations are referenced in the Pollution Incident Response Management Plan, which is tested annually and updated as required.

Storage, management and access to explosives onsite is outlined in the Store, Manage and Access Explosives Standard BHO-STD-MIN-001. A security plan compiled and submitted by the supervising licensee detailing the security measures for explosives on the Broken Hill Operations Pty Ltd, Rasp Mine site. (Document PLN- 03-06-01)

Explosives are stored both on the surface and underground. The surface explosive magazines (SEM) are located within the BHP Pit approx. 3 km north from the main office on Eyre Street. The area encompasses one detonator magazine (IE), one packaged explosives magazine (HE) and one emulsion bulk storage compound. The magazines are separated by a minimum of 7 metres and are bunded in accordance with AS 2187.1. All gates and magazines are secured with locks, and signage that meet the minimum required standards.

The underground explosive magazines (UEM) are located within the underground operations of Broken Hill Operations Pty Ltd, Rasp Mine. Separate storages are utilised for the storage of (IE) and (HE) Explosives Magazines are secured with locks, and signage that meet the minimum required standards.

SEM & UEM keys are locked in a secured key cabinet in the Broken Hill Operations Pty Ltd, Rasp Mine Site Office and are to be issued only by the Emergency Service Officers, who must check the identity and authority of the person wishing to take possession of the keys. The SEM & UEM Explosive Magazine Access Log Book BHO-TRN-REG-004 must be completed prior to issuing and returning the keys. Personnel will only be granted access if they possess a Security Clearance and their name appears on the Key Register (Section 7 of the Site Security Plan).

3.10 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.

3.10.1 Mineral wastes

Mineral wastes consist of waste rock from underground workings and tailings residue from the processing of ore.

Waste rock that cannot be returned underground to fill voids is stored in Kintore Pit or used for underground roads. In the reporting period 148,216 t of waste rock was placed underground and 105,168 t was trucked to surface.

Tailings is discharged into Blackwood Pit (TSF2) with water recycled for use in processing where possible. In the reporting period 378,150 t of tailings was placed in Blackwood Pit.

3.10.2 Non-mineral waste

Rasp Mine has four main laydown areas where used parts and equipment are stored for future use. The recyclable area has dedicated sections for scrap metal, timber, batteries, rubber, electronic goods and used pods. Used 1000L pods are returned to the manufacturer for reconditioning and reuse or removed by a waste contractor for recycling or disposal.

Waste oil, oily water, coolant, hydrocarbon-contaminated solids (rags, spill control material, etc.), grease, oil filters, hydraulic hoses, and batteries are collected by a waste contractor for disposal or recycling.

Paper and cardboard are disposed on in blue recycling bins and skips which are collected by City Council. Printer cartridges are collected in “Planet Ark” disposal bags and delivered to the local Post Office for recycling. Scrap Metal is sold to a local scrap metal merchant and Cans and Bottles are sold to a local bottle collection merchant.

Waste disposed of in 2021 is summarised in **Table 3-15**.

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. Occasionally heavy tyres will be transported off-site for disposal. All other LV and light truck tyres are removed from site under arrangement with the tyre supplier.

Table 3-15 Waste Summary - 2021

Waste	Quantity Disposed
Oil	60,000L
Oily water	31,000 L
Coolant	0 L
Scrap metal	87.51 t
Grease	8,610 L
Oil filters, hoses,	18 m^3
Contaminated drums/IBC’s	13 m^3
Printer cartridges	7 bags
E-waste	Nil
Waste to Landfill	305 t

3.11 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. Goats frequent the site and removal is planned if a safe method can be employed.

3.12 Weeds

During site inspections in 2019, individual Bush Tobacco (*Nicotiana glauca*) trees and a stand of rhizomatous bamboo (likely *Phyllostachys spp*) have been identified for removal in 2022. The Bush Tobacco, which grows along water storages and some isolated locations on dumps, will be controlled by spraying. Attempts in 2019 to remove the some tobacco by cutting at the stump was unsuccessful as the plants have grown back. Bamboo is growing in the Eyre St trench and will likely be sprayed with a Glyphosate-based herbicide.

3.13 Blasting

There are six monitors installed to record blasting vibration and over pressure. Blast monitors are installed at five locations around Broken Hill and there is one monitor located on-site near the core shed (this is used to monitor blast impacts at South Road). Locations are shown on **Figure 6-2**.

If a blast complaint is received, the complainant is given the opportunity to have a 'roving monitor' placed at their residence/location. By doing so BHOP can monitor the impact at the location for a time. Normally, a roving monitor is placed at the complainants' location for at least two months to develop an accurate K Factor, which is used in blast design to predict ground vibration at a set location. BHOP maintains a spare monitor to replace compliance monitors removed for calibration or due to fault. In 2020, BHOP purchased three additional monitors to be employed as compliance monitors. In April 2017, blast monitor V4 at 123 Eyre St was removed at the residents request and placed at the Eyre St Bowls Club.

Table 6-16 and **Table 6-17** lists the criteria for blasting ground vibration and overpressure for Western Mineralisation / Main Lodes (Western Min/Main Lodes) and Block 7, respectively**.**

Table 3-16 Overpressure and Ground Vibration Western Min/Main Lodes (excluding Block 7)

Location	Airblast Overpressure (dB(Lin Peak))	Ground Vibration (mm/s)	Allowable Exceedance
Residence on privately owned land (7am-7pm)	115	5	5% of the total number of blasts over a 12-month period[ab]
(7am-7pm)	120	10	0%
(7pm-10pm)	105	-	-
(10pm-7am)	95	-	-
Public Infrastructure[d]	-	100	0%

Table 3-17 Overpressure and Ground Vibration Block 7 (includes Zinc Lodes)

Location	Airblast Overpressure (dB(Lin Peak)	Ground Vibration (mm/s)	Allowable Exceedance
Residence on privately owned land (7am-7pm)	115	3 (interim)[c]	5% of the total number of blasts over a 12-month period[a]
(7am-7pm)	120	10	0%
(7pm-10pm)	105	-	-
(10pm-7am)	95	-	-
Broken Hill Bowling Club, Italio (Bocce) Club, Heritage Items within CML7	-	50	0%
Perilya Southern Operations	-	100	0%
Public Infrastructure[d]	-	100	0%

The Project Approval provides the following notes to these **Table 3-1618** and **6-19:**

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 addition, the following conditions also apply:-

- Production blasts may occur between 6.45 am and 7.15 pm on any day
- 1 production blast per day, with 6 per week averaged over a calendar year
- 6 development blasts per day, with 42 per week averaged over a calendar year

In accordance with Project Approval and EP Licence conditions:

- All production-blasting times occurred between 6.45am and 7.15pm on any day.
- Production blasts averaged 3.2 per week over the previous calendar year
- Development blasts averaged 31.4 per week over the previous calendar year

A total of 1,510 blasts were fired during the reporting period, 1,402 for development and 108 for production.

In the Western Mineralisation/Main Lodes mining areas (external to Block 7), 1,634 blasts were fired. Of these, 1,402 were for development and 105 were for production. Nine blasts exceeded 5 mm/s, all recorded from production blasts. The percentage of production blasts exceeding 5 mm/s was 2.9% and the percentage of development blasts was 0.0%, both within the criteria of 5% allowable exceedance.

Blast monitors are set to trigger (record) when they detect ground vibration of 0.13 mm/s or higher.

Table 3-18 lists the highest recorded results for ground vibration (mm/s) at each of the vibration monitors.

Table 3-18 Ground Vibration Results at Vibration Monitors for the Reporting Period (2021)

Vibration Monitor/Location	Highest Recorded Ground Vibration (mm/s)
V1 Silver Tank (located on CML7)	1.34
V2 Hire yard	8.20
V3 Air Express	9.60
V4 123 Eyre St / Bowls Club	1.47
V5 80 Eyre St	1.24
V6 BHOP Core Shed (located on CML7)	1.56

All blasts recorded off-site were under 10 mm/s.

There were no exceedances of criteria for overpressure levels.

3.14 Operational Noise

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

Noise monitoring is completed annually at noise monitoring locations shown together with the relevant location criteria in **Table 3-19**.

During the reporting period, EMM Consulting Pty Ltd conducted a noise assessment for these receptors, **Figure 3-19**. Attended noise monitoring was conducted during two consecutive night-time periods from 3 to 5 May 2021 to quantify off-site noise levels from the Rasp Mine. While the EPL nominates noise limits for day, evening and night, attended monitoring was completed during the night-time period to minimise the contamination of monitoring data by extraneous noise sources (e.g. domestic and road traffic noise).

A total of 28 operator-attended noise measurements were completed, two measurements at each of the 14 monitoring locations. For 19 out of the 28 samples the wind speed was above 3 m/s and therefore the noise limits did apply for these samples according to the site's EPL. Site noise was inaudible during 19 of 28 measurements. The Rasp Mine noise contributions satisfied the relevant night-time noise limits at all assessment locations. Noise monitoring results are shown in **Table 3-20**.

Figure 3-19 Noise Receptors

Low frequency noise was assessed by using the Noise Policy for Industry (NPfI) (EPA 2017) methodology for each attended measurement and for audible contributions only. Low frequency noise, as defined in the NPfI, was not identified during the attended measurements.

Rasp Mine LAeq,15min noise contributions (including the addition of the relevant modification factor) satisfied the relevant night-time noise limits at all assessment locations, including during attended measurements when noise limits did not apply due to adverse weather conditions

Noise attenuation measures on site 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 rock fall 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.
- 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.

Table 3-19 Operational Noise Criteria

Location	Day (dB(A))	Evening (dB(A))	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 3-20 Noise Monitoring Results

Location	Date	Start	LA_{EQ}	LA_{MAX}	Rasp contribution $LA_{EQ(15\text{-}min)}$	Criteria	Compliant
A13	3/5/21	22:04	56	75	<30	35	Y
A14	3/5/21	22:23	39	72	<30	35	Y
A1	3/5/21	22:42	37	70	<30	35	Y
A2	3/5/21	23:00	34	48	<30	35	Y
A3	3/5/21	23:19	47	70	<30	39	Y
A4	3/5/21	23:39	49	74	<30	39	NA
A5	3/5/21	23:59	52	73	<31	39	Y
A6	4/5/21	00:17	49	70	32	39	Y
A7	4/5/21	00:56	40	63	<30	35	NA
A8	4/5/21	01:18	42	55	<30	39	NA
A9	4/5/21	01:37	56	76	<30	39	NA
A10	4/5/21	01:58	36	56	<30	35	NA
A11	4/5/21	02:17	50	71	39	39	NA
A12	4/5/21	02:38	48	68	38	39	NA
A13	4/5/21	22:00	56	77	<30	35	NA
A14	4/5/21	22:18	46	65	<30	35	NA
A1	4/5/21	22:38	56	83	<30	35	NA
A2	4/5/21	22:57	51	79	<30	35	NA
A3	4/5/21	23:18	55	77	<30	39	NA
A4	4/5/21	23:37	47	63	<32	39	NA
A5	4/5/21	23:56	54	76	<33	39	NA
A6	5/5/21	0:15	53	70	<30	39	NA
A7	5/5/21	00:35	43	62	<30	35	NA
A8	5/5/21	00:57	42	59	<30	39	NA
A9	5/5/21	01:15	60	86	<31	39	NA
A10	5/5/21	01:35	36	55	<30	35	NA
A11	5/5/21	01:56	43	59	32	39	NA
A12	5/5/21	02:15	38	49	32	39	Y

IA: Inaudible

3.15 Visual, Stray Light

Light towers around machinery, where practicable, are designed to face light away from residents.

There were no light complaints for the reporting period.

3.16 Indigenous Heritage

There are no known significant indigenous sites within CML7.

3.17 Natural and Social Heritage

3.17.1 Conservation management strategy

The Conservation Management Strategy draft has been developed however cannot be finalised until the Line-of-Lode Interagency Panel provides advice.

An Options Analysis Study for mine closure is being developed along with recommendations for rehabilitation methods and trials.

In February 2020 a structural engineer was engaged to inspect a number of structures on site to determine maintenance requirements. The structures include the:

- No4 Headframe,
- Thompsons Headframe,
- Thompsons Change house,
- Carpenters Shop,
- Maintenance Workshop,
- Fire and Ambulance Station,
- South Mill,
- Pattern Store,
- BHP Pit structures,
- Electrical Workshop,
- Training Centre, and
- Remnant concrete walls at the site entrance.

Each report identified the condition of the structure and made recommendations for works to repair or stabilise the structure.

Structural inspections are planned for March 2022 of the following structures:

- No4 Headframe,
- Carpenters Shop,
- Maintenance Workshop,
- Pattern Store,
- Electrical Workshop,
- Thompsons Headframe

3.18 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 begin 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.

3.19 Bushfire

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

The Rasp Mine has a fully equipped fire truck available at all times to respond to fires and has a trained mines rescue team for firefighting. There are fire hydrants and hoses installed at strategic locations across the mine site and within vehicles with deluge systems installed on loaders and in the underground fuel bay.

3.20 Mine Subsidence

Monitoring occurs on Bonanza St/South Road to detect any movement that may be associated with mining activities in the Zinc Lodes.

Surveying results indicate that most of the detected “movement” is due to instrument set-up errors, atmospherics etc. This is evidenced by the fact that the plot for each prism vector looks very similar to the same vector for the other prisms (i.e. all northing plots look the same, all easting plots look the same) indicating that the errors affect all prisms. Mining in the area of the Zinc Lodes has now been completed with the exception of some minor remnant ore extraction, BHOP will continue to monitor road movement and has back-filled the mining/production voids in this area.

No subsidence from mining activities was detected in the reporting period.

3.21 Methane Drainage/Ventilation

As the nature of the mine is not gassy (e.g. coal mine), there are no permanent methane monitoring locations. However, all personnel carry gas monitors while performing the following underground activities to monitor any hazardous gases:

- All production rigs while drilling;
- All production loaders (Boggers) while bogging;
- All Jumbos;
- Vent Officer while doing vent surveys;
- Re-Entry Crews while performing re-entry; and
- Service crew when required.

3.22 Public Safety

All active mine areas of the Rasp Mine site are signposted and fenced to restrict any unauthorised access.

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).

3.23 Radiation

BHOP has a Radiation Management Licence, RML5063802 current until 26 July 2022. 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 slurry density and identify the percentage of lead/zinc/iron. Radiation is used by 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 biennial inspections of the individual radiation gauges on site while the site RSO conducts semi-annual inspections. During the reporting period, no issues were identified 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.

No radiation apparatus was dismantled during the reporting period.

Table 3-21 lists the regulated materials (fixed radiation gauges) that make up the schedule to the licence.

Table 3-21 Regulated Radiation Equipment

Location	Rasp Mine Asset Number	Type	Equipment	Components	Purpose
Mill - Flotation building	2321727346	Radiation apparatus	X-RF	- 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	- Control console / generator	Analysis of materials
Radiation Store 'REMOVED FROM SERVICE'	1570661354	Sealed source device	Fixed Radiation Gauge	- Container - Sealed source	Density gauge

4. WATER MANAGMENT

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. Water from the town supply is treated at the Mica Street treatment plant and supplied to the Project via existing connections and is used for showers, toilets, and laundry. Average annual usage of potable water is 9 ML supplying the offices, workshop, core shed and processing facility.

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.

Water is reclaimed onsite from various sources to be recycled for the Project, mainly from underground dewatering. If necessary, the reclaimed water is treated onsite to ensure that it is suitable for use as process water in both the processing plant and underground operations. Reclaimed water is returned after treatment to the process water tank which has a three hour holding capacity or to the Silver Tank which has a capacity of 8 ML.

The sources for the reclaimed water include:

- No. 7 Shaft dewatering;
- Underground mine operations dewatering;
- TSF decant pond; and
- Stormwater containment dams (only during extreme rain events)

The Rasp Mine has installed a number of water meters to monitoring water supplies and movements these are listed in **Table 4-1**.

Table 4-1 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
Patto's Pond	Weekly

Raw water used during the period was 330 ML, decreased from 322 ML used in the previous period.

Potable water used during the period was 10.1 ML, a decrease from 13.4 ML used in the previous period due to a decrease in personnel and contractors.

BHOP has a water extraction licence, 85BL256102, to extract by active pumping 370 ML pa. Nett water extraction in 2021 was 399.5 ML.

No water was transferred to Perilya South Mine Operations, during the reporting period.

5. REHABILITATION

5.1 Buildings

No buildings were constructed on CML7 in 2020.

5.2 Rehabilitation and Disturbed Land

Dust deposition gauges were installed on top of Mt Hebbard in October 2017 as part of the waste rock trial to be undertaken in this area in 2018. It was proposed in the MOP to install the gauges to monitor current dust conditions for a 12 month period, then place the waste rock and re-install the gauges for another 12 month period and compare results. As BHOP are still using crushed extracted material (waste rock) in the construction of the TSF2 embankments, waste rock has not yet been applied to the surface of Mt Hebbard. As 12 months of dust results had been collected from the Mt Hebbard dust gauges, dust suppressant was applied at the end of 2018 and again in 2020 to control dust as the surface of Mt Hebbard is one of the "free areas" identified on the site to be potential contributors of dust to the surrounding environment.

BHOP was considering expanding the Options Study as a project with the Centre for Mined Land Rehabilitation, University of Queensland, however, BHOP has decided to put the project on hold due to the lack of feedback from the Minister for Cabinet Interagency Panel on the Line of Lode. Guidance from the Resources Regulator following the Department of Premier & Cabinet Broken Hill Post Mining Interagency meeting held in Broken Hill on 13 and 14 August 2019 is still forthcoming. During the Interagency meeting there was agreement that paddock dumping of waste rock on free areas may be a suitable method of capping them. Following the Resources Regulator Targeted Assessment Program (TAP) audit for Soils and Minerals in November 2020, BHOP have conducted an analysis of the volumes of suitable waste rock required for free area coverage and other surface usage purposes. The Draft Options Study developed in 2018 was amended in accordance with the MOD6 Development Application to be finalised and submitted early in 2021.

Cone Penetrometer Testing was conducted across tailings dumps on site in 2020 as part of the Instability and Inrush Risk Assessment and findings will be used to conduct a risk assessment around placing waste rock on historical tailings facilities and waste dumps.

Table 5-1 and **Table 5-2** detail disturbed areas. No new areas were disturbed during the reporting period.

Table 5-1 Rehabilitation Summary

	Area Affected / Rehabilitated (hectares)		
	To date 1/1/2021-31/12/2021	**Last Report 1/1/2020-31/12/2020**	**Next Report 1/1/2021 – 31/12/2021**
A: MINE LEASE AREA			
A1 Mine lease(s) Area	342.66	342.66	342.66
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	13.2
B3 Waste emplacements, (active / unshaped / in or out-of-pit)	2.27	2.27	2.27
B4 Tailings emplacements (active / unshaped / uncapped)	3.8	3.8	16.53
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 5-2 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	2.5	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	0.01	Bamboo, Bush Tobacco, Mesquite - spraying
Feral animal control (detail – additional fencing, trapping, baiting etc.)	0	0	Goats – Manual collection

6. COMMUNITY RELATIONS

6.1 Environmental Complaints

During the period of the AEMR, BHOP has maintained a register for community complaints and concerns which is available on the CBH website.

A total of 6 (11 in 2020 and 22 in 2019) complaints were received over the reporting period relating to blasting vibration and noise; see **Table 6-1**.

Four complaints were made regarding blast vibration, one for perceived water use, and one for suspected surface mining. The surface mining was most likely mistaken for TSF2 Embankment works.

In February 2020 a structural engineer was engaged to inspect eight residences and structures of complainants who requested the service in 2019. It was determined that any cracking and other damage claimed by complainants to be caused by blasting at BHOP was likely due to factors such as poor drainage and reactive soils generating vertical movement, and poor construction methods.

Additional and follow-up structural inspections of residences will be conducted in March 2022.

Table 6-1 Complaints register

Date of Complaint	Reason for Complaint	Comment
February 2021	Vibration	• A complainant contacted BHO about blast vibration from 26 February. • The Complainant had made a complaint to BHOP previously. • Blast monitors were previously installed at the residence and have since been removed. • The complainant was contacted by a BHOP staff member. • Vibration levels measured at nearby blast monitors were below licence limits.
June 2021	Surface Mining	• A complainant contacted the EPA in June with concerns that surface mining was taking place at Rasp Mine. • The EPA forwarded the query to BHO on 17 June. • On 18 June, BHO responded to the query with a letter confirming there were no surface mining activities, or any other activities contrary to project approval conditions, taking place at Rasp Mine. • During the period in question BHO was completing construction of the Blackwoods TSF2 embankments and crushing and screening waste rock in BHP Pit in accordance with PA 07_0018 MOD4 and MOD7.
July 2021	Vibration	• A complainant contacted the NSW EPA about blast vibration from 14 July. The complainant details were not provided to CBH by the EPA. • Blast vibration levels measured at compliance monitors were below licence limits. • Blast vibration data was provided to the NSW EPA. • No follow-up contact with the complainant was

Date of Complaint	Reason for Complaint	Comment
		requested.
September 2021	Vibration	• A complainant contacted the NSW EPA about blast vibration from 23 September. The complainants details were provided to CBH by the EPA. • A blast monitor is installed at the complainants residence and vibration levels measured at this monitor and nearby compliance monitors were below licence limits. • The blast vibration data for the blast was provided to the NSW EPA. • BHOP have contacted the complainant to discuss the details of the blast.
	Vibration	• A complainant contacted the NSW EPA about blast vibration from 12 August, and 20 and 23 September. The complainants details were provided to CBH by the EPA. • Vibration levels measured at nearby compliance monitors on the dates provided were below licence limits. • A blast monitor was previously installed at the complainants residence and vibration levels recorded were below licence limits. • The blast vibration data for the blast was provided to the NSW EPA. • BHOP have contacted the complainant to discuss the details of the blast.
December 2021	Water	• A complainant contacted the NSW EPA about water use with regards to site surface dust suppression and hours of water cart operation. • BHOP is reviewing site practices in line with consent conditions and is preparing a response for the NSW EPA.

6.2 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)
- Environment Protection Authority (EPA)
- Department of Planning Industry and Environment (DPIE)
- Department of Industry- Lands (DI-L)
- Essential Energy
- Essential Water
- Australian Rail Track Corporation Ltd (ARTC)
- Broken Hill Health Service, Child and Family Health Centre

The following community communication activities occurred during the period:

- BHOP was represented at all meetings of the BHCC Lead Reference Group.
- Child and Family Health Centre Lead Week – each year BHOP would participate in the Lead week program and provide water, fruit, a fruit or vegetable seedling, and bags for these items and information pamphlets provided by the Leadsmart group. In 2020 however, the function did not take place due to COVID-19 restrictions.

6.3 Community Support

During the reporting period, Rasp provided $28,318.18 to community groups.

These groups include:

- BH Football Club
- Various Broken Hill Schools
- Swim SA Carnival
- Foundation Broken Hill

Moving forward BHOP will focus on supporting local education and major events that support the promotion of the Broken Hill Community.

7. AUDITS

Independent Audit

An independent audit was conducted by Integrated Environmental Systems Pty Ltd in the week of 9 to 15 March 2019. The audit was commissioned by BHOP to satisfy Schedule 4, Conditions 7 and 8 of the Project Approval, requiring an audit to be conducted every three years.

The audit was conducted tom determine how BHOP was maintaining compliance against applicable conditions specified in:

- Project Approval 07_0018 MOD 5 approved under the former Part 3A of the Environmental Planning and Assessment Act 1979 (which continues as an approval of a transitional Part 3A project under Schedule 6A of that Act) by the delegate of the NSW Minister of Planning ('Project Approval' or 'PA');
- Environment Protection Licence Number 12559 as at 21 December 2017 ('EPL'); and
- Consolidated Mining Lease Number 7 as renewed on 17 January 2007 ('CML7').

BHOP's level of compliance with the applicable conditions (i.e. all conditions except those which were 'not triggered') in each instrument was as follows:

- BHOP was compliant with 48 of the 67 applicable Project Approval conditions;
- BHOP was compliant with 52 of the 75 applicable EPL conditions;
- BHOP was compliant with 24 of the 28 applicable CML7 conditions.

The non-compliance against the Conditions of CML7 are as follows:

- **Notice to Landholders – Condition 1 – Administrative non-compliance** – At the time of this February 2019 audit, BHOP was unable to provide evidence of written notification to landholders of the leased land or of a published notice in a newspaper circulating in the lease area.
  It was determined by BHOP that the notification was not provided.
- **Mining, Rehabilitation, Environmental Management Process (MREMP) – Mining Operations Plan – Condition 2 – Administrative non-compliance** – In relation to paragraphs (a) and (b) of this condition:
  (a) BHOP was unable to provide evidence of the Resources Regulator's approval of the current MOP; and
  (b) The current MOP does not identify how the mine will be managed to allow mine closure due to an apparent lack of agreement for end land use, which has continued to the time of this February 2019 audit.
  A notice of assessment of 30 January 2018 acknowledges receipt of the RCE and, therefore, acceptance of the MOP. An observation to indicate on the cover of the MOP the approval status as pending or approved will be employed going forward.
- **Reports – Condition 7 – Non-compliant (low risk)** – At the time of this February 2019 audit, BHOP was unable to provide evidence of exploration reports being prepared and provided to the DPE (Division of Resources & Geoscience) within the required 28-day period.
  Reports were subsequently provided to Resources and Geosciences.
- **Exploratory drilling – Condition 15 – Non-compliant (low risk)** – At the time of this February 2019 audit, BHOP was unable to provide evidence of having given the minimum 28 days' notification of exploratory drilling to the DPE (Division of Resources & Geoscience).
  Going forward, BHOP will provide a minimum of 28 days notification of explanatory drilling to Resources and Geoscience.

Dam Safety Audit

Conducted by Dam Safety NSW on 24 November 2021 the audit was to address:

- Dam operation and maintenance and related processes;
- Dam Emergency preparedness process as an integrated part of the emergency planning process; and
- Dam Safety management process and related risk management and assurance processes.

Audit findings have not yet been forwarded to BHO.

8. INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

Environmental incidents are reported using the Rasp Incident Reporting Procedure BHO-SAF-PRO-101.

BHOP maintains a Pollution Incident Response Management Plan BHO-ENV-PLN-002 on the CBH website in accordance with EPA requirements.

There was one reportable incidents/non-compliances during the reporting period.

Blackwoods TSF pit slope seepage

On 28 November 2021 a Mill Operator identified tailings liquid seeping from the toe of the existing pit slope of the Blackwood's Tails Storage Facility (TSF) 2. The small amount of seepage discharged onto the mill access road.

The incident was reported to Dam Safety NSW and NSW Resources Regulator.

It was identified that a valve was leaking and causing tailing to discharge from the valve and not the intended discharge point. A small bund was established to contain the tailing seepage. The tailings discharge point was changed to divert tailings away from affected area and to allow valve replacement. When the valve was changed the seepage stopped.

The pit side of the embankment was excavated along with adjacent tailings. The exposed slope was rolled and covered with A44 Bidum geofabric, and the area backfilled with dry tailings and compacted using a wheeled compactor mounted on an excavator.

9. ACTIVITIES PROPOSED IN THE NEXT AEMR PERIOD

The following lists the proposed activities during the next AEMR period in line with the MOP some of these activities continue into the next reporting period:

- Update and issue the draft Conservation MP following submission of MOD6.
- Develop and issue the Rehabilitation Management Plan.
- Development of the Waste Rock Management Strategy.
- Trial waste-rock capping of Mt Hebbard.
- Undertake on-going maintenance and inspections of heritage buildings as required.
- Continue application of chemical dust suppressant to 'free areas' of the site to minimise dust generation, including the trialling of an alternative product for unsealed roads.
- Eyre Street dam project – contaminated soil investigation.
- Ryan Street dam project – BHOP has engaged consultants to determine and advise on appropriate closure strategies for this area. Water sampling of rain runoff will also be undertaken for rainfall events to confirm level of rainwater contamination.
- Weed control.
- Sediment removal in water storages if required.
- MOD6 (pending approval) works including boxcut and TSF3 construction.