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

Rasp Mine

Annual Review

REPORTING PERIOD

1 May 2020 – 30 April 2021

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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, MOD5, MOD7, MOD8)
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
AR Commencement Date: 01/05/2019	**AR End Date:** 30/04/2021
I, Devon Roberts, certify that this report is a true and accurate record of the compliance status of the Rasp Mine for the period 1 January 2019 to 30 April 2020 (Reporting Period as per DA 07_0018 Sch4 Cond3) 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:	D Roberts
Date: 30/6/21	

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TABLES

FIGURES

1. STATEMENT OF COMPLIANCE

Table 1-1 lists the development consent and mining leases and confirms compliance as at the end of the reporting period. **Table 1.2** lists the non-compliances with relevant approval conditions for the reporting period.

Table 1-1 Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	(Yes/No)
Project Approval 07_0018 (Consolidated MOD8)	No
Consolidated Mining Lease 7	Yes
Mining Purpose Lease 183	Yes
Mining Purpose Lease 184	Yes
Mining Purpose Lease 185	Yes
Mining Purpose Lease 186	Yes

Table 1-2 lists conditions that were identified as non-compliant and provides a comment outlining actions undertaken and where appropriate, addressed in this Annual Report. An Independent Environmental Audit was conducted in February 2019 and non-compliance identified are included here.

Table 1-2 Non-Compliances

Relevant Approval	Relevant Condition	Condition description (summary)	Compliance Status	Comment	Annual Review Section
PA07_0018	Schedule 3 Condition 5 Table 5	The Proponent shall ensure that the project is operated in a manner that does not exceed the criteria listed in Tables 4 and 5.	Non-compliant	Quarterly emissions testing conducted at the Crusher Baghouse, EPL ID 2, on 9 December 2020 returned results exceeding the PA07_0018 Schedule 3 Condition 4 Table 5 limits for Total Suspended Particles (TSP) and Type 1 and 2 Substances.	10
PA07_0018	Schedule 3 Condition 18	Proponent shall ensure blasting on site does not cause exceedances of the criteria in Table 8 and 9 of Project Approval 07_0018.	Non-compliant	For the annual period May 2020 to April 2021, Block 7 compliance for production blasts exceeded the 5% allowance for ground vibration with 100% of blasts recording ground vibration over 3mm/s. This was predominantly a timing issue. There was minimal blasting in Block 7 for the period which resulted in the denominator decreasing and hence the percentage increasing.	10

1.1 Actions required from previous Annual Review

Item	Action	Status
1	Signature required on the Annual Review title block	Complete
2	Clarify the periods and figures for extraction; in section 4.3.2 it refers to the whole reporting period (649,902t) and in section 4.3.6 it refers to the whole reporting period (858,574t)	Complete
3	Clarify period in section 4.6.2	Complete
4	Update section 4.6.3 to reflect current status of back fill plant (currently states 'It is also planned to commission the Backfill Plant in late 2019 which will result in future tailings placement in underground voids')	Complete
5	Clarify whether PM 10 were purchased (page 23 states that '3 PM10 would be purchased in 2019')	Complete
6	Align dates to reflect current reporting period in Table 7.1	Complete
7	Include details of the Official Caution issued by the Department for the non-compliance reference no 2: 'Incorrectly sourced material for Embankment 2'	Complete

A rehabilitation strategy has not been finalised although a Closure Options Study for Rasp Mine was in a final draft form in April 2021 having been updated to take into account findings from recent waste rock handling practices. The draft report included a revegetation assessment (with a review of previous revegetation programs) and recommendations for rehabilitation trials. 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.

BHO have developed a procedure for field-testing of waste rock samples using a hand-held XRF device and have employed it to classify waste materials used in the TSF2 Embankment works. Material to be tested is no more than 3m in depth and is marked up into 4m x 4 m areas. Three XRF samples are taken at six locations in the 4 x 4m area. A sample of at least 0.2kg is taken from each of the six samples locations to form a composite sample which is sent to a lab for analysis. By having samples analysed at a lab the material can be identified as suitable for use, but most importantly to generate a model of XRF accuracy. A consulting Geo-Technical firm will be conducting an analysis of the XRF accuracy with lab analyses of the tested samples.

2. INTRODUCTION

2.1 Purpose

The Annual Review (AR) documents the environmental performance of the Rasp Mine for the reporting period 1 May 2020 to 30 April 2021. It has been prepared in accordance with the NSW Government *Post-approval requirements for State significant mining developments - Annual Review Guideline*, October 2015 to meet the requirements of the relevant mining leases, Project Approval 07_0018, and EPL 12559.

The Annual Review has previously been reported with the Annual Environmental Management Report, which was due annually on 31 March. It is now reported separately to more closely align with the end of June reporting date stated in Schedule 4 Condition 3 of Project Approval 07_0018.

2.2 Location

The Rasp Mine is owned and operated by Broken Hill Operations Pty Ltd (BHO), 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 2-1) 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 south east, 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 2-1**.

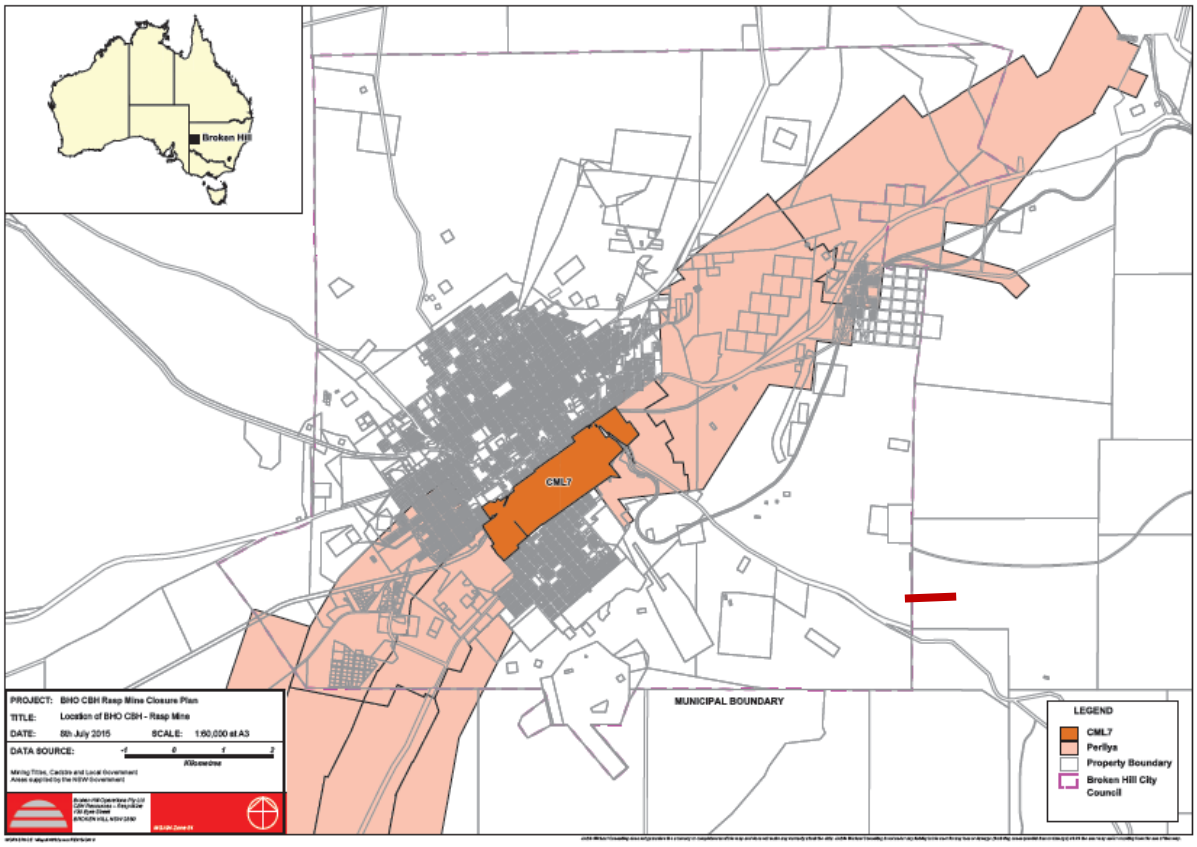
The mining leases occupy a central region of the historic Broken Hill Line of Lode ore body incorporating the original mine areas that commenced operations in the 1880s including a substantial amount of mining infrastructure from various mining phases. The Mine was the birthplace of Broken Hill Pty Ltd (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 Project Area includes additional areas to the south-east located on Western Land leases or freehold properties owned or leased by BHO (highlighted in orange). Located in this area are the current Rasp Mine administration offices and stores.

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

Figure 2-1 Location Map – Plan 1



2.2 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.

2.3 Mine Contacts

Table 2-1 outlines the contacts for the Rasp Mine.

Table 2-1 Mine Contacts

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

3. APPROVALS, LICENCES AND PERMITS

3.1 Approvals

Table 3-1 provides a list of all current development consents, mining leases and licences held by the Rasp Mine.

Table 3-1 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.
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, 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,	Authorises the carrying out of scheduled activities:

Approval Number	Date Issued	Expiry	Purpose
		suspension or revocation.	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 2021	Sell and/or possess radiation apparatus. Sell and/or possess radioactive or items containing radioactive substances.

3.2 Mining Operations Plan

The Rasp Mine has an approved Mining Operations Plan (MOP) currently in place for the period 1 October 2017 to 30 September 2021.

3.3 Management Plans

The Rasp Mine has developed a number of environmental management plans as required by PA07_0018. **Table 3-3** provides a list of these Plans together with the date last updated.

Table 3-2 Status of Environmental Management Plans

Environmental Management Plan	Condition	Updated
Environment Management Strategy	Sched 4 Cond 1	25-Jun-19
Air Quality Management Plan	Sched 3 Cond 11	25-Jun-19
Community Lead Management Plan	Sched 3 Cond 13	01-Mar-16
Noise and Blast Management Plan:	Sched 3 Cond 20	
- Noise Management Plan		25-Jun-19
- Technical Blasting and Vibration Management Plan		15-Nov-18
Site Water Management Plan	Sched 3 Cond 23	25-Jun-19

4. OPERATIONS SUMMARY

During the reporting period, the Project Approval was modified (MOD8) to permit mining under a Perilya sublease arrangement for ML1249.

Construction of the TSF2 Embankment 2 started on 13 June 2019 with the stripping of tailings before placement of the embankment material. The DPE were notified on 7 June of the intention to start works. All construction was undertaken in accordance with stipulated construction hours – 7 am to 6 pm Monday to Friday, 8 am to 1 pm Saturday and no Sundays or public holidays.

Table 4-1 outlines the production summary for the reporting period. The information in this table is a result of a review of data inputs for the years 2012 to 2020 and has been amended to improve accuracy. Predictions are based on calendar years so the data in Table 4.1 is to the end of 2020.

Table 4-1 Production Summary – Cumulative

Material	Approved Limit	Start of 2018	At end of 2019	End of reporting period
Waste rock	NA	2,446,539	2,601,599	2,873,599
Ore	750,000	4,294,551	4,944,453	5,603,718
Processing waste (Tailings)	NA	3,712,062	4,290,534	4,869,006
Product (Concentrates)	NA	503,541	576,375	659,263

4.1 Exploration

4.1.1 Surface exploration

Consistent with the drilling programs proposed in the MOP, the Rasp Mine completed a surface drilling program across CML7. 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.

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.

In the next reporting period, surface exploration will target the Western Mineralisation, No 2 and 3 Lens Main Lode remnants, McCulloch's, McBryde's, Blackwood's, and Zinc Lodes areas.

4.1.2 Underground exploration

During the reporting period, 37,528 m of underground diamond drilling was completed:

The 2021 program will continue to focus on the Western Mineralisation, Main Lodes 2 Lens and 3 Lens, and Blackwoods deposits.

4.2 Construction

4.2.1 New buildings / structures

Construction works for Stage 2 of the Blackwoods Pit TSF2 embankment raise commenced in July 2020 with the continuation of raising Embankment 1 and commencing the construction of Embankment 3. 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 commenced in February 2021.

During construction activities at Embankment 1, Jamieson House (managed by the Broken Hill Historical Society) was inspected regularly 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 blast monitor was installed on a concrete plinth adjacent to the Embankment 2 to monitor blast vibration in June 2020 to satisfy the Dam Safety Committee requirement for a monitor to be installed on each Embankment. The trigger limit has been set at 30 mm/s with the highest recorded result at this monitor being 1.05 mm/s to the end of 2020. Blast monitors will be installed on Embankments 1 and 3 when construction is completed.

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.

Figure 4-1 View of Embankments 1, 2 and 3

4.2.2 Roads and fencing

No new roads were constructed in the reporting period.

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.

4.3 Mining

4.3.1 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;

4.3.2 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 476,926 t of ore from 139 stopes was mined during the reporting period. This resulted in approximately 14,500 truck movements to the ROM pad. **Figure 4-2** provides a long section indicating location of the stopes mined. A vertical distance of 64 m was maintained (in the Zinc Lodes) from South Rd/Bonanza Street.

4.3.3 Void backfilling

Waste rock was used to backfill mined out stopes with a total of 204,417 t placed during the reporting period. This includes Cemented Rock Fill where conditions dictate its use.

4.3.4 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 403,532 t was extracted as waste, 204,417 t of waste rock was returned underground as void fill, and 199,115 t to surface pits. 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.

4.3.5 Underground decline development

The Rasp Decline provides access to stopes for mining. During the reporting period the Decline was extended by 152.6 m providing access to the Western Mineralisation 23 Level, and the incline to Dickenson's Orebody (DOB) extended by 401.8m.

4.3.6 Ore and waste stockpiles

Ore mined in the reporting period (476,926 t) was transported by truck and stored on the ROM Pad before being processed. The ROM Pad is 32 m by 80 m and is surrounded by 5 m 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 in the period (476,926 t) was below the approved maximum rate of 750,000 tpa.

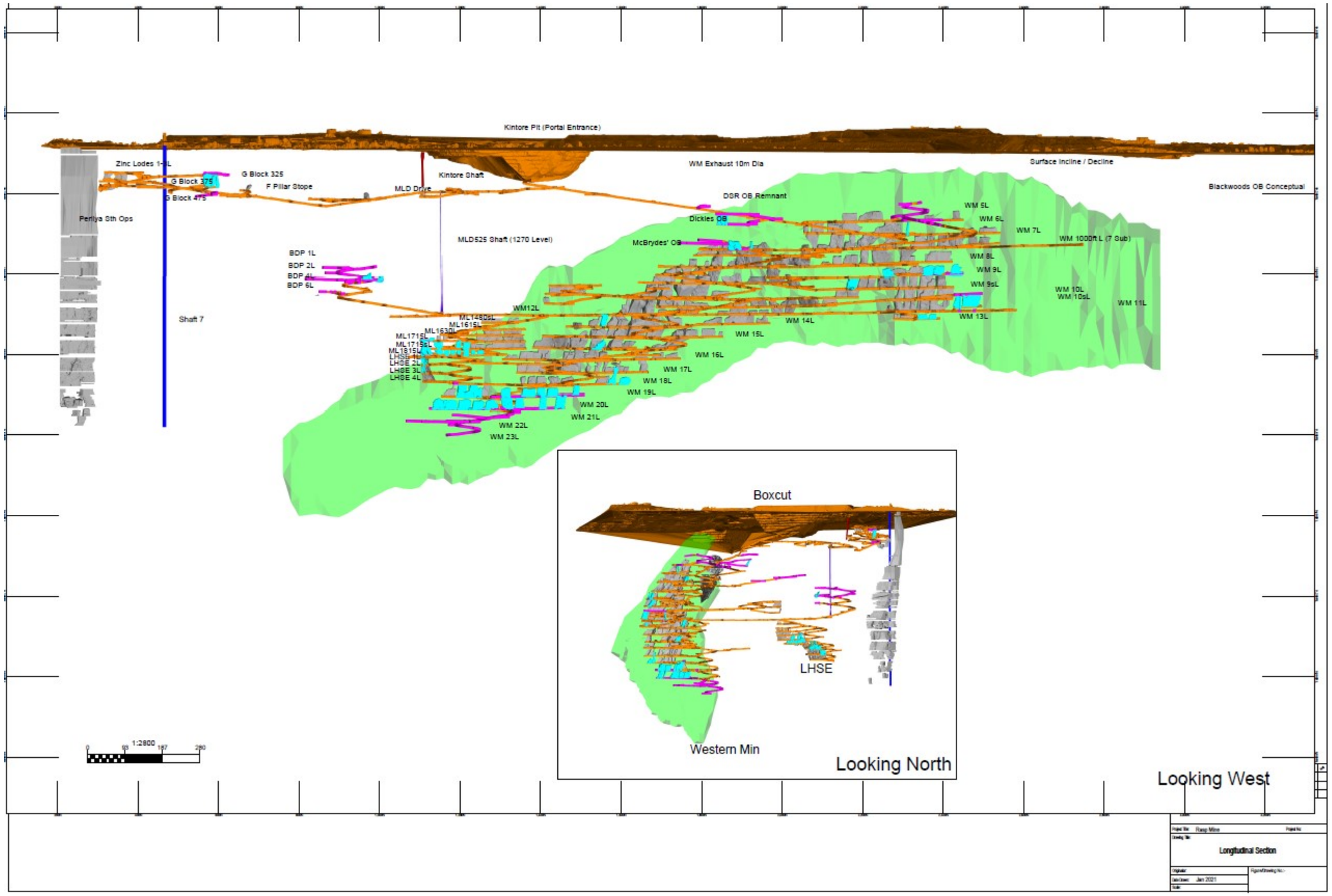
A total of 199,115 t of waste was hauled to the surface from underground during the reporting period and stored in Surface Pits totalling 1,046,243 t stored.

Ore and waste production for the reporting period is summarised in **Table 4-3** Ore and Waste Summary for the Reporting Period .

Table 4-2 Ore and Waste Summary for the Reporting Period

Item	Total Production Tonnes
Topsoil Stripped	N/A
Topsoil Spread	N/A
Ore Tonnes Mined: Dry Tonnes	476,926
Waste Backfill (UG voids): Tonnes	204,417
Waste Trucked to Pits	199,115

Figure 4-2 Plan 3 Mining Activities in the Reporting Period



4.4 Mineral Processing

4.4.1 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 the period 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 4-4.**

Table 4-3 Mineral Processing Summary for the Reporting Period

Activity	Total in reporting period (t)
Milled	476,926
Lead concentrate	18,636
Zinc concentrate	40,620
Tailings deposited	417,670
Tailings Storage Facility (TSF2) storage capacity as at end of period	October 2023

4.4.2 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.

4.4.3 Mineral waste - tailings

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

During the reporting period, 417,670 t of tailings were pumped to TSF2, on average the tailings contained zinc (0.35%), lead (0.21%) and copper (0.01%), Ag (8g/t), Fe (2.97%).

In the initial Project Approval, BHO 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. BHO 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.

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

Table 4-5 shows past and proposed tailings deposition and waste rock production rates.

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

Year (to 30 June)	EA Tailings in Underground back fill per year (t)	EA Tailings deposited in TSF1 (t)	EA Tailings deposited in TSF2 (t)	EA Waste Rock U/G (t)	Actual[1]/ Predicted[2] Tailings in TSF2 (t)	Actual waste rock placed underground (t)	Actual waste rock stored Kintore Pit (t)	Actual Total waste rock (t)
2012	97,969	273,281	0	250,000	322,111[1]	47,527	150,000[3]	197,527
2013	195,938	195,138	0	250,000	574,833[1]	230,607	150,000[3]	380,607
2014	195,938	195,138	0	250,000	486,749[1]	223,473	163,304	386,777
2015	216,563	216,563	0	250,000	499,598[1]	223,611	228,942	452,553
2016[1]	247,500	88,281	159,219	250,000	555,837[1]	265,369	96,888	362,257
2017[1]	292,475	0	278,438	250,000	622,161[1]	215,897	76,578	292,475
2018[1]	309,375	0	309,375	250,000	644,828[1]	332,702	121,864	444,566
2019[1]	309,375	0	309,375	250,000	578,472[1]	357,792[2]	134,706[1]	492,792[1]
April 2021[1]	309,375	0	309,375	250,000	469,049[1]	318,816	-	338,220
TOTALS	**2,174,508**	**968,401**	**1,365,782**	**2,250,000**	**4,651,289**	**2.521.465**	**1,206,896**	**3,747,581**

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

4.5 Mining Fleet

There were no changes to the mining fleet during the reporting period. **Table 4-6** lists the mining fleet as at the end of the reporting period.

Table 4-5 Mining Fleet

Vehicle Category	Number	Vehicle Category	Number
Jumbo drill	3	Grader	1
Production Drill	2	Excavator	1
Haul Truck	6	Service Vehicle	6
Load Haul Dump	5	Wheel Loader	2
Explosive Charger	2	Prime Mover	2
Forklift IT	7	Light Vehicle	30

4.6 Next Reporting Period

4.6.1 Construction

Construction of Stage 2 works for the TSF2 Embankments will be undertaken in 2021.These works will include construction of Stage 2 of Embankment 1 and construction of Embankment 3. A spray system will also be installed around the perimeter of the TSF2.

4.6.1.1 Construction of the Stage 2 TSF2 Embankment Works

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.

Stage 2 TSF2 Embankment works will be completed in 2021. These works consist of:

- Completion of Embankment 1
- Construction of Embankment 3
- Water spray system

The embankments will be formed from compacted waste rock excavated during mining operations and currently stored in Kintore Pit. The rock fill would also be used to form a pioneering layer for raise construction on potentially soft tailing. The testing procedure for lead content of the waste rock will be the same as used for the noise bund constructed at the CBP.

The embankments will be lined and seepage collection systems installed. Rainwater from embankments 1 and 2 directed to the current stormwater management system.

Golder Associates have been engaged to design the extensions to TSF2 and associated infrastructure are currently completing the detailed design. With the completion of the detailed design, the Site Water Management Plan and Air Quality Management Plan were updated and submitted to the DPE, EPA and DRG for review and approval.

In 2018, BHO held discussions with the EPA in regards to an air quality monitoring program for the construction period and operations. BHO updated the Air Quality Management Plan and Monitoring Program, Noise Management Plan, Site Water Management Plan, and Environmental Management Strategy, with the agreed requirements and they have been submitted to the DPE, EPA and DRG for review and approval. No works will commence for the construction of the embankments until these have been approved by the DPE.

Two portable PM10 monitors were purchased in 2019 and one in 2020, 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 are required to be removed during the construction of Embankment 2. When the Blackwood Pit monitoring equipment is re-installed following the Embankment 2 construction, the PM10 at Proprietary Square will be moved to the TSF2 ramp to monitor in-pit dust levels. Video cameras will also be installed on the Mill Control Room and overlooking TSF2 before the embankment works start 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.

4.6.2 Exploration

During 2021, exploration on CML7 will continue to focus on:

(a) Western Mineralisation:

- Southern and down-plunge delineation.
- Northern plunge reversal.
- Far north

(b) Number 2, 3 Lens Main Lode remnants as well as further extensional targets near the base of McCulloch's, McBryde's and Blackwood's areas.

- Block 7 and below Main Lode.

4.6.3 Operations

Table 4-7 outlines the planned production rates for 2021**. Figure 4-2** shows the mining areas and stopes. Planned mine production is 451,504 t, tailings deposition is estimated at 384,223 t.

Table 4-6 Summary of Planned Production for next reporting period

Activity	Next reporting period (t)
Ore Mined	451,504
Waste Backfill (UG Rock Places)	55,913
Waste Trucked to Surface	184,087
Milled	451,505
Lead concentrate	20,949
Zinc concentrate	46,333
Tailings deposited	384,223
TSF2 storage capacity as at end of period	1.8 years

4.6.4 Water structures - maintenance

Surveying of the water storage structures were conducted in 2018.

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.

4.6.5 Modification applications

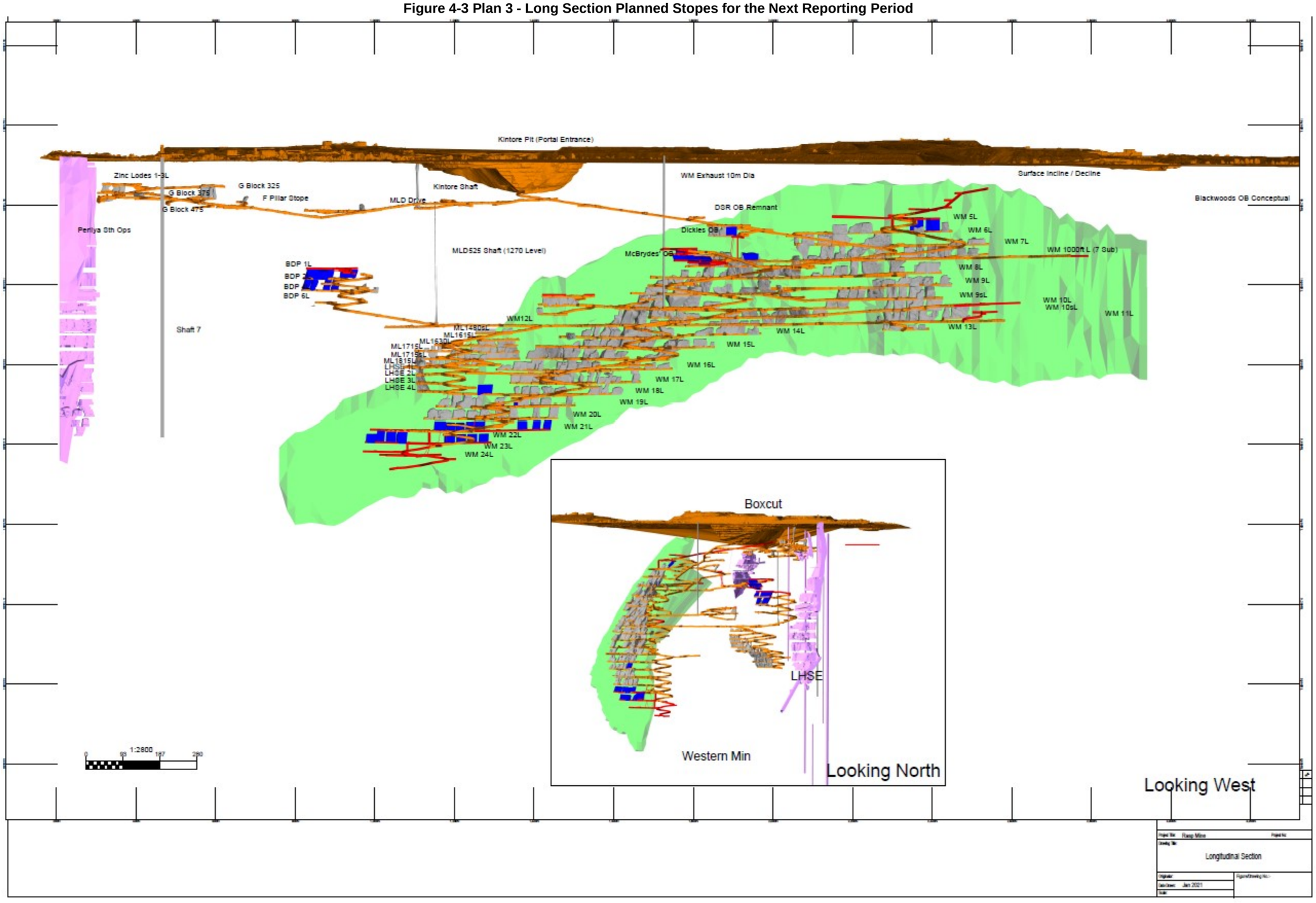
In 2021, BHO will apply for modification (MOD6) of the project approval to deposit tailings into Kintore Pit, relocate the mine portal, and provide for future waste rock storage.

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). BHO 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 4-3 Plan 3 - Long Section Planned Stopes for the Next Reporting Period



5. ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

5.1 Meteorological

Figure 5-1 and **Table 5-1** 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 the reporting period remained consistent with historical records, rainfall (34.76 mm) for the period was significantly lower than the BoM's long-term annual average of 259 mm. There were only 32 rain days for the period with most rain falling in Autumn. Winds were predominantly from the south with high winds experienced during July to January.

Figure 5-1 Weather Data for the Reporting Period

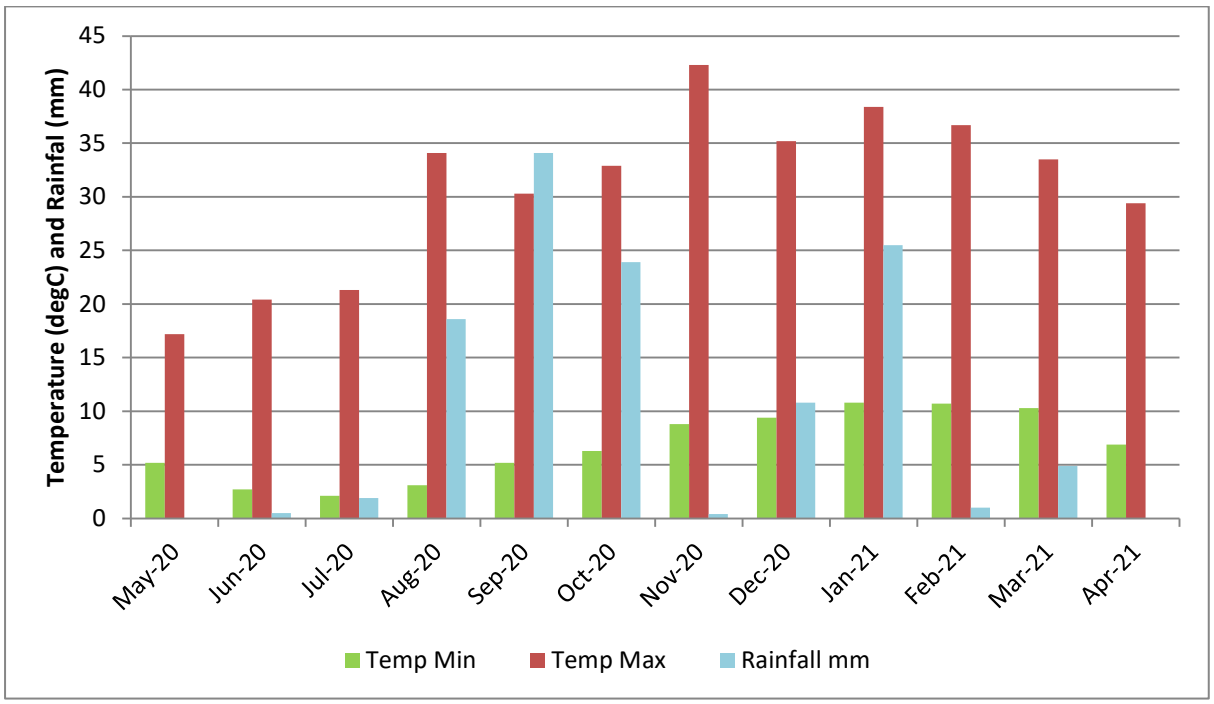


Table 5-1 Summary of Wind and Rain Days in Reporting Period

Month	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Predominant Wind Direction	S-SW	NW	SSW	NW	S-W	S-SW	S	S	S	S	S	S
Max wind speed (km/hr)	49.6	43.3	36.5	48.7	60.2	51.5	59.2	47.1	37.3	39.6	46.6	37.0
Days rained in month	0	1	2	5	4	6	1	2	3	3	5	0

5.2 Environmental Monitoring Locations

The BHO site environmental monitoring program is summarised in **Table 5-2**, locations for sampling/monitoring points are shown in **Figure 5-2**. A new weather station was installed on site in January 2019 as the previous weather station could not calculate Sigma Theta, a requirement of EPL 12559.

Table 5-2 Summary of BHO Environmental Monitoring Program

EPA ID	BHO 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	TSP-HVAS	Total Suspended Particulate, Lead on filter paper	Every 6 days
11, 12	HVAS1 & 2	PM10, Lead on filter paper	Every 6 days
13, 14	TEOM 1 & 2	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 mths) 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, Sigma Theta	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.

5.3 Air Quality

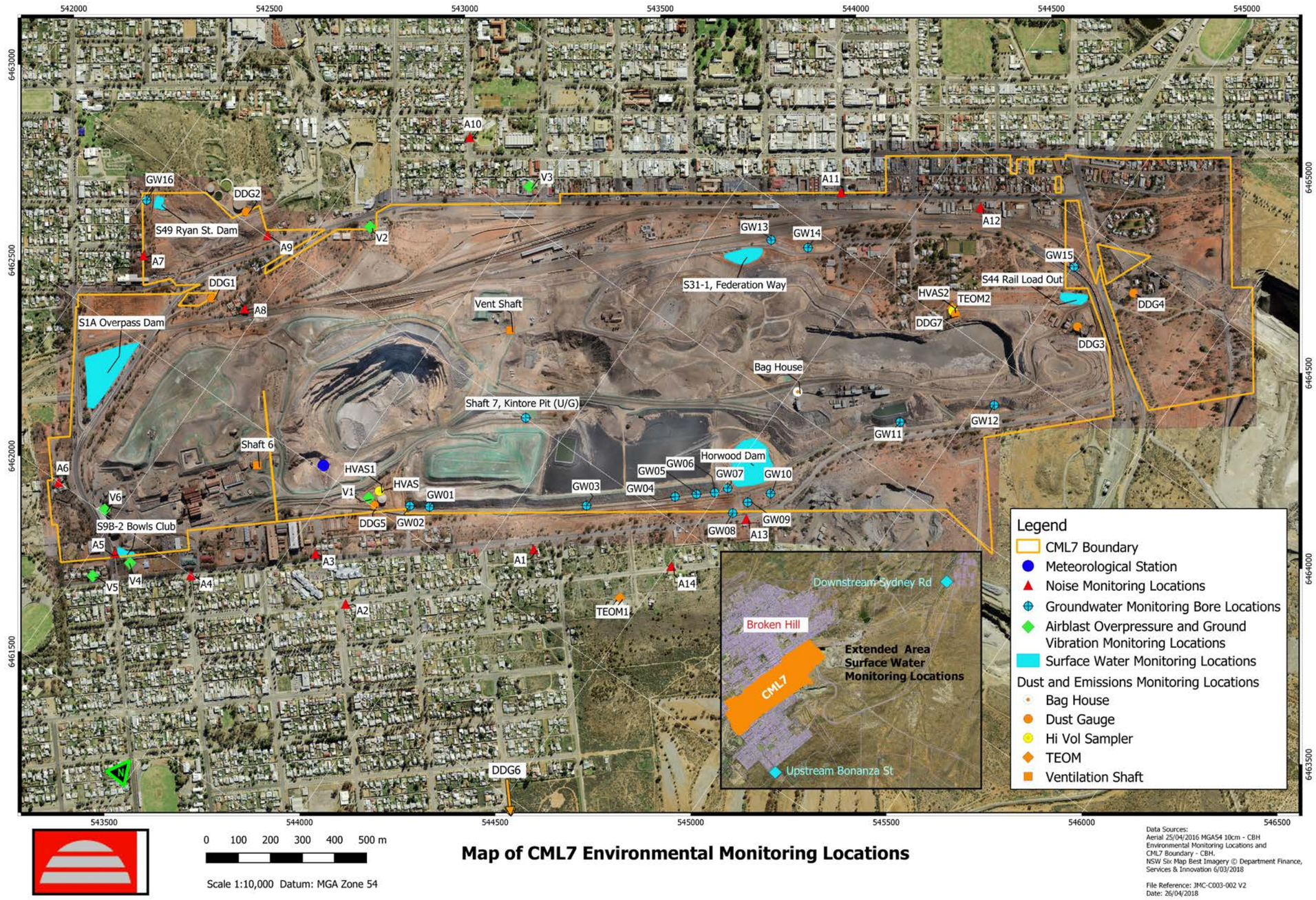
In accordance with the conditions of PA07_0018 and EPL12259 air quality is monitored:

- 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 BHO 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 5-2 shows the sampling locations for all air quality monitoring units.

Figure 5-2 Location of Monitoring / Sampling Points



5.3.1 In-stack air quality

During the reporting period BHO 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 5-3** provides the results of the testing against the limits as set out in the EPL.

On 9 December 2020 quarterly emissions testing conducted at the Crusher Baghouse returned results (received January 2021) exceeding the PA07_0018 Schedule 3 Condition 4 Table 5 limits for Total Suspended Particles (TSP) and Type 1 and 2 Substances. The TSP result from the test conducted on 9 December 2020 was 58.9 mg/m3 (limit 20 mg/m3), and the Type 1 and 2 Substance result from the 9 December 2020 test was 4.32 mg/m3 (limit 1 mg/m3). Details are provided in Section 8.

After receiving the December 2020 monitoring report in January 2021, crushing activities were stopped and the baghouse was shut down. An inspection of the baghouse seals and filter bags was conducted on 11 January utilising a powdered dye to detect holed filter bags and/or dust leakage points. The use of the powdered dye is a common process also utilised by baghouse specialists to detect dust leakage issues. During the first inspection, a filter bag with a significant tear was detected due to the presence of visible powdered dye around the top of the damaged filter bag. This filter bag was replaced and another test was undertaken, again using the dye powder. On this occasion another two filter bags with smaller holes were detected. These filter bags were replaced and again the test was repeated. On the third test, minimal dye was detected on the 'clean side' of the baghouse, and only with the aid of a ultra-violet light source. One bag with a small hole (<10mm) was identified and replaced. Based on this result, it was determined the crusher and baghouse could be restarted and a follow-up monitoring event was organized with Assured Environmental which was conducted on 20 January 2021.

Environmental harm was not likely as the baghouse is situated in a sheltered area and the winds between 9 December 2020 and 11 January 2021 were predominantly from the South, so much of the dust emitted would be contained locally or could be expected to be deposited in the Blackwoods Tailings Facility. A review of PM10 air monitoring data for air monitors placed north of the baghouse exhaust did not show any noticeable increase in dust levels recorded.

Table 5-3 Vent and Baghouse Testing Results During the Reporting Period

	Limit	Primary Vent (EPL1)				Crusher Baghouse (EPL2)			
Testing Date		16/6	17/11	18/12	13/4	16/6	17/11	18/12	13/4
Nitrogen Oxides (mg/m^3)	350	5.05	7.05	7.07	2.05	N/A[1]	N/A[1]	N/A[1]	N/A
Volatile Organic Compounds (mg/m^3)	40	0.463	0.465	0.477	0.468	N/A[1]	N/A[1]	N/A[1]	N/A
Total Suspended Particles (mg/m^3)	20	9.62	3.0	4.31	4.59	19.0	19.2	58.9	5.49
Type 1 and Type 2[2] (mg/m^3)	1	0.076	0.139	0.037	0.0917	0.466	0.734	4.32	0.197

Note 1 = Not required to be tested.
Note 2 = Type 1 substance Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements. Type 2 substance Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements.

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:

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

5.3.2 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 5-2**. 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 reinstalled in February 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 5-4.**

Table 5-4 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 (2019 – April 2021) and trends over the operational life of the Rasp Mine. Dust deposition results are reported and reviewed internally on a monthly basis.

Figure 5-3 and **Figure 5-4** show the monthly dust deposition and total deposited lead results for the reporting period. Dust deposition results are lower in 2020 when compared to the previous year which is likely due to increased rainfall and a lower frequency of regional dust storms.

There were 5 occasions where the monitoring location exceeded the depositional dust level of 4 g/m2/month limit (red figures in **Table 5-5**) compared to 26 the previous year. Highest readings occurred in the spring and summer months when wind speeds are higher and dust storms more frequent despite the majority of the year's rainfall occurring in those months. D6-Casuarina Avenue is a control site which recorded more monthly results above the 4 g/m2/month limit than any other location.

Rainfall in each of the three 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, and 108.6 mm in 2020.

Lead results were frequently above baseline levels throughout the period at D3-Thompsons Shaft and D4-Junction Mine, which are adjacent to the rail loading facility and access road, as well as exposed areas situated on the northern side of the site. Exposed site areas around the Thompson Shaft gauge are sprayed with dust suppressant and a water cart services the haul road while concentrate is being carted to the rail loadout and loaded to trains .

Table 5-5 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	
Month	**DD**	**LD**	**DD**	**LD**	**DD**	**LD**	**DD**	**LD**	**DD**	**LD**	**DD**	**LD**	**DD**	**LD**
May-20	0.3	0.001	0.5	0.00061	0.5	0.00694	1.90	0.010	1.5	0.0084	0.9	0.00087	NS	NS
Jun-20	0.2	0.00029	0.4	0.0002	0.2	0.00207	0.70	0.003	1.1	0.00552	1.2	0.00063	NS	NS
Jul-20	0.8	0.00392	0.4	0.00123	0.9	0.0083	2.00	0.013	0.8	0.00464	1.3	0.0012	NS	NS
Aug-20	1.4	0.00097	1.9	0.00086	1.1	0.0046	3.80	0.004	3.4	0.0113	3.2	0.00131	NS	NS
Sep-20	1.7	0.00107	2.1	0.00117	2	0.0117	4.40	0.007	2.8	0.00422	4.9	0.00259	NS	NS
Oct-20	11.3	0.00047	1.1	0.0013	1.6	0.0089	3.80	0.001	2.7	0.00681	2	0.00071	NS	NS
Nov-20	2.9	0.00147	4.8	0.00259	2.3	0.0086	10.90	0.024	3.7	0.0116	11.3	0.0044	NS	NS
Dec-20	1.2	0.0005	0.8	0.0009	1.5	0.0056	3.90	0.006	1.5	0.00177	4	0.00056	NS	NS
Jan-21	0.2	0.00077	1.4	0.00426	1	0.0151	3.80	0.022	2.1	0.0089	6.2	0.0025	0.4	0.00194
Feb-21	1.6	0.00267	0.2	0.00061	1.2	0.00528	2.70	0.009	1.4	0.00206	2.4	0.00061	0.6	0.00334
Mar-21	0.6	0.0171	2.9	0.0191	1	0.0442	2.30	0.013	0.8	0.00531	1.7	0.00318	0.4	0.005831
Apr-21	0.3	0.0015	0.1	0.00059	0.1	0.0009	0.90	0.007	1.1	0.006	1.6	0.0012	0.7	0.0089
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 5-3 Monthly Total Deposited Dust for Results for the Reporting Period

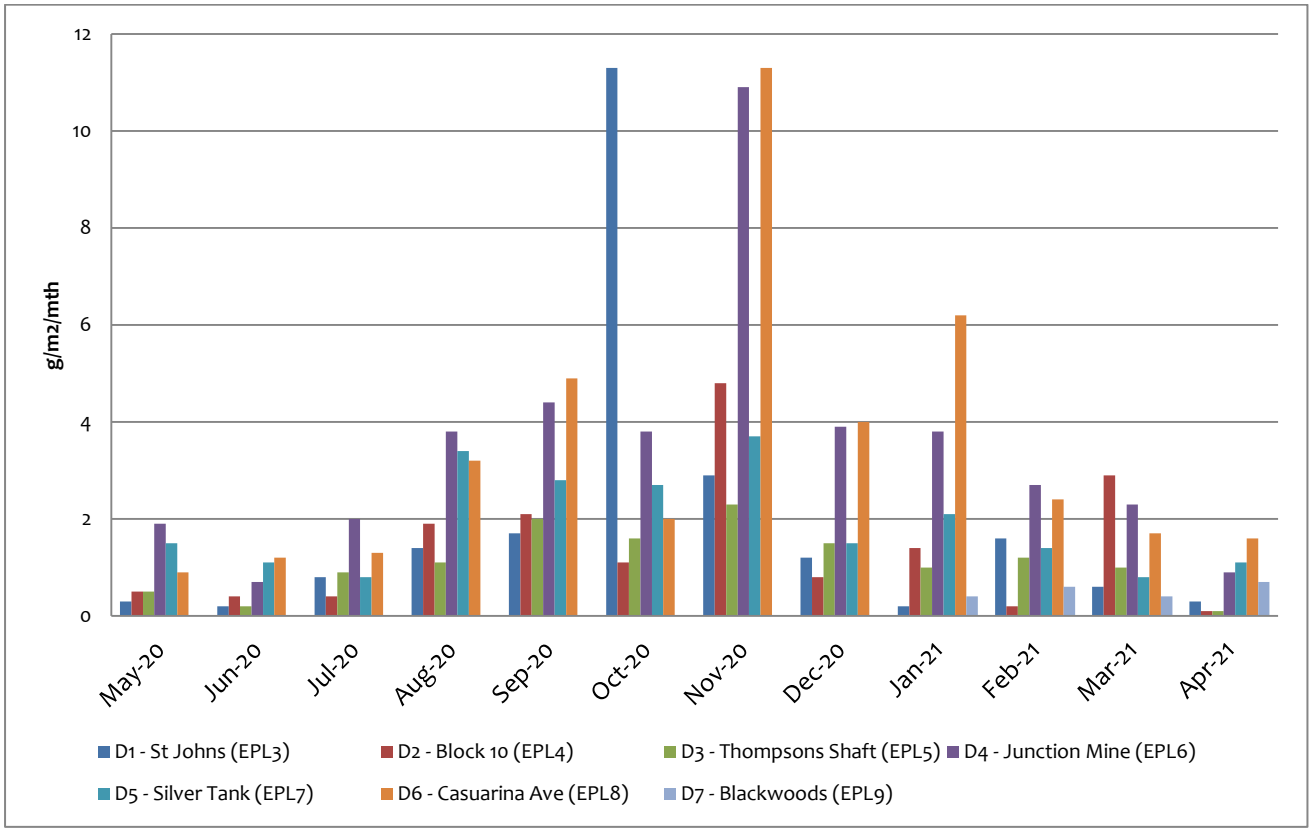


Figure 5-4 Monthly Lead Deposition for the Reporting Period

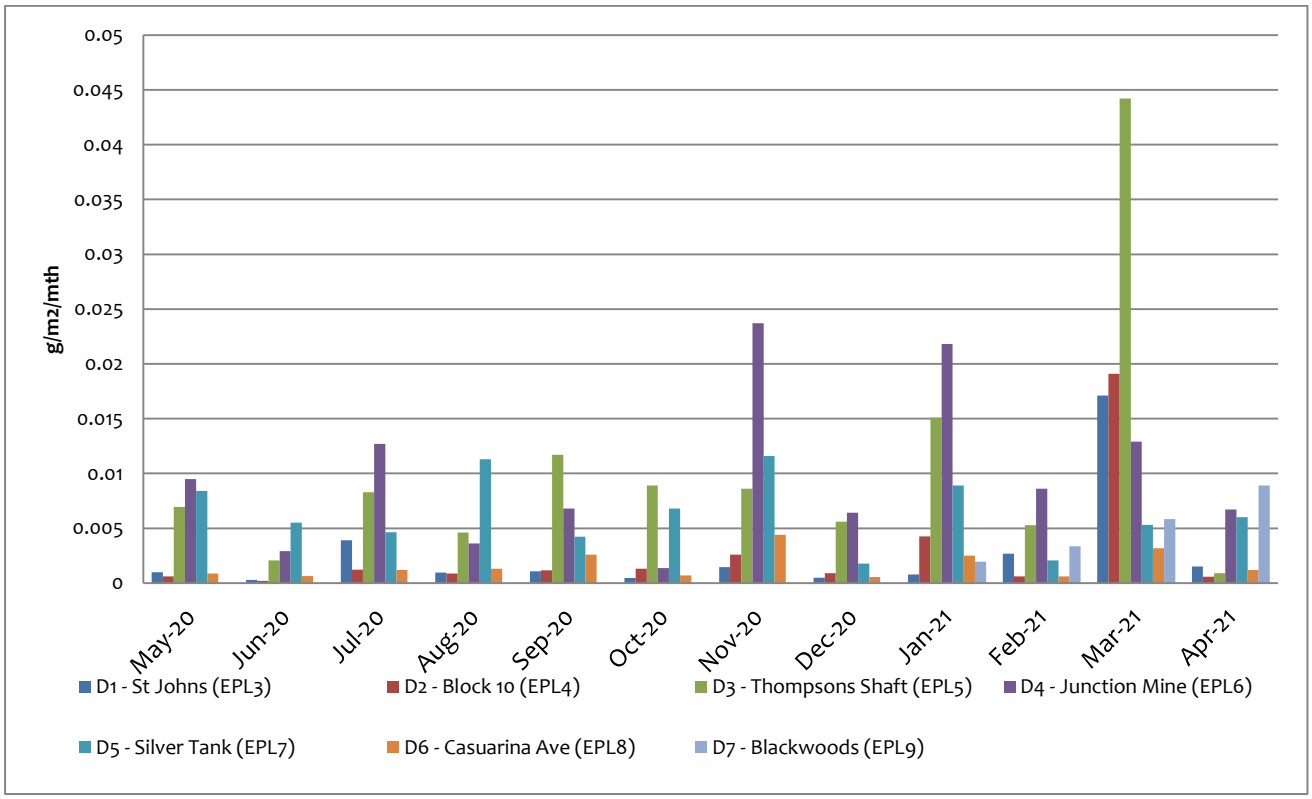


Figure 5-5 Total Deposited Dust 2007 – Apr 2021

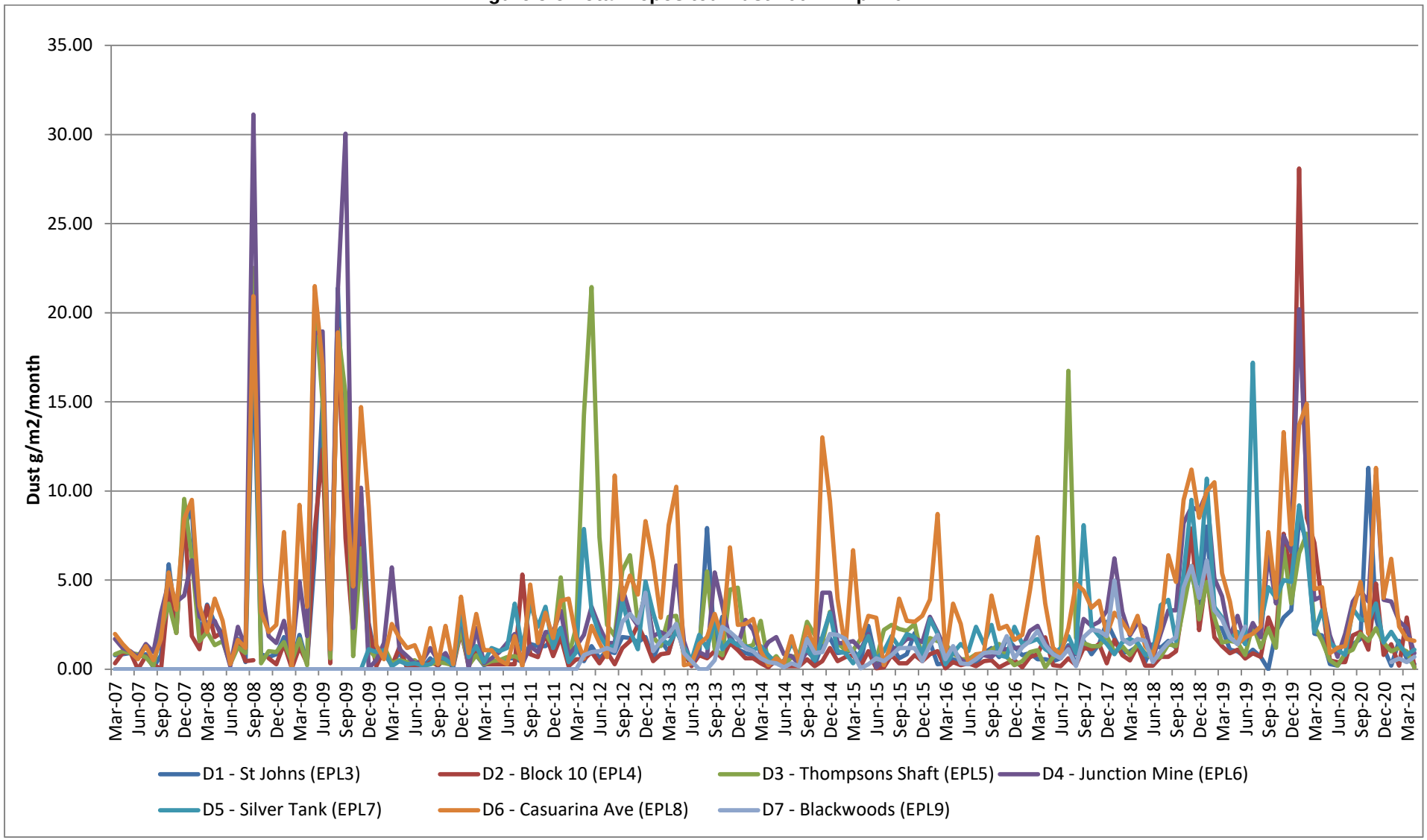
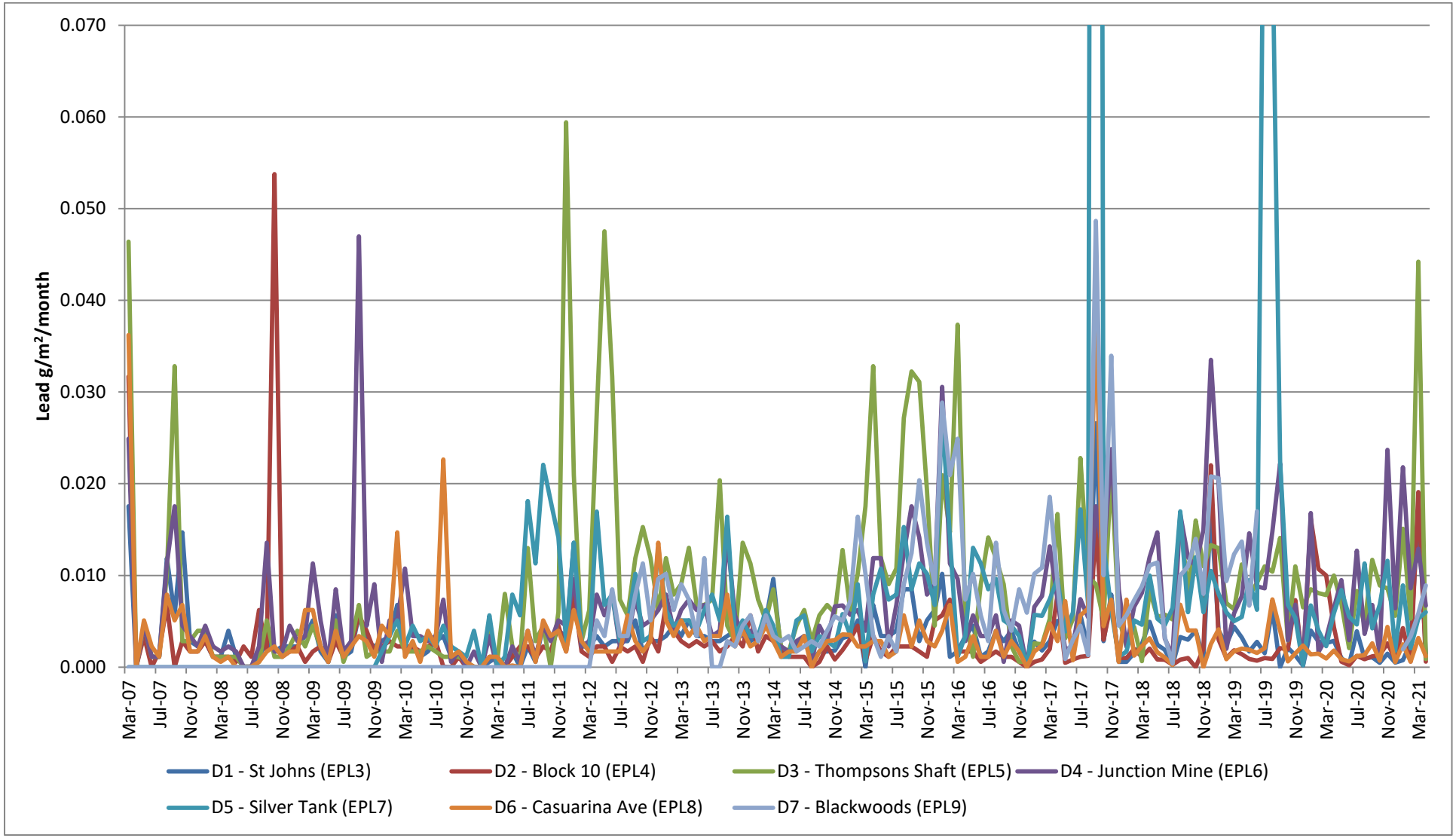


Figure 5-6 Total Deposited Lead 2007 to Apr 2021



5.3.3 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 5-2**. 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 5-6** 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 remain unchanged.

Table 5-6 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 $\mu g/m^3$

Note: Criteria changed from 30 $\mu g/m^3$ to 25 $\mu g/m^3$ in September 2017

Provided below is a discussion of results for each HVAS unit during the reporting period 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 the period recorded by HVAS are shown in **Figure 5-7** and **Figure 5-8.** These show the results have remained consistent over the reporting period.

The rolling annual average TSP at the HVAS unit recorded 54.17 $\mu g/m^3$ for the reporting period was a significant decrease from the previous period rolling annual average of 71.5 $\mu g/m^3$.

The rolling annual average TSP-lead at the HVAS unit has increased to 0.25 $\mu g/m^3$ from 0.24 $\mu g/m^3$ in the reporting period. 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 $\mu g/m^3$.

The highest TSP-Lead level recorded was on 15 November 2020 (1.10 $\mu g/m^3$) during a dust storm when winds were from multiple directions.

Figure 5-9 provides a summary of TSP and TSP-lead results from 2008 to 2021. 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 5-7 HVAS TSP Results for the Reporting Period

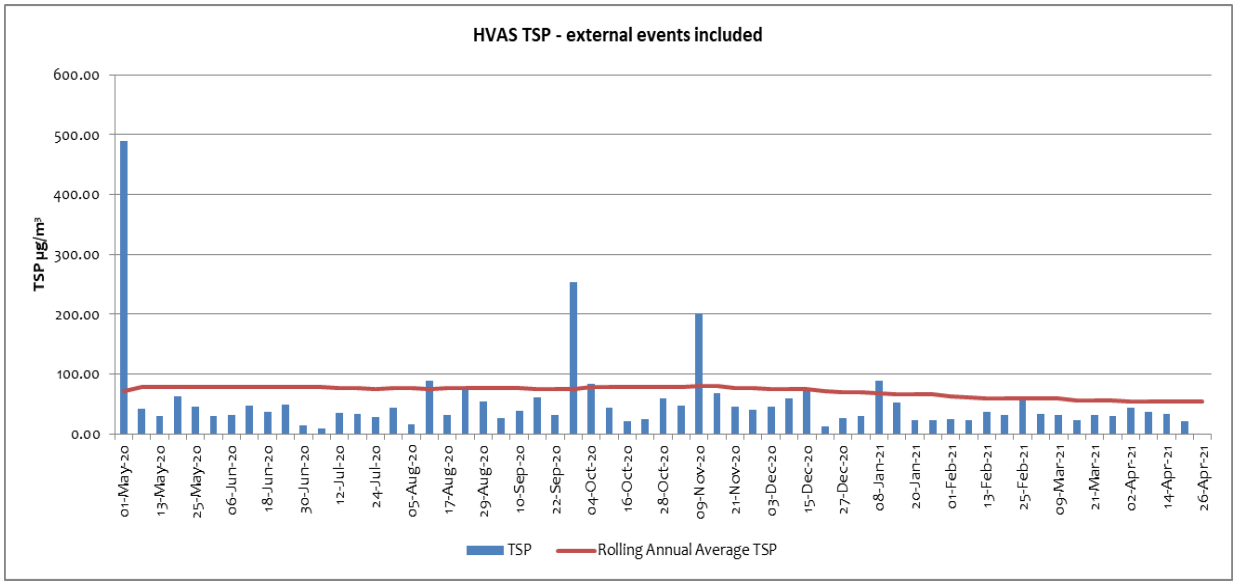
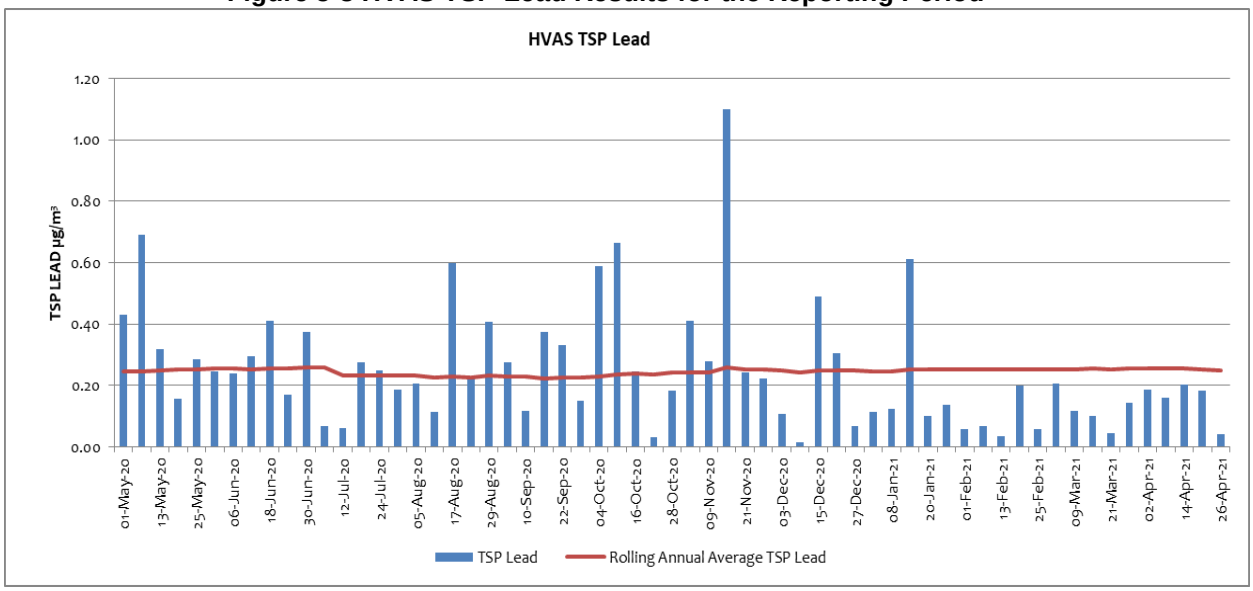


Figure 5-8 HVAS TSP-Lead Results for the Reporting Period



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

As can be seen in **Figure 5-9** 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.

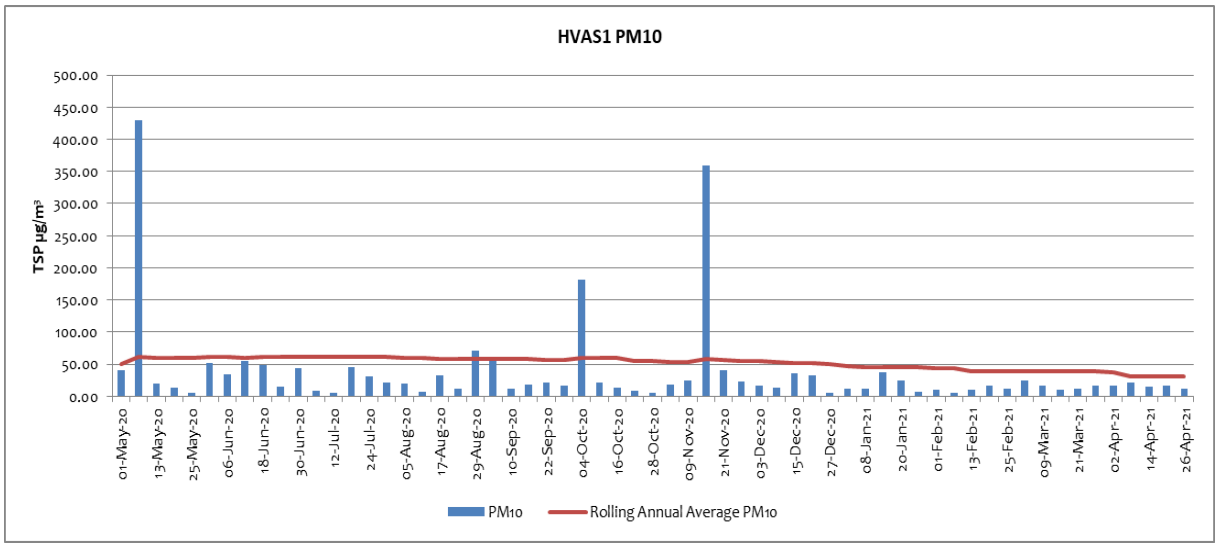
Figure 5-9 HVAS TSP and TSP-Lead Results for the Period 2008 to 2021

HVAS1 (EPL11)

HVAS1 is used for sampling PM_{10} and PM_{10}-lead. The average annual PM_{10} level recorded at this monitoring point at the end of the reporting period was 30.8 $\mu g/m^3$, which has decreased from the previous reporting period of 54.4 $\mu g/m^3$ and is above the background level reported in the EA of 29.1 $\mu g/m^3$. The average annual PM_{10} level is calculated using data collected during extreme events. Results for the reporting period are shown in **Figure 5-10** which indicates that the rolling annual average for PM_{10} is above the criteria of 25 $\mu g/m^3$. As expected there were elevated PM10 levels recorded in the summer and spring months.

Results for the period 2011 to 2021 are shown in **Figure 5-14**.

Figure 5-10 HVAS1 PM_{10} Results for the Reporting Period

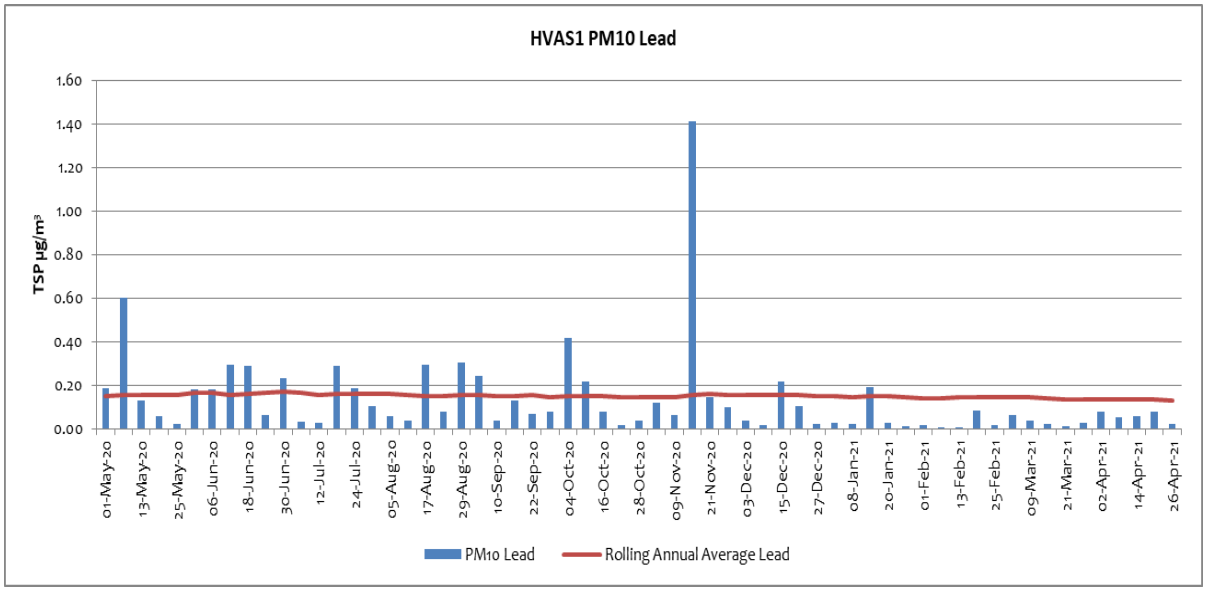


The annual average PM_{10}-lead concentration has decreased slightly from 0.15 $\mu g/m^3$ in the previous reporting period to 0.13 $\mu g/m^3$, **Figure 5-11.** The highest HVAS1-Lead level recorded was on 15 November 2020 (1.41 $\mu g/m^3$) during a dust storm when winds were from multiple directions.

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

Results for the period 2011 to 2021 are shown in **Figure 5-17**.

Figure 5-11 HVAS1 PM_{10}-Lead Results for the Reporting period

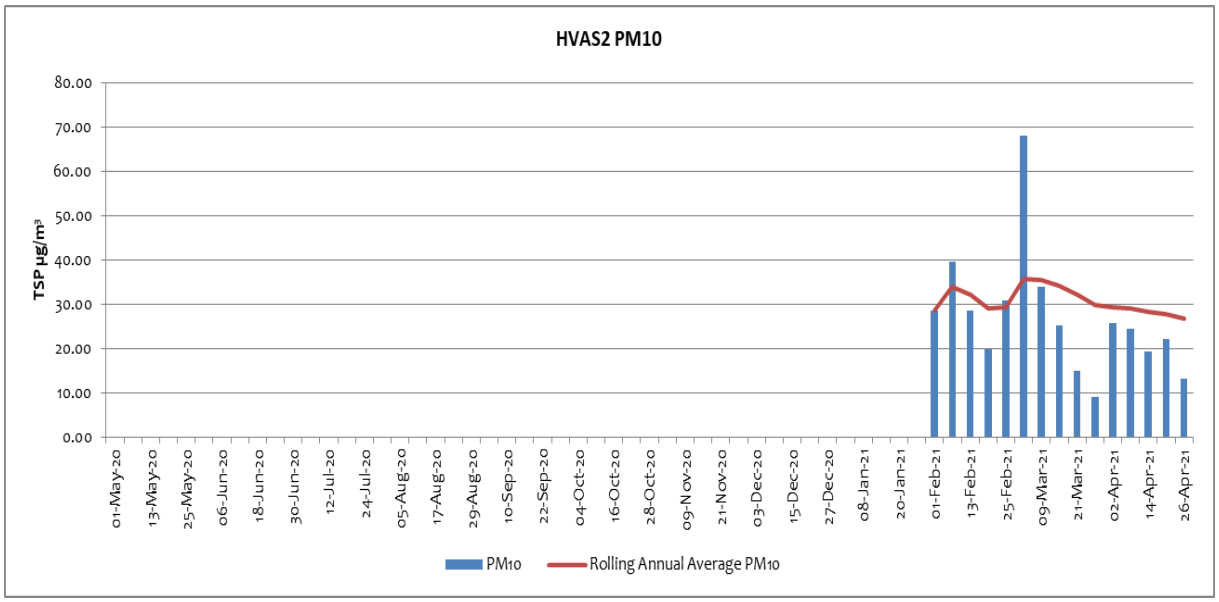


HVAS2 (EPL12)

HVAS2 was removed from Blackwoods Pit in June 2019 due to Embankment 2 construction works. To June 2019 the average annual PM_{10} level recorded at this monitoring point was 41.74 µg/m^3, which has increased significantly from the previous reporting period (23.78 µg/m^3), above the background level reported in the EA of 29.1µg/m^3 and above the criteria of 25µg/m^3 (for off-site receptors), **Figure 5-12.** Data presented includes that which may be result of external events, particularly dust storms which are expected in the spring and summer months.

Trends are discussed below and results for the period 2011 to 2020 are shown in **Figure 5-17**. Since May 2011 when HVAS1 started operating dust levels have fallen and then risen in the last year due to the drought and frequent dust storms.

Figure 5-12 HVAS2 PM_{10} Results for the Reporting Period

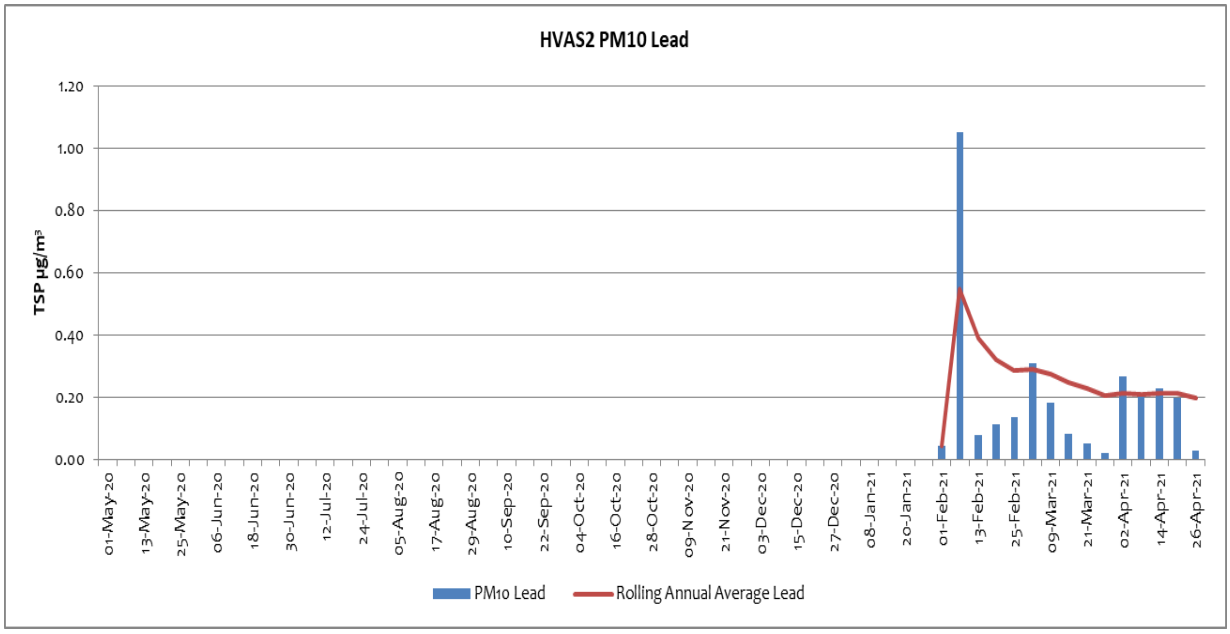


HVAS2 was removed from Blackwoods Pit in June 2019 due to Embankment 2 construction works. To June 2019 the average annual PM_{10} level recorded at this monitoring point was 41.74 µg/m^3,

which was an increase over the previous reporting period (23.78 µg/m^3), above the background level reported in the EA of 29.1µg/m^3 and above the criteria of 25µg/m^3 (for off-site receptors). **Figure 5-13**. The annual rolling average for PM10 dust at this location is 26.83 µg/m3 at the end of April 2021, however due to the unit being reinstalled after 19 months decommissioned, annual rolling average is calculated using data from February to April 2021 only. The rolling annual average for PM10 Lead in April 2021 was 0.20 µg/m3, however due to the unit being reinstalled after 19 months decommissioned, annual rolling average is calculated using data from February to April only.

Results for the period 2011 to 2021 are shown in **Figure 5-17**. Since September 2013 when HVAS2 started operating dust levels have risen in the last few years due to the drought and frequent dust storms.

Figure 5-13 HVAS2 PM_{10}-Lead Results for the Reporting Period



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 has been decommissioned while Embankment 2 TSF2 construction works are undertaken. A real-time PM_{10} monitor was in place adjacent to the HVAS3 location during this period of embankment construction.

To 26 April 2021 the rolling average annual TSP level recorded at this monitoring point was 53.08 µg/m^3 and while it appears it may be falling it is based on three months of data only as shown in **Figure 5-14.** The rolling annual average for TSP Lead in April 2021 was 0.40 µg/m3, however due to the unit being reinstalled after 19 months decommissioned, annual rolling average is calculated using data from February to April only. Elevated lead levels were recorded on 2, 14, and 20 April with the results of 2 April and 14 April likely to have been generated from site activities as the predominant wind direction on these dates were from the ESE and SSW respectively. The predominant wind direction on 20 April was from the NW so lead content likely came from off-site sources or activities.

Figure 5-14 HVAS3 TSP Results for the Reporting Period

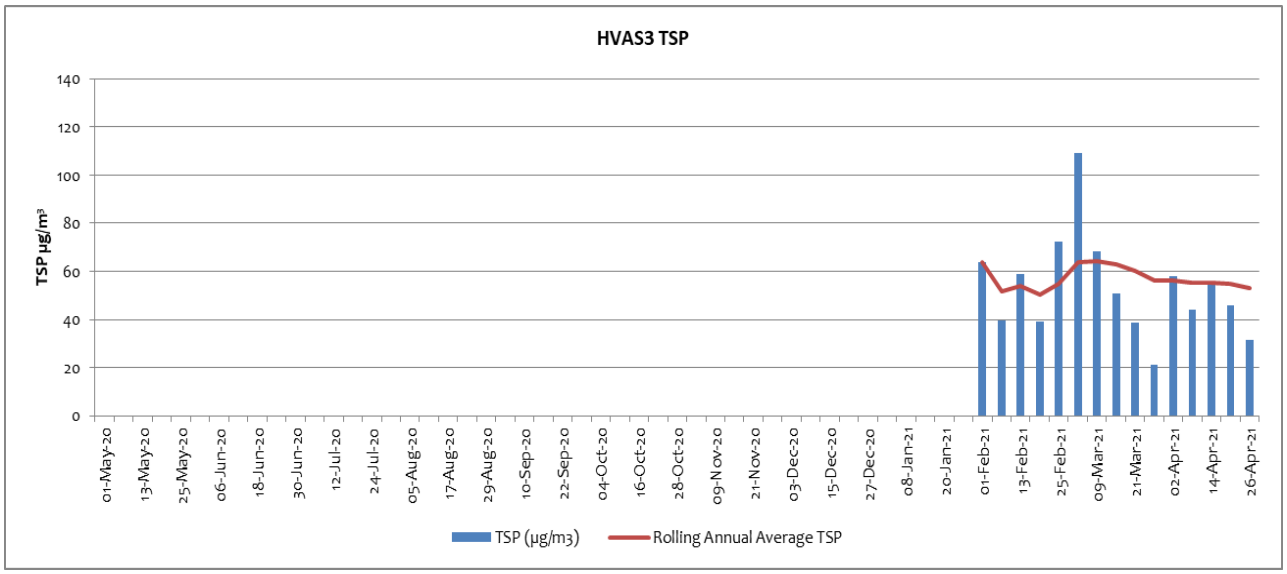


Figure 5-15 HVAS3 TSP-Lead Results for the Reporting Period

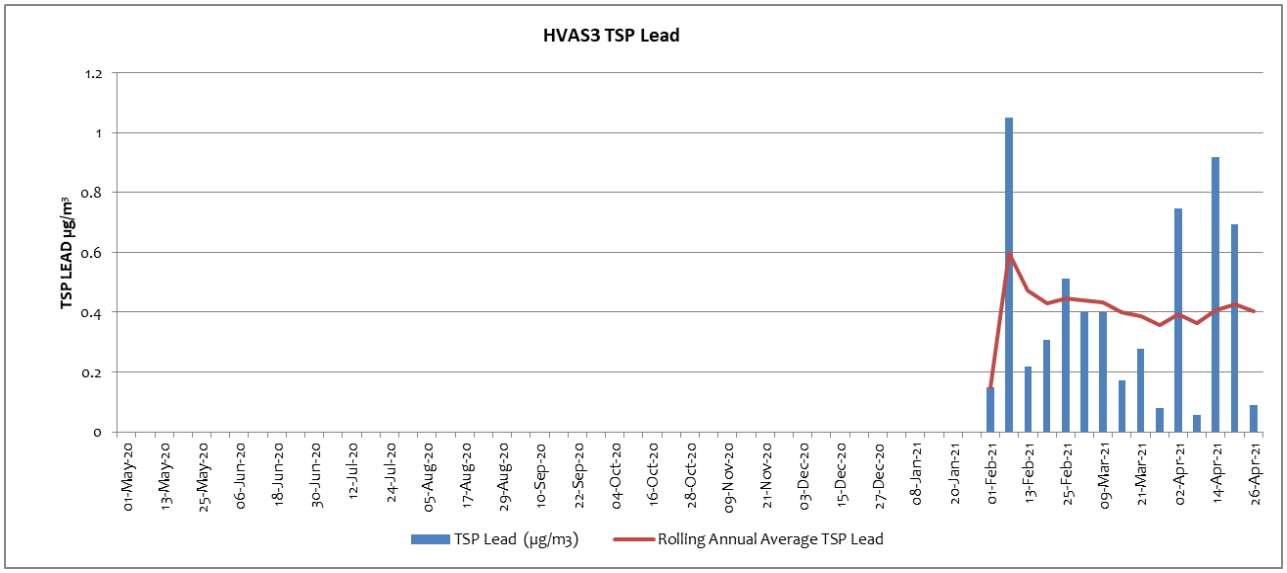


Figure 5-16 HVAS1 & HVAS2 PM_{10} Annual Average Results for the Period 2011 to 2021

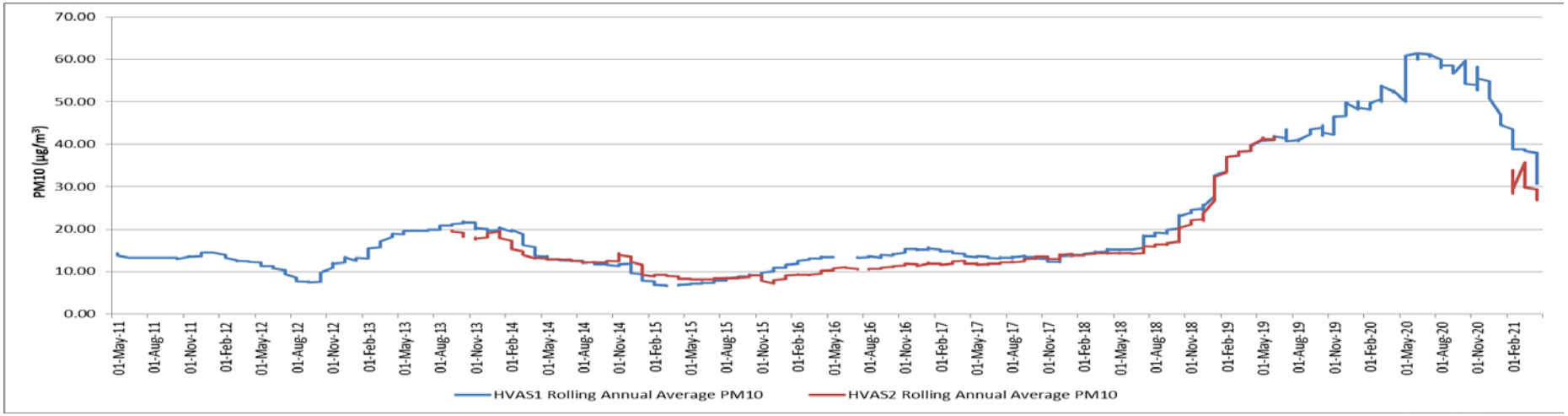
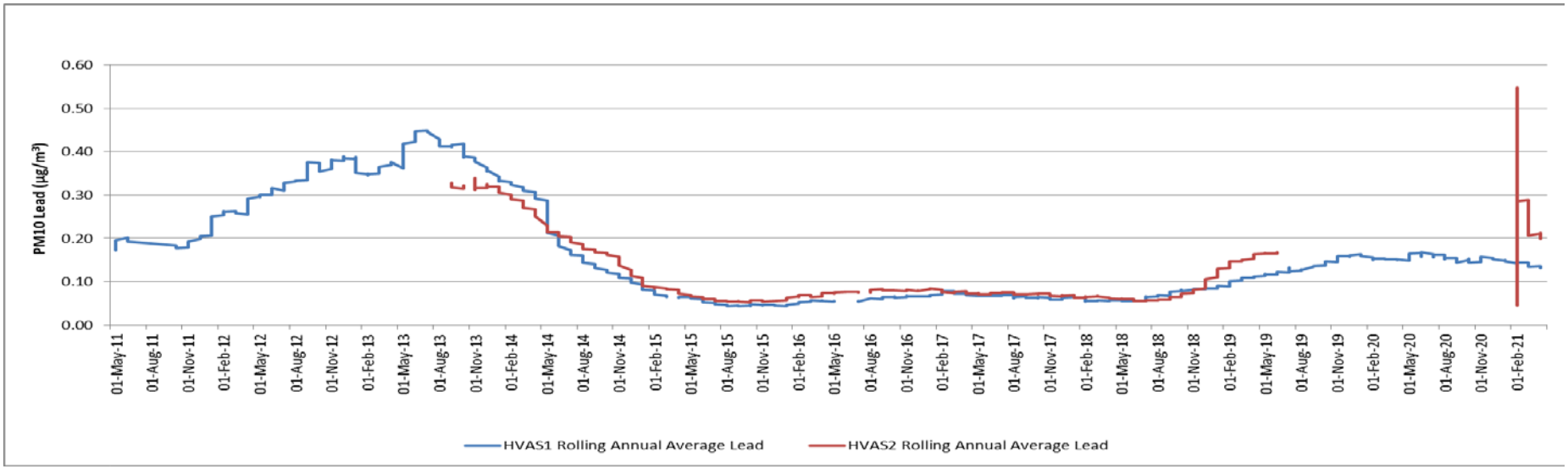


Figure 5-17 HVAS1 & HVAS2 PM_{10}-Lead Annual Average Results for the Period 2011 to 2021



5.3.4 TEOM monitors

The Rasp Mine has two Tapered Element Oscillating Microbalance (TEOM) air quality monitors, which record real time PM_{10} data. Figure 5-2 shows the location of these monitors.

Table 6-7 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

Note: Criteria changed from 30 µg/m^3 to 25 µg/m^3 in September 2017

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 when triggers are exceeded (when the level exceeds 100 ug/m3 expressed as a 1 hour rolling average) 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 due to Embankment 2 construction works on the northern side of Blackwoods Pit and reinstalled in January 2021. During the reporting period TEOM1 was service by a technician on 9 October 2021, and both TEOMs were serviced by a Technician on 1-3 February 2021.

The corrected results with storm events excluded for TEOM1 PM_{10} 24-hour average for the reporting period are provided in **Figure 5-18**. A number of dust storm events were recorded on TEOM 1 and 2 during the period. As can be seen in the graphs in Figure 5-18 and Figure 5-19, high-dust events are captured by both monitors so they are unlikely to be the result of site activities.

The corrected results with storm events excluded for TEOM2 PM10 24-hour average for the reporting period are provided in **Figure 5-19**. There were a number of occasions during the reporting period when TEOM2 (located adjacent Blackwood Pit) recorded above the criteria for a 24-hour average. The highest record of these events was on 18 January 2019 (326 µg/m3). Again, this was the result of dust storms across Broken Hill.

The PM10 annual rolling average at the TEOM1 monitor at the end of the reporting period was 13.67 µg/m^3 (16.24 µg/m^3 in the previous year) and is below the listed criteria of 25 µg/m^3. The annual rolling average PM10 at TEOM2 was 15.61 µg/m^3 which is below the criterion 25 µg/m^3 required at the nearest residential location. A graph of results for TEOM1 and TEOM2 are provided in **Figure 5-20**.

The recorded annual average PM10 result at TEOM2 (20.52 µg/m^3) is below the prediction for R28, the closest receptor to this monitoring point (30 m) reported in the EA for MOD4 at 17.54 µg/m^3.

Annual average PM10 results for TEOM1 and TEOM2 have reduced after an increase in dust levels in 2019 and early 2020, which is expected considering the severity of the drought over the past four years, **Figure 5-21**.

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 5-18 TEOM1 PM_{10} 24-hour Average Results for the Reporting Period

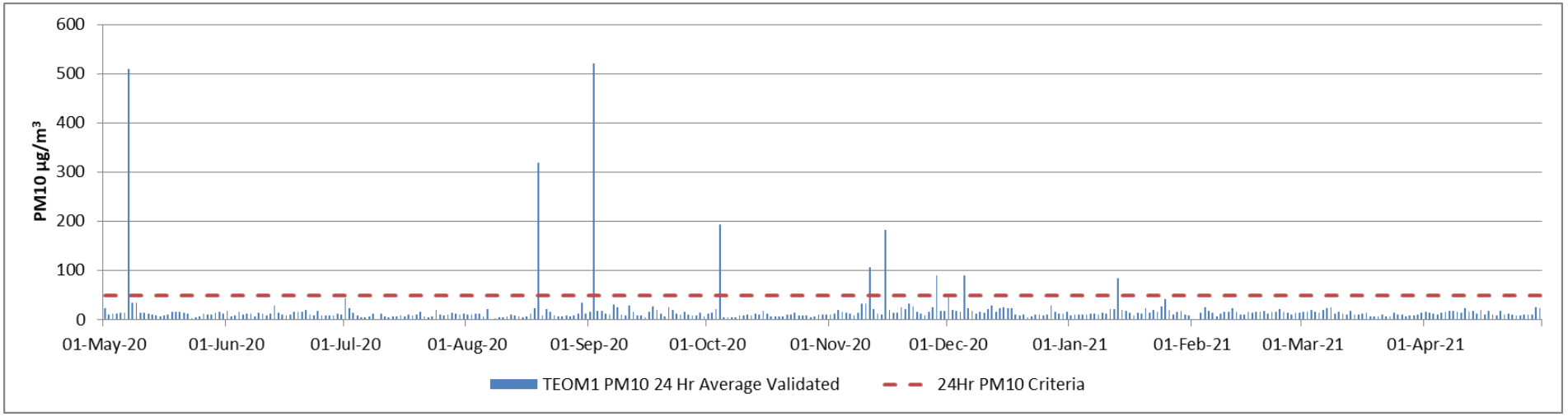


Figure 5-15 TEOM2 PM_{10} 24-Hour Average Results for the Reporting Period

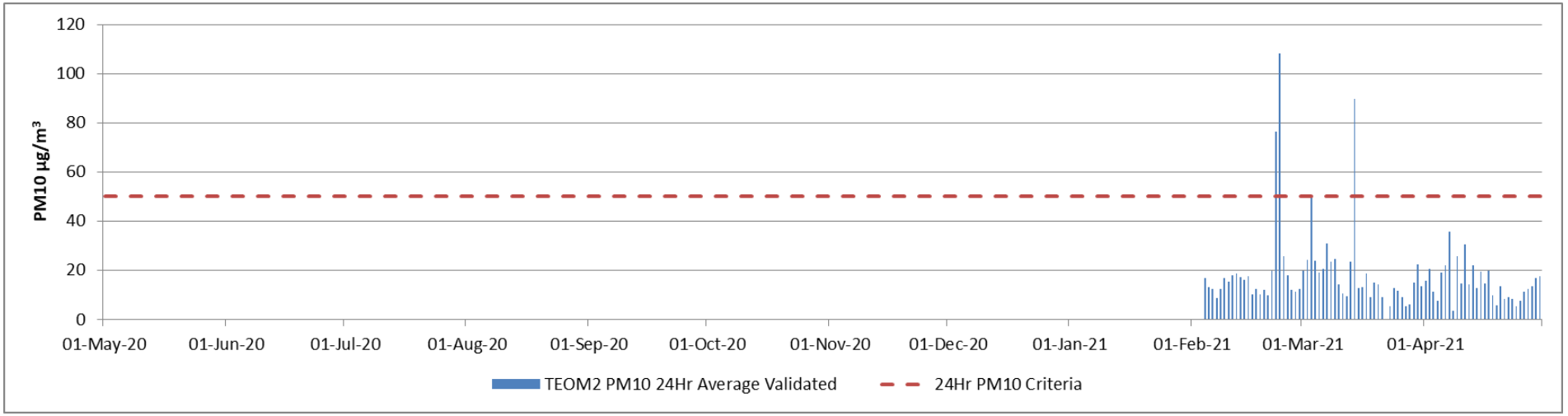


Figure 5-20 TEOM1 & TEOM2 PM_{10} Annual Rolling Average for the Reporting Period

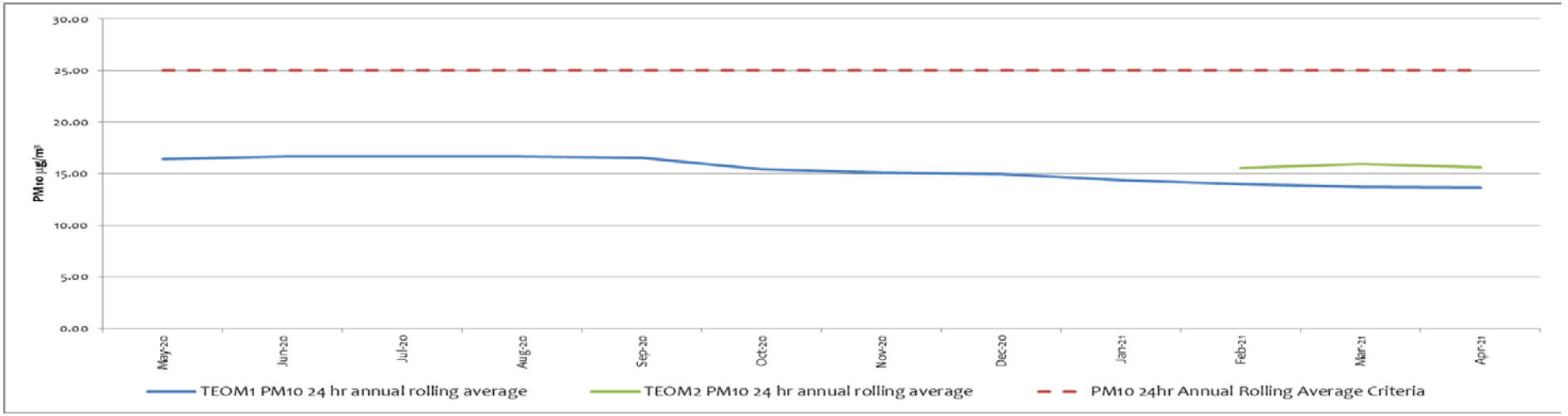
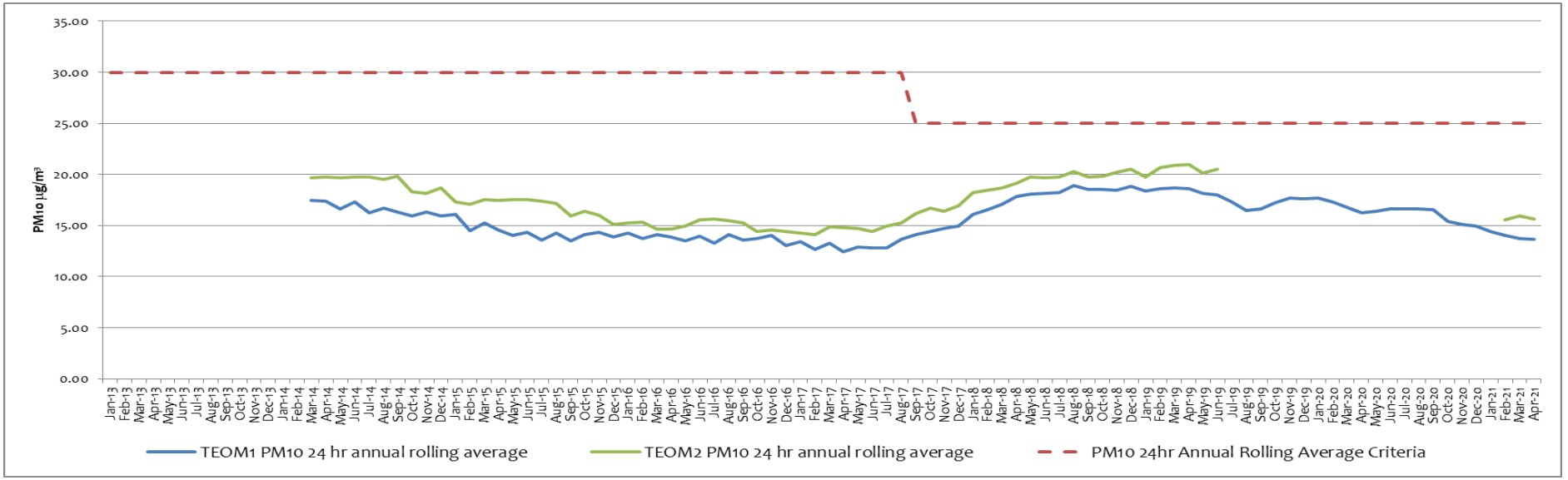


Figure 5-21 TEOM1 & TEOM2 PM_{10} Annual Rolling Average Results for the Period 2013 to Apr 2021



5.4 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.

5.5 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 100year 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. Quarterly water quality samples are taken from dams when the water levels are above 20% capacity. 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 5-8** and locations of sampling points are shown in **Figure 5-2**.

Table 5-8 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 March 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 5-9**.

No storage water overflowed from these ponds during the reporting period. Lead and Zinc levels were slightly elevated in S1-A which is the pond between the South Road overpass and Gypsum Street as this was a former mine water storage dam. Zinc was elevated in S31-1 as it is situated on Federation Way and receives water from the roadway and waste dumps along the northern side of the site. S49 returned elevated Lead and Zinc levels due to it capturing water from Block 10 which, as the former site a mill, is contaminated. Horwood Dam recorded 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 5-9 Stormwater Pond Water Quality Results for the Reporting Period

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	21-Sep-20	5.93	2460	3110	<1	1600	44	172	25	58	4.83	1.64	146	533	<0.05
	04-Jan-21	5.93	2220	2520	2	1460	34	154	20	42	4.23	1.79	108	424	<0.05
S49	21-Sep-20	6.31	537	444	6	244	6	59	6	9	0.241	0.092	11	33.2	<0.05
	04-Jan-21	6.54	641	486	11	306	7	77	7	11	0.228	0.142	12.2	31.4	<0.05
S1A	21-Sep-20	6.83	386	374	17	150	20	43	6	18	0.0796	0.581	3.5	11.3	<0.05
	04-Jan-21	6.81	585	426	29	205	37	52	10	35	0.123	0.326	4.6	14.7	<0.05
S9B-2	21-Sep-20	Dry													
	04-Jan-21	Dry													
Horwood Dam	21-Sep-20	6.38	6260	6510	6	3010	1190	375	212	1020	3.49	2.07	130	166	<0.05
	04-Jan-21	6.41	13700	13200	9	5060	2520	492	422	2050	7.58	3.4	267	351	<0.05
Upstream	21-Sep-20	6.68	646	500	45	211	42	72	11	45	0.0103	0.014	0.322	1.6	<0.05
	04-Jan-21	Dry													
Downstream	21-Sep-20	7.43	303	262	64	30	38	17	4	43	0.0001	<0.001	<0.001	0.008	<0.05
	04-Jan-21	7.53	242	186	90	19	17	16	4	26	0.0007	<0.01	0.004	0.091	<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 BHO 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, 2020 was a dry year (108.6 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.

5.5.1 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 5-10** 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.

Table 5-10 Water Containment Structures

	Pond Identification	Start of reporting period m^3 (1-Jan-2019)	At end of reporting period m^3 (30-Apr-2020)	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

5.6 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 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 5-11** lists the location and function of each borehole.

Table 5-11 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 (UG) - 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 5-12** the majority of piezometers showed a steady or decrease in water levels during the reporting period which can be attributed to the low rainfall. **Table 5-13** provides a summary of groundwater monitoring results for 2020.

Table 5-14 provides a summary of water monitoring results for Shaft 7 and mine dewatering (Kintore Pit), indicating samples above baseline trigger in orange.

Figures 5-20 and **5-21** provide a summary of water monitoring results for the period 2012, commencement of operations, to 2021.

Table 5-12 Bore Piezometer Depths

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

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 2020.

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 had sufficient water to monitor each quarter while GW2 was dry through the year. GW1 was dry for each sampling event in 2020, probably due to the ongoing drought; water levels for GW2 were not

recorded for previous years except for 2017 but this was at bore depth. **Figure 5-22** indicates that results remain within historic ranges.

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 were stable in GW3 and GW4 and falling in bores GW5 to GW10. Results for all parameters have remained stable for all bores except for Lead which has fallen over the period in GW3. **Figure 5-22** indicates that results remain within historic ranges.

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 lower than previous periods and the level of GW12 is stable. GW11 recorded elevated Cadmium, Manganese, Magnesium, Calcium, Total Alkalinity, Sodium, Chloride, Sulphate, TDS and EC in September and December of 2019 and in March and June of 2020. The same pattern occurred in June and September 2018 and is likely due to the tailings level in TSF2 reaching a point where a fault or crack in the pit wall has allowed water to escape. Concentrations are being monitored and levels are expected to return to normal as the fault or crack is sealed by tailings. **Figure 5-22** indicates results remain within historic ranges.

GW13 (adjacent 31-1, GW14 (adjacent BHP chimney) 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.

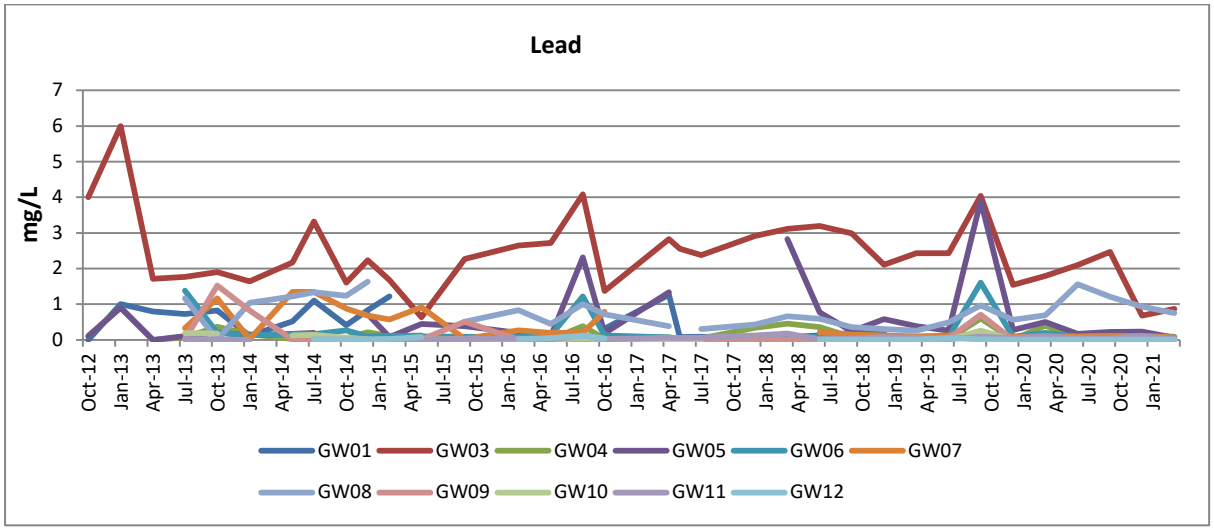
Table 5-13 Piezometer Monitoring Results for the Reporting Period

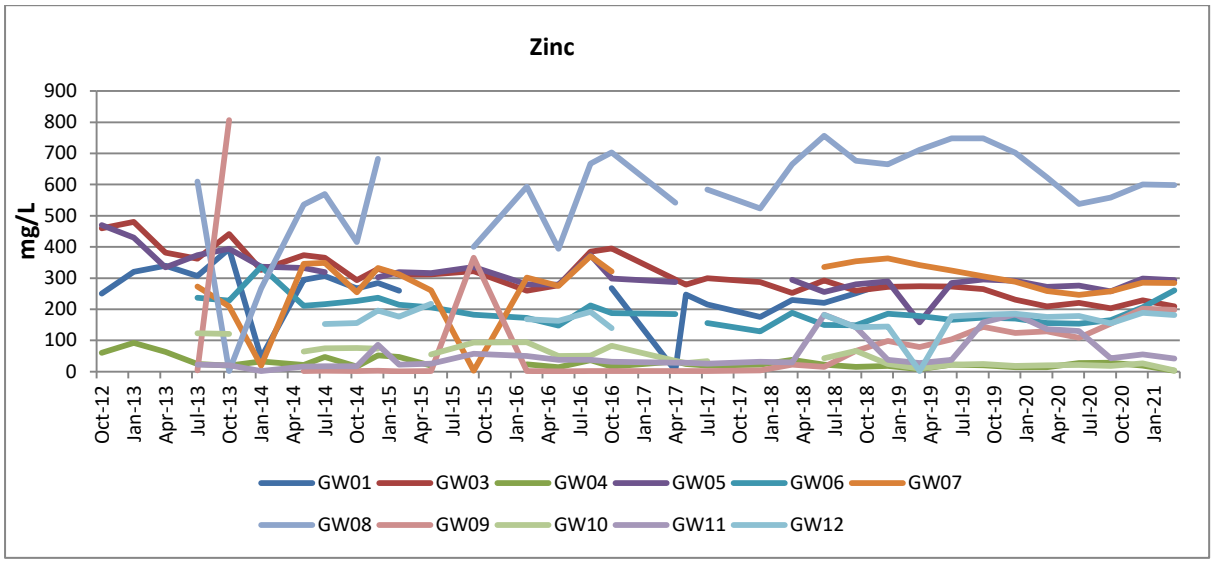
Site	Month Sampled	pH	EC	TDS	Alk	SO4	Cl	Ca	Mg	Na	Cd	Pb	Mn	Zn	Fe
GW01	Jun, Sep, Dec, Mar	Dry													
GW02	Jun, Sep, Dec, Mar	Insufficient depth for sample													
GW03	Jun	6.63	13300	11800	3	4680	2930	567	358	2200	0.951	2.1	262	221	0.07
	Sep	5.39	14700	12600	<1	4300	2910	489	337	2120	0.972	2.47	247	203	<0.05
	Dec	5.48	13700	12800	<1	4660	2690	571	347	2250	1.09	0.679	269	229	0.32
	Mar	5.96	14400	11800	5	4570	2950	489	354	2260	1.19	0.869	229	209	<0.05
GW04	Jun	6	12800	11200	161	4780	2620	556	482	2210	0.126	0.007	74.3	27.4	<0.05
	Sep	6.49	13900	11700	200	4270	2650	491	457	2100	0.125	0.001	62.1	28.1	<0.05
	Dec	6.53	13700	12000	239	4670	2390	583	530	2360	0.066	0.002	39.6	19.4	0.05
	Mar	6.51	14200	11400	186	4690	2650	502	531	2340	0.0631	<0.001	41.1	3.15	<0.05
GW05	Jun	5.49	14800	14700	104	6340	2670	500	630	2540	0.62	0.17	328	276	<0.05
	Sep	5.69	16000	15300	93	5920	2690	450	594	2430	0.72	0.222	319	257	<0.05
	Dec	5.69	15600	15400	99	6920	2590	517	626	2520	0.642	0.225	358	299	0.05
	Mar	5.82	16100	14600	97	6210	2710	446	634	2260	0.728	0.059	328	293	<0.05
GW06	Jun	5.4	13000	11900	62	5100	2600	535	457	2120	0.736	0.083	249	154	<0.05
	Sep	5.82	13800	12600	61	4600	2640	464	433	2010	0.832	0.11	256	165	<0.05
	Dec	6.73	13400	12800	51	4800	2390	538	451	2120	0.944	0.109	323	206	0.05

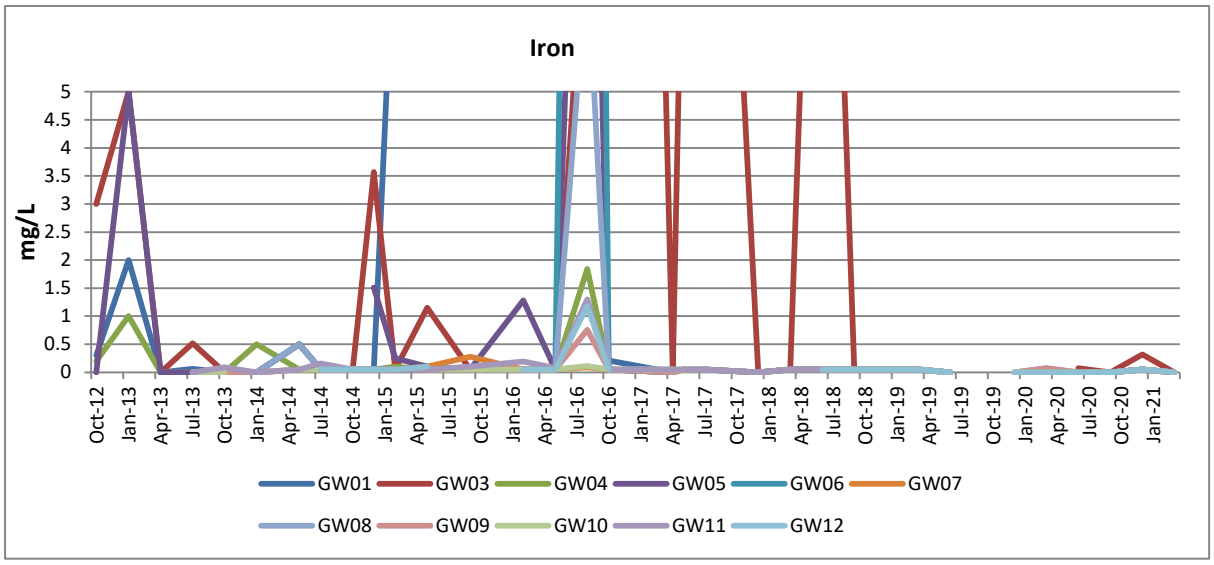
Site	Month Sampled	pH	EC	TDS	Alk	SO4	Cl	Ca	Mg	Na	Cd	Pb	Mn	Zn	Fe
	Mar	5.88	14400	12700	47	5280	2610	457	480	2260	1.63	0.09	382	261	<0.05
GW07	Jun	6.01	11300	10300	41	4490	1970	542	306	1760	1.87	0.094	219	246	<0.05
	Sep	6.92	12100	11100	39	4090	1850	469	296	1700	2.04	0.111	232	258	<0.05
	Dec	5.96	12000	11500	34	4250	2160	548	302	1800	2.31	0.101	265	285	0.05
	Mar	5.94	12700	10900	31	4500	2370	472	329	1890	2.45	0.068	253	284	<0.05
GW08	Jun	6.07	13200	13200	40	5340	2700	534	343	2000	1.16	1.56	507	538	<0.05
	Sep	5.59	14000	13900	34	4780	2730	472	331	1940	1.2	1.21	531	558	<0.05
	Dec	5.62	12900	13900	23	4980	2360	546	316	1810	1.54	0.93	618	600	0.05
	Mar	5.64	12200	11600	12	4820	2200	465	336	1890	1.58	0.749	528	598	<0.05
GW9	Jun	5.3	10600	9780	93	4590	1850	603	530	1390	1.03	0.002	82	109	<0.05
	Sep	6.12	11600	10500	72	4110	1780	545	505	1400	1.45	0.007	105	154	<0.05
	Dec	6.06	11400	10600	60	4430	2080	625	506	1480	1.86	0.006	140	202	0.05
	Mar	6.06	11900	10400	55	4480	2130	528	524	1520	1.87	<0.001	127	198	<0.05
GW10	Jun	5.45	13100	10800	283	4450	2630	580	528	2160	0.153	<0.001	11.6	21.4	<0.05
	Sep	6.46	13900	11700	315	4040	2780	508	502	2060	0.135	<0.001	3.99	18.4	<0.05
	Dec	6.5	13400	11500	258	4370	2430	608	520	2140	0.181	0.006	5.67	26.6	0.05
	Mar	6.44	14000	11200	232	4520	2730	522	550	2260	0.181	<0.001	7.15	3.96	<0.05
GW11	Jun	6.61	9600	8760	79	4310	1430	405	429	1440	1.62	0.038	96.2	130	<0.05

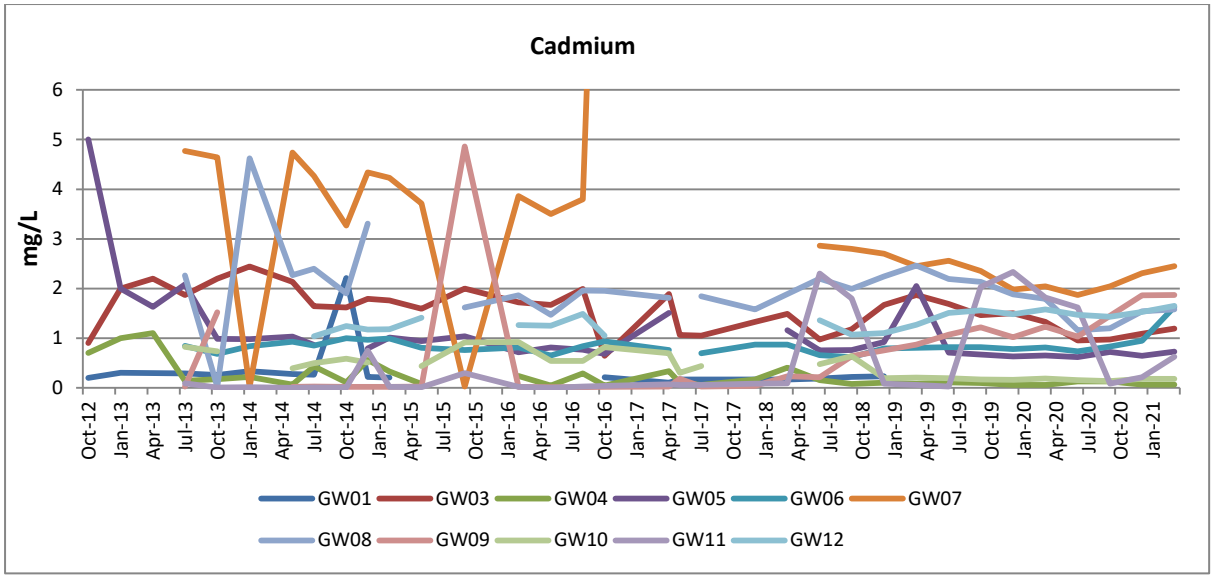
Site	Month Sampled	pH	EC	TDS	Alk	SO4	Cl	Ca	Mg	Na	Cd	Pb	Mn	Zn	Fe
	Sep	6.56	5860	4930	92	2400	643	328	187	736	0.0829	0.037	31.4	43.1	<0.05
	Dec	6.68	5650	4800	77	2540	622	332	190	766	0.209	0.101	33.7	54.8	0.05
	Mar	6.48	5850	4600	71	2550	637	284	196	786	0.626	0.019	35.5	41.7	<0.05
GW12	Jun	6	12700	11800	74	5520	2000	475	594	2110	1.47	0.005	83.2	178	<0.05
	Sep	5.68	13100	12200	80	4790	1760	416	543	1970	1.43	0.003	80.5	155	<0.05
	Dec	5.76	12900	12200	81	5720	1860	490	574	2080	1.53	0.009	77.3	189	0.05
	Mar	5.68	13600	11800	73	5350	2150	414	606	2170	1.65	0.002	84.2	181	<0.05
GW13	Jun, Sep, Dec, Mar	Dry													
GW14	Jun, Sep, Dec, Mar	Dry													
GW15	Jun, Sep, Dec, Mar	Dry													
GW16	Jun, Sep, Dec, Mar	Dry													

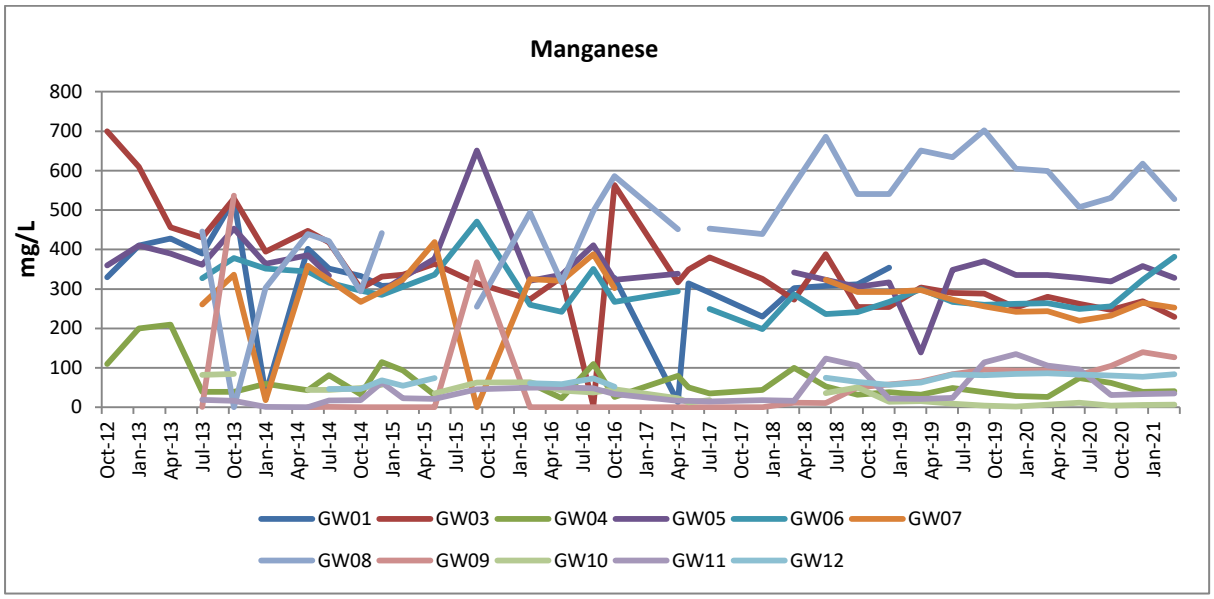
Figure 5-22 Groundwater Quality Results for Sampled Parameters for the Period 2012 to Apr 2021








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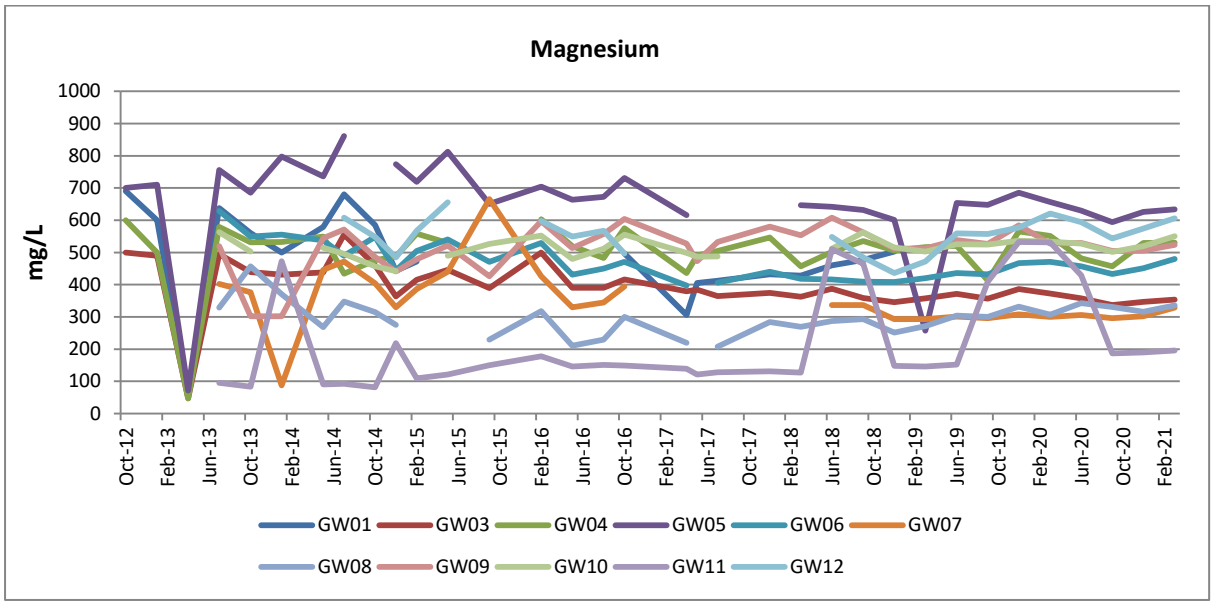
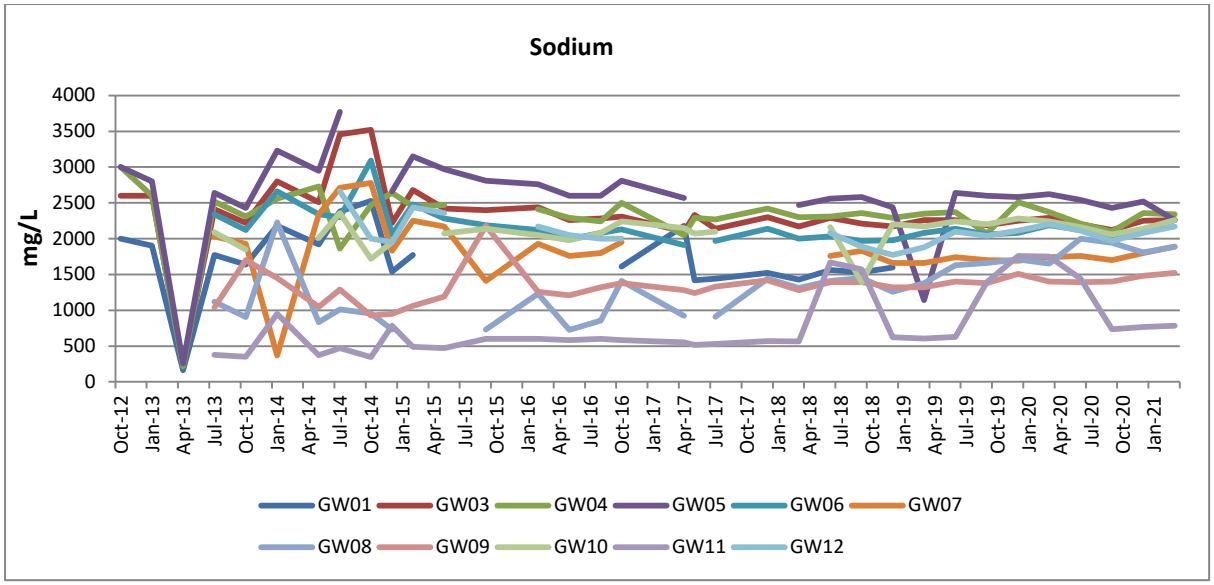
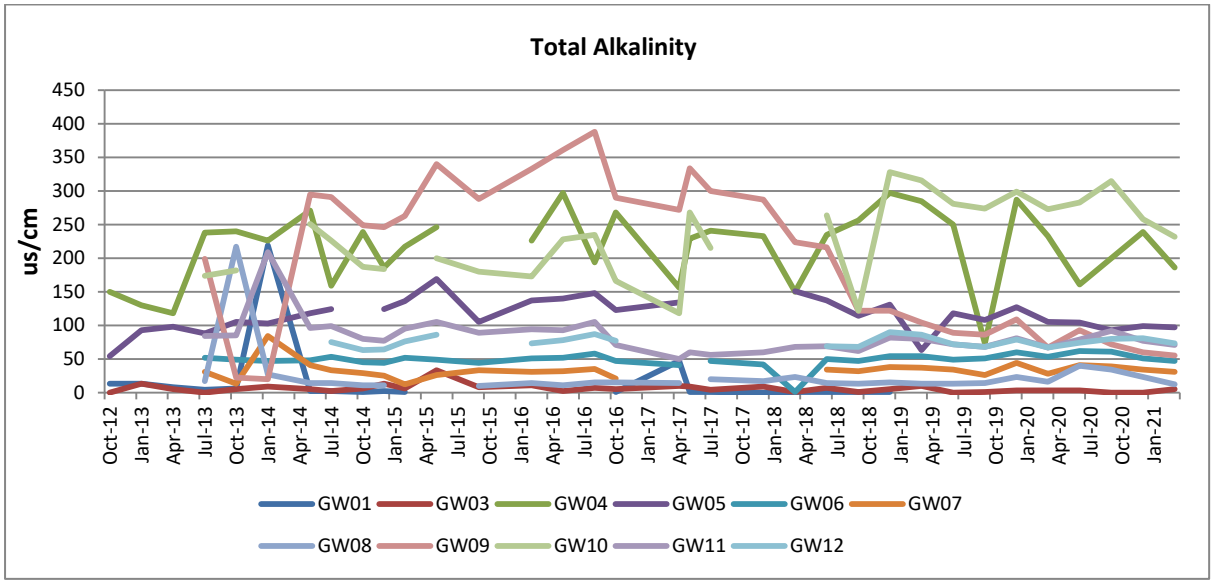
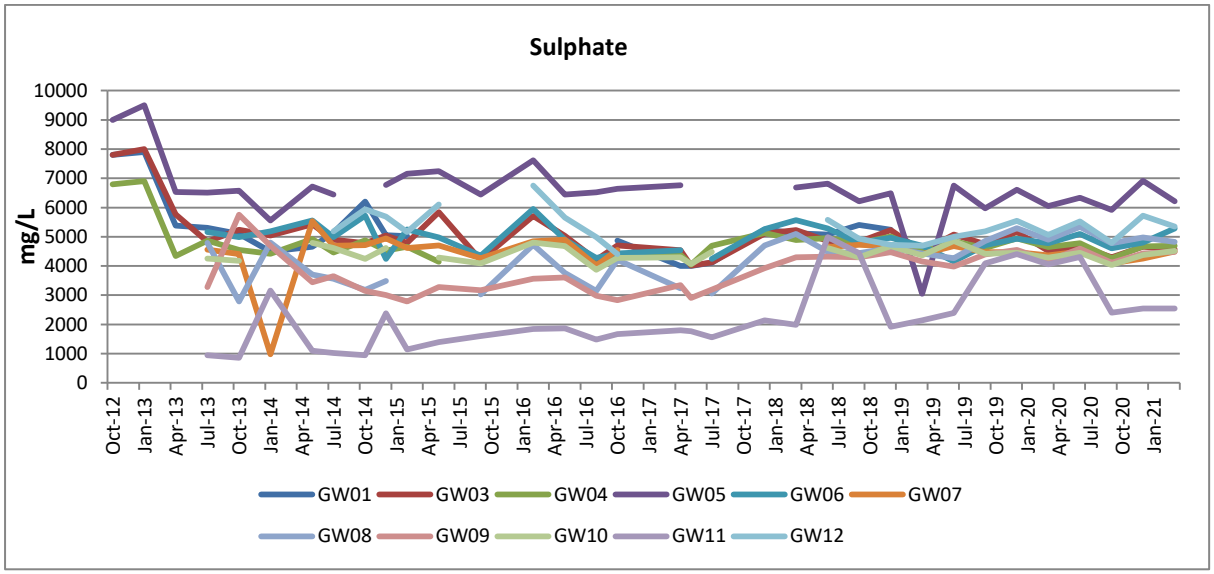
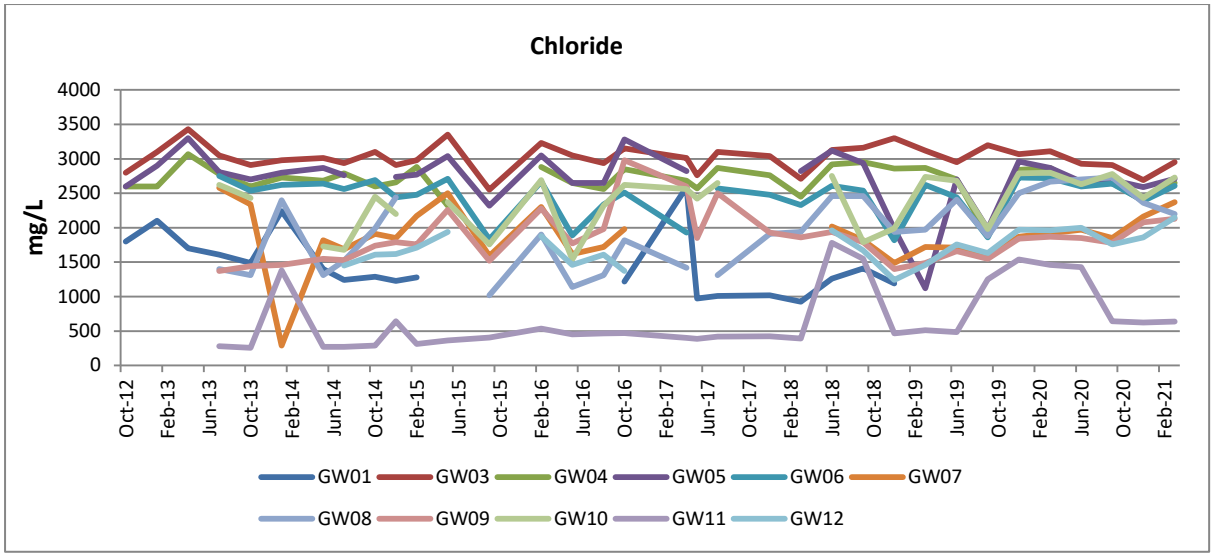
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16
Jan-17
Apr-17
Jul-17
Oct-17
Jan-18
Apr-18
Jul-18
Oct-18
Jan-19
Apr-19
Jul-19
Oct-19
Jan-20
Apr-20
Jul-20
Oct-20
Jan-21
GW01
GW03
GW04
GW05
GW06
GW07
GW08
GW09
GW10
GW11
GW12

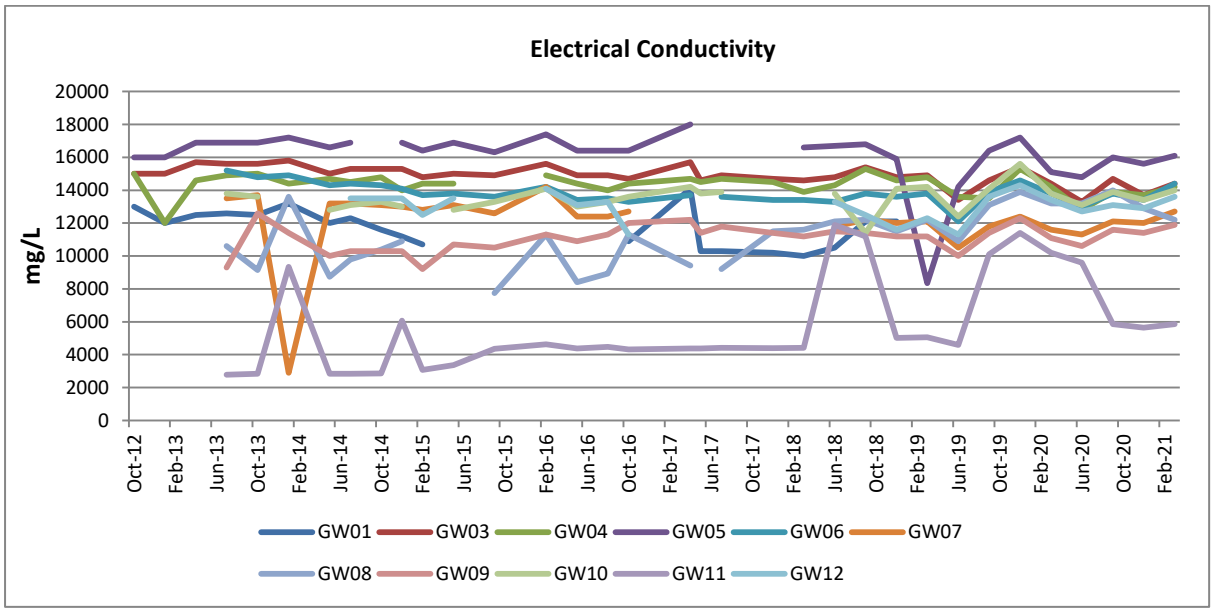

Magnesium
mg/L
0
100
200
300
400
500
600
700
800
900
1000
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
GW01
GW03
GW04
GW05
GW06
GW07
GW08
GW09
GW10
GW11
GW12


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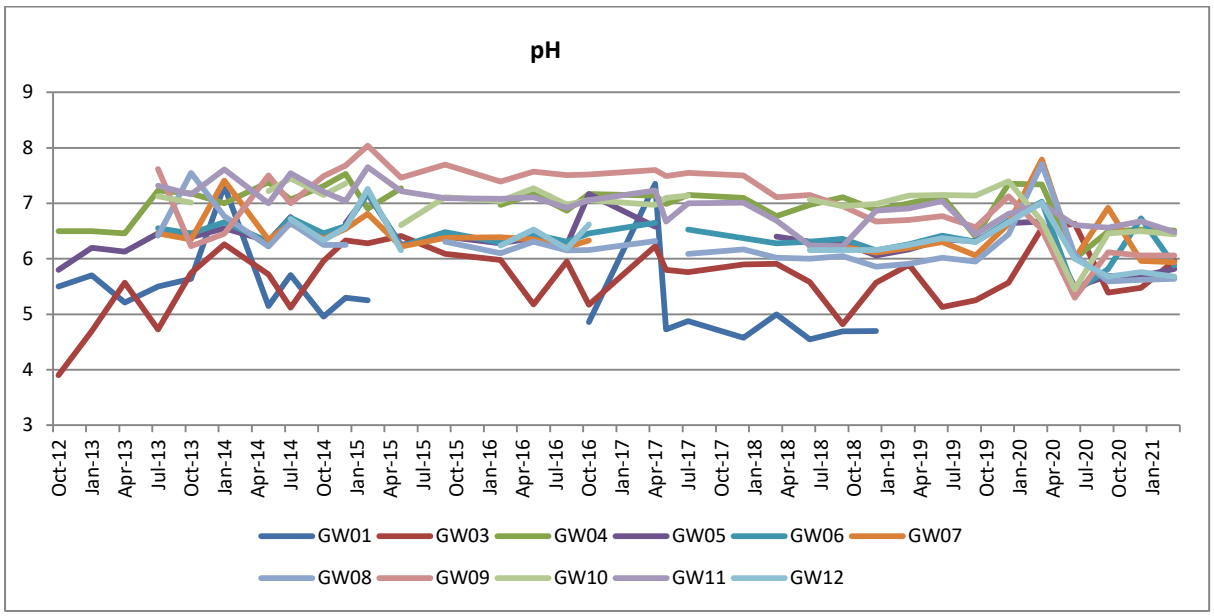
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12


pH
9
8
7
6
5
4
3
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
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Jan-16
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Apr-17
Jul-17
Oct-17
Jan-18
Apr-18
Jul-18
Oct-18
Jan-19
Apr-19
Jul-19
Oct-19
Jan-20
Apr-20
Jul-20
Oct-20
Jan-21
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12

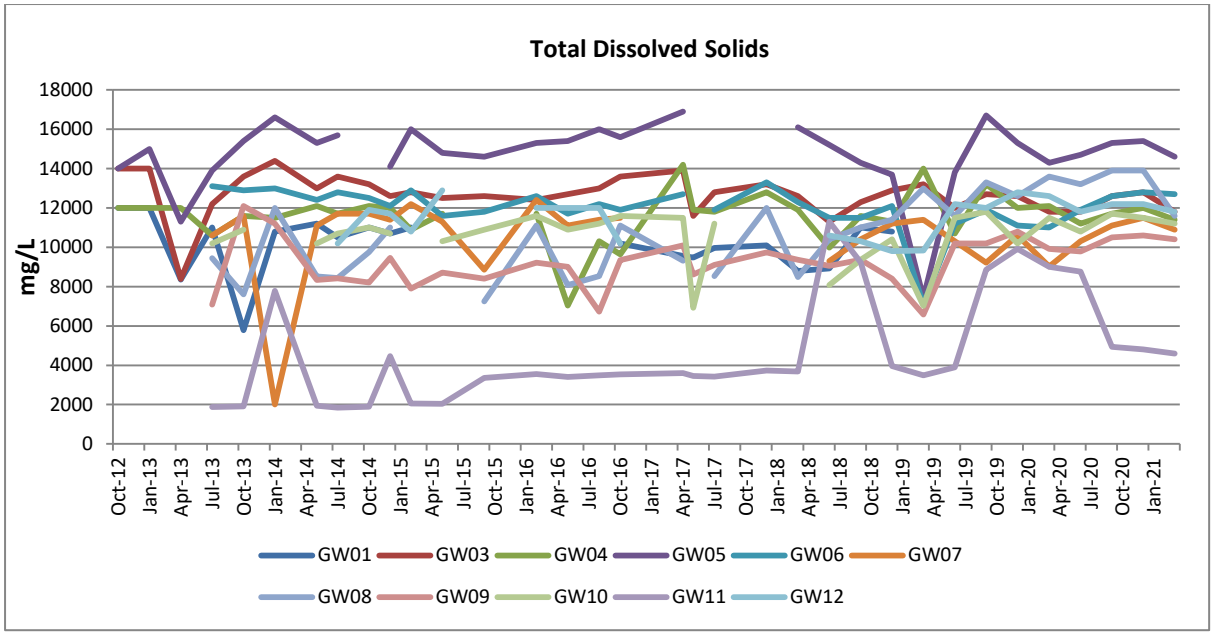

Total Dissolved Solids
mg/L
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Jan-14
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16
Jan-17
Apr-17
Jul-17
Oct-17
Jan-18
Apr-18
Jul-18
Oct-18
Jan-19
Apr-19
Jul-19
Oct-19
Jan-20
Apr-20
Jul-20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

Table 5-14 Groundwater Monitoring Results for Shaft 7 and Mine Dewatering for the Period

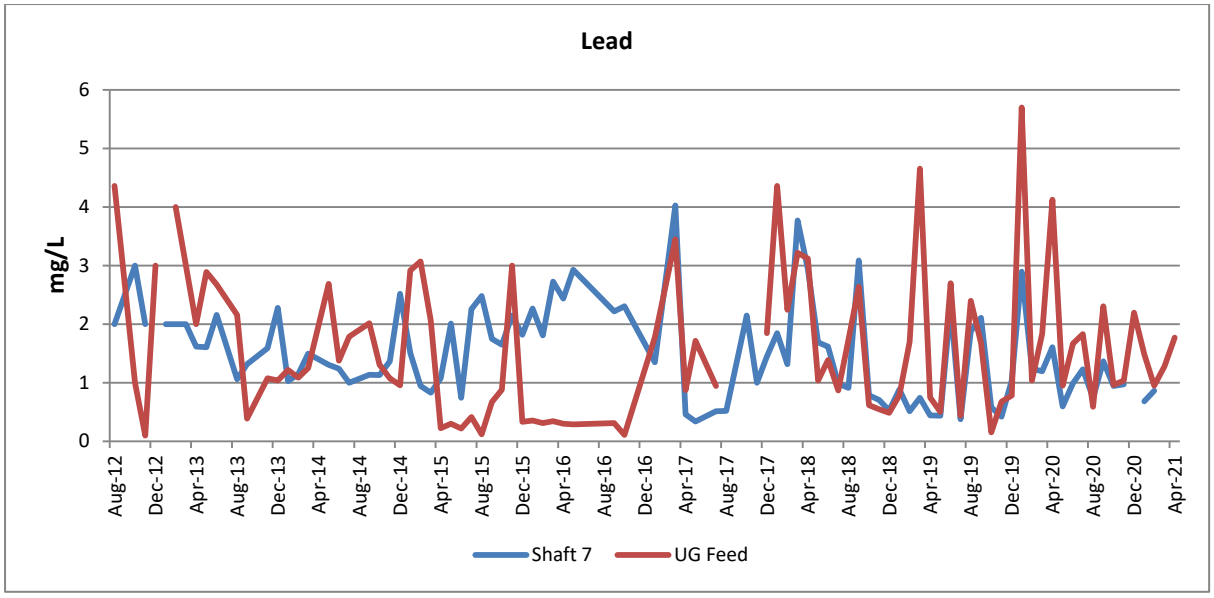
Site	Date	pH	EC	TDS	Alkalinity ($CaCO_3$)	SO4	Cl	Ca	Mg	Na	Cd	Pb	Mn	Zn	Fe
			(µS/cm2)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
Shaft 7	8/05/2020	6.69	11900	11700	24	4940	1710	487	278	1660	2.25	0.598	269	828	0.05
	15/06/2020	6.63	11600	12500	11	5540	1710	515	278	1700	2.58	0.990	263	875	0.05
	2/07/2020	NS	12100	13800	5	5610	1740	494	267	1670	3.35	1.23	336	1080	<0.05
	7/08/2020	6.09	9600	13200	8	5400	1600	478	246	1510	4.22	0.744	322	1130	0.12
	2/09/2020	5.66	9700	13400	3	4540	1690	493	268	1670	4.63	1.37	349	1260	<0.05
	6/10/2020	5.91	11500	11600	28	4580	1500	457	273	1540	1.96	0.947	220	646	0.05
	11/11/2020	6.28	13100	13800	10	5760	1720	478	279	1500	3.71	0.972	306	983	0.05
	11/12/2020	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	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	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	1/04/2021	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
UG Water	8/05/2020	6.5	12700	13000	6	5390	1680	487	272	1720	3.32	0.954	326	1200	1.74
	15/06/2020	6.6	12000	13400	8	5690	1710	505	271	1700	3.30	1.67	288	1030	0.26
	2/07/2020	NS	12500	14600	1	5650	1750	484	272	1660	3.85	1.83	363	1240	<0.05
	7/08/2020	5.7	9510	13200	5	5220	1570	470	247	1530	4.2	0.589	322	1120	0.39
	2/09/2020	5.94	9560	13700	4	4480	1680	493	275	1690	4.65	2.31	346	1250	<0.05
	6/10/2020	5.21	12500	14100	2	5260	1550	425	252	1580	4.25	0.961	300	1140	0.79
	11/11/2020	6.18	13300	14600	7	5950	1720	478	279	1580	4.63	1.04	351	1210	0.05
	11/12/2020	6.09	13000	15000	2	6900	1700	518	293	1780	4.28	2.2	432	1340	0.62
	13/01/2021	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
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

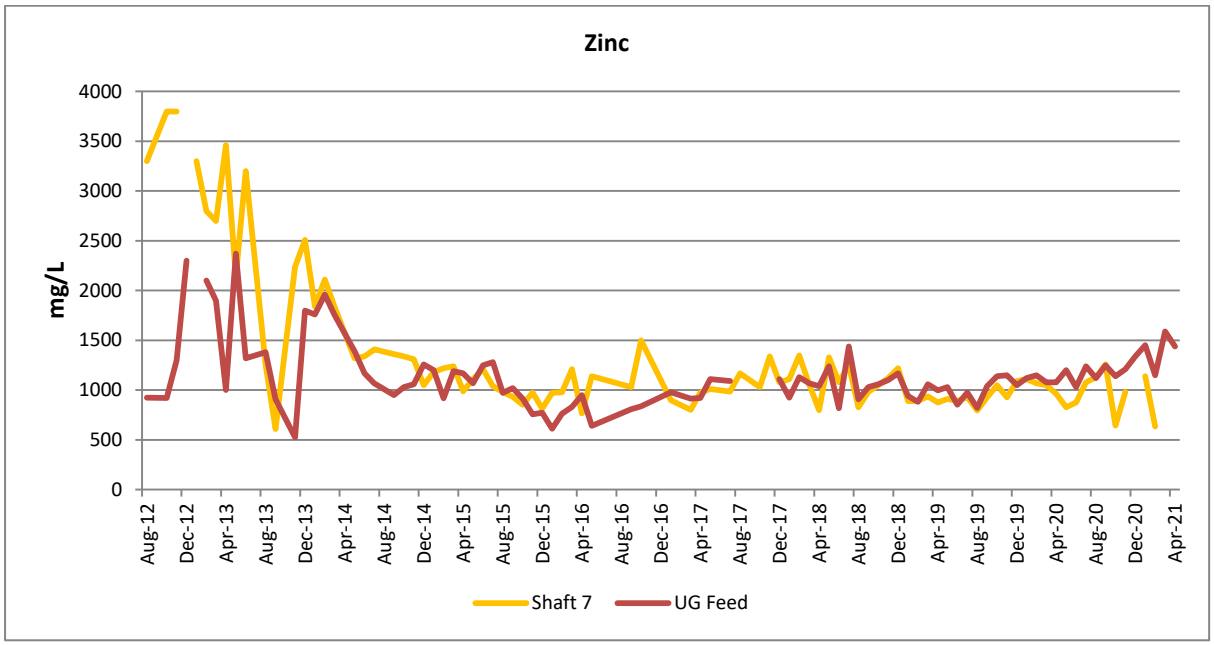
Trigger = Baseline + 30%

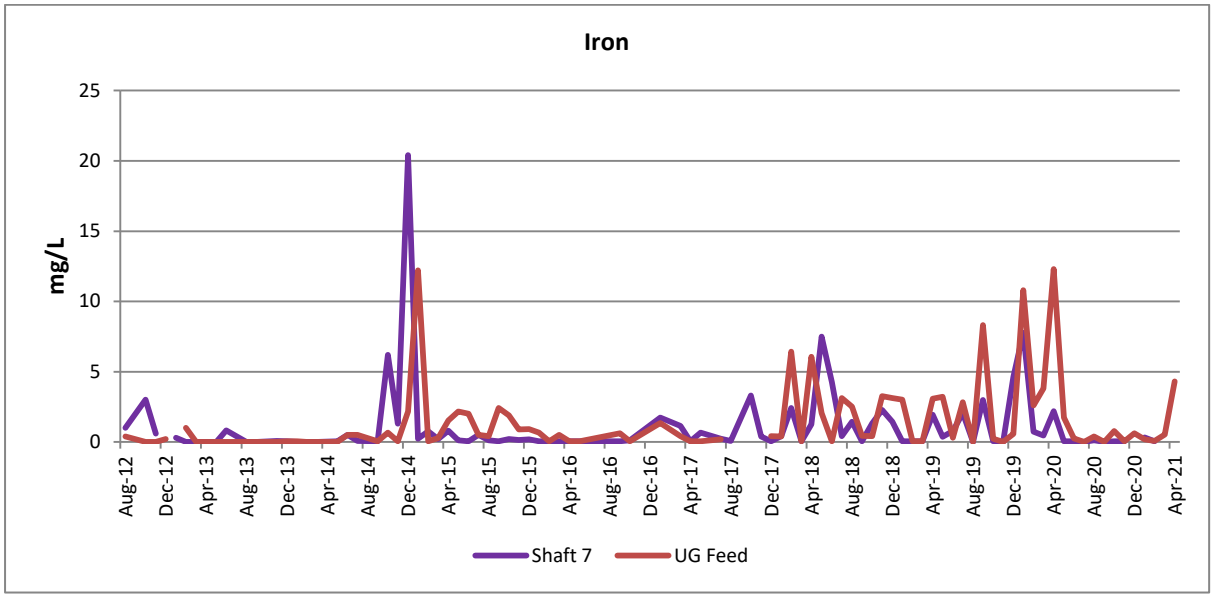
Results for both Shaft 7 and UG Feed occasionally exceeded trigger thresholds for Chloride but are variable. Total dissolved solids (TDS) results were above the trigger threshold for all samples, however results were within the historic range for TDS. Most parameters have increased slightly in UG Water samples in the first months of 2021 but are within historic levels and is likely due to changes in the location of mining.

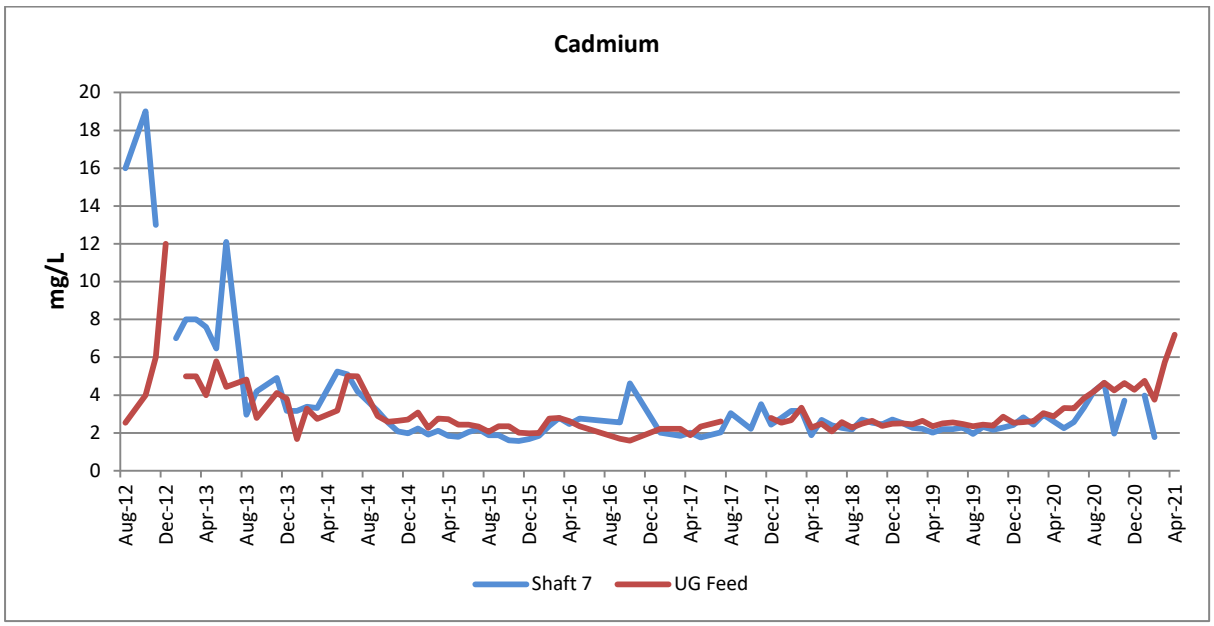
Figure 5-23 provides a series of graphs indicating results for the period 2012, commencement of operations, to 2021. Results are within the historic range for all parameters.

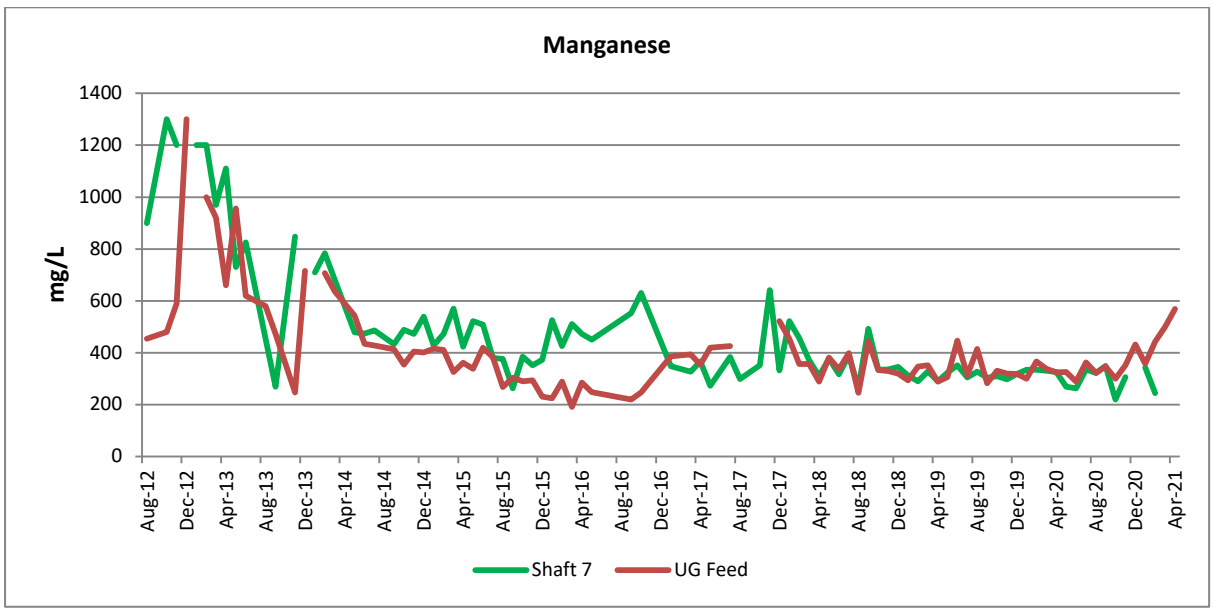
Figure 5-16 Shaft 7 & Mine Dewatering Results for Sampled Parameters - Period 2012 to Apr 2021

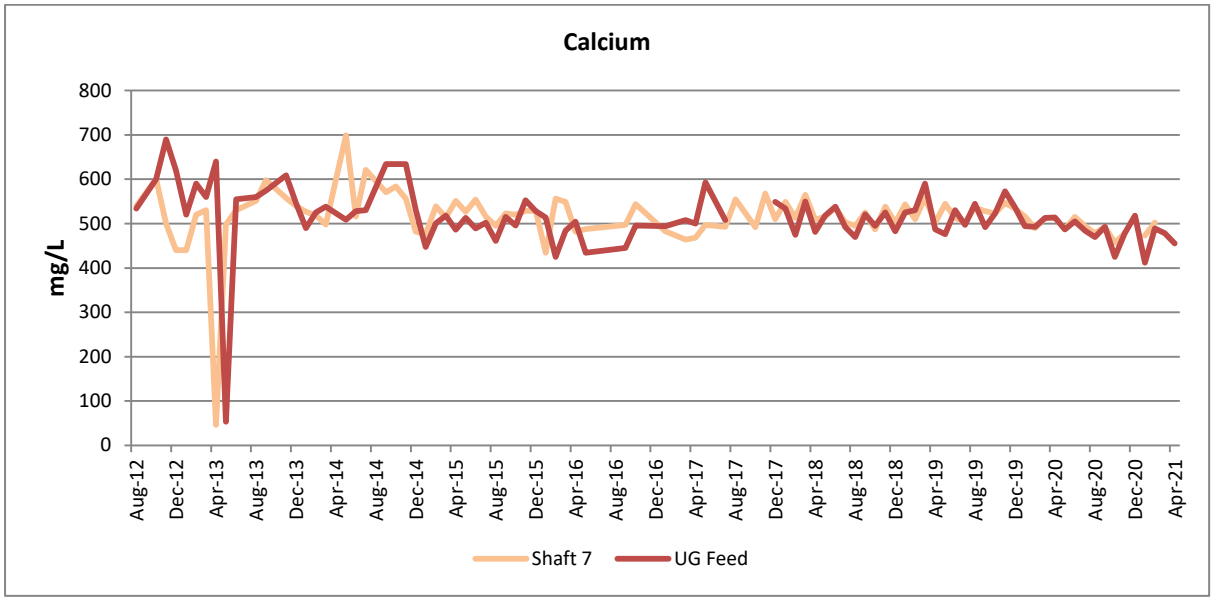





Iron
mg/L
25
20
15
10
5
0
Aug-12
Dec-12
Apr-13
Aug-13
Dec-13
Apr-14
Aug-14
Dec-14
Apr-15
Aug-15
Dec-15
Apr-16
Aug-16
Dec-16
Apr-17
Aug-17
Dec-17
Apr-18
Aug-18
Dec-18
Apr-19
Aug-19
Dec-19
Apr-20
Aug-20
Dec-20
Apr-21
Shaft 7
UG Feed


Cadmium
mg/L
20
18
16
14
12
10
8
6
4
2
0
Aug-12
Dec-12
Apr-13
Aug-13
Dec-13
Apr-14
Aug-14
Dec-14
Apr-15
Aug-15
Dec-15
Apr-16
Aug-16
Dec-16
Apr-17
Aug-17
Dec-17
Apr-18
Aug-18
Dec-18
Apr-19
Aug-19
Dec-19
Apr-20
Aug-20
Dec-20
Apr-21
Shaft 7
UG Feed


Manganese
mg/L
1400
1200
1000
800
600
400
200
0
Aug-12
Dec-12
Apr-13
Aug-13
Dec-13
Apr-14
Aug-14
Dec-14
Apr-15
Aug-15
Dec-15
Apr-16
Aug-16
Dec-16
Apr-17
Aug-17
Dec-17
Apr-18
Aug-18
Dec-18
Apr-19
Aug-19
Dec-19
Apr-20
Aug-20
Dec-20
Apr-21
Shaft 7
UG Feed


Calcium
mg/L
800
700
600
500
400
300
200
100
0
Aug-12
Dec-12
Apr-13
Aug-13
Dec-13
Apr-14
Aug-14
Dec-14
Apr-15
Aug-15
Dec-15
Apr-16
Aug-16
Dec-16
Apr-17
Aug-17
Dec-17
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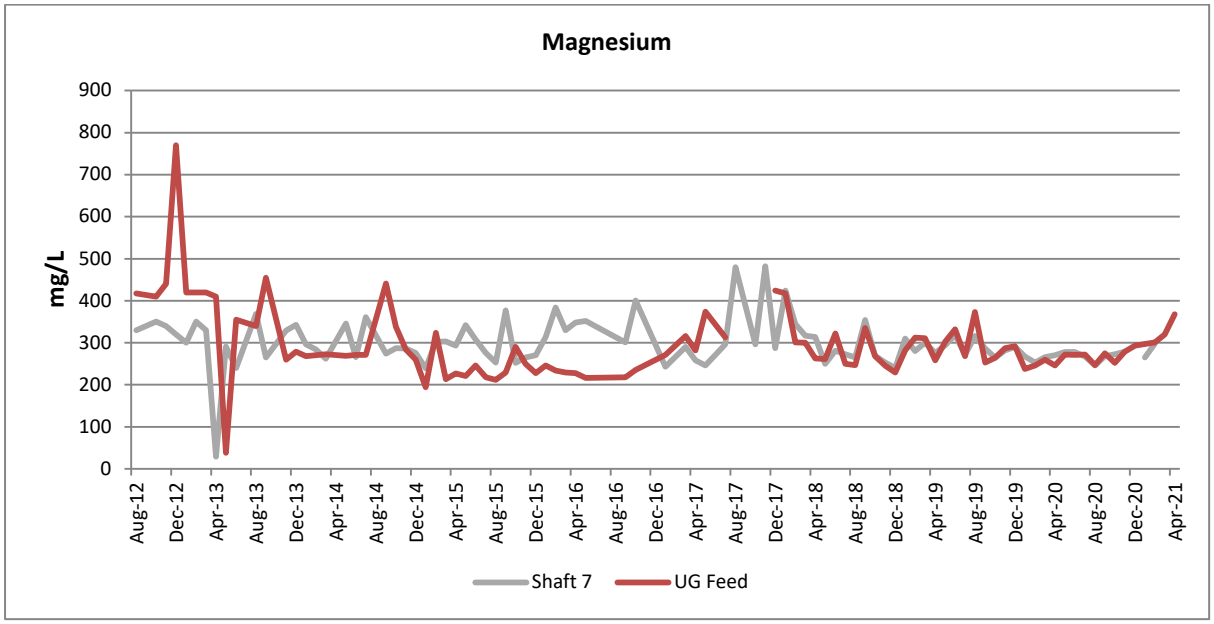
Apr-19
Aug-19
Dec-19
Apr-20
Aug-20
Dec-20
Apr-21
Shaft 7
UG Feed


Magnesium
mg/L
900
800
700
600
500
400
300
200
100
0
Aug-12
Dec-12
Apr-13
Aug-13
Dec-13
Apr-14
Aug-14
Dec-14
Apr-15
Aug-15
Dec-15
Apr-16
Aug-16
Dec-16
Apr-17
Aug-17
Dec-17
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Dec-18
Apr-19
Aug-19
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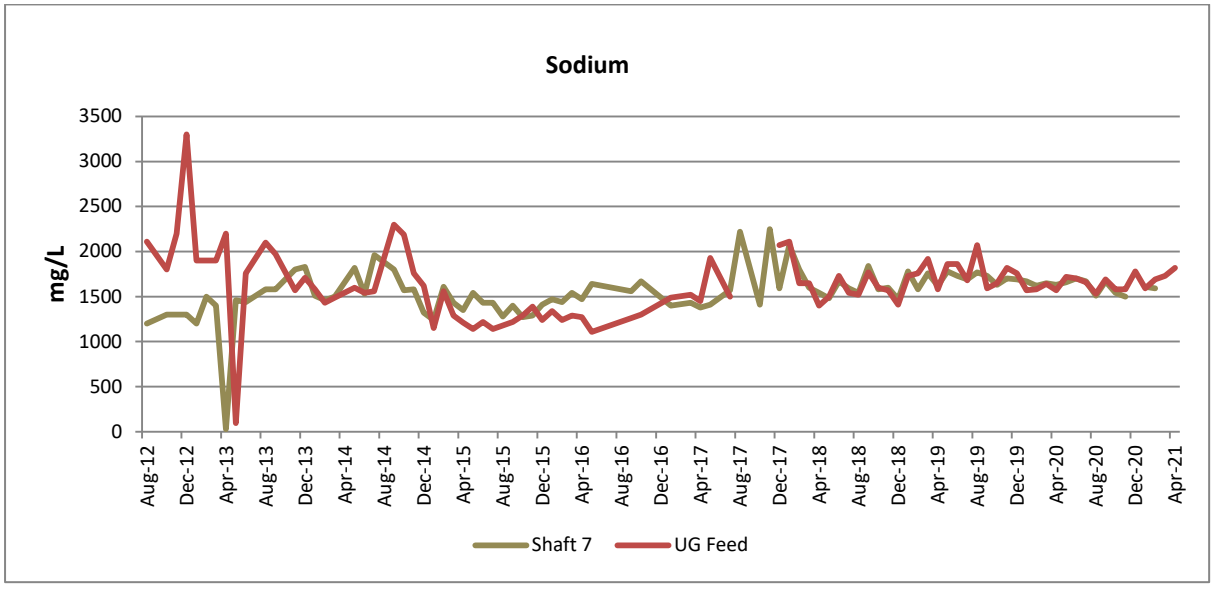
Aug-20
Dec-20
Apr-21
Shaft 7
UG Feed


Sodium
mg/L
3500
3000
2500
2000
1500
1000
500
0
Aug-12
Dec-12
Apr-13
Aug-13
Dec-13
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Aug-14
Dec-14
Apr-15
Aug-15
Dec-15
Apr-16
Aug-16
Dec-16
Apr-17
Aug-17
Dec-17
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Dec-18
Apr-19
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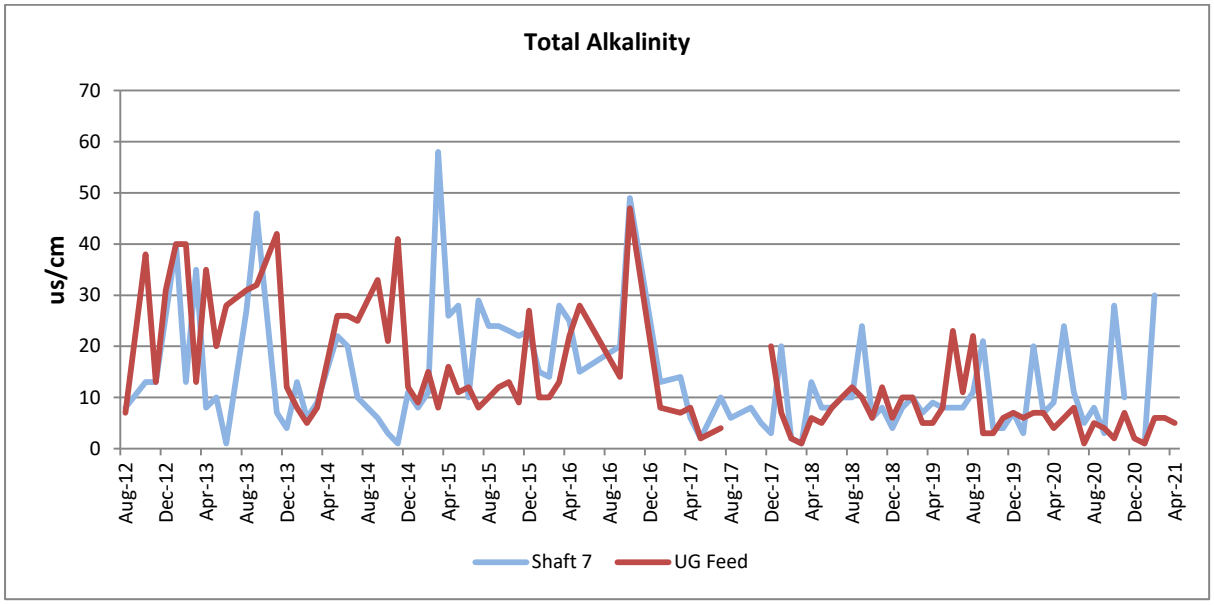
Dec-19
Apr-20
Aug-20
Dec-20
Apr-21
Shaft 7
UG Feed


Total Alkalinity
us/cm
70
60
50
40
30
20
10
0
Aug-12
Dec-12
Apr-13
Aug-13
Dec-13
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Aug-14
Dec-14
Apr-15
Aug-15
Dec-15
Apr-16
Aug-16
Dec-16
Apr-17
Aug-17
Dec-17
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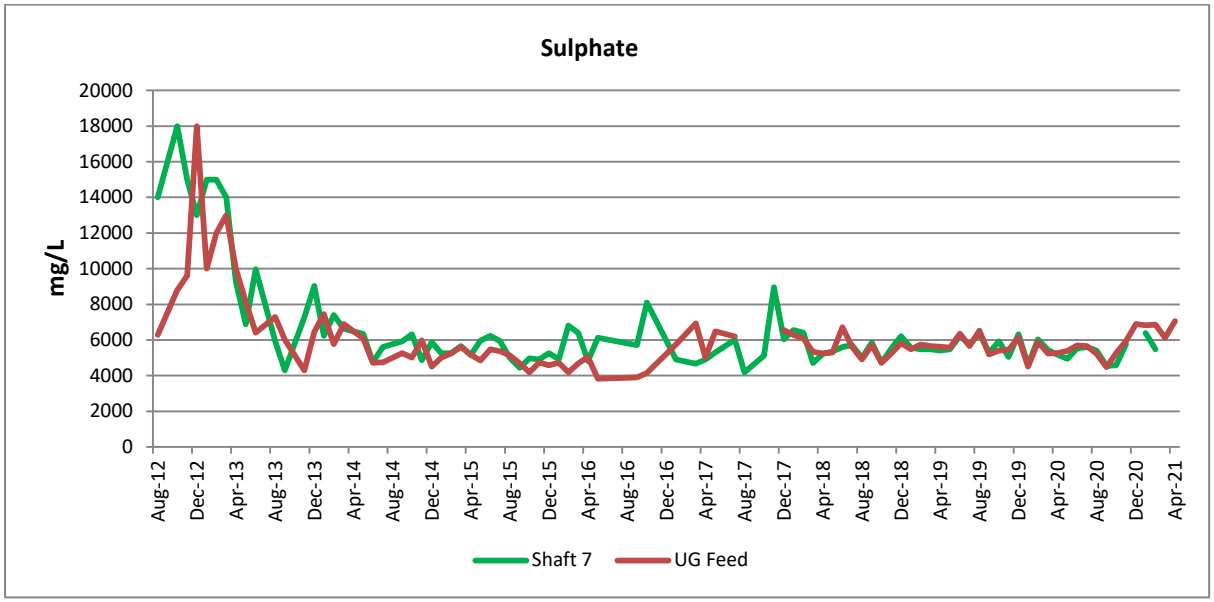
Dec-18
Apr-19
Aug-19
Dec-19
Apr-20
Aug-20
Dec-20
Apr-21
Shaft 7
UG Feed


Sulphate
mg/L
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Aug-12
Dec-12
Apr-13
Aug-13
Dec-13
Apr-14
Aug-14
Dec-14
Apr-15
Aug-15
Dec-15
Apr-16
Aug-16
Dec-16
Apr-17
Aug-17
Dec-17
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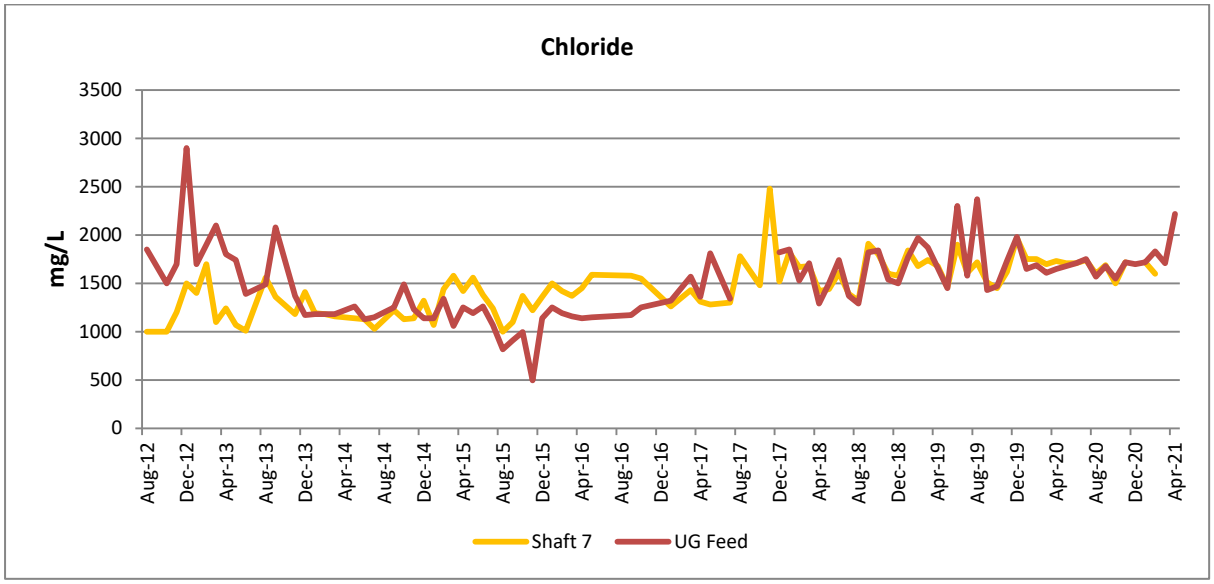
Apr-19
Aug-19
Dec-19
Apr-20
Aug-20
Dec-20
Apr-21
Shaft 7
UG Feed


Chloride
mg/L
3500
3000
2500
2000
1500
1000
500
0
Aug-12
Dec-12
Apr-13
Aug-13
Dec-13
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Aug-14
Dec-14
Apr-15
Aug-15
Dec-15
Apr-16
Aug-16
Dec-16
Apr-17
Aug-17
Dec-17
Apr-18
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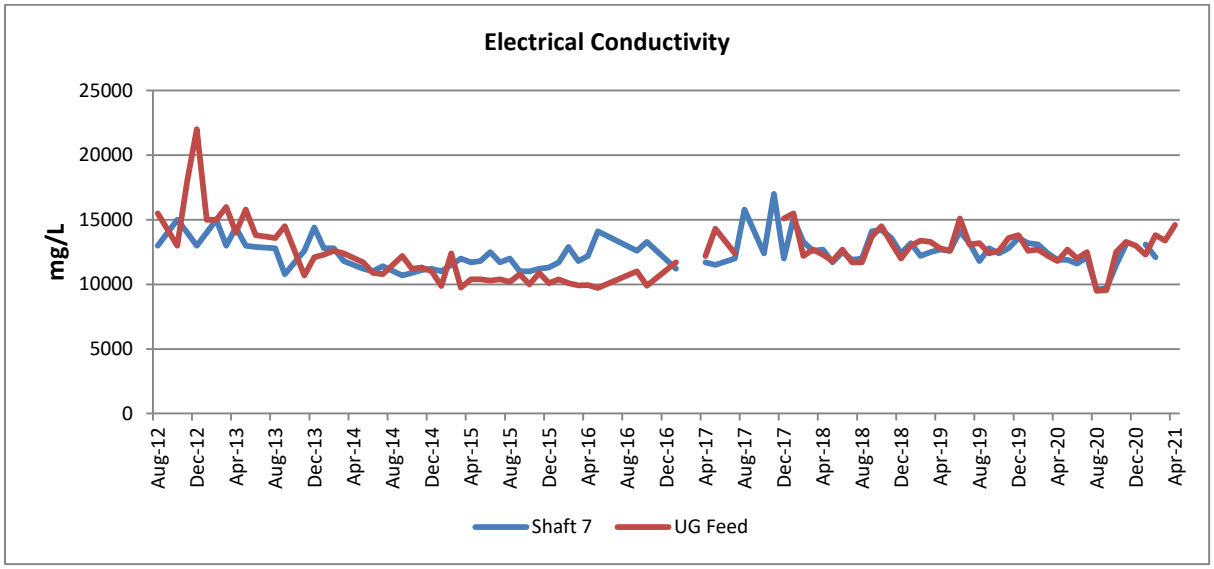
Dec-18
Apr-19
Aug-19
Dec-19
Apr-20
Aug-20
Dec-20
Apr-21
Shaft 7
UG Feed


Electrical Conductivity
mg/L
25000
20000
15000
10000
5000
0
Aug-12
Dec-12
Apr-13
Aug-13
Dec-13
Apr-14
Aug-14
Dec-14
Apr-15
Aug-15
Dec-15
Apr-16
Aug-16
Dec-16
Apr-17
Aug-17
Dec-17
Apr-18
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Dec-18
Apr-19
Aug-19
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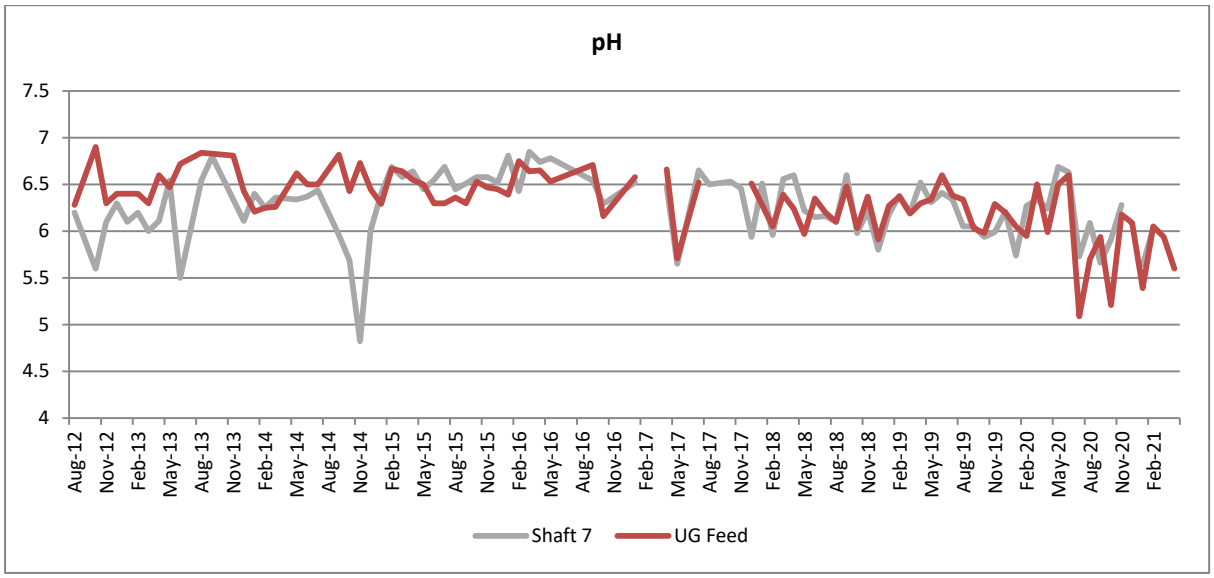
Apr-20
Aug-20
Dec-20
Apr-21
Shaft 7
UG Feed


pH
7.5
7
6.5
6
5.5
5
4.5
4
Aug-12
Nov-12
Feb-13
May-13
Aug-13
Nov-13
Feb-14
May-14
Aug-14
Nov-14
Feb-15
May-15
Aug-15
Nov-15
Feb-16
May-16
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Nov-16
Feb-17
May-17
Aug-17
Nov-17
Feb-18
May-18
Aug-18
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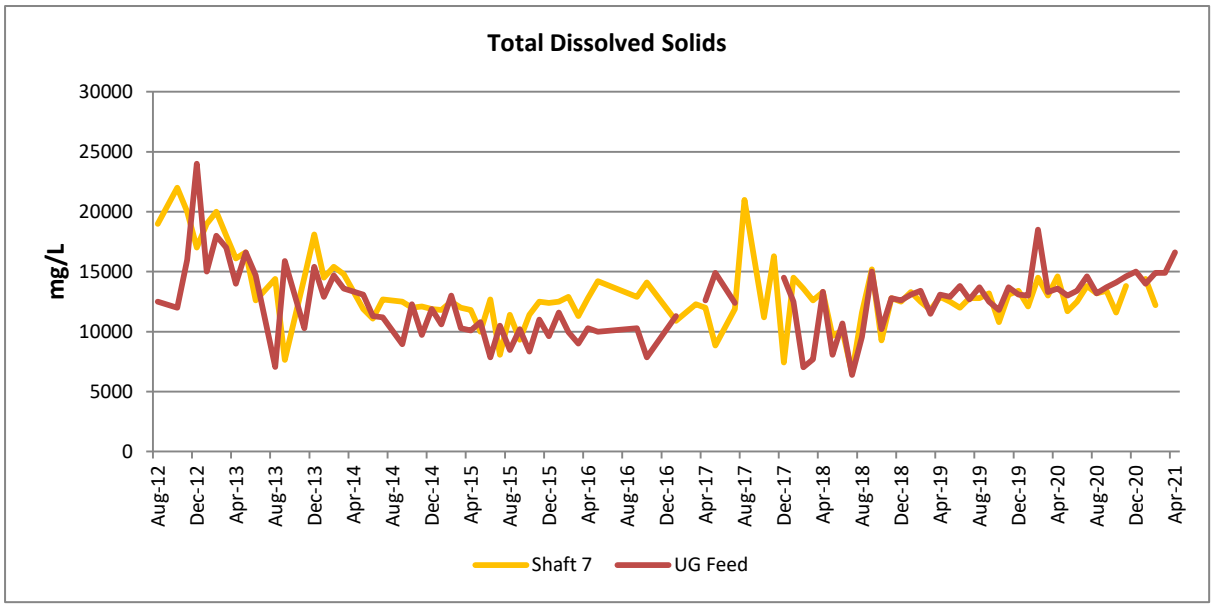
May-20
Aug-20
Nov-20
Feb-21
Shaft 7
UG Feed


Total Dissolved Solids
mg/L
30000
25000
20000
15000
10000
5000
0
Aug-12
Dec-12
Apr-13
Aug-13
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Aug-14
Dec-14
Apr-15
Aug-15
Dec-15
Apr-16
Aug-16
Dec-16
Apr-17
Aug-17
Dec-17
Apr-18
Aug-18
Dec-18
Apr-19
Aug-19
Dec-19
Apr-20
Aug-20
Dec-20
Apr-21
Shaft 7
UG Feed

5.7 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.

5.8 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.

5.8.1 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. BHO 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.

5.8.2 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.

5.8.3 Solvents

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

5.8.4 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
- Flocculant
- InterFroth F228
- Cytec S9232 (zinc collector)
- Antiscalant

- 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.

5.9 Hazardous Material Management

5.9.1 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.

5.9.2 Dangerous goods management

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

A Safety Data Sheet (SDS) database for each chemical is maintained. SDS's are kept at each location where chemicals are stored and in the mines rescue room. SDS's are also electronically available on the 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).

5.10 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.

5.10.1 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 and BHP Pit (for embankment material crushing), following testing and confirmation that it contains less than 0.5% lead. In the reporting period 204,417 t of waste rock was placed underground and 147,168 t was placed on the stockpile/tipple in Kintore and BHP Pits.

Tailings is discharged into Blackwood Pit (TSF2) with water recycled for use in processing where possible. In the reporting period 417,670 t of tailings was placed in Blackwood Pit.

5.10.2 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.

Waste disposed of in 2020 is summarised in **Table 5-15**.

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. All other LV and light truck tyres are removed from site under arrangement with the tyre supplier.

Table 5-15 Non-mineral Waste Summary for reporting period

Waste	Quantity Disposed
Oil	11,600 L
Oily water	0 L
Coolant	2,000 L
Scrap metal	137.55 t
Grease	13325 L
Oil filters, hoses,	20 m^3
Contaminated drums/IBC’s	110 m^3
Printer cartridges	7 bags
E-waste	Nil
Waste to Landfill	171.3 t

5.11 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 in 2021.

5.12 Weeds

During site inspections in 2018, individual Bush Tobacco (*Nicotiana glauca*) trees and a stand of rhizomatous bamboo (likely *Phyllostachys spp*) have been identified. The Bush Tobacco, which grows along water storages and some isolated locations on dumps, will be removed by cutting at the stump. Native tobacco around the S17 pond were removed using chemical means but have regrown and will have to be targeted with herbicide. The bamboo growing in the Eyre St trench and will likely be sprayed with a Glyphosate-based herbicide.

5.13 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**. When a blast complaint is received, the person is given the opportunity to have a roving monitor placed at their location. By doing so BHO 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. BHO maintains a spare monitor to replace compliance monitors removed for calibration or due to fault, and in 2020 has purchased four new monitors to be employed as compliance monitors. In April 2018, blast monitor V4 at 123 Eyre St was removed at the residents request and placed at the Eyre St Bowls Club.

Table 5-16 and **Table 5-17** lists the criteria for blasting ground vibration and overpressure for Western Mineralisation / Main Lodes (Western Min/Main Lodes) and Block 7, respectively**.**

Table 5-16 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 5-17 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 5-16** and **Table 5-19:**

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 4.3 per week over the previous calendar year
- Development blasts averaged 34.2 per week over the previous calendar year

A total of 1,577 blasts were fired during the reporting period, 1,449 for development and 128 for production. **Table 5-18** and **Table 5-20** lists the total number of blasts for each area per month during the reporting period and **Tables 5-19** and **Tables 5-22** summarise the blasts over 5 mm/s (Western Min/Main Lodes) and 3 mm/s (Block 7). "No Trigger" are the number of blasts that did not trigger vibration monitors.

In the Western Mineralisation/Main Lodes mining areas (external to Block 7), 1,574 blasts were fired. Of these, 1,449 were for development and 125 were for production. Two blasts exceeded 5 mm/s, all recorded from production blasts. The percentage of production blasts exceeding 5 mm/s was 1.6% and the percentage of development blasts exceeding 5 mm/s was 0.0%.

Table 5-18 Western Mineralisation/Main Lodes Summary of Blasts for Reporting Period

	Western Mineralisation / Main Lode									
	Production					Development				
	Blasts	< 5	>= 5	>= 10	No Trigger	Blasts	< 5	>= 5	>= 10	No Trigger
May-20	13	13	0	0	0	157	0	0	0	157
Jun-20	14	14	0	0	0	157	0	0	0	157
Jul-20	11	11	0	0	0	123	0	0	0	123
Aug-20	12	12	0	0	0	137	0	0	0	137
Sep-20	13	13	0	0	0	107	0	0	0	107
Oct-20	16	15	0	0	1	117	0	0	0	117
Nov-20	12	11	0	0	1	91	0	0	0	91
Dec-20	8	8	0	0	0	108	0	0	0	108
Jan-21	9	6	2	0	1	113	0	0	0	113
Feb-21	4	4	0	0	0	108	0	0	0	108
Mar-21	8	8	0	0	0	122	0	0	0	122
Apr-21	5	5	0	0	0	109	0	0	0	109
TOTAL	125	123	2	0	3	1449	0	0	0	1449

Table 5-19 Western Mineralisation/Main Lodes Blasts > 5 mm/s for the reporting Period

Production	Blasts >5 mm/s	Exceedance Result
125	2	1.6%

For the annual period May 2020 to May 2021, Western Mineralisation/Main Lodes production blast levels was compliant with the 5% allowance for ground vibration with 2.4% of blasts recording ground vibration over 5mm/s.

In the Block 7 mining areas (including the Zinc Lodes), a total of 3 production blasts were fired during the reporting period, all exceeding 3 mm/s at one or more of the compliance monitors. The percentage of production blasts exceeding 3 mm/s was 100%.

Table 5-20 Block 7 (and Zinc Lodes) Summary of Blasts for the Reporting Period

	Block 7 (includes Zinc Lode)									
	Production					Development				
	Blasts	< 3	>= 3	>= 10	No Trigger	Blasts	< 3	>= 3	>= 10	No Trigger
May-20	0	0	0	0	0	0	0	0	0	0
Jun-20	0	0	0	0	0	0	0	0	0	0
Jul-20	0	0	0	0	0	0	0	0	0	1
Aug-20	0	0	0	0	0	0	0	0	0	2
Sep-20	0	0	0	0	0	0	0	0	0	0
Oct-20	0	0	0	0	0	0	0	0	0	0
Nov-20	0	0	0	0	0	0	0	0	0	0
Dec-20	0	0	0	0	0	0	0	0	0	0
Jan-21	1	0	1	0	0	0	0	0	0	0
Feb-21	1	0	1	0	0	0	0	0	0	0
Mar-21	1	0	1	0	0	0	0	0	0	0
Apr-21	0	0	0	0	0	0	0	0	0	0
TOTAL	3	0	3	0	0	0	0	0	0	0

Table 5-21 Block 7 Blasts Exceeding 3 mm/s for Reporting Period

Production Blasts	Blasts >3 mm/s	Exceedance Result
3	3	100%

Table 5-22 lists the highest recorded results for ground vibration (mm/s) at each of the vibration monitors.

Table 5-22 Ground Vibration Results at Vibration Monitors for the Reporting Period

Vibration Monitor/Location	Highest Recorded Ground Vibration (mm/s)
V1 Silver Tank (located on CML7)	2.01
V2 Hire yard	3.14
V3 Air Express	9.60
V4 123 Eyre St / Bowls Club	7.29
V5 80 Eyre St	4.36
V6 BHO Core Shed (located on CML7)	10.26

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

While V6 BHO Core Shed recorded vibration over 10mm/s it is not a residential monitoring location and is in place to monitor vibration levels at the Bonanza St/South St overpass and against the 50mm/s limit.

There were no exceedances of criteria for overpressure levels.

5.14 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 5-23**.

During the reporting period EMM Consulting Pty Ltd conducted a noise assessment for these receptors, **Figure 5-21**. Attended noise monitoring was conducted during two consecutive night-time periods from 15 to 16 December 2020 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 (eg domestic and road traffic noise).

A total of 28 operator-attended noise measurements were completed, including two measurements at each of the 14 monitoring locations. For 2 out of the 28 samples the wind speed was below 3 m/s and therefore the noise limits did apply for these samples according to the site's EPL. Site noise was inaudible during 21 of 28 measurements. Noise monitoring results are shown in **Table 5-24**.

Figure 5-21 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 5-23 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 5-24 Noise Monitoring Results

Location	Date	Start	LA_{EQ}	LA_{MAX}	Rasp contribution $LA_{EQ(15\text{-}min)}$	Criteria	Compliant
A13	15/12	22:06	56	76	<30	35	NA
A14	15/12	22:25	36	50	IA	35	NA
A12	15/12	22:48	51	72	36	39	NA
A11	15/12	23:07	54	79	38	39	NA
A10	15/12	23:34	45	65	32	35	NA
A9	15/12	23:55	45	79	34	39	NA
A8	16/12	00:15	40	54	IA	39	NA
A7	16/12	00:36	44	71	IA	35	NA
A6	16/12	00:56	48	69	IA	35	NA
A5	16/12	01:14	55	75	IA	35	NA
A4	16/12	01:32	45	71	<30	39	NA
A3	16/12	01:50	42	68	IA	39	NA
A2	16/12	02:09	39	59	IA	35	NA
A1	16/12	02:27	44	72	IA	35	NA
A13	16/12	22:10	58	76	IA	35	NA
A14	16/12	22:28	37	52	<30	35	NA
A1	16/12	22:47	41	60	IA	35	NA
A2	16/12	23:05	39	53	IA	39	NA
A3	16/12	23:23	47	73	IA	39	NA
A4	16/12	23:49	51	76	IA	39	NA
A5	17/12	00:00	55	81	IA	39	NA
A6	17/12	0:18	54	71	IA	39	NA
A7	17/12	00:37	51	71	IA	35	NA
A8	17/12	00:56	39	71	IA	39	NA
A9	17/12	01:14	52	74	IA	39	NA
A10	17/12	01:32	39	55	IA	35	NA
A11	17/12	01:51	37	66	IA	39	NA
A12	17/12	02:09	54	83	38	39	NA

IA: Inaudible

5.15 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.

5.16 Indigenous Heritage

There are no known significant indigenous sites within CML7.

5.17 Natural and Social Heritage

5.17.1 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.

5.18 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.

5.19 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.

5.20 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, BHO 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.

5.21 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.

5.22 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).

5.23 Radiation

BHO has a Radiation Management Licence, RML5063802 current until 26 July 2021. The Licence permits BHO 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. SGS are contracted to conduct inspections of individual radiation gauges on site. They are scheduled to conduct the next inspection in June 2018.

Table 5-25 lists the regulated materials (fixed radiation gauges) that make up the schedule to the licence.

Table 5-25 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

6. 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.

BHO 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.

Raw water used during the period was 306 ML, a decrease from 316 ML used in the previous period.

Potable water used during the period was 11.2 ML, decreased from 15.6 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.

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

7. REHABILITATION

7.1 Buildings

No buildings were constructed on CML7 in 2020. The most recent building construction was the extension of the site warehouse in 2019.

7.2 Rehabilitation and Disturbed Land

A trial to cap Mt Hebbard with waste rock was agreed to by the Resources Regulator to be undertaken in 2018. As BHO was still developing a waste rock testing procedure and were unable to crush extracted material (waste rock) on the surface, waste rock was not applied to the surface of Mt Hebbard in 2019. Waste rock capping operations were further postponed as a site-wide Instability and Inrush Risk Assessment, and slope stability investigation, were conducted on waste dumps in 2020.

Dust deposition gauges were installed on top of the Mt Hebbard waste dump in October 2017 as part of the waste rock trial to be. It was proposed in the MOP to install the gauges to monitor current dust conditions for a 12 month period, then place waste rock capping and re-install the gauges to monitor for another 12 month period and compare results. 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 2019 to control dust. 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.

The waste rock capping trial for the Mt Hebbard waste dump is expected to progress in 2021.

A rehabilitation strategy has not been finalised although an Options Study for rehabilitation at Rasp Mine was begun in 2018 and in final draft stages in early 2021, having been updated to align with activities sought for approval in MOD6 of DA07_0018. The draft report included a revegetation assessment (with a review of previous revegetation programs) and recommendations for rehabilitation trials. Further development of the Rehabilitation Strategy is hampered by the lack of guidance from regulators following the Department of Premier & Cabinet Broken Hill Post Mining Interagency Meeting held in Broken Hill on 13 and 14 August 2019. 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 comments from David Williams, Director of Geotechnical Engineering, University of Queensland.

Table 7-1 and **Table 7-2** detail disturbed areas. No new areas were disturbed during the reporting period.

Table 7-1 Rehabilitation Summary

	Area Affected / Rehabilitated (hectares)		
	To date 1/05/2020-30/04/2020	**Last Report 1/1/2019-30/04/2020**	**Next Report 1/5/2021 – 30/04/2022**
A: MINE LEASE AREA			
A1 Mine lease(s) Area	226.4	226.4	226.4
B: DISTURBED AREAS			
B1 Infrastructure area (other disturbed areas to be rehabilitated at closure including facilities, roads)	64.5	64.5	64.5
B2 Active Mining Area (excluding items B3 – B5 below)	11.5	11.5	11.5
B3 Waste emplacements, (active / unshaped / in or out-of-pit)	2.27	1.92	2.27
B4 Tailings emplacements (active / unshaped / uncapped)	3.8	3.8	3.8
B5 Shaped waste emplacement (awaits final vegetation)	0.0	0.0	0.0
ALL DISTURBED AREAS	77.2	77.2	77.2
C REHABILITATION			
C1 Total Rehabilitated area (except for maintenance)	149.1	149.1	149.1
D REHABILITATION ON SLOPES			
D1 10 to 18 degrees	4.1	4.1	4.1
D2 Greater than 18 degrees	14.7	14.7	14.7
E SURFACE OF REHABILITATED LAND			
E1 Pasture and grasses	N/A	N/A	N/A
E2 Native forest / ecosystems			
E3 Plantations and crops	2.6	2.6	2.6
E4 Other (include non-vegetative outcomes)	151.3	151.3	151.3

Table 7-2 Maintenance Activities on Rehabilitated Land

	Area Treated (ha)		
NATURE OF TREATMENT	**Report Period**	**Next Period**	**Comment / control strategies / treatment detail**
Additional erosion control works (drains re-contouring, rock protection)	0	0	N/A
Re-covering (detail further topsoil, subsoil, sealing etc)	0	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	N/A
Feral animal control (detail – additional fencing, trapping, baiting etc)	0	0	N/A

8. COMMUNITY RELATIONS

8.1 Environmental Complaints

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

Six complaints were received over the reporting period compared to 30 complaints in the previous period. Of those complaints, four related to noise and two to blast vibration. **Table 8-1**. All complainants were contacted by BHO if requested and if details were provided.

All blasts were found to be compliant with the applicable licence limits. The finalised data was distributed to the EPA and the affected resident.

Four of the noise complaints were from the same complainant who had contacted both Rasp Mine and the EPA. A blast monitor and a noise monitor were installed at the complainants' residence. The results of the monitoring were provided to noise consultants who provided a report confirming BHO activities were not likely to be the source of any vibration and noise encountered at the complainants' residence. This report was provided to both the complainant and the EPA.

Table 8-1 Complaints register

Date of Complaint	Reason for Complaint	Comment
May 2020 Event #5761	Noise	• A complainant contacted BHOP regarding noise during the night of 17 May. • The complainant had made a complaint to BHOP previously. • BHOP staff have met with the complainant in response to this complaint. • A noise monitor was installed in the complainants' residence to monitor noise levels, frequencies, and record audio at triggered levels. • A blast monitor was installed at the complainants' property to monitor vibration from blasts. • Noise consultants were engaged to review noise and blast monitor data collected from the residence to determine impacts from BHOP activities.

Date of Complaint	Reason for Complaint	Comment
		• A review of the noise and blast data collected determined that BHOP activities were not likely to be the source of any vibration and noise encountered at the complainants' residence. • The review of the noise and blast data by consultants was provided in a report which was presented to the complainant and the EPA.
May 2020 Event #5761	Noise	• A complainant contacted BHOP regarding noise during the night of 24 May. • The complainant had made a complaint to BHOP previously. • BHOP staff have met with the complainant in response to this complaint. • A noise monitor was installed in the complainants' residence to monitor noise levels, frequencies, and record audio at triggered levels. • A blast monitor was installed at the complainants' property to monitor vibration from blasts. • Noise consultants were engaged to review noise and blast monitor data collected from the residence to determine impacts from BHOP activities. • A review of the noise and blast data collected determined that BHOP activities were not likely to be the source of any vibration and noise encountered at the complainants' residence.

Date of Complaint	Reason for Complaint	Comment
		• The review of the noise and blast data by consultants was provided in a report which was presented to the complainant and the EPA.
June 2020	No complaints in June.	
July 2020 Event #5923	Noise	• A complainant contacted BHOP regarding noise during the night of 6 July. • The complainant had made a complaint to BHOP previously. • BHOP staff contacted the complainant in response to this complaint. • A noise monitor was previously installed in the complainants' residence to monitor noise levels, frequencies, and record audio at triggered levels. • A blast monitor was previously installed at the complainants' property to monitor vibration from blasts. • Noise consultants were engaged to review noise and blast monitor data collected from the residence to determine impacts from BHOP activities. • A review of the noise and blast data collected determined that BHOP activities were not likely to be the source of any vibration and noise encountered at the complainants' residence. • The review of the noise and blast data by

Date of Complaint	Reason for Complaint	Comment
		consultants was provided in a report which was presented to the complainant and to the EPA.
July 2020 Event #6095	Noise	• A complainant contacted BHOP regarding noise during the early morning of 30 July. • The complainant had made a complaint to BHOP previously. • The complainant did not request further contact from BHOP staff regarding the complaint. • A noise monitor was previously installed in the complainants' residence to monitor noise levels, frequencies, and record audio at triggered levels. • A blast monitor was previously installed at the complainants' property to monitor vibration from blasts. • Noise consultants were engaged to review noise and blast monitor data collected from the residence to determine impacts from BHOP activities. • A review of the noise and blast data collected determined that BHOP activities were not likely to be the source of any vibration and noise encountered at the complainants' residence. • The review of the noise and blast data by consultants was provided in a report which was presented to the complainant and to the EPA.

Date of Complaint	Reason for Complaint	Comment
August 2020	No complaints in August.	
September 2020	No complaints in September.	
October 2020	No complaints in October.	
November 2020	No complaints in November.	
December 2020	Vibration	• A complainant contacted the NSW EPA about blast vibration on 17 December. 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 requested.
January 2021	No complaints in January.	

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.
March 2021	No complaints in March.	
April 2021	No complaints in April.	

8.2 Community Liaison

During the period of the AEMR, BHO 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)
- Resources Regulator within the Department of Regional NSW (RR)
- Department of Crown Lands (DCL)
- Essential Energy
- Essential Water
- Australian Rail Track Corporation Ltd (ARTC)
- Transport for NSW (TfNSW)
- Far West Area Health Service, Child and Family Health Centre

The following community communication activities occurred during the period:

- BHO was represented at the one quarterly meeting of the BHCC Lead Reference Group (BHLRG) during the reporting period on 18 March 2021. Covid-19 restrictions in 2020 had resulted in cancellation of BHLRG meeting for the year.
- Child and Family Health Centre Lead Week – BHO each year BHO 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.

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8.3 Community Support

During the reporting period, Rasp provided $20,750 to community groups.

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

9. 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 BHO 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 BHO 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').

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

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

Discussion of the audit findings and actions are provided in the 2019 – 2020 Annual Review.

10. INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

Environmental incidents are reported using the Rasp Incident Reporting Procedure BHO-SAF-PRO-101. BHO maintains a Pollution Incident Response Management Plan BHO-ENV-PLN-002 on the CBH website in accordance with EPA requirements.

The Pollution Incident Response Management Plan was tested in June 2020, in accordance with the requirements of EPL 12559.

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

1) Baghouse Emissions Testing Exceedance

On 12 February 2021, BHO notified regulators that quarterly emissions testing conducted at the Crusher Baghouse, EPL ID 2, on 9 December 2020 returned results (received January 2021) exceeding the PA07_0018 Schedule 3 Condition 4 Table 5 limits for Total Suspended Particles (TSP) and Type 1 and 2 Substances.

The TSP result from the test conducted on 9 December 2020 was 58.9 mg/m3 (limit 20 mg/m3), and the Type 1 and 2 Substance result from the 9 December 2020 test was 4.32 mg/m3 (limit 1 mg/m3).

Environmental harm was not likely as the baghouse is situated in a sheltered area, and the winds between 9 December 2020 and 11 January 2021 were predominantly from the South, so much of the dust emitted would be contained locally or could be expected to be deposited in the Blackwoods Tailings Facility.

Immediate actions

Upon review of the monitoring report received from Assured Environmental and confirmation the results were accurate, BHO took the following actions:

- The Crusher and Baghouse were shut down on 11 Jan 2021 and inspections of the baghouse seals and filter bags were conducted.

- The inspections included the use of a powdered dye deployed through the baghouse to detect dust leakage points in the filter enclosure including any holed filter bags. This process was completed three times. Holed bags were identified in each of the three rounds of testing and changed out. It was after the third test when a small hole was found in a filter bag and it was replaced that crushing recommenced.
- The incident was reported to the EPA Hotline at 4:40PM, 11 January 2021. The report reference is C00480-2021/EPA114940. An email detailing the incident was provided to the Compliance, DPIE, on 14 January 2021.
- Assured Environmental was engaged to attend site as soon as possible and conduct follow up testing of the baghouse emission limits following the filter bag replacements. This occurred on 20 January 2021. The results of which confirmed emissions to be below EPL limits as the TSP was 9.72 mg/m3 (EPL limit 20 mg/m3), and the Type 1 and 2 Substance result was 0.566 mg/m3 (EPL limit 1 mg/m3).

Contributing Factors

An investigation of the incident has determined there were a number of factors that contributed to the incident. These include:

- During daily inspections there were no visible signs of dust emissions.
- There was no monitoring devices installed to quantitatively measure the baghouse emissions.
- Filter bags had previously lasted much longer than 18 months and at a higher crusher throughput.
- During inspections of the top/clean area of the baghouse there was no significant dust accumulating on the baghouse surface which is an indicator of dust leakage/filter bag failure and had previously been the means by which leaks or holed filter bags had been identified.
- Testing for dust leakage with the dye powder is a qualitative indicator only, somewhat subjective, and at times difficult to detect particularly in small quantities.
- The delay in quarter 3 testing due to COVID-19 travel restrictions resulted in minimal time between receiving the quarter 3 results and the quarter 4 test being undertaken (approximately 1 week). Whilst it was determined that all filter bags should be changed at this time, the long lead time of 196 filter bags (approximately 3 months) meant that the task could not be undertaken promptly.
- BHO personnel had observed dye testing being performed by competent external personnel however they were not experienced in the task of which there is no formal training.
- The pressure differential gauge used to monitor air pressure in the baghouse is of a small scale and difficult to use in determining minor changes in pressure which indicates there are holed filter bags or loose seals.
- The compressor used to produce air to purge the dust collected on the bag filters was replaced in 2019 and was recently determined to be producing air at a higher pressure than required which may have contributed to the holing of filter bags.
- Purge jets above each bag filter deliver bursts of air to remove dust from the dirty side of each bag filter. After an inspection on 11 January 2021 it was determined that some jets were off-center which could generate tears in the bags by weakening and opening a hole in the bag.

Corrective Actions

- All 196 filter bags in the baghouse were replaced in April 2021.
- A suitable real-time dust monitor is to be installed in the baghouse exhaust stack to detect increases in dust output due to dust leakage including from damaged filter bags. BHO have been working with Ecotech who service the site TEOM and High Volume Air Samplers to source the real-time dust monitor. Assured Environmental have experience in calibrating stack dust monitors and will perform the calibration during each quarterly emissions sampling event.

- A more accurate pressure differential gauge was installed in the baghouse enclosure to provide another means of detecting damage in filter bags due to a differential in air pressure.
- Mill and Maintenance Operators were provided with training to identify issues with the baghouse operation.
- The trigger point for action with regard to monitored baghouse dust levels was reviewed and incorporated into relevant site procedures and manuals.
- The purge air compressor was adjusted to provide air at required pressures to reduce the chance of damaging bag filters and the required regulator has been ordered.

2) Exceedance of blasting limits for Block 7 production blasts

For the annual period May 2020 to April 2021, Block 7 compliance for production blasts exceeded the 5% allowance for ground vibration with 100% of blasts recording ground vibration over 3mm/s. Three production blasts were fired in Block 7 early in 2021 and all three registered over 3mm/s at a blast monitor. The highest recording at a residence was 4.36mm/s.

11. ACTIVITIES PROPOSED IN THE NEXT REPORTING PERIOD

The following lists the proposed activities during the next reporting period:

- Engage with stakeholders regarding the draft CMP content as well as the concept for post-mining land uses following outcomes from the inter-governmental consultation and review. This will form part of the Rehabilitation Strategy to be developed and submitted to DRG. This is dependent on receiving advice from DRG following the inter-government discussions.
- Develop in consultation with stakeholders the Rehabilitation Management Plan to be completed within 6 months of the approval of the Rehabilitation Strategy. This is dependent on receiving advice from DRG following the inter-government discussions.
- Submit MOD6 for DA07_0018.
- Completion of Embankment construction works and installation of an automated sprinkler system for dust suppression on TSF2.
- Undertake further sampling of surface materials to confirm lead levels which will assist in prioritising placement of waste rock/capping material and prioritise rehabilitation activities.
- Plan to remove goats from within the CML7 fenced area, annual program.
- 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 application of an alternative product for unsealed roads.
- Eyre Street dam project, remove contaminated bunding and materials from the dam and cap the area with suitable waste rock or revegetate the area or a mixture of the two.
- Weed control.
- Sediment removal in water storages as required.