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

Rasp Mine

Annual Review

REPORTING PERIOD

1 May 2021 – 30 April 2022

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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, MOD6, MOD7, MOD8, MOD9)
Name of holder of development consent / project approval:	Broken Hill Operations Pty Ltd
Mining Titles / Leases:	Consolidated Mining Lease 7 Mining Purpose Leases 183, 184, 185, 186
Name of holder of mining lease:	Broken Hill Operations Pty Ltd
Water licence:	85WA752823
Name of holder of water licence:	Broken Hill Operations Pty Ltd
AR Commencement Date: 01/05/2021	**AR End Date:** 30/04/2022
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 May 2021 to 30 April 2022 (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:	
Date: 30 June 2022	

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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	No
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 March 2022 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 3 Table 2	The Proponent shall ensure that all reasonable mitigation measures are employed so that particulate matter emissions generated by the project do not cause an exceedance of the criteria listed in Tables 1, 2 or 4 at any residence on privately-owned land.	Non-compliant	A severe weather event on the 12 January 2022 caused a temporary loss of power disruption to TEOM1 caused the Safety Switch Circuit Breaker to close at approximately 8pm and was not restarted until 8am the following morning. As a result of this the minimum data collection for the 24-hour period was no achieved and BHOP was non-compliant with Schedule 3 Condition 3 Table 2 of PA07_0018.	10
PA07_0018	Schedule 3 Condition 3 Table 2	The Proponent shall ensure that all reasonable mitigation measures are employed so that particulate matter emissions generated by the project do not cause an exceedance of the criteria listed in Tables 1, 2 or 4 at any residence on privately-owned land.	Non-compliant	A severe weather event on the 28 February 2022 caused a temporary loss of power disruption to TEOM2 caused an extended power disruption to central Broken Hill and infrastructure at the northern end of the mine site, TEOM2 was affected by this. Power was lost at approximately 7:25pm and wasn't restored until 10am the following morning. As a result of this the minimum data collection for the 24-hour period was no achieved and BHOP was non-compliant with Schedule 3 Condition 3 Table 2 of PA07_0018.	10
PA07_0018	Schedule 3	The Proponent shall ensure that all	Non-compliant	On 4 March, during the monthly changeover of depositional dust	10

	Condition 3 Table 2	reasonable mitigation measures are employed so that particulate matter emissions generated by the project do not cause an exceedance of the criteria listed in Tables 1, 2 or 4 at any residence on privately-owned land.		gauges it was found that the jar in DDG2, located in the Essential Water compound at Block 10, was cracked. This damage is believed to be as a result of the storm that passed through Broken Hill on 28 February 2022. The damage to collection jar rendered the sample void and no sample was recorded for DDG2 over this period, hence, a non-compliance was recorded against PA07_0018 Schedule 3 Condition 3.	
PA07_0018	Schedule 2 Condition 1	The Proponent shall implement all reasonable and feasible measures to prevent material harm to the environment as a result of the project.	Non-compliant	On 10 March 2022 during an inspection of S49, seepage was observed extending approximately 4m beyond the boundary fence. The seepage occurred as a result of rain on the 28 February and a lack of equipment to move water out of the pond. This	10
CML 7	Condition 2	(b) The MOP must: • identify how the mine will be managed to allow mine closure;	Non-compliant	To be developed within the Rehabilitation Management Plan to be submitted July 2022.	

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 PM10 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

2. INTRODUCTION

2.1 Purpose

The Annual Review (AR) documents the environmental performance of the Rasp Mine for the reporting period 1 May 2021 to 30 April 2022. 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.

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**.

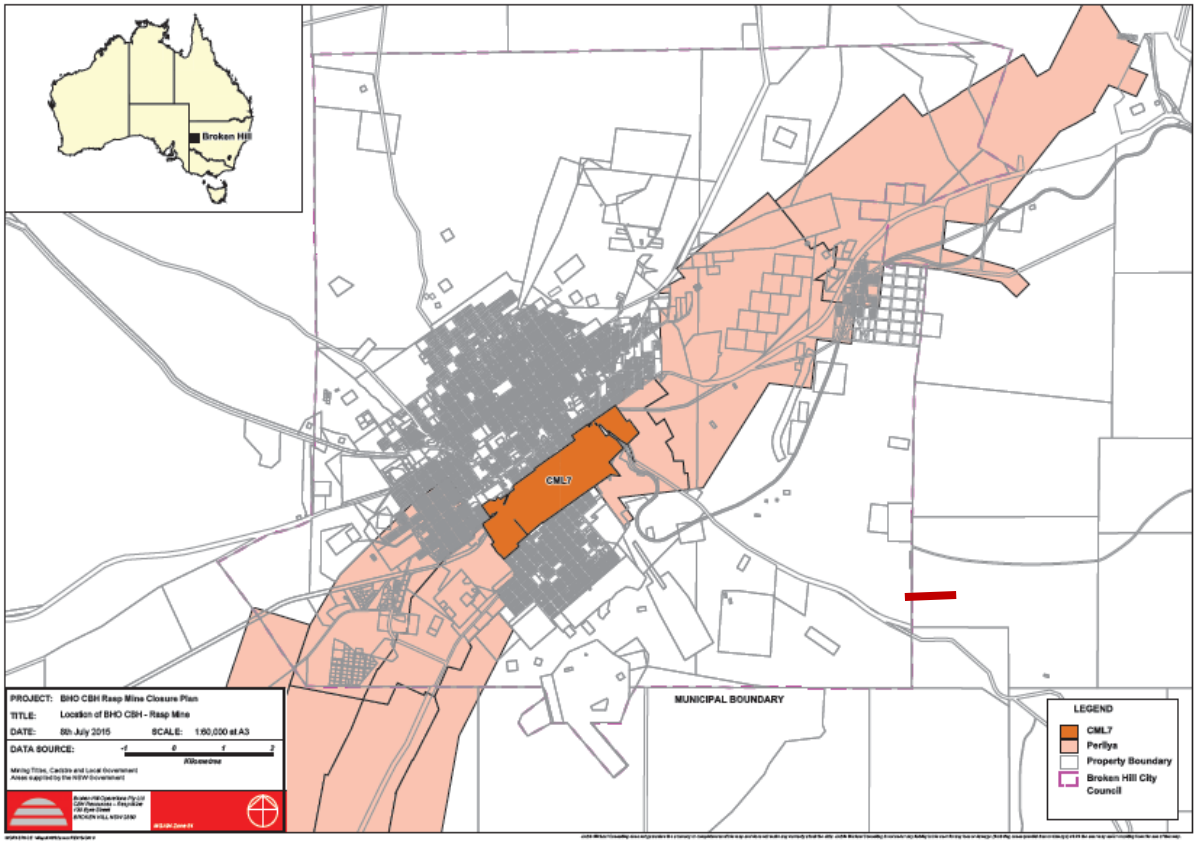
The mining leases occupy a central region of the historic Broken Hill Line of Lode ore body incorporating the original mine areas that commenced operations in the 1880s including a substantial amount of mining infrastructure from various mining phases. The Mine was the birthplace of Broken Hill Pty Ltd (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	
Giorgio Dall'Armi	BHO General Manager	
Joel Sulicich	BHO HSET Manager	
Devon Roberts	BHO Senior Environmental Advisor	
Jacinta Clark	BHO Environmental Graduate	
Complaints Line	Health, Safety and Environment Office	

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) MOD4 – Installation of Concrete Batching Plant and Extension to TSF2 MOD5 – Warehouse Extension, Cement Silo and adjustment of air quality monitoring MOD6 – New Tailing Storage Facility and Mine Portal (March 2022) MOD7 – Utilise, crush and screen waste rock in BHP Pit for Embankments construction MOD8 – Mining under a Perilya Sublease MOD9 – Extension of Underground Exploration (December 2021)
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 2025	Use of refrigerant
Water extraction 85WA752823	NOW	29 Mar 2027	To extract 370 ML for use on site or to send to Perilya Broken Hill Operations Pty Ltd.
Radiation #5063802	EPA	26 July 2022	Sell and/or possess radiation apparatus. Sell and/or possess radioactive or items containing radioactive substances.

3.2 Mining Operations Plan

The Rasp Mine has an approved Mining Operations Plan (MOP) currently in place for the period 1 October 2021 to 30 September 2023 (to be voided with submission of Rehabilitation Management Plan).

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 twice:

- MOD9 to permit the extension of Underground Exploration; and
- MOD6 to permit the construction of a new mine portal, Kintore Pit TSF (TSF3) and conduct capping of surface areas to progress rehabilitation.

Construction of the TSF2 Embankment Stage 2 (Embankments 1 and 3)was completed in July 2021.

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 2022 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 2019	At end of previous period	End of reporting period
Waste rock	NA	2,601,599	2,873,599	3,154,662
Ore	750,000	4,944,453	5,603,718	6,046,645
Processing waste (Tailings)	NA	4,290,534	4,869,006	5,261,606
Product (Concentrates)	NA	576,375	659,263	725,644

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 Centenary, Blackwoods and Thompson areas was conducted in the 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, Main Lode, including Thompsons and beyond the Blackwoods ore deposits.

4.1.2 Underground exploration

During the reporting period, 39,410.4 m of underground diamond drilling was completed.

The 2022/2023 program will continue to focus on the Western Mineralisation, Centenary, and Main Lode (including Blackwoods).

4.2 Construction

4.2.1 New buildings / structures

Construction works for Stage 2 of the Blackwoods Pit TSF2 embankment raise were completed in July 2021 with raising Embankment 1 and 3. Blast monitors have been installed on each of the three Embankments to satisfy the Dam Safety Committee requirement for blast monitoring. The trigger limit has been set at 30mm/s.

The TSF2 Embankment 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.

Construction of the TSF2 water spray system is continuing and is expected to be completed in 2022.

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 442,927t of ore from 51 stopes was mined during the reporting period. This resulted in approximately 9,842 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 197,140t placed during the reporting period. This includes Cemented Rock Fill where conditions and requirements 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 281,063t was extracted as waste, 197,140t of waste rock was returned underground as void fill, and 83,923t to surface pits. At the end of the reporting period, the waste stockpile in Kintore Pit held approximately 1,200,000t and BHP Pit held approximately 100,000t.

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 Ore and waste stockpiles

Ore mined in the reporting period (442,927 t) was transported by truck and stored on the ROM Pad before being processed. The ROM Pad is 32m by 80m 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 (442,927t) was below the approved maximum rate of 750,000t/pa.

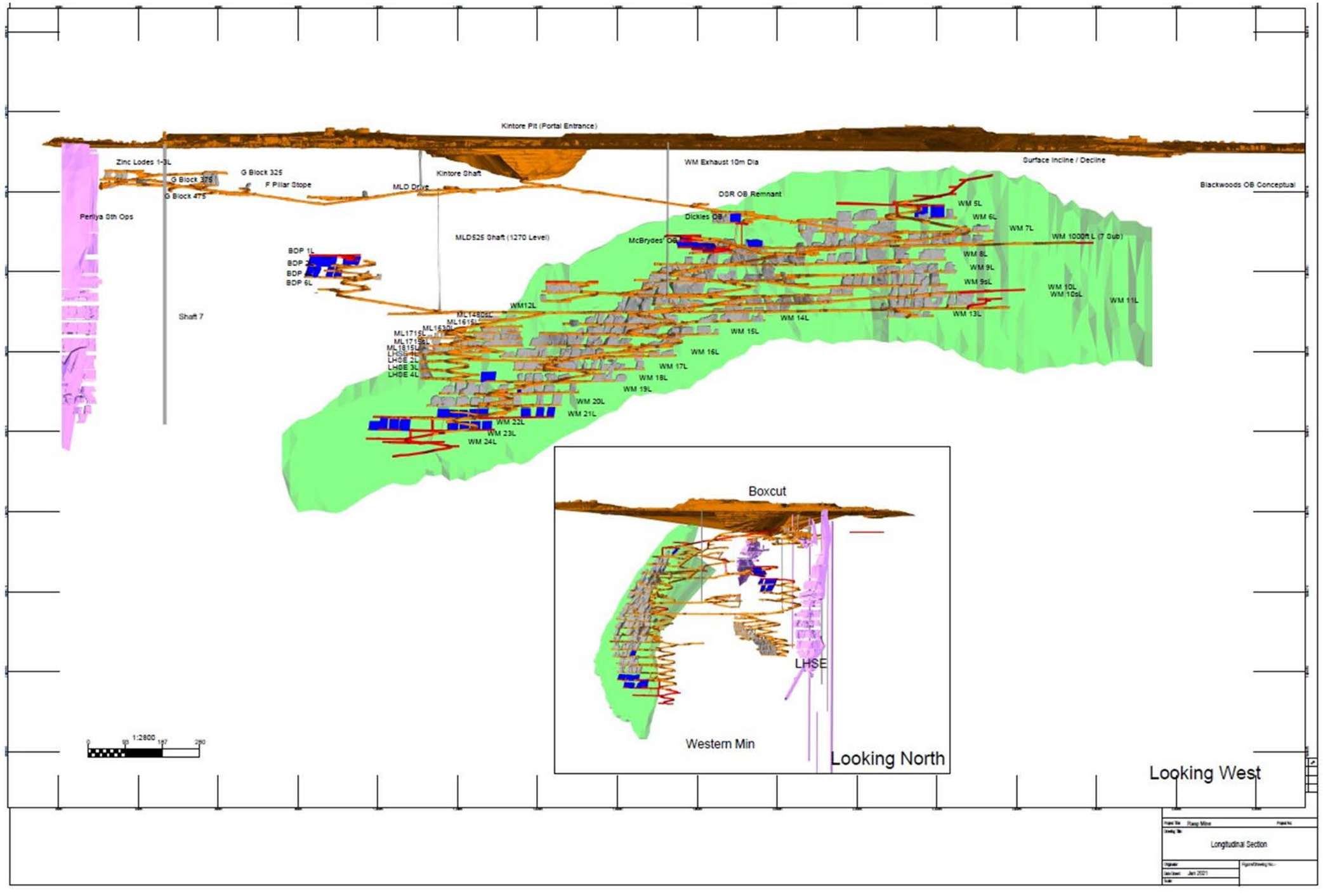
A total of 83,923t of waste was hauled to the surface from underground during the reporting period and stored in Surface Pits totalling approximately 1,300,000t stored.

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	442,927
Waste Backfill (UG voids): Tonnes	197,140
Waste Trucked to Pits	83,923

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 Aurizon-owned 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.

With MOD6 approval, the capacity of TSF2 is extended by employing tailings harvesting with deposit to Kintore Pit TSF3.

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	435,200
Lead concentrate	22,781
Zinc concentrate	43,600
Tailings deposited	392,600
Tailings Storage Facility (TSF2) storage capacity as at end of period	October 2022

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, 392,600t of tailings were pumped to TSF2, on average the tailings contained zinc (0.74%), lead (0.37%), copper (0.02%), Ag (8g/t), and 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
April 2022	309,375	0	309,375	250,000	392,600	197,140	83,923	281,063
TOTALS	**2,483,883**	**968,401**	**1,675,157**	**2,500,000**	**5,043,889**	**2,718,785**	**1,290819**	**4,028,644**

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

The next reporting period will see BHOP enacting MOD9 approved in December 2021 and begin construction on MOD6 approved in March 2022. MOD9 will allow access to the Blackwoods deposit and MOD6 will provide a new tailings storage facility, to relieve pressure on TSF2, which is nearing capacity.

4.6.1.1 MOD4 TSF2 water spray system

The water spray system that was designed and approved as part of MOD4 has been partially installed at the end of the previous reporting period. It is expected that the system will installed and operational by the quarter three of 2022. The spray system has been redesigned to complement the MOD6 TSF2 harvesting arrangement.

4.6.1.2 MOD 9

Development consent (PA07_0018) MOD 9 was granted on 23 December 2021. This development allows BHOP to extend underground exploration in the Main Lode to Blocks 13-15 within CML7. Mining techniques in this new area of development will not change from current practice.

In addition, MOD9 includes the installation of an emergency egress ladder from Stockpile 1 (underground) to the surface. The new egress ladder has been installed near the current main vent shaft and the current emergency egress/winder will be decommissioned. The new egress ladder has been installed in an area that has not previously been mined and there are no historic workings. The ladderway is approximately 150m long and has opening/closing platforms every 6m and the exit point is enclosed in a secure, well-ventilated structure.

4.6.1.3 MOD 6

Development consent (PA07_0018) MOD6 was granted on 16 March 2022. This development would see BHOP establish Kintore Pit as a new Tailings Storage Facility (TSF3). In order for this to occur, a new mine portal and access decline will be developed and TSF2 will be redeveloped to allow tailings drying and harvesting for final deposition in Kintore Pit.

Golder Associates (Tailing Storage Facility Options Assessment, September 2017) were engaged to investigate potential sites in and around Rasp Mine for establishment of a new tailing storage facility, concluding that Kintore Pit is the most suitable site. It was established that in order to reduce the risk of inrush to the underground workings, tailings would need to be dewatered further than 35% as is output by milling processes, leading to the decision to dry (naturally) and harvest tailings.

As part of MOD6 approval BHOP will begin monitoring for $PM_{2.5}$ as well as continuing to monitor PM_{10} and TSP. Noise monitors will be installed on TSF1 to monitor noise from excavation and construction of the boxcut.

4.6.2 Exploration

During 2022, exploration on CML7 will continue to focus on:

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

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

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

4.6.3 Operations

Table 4-7 outlines the planned production rates for 2022**. Figure 4-2** shows the mining areas and stopes. Planned mine production is estimated at 454,218t, tailings deposition is estimated at 392,600t.

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

Activity	Next reporting period (t)
Ore Mined	454,218
Waste Backfill (UG Rock Places)	172,000
Waste Trucked to Surface	84,000
Milled	454,000
Lead concentrate	17,000
Zinc concentrate	44,400
Tailings deposited	392,600
TSF2 storage capacity as at end of period	0.25 years
TSF3 storage capacity as at end of period	13 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.

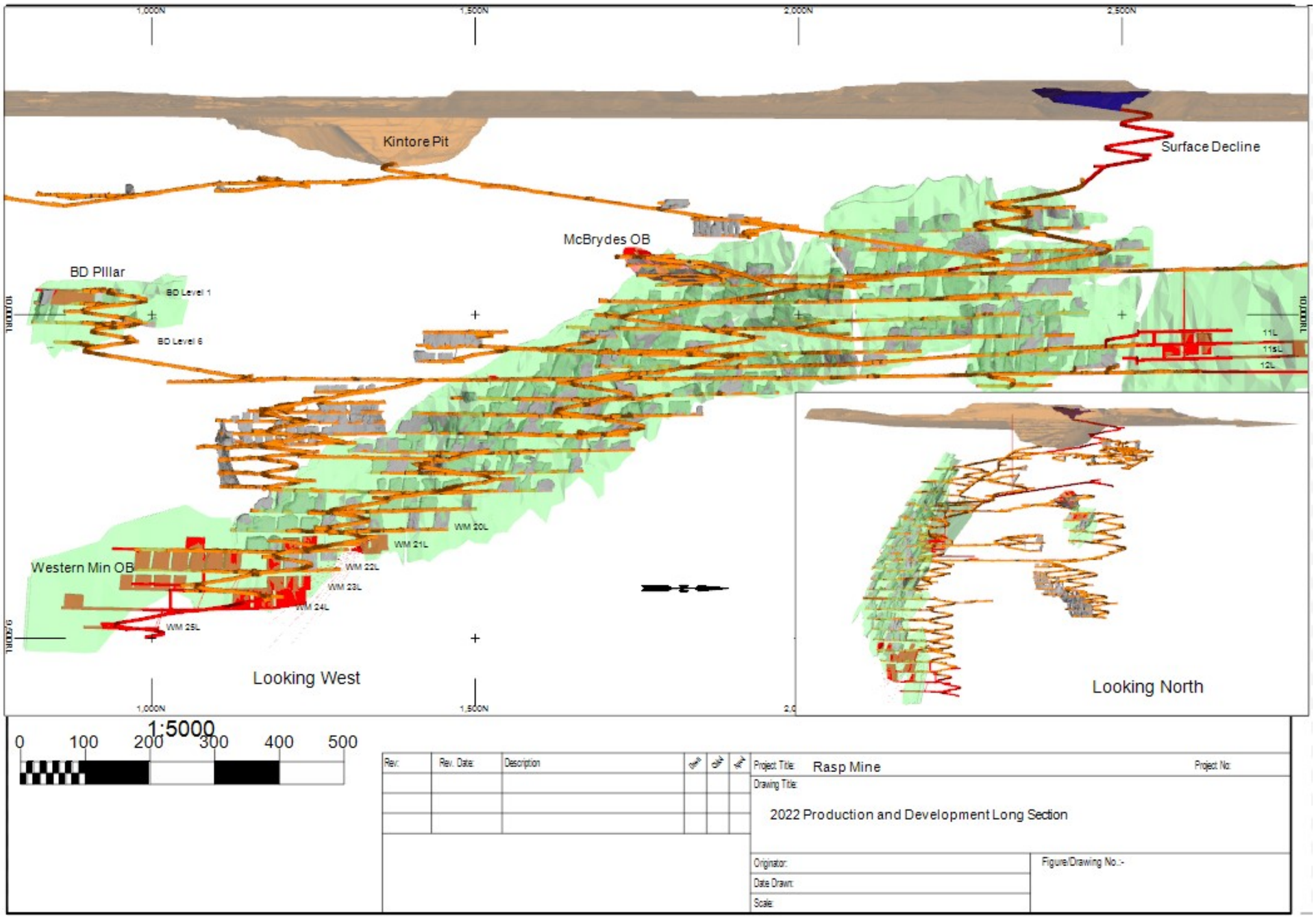
With the construction of Kintore Pit TSF3 an new repository for potentially contaminated sediment will become available.

4.6.5 Modification applications

In 2022, BHO will apply for modification (MOD10 & MOD11) of the project to the installation of a new ventilation raise to provide adequate ventilation to northern areas of the mine and mine northern

areas of Main Lodes containing the Blackwoods and Blackwoods North deposits, including the final stages of Blackwoods development and mining of Blackwoods and Blackwoods North.

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).

Temperatures and rainfall in the reporting period remained consistent with the BoM's long-term averages, with rainfall (286.1mm) for the period was higher than the BoM's long-term annual average of 246mm. There were 48 rain days for the period with most rain, approximately 200.6mm, falling between January and April 2022. Winds were predominantly from the south with high winds experienced during July to January.

Figure 5-5-1 Weather Data for the Reporting Period

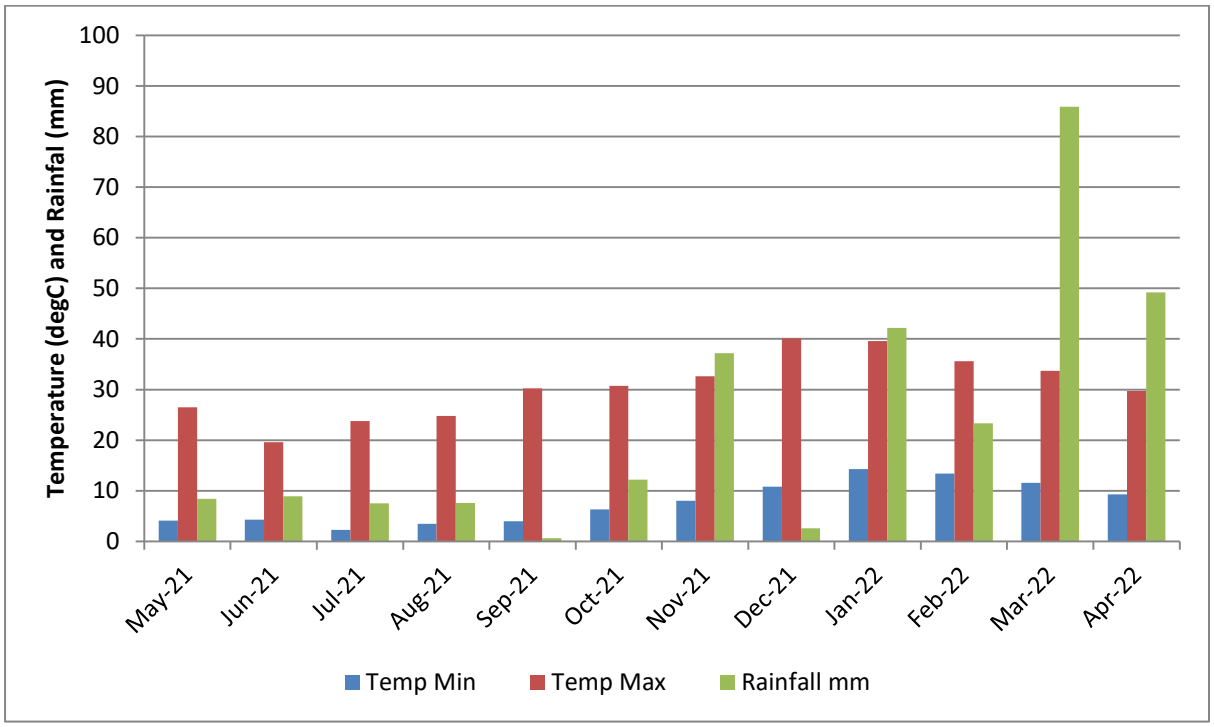


Table 5-1 Summary of Wind and Rain Days in Reporting Period

Month	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Predominant Wind Direction	SSW	SW-NW	NW	SW	S-SW	S-SW	SSW	S	S	S	S	S
Max wind speed (km/hr)	49.5	41.7	52.7	51.2	52.7	51.4	50.4	60.6	54.0	49.1	49.1	40.6
Days rained in month	3	5	7	3	1	4	7	1	6	3	2	6

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	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:

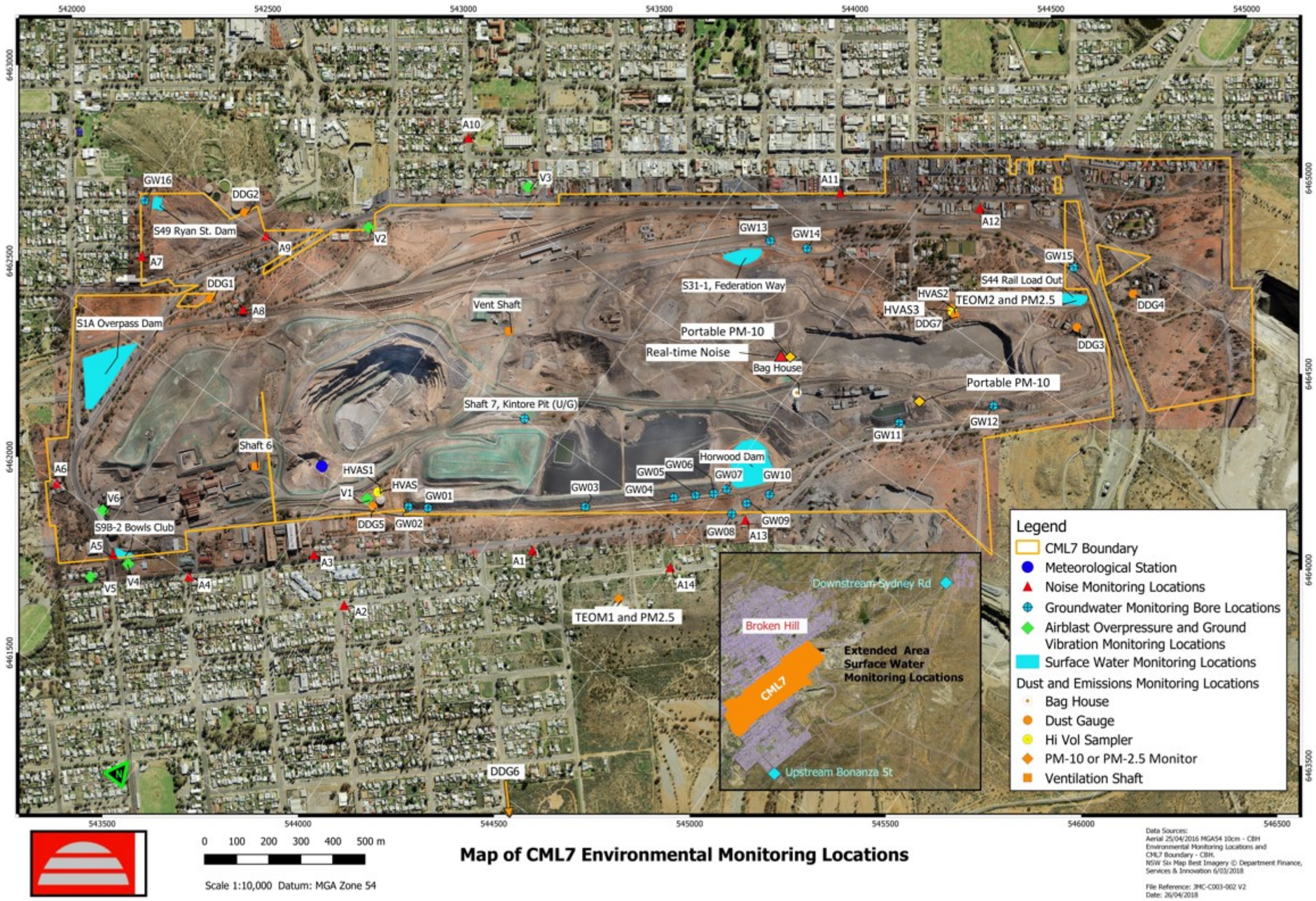
- Air emissions from in-stack mine exhaust ventilation and the crusher baghouse are tested quarterly by an external contractor with specialised equipment;
- Ambient air quality is monitored by BHO personnel via a combination of dust deposition gauges, high volumes air samplers (HVAS) and tapered element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

A Sintrol real-time dust monitor was installed in the crusher baghouse emissions stack in April 2022 to provide early warning of potential damage to the baghouse dust bags.

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.

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

	Limit	Primary Vent (EPL1)				Crusher Baghouse (EPL2)			
Testing Date		11/08	12/10	23/11	22/02	11/08	13/10	24/11	22/02
Nitrogen Oxides (mg/m^3)	350	2.22	5.28	2.23	<2.05	N/A[1]	N/A[1]	N/A[1]	N/A
Volatile Organic Compounds (mg/m^3)	40	0.464	0.438	2.91	0.757	N/A[1]	N/A[1]	N/A[1]	N/A
Total Suspended Particles (mg/m^3)	20	1.83	1.38	1.55	2.81	3.74	2.96	1.5	3.35
Type 1 and Type 2[2] (mg/m^3)	1	0.227	0.0102	0.0104	0.0669	0.479	0.0869	0.0292	0.141

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 and continuous stack monitor.

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.

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	Maximum total

		deposited dust level	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 (May 2021 – April 2022) 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. There were 5 occasions where the monitoring location exceeded the depositional dust level of 4 g/m^2/month limit (red figures in **Table 5-5**), which was the same in the previous reporting period. 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. Although there has been increase rainfall in the latter part of the reporting period, these large rainfall events have often been preceded by high winds and regional dust storms.

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	
May-21	0.4	0.00089	0.1	0.00087	2.6	0.0258	1.1	0.001	0.9	0.00349	1.2	0.00061	0.7	0.00528
Jun-21	0.2	0.00059	0.1	0.00037	0.5	0.0071	1.1	0.003	0.8	0.00277	0.9	0.00052	0.4	0.0012
Jul-21	0.8	0.00124	1.1	0.00093	0.6	0.007	2.0	0.003	3.3	0.0109	3.1	0.00188	0.7	0.0011
Aug-21	0.5	0.00081	0.8	0.00055	0.6	0.00735	2.5	0.007	2	0.00762	2.2	0.00212	0.4	0.00167
Sep-21	0.8	0.0023	1	0.00095	1.2	0.0127	2.6	0.0155	1.2	0.00689	1.7	0.00235	0.6	0.0035
Oct-21	1.8	0.0035	2.7	0.00148	2.2	0.0194	3.3	0.00708	3.2	0.0092	6	0.0024	1.4	0.00537
Nov-21	1.3	0.00119	1.5	0.00063	1.4	0.0059	2.6	0.00773	1.4	0.00207	6.1	0.00181	0.6	0.00246
Dec-21	1.8	0.00291	1.8	0.0017	2	0.00746	4.6	0.0093	3.2	0.0057	5.3	0.0023	1.1	0.00249
Jan-22	2.6	0.00288	2.5	0.00214	2.8	0.018	6.8	0.0186	4.6	0.00662	5.8	0.00319	2.2	0.00774
Feb-22	2.8	0.00221	ns	ns	3	0.0348	7.4	0.0115	3.1	0.00464	3.1	0.00071	1.9	0.00514
Mar-22	1.2	0.00192	1	0.00093	1.4	0.0026	5.9	0.00232	2.7	0.00353	3	0.000738	ns	ns
Apr-22	0.6	<0.000874	0.6	<0.000874	1.1	0.0033	1.5	0.00503	1	0.00181	0.2	<0.000874	0.6	0.0017
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

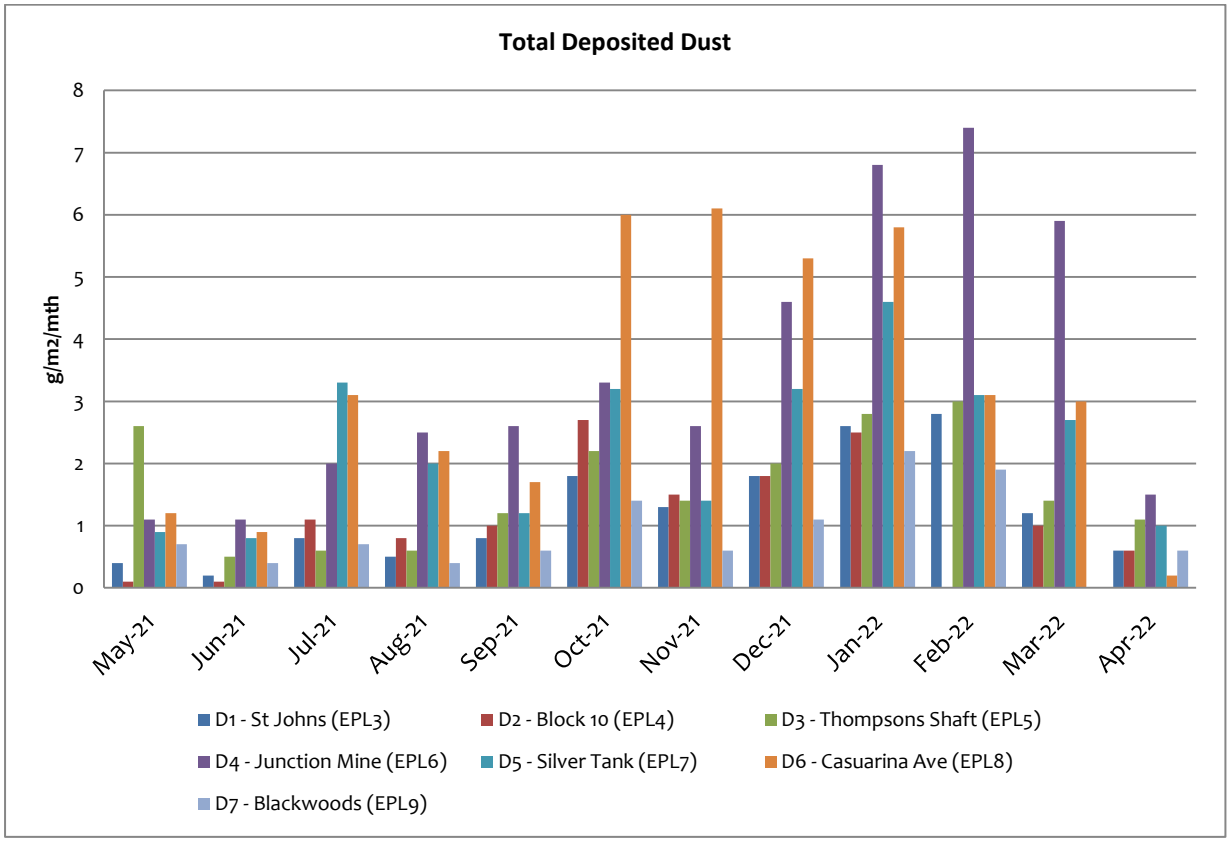


Figure 5-4 Monthly Lead Deposition for the Reporting Period

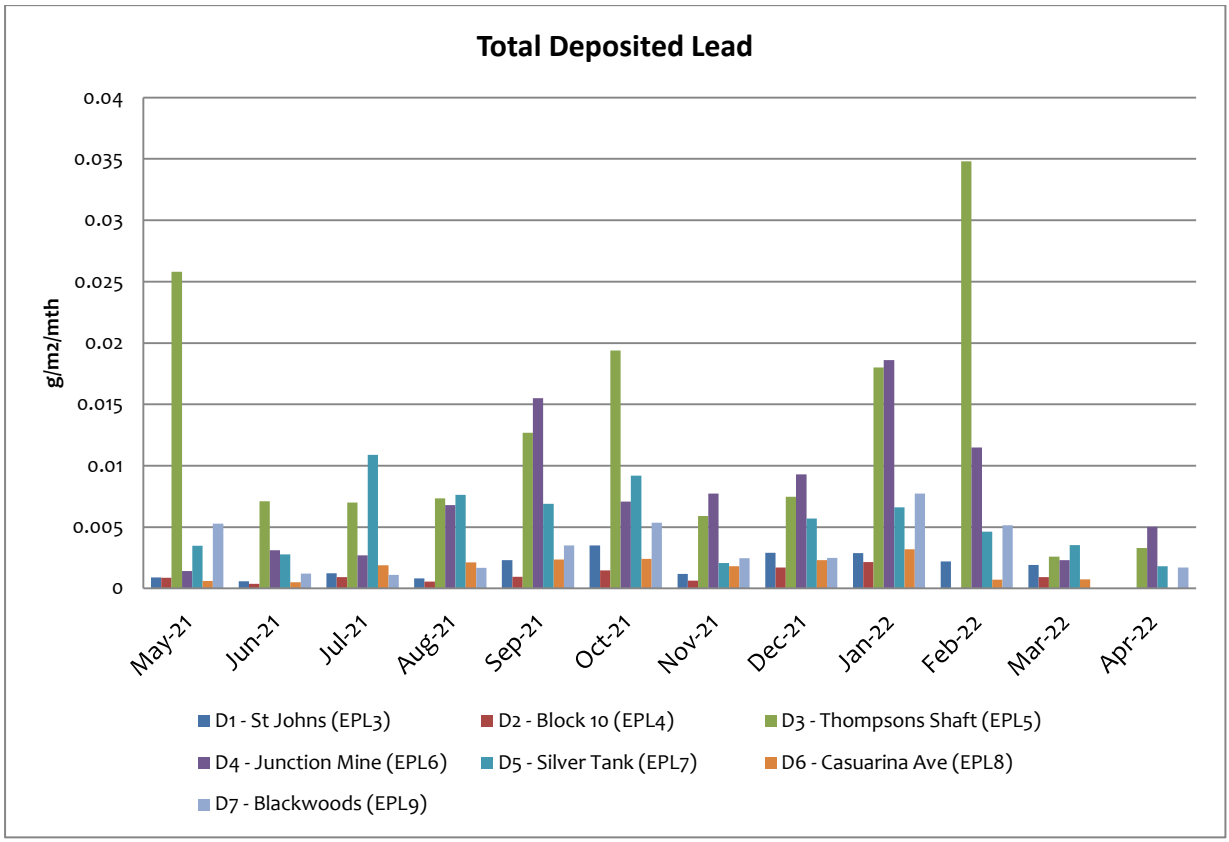


Figure 5-5 Total Deposited Dust 2007 – Apr 2022

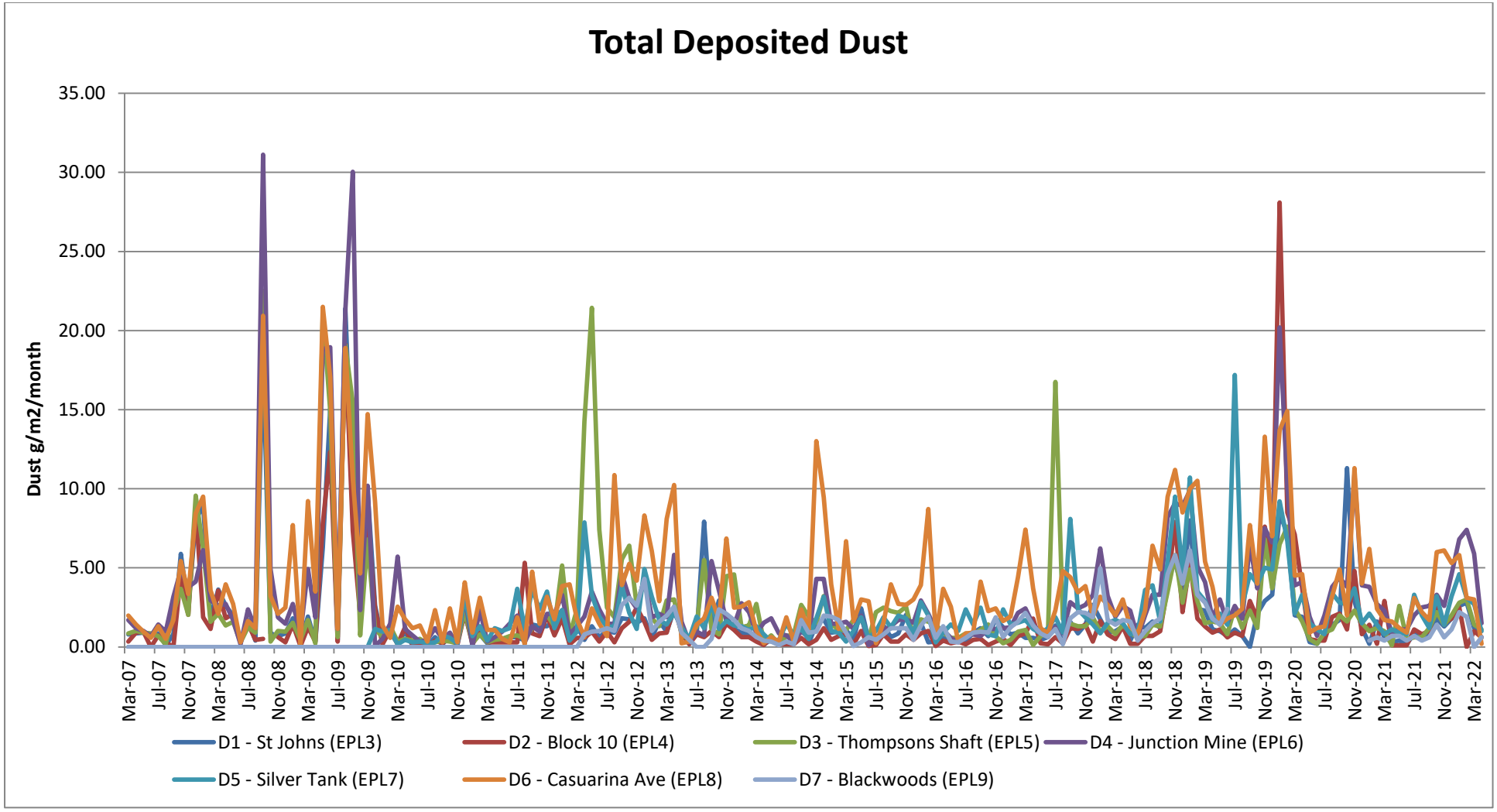
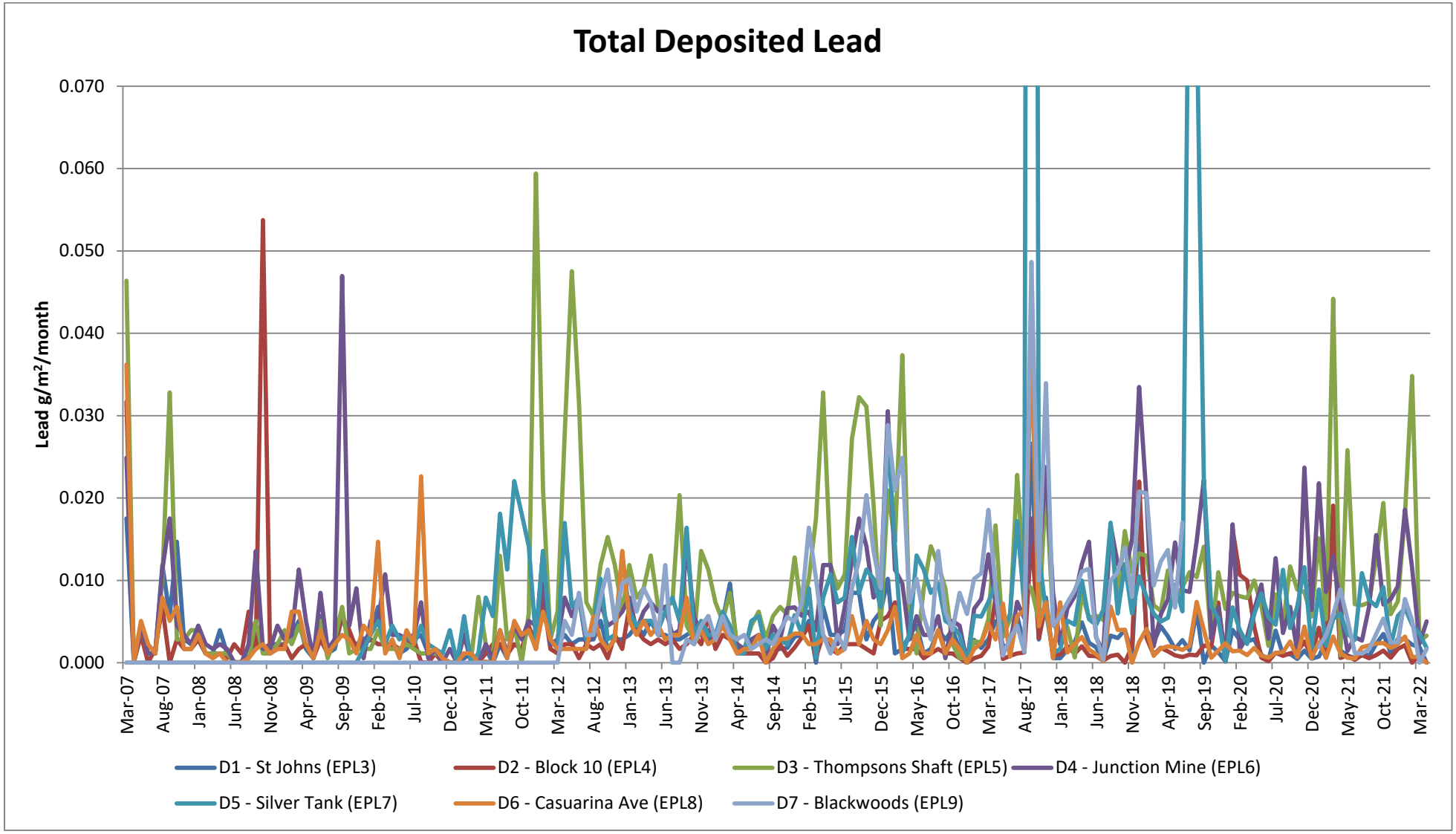


Figure 5-6 Total Deposited Lead 2007 to Apr 2022



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

Note: Criteria changed from 30 µg/m^3 to 25 µg/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 35.98µg/m^3 for the reporting period was a significant decrease from the previous period rolling annual average of 53.59µg/m^3.

The rolling annual average TSP-lead at the HVAS unit has decreased to 0.18µg/m^3 from 0.24µg/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 0.50µg/m^3.

The highest TSP-Lead level recorded was on 30 August 2021 (0.85µg/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 2022. Results for TSP are well below the EPA threshold of 90µg/m^3 and 0.5 µg/m^3 for TSP-lead.

Figure 5-7 HVAS TSP Results for the Reporting Period

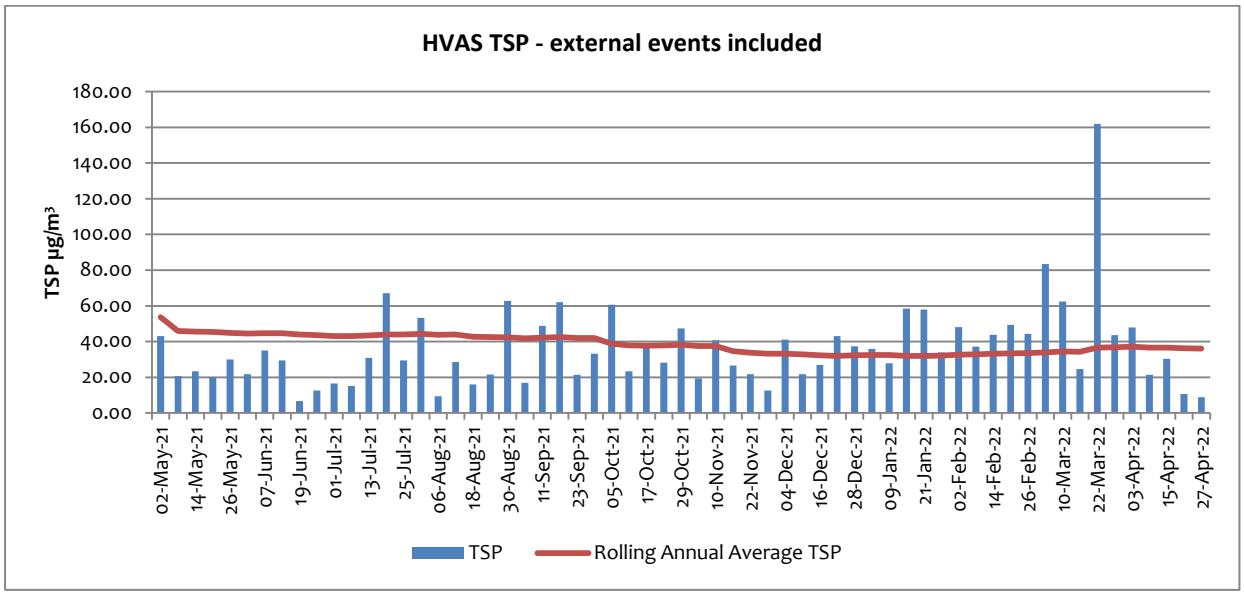
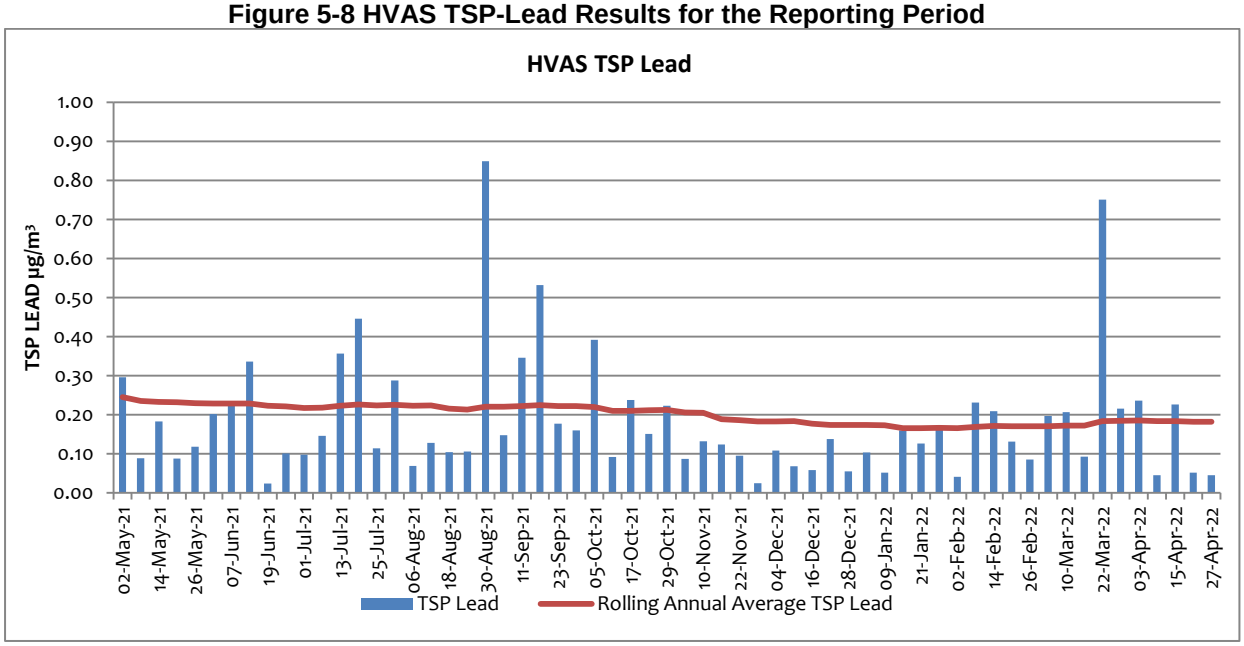


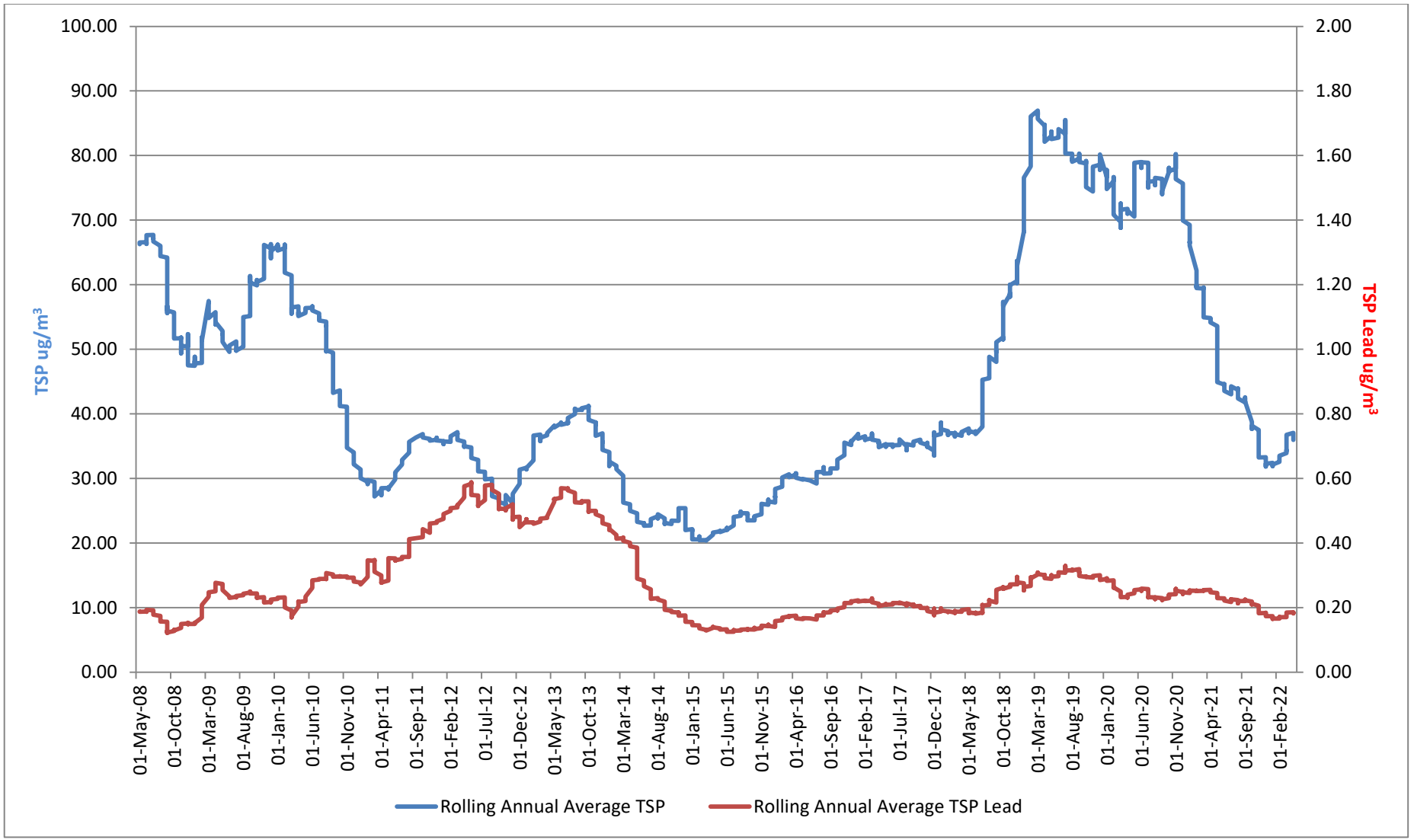
Figure 5-8 HVAS TSP-Lead Results for the Reporting Period



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 after 2016 due to the period of drought but are falling in the reporting period due to increased rainfall. 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 2022

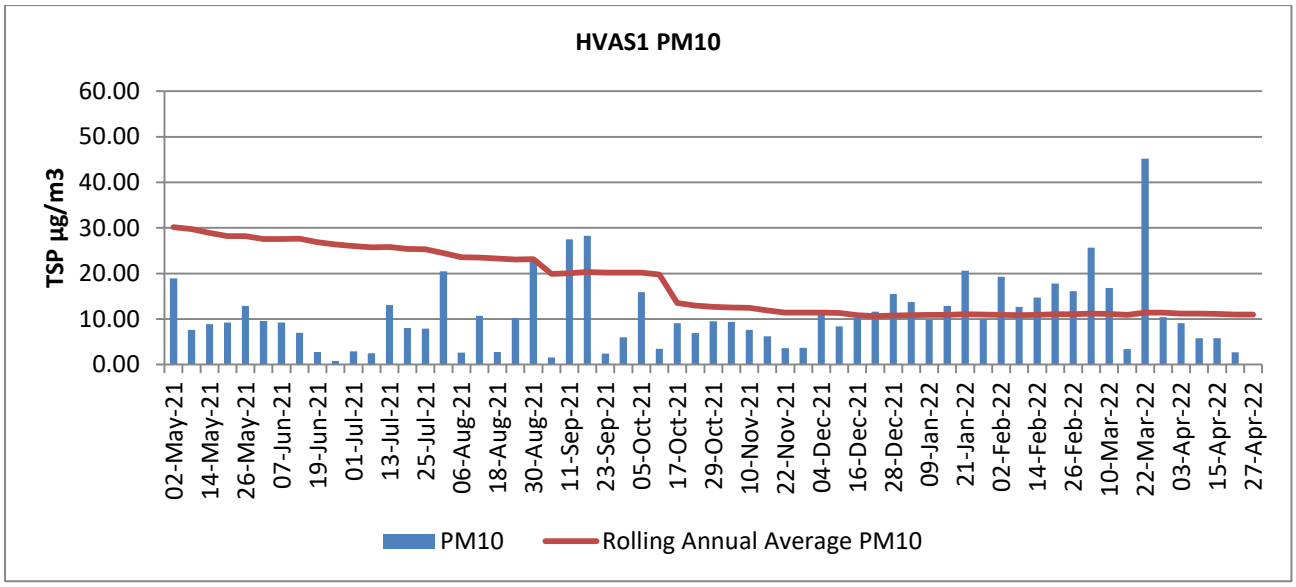


HVAS1 (EPL11)

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 11.0μg/m^3, which has decreased from the previous reporting period of 30.2μg/m^3 and is well below the background level of 29.1μg/m^3 reported in the EA. The average annual PM_{10} level calculation includes 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 below the criteria of 25 μg/m^3, and has consistently trended downwards during the reporting period.

Results for the period 2011 to 2022 are shown in **Figure 5-14**.

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

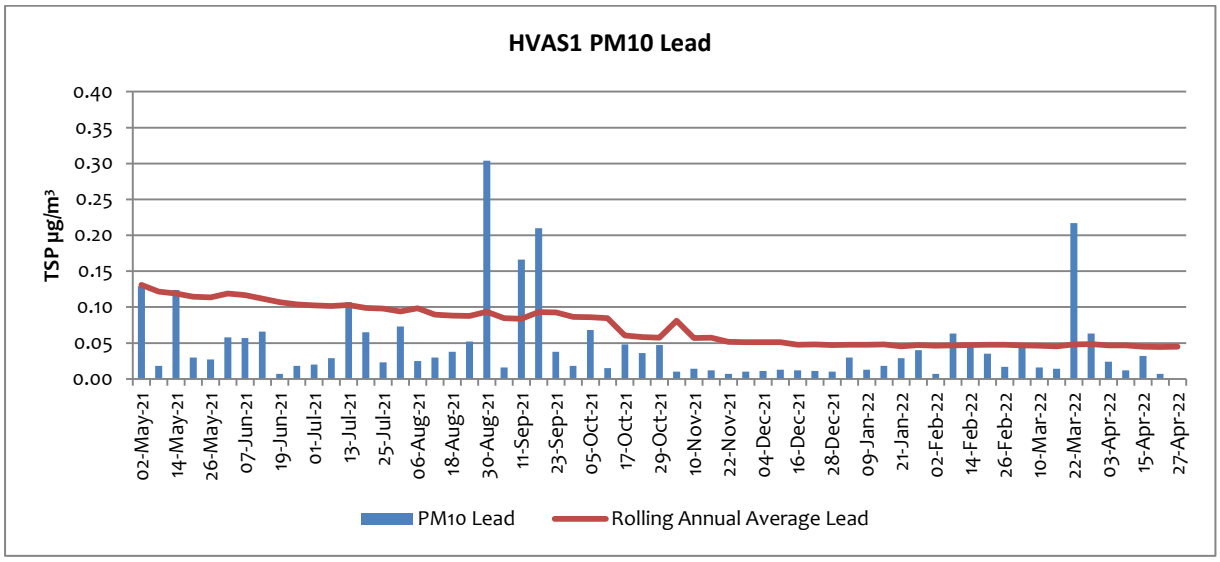


The annual average PM_{10}-lead concentration has decreased significantly from 0.13μg/m^3 in the previous reporting period to 0.04μg/m^3, **Figure 5-11**. The highest HVAS1-Lead level recorded was on 30 August 2021 (0.30μg/m^3).

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 2022 are shown in **Figure 5-17**.

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

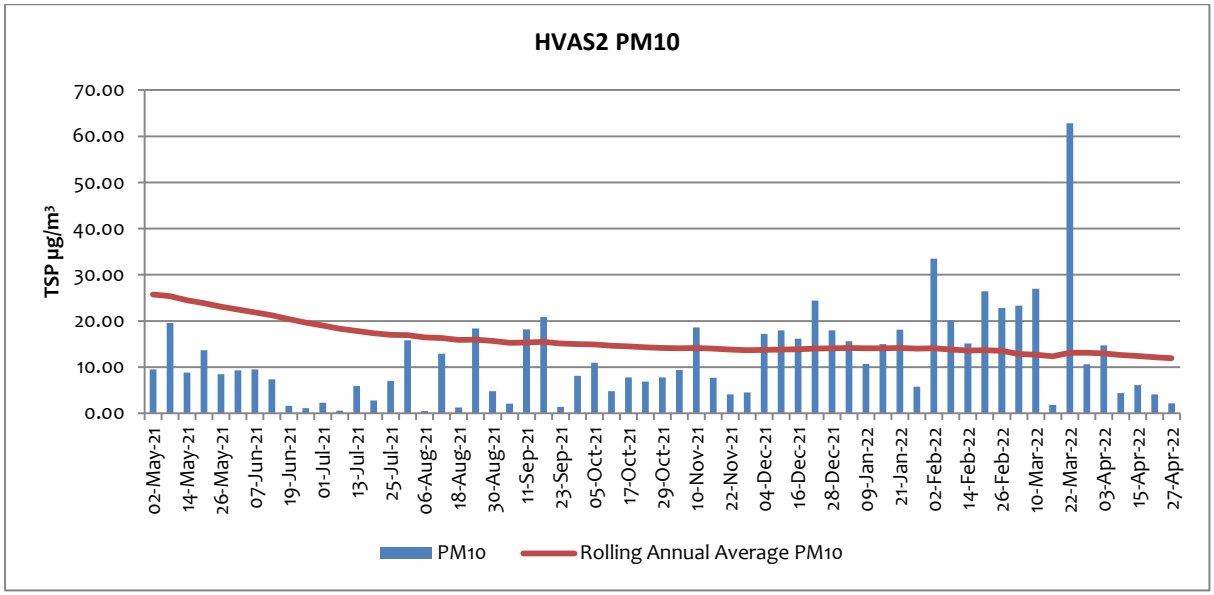


HVAS2 (EPL12)

The average annual PM_{10} level recorded at this monitoring point was 11.94µg/m^3, which has decreased from the previous reporting period (25.74µg/m^3), below the background level reported in the EA of 29.1µg/m^3 but 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 2022 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.

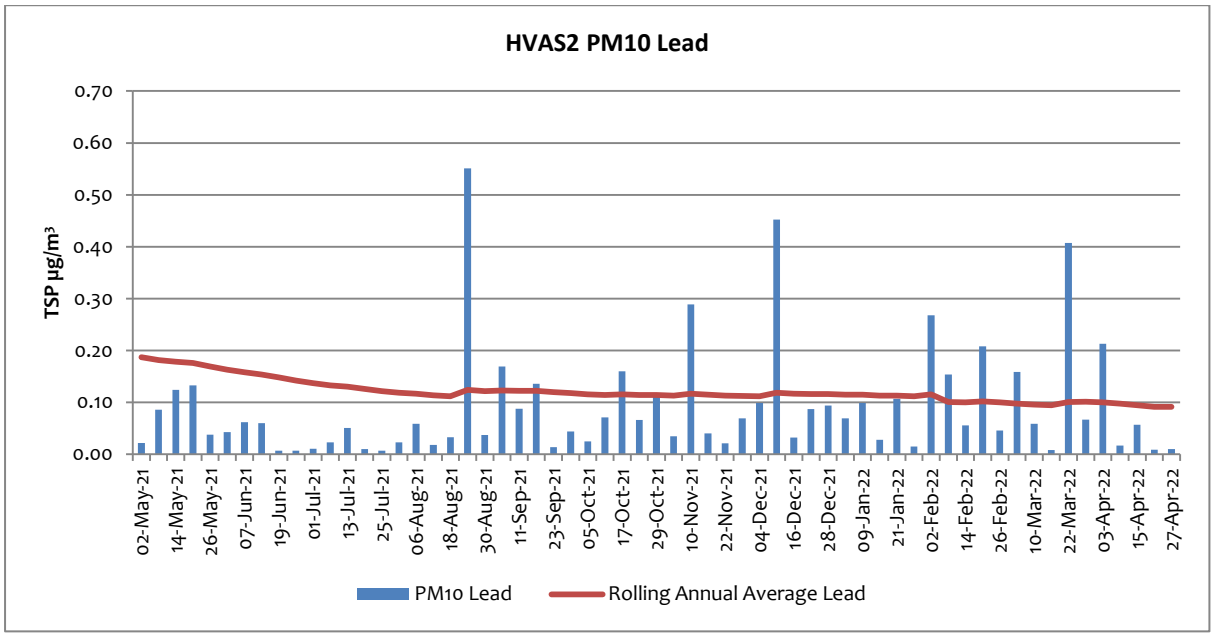
Figure 5-12 HVAS2 PM_{10} Results for the Reporting Period



The average annual PM_{10}-lead level recorded at this monitoring point was 0.09µg/m^3, which is a decrease over the previous reporting period (0.19µg/m^3), below the background level reported in the EA of 29.1µg/m^3 and below the criteria of 25µg/m^3 (for off-site receptors). **Figure 5-13**.

Results for the period 2011 to 2022 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.

To 27 April 2022 the rolling average annual TSP level recorded at this monitoring point was 32.63µg/m^3, down from 51.02µg/m^3 at the beginning of the reporting period as seen in **Figure 5-14**. The rolling annual average for TSP Lead in April 2022 was 0.35µg/m^3, a decrease from 0.39µg/m^3 at the beginning of the reporting period. Elevated lead levels were recorded during the month of May 2022, given the wind direction for most of the most being predominately from the NW and E for the month of May, it is likely that only the results for 14 May 2022 were as a result of dust generated on site.

Figure 5-14 HVAS3 TSP Results for the Reporting Period

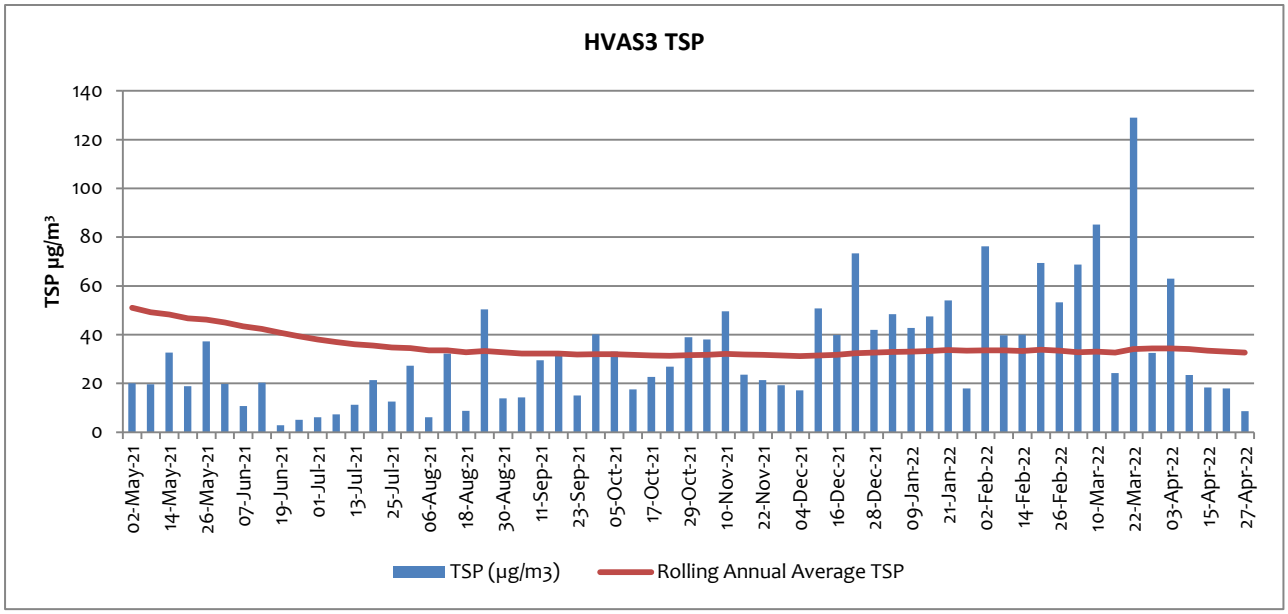


Figure 5-15 HVAS3 TSP-Lead Results for the Reporting Period

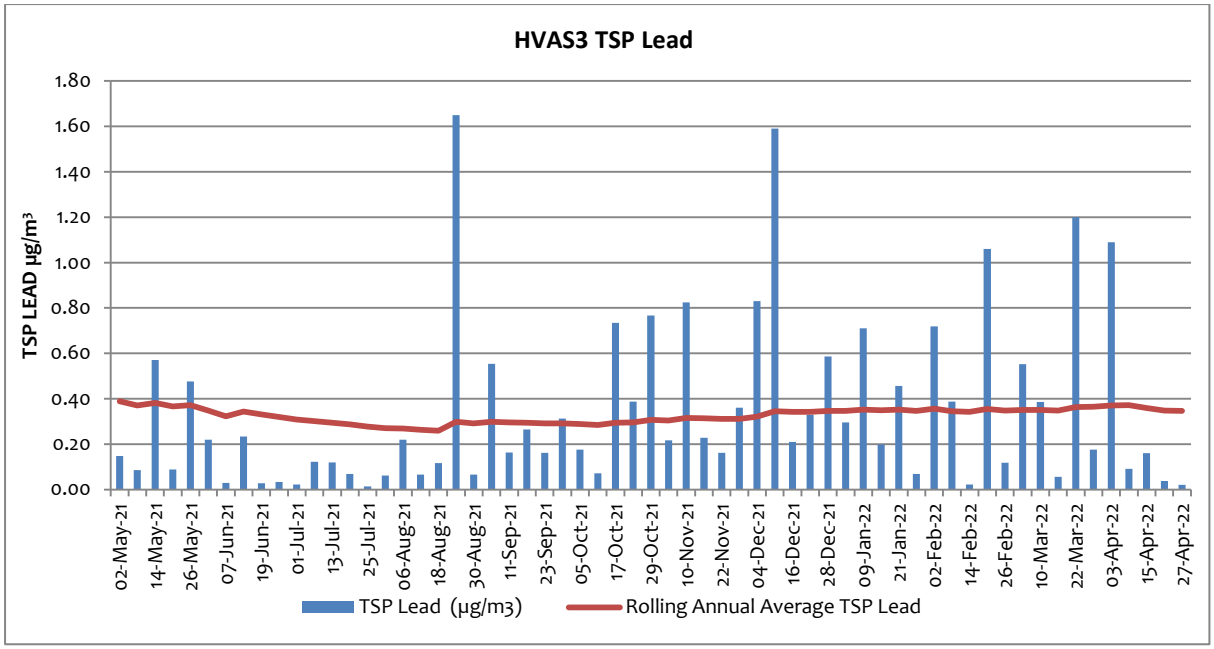


Figure 5-16 HVAS1 & HVAS2 PM10 Annual Average Results for the Period 2011 to 2022

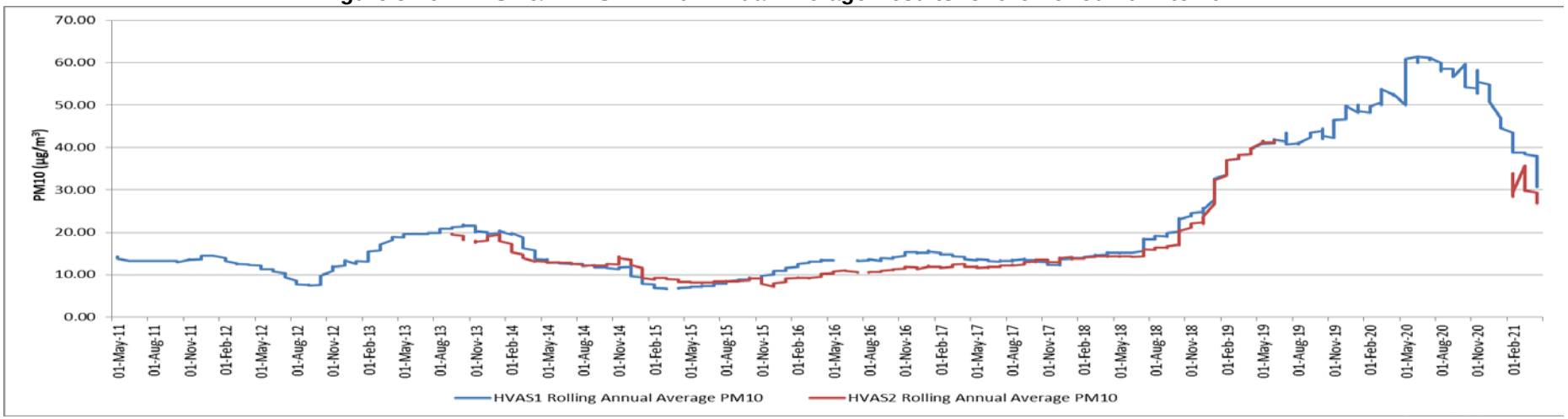


Figure 5-17 HVAS1 & HVAS2 PM10-Lead Annual Average Results for the Period 2011 to 2022

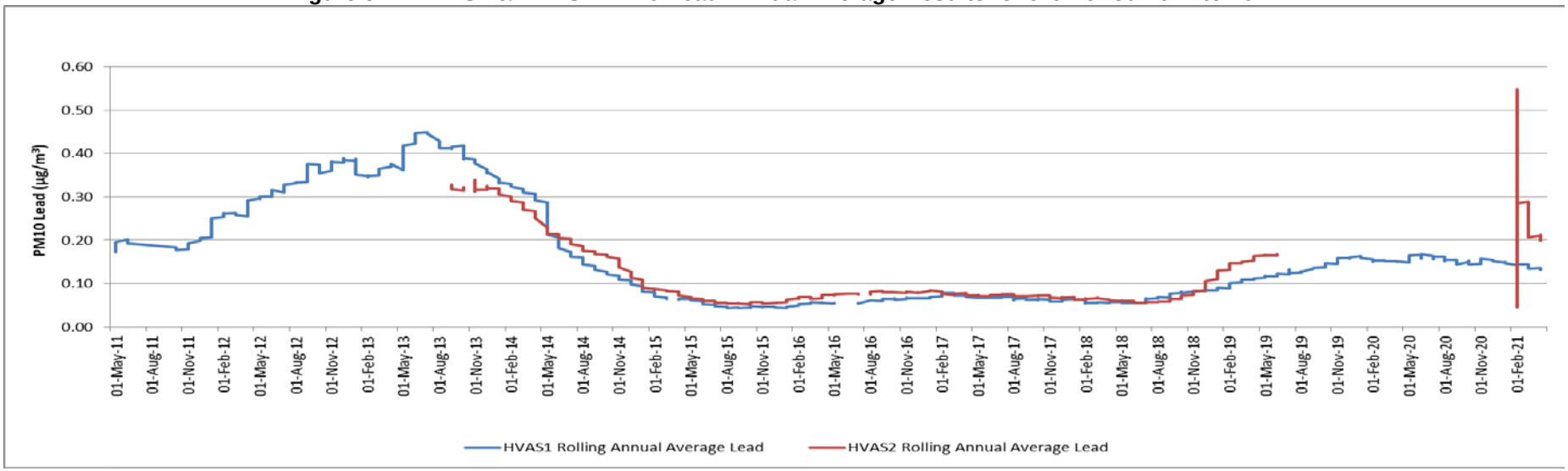


Figure 5-18 HVAS & HVAS3 TSP Annual Average Results for the Period 2008 to 2022

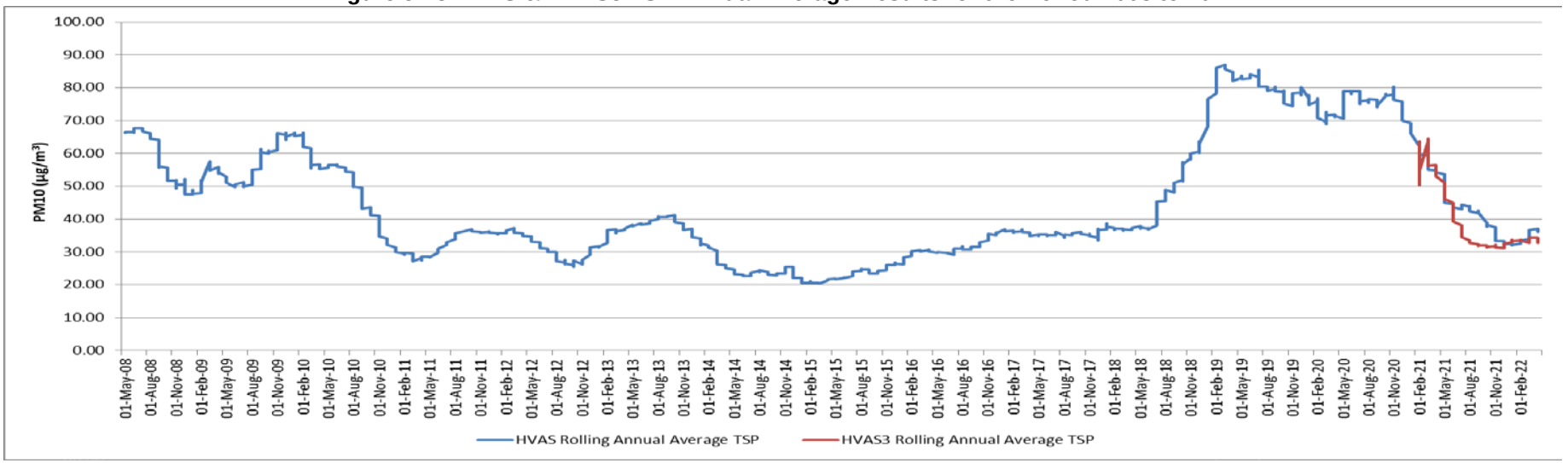
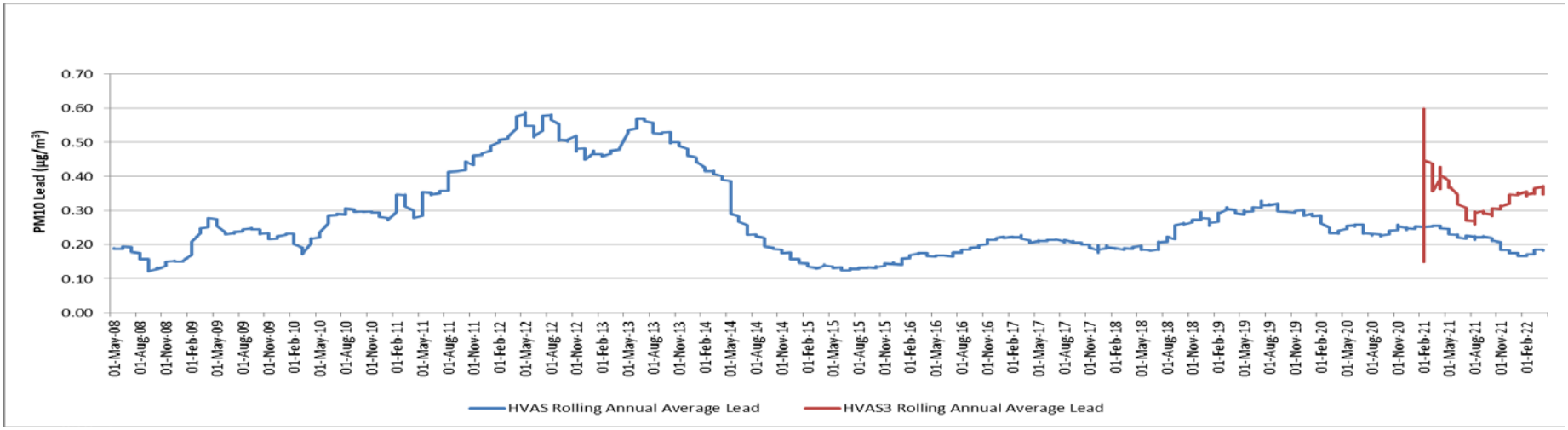


Figure 5-19 HVAS & HVAS3 TSP-Lead Annual Average Results for the Period 2008 to 2022



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.

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 ESO 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.

During the reporting period TEOM1 was serviced by a Technician in September 2021 and April 2022.

The corrected results with storm events excluded for TEOM1 PM_{10} 24-hour average for the reporting period are provided in Figure 5-20**.** 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 5-21**. The highest recording for the reporting period was on 18 November 2012 (44.6µg/m3).

The PM10 annual rolling average at the TEOM1 monitor at the end of the reporting period was 13.27µg/m^3 (13.70µg/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 13.70µg/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 (13.70µg/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.

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;
- An enclosed crusher building 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 on a daily basis.
- 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 5-20 TEOM1 PM10 24-hour Average Results for the Reporting Period

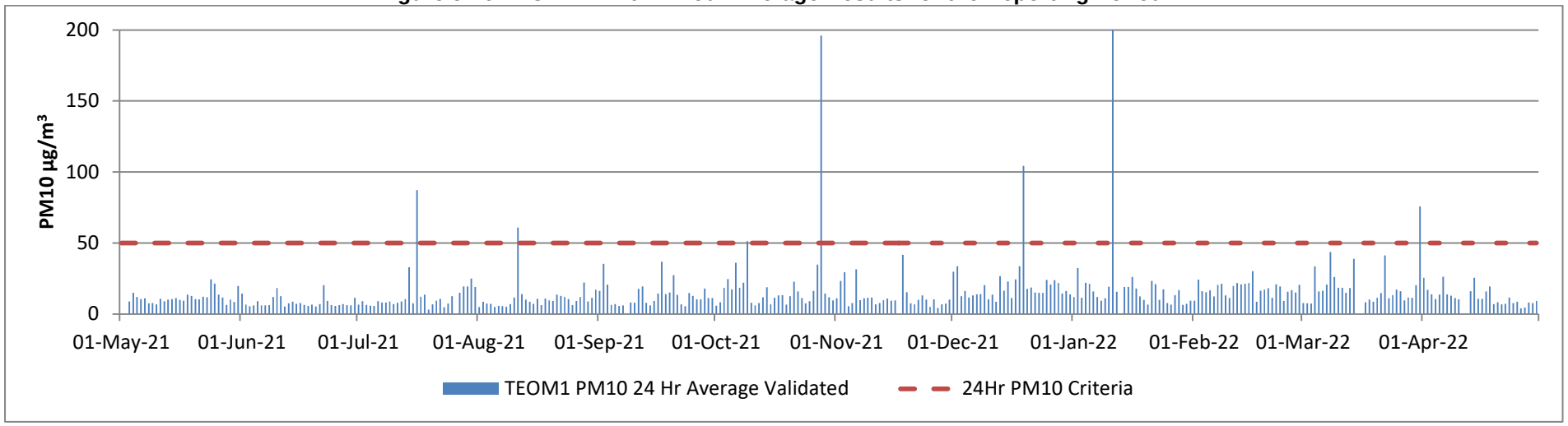


Figure 5-21 TEOM2 PM_{10} 24-Hour Average Results for the Reporting Period

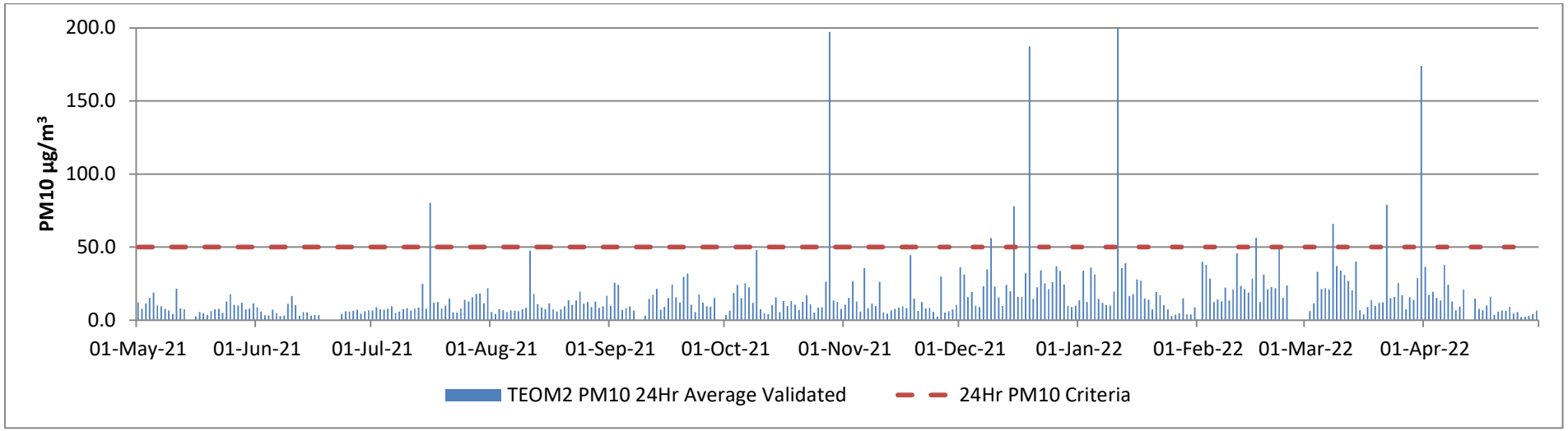


Figure 5-22 TEOM1 & TEOM2 PM10 Annual Rolling Average for the Reporting Period

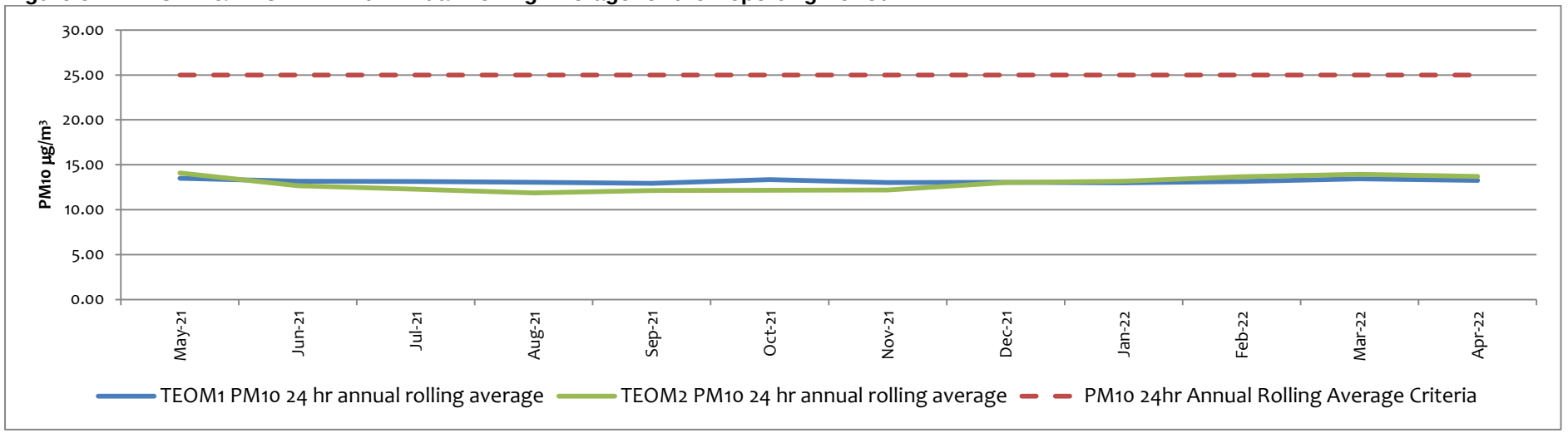
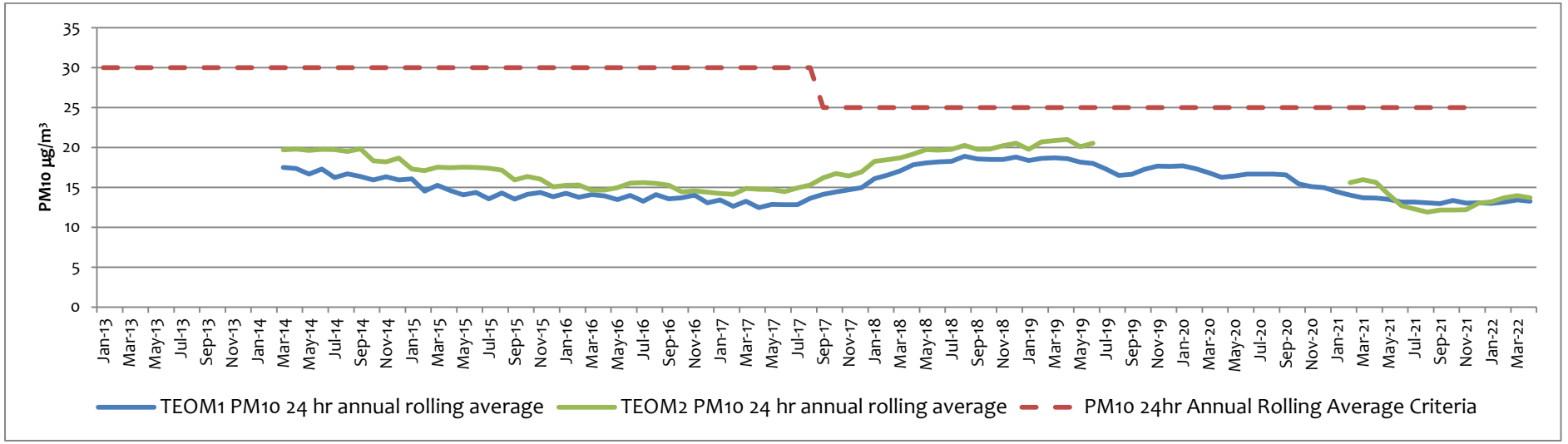


Figure 5-23 TEOM1 & TEOM2 PM10 Annual Rolling Average Results for the Period 2013 to April 2022



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 5-7 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**.

Following heavy rainfall events in March and April 2022 water was able to seep from the S49 Ryan St Dam and S14 House Dam as water could not be transferred from these ponds in a timely manner. Details of the seepage incidents are in Section 10. Lead, Manganese and Zinc levels were slightly elevated in S1-A and S31-1 following heavy rainfalls in February and March which is likely due to receiving contaminated water from adjacent roadways and waste dumps. S49 returned elevated Lead, Managnese 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 5-8 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	11-Nov-21	6.99	566	529	3	288	6	39	2	8	1.11	1.9	13.2	92.1	0.05
	25-Nov-21	6.83	1060	1060	4	562	11	88	8	15	1.53	1.56	40.5	143	0.05
	01-Feb-22	6.08	993	1030	4	587	12	93	6	17	1.5	1.8	34.2	148	<0.05
	01-Mar-22	5.89	2450	3640	4	1940	56	200	31	76	5.36	1.9	183	625	<0.05
	16-Mar-22	6.51	1520	1710	2	609	28	128	16	44	1.92	1.89	67.8	201	<0.05
	19-Apr-22	6.21	1140	1180	4	672	18	109	8	17	1.42	1.28	40.3	185	<0.05
	27-Apr-22	6.21	1040	986	2	579	15	66	8	23	1.06	1.21	42.8	117	<0.05
S49	11-Nov-21	7.28	392	322	7	156	2	63	2	6	0.0662	0.114	4.9	6.83	0.05
	25-Nov-21	7.03	571	469	6	265	5	65	6	7	0.269	0.187	10.4	31.1	0.05
	01-Feb-22	6.42	484	353	8	207	3	71	4	6	0.178	0.11	9.09	23.8	<0.05
	01-Mar-22	6.53	896	818	10	484	9	118	11	17	0.479	0.262	23	63.4	<0.05
	16-Mar-22	6.89	512	464	7	226	5	60	6	9	0.23	0.155	8.72	29.7	<0.05
	19-Apr-22	6.64	322	292	6	135	2	37	4	5	0.119	0.113	5.63	18.8	<0.05
	27-Apr-22	6.52	685	556	7	335	6	74	7	10	0.331	0.134	15	48.3	<0.05
S1A	11-Nov-21	Insufficient sample													
	25-Nov-21	7.41	273	254	18	94	8	32	4	7	0.0633	0.362	2.14	7.86	0.05
	01-Feb-22	6.62	322	300	17	117	12	43	5	11	0.0946	0.221	2.72	9.79	<0.05
	01-Mar-22	5.89	2450	3640	4	1940	56	200	31	76	5.36	1.9	183	625	<0.05
	16-Mar-22	6.61	1200	1240	5	618	32	116	19	36	0.879	1.16	28.6	122	<0.05
	19-Apr-22	7.02	511	440	9	222	8	81	5	6	0.0992	2.35	0.161	10	<0.05
	28-Apr-22	6.96	255	187	13	91	4	30	2	4	0.0556	0.096	1.69	6.79	<0.05

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)
S9B-2	11-Nov-21	Dry													
	25-Nov-21	Insufficient sample													
	01-Feb-22	6.22	1240	1040	15	544	65	154	22	97	0.479	0.429	11.3	35	<0.05
	01-Mar-22	Dry													
	16-Mar-22	7.15	395	332	9	142	16	50	4	15	0.0848	0.334	1.28	6.32	<0.05
	19-Apr-22	6.6	375	326	7	147	13	46	5	12	0.114	1.78	0.535	8.36	<0.05
	27-Apr-22	6.79	246	162	9	76	11	22	2	11	0.0666	0.272	1.01	5.6	<0.05
Horwood Dam	11-Nov-21	No inflow													
	25-Nov-21	6.94	10100	8600	11	3560	1660	403	289	1460	2.78	2.38	190	186	0.05
	01-Feb-22	6.19	6830	6530	7	2990	1180	372	232	1140	2.96	3	147	161	<0.05
	01-Mar-22	6.58	9410	12000	10	5190	2300	491	415	1940	6.93	3.12	297	336	<0.05
	19-Mar-22	5.39	4500	4010	1	1810	630	287	110	553	2.11	2	75.8	116	<0.05
	19-Apr-22	6.44	6690	6920	5	2910	1030	345	187	913	3.32	145	2.02	194	<0.05
	28-Apr-22	6.62	5640	4640	6	2090	780	286	135	661	2.4	2.07	96.8	119	<0.05
Upstream	11-Nov-21	7.87	201	121	20	37	22	16	3	15	0.0089	0.086	0.731	1.41	0.05
	25-Nov-21	7.61	212	175	30	46	17	22	3	14	0.0057	0.02	0.309	1.14	0.05
	01-Feb-22	7.09	182	172	39	35	15	23	3	13	0.0041	0.015	0.008	0.574	<0.05
	01-Mar-22	Dry													
	16-Mar-22	6.69	2410	2510	24	1200	158	265	44	151	1.38	0.08	33.3	172	<0.05
	19-Apr-22	7.18	64	75	24	4	5	10	1	5	0.0017	0.01	0.016	0.067	<0.05
	27-Apr-22	6.32	1960	1710	26	893	126	212	35	123	0.783	0.023	16.8	98.1	<0.05

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)
Downstream	11-Nov-21		Dry												
	25-Nov-21	7.68	284	359	43	45	29	23	5	24	0.0005	0.002	0.004	0.38	0.05
	01-Feb-22	7.22	238	493	91	16	14	16	4	31	0.0001	<0.001	<0.001	0.008	<0.05
	01-Mar-22	7.37	276	248	77	14	19	12	4	34	0.0001	<0.001	<0.001	0.008	<0.05
	16-Mar-22	7.76	400	318	81	32	54	26	7	42	0.0022	0.002	0.004	0.204	<0.05
	19-Apr-22	7.95	222	407	67	20	20	16	4	29	0.0004	0.009	0.002	0.035	<0.05
	27-Apr-22	7.16	224	170	60	22	18	16	4	18	0.005	<0.001	0.004	0.098	<0.05

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 5-9 Water Containment Structures

	Pond Identification	Start of reporting period m^3 (1-May-2021)	At end of reporting period m^3 (30-Apr-2022)	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	50	7813
	S17	0	1000	4265
	S31-2	0	0	225
	S49	0	500	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 5-10 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.

Quarterly samples were obtained from 11 of the 16 bores, samples were obtained from ten bores, and no samples could be obtained from bores GW2, GW13, GW14, GW15, or GW16. This was due to dry conditions as a result of the low rainfall in Broken Hill for 2021.

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.

Table 5-11 Bore Piezometer Depths

Sample point	Depth mbTOC								
	Avg 2021/22	Avg 2020/21	Avg 2019	Avg 2018	Avg 2017	Avg 2016	Avg 2015	Avg 2014	Trend
GW01	8.96	Dry	8.42	8.35	6.85	7.39	7.25	7.25	Falling
GW02	Dry	Dry	Dry	Dry	3.33	Dry	Dry	Dry	Stable
GW03	3.66	3.66	3.83	3.6	3.58	3.64	3.62	3.61	Stable
GW04	3.03	3.42	2.99	2.73	2.87	2.94	2.9	2.83	Stable
GW05	3.48	4.16	3.76	3.65	3.49	3.53	3.5	3.4	Falling
GW06	3.26	3.21	3.16	3.10	2.96	2.85	2.76	2.66	Falling
GW07	3.25	3.80	3.14	3.15	2.58	2.74	2.8	2.54	Falling
GW08	2.22	3.08	2.53	2.36	1.88	1.81	1.87	2.11	Falling
GW09	3.34	4.31	3.89	3.84	3.50	2.94	3.07	1.79	Falling
GW10	4.1	5.2	4.20	3.46	1.90	1.49	1.725	0.83	Falling
GW11	11.42	13.30	12.17	12.00	10.00	10.10	10.4	10.69	Stable
GW12	Dry	21.52	21.53	20.47	19.19	34.49	37.1	21.6	Falling
GW13	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Stable
GW14	0.34	Dry	Dry	Dry	1.3	Dry	Dry	Dry	Stable
GW15	Dry	Dry	Dry	Dry	2.8	Dry	Dry	Dry	Stable
GW16	1.14	Dry	Dry	Dry	Dry	1.55	Dry	Dry	Stable

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 contained water following rainfall in February and March and sample results were consistent with results from previous years. GW2 did not contain water in 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. Lead results from GW3, GW4, and GW5 were elevated in the December 2021 round of monitoring and while potentially the result of sampling contamination, results for GW4 and GW5 were slightly elevated during the February 2022 resampling event. December 2022 Lead results for these bores are not included in the graphs in March 2022 results for these bores were consistent with historic results. **Figure 5-23** 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 GW12 has gone dry which may be due to nearby exploration drilling intercepting an old working in the area. GW11 recorded elevated Cadmium, Manganese, Lead and Zinc in December and March. The same pattern occurred in 2018 and 2019 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 5-23** indicates results remain within historic ranges.

GW13 and GW14 (adjacent 31-1), 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.

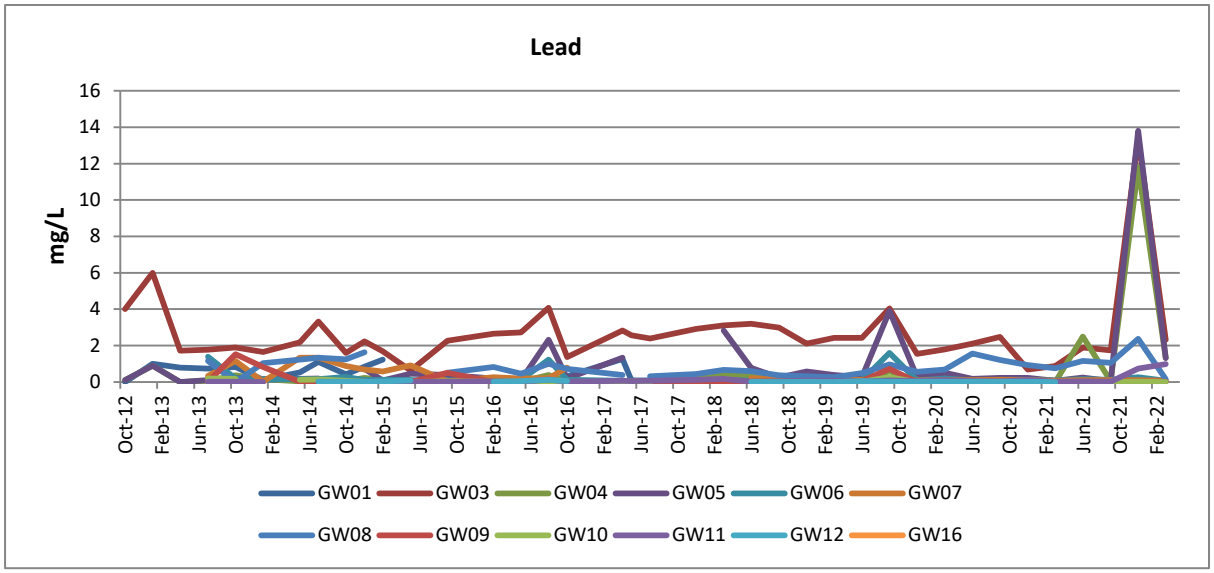
Table 5-12 Piezometer Monitoring Results for the Reporting Period

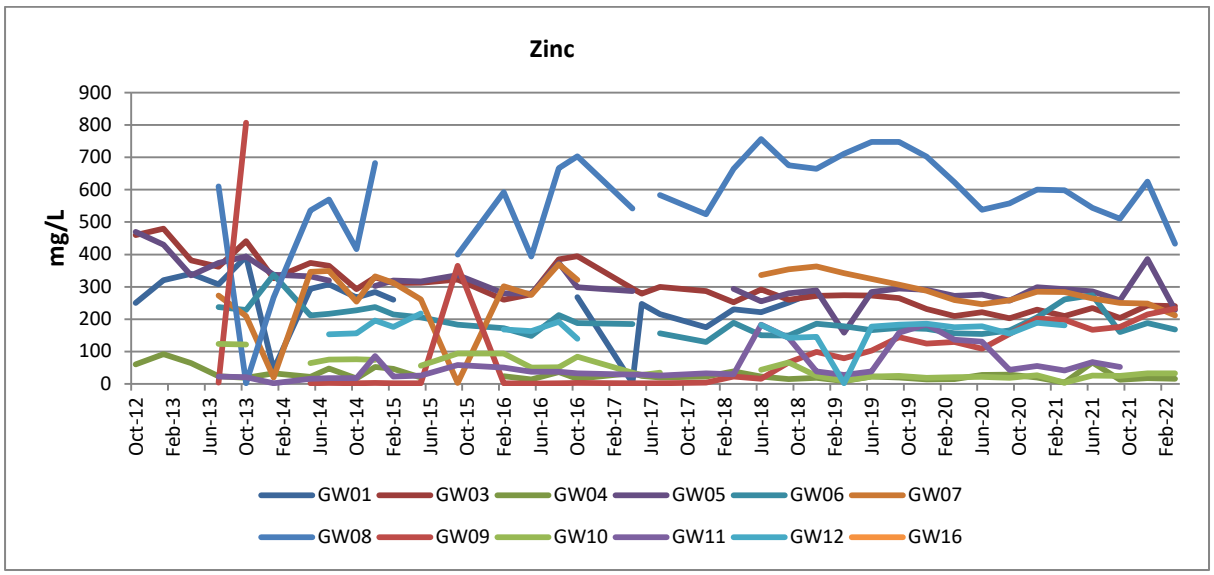
Sample Point	Sample Date	pH	EC	TDS	Alkalinity ($CaCO_3$)	SO4	Cl	Ca	Mg	Na	Cd	Pb	Mn	Zn	Fe
			(µS/cm2)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
GW1 (EPL37)	29/06/2021	Dry													
	28/09/2021	Dry													
	14/12/2021	Dry													
	31/03/2022	4.77	13200	13500	<1	6270	1730	372	586	1820	0.34	0.331	364	290	<0.05
GW2 (EPL38)	29/06/2021	Dry													
	28/09/2021	Dry													
	14/12/2021	Dry													
	31/03/2022	Dry													
GW3 (EPL39)	29/06/2021	5.83	13700	11800	7	4740	3000	504	348	2270	1.03	1.9	255	234	<0.05
	28/09/2021	6.02	14200	12000	2	4620	2990	508	340	2200	1.16	1.73	206	204	<0.05
	14/12/2021	5.61	14500	12400	7	4840	2420	554	349	2190	1.35	13.4	264	242	68.6
	31/03/2022	5.48	14800	13700	2	5060	3180	577	344	2160	0.797	0.693	350	288	32.6
GW4 (EPL40)	29/06/2021	6.05	12200	10500	4	4630	2400	488	390	2050	0.258	2.5	132	65.6	<0.05
	28/09/2021	6.65	14200	11500	295	4840	2750	518	557	2470	0.0659	0.038	26.8	12.7	<0.05
	14/12/2021	6.53	14200	11700	203	4740	2750	559	534	2330	0.0399	11.8	27.3	17.2	41.8
	31/03/2022	6.39	14200	12200	233	4862	2760	564	487	2150	0.0417	0.035	32.6	13.1	<0.05
GW5 (EPL41)	29/06/2021	5.69	15200	14900	83	7090	2710	456	619	2570	0.677	0.235	353	286	<0.05
	28/09/2021	5.95	15700	14500	118	6560	2740	458	647	2630	0.668	0.044	291	258	<0.05
	14/12/2021	5.66	16600	17400	66	7280	3060	497	627	2490	6.74	13.8	332	386	84.4
	31/03/2022	5.76	14000	12900	39	5330	2680	545	442	2140	1.56	0.388	286	218	<0.05
GW6 (EPL42)	29/06/2021	5.78	13800	13400	54	5910	2630	474	475	2260	1.53	0.152	413	274	<0.05
	28/09/2021	5.84	14000	12200	58	5270	2620	481	468	2100	1.1	0.121	244	160	<0.05
	14/12/2021	5.78	14500	13100	51	5800	2840	519	506	2210	1.14	0.253	316	188	1.42
	31/03/2022	5.9	14600	138000	60	5590	2850	531	472	2180	1.2	0.047	297	180	<0.05

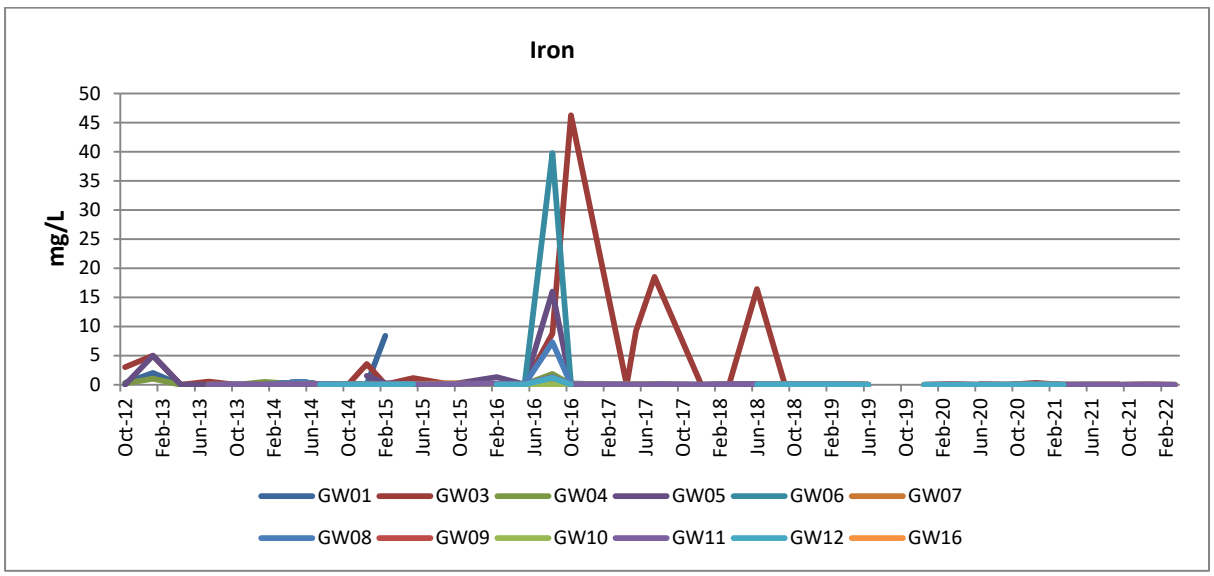
Sample Point	Sample Date	pH	EC	TDS	Alkalinity ($CaCO_3$)	SO4	Cl	Ca	Mg	Na	Cd	Pb	Mn	Zn	Fe
			(µS/cm2)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
GW7 (EPL43)	29/06/2021	5.9	12300	11200	48	4770	2440	494	335	1930	2.19	0.108	259	264	<0.05
	28/09/2021	6.08	12600	10900	46	4670	2340	483	319	1820	2.28	0.098	216	250	<0.05
	14/12/2021	6.25	12000	11000	32	4860	1850	513	315	1790	1.8	0.097	242	248	0.06
	31/03/2022	6.03	12100	10400	28	4690	1860	519	297	1720	2.95	0.054	222	226	<0.05
GW8 (EPL44)	29/06/2021	5.81	13300	13300	35	5680	2650	477	344	2030	1.34	1.16	542	544	<0.05
	28/09/2021	5.85	14000	13300	42	5620	2700	481	353	2030	1.34	1.05	444	510	<0.05
	14/12/2021	5.52	12600	13000	11	5440	2280	518	288	1660	1.79	2.37	566	625	6.4
	31/03/2022	5.71	9170	9200	4	3710	1420	601	196	1220	1.85	0.582	212	404	<0.05
GW9 (EPL45)	29/06/2021	6.2	11400	10800	82	4750	1850	544	527	1570	1.5	0.004	128	167	<0.05
	28/09/2021	6.27	11900	10300	68	4700	2170	551	510	1490	1.76	0.003	113	176	<0.05
	14/12/2021	6.21	12400	11500	47	4990	2470	581	519	1580	1.87	0.012	151	214	0.06
	31/03/2022	6.25	12000	10500	72	4490	2290	606	479	1520	1.71	<0.001	121	166	<0.05
GW10 (EPL46)	29/06/2021	6.49	13400	11400	276	4680	2780	534	547	2310	0.176	<0.001	11.1	25.6	<0.05
	28/09/2021	6.46	13900	11300	246	4710	2800	537	526	2120	0.189	0.001	8.86	24.2	<0.05
	14/12/2021	6.76	14200	11700	212	4980	2940	583	548	2240	0.209	0.012	13.3	32.7	0.05
	31/03/2022	6.21	14900	13000	135	5070	3150	641	533	2170	1.2	<0.001	118	141	<0.05
GW11 (EPL47)	29/06/2021	6.66	5620	4780	73	2420	623	299	194	799	0.662	0.037	40.5	67.4	<0.05
	28/09/2021	7.06	5670	4840	73	2560	642	297	184	755	0.638	0.007	8.86	51.8	<0.05
	14/12/2021	6.54	5740	5170	25	2630	637	368	140	734	1.68	0.734	48.2	112	0.05
	31/03/2022	6	8850	7800	47	3640	1160	331	264	1220	1.76	0.238	82	106	<0.05
GW12 (EPL48)	29/06/2021	Dry													
	28/09/2021	Dry													
	14/12/2021	Dry													
	31/03/2022	Dry													

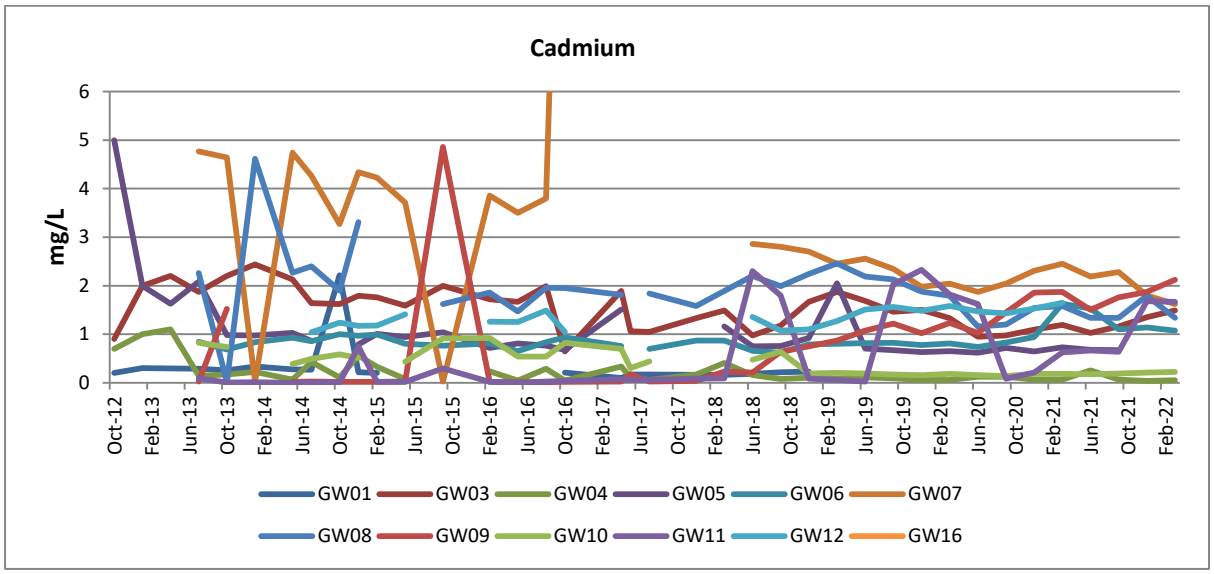
Sample Point	Sample Date	pH	EC	TDS	Alkalinity ($CaCO_3$)	SO4	Cl	Ca	Mg	Na	Cd	Pb	Mn	Zn	Fe
			(µS/cm2)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
GW13 (EPL49)	29/06/2021	Dry													
	28/09/2021	Dry													
	14/12/2021	Dry													
	31/03/2022	Dry													
GW14 (EPL50)	29/06/2021	Dry													
	28/09/2021	Dry													
	14/12/2021	Dry													
	31/03/2022	Dry													
GW15 (EPL51)	29/06/2021	Dry													
	28/09/2021	Dry													
	14/12/2021	Dry													
	31/03/2022	Dry													
GW16 (EPL52)	29/06/2021	Dry													
	28/09/2021	Dry													
	14/12/2021	Dry													
	31/03/2022	Dry													

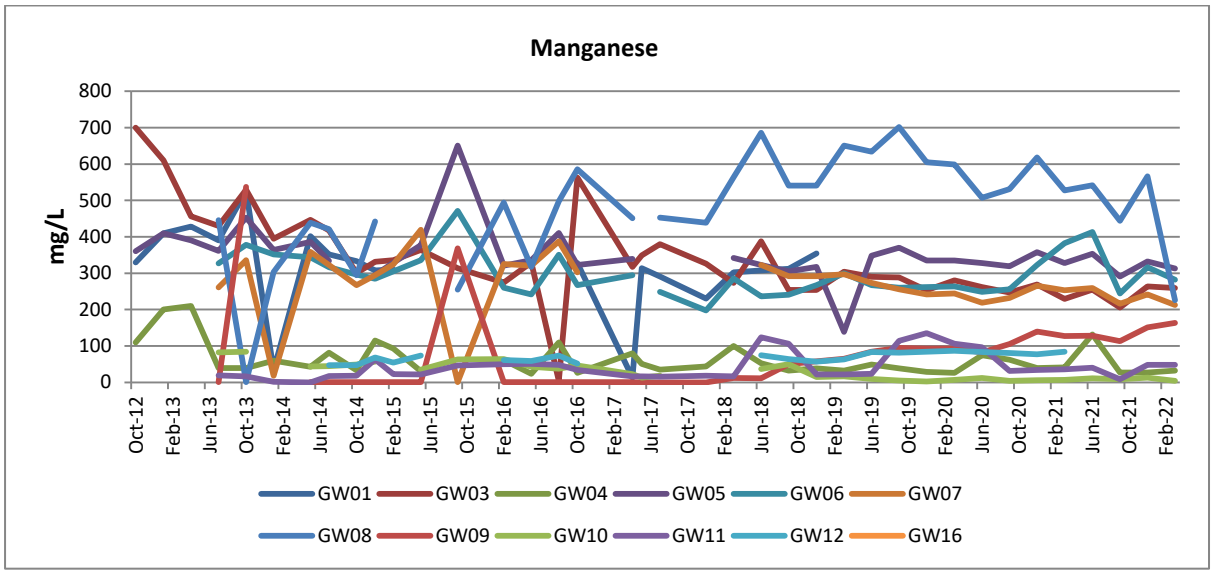
Figure 5-24 Groundwater Quality Results for the Period 2012 to April 2022

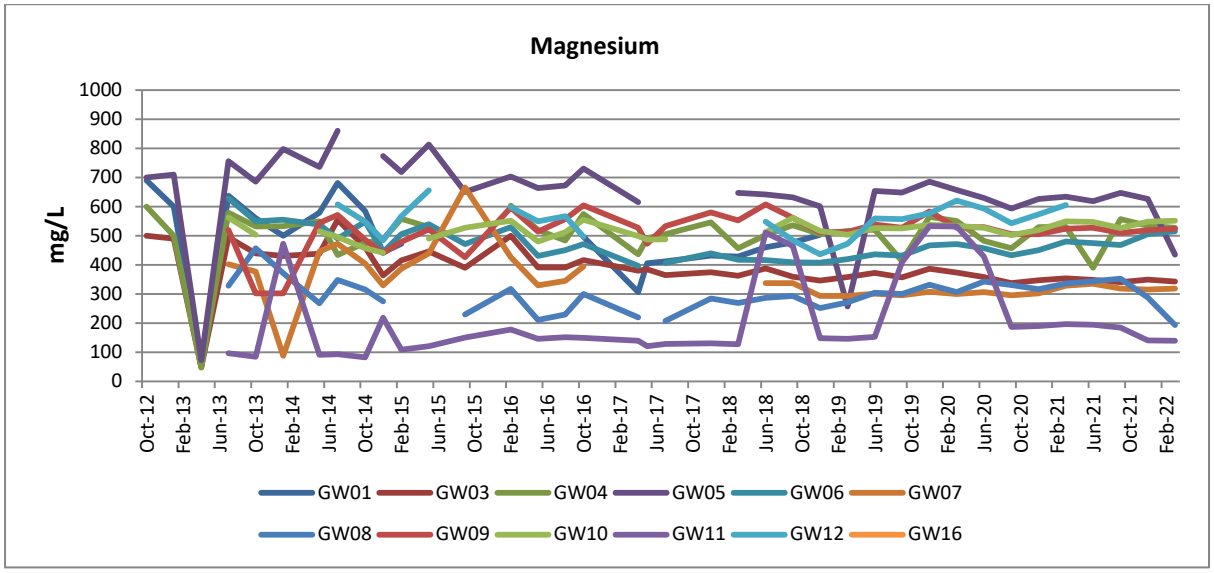


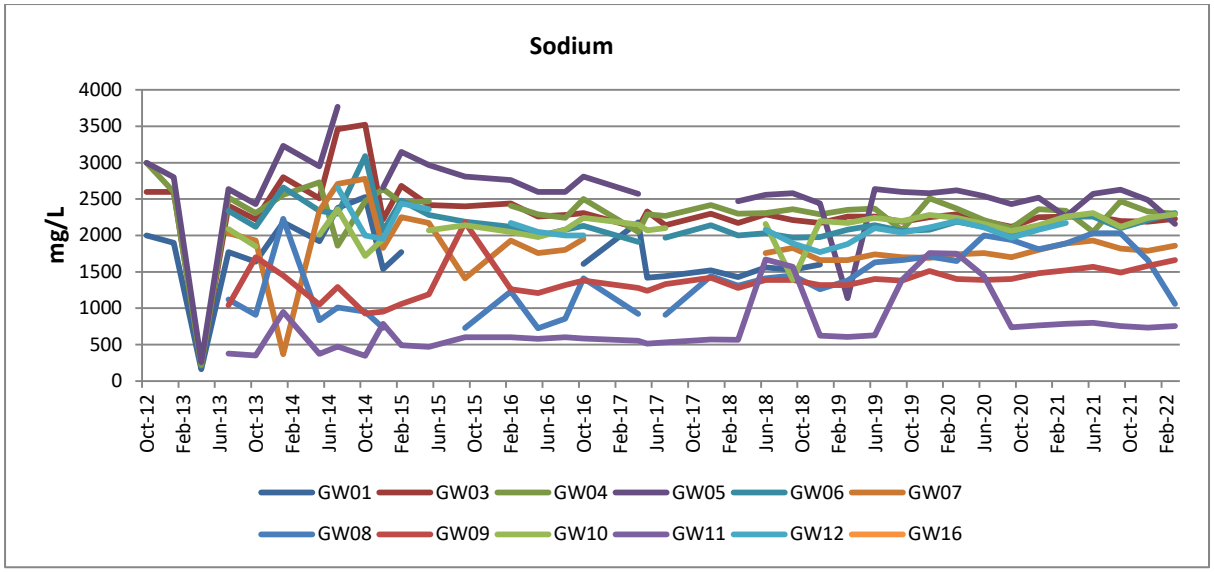


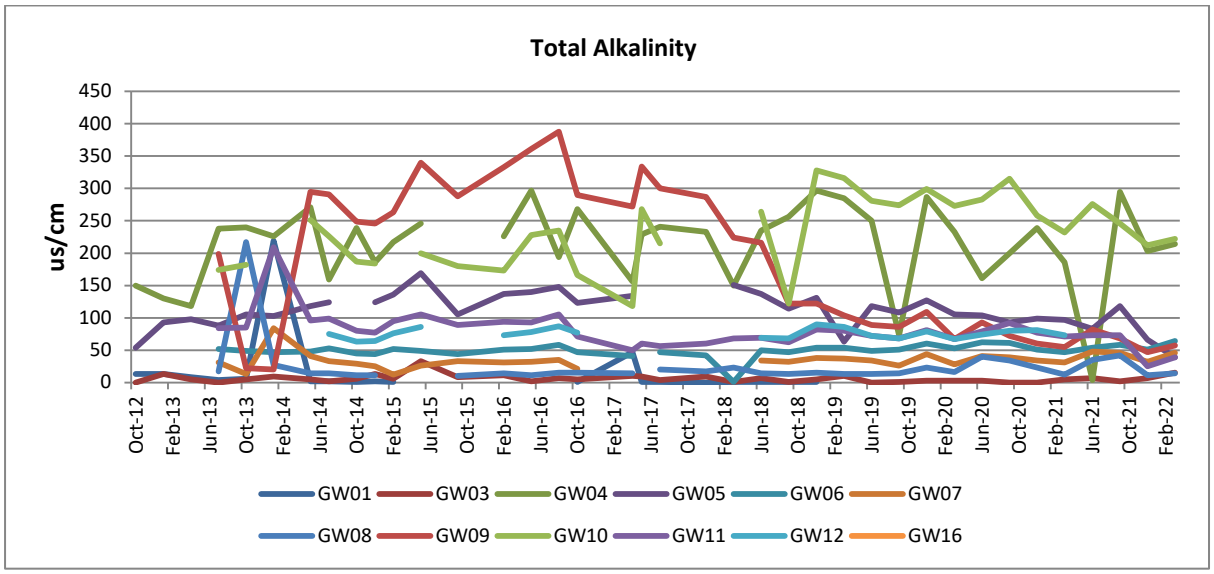


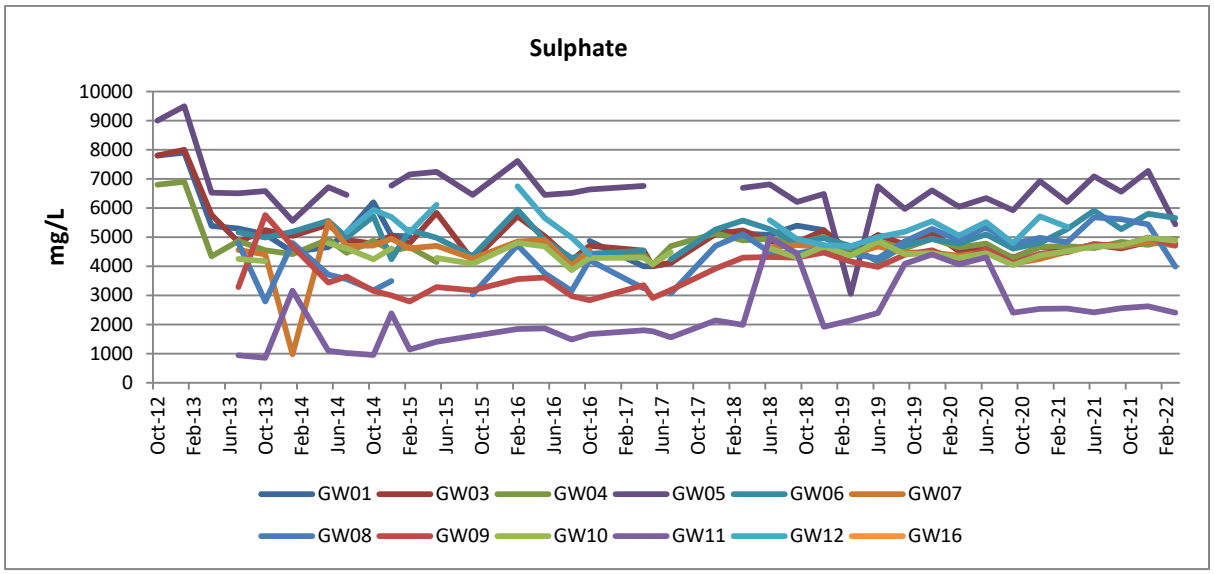

Cadmium
mg/L
0
1
2
3
4
5
6
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
Feb-22
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12 GW16

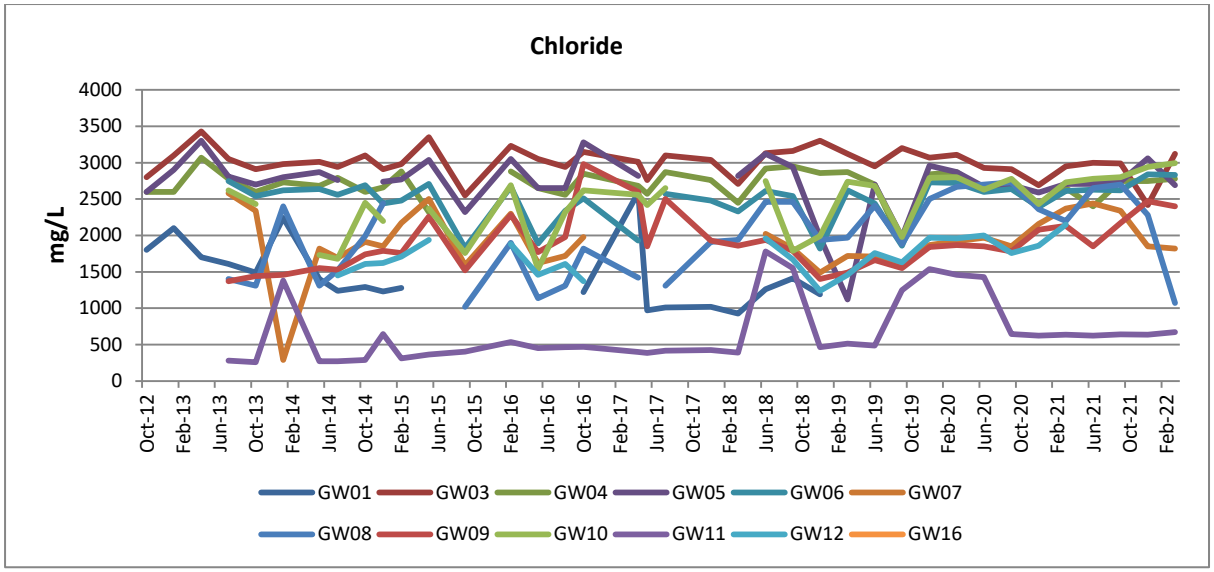

Manganese
mg/L
0
100
200
300
400
500
600
700
800
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
Feb-22
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12 GW16

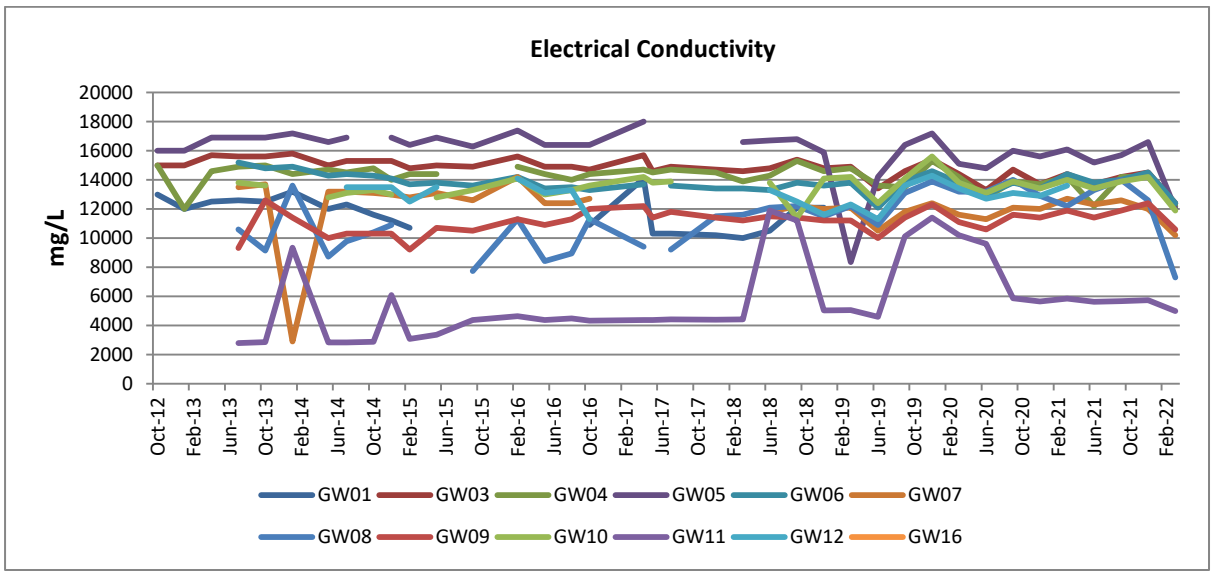

Magnesium
mg/L
0
100
200
300
400
500
600
700
800
900
1000
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
Feb-22
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12 GW16

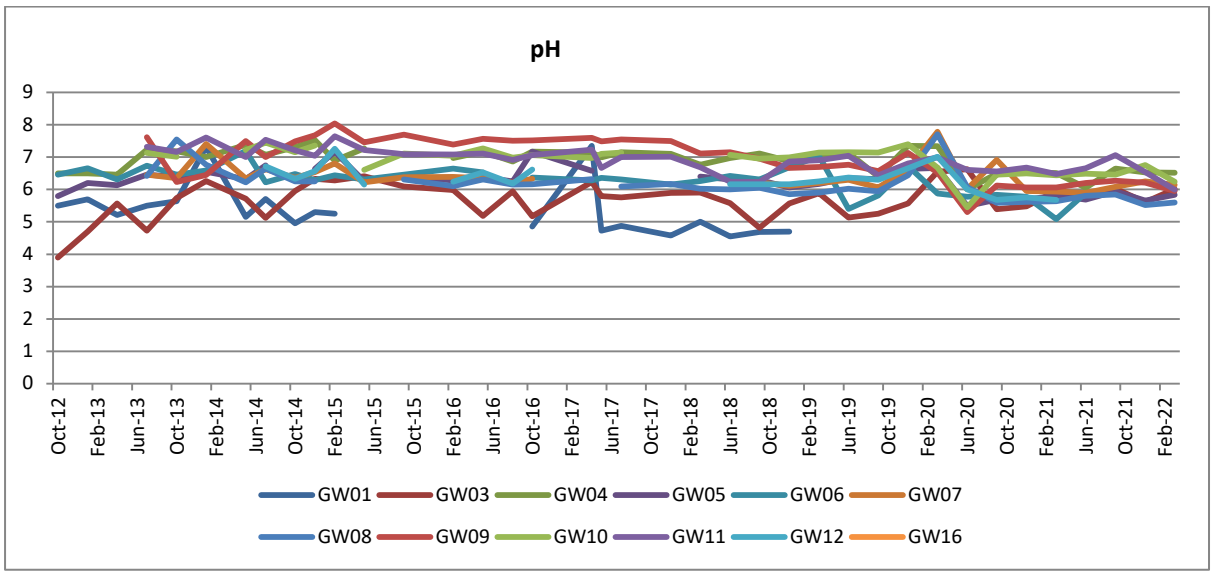

Sodium
mg/L
4000
3500
3000
2500
2000
1500
1000
500
0
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
Feb-22
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12 GW16


Total Alkalinity
us/cm
450
400
350
300
250
200
150
100
50
0
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
Feb-22
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12 GW16


Sulphate
mg/L
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
Feb-22
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12 GW16


Chloride
mg/L
4000
3500
3000
2500
2000
1500
1000
500
0
Oct-12 Feb-13 Jun-13 Oct-13 Feb-14 Jun-14 Oct-14 Feb-15 Jun-15 Oct-15 Feb-16 Jun-16 Oct-16 Feb-17 Jun-17 Oct-17 Feb-18 Jun-18 Oct-18 Feb-19 Jun-19 Oct-19 Feb-20 Jun-20 Oct-20 Feb-21 Jun-21 Oct-21 Feb-22
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12 GW16


Electrical Conductivity
mg/L
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Oct-12 Feb-13 Jun-13 Oct-13 Feb-14 Jun-14 Oct-14 Feb-15 Jun-15 Oct-15 Feb-16 Jun-16 Oct-16 Feb-17 Jun-17 Oct-17 Feb-18 Jun-18 Oct-18 Feb-19 Jun-19 Oct-19 Feb-20 Jun-20 Oct-20 Feb-21 Jun-21 Oct-21 Feb-22
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12 GW16


pH
9
8
7
6
5
4
3
2
1
0
Oct-12 Feb-13 Jun-13 Oct-13 Feb-14 Jun-14 Oct-14 Feb-15 Jun-15 Oct-15 Feb-16 Jun-16 Oct-16 Feb-17 Jun-17 Oct-17 Feb-18 Jun-18 Oct-18 Feb-19 Jun-19 Oct-19 Feb-20 Jun-20 Oct-20 Feb-21 Jun-21 Oct-21 Feb-22
GW01 GW03 GW04 GW05 GW06 GW07
GW08 GW09 GW10 GW11 GW12 GW16

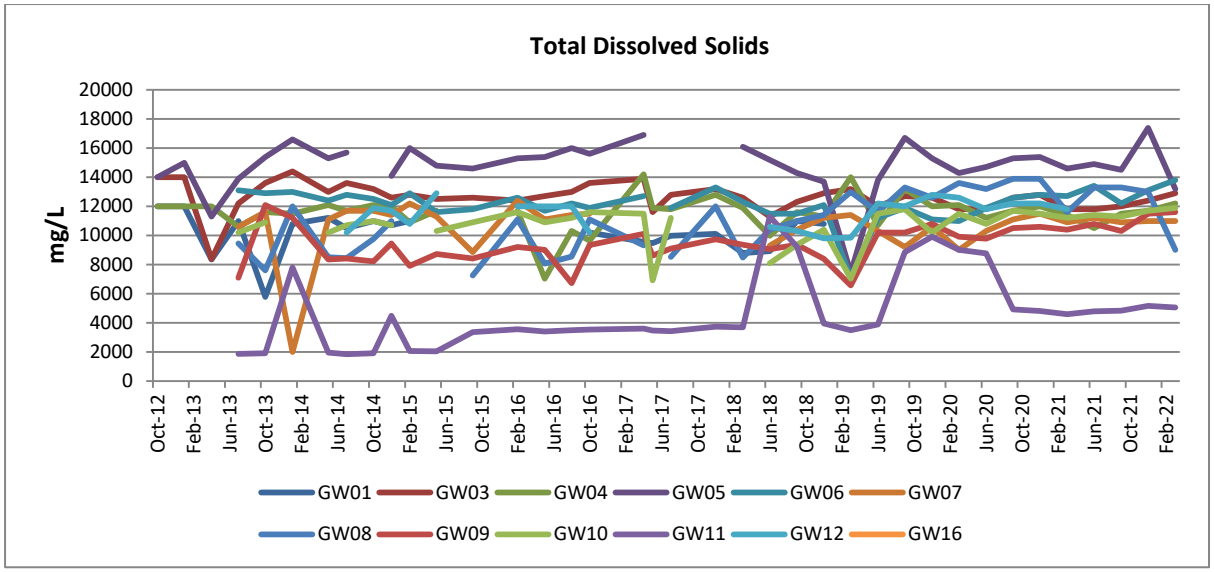

Total Dissolved Solids
mg/L
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Oct-12
Feb-13
Jun-13
Oct-13
Feb-14
Jun-14
Oct-14
Feb-15
Jun-15
Oct-15
Feb-16
Jun-16
Oct-16
Feb-17
Jun-17
Oct-17
Feb-18
Jun-18
Oct-18
Feb-19
Jun-19
Oct-19
Feb-20
Jun-20
Oct-20
Feb-21
Jun-21
Oct-21
Feb-22
GW01
GW03
GW04
GW05
GW06
GW07
GW08
GW09
GW10
GW11
GW12
GW16

Table 5-13 Groundwater Monitoring Results for Shaft 7 and Mine Dewatering for the Period

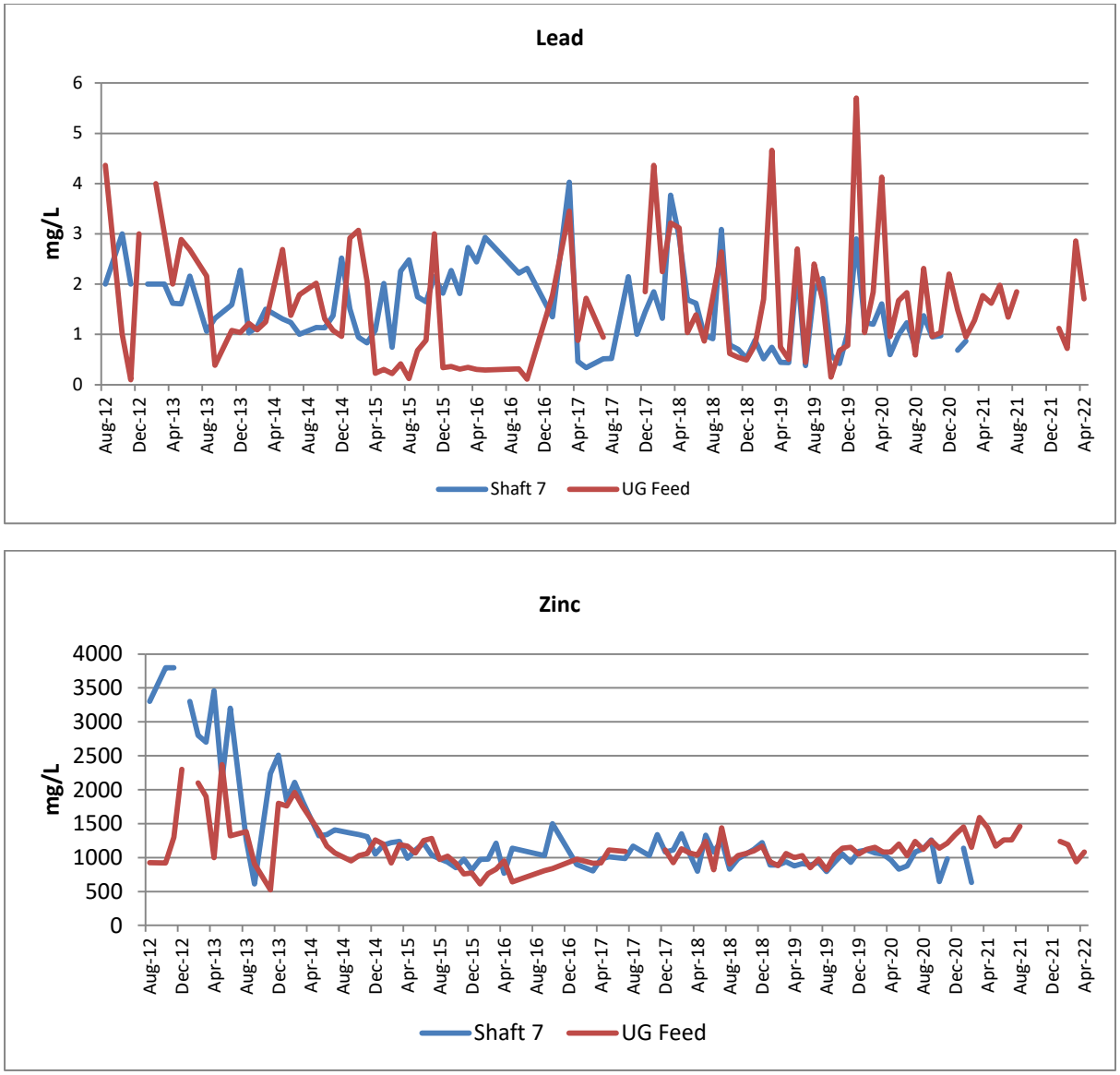
Sample Point	Date	pH	EC	TDS	Alkalinity ($CaCO_3$)	SO4	Cl	Ca	Mg	Na	Cd	Pb	Mn	Zn	Fe
			(µS/cm2)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
Shaft 7	28/05/2021	5.99	9740	9740	39	4940	1540	509	320	1620	1.72	0.644	258	595	<0.05
	24/06/2021	Shaft 7 not pumping													
	19/07/2021	Shaft 7 not pumping													
	9/08/2021	6.21	11400	11500	40	5340	1280	517	311	1560	1.54	0.77	242	600	0.12
	27/09/2021	Shaft 7 not pumping													
	27/10/2021	Shaft 7 not pumping													
	15/11/2021	6.06	11600	12600	20	5630	1550	505	278	1510	2.01	1.67	280	817	0.05
	14/12/2021	Shaft 7 not pumping													
	12/01/2022	Shaft 7 not pumping													
	1/02/2022	Shaft 7 not pumping													
	24/03/2022	Shaft 7 not pumping													
	8/04/2022	5.56	11200	13000	28	5930	1490	529	280	1470	2.03	1.75	278	831	<0.05
UG/Kintore	28/05/2021	6.02	11600	13800	<1	6220	1760	492	336	1750	4.5	1.62	471	1170	0.25
	24/06/2021	5.96	12700	14100	5	7020	1620	431	326	1740	5.56	1.98	490	1260	<0.05
	19/07/2021	5.84	13200	14000	2	6260	1760	550	319	1770	5.64	1.34	474	1260	1.14
	9/08/2021	6.17	14200	15800	5	7890	1540	492	351	1820	7.92	1.85	546	1460	<0.05
	27/09/2021	No extraction Kintore Pit													
	27/10/2021	No extraction Kintore Pit													
	15/11/2021	No extraction Kintore Pit													
	14/12/2021	No extraction Kintore Pit													
	12/01/2022	6.03	13800	14600	12	6470	1870	487	309	1670	3.16	1.12	404	1240	0.91
	1/02/2022	5.84	10400	15300	9	6410	1800	507	318	1840	3.58	0.721	443	1190	<0.05
	24/03/2022	5.56	14700	15400	6	6800	2180	528	363	1930	3.03	2.86	418	940	0.1
	8/04/2022	5.85	14300	16500	14	6870	2170	553	370	1900	4.22	1.71	473	1080	0.13
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	7.57	2.93	1179	4329	2.04

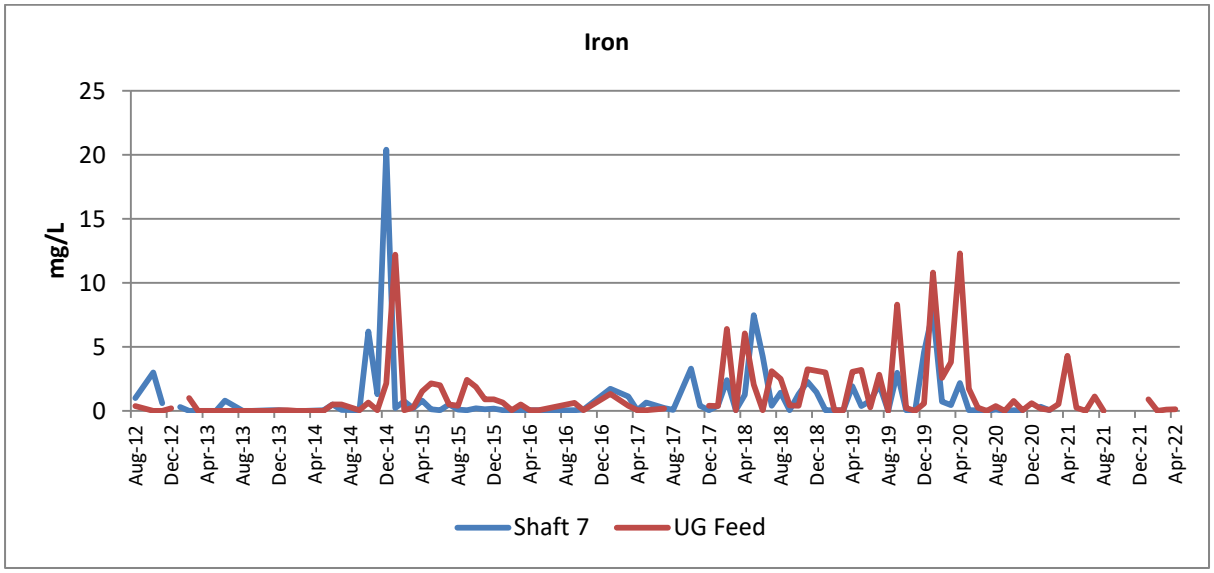
Trigger = Baseline + 30%

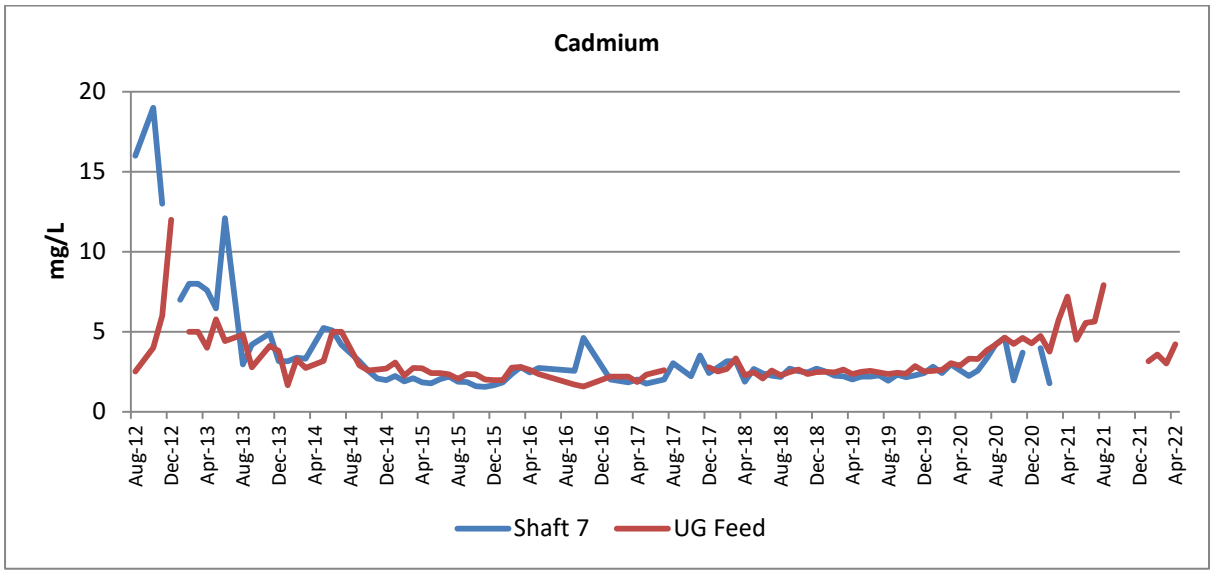
Results for UG Feed have recently exceeded trigger thresholds for Chloride but are variable. Total dissolved solids (TDS) results were above the trigger threshold for all UG Feed results and all Shaft 7 results but one, however results were within the historic range for TDS. Water from both sources is only used on site and not discharged. Samples from both locations were interrupted throughout 2021 as pumping from each location was sporadic.

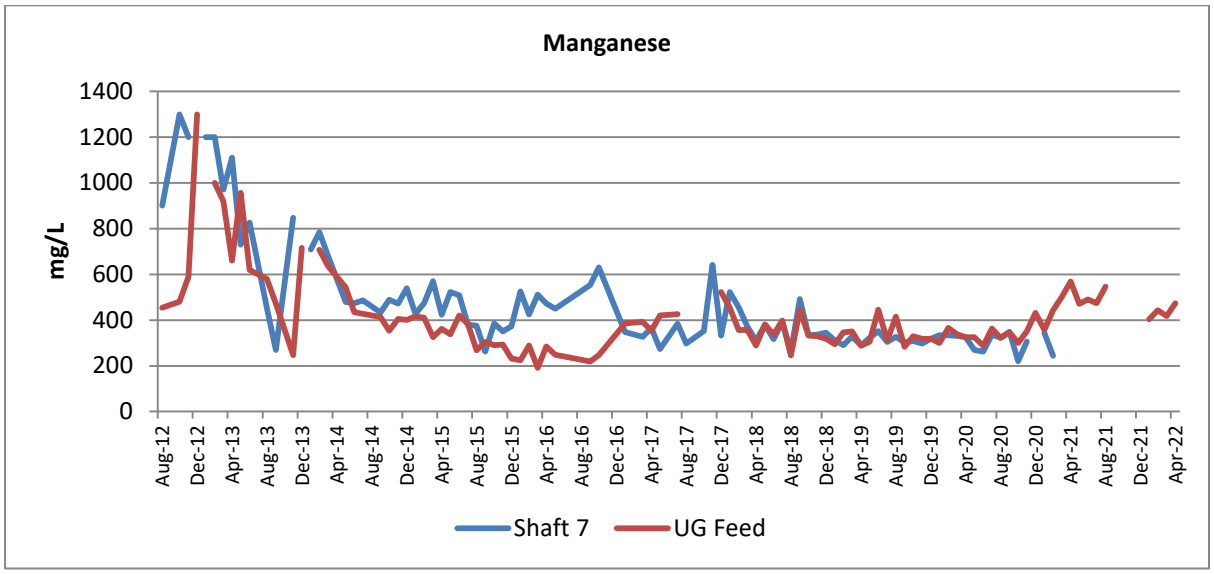
Figure 5-23 provides a series of graphs indicating results from commencement of operations to present (2012-2022). Results are within the historic range for all parameters.

Figure 5-25 Shaft 7 & Mine Dewatering Results for Sampled Parameters - Period 2012 to Apr 2022




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
Aug-21
Dec-21
Apr-22
Shaft 7
UG Feed


Cadmium
mg/L
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
Aug-21
Dec-21
Apr-22
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
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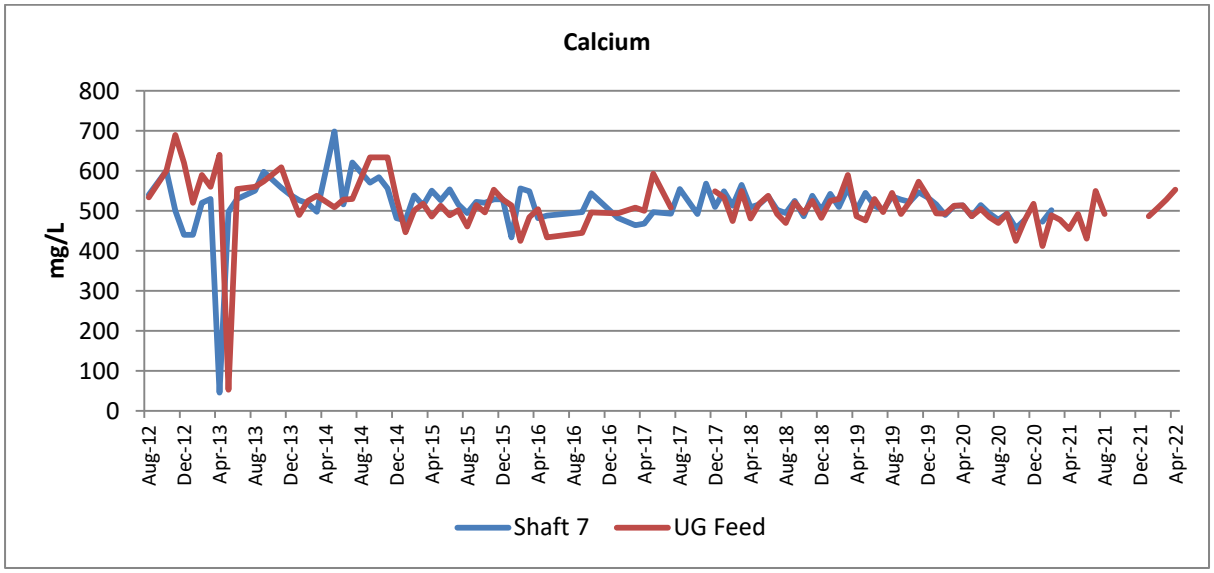
Calcium
mg/L
800
700
600
500
400
300
200
100
0
Aug-12
Dec-12
Apr-13
Aug-13
Dec-13
Apr-14
Aug-14
Dec-14
Apr-15
Aug-15
Dec-15
Apr-16
Aug-16
Dec-16
Apr-17
Aug-17
Dec-17
Apr-18
Aug-18
Dec-18
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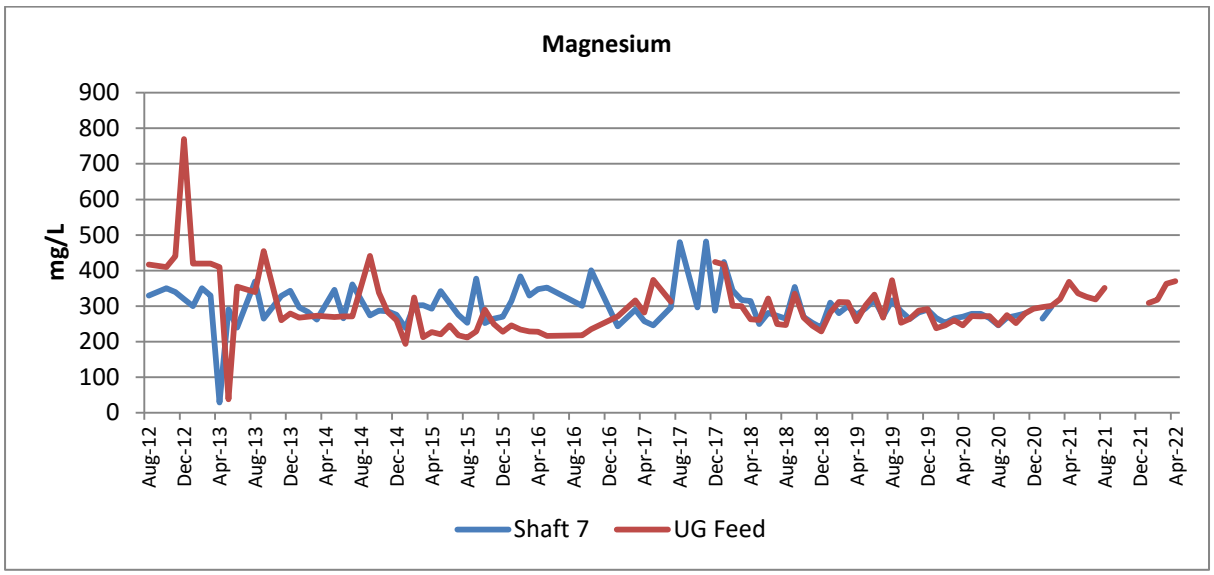
Apr-21
Aug-21
Dec-21
Apr-22
Shaft 7
UG Feed


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
Apr-18
Aug-18
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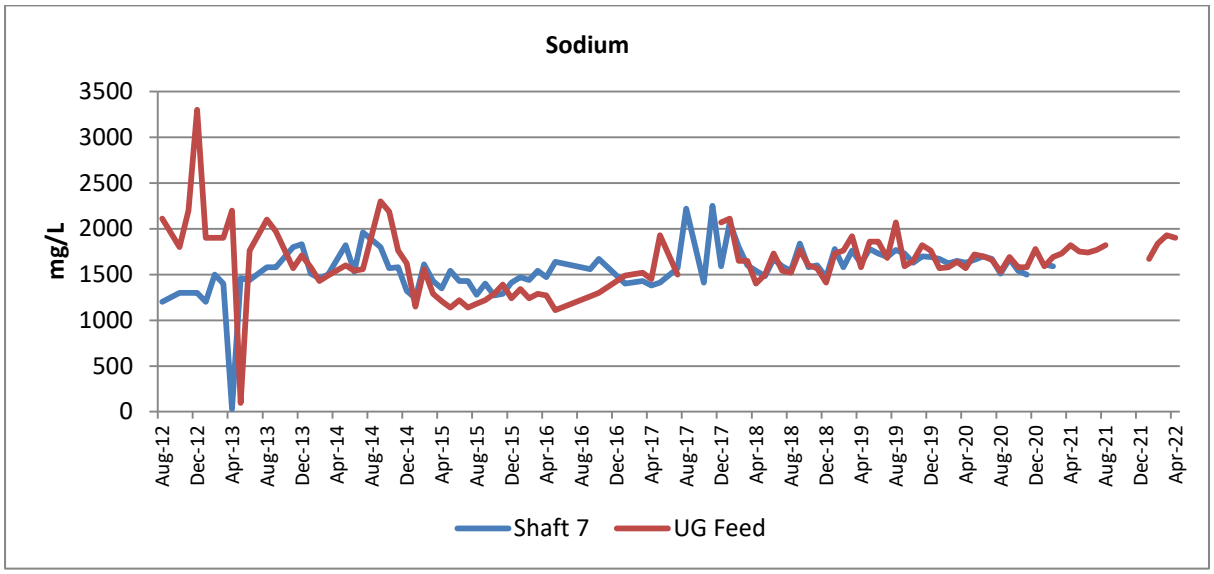
Apr-21
Aug-21
Dec-21
Apr-22
Shaft 7
UG Feed


Sodium
mg/L
3500
3000
2500
2000
1500
1000
500
0
Aug-12
Dec-12
Apr-13
Aug-13
Dec-13
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
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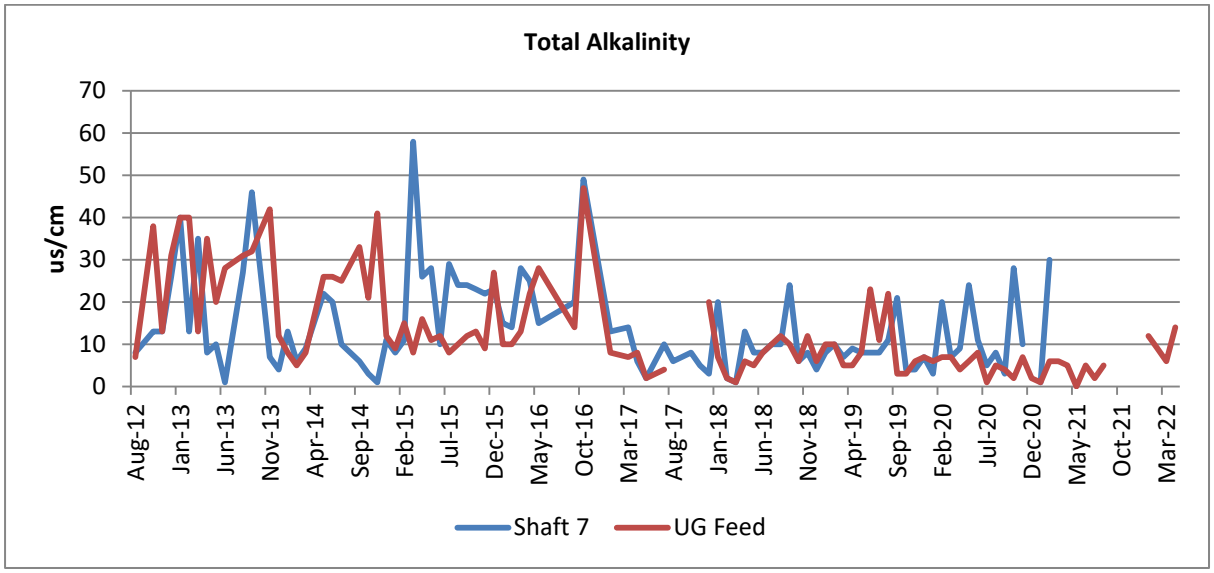
Apr-21
Aug-21
Dec-21
Apr-22
Shaft 7
UG Feed


Total Alkalinity
us/cm
70
60
50
40
30
20
10
0
Aug-12
Jan-13
Jun-13
Nov-13
Apr-14
Sep-14
Feb-15
Jul-15
Dec-15
May-16
Oct-16
Mar-17
Aug-17
Jan-18
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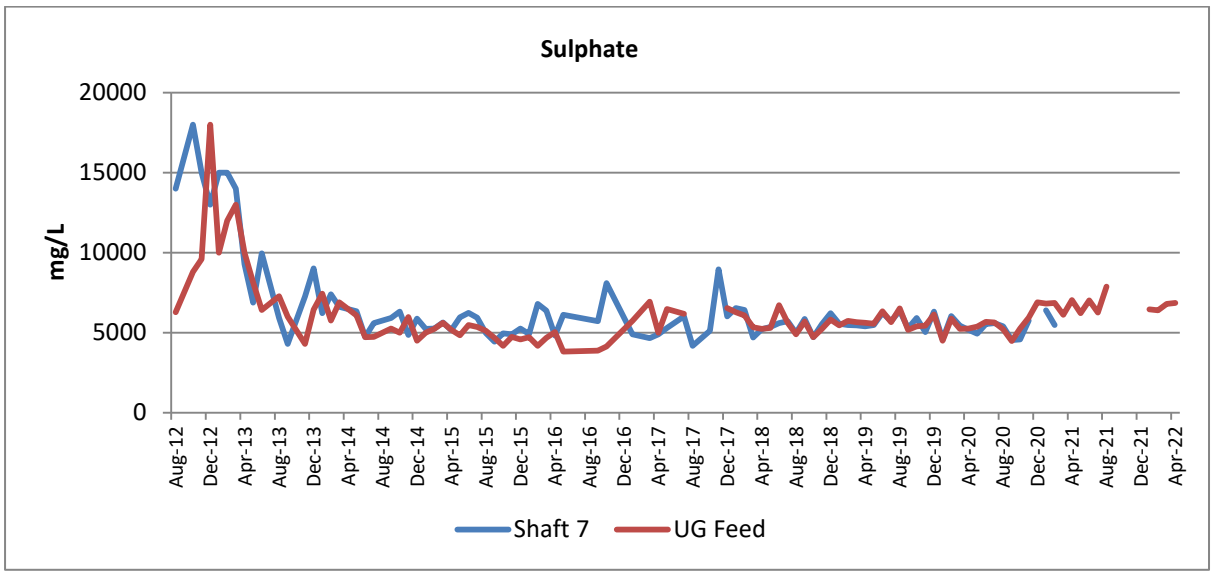
Dec-20
May-21
Oct-21
Mar-22
Shaft 7
UG Feed


Sulphate
mg/L
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
Aug-18
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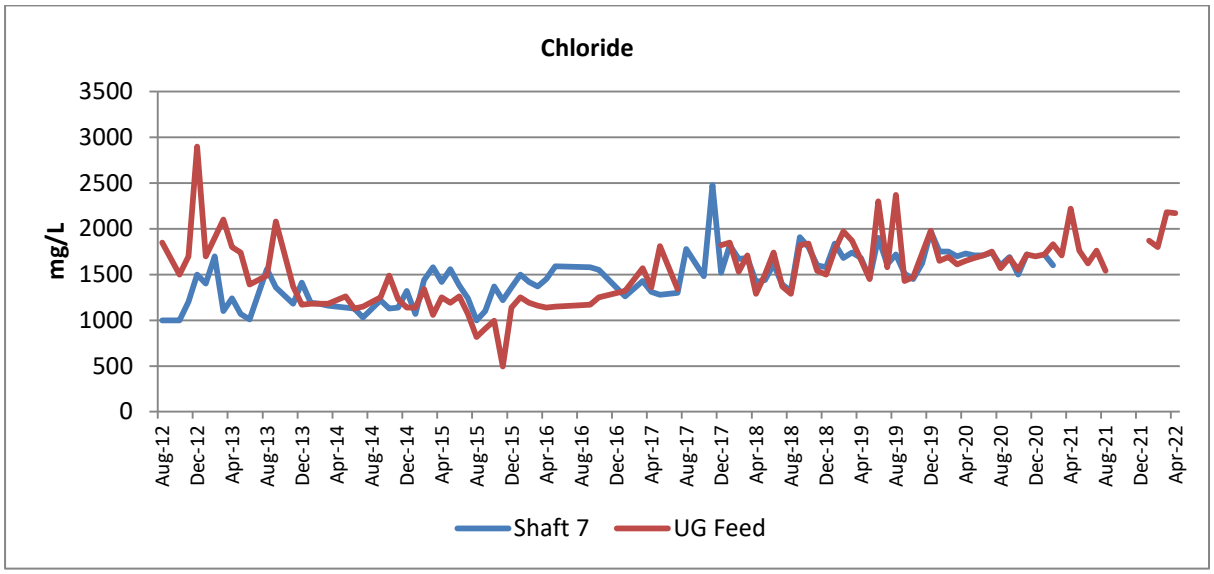
Apr-21
Aug-21
Dec-21
Apr-22
Shaft 7
UG Feed


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
Aug-18
Dec-18
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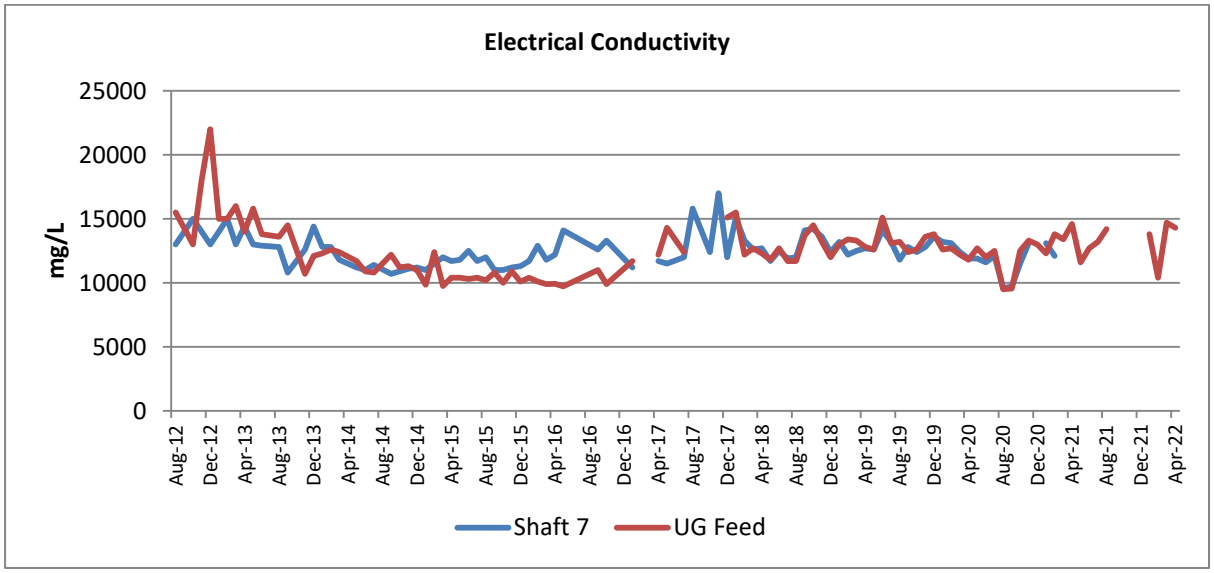
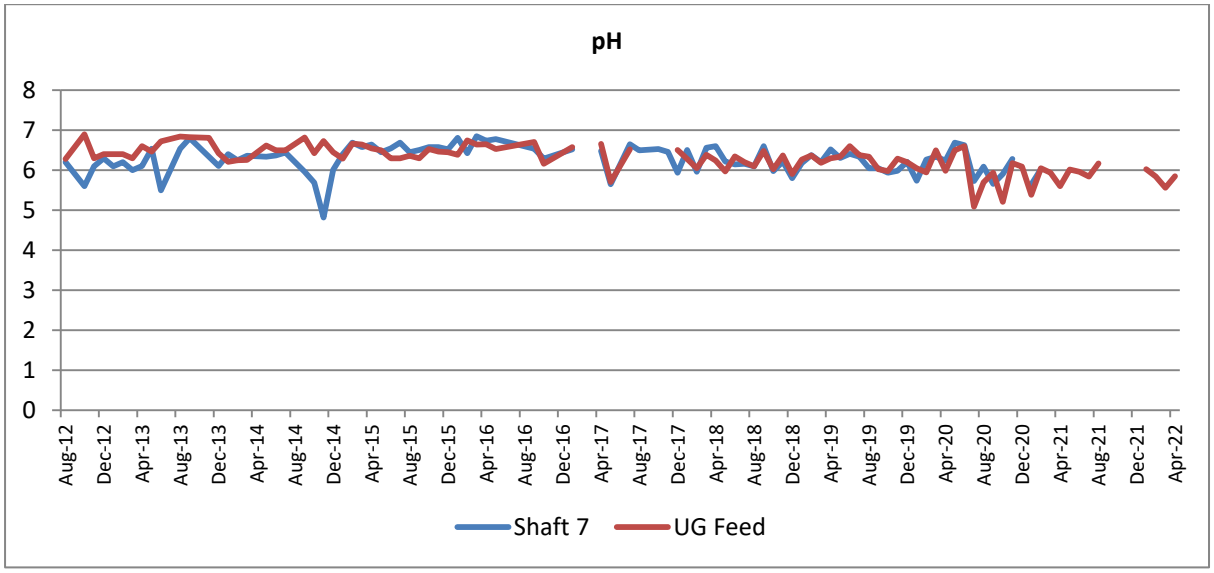
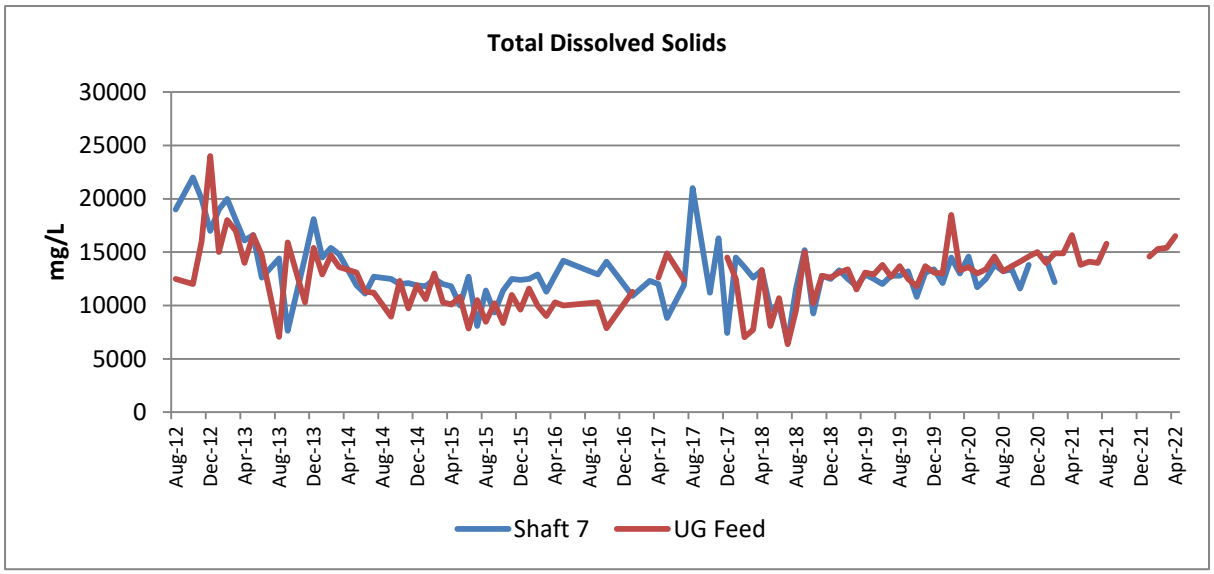
Apr-21
Aug-21
Dec-21
Apr-22
Shaft 7
UG Feed


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 Aug-18 Dec-18 Apr-19 Aug-19 Dec-19 Apr-20 Aug-20 Dec-20 Apr-21 Aug-21 Dec-21 Apr-22
Shaft 7
UG Feed


pH
8
7
6
5
4
3
2
1
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 Aug-21 Dec-21 Apr-22
Shaft 7
UG Feed


Total Dissolved Solids
mg/L
30000
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 Aug-18 Dec-18 Apr-19 Aug-19 Dec-19 Apr-20 Aug-20 Dec-20 Apr-21 Aug-21 Dec-21 Apr-22
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 are 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 197,140 t of waste rock was placed underground and 83,923 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 392,600 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 the period 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 5-14 Non-mineral Waste Summary for reporting period

Waste	Quantity Disposed
Oil	21,600 L
Oily water	4,000 L
Coolant	2,000 L
Scrap metal	137.55 t
Grease	13325 L
Oil filters, hoses,	40 m^3
Contaminated drums/IBC’s	110 m^3
Printer cartridges	7 bags
E-waste	Nil
Waste to Landfill	326.03 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 2022.

5.12 Weeds

During site inspections in 2020, 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 5-15 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 5-16 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 1,454 blasts were fired during the reporting period, 1,325 for development and 129 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), 1,452 blasts were fired. Of these, 1,325 were for development and 127 were for production. One blasts exceeded 5 mm/s, all recorded from production blasts. The percentage of production blasts exceeding 5 mm/s was 0.8% and the percentage of development blasts exceeding 5 mm/s was 0.0%.

Table 5-17 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	4	4	0	0	0	115	0	0	0	115
Jun-20	8	7	0	0	1	127	0	0	0	127
Jul-20	11	10	0	0	1	114	0	0	0	114
Aug-20	15	12	0	0	3	111	0	0	0	111
Sep-20	10	9	0	0	1	121	0	0	0	121
Oct-20	14	13	0	0	1	118	0	0	0	118
Nov-20	7	5	1	0	1	121	0	0	0	121
Dec-20	15	5	0	0	10	116	0	0	0	116
Jan-21	11	5	0	0	6	103	0	0	0	103
Feb-21	11	9	0	0	3	88	0	0	0	88
Mar-21	10	8	0	0	2	91	0	0	0	91
Apr-21	11	10	0	0	1	100	0	0	0	100
TOTAL	127	97	1	0	30	1325	0	0	0	1325

Table 5-18 Western Mineralisation/Main Lodes Blasts > 5 mm/s for the reporting Period

Production	Blasts >5 mm/s	Exceedance Result
127	1	0.8%

For the annual period May 2021 to April 2022, Western Mineralisation/Main Lodes production blast levels was compliant with the 5% allowance for ground vibration with 0.8% of blasts recording ground vibration over 5mm/s.

In the Block 7 mining areas (including the Zinc Lodes), a total of 2 production blasts were fired during the reporting period, none of which exceeded 3 mm/s at any of the compliance monitors. Block 7 was 100% compliant for the reporting period.

Table 5-19 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	2	2	0	0	0	0	0	0	0	0
Jul-20	0	0	0	0	0	0	0	0	0	0
Aug-20	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0
Feb-21	0	0	0	0	0	0	0	0	0	0
Mar-21	0	0	0	0	0	0	0	0	0	0
Apr-21	0	0	0	0	0	0	0	0	0	0
TOTAL	2	2	0	0	0	0	0	0	0	0

Table 5-20 Block 7 Blasts Exceeding 3 mm/s for Reporting Period

Production Blasts	Blasts >3 mm/s	Exceedance Result
2	0	0%

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

Table 5-21 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)	2.29
V2 Hire yard	8.20
V3 Air Express	2.50
V4 123 Eyre St / Bowls Club	1.60
V5 80 Eyre St	2.61
V6 BHO Core Shed (located on CML7)	6.23

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

While V6 BHO Core Shed recorded vibration over 5mm/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 resulting from blasting.

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**.

Table 5-22 Operational Noise Criteria

Location	Day (dB(A))	Evening (dB(A))	Night (dB(A))
A1 – Piper Street North	40	37	35
A2 – Piper Street Central	40	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	45	42	36
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	40	35	35
A14 – Piper Street North	40	35	35

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 3 to 4 May 2021 to quantify off-site noise levels from the Rasp Mine. While the EPL nominates noise limits for day, evening and night, attended monitoring was completed during the night-time period to minimise the contamination of monitoring data by extraneous noise sources (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. Stability category F temperature inversion conditions were identified to be present during the first six measurements on 3 May 2021. Wind speeds were below 2 m/s for all but one of these six measurements, hence the noise limits were still considered to be applicable. The noise limits did not apply at A4 on 3 May 2021 due to the presence of stability category F temperature inversion conditions and wind speeds greater than 2 m/s.

Additionally, the wind speed was above (greater than) 3 m/s during 19 of the 28 attended measurements and therefore the noise limits did not apply for these periods according to the site's EPL. In total, noise limits did not apply for 20 of the 28 attended measurements due to either temperature inversion conditions or wind speeds exceeding the EPL criteria. Regardless of the wind speed, the site noise contribution was below (complied) with the relevant noise limits. The site was inaudible during 19 of the 28 measurements.

Site noise was inaudible during eight of the 14 measurements on the night of Monday 3 May 2021, and during 11 of the 14 measurements on the night of Tuesday 4 May 2021. When a source is inaudible, it can be assumed that the source is well below (eg 10 dB) the measured total background (LA90) noise level. Given this, site LAeq,15min noise contribution can be estimated to be below (satisfied) the relevant limits at all these locations during these measurements.

Noise monitoring results are shown in **Table 5-24**.

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

Figure 5-21 Noise Receptors

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 Noise Monitoring Results

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

IA: Inaudible

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 has been 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 2022. 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 5-24 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
Radiation Store 'REMOVED FROM SERVICE'	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 8ML.

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 337.1ML, an increase from 306ML used in the previous period.

Potable water used during the period was 13.4ML, increased from 11.2ML used in the previous period due to an increase in personnel and contractors.

BHOP has a water extraction licence, 85BL256102, to extract by active pumping 370ML pa. In the reporting period, approximately 500ML was extracted and 217ML returned to Underground for a Net Extraction 283MLpa. An independent review of the site water balance by EMM in 2021 included investigation into flow meter data records and descriptions of day to day water movements provided by site operators. It was determined that the groundwater take at Rasp Mine is estimated using the water balance as: Groundwater take = Dewatering (pumping from underground to surface) minus the Underground supply (pumping water underground for use in the mining process). During a consultation session between BHO, EMM and DPIE Water held on 15 November 2021, this methodology was discussed and endorsed by DPIE Water representatives as appropriate given the nature of the operation and associated water balance. In 2020, approximately half of the water removed from the underground workings via dewatering pumps was directly attributable to water taken underground for the purposes of operating underground machinery and ancillary uses such as fire water. This water was used in mining activities, collected in sumps within the excavated shafts and drives, and returned to the surface for settling in pond S22 before being recycled. The remainder of the water removed from the underground workings is attributed to groundwater inflows.

Flow meters are being installed on dewatering lines in 2022 as part of the NSW non-urban water-metering framework. BHO has subsequently engaged a Duly Qualified Person to install and verify pattern approved flow meters.

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 the reporting period. 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 2022.

A rehabilitation strategy has not been finalised although an Options Study for rehabilitation at Rasp Mine was begun in 2018 and finalised 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	2.27	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)	0.01	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.

Eight complaints were received over the reporting period compared to six complaints in the previous period. Of those complaints, four related to blast vibration, and others related to surface operations, water use, sediment control, and noise, . **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.

Table 8-1 Complaints register

Date of Complaint	Reason for Complaint	Comment
May 2021	No complaints in May	
June 2021 Event #7197	Surface mining	• A complainant contacted the EPA in June with concerns that surface mining was taking place at Rasp Mine. • The EPA forwarded the query to BHOP on 17 June. • On 18 June, BHOP responded to the query with a letter confirming there were no surface mining activities, or any other activities contrary to project approval conditions, taking place at Rasp Mine. • During the period in question BHOP was completing constructing of the Blackwood TSF2 embankments and crushing and screening waste rock in BHP Pit in accordance with PA 07_0018 MOD4 and MOD7.
July 2021 Event #7323	Vibration	• A complainant contacted the NSW EPA about blast vibration from 14 July, the EPA did not provided complainant's details to BHOP. • Blast vibration levels measured at compliance monitors were below licence limits. • Blast vibration data were provided to the EPA. • No follow up contact with the complainant was requested.

Date of Complaint	Reason for Complaint	Comment
August 2021	No complaints in August.	
September 2021 Event #7945	Vibration	• A complainant contacted the NSW EPA about blast vibration from 23 September. The EPA provided the complainant's details to BHOP. • A blast monitor is currently installed at the complainant's residence and vibration levels measured at this monitor and nearby compliance monitors were below licence limits. • Blast vibration data for the blast were provided to the EPA. • BHOP have contacted the complainant to discuss the details of the blast.
September 2021 Event #7946	Vibration	• A complainant contacted the NSW EPA about blast vibration from 12 August, 20 and 23 September. The EPA provided the complainant's details to BHOP. • Vibration levels measured at nearby compliance monitors on the dates provided were below licence limits. • A blast monitor was previously installed at the complainant's residence and vibration levels recorded were below licence limits. • The blast vibration data for the blasts were provided to the EPA. • BHOP have contacted the complainant to discuss the details of the blast.
October 2021	No complaints in October.	
	No complaints in	

Date of Complaint	Reason for Complaint	Comment
November 2021	November.	
December 2021 Event #7560	Water	• A complainant contacted the EPA about water use with regards to site surface dust suppression and hours of water cart operation. • BHOP reviewed site practices in line with consent conditions and provided a response to the EPA.
January 2022 Event # 7692	Vibration	• A complainant contacted the EPA about blast vibration from 11 January. The EPA provided the complainant's details to BHOP. • A blast monitor is installed at the complainant's residence and vibration levels measured at this monitor were below licence limits. • The blast vibrations data for the blast were provided to the EPA. • BHOP have contacted the complainant to discuss the details of the blast.
February 2022	No complaints in February.	
March 2022 Event # 7765	Sediment	• BHOP was contacted on 25 March by the EPA in regards to a complaint made about sediment on the road near Ryan St Dam. • BHOP arranged for a street sweeper to service the area on multiple occasions following this. • The EPA did not provide complainant details to BHOP.
April 2022 Event #7797	Drilling/Noise	• On the morning of 9 April drilling contractors, working for BHOP, were approached by a resident in regards to noise generated by drilling activities. • BHOP staff contacted the resident and agreed to amend drilling times in certain periods.

8.2 Community Liaison

During the period of the Annual Review, 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 quarterly meetings of the BHCC Lead Reference Group (BHLRG) during the reporting period.
- 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 2021 however, the function did not take place due to COVID-19 restrictions.
  .

8.3 Community Support

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

These groups include:

- BH AFL
- Various Broken Hill Schools
- Swim SA Carnival
- Foundation Broken Hill
- Broken Hill City Council community projects

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 7 to 11 March 2022. 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 MOD9 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 4 October 2019 ('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 46 of the 67 applicable Project Approval conditions;
- BHO was compliant with 55 of the 75 applicable EPL conditions;
- BHO was compliant with 24 of the 28 applicable CML7 conditions.

Copies of the Independent Audit report and Action Plan are available on the CBH Website and have been provided to DPIE.

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 October 2021, in accordance with the requirements of EPL 12559.

There were six reportable incidents/non-compliance during the reporting period.

1) TEOM1 /EPL Point 13 data collection non-compliance (Ref MP07_0018-PA-12)

As reported on 18 January 2022, following a severe weather event on 12 January 2022 a temporary power disruption to TEOM1 caused the Safety Switch Circuit Breaker, which regulates power to the unit, to close at approximately 8pm and was not restarted until the 8am the next morning. This resulted in a con-compliance against PA07_0018 Schedule 3 Condition 3 Table 2 as an average for the 24-hour period could not be calculated, as the minimum 75% data capture for the day was not achieved.

It is unlikely that an environmental harm was caused as a result of this non-compliance, as the region experienced a dust storm, followed by a rainfall event. The 24-hour average recorded at TEOM2 for this date was 56.63 $\mu g/m^3$, the highest readings for the period were 2,575.17$\mu g/m^3$ and 2,554.67$\mu g/m^3$ at 8:10 and 8:15pm due to the dust storm.

Operation of the TEOM's is monitored 24/7 by Acoem Environmental Reporting Services (ERS), an automated alert was received indicating a brief loss of power, followed later by notification that power had been restored for TEOM2, however no such alerts were received for TEOM1. Both units had been sending alerts for high dust readings in the days prior to this incident indicating the automated alert system was working.

Following this incident, a number of corrective actions have been put in place including:

- Acoem were notified of the failure in automated alerts on this occasion
- Inspection of the circuit breaker that controls power to the TEOM was conducted to ensure it was fit for purpose and operating as intended
- A TARP developed for checks required in the event of power loss; and
- A monitoring display was installed in the ESO office.

2) TEOM2/EPL Point 14 data collection non-compliance (MP07_0018-PA-14)

As reported on 7 March 2022, a severe weather event on the evening of 28 February 2022 caused an extended power disruption to a large part of central Broken Hill and infrastructure at the northern end of the mine site. TEOM2, located on the norther side of TSF2 Blackwood Pit was impacted by this power outage between approximately 7:25pm on 28 February to 10:00am on 1 March 2022. As a result, BHOP was non-compliant with PA07_0018 Schedule 3 Condition 3 Table 2 requirements, as a 24-hour average for 1 March could not be calculated from 14 hours of data, where the minimum required it 75%.

It is unlikely that any environmental harm was caused as result of this outage as dust levels in the lad up to this outage were relatively low and within compliance limits. Data capture at TEOM1 indicate that a dust storm prior to the power loss, which was followed by heavy rainfall.

An automated alert was issued at 8:12pm on 28 February indicating a lack of data capture; however, the on-site ESO along with an electrician had already inspected the unit and identified the lack of power following the thunderstorm. It was determined that the power loss was due to loss of supply to central Broken Hill, the site electrical team maintained watch on reconnection updates from Essential Energy.

Following this incident, the automated alert system was reviewed and tested to ensure intended functionality. As a result of a similar even on 12 January visual displays were already being placed in the ESO office for ongoing real-time monitoring of the units, particularly during night shift, and TARP was previously developed for checks required in response to various alerts from the TEOM units.

3) Cracked Deposition Dust Gauge 2 (MP07_0018-PA-16)

As reported on 10 March 2022, during the monthly change-over of depositional dust gauges DDG2, located in the Essential Water compound at Block 10, it was found that a crack had formed down the side of the collection jar. The ALS Newcastle laboratory was contacted to discuss the incident and it was determined that due to quality control concerns the sample for the month of February was unable to be analysed. Hence, BHOP was non-compliant with PA07_0018 Schedule 3 Condition 3 Table 3 requirements for deposited dust to be collected over a monthly period and EPL 12559 requirements for monthly data collection for Point 4.

The Essential Water compound is fenced and no vandalism of dust gauges has occurred previously at this location, it is likely the damage to the collection jar was caused by heavy winds shaking the gauge during the thunderstorm experienced on 28 February. Following this incident Styrofoam padding has been added within the gauges to prevent movement of the glass jars.

4) S49 Seepage (MP07_0018-PA-13)

As reported on 26 May 2022, on 10 March during an inspection of storm water pond S49 seepage was observed extending approximately 4m beyond the boundary fence with minor pooling, but no surface flow. This seepage potentially resulted in BHOP being non-compliant with:

- PA07_0018 Schedule 2 Condition 1 to minimize any material harm to the environment that might occur as the result of the project; and
- EPL Condition L1.1 & Condition L8.1 as there is the potential that waters located outside the CML7 leave boundary could have become polluted if seepage mixed with stormwater run-off and in that S49 did not indefinitely hold stormwater run-off generated in a rainfall event.

On 28 February 2022 22.3mm of rain was recorded by the Rasp Mine weather station in 30 minutes, following this on 1 March S49 was inspected and it was deemed necessary to pump water out of S49 to another location within CML7. It was at this time that the pump used for this purpose was unable to be located from its normal location at S14. The next inspection of S49 occurred on 10 March and it was at this point that the seepage was first observed, a hire pump was obtained at this point and pumping of water out of S49 began. Following the initial rainfall a number of large rainfall events occurred during March and April recharging the pond and on some occasions restarting seepage that had previously ceased.

Seepage from S49 is a historic issue, occurring on three previous occasions in 2011, 2012 and 2016 all following large rainfall events. A number of seepage mitigation measures have been implemented in an effort to prevent reoccurrences, including excavation of rear ponds to create depth and keep water away from the fill wall, installation of a HDPE liner and installation of a permanent pump. None of which have been successful at preventing seepage incidents from reoccurring.

Following the most recent seepage event BHOP has initiated a number of corrective actions including:

- Pumping of water out of S49 to another holding pond on CML7.
- Water and soil samples taken for investigation.
- Excavation of a seepage interception trench and collection bund outside the wall of S49.
- Engagement of electrical infrastructure to scope installation of a fixed, fit for purpose pump with automated trigger for transfer of water out of S49.
- Capping of unsealed area at the end of the Ryan St cul-de-sac to reduce removal of sediment via vehicle movement and run-off.
- An engineering firm has been engaged to review the integrity of the storm water pond with the intention of improving water retention.
- Engagement of site contamination experts to inspect the surround area and determine appropriate remediation.
- A Trigger Action Response Plan (TARP) has been developed for stormwater retention ponds following rainfall events.
- Long-term rehabilitation of the Block 10 area as part of the Rehabilitation Management Plan due for submission July 2022.

5) Broken Deposition Dust Gauge 7 lid (MP07_0018-PA-18)

As reported on 19 April 2022, Depositional Dust Gauge 7 located at Blackwood TSF2 was collected on 4 April, as per monitoring protocols. It was packaged in the foam boxes in which they were supplied to BHOP and forwarded to ALS Newcastle for analysis. Upon arrival at the laboratory the lid was damaged, likely to have occurred in transport. ALS contacted BHOP in regards to the incident and advised they would not be able to perform analysis on the sample due to the loss of volume and sample integrity. This resulted in BHOP being non-compliant with PA07_0018 Schedule 3 Condition 3 Table 3 for the DG& location. Moving forward dust gauge bottles will be shipping in foam boxes within a cardboard box for additional protection.

6) S14 Seepage (MP07_0018-PA-19)

As reported on 17 May 2022, during an inspection of the storm water storage pond S14 on 28 April seepage was observed flowing into decommissioned transformer cells on a neighbouring uninhabited industrial block, into a vacant residential block and onto Eyre Street. This seepage potentially resulted in BHOP being non-compliant with:

- PA07_0018 Schedule 2 Condition 1 (to prevent and/or minimise any material harm to the environment as a result of the project) and

- EPL 12559 Condition L1.1 (to comply with section 120 of the Protection of the Environment Operations Act 1997) & Condition L8.1 (that all storm water and surface water holding ponds be capable of holding stormwater run-off from a 1:100 ear ARI event).

This seepage was the result of 27.8mm of rain recorded at the Rasp Mine weather station on 26 April, given there have been no previous seepage events at this location, the pond was not inspected following this rainfall event. However, previously rainfall events totalling 152.5mm in March and April meant this pond was already saturated and the added rainfall on 26 April increased the water level to a point that instigated seepage. The pump usually kept in this location was unable to be located in March and BHOP were still awaiting the purchased replacement pumps, for this reason a hire pump was obtained and seepage had ceased from S14 by the afternoon of 29 April.

Following this seepage event electric pumps have been purchased and installed to maintain water levels in S14 and the adjacent stormwater ponds. These units are currently powered by generators, however and electrical engineering company have been engaged to explore installation of a permanent power source in this area. An engineering and environmental consultancy company have also been engaged to review the integrity of multiple water storage ponds across site, S14 included.

11. ACTIVITIES PROPOSED IN THE NEXT REPORTING PERIOD

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

- Develop the Waste Rock Management Strategy as requested by NSW Resources Regulator.
- Submit the Rehabilitation Management Plan and Strategy.
- Installation of an automated sprinkler system for dust suppression on TSF2.
- Boxcut and Kintore Pit TSF construction as approved under Project Approval 07_0018 MOD6.
- Waste-rock capping.
- Undertake on-going maintenance and inspections of heritage buildings as required.
- Continue application of chemical dust suppressant to ‘free areas’ and unsealed roads.
- Weed control.
- Stormwater pond maintenance, including sediment removal.