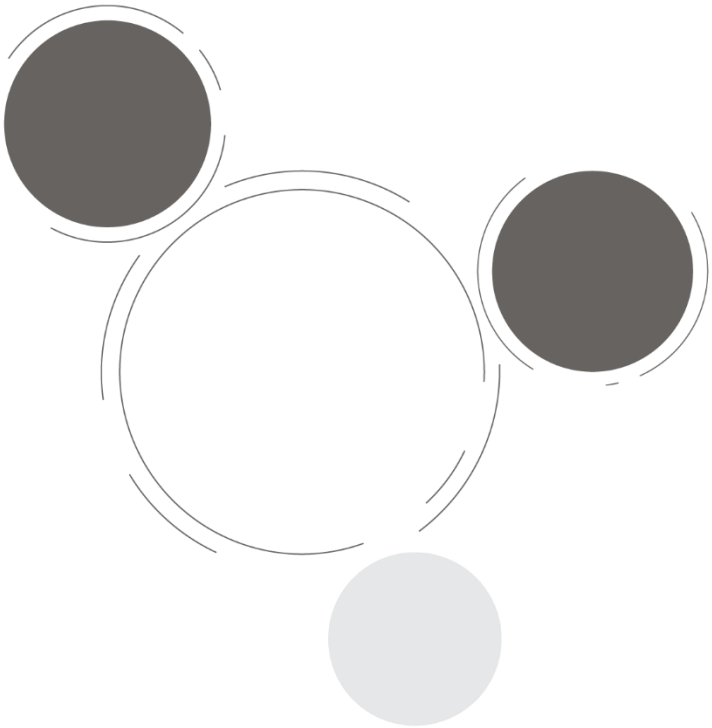
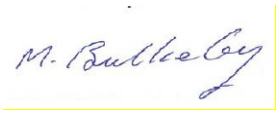
BAAL BONE UNDERGROUND

GLENCORE



Annual Review
2022

Name of Operation	Baal Bone Colliery
Name of Operator	Baal Bone Colliery
Project Approval Number	09_0178
Name of Holder of Project Approval	The Wallerawang Collieries Ltd
Mining Lease Number/s	CCL749, MPL261, CL391, ML1302, ML1389, ML1607
Name of Holder of Mining Lease/s	The Wallerawang Collieries Ltd
Water Licence Number/s	WAL27887, WAL34952, 80WA706034, 80WA706035
Name of Holder of Water Licence/s	The Wallerawang Collieries Ltd
RMP Start Date	1st August 2022
Annual Review Start Date	1st January 2022
Annual Review End Date	31st December 2022
I, Mark Bulkeley, certify that this audit report is a true and accurate record of the compliance status of Baal Bone Colliery for the period 1st January 2022 to 31st December 2022 and that I am authorised to make this statement on behalf of Baal Bone Colliery. *Note.* *a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.* *b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).*	
Name of Authorised Reporting Officer	Mark Bulkeley
Title of Authorised Reporting Officer	Operations Manager
Signature of Authorised Reporting Officer	
Date	24 March 2023

Abbreviations:

ACMA – Australian Communications and Media Authority
BOD –Biochemical Oxygen Demand
CCL – Consolidated Coal Lease
CL – Coal Lease
CMRA – Coal Mines Regulation Act 1982
DPIE – Department of Planning, Industry & Environment
DPI – Department of Primary Industry
DRE - Department of Industry, Division of Resources & Energy
DRG –Department of Planning, Industry & Environment – Division of Resources and Geoscience
EC – Electrical Conductivity
EPA – Environmental Protection Authority
EPL – Environment Protection Licence
MBAS – Methylene Blue Active Substances
ML – Mining Lease
MOP – Mining Operations Plan
MPL – Mining Purposes Lease
OEH – Office of Environment and Heritage
REA - Reject Emplacement Area
TSS – Total Suspended Solids

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1 Statement of Compliance

Table 1.1: Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	Yes/No*
PA 09_0178	No
EPL 765	No
Mining Leases	Yes
Water Licences	Yes

Table 1.2 Details of non-compliances in 2022.

Relevant Approval	Condition #	Condition description	Risk	Comment	Reference
PA 09-0178	Schedule 3, Condition 14	Soil and Water discharge limits	Low	Dissolved iron and PH exceedances at LDP16 (Overshot Dam).	**Section 7.2.4** and **Section 11**
EPL 765	L2.4	Water and/or Land Concentration Limits	Low	Dissolved iron and pH results outside of EPL concentration limits at LDP16 during monthly sampling events in February, March and April 2022.	**Section 7.1.2** and **Section 11**

Compliance status key for Table 1.2

Risk Level	Colour Code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-compliant	Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur
Low	Non-compliant	Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur
Administrative non-compliance	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)
Compliant	Compliant	Criteria met

2 Introduction

2.1 Overview

An Annual Review is prepared annually by Baal Bone Colliery (Baal Bone), to fulfil the reporting requirements of various regulatory departments. Baal Bone is operated by The Wallerawang Collieries Ltd (TWCL). The reporting period for this Annual Review is 1 January 2022 to 31 December 2022.

On 14 January 2011, Baal Bone received Project Approval (PA 09_0178) for the continuation of mining activities at Baal Bone via Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Project Approval granted approval for the continuation of mining operations at Baal Bone until 14 December 2014, and included:

- continuation of underground mining of Longwalls (LW) 29-31 in accordance with the approved Subsidence Management Plan (SMP) and Mining Operations Plan (MOP);
- continued operation of associated surface infrastructure;
- saleable coal production of 2.0 Mtpa (equating to 2.8 Mtpa run of mine (ROM) coal);
- continued transport of prepared saleable coal to markets by rail, and up to 900,000 tonnes per annum (tpa) by road; and
- mining of other isolated Remnant Areas within existing workings.

Underground mining at Baal Bone ceased on 3 September 2011, with the site entering into care and maintenance.

In February 2015, then DP&E approved amendment to the Project Approval to extend the life of mine for an additional three years until 31 December 2019 to allow the Remnant Areas to be mined.

In December 2015, DP&E approved a second modification to the Project Approval to allow Ben Bullen Creek to remain in its current alignment.

On 20 December 2019, the Resources Regulator approved the Mine Closure MOP until 31 December 2025.

In January 2020 demolition of infrastructure on the Baal Bone site commenced, which included the demolition of the Coal Handling Preparation Plant (CHPP), bathhouse and workshop, as well as all coal conveyors, reclaim tunnels, transfer towers, bins, sheds and other associated ancillary infrastructure. The rail loop linking the site to the Main Western Railway line was also decommissioned and all rail lines, ballast and sleepers were removed from the corridor.

The civil works and rehabilitation component of the closure activities commenced in September 2020, including the remediation of the CHPP and Run of Mine (ROM) areas and the former rail corridor. Activities included the addition of topsoil, fertiliser, lime and gypsum followed by the areas being ripped. The CHPP ROM area was then seeded with a pasture seed mix and the rail loop was seeded with a woodland seed mix.

During 2020, filling of voids including the Leachate Dam, REA 6 Tailings Dam, Central Void and the Southern Void were commenced. The filling of the REA 6 Tailings Dam was completed in December 2020. The remaining voids were continued to be filled throughout the 2021 reporting period.

During 2021, the filing of the Southern Void and Leachate Dam were completed. The administration and workshop buildings were demolished in October 2021. Over 42 ha of land was shaped to final landform, ameliorated and seeded – including areas of the Northern rehabilitation domain and the Southern void domain.

During 2021 rehabilitation works were completed on sections of Ben Bullen Creek where it passes through the site. Remediation works included large amounts of rock revetment along the banks of the creek (Reach 2), the installation of high and low flow channels, and highwall safety and stabilisation work. Over 10,000 tubestock plants, including the threatened Capertee Stringybark were planted along the remediated sections of Ben Bullen Creek.

During 2022, the filing of the Central Void was completed. The central void area together with the remaining sections of central pit-top area and infrastructure area were shaped to final landform, ameliorated and seeded with a pasture seed mix. The remaining areas in the southern rehabilitation area, southern void area and Ben Bullen Creek area were shaped to final landform, ameliorated and seeded with a woodland seed mix.

2.2 Scope of this Annual Review

The layout of this Annual Review has been aligned to the DP&E Post- approval requirement for state significant mining developments - Annual Review Guideline (October 2015).

This Annual Review has also been prepared to address the requirements of Schedule 5, Condition 3 of Baal Bone's Project Approval (PA 09_0178), which requires a report to be submitted to the Secretary reviewing the annual environmental performance of the project. The requirements of Schedule 5, Condition 3 of the Project Approval and where these are addressed in the Annual Review are listed in **Table 2.1.**

Appendix C (A.3) contains the information prepared and submitted via the Resources Regulator Portal for the Annual Rehabilitation Report as required by Mining Amendment (Standard Conditions of Mining Leases—Rehabilitation) Regulation 2021.

Table 2.1: Requirements of Schedule 5, Condition 3 of Project Approval 09_0178

Schedule 5, Condition 3 requirement	Annual Review Section
a) describe the works that were carried out in the previous calendar year, and the works that are proposed to be carried out over the current calendar year.	**Section 4** and **Section 12**
b) include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against: • the relevant statutory requirements, limits or performance measures/criteria; • the monitoring results of previous years; and • the relevant predictions in the EA.	**Sections 6, 7, 8 and 9**
c) identify any non-compliance over the previous calendar year, and describe what actions were (or are being) taken to ensure compliance;	**Sections 1** and **11**

d) identify any trends in the monitoring data over the life of the project;	**Sections 6, 7** and **8**
e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and	**Sections 6, 7** and **8**
f) describe what measures will be implemented over the current calendar year to improve the environmental performance of the project.	**Section 12**

It should be noted that this Annual Review does not necessarily provide a comprehensive description of each individual operation or environmental control that is currently employed at Baal Bone. Rather, this Annual Review focuses on providing a succinct review of the significant operational and environmental activities undertaken throughout the year. It also examines the performance of key site operations and environmental controls throughout the 2022 reporting period.

Included is a summary of monitoring data (as applicable), a discussion regarding the level of compliance achieved, together with an overview of initiatives proposed and actions planned for the 2023 reporting period.

2.3 Mine Contacts

Baal Bone Colliery can be contacted via telephone on (02) 6350 6900 and fax (02) 6359 0530. The postal and street addresses are as follows:

Postal: Baal Bone Colliery
PO Box 13
Lithgow NSW 2790

Street: Baal Bone Colliery
Castlereagh Highway
Cullen Bullen NSW 2790

Personnel responsible for environmental management at Baal Bone Colliery are shown below:

Table 1.2: Mine Personnel Contact Details

Contact Person	Position	Contact Details
Mark Bulkeley	Operations Manager	Ph: (02) 6350 6943 Email: *Mark.Bulkeley@Glencore.com.au*
Elizabeth Fishpool	Environment and Community Coordinator	Ph: (02) 6350 6920 Email: *Elizabeth.Fishpool@Glencore.com.au*

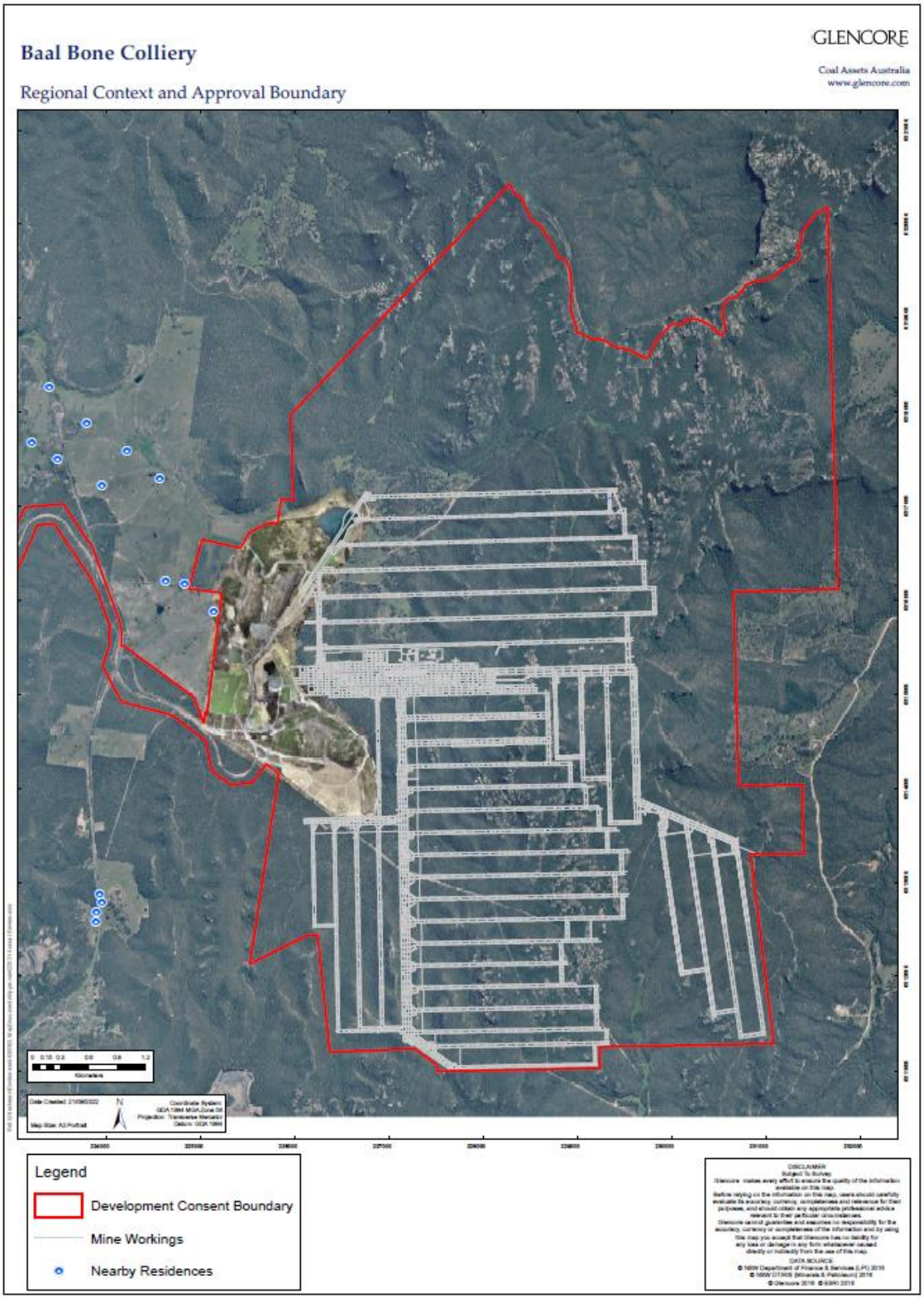


Figure 1.1: Locality plan showing approval boundary.

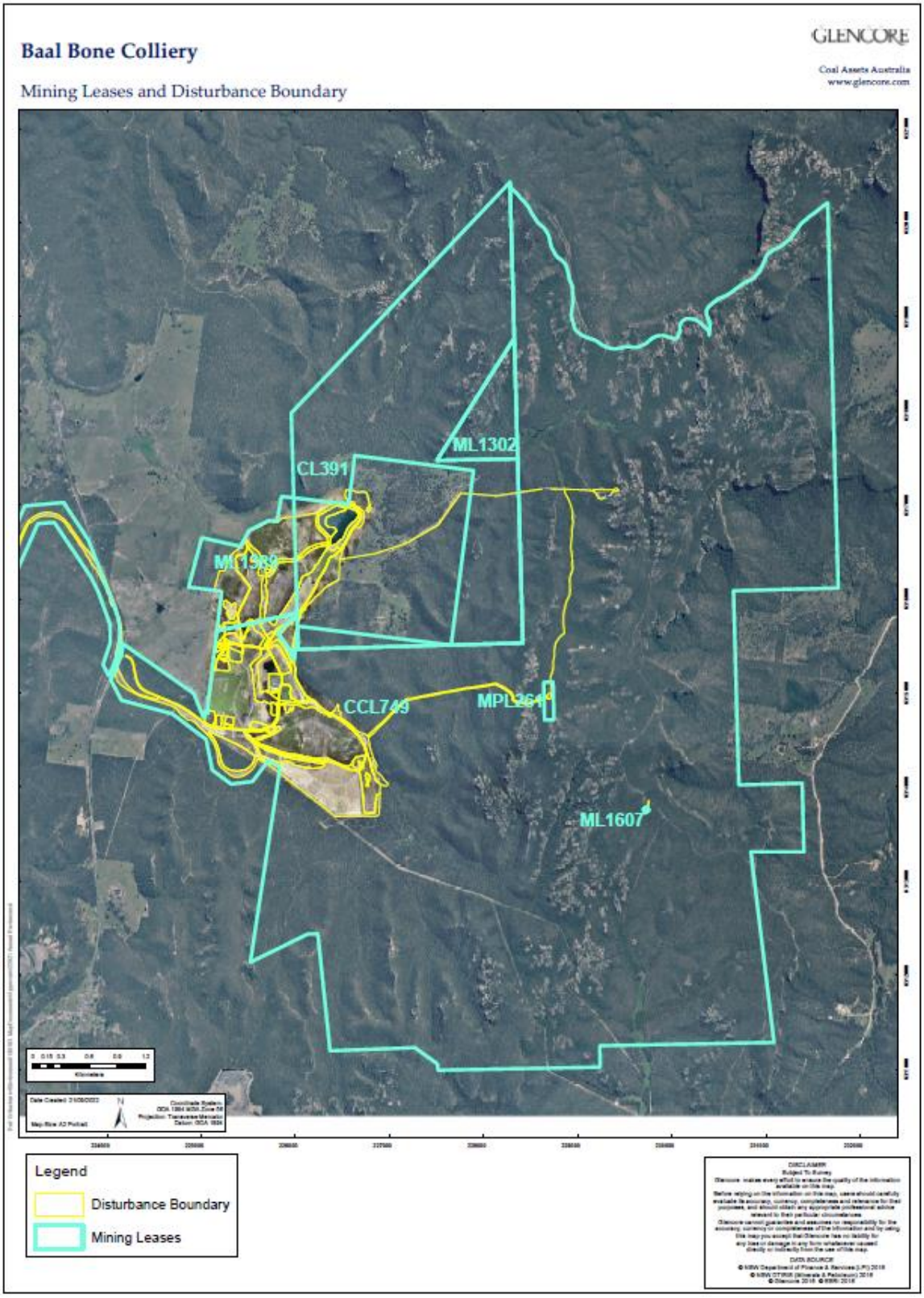


Figure 1.2: Mining lease boundaries and disturbance area.

3 Approvals

A list of all current consents, leases, licences and approvals are included below in **Table 3.1** along with their compliance status for the 2022 calendar year.

Table 3.1: Consents, Leases, Licences and Approvals.

Type	Regulatory Authority	Approval Number	Holder	Issue Date	Expiry/ Review Date	Scope	Were all Approval Conditions Complied With?
Project Approval	DPIE	07_0035	The Wallerawang Collieries Ltd	24/10/2007	Perpetuity	Part 3A Project Approval for the Ventilation Shaft and Power Line Project.	Yes
	DPIE	09_0178	The Wallerawang Collieries Ltd	14/01/2011	31/12/2014 (Mining operations)	Part 3A Project Approval for continued operations at Baal Bone Colliery.	Yes
	DPIE	09_0178 (MOD 1)	The Wallerawang Collieries Ltd	14/01/2011 Mod 1 Feb 2015	31/12/2019 (Mining operations)	Part 3A Project Approval for continued operations at Baal Bone Colliery until 31 December 2019.	Yes
	DPIE	09_0178 (MOD 2)	The Wallerawang Collieries Ltd	01/12/2015 Mod 2 Dec 2015	31/12/2019 (Mining operations)[1]	s75W modification to maintain alignment of Ben Bullen Creek.	No – refer to Table 1.2 and Section 11.
Environment Protection Licence	EPA	765	The Wallerawang Collieries Pty Ltd	05/10/2022	Until surrendered, suspended or revoked.	Premises and Scheduled Activity (Coal Mining/ Washery) Licence	No – refer to Table 1.2 and Section 11.
Rehabilitation Management Plan	Resources Regulator	RMP	The Wallerawang Collieries Pty Ltd	01/08/2022	As required by clause 11, sch. 8A of Mining Reg 2016.	RMP to replace Mine Closure MOP	Yes
Mining Leases	Resources Regulator	CCL 749	The Wallerawang Collieries Pty Ltd	05/04/1990	11/03/2030	Mining Entitlement (Consolidates CL 209, CL 246, CL 329, CL 330, CL331 and CL332) Various depths	Yes
	Resources Regulator	MPL 261 (Act 1973)	The Wallerawang Collieries Pty Ltd	22/08/1990	22/08/2032	Mining Entitlement (Southern mine dewatering bores) Parish: Ben Bullen,	Yes

1 Expiry date relates only to mining operations. As per PA 09_0178: *"Under this approval, the Proponent is required to rehabilitate the site and perform additional undertakings to the satisfaction of the Secretary and DRE. Consequently this approval will continue to apply in all other respects other than the right to conduct mining operations until the site has been properly rehabilitated".*

Type	Regulatory Authority	Approval Number	Holder	Issue Date	Expiry/ Review Date	Scope	Were all Approval Conditions Complied With?
						Depth: Surface - 10m	
	Resources Regulator	CL 391 (Act 1973)	The Wallerawang Collieries Pty Ltd	24/02/1992	11/03/2030	Mining Entitlement Parish: Ben Bullen Depth: > 20m	Yes
	Resources Regulator	ML 1302 (Act 1992)	The Wallerawang Collieries Pty Ltd	29/09/1992	11/03/2030	Mining Entitlement Parish: Ben Bullen Depth: >20m	Yes
	Resources Regulator	ML 1389 (Act 1992)	The Wallerawang Collieries Pty Ltd	09/05/1996	11/03/2030	Mining Entitlement Parish: Ben Bullen Depth: Surface – unlimited Surface - 20m	Yes
	Resources Regulator	ML1607	The Wallerawang Collieries Pty Ltd	08/01/2008	11/03/2030	Mining Lease (Purposes) Parish: Cox Depth: Surface – 10m	Yes
Water Access Licence	DPI Water	WAL27887 *80WA706118* - 750 units	The Wallerawang Collieries Pty Ltd	17/7/2007	Perpetuity *15/01/2025*	Water Access Licence (under Water Management Act 2000) replaces bore licences: 80BL135509 (near rail loop) and 80BL136703 (near UC1). Both bores have been decommissioned and sealed.	Yes
	DPI Water	WAL34952 *80WA716836* – 25 units	The Wallerawang Collieries Pty Ltd	27/07/2013	Perpetuity *16/07/2027*	Water Management Act 2000 licence – replaces bore licence 80SL046064. 80WA716836 licences the Overshot Dam.	Yes
Bore Licences	DPI Water	80WA706034	The Wallerawang Collieries Pty Ltd	18/01/1995	15/01/2022	Section 115 of the Water Act 1912. Bore – Mine dewatering LW 1 (South Bore 1). Converted to monitoring bore in 2020.	Yes
	DPI Water	80WA706035	The Wallerawang Collieries Pty Ltd	18/01/1995	Surrendered in 2022	Section 115 of the Water Act 1912. Bore – Mine dewatering LW 1 (South Bore 2). Decommissioned in 2020.	Yes

Type	Regulatory Authority	Approval Number	Holder	Issue Date	Expiry/ Review Date	Scope	Were all Approval Conditions Complied With?
	DPI Water	**80BL239077**	**The Wallerawang Collieries Pty Ltd**	**19/06/2006**	**18/06/2016**[2]	**Section 115 of the Water Act 1912. Bore – Mine dewatering LW 19 (North Bore). Converted to monitoring bore in 2020.**	**Yes**

Refer to **Section 10** for details of findings from 2019 Independent Environmental Audit.

3.1 Amendments during the Reporting Period

Rehabilitation Management Plan

On 1 August 2022, Baal Bone Colliery submitted the Final Landform and Rehabilitation Plan (FLRP), and Rehabilitation Objectives Statement (ROBJ) via the Regulator Portal.

A Rehabilitation Management Plan, and Annual Rehabilitation Report and Forward Program were prepared and submitted to stakeholders for comment in accordance with Schedule 3, Condition 25 of PA 09_0178.

On 8 November 2022, the Resources Regulator refused the Final Landform and Rehabilitation Plan, and Rehabilitation Objectives Statement.

On 15 November 2022, Baal Bone Colliery requested an extension for the re-submission of the FLRP and ROBJ. On 29 November 2022, the Resources Regulator approved an extension of the due date for the FLRP and ROBJ until 16 February 2023.

Environment Protection Licence

On 10 August 2022, EPL 765 was varied to remove dust and weather monitoring points (EPA Identification Points 7, 13, 14 and 15) and all corresponding monitoring requirements.

On 5 October 2022, EPL 765 was varied to add a second licence discharge point (LDP17) at the Northern Void into Jews Creek.

Environmental Management Strategy

On 1 December 2022 an update to the consolidated Environmental Management Strategy was submitted to DPIE. The updated document removed the requirements for dust, noise and meteorological monitoring following on from the variation to EPL 765. On 7 December 2022, DPIE approved the updated Environmental Management Strategy.

2 In correspondence dated 19/12/2017 DPI Water confirmed that licence 80BL239077 is still valid, despite it being expired. This is due to an administrative issue being addressed by DPI Water. In correspondence dated 2/7/20 DPI Water reconfirmed that the licence is still valid. Note: dewatering from this bore ceased on 17/12/2019 in accordance with EPL 765.

4 Operations Summary

4.1 Exploration

There was no exploration activity conducted during the reporting period.

4.2 Land preparation, Mining and Mineral Processing

Mining operations at Baal Bone ceased in September 2011 and the site entered care and maintenance. Coal washing operations were completed in December 2011. Transportation of coal product ceased in April 2012.

On 20 December 2019 the Baal Bone Colliery Mine Closure Mining Operations Plan (MOP) was approved and the site entered into a mine closure execution phase.

4.3 Demolition

During 2019, eleven entries into the underground mine, and the Longwall 19 ventilation shaft were filled and sealed in accordance with *MDG6001 Guidelines for Permanent Filling and Capping of Surface Entries to Coal Seams.* Adits 1-5 and 8-11 required the demolition of concrete collars. Adit 1 (Main Fan) and Longwall 19 also required the dismantlement of ventilation fans. In 2020 a further eight buried adits were drilled from the surface, grouted and sealed.

Civil contractors were engaged in January 2020 to conduct the demolition and removal of mine infrastructure. The first stage of activities were completed by July 2020 and included the demolition of the Coal Handling Preparation Plant (CHPP), bathhouse and workshop, as well as all coal conveyors, reclaim tunnels, transfer towers, bins, sheds and other associated ancillary infrastructure. The rail loop linking the site to the Main Western Railway line was also decommissioned and all rail lines, ballast and sleepers were removed from the corridor.

During 2021 the majority of the remaining infrastructure onsite was demolished including the administration building, workshop and other ancillary infrastructure in the Central Pit Top area.

During 2022, the site electrical substation and feeder line were demolished.

4.4 Water Balance

Due to mine closure status of BBC, the key components of water system onsite are the following:

- Groundwater inflows and outflows;
- Rainfall/runoff onsite;
- Limited potable water purchased from Water NSW and delivered via the Fish River Pipeline for the temporary administration building;
- Two licence discharge points: LDP16 (Overshot Dam) and LDP17 (Northern Void); and
- Passive take water storages onsite (Dirty Water Dam, Process Water Dam and Northern Void).

EPL 765 authorises an annual maximum volume of discharge of 100-1000ML. Table 4.1 summarises the annual discharge onsite.

Table 4.1: BBC discharge

LDP	Volume (ML)
2022 Estimated discharge from LDP16 - Overshot Dam*	638.75 ML
2022 Total discharge from LDP17 (Oct – Dec)	5.62 ML
2022 ANNUAL DISCHARGE (estimated)	**644.37 ML**
EPL maximum annual volume of discharge authorised	*1000.00 ML*

* 2017 GHD GW Model predicted that the average daily discharge from the Overshot Dam would be 1.2 ML/day by 2045. A graph in the model report suggests that the max average daily discharge would be approximately 1.75 ML/day. The figure of 1.75ML/day has been used to estimate the 2022 annual total.

5 Actions Required from Previous Annual Review

The 2021 Baal Bone Annual Review was submitted on 24 March 2022. In correspondence dated 4 May 2022, the Department of Planning and Environment advised:

"The Department has reviewed the Annual Review and considers it to generally satisfy the reporting requirements of the approval and the Department's Annual Review Guideline (October 2015). Prior to uploading a copy of the 2021 Annual Review on the company website please amend the Annual Review to update the figures in Section 2 with recent aerial photos showing development consent boundary, current operational disturbance footprint and offset areas."

The figures in Section 2 were amended to include recent aerial photos showing development consent boundary and current operational disturbance footprint. Baal Bone Colliery does not have any offset areas.

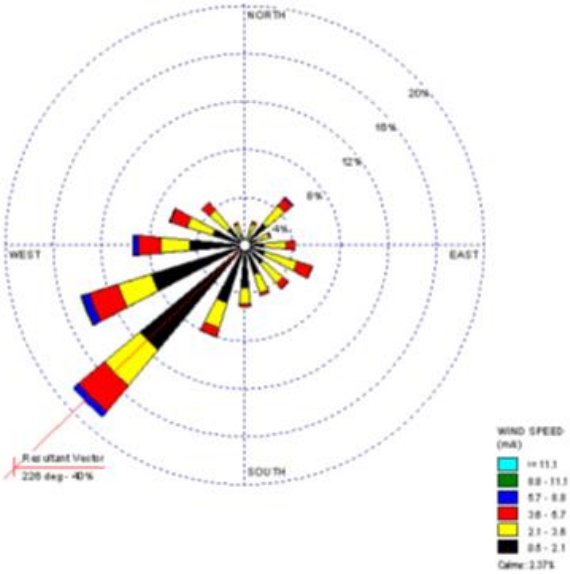
A copy of the 2021 Annual Review, and previous Annual Reviews can be found on the Baal Bone webpages at: *Reporting documents - Baal Bone Colliery (glencore.com.au)*.

6 Environmental Performance

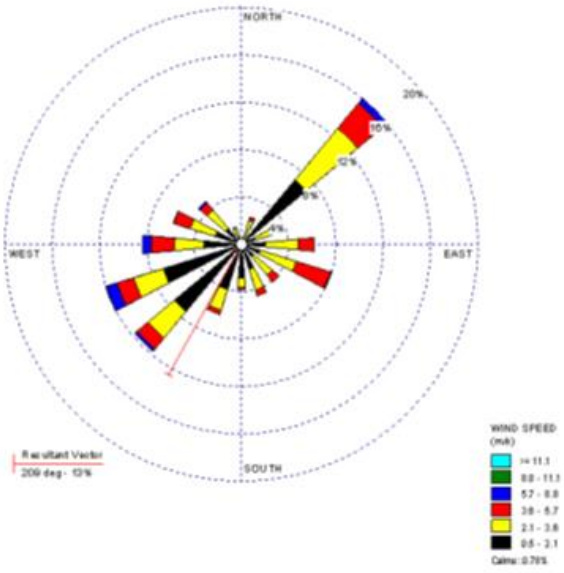
6.1 Air Pollution

6.1.1 Wind speed and direction

As discussed in the **Air Quality Monitoring Program**, local meteorological data for the area was sourced from the Mt Piper Power Station monitoring station to ensure consistency with previous air quality reports. The data shows a predominant northeast / southwest wind axis, although the northeast portion is predominant in the summer months. The annual and summer wind roses are shown in **Figure 5.1**.



Annual Wind Rose



Summer Wind Rose

Figure 6.1: Wind Roses (Mt Piper Power Station Meteorological Station)

6.1.2 Dust Monitoring and Sample Locations

Monthly dust deposition monitoring is carried out in accordance with Australian Standard AS3580.10.1 and EPL requirements.

Baal Bone maintains a network of four dust deposition gauges to monitor dust levels around site and in the vicinity of the nearest neighbour, these are:

- Sample location DM1 (EPL monitoring point No. 7);
- Sample location DM2 (EPL monitoring point No. 13);
- Sample location DM3 (EPL monitoring point No. 14); and
- Sample location DM4 (EPL monitoring point No. 15);

On 10 August 2022, EPL 765 was varied to remove conditions related to noise, dust and meteorological monitoring.

In correspondence dated 19/10/2022, the nominee of the Planning Secretary approved the cessation of attended noise monitoring and depositional dust and meteorological monitoring.

Dust monitoring accordingly ceased in October 2022.

6.1.3 Review and interpretation of dust monitoring results

Schedule 3, Condition 10 of PA 09_0178 includes air quality impact assessment criteria for the project which are summarised in below. The pollutants to be monitored include deposited dust, TSP and PM_{10}.

Table 6.1: Baal Bone air quality impact assessment criteria

Pollutant	Averaging period	Criterion	
Deposited dust	**Annual**	**Maximum increase**	**Maximum total**
		2 g/m^2/month	4 g/m^2/month
		Maximum Total	
TSP	Annual (suspended)	90 $\mu g/m^3$	
PM_{10}	24 hour (suspended)	50 $\mu g/m^3$	
	Annual (suspended)	30 $\mu g/m^3$	

Levels of deposited dust were monitored in accordance with the air quality impact assessment criteria. Results of deposited dust monitoring conducted during the 2022 reporting period provided below.

Table 5.2: Deposited dust monitoring results for 2022 (g/m^2/month)

Collection Date	EPL Point 7 DM1	EPL Point 13 DM2	EPL Point 14 DM3	EPL Point 15 DM4
10-Jan-22	0.1	0.4	0.8	0.6
8-Feb-22	0.4	0.4	0.7	0.5
8-Mar-22	0.5	0.8	0.6	0.8
5-Apr-22	0.3	0.2	0.2	0.1
3-May-22	0.7	0.6	0.7	0.7
31-May-22	0.3	0.2	0.4	0.2
28-Jun-22	0.5	0.2	0.2	0.2
26-Jul-22	0.4	0.6	0.7	0.4
24-Aug-22	0.5	0.3	0.6	0.3
23-Sep-22	1.1	0.5	0.7	0.4
24-Oct-22	1.2	0.7	1.1	1.0

EPL varied in August 2022 to remove requirement for dust, noise and met monitoring. DPIE approved cessation of monitoring in October 2022. Dust sample collected on 24 October 2022 is final sample for Baal Bone Colliery.

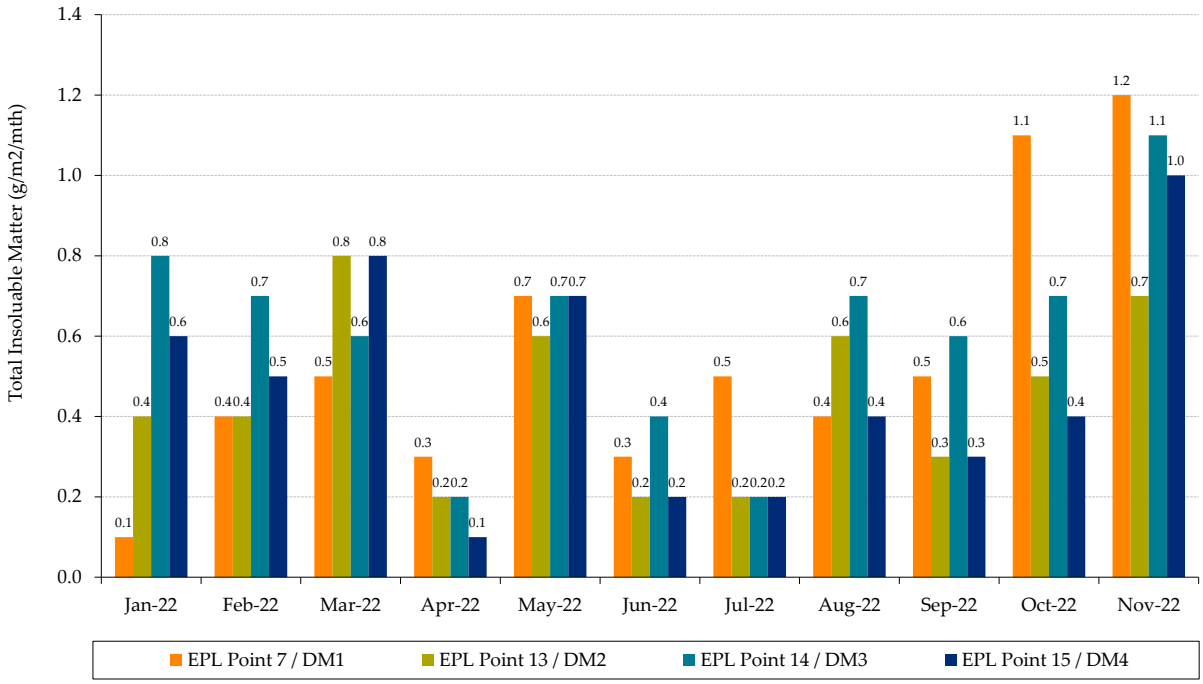


Figure 6.2: 2022 Deposited Dust Monthly Monitoring Results

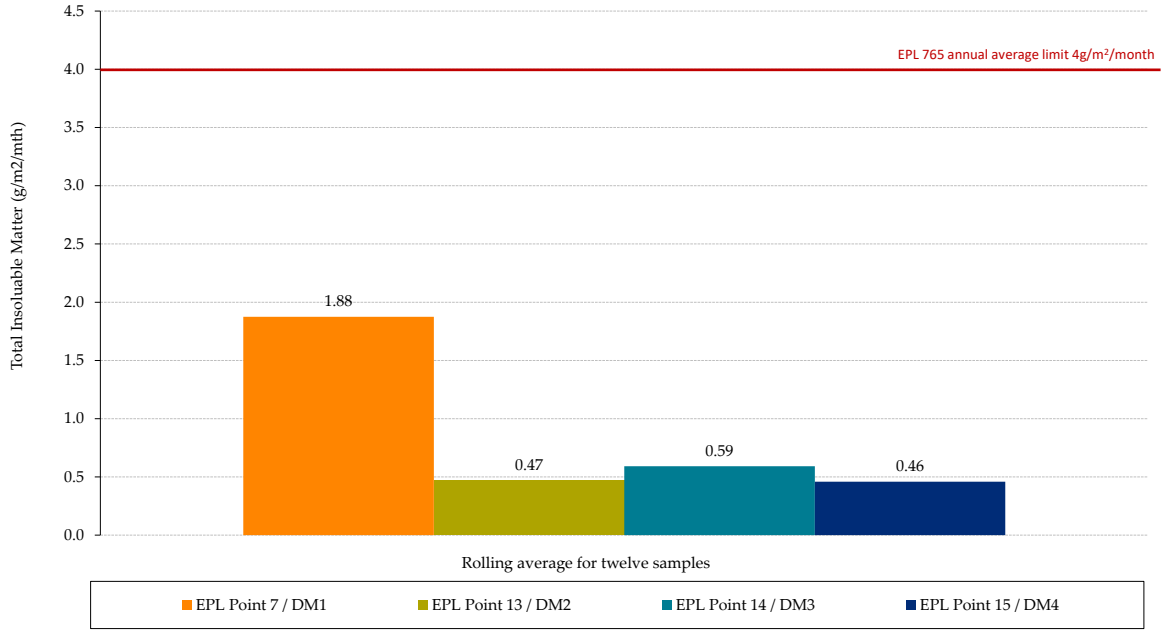


Figure 6.3: 2022 Annual Average Deposited Dust Results

Dust monitoring results for 2022 are below the maximum allowable annual average dust level of 4 g/m^2/month, in accordance with Schedule 3, Condition 10 of Project Approval 09_0178.

6.1.4 Comparison against previous Annual Reviews

Historically, deposited dust results have remained below the maximum allowable annual average dust level of 4 g/m^2/month in accordance with Schedule 3, Condition 10 of Project Approval 09_0178. **Figure 6.4** shows the annual averages for DM1 – DM4 for the period 2011 to 2022.

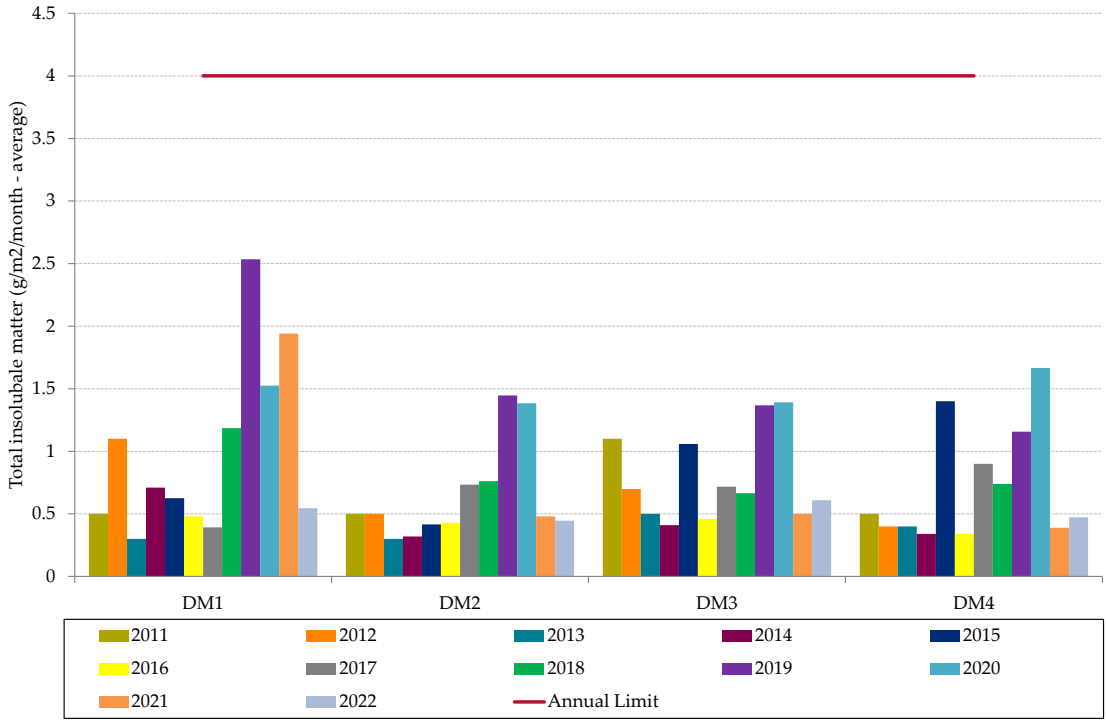


Figure 6.4: 2012 to 2022 Deposited Dust Monitoring Results

6.1.5 Comparison against EA

Levels of air quality pollutants as predicted under the EA are presented in the table below. **Table 6.3** shows the predicted cumulative pollutant concentration (which includes the predicted concentration from Baal Bone plus the background concentration). Deposited dust criteria are expressed as deposition rates and not concentrations. The predicted levels were all below the specified criteria.

Table 6.3: Maximum predicted pollutant results at the discrete sensitive receptors (AECOM, 2010).

No.	Deposited Dust (g/m^2/month)	
	Annual	Annual cumulative*
1	0.76	3.3
2	0.4	3.0
4	0.2	2.8
5	0.2	2.8
6	0.2	2.8
7	0.2	2.8
8	0.2	2.8
9	0.4	3.0
10	0.4	3.0
11	0.2	2.8
12	0.2	2.8
13	0.2	2.8
Criteria	4 g/m^2/month	

* Includes the predicted concentration from Baal Bone plus ambient background concentrations

The monitoring results at DM2 for deposited dust are likely to be representative of predicted deposited dust results at receptor number 2 listed in **Table 6.3**. The monthly deposited dust monitoring results at DM2 during the reporting period, presented in Section 6.1.3, are frequently at or below than the maximum predicted pollutant levels within the EA, as well as below the relevant criteria.
Therefore, the air quality impacts associated with Baal Bone's operations are consistent with the predicted impacts in the EA.

6.2 Blasting

No blasting was conducted at Baal Bone during the reporting period.

6.3 Operational Noise

There were no noise audits conducted during 2022. Mine closure works were completed in April 2022. On 10 August 2022, EPL 765 was amended to remove dust and weather monitoring points and conditions. On 19 October 2022, Baal Bone Colliery received approval

from DPIE for "the cessation of the attended noise monitoring and depositional dust and meteorological monitoring at the EPL Monitoring Points No. 7, 13, 14 and 15".

Historical noise audit reports can be accessed from the Baal Bone publications webpage at: *https://www.glencore.com.au/operations-and-projects/coal/past-operations/baal-bone-colliery/reporting-documents.*

There were no complaints regarding operational noise received during the reporting period.

6.3.1 Comparison against EA and previous Annual Reviews

The EA predicted $L_{Aeq\ 15\ minute}$ dB(A) noise levels at residences R1 and R2/R3, both with and without the dozer operating on the ROM stockpile. The EA also predicted $L_{A1,\ 1min}$ dB(A) intermittent noise levels at R1 and R2/R3 at night. The results of historic attended noise audits confirm that Baal Bone Colliery noise levels were consistent with the EA predicted noise levels.

6.4 Aboriginal and European Heritage

6.4.1 Aboriginal Heritage

An Aboriginal Cultural Heritage Management Plan (ACHMP) for the potential rock shelter site BBC-RS1 was developed by OzArk Environmental & Heritage Management Pty Ltd in 2008, based on the findings of the Indigenous Heritage Assessment.

6.4.2 European Heritage

No European Heritage Sites have been identified within the Baal Bone mining lease.

6.4.3 Comparison against EA

The EA predicted that, while subsidence may occur, it is unlikely to impact currently undetected Aboriginal sites such as open sites. Potential impacts to Aboriginal heritage associated with the mining of LW29-31 have been assessed in previous surveys (OzArk 2007a; 2010). No significant impacts were predicted in this area, however, subsidence monitoring was to be undertaken during extraction. The rock shelter site BBC-RS1 was also required to be managed in accordance with an ACHMP.
Extraction of LW30 beneath BBC-RS1 occurred in July 2010. During this time, Baal Bone inspected the site twice weekly. Following extraction beneath BBC-RS1, the area was resurveyed and movement vectors were calculated. Subsidence monitoring during the reporting period has confirmed the predictions in the EA. The data showed that the rock which forms the main shelter (overhang) moved 536 mm in a westerly direction and subsided approximately 717 mm (10 mm accuracy). However, there was no visible damage caused to BBC-RS1 as a result of the extraction of LW30.

On 7 December 2020 BBC-RS1 was inspected again by Baal Bone personnel with no issues found.

6.5 Natural Heritage

No natural heritage sites have been identified within the Baal Bone mining lease.

6.6 Mine Subsidence

The SMP for development and extraction of LW 29-31 expired on 1 December 2014 with mining operations in the LW 29-31 area completed on 3 September 2011.

Historic subsidence results can be found in Subsidence Status Reports published on the Baal Bone website in the following location: *https://www.glencore.com.au/operations-and-projects/coal/past-operations/baal-bone-colliery/reporting-documents*.

6.7 Hydrocarbon Contamination

Baal Bone Colliery conducts six-monthly testing of groundwater monitoring wells in the vicinity of the underground diesel storage tank (UST). Refer to **Plan 3** and **Plan 4** for locations.

Six-monthly testing of the groundwater monitoring wells in the vicinity of the underground diesel tank (UST) occurred until the decommissioning of the UST in February 2022. The results of this monitoring program acknowledged that previous activities at the site resulted in contamination of shallow groundwater. The contamination is localised and associated with the known point source, the fuel storage area.

2021 results for TRH at MW01 were consistent with historical levels until October 2021 when levels increased again. Subsequent use of the underground diesel tank was discontinued, and the tank was purged in December 2021.

Results for TRH at MW01 are presented in **Figure 5.6** below.

In February 2022 the UST was removed and contaminated material excavated from the area surrounding the UST. The contaminated material was removed to an adjacent designated area onsite (Pip top grit trap) which has been configured as a land farm for bioremediation. A number of soil samples from the excavated pit were taken and analysed to confirm that all hydrocarbon contaminated material had been removed.

Validated materials from the bioremediation areas onsite (1) Pit top grit trap, and (2) STP ponds will be re-used onsite once sampling confirms hydrocarbon levels have reached acceptable levels.

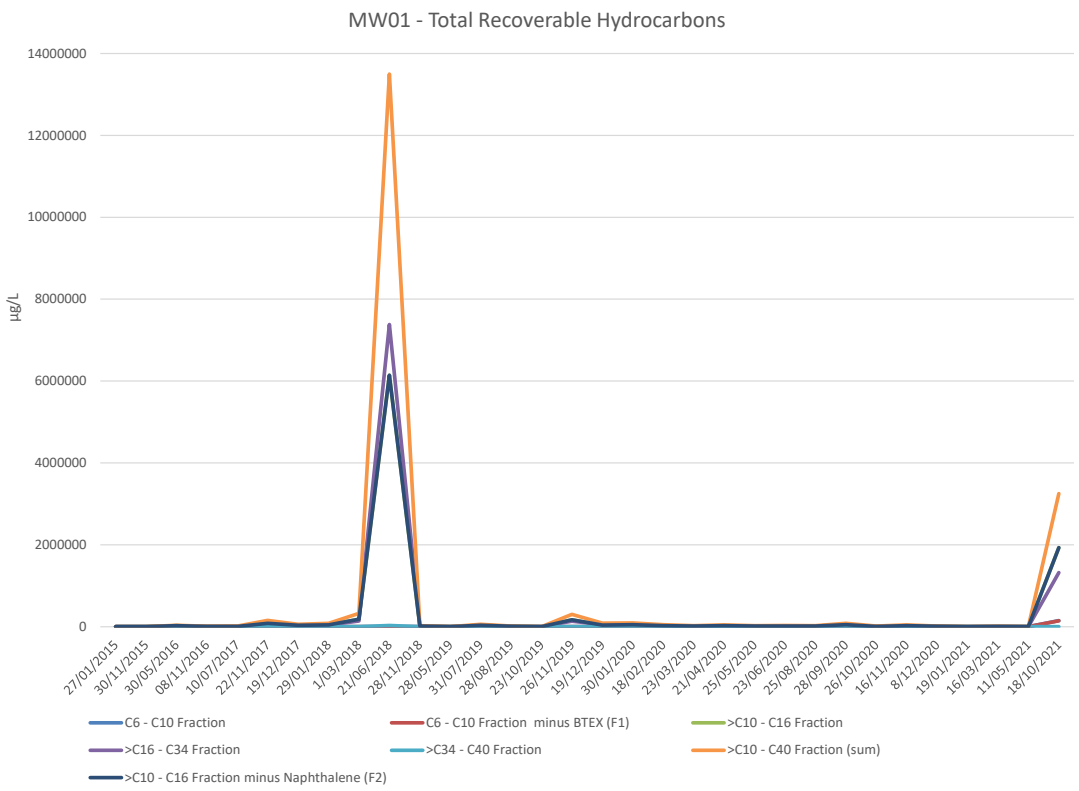


Figure 6.6: TRH results for MW01 (2015 to 2021)

Plate 1: Removal of UST

Underground diesel tank following removal	Remediation site with bioremediation area in background.
	

6.8 Greenhouse Gas Emissions

6.8.1 Reported greenhouse gas emissions

Baal Bone Colliery reports greenhouse gas emissions (GHG) in accordance with National Energy and Greenhouse Gases (NGER) legislation. Each financial year Baal Bone Colliery is required to submit to the federal government the emissions from their NGERs registered facility. The NGERs reporting year is based on a financial year, not a calendar year such as this Annual Review. In order to prevent incompatible public reporting, the values in this report also cover a financial year. The following table contains the Scope 1 (direct emissions from the mining activities during the year), and Scope 2 emissions (electricity consumption by the mine during the year).

Table 6.4 Scope 1 and Scope 2 emissions for Baal Bone Colliery - FY2022

Site	Scope 1 tCO2e	Scope 2 tCO2e
Baal Bone	805	105

6.8.2 Comparison against EA

Baal Bone Colliery ceased mining in 2011, therefore there are no relevant GHG predictions for 2023.

6.8.3 Steps taken to improve energy efficiency and reduce GHG emissions

Baal Bone Colliery is a part of the wider coal assets held by Glencore across Australia. Glencore Coal Assets Australia (GCAA) are themselves a part of the global Glencore mining portfolio. In line with the ambitions of the 1.5^{o}C scenarios set out by the IPCC, Glencore target a short-term reduction of 15% by 2026 and a medium-term 50% reduction of our total (Scope 1, 2 and 3) emissions by 2035 on 2019 levels. Post 2035, Glencore's ambition is to achieve, with a supportive policy environment, net zero total emissions by 2050.

Glencore incorporates energy costs and our carbon footprint into our annual planning process. Commodity departments, such as Glencore Coal Assets Australia, are required to provide energy and GHG emissions forecasts for each asset over the forward planning period and provide details of emissions reduction projects.

6.9 Public Safety

Fences are in place around the mining lease area, with all other boundary gates locked and maintained in correct working order. All access points onto the mine area are signposted to warn the public of Baal Bone Colliery's mining operations and of the risks involved. Warning signs have also been erected along public tracks in the Ben Bullen State Forest warning of mine subsidence and prohibiting entry to unauthorised persons.

6.10 Visual Amenity and Lighting

During 2020 and 2021 the majority of structures onsite were demolished as part of mine closure activities. As at end 2022, one demountable office block, a small shed and two storage containers are the main infrastructure left onsite.

6.11 Weed and Pest Management

During 2022 Baal Bone Colliery carried out a weed spraying program predominantly targeting Blackberry.

7 Water Management

7.1 Surface Water

EPL 765 licensed monitoring points are provided in the **Table 7.1** below. The location of monitoring points can be seen **in Plan 2.**

Note: On 5 October 2022, EPL 765 was varied to add a second licence discharge point (LDP17) at the Northern Void into Jews Creek.

Table 7.1: EPL Licenced Monitoring Points

EPA Identification No.	Type of Monitoring Point	Description of Location
16	Discharge to waters	Ben Bullen Creek downstream of active surface mining area, labelled as 'BBLDP1'
17	Discharge to waters	Discharge, via culvert, from Northern Void Lake to Jews Creek

A copy of EPL 765 can be accessed here: *www.epa.nsw.gov.au/prpoeoapp*

A description of discharge and monitoring sites, analyses conducted, frequency of sampling and concentration limits (where applicable) are shown below. EPL Monitoring Points are shaded in yellow.

Table 7.2: Baal Bone Colliery water monitoring locations and monthly analysis during 2022

Sample Name	Sample Location	Frequency	Pollutants Analysed	EPL Limits Apply
BBLDP16 (BBLDP1)	EPL Monitoring Pt No.16. Immediately below the pipe outlet or in stilling pool below spillway of overshoot dam (Previously BBLDP1/EPL Monitoring Pt No. 11)	Monthly during discharge	EC, oil & grease, sulphate, iron, TSS, pH, flow rate, hardness, MBAS, nitrogen, phosphorus	Oil & grease, pH, dissolved iron, TSS

Sample Name	Sample Location	Frequency	Pollutants Analysed	EPL Limits Apply
BBLDP17	EPL Monitoring Pt No.17. Discharge from culvert/pipeline from Northern Void.	Monthly during discharge	EC, oil & grease, sulphate, iron, TSS, pH, flow rate, hardness, MBAS, nitrogen, phosphorus	Oil & grease, pH, dissolved iron, TSS
BBBC	Northern Void	Monthly (only when no flow through LDP17)	EC, oil & grease, sulphate, iron, TSS, pH, flow rate, hardness, MBAS, nitrogen, phosphorus	N/A
BBBBC Mid	Ben Bullen Creek mid-way through site	Monthly (during flow)	Flow rate, pH, EC, TSS, iron, sulphates, oil & grease, nitrogen, phosphorus	N/A
BBJC2	Jews Creek upstream of mining operations, but below dewatering bore discharges	Monthly (during flow)	Flow rate, pH, EC, TSS, iron, sulphates, oil & grease, nitrogen, phosphorus	N/A
BBJCH	Jews Creek headwaters upstream of all mining operations and mine dewatering discharges	Monthly (during flow)	Flow rate, pH, EC, TSS, iron, sulphates, hardness, oil & grease, nitrogen, phosphorus	N/A
BBJCB	Jews Creek downstream at bridge on Castlereagh Highway.	Monthly (during flow)	EC, oil & grease, sulphate, iron, TSS, pH, flow rate, hardness, MBAS, nitrogen, phosphorus	N/A
BBCR	Cox's River	Monthly (during flow)	Flow rate, pH, EC, TSS, iron, sulphates, oil & grease, nitrogen, phosphorus, Hardness	N/A

Note: sampling at the following internal monitoring points: BBPOT, BBDW and BBPRW was discontinued in late 2022.

7.1.1 Interpretation and Review of Monitoring Results

Condition L2 of EPL 765 outlines water concentration limits for oil and grease, pH, total suspended solids and dissolved iron. These limits are presented below:

Table 7.3: EPL concentration limits

Pollutant	BBLDP16/BBLDP17 (EPL Monitoring Points 16 and 17)
Oil and grease (mg/L)	10
pH	6.5-8.5
Total Suspended Solids (mg/L)	50
Iron (dissolved) (mg/L)	1.0

Monitoring results for Baal Bone's two monitoring points as required by EPL 765 are discussed in **Table 7.4**, and **Figures 7.1 to 7.4**. Samples were taken monthly during discharge in accordance with the EPL.

Table 7.4: 2022 concentrations as required by EPL 765.

EPL Point	Month	EC	O&G	SO^{2-}_4	Fe	TSS	pH
		uS/cm	mg/L	mg/L	mg/L	mg/L	-
EPL Point 16 (LDP1)	Jan	464	<5	155	0.05	10	6.8
	Feb	530	<5	210	1.21	12	6.46
	Mar	370	<5	115	1.87	12	6.9
	Apr	645	<5	252	1.97	23	6.3
	May	599	<5	210	0.05	14	7.3
	June	1226	<5	392	0.15	9	7.2
	Jul	1167	<5	427	0.11	5	6.6
	Aug	1342	<5	578	0.11	6	6.6
	Sept	1529	<5	617	0.05	10	6.6
	Oct	1062	<5	242	0.46	8	6.8
	Nov	836	<5	281	0.43	12	6.9
	Dec	1552	<5	496	0.05	5	7.1
EPL Point 17 (LDP17)	*On 5/10/2022 EPL 765 was varied to add LDP17 and associated monitoring and limit conditions.*						
	Oct	1704	<5	483	<0.05	<5	8
	Nov	1459	<5	463	<0.05	<5	8.1
	Dec	1420	<5	498	<0.05	<5	8

Legend

BOD = Biological oxygen demand
EC = Electrical conductivity
Fe = Iron (dissolved)
N = Nitrogen
O & G = Oil and Grease
P = Phosphorus
SO_4^{2-} = Sulphate
TSS = Total suspended solids

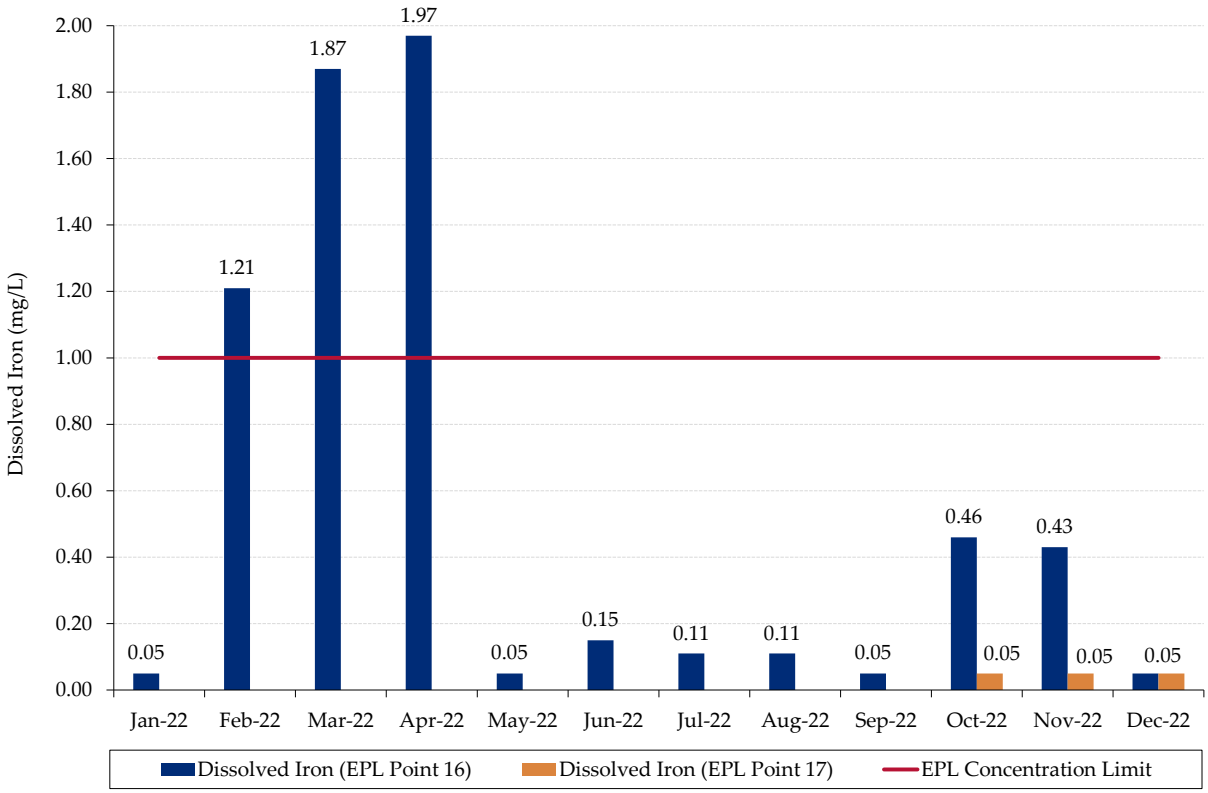


Figure 7.1: Dissolved Iron

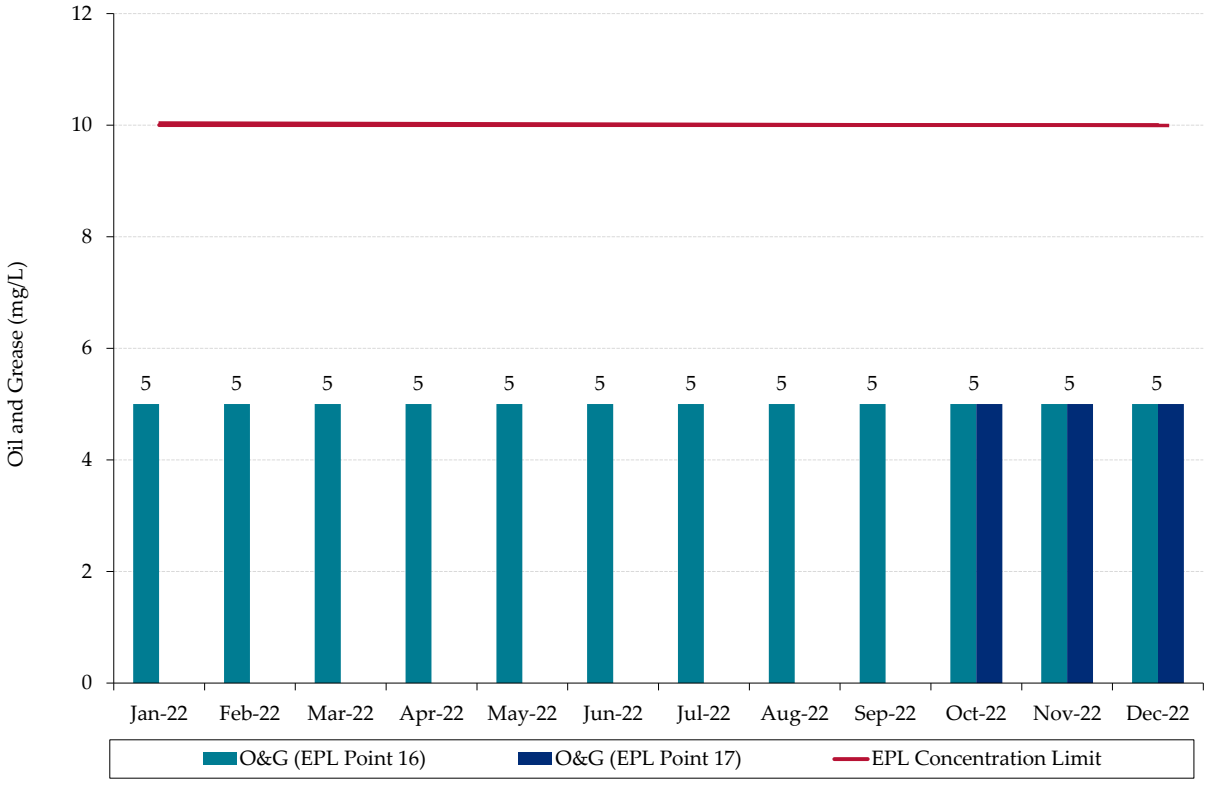


Figure 7.2: Oil & Grease

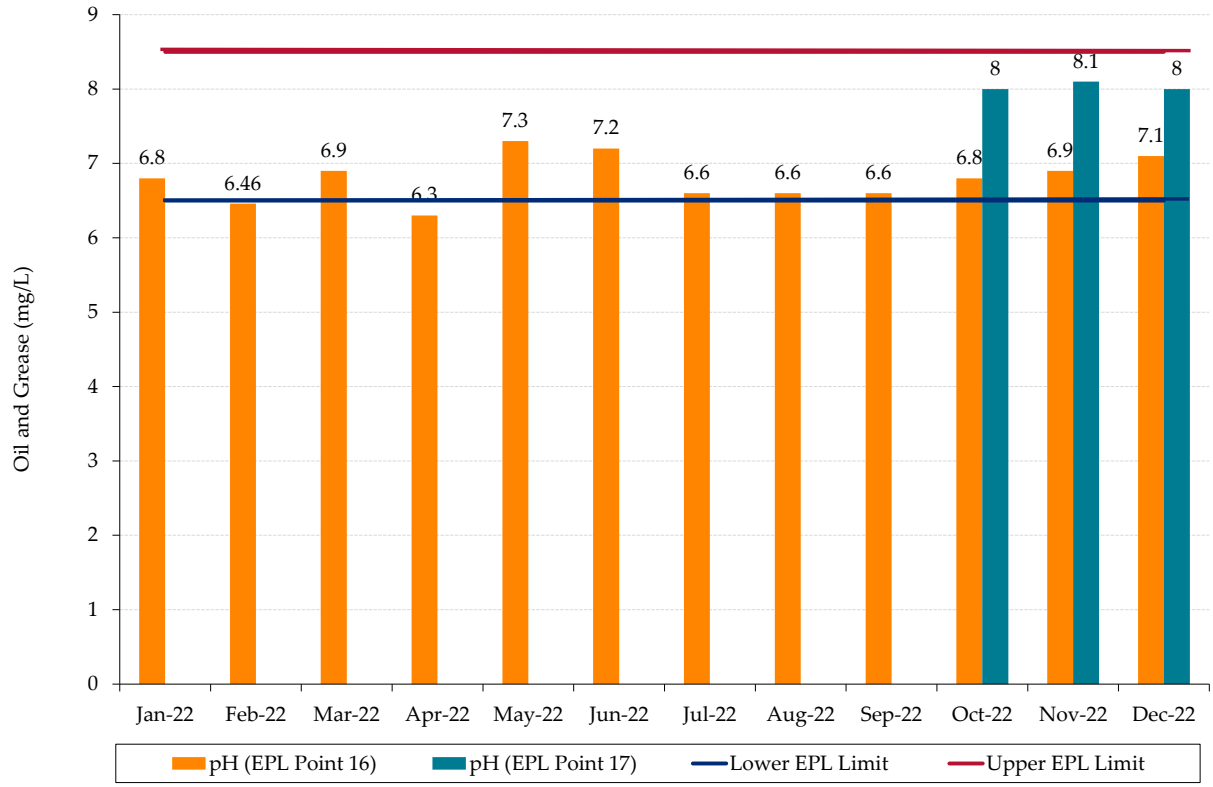


Figure 7.3: pH

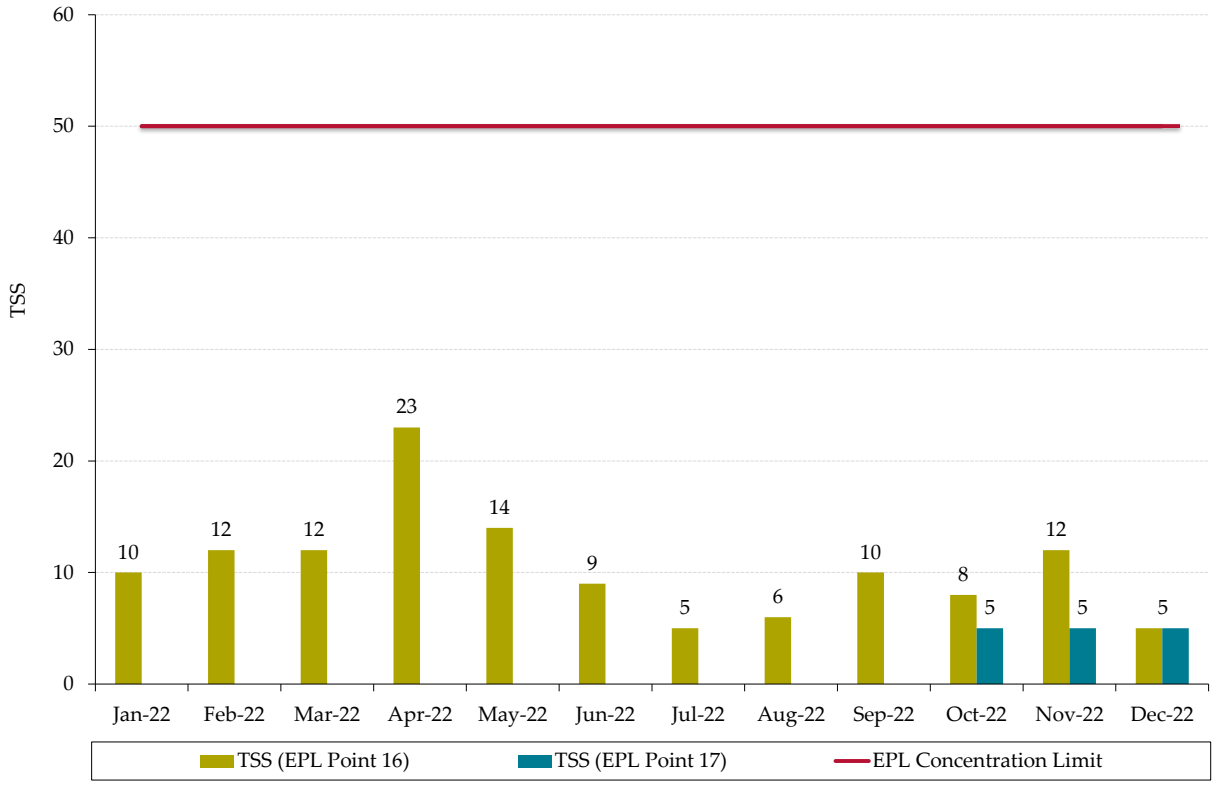


Figure 7.4: Total Suspended Solids

A summary of monitoring results for EPL discharge and monitoring points (those with specified concentration limits) can be found below for the 2022 reporting period to date:

- All monthly TSS results were below the EPL concentration limit of 50 mg/L; and
- All oil and grease levels were below the EPL concentration limit of 10 mg/L.
- February, March and April 2022 results for dissolved iron exceeded the EPL limit of 1mg/L with readings of 1.21 mg/L, 1.87 mg/L and 1.97 mg/L respectively.
- February and April 2022 samples returned pH readings of 6.46 and 6.3 respectively which are outside of the pH concentration limits.
- Routine EPL sampling demonstrated that dissolved iron and pH levels returned to within EPL concentration limits from May 2022 until December 2022.

Management actions in response to pH and dissolved iron readings outside of EPL concentration limits at EPL Monitoring Point 16:

- An external consultant: Gauge Scientific was commissioned in 2021 and has provided a report to Baal Bone Colliery investigating the iron exceedances, and providing monitoring and management recommendations;
- Gauge Scientific has advised that the increased iron concentrations are unlikely to have caused material harm to the environment;
- During 2021, an additional downstream monitoring point was established, and is now monitored monthly;
- Regular inspections are conducted of the area, with a focus on water quality and appearance;
- If required, lime is applied to the Overshot Dam to raise the pH, and the water is aerated – actions which both allow the iron to precipitate out of solution more readily;
- Written notifications were provided to the DPIE and EPA on 22 February 2022, 7 April 2022 and 3 May 2022.

Monthly EPL reporting can be accessed here: *https://www.glencore.com.au/operations-and-projects/coal/past-operations/baal-bone-colliery/reporting-documents*.

7.1.2 Comparison against previous Annual Reviews

A summary of water quality results from previous Annual Reviews is provided below.

Table 7.5: Water quality results 2006 - 2022

Annual Review Year	Iron	Oil and Grease	pH	TSS
2006	One minor exceedance at BBLDP16.	Compliant	Compliant	Compliant
2007	One erroneous exceedance at BBLDP16 of 5.4mg/L in August 2007 – retesting showed compliant level of 0.9mg/L	Compliant	Compliant	One erroneous exceedance at BBLDP1 of 266mg/L in August 2007 – retesting showed compliant level of 25mg/L
2008	Compliant	Compliant	Compliant	Compliant
2009	Compliant	Compliant	Compliant	Compliant

Annual Review Year	Iron	Oil and Grease	pH	TSS
2010	1 exceedance at BBLDP16 of 2mg/L in February 2010.	Compliant	Compliant	Compliant
2011	2 exceedances at BBLD6 in April and October and 1 exceedance at BBLDP16 in June 2011 of 1.2, 1.2 and 3mg/L respectively.	Compliant	Compliant	Compliant
2012	1 exceedance at BBLD6 of 2mg/L in September 2012.	Compliant	Compliant	Compliant
2013	Compliant	Compliant	Compliant	Two Total Suspended Solids (TSS) exceedances at BBLDP3 (60mg/L) and BBLDP6 (85mg/L) in February
2014	Total iron recorded in Jan 2014 at BBLDP16 was 1.11mg/L. However note that EPL limit is for *dissolved iron.* Sampling routine changed to include dissolved iron.	Compliant	Compliant	Compliant
2015	Compliant	Compliant	Compliant	Compliant
2016	Compliant	Compliant	Compliant	Compliant
2017	Compliant	Compliant	Compliant	Compliant
2018	Compliant	Compliant	Compliant	Compliant
2019	Compliant	Compliant	Compliant	Compliant
2020	Dissolved iron level exceedance of 1.68mg/L in August at BBLDP16.	1 exceedance at BBLDP16 in January.	Compliant	Compliant
2021	February, March and May 2021 results at BBLDP16 for dissolved iron exceeded the EPL limit with readings of 1.65 mg/L, 3.21 mg/L and 1.32 mg/L respectively.	Compliant	March 2021 sample at BBLDP16 returned a result of 6.2	Compliant
2022	February, March and April 2022 results at BBLDP16 for dissolved iron exceeded the EPL limit with readings of 1.21 mg/L, 1.87 mg/L and 1.97 mg/L respectively.	Compliant	February and April 2022 samples at BBLDP16 returned results of 6.46 and 6.3 respectively	Compliant

Occasional exceedances of iron have been recorded in 2006, 2010, 2011, 2012, 2014, 2020, 2021 and 2022. Note: the EPL limit of 1 mg/L is for Dissolved Iron, and the exceedances reported in previous years were Total Iron results. Monitoring was amended during 2014 to include dissolved iron at EPL monitoring points.

Figures 7.5 – 7.8 illustrate the long term trends for dissolved iron, oil and grease, pH and total suspended solids at current EPL monitoring points

Figure 7.5 shows the iron level recorded at BBLDP16 from 2014 to 2022.

During 2022 there were three exceedances of the dissolved iron EPL limit of 1mg/L. Refer to **Section 7.1.1** for further detail on 2022 exceedances and management actions.

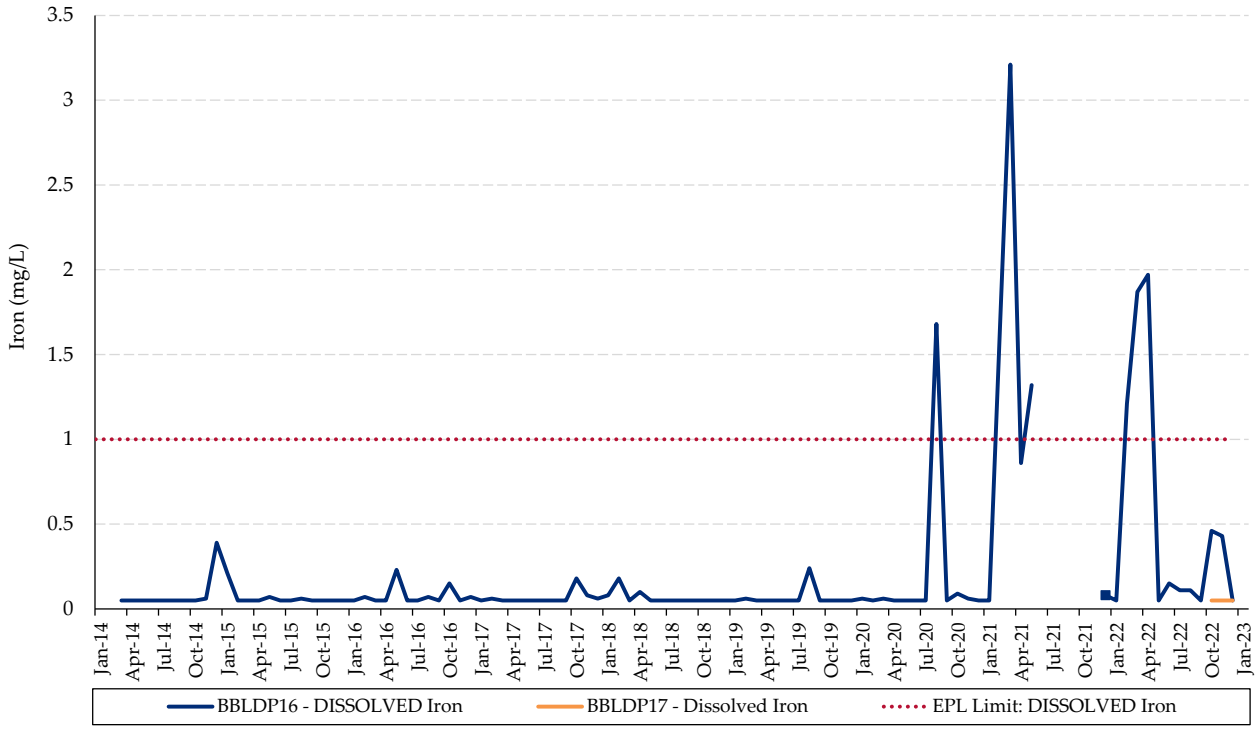


Figure 7.5: Iron Dissolved (2014 – 2022)

Figure 7.6 shows oil and grease levels for the period 2014-2022. All results are under the EPL concentration limit of 10mg/L with the exception of an oil and grease level sample from January 2020 with a result of 11 mg/L. An investigation was undertaken into this exceedance which found that potential contributors may have been the extended dry spell and recent rainfall, the bushfires moving through the area as well as vehicles and machinery on site. Refer to previous Annual Reviews for further information.

Note that prior to January 2014, the limit of reporting for oil and grease was < 2 mg/L. From January 2014, limit of reporting value became < 1 mg/L before increasing back to <2 mg/L in March 2016. From October 2017 the limit of reporting increased to <5 mg/L due to changing to ALS Group Environmental Division Lithgow to undertake the monthly monitoring and analysis. These changes in the limit of reporting account for the step change in reported oil and grease levels.

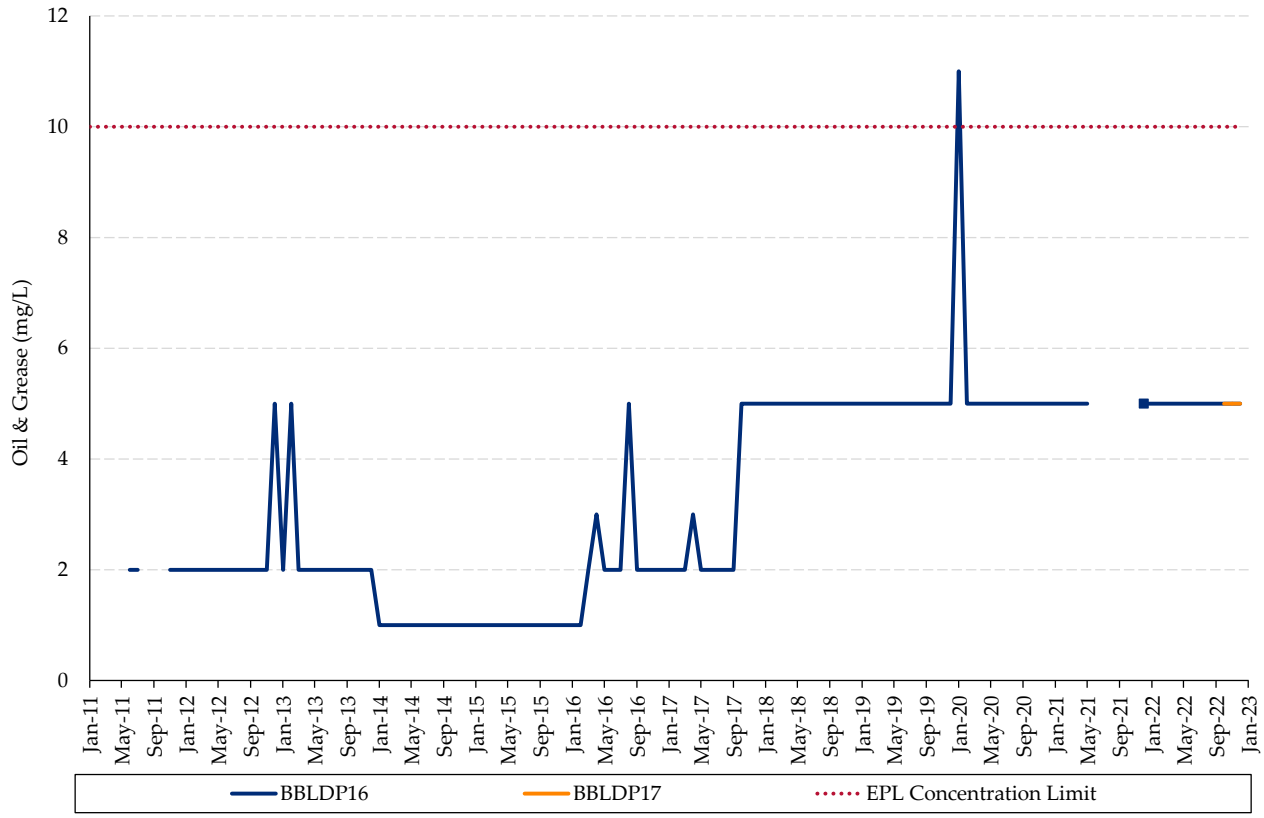


Figure 7.6: Oil and grease levels from 2011 to 2022

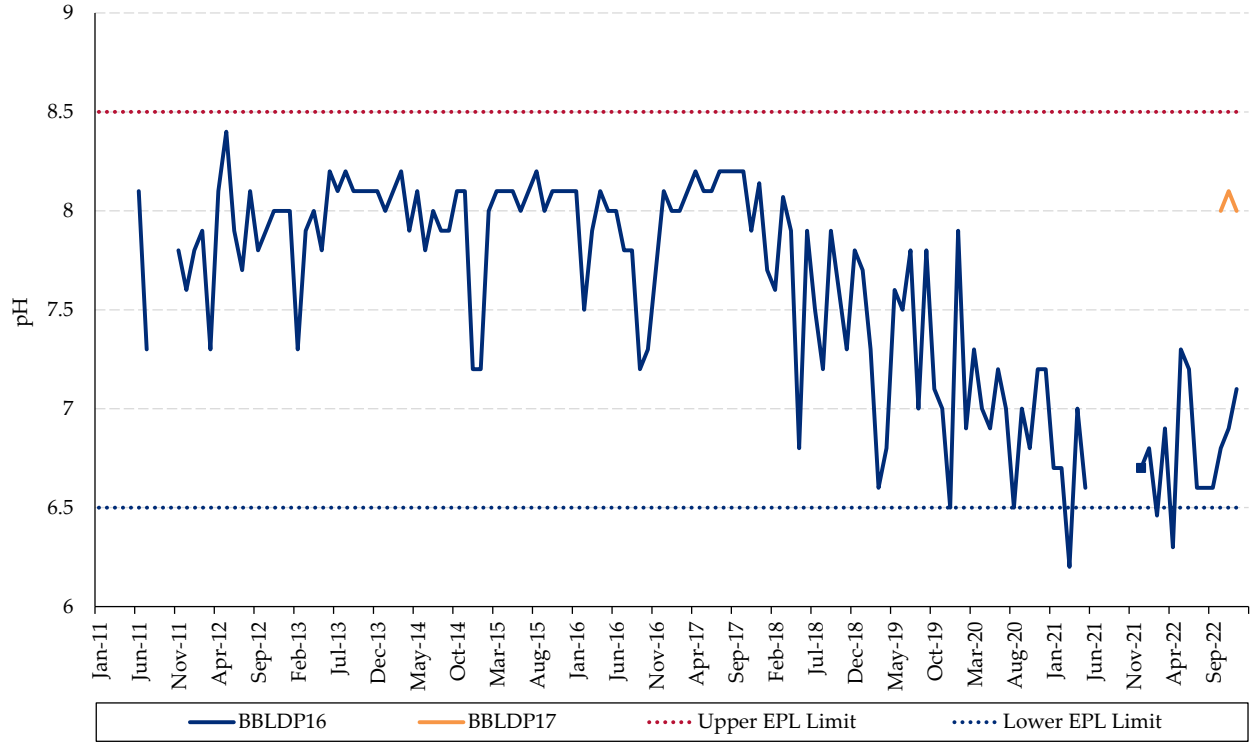


Figure 7.7: pH levels from 2011 to 2022

Figure 7.7 shows the long term pH trends. Refer to **Section 7.1.1** for a discussion of the 2022 pH results outside of EPL limits.

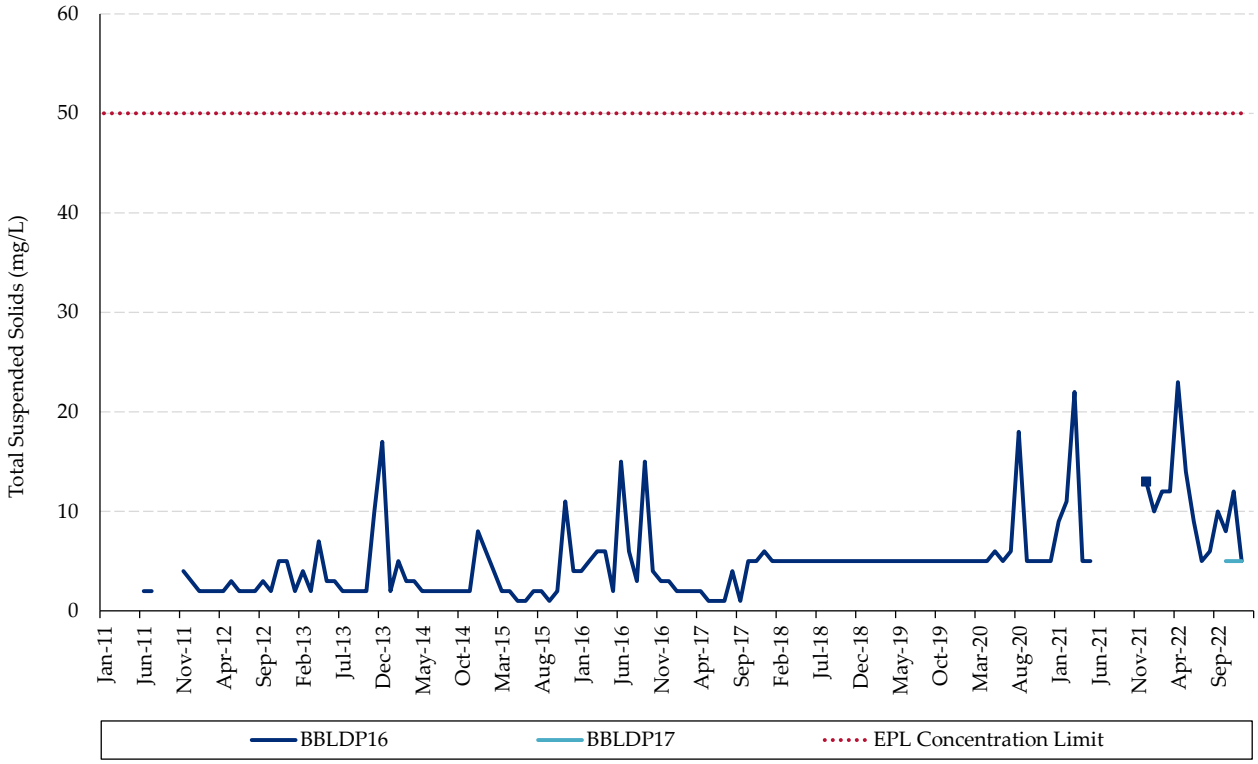


Figure 7.8: Total suspended solids levels from 2011 to 2022

7.1.3 Comparison against EA

The EA reported that, based on past monitoring results for EPL discharge and monitoring points, water quality was expected to continue to be within the EPL limits during extraction of LW29-31. This prediction is supported by the results presented in the current and past Annual Reviews.

7.2 Groundwater

Section 3 outlines the water bore and piezometer licences held by Baal Bone Colliery.

7.2.1 Groundwater Extraction

Mine water discharge from EPA Licenced Discharge Point LDP11 (now BBLDP16) ceased on 17 December 2019 in accordance with EPL Licence No. 765, Special Condition E2 which required this to occur prior to 31 December 2019.

Historical groundwater extraction is reported in previous Annual Reviews available here: *https://www.glencore.com.au/operations-and-projects/coal/past-operations/baal-bone-colliery/reporting-documents*.

Table 7.6 Groundwater Extraction

Water Licence	Water sharing plan, source and management zone	Entitlement (Unit Shares)	Water Approval Number/ Water Supply Works	TOTAL Water Pumped
WAL 27887	NSW Murray Darling Basin Porous Rock Groundwater Sources	750 units	80WA706118	Nil*
WAL 34952	Macquarie Bogan Unregulated and Alluvial Water Sources	25 units	80WA716836	Nil

*Passive take of groundwater is occurring into the Northern Void.

7.2.2 Groundwater Monitoring

Baal Bone Colliery monitors groundwater levels and groundwater chemistry in six piezometers in and around Cox's River Swamp (**Appendix A -Plan 5)**.

Monitoring data in the six piezometers (four aquifer and two swamp/alluvial) are presented in **Figure 6.9 to Figure 7.5**. Piezometers BBPB1-BBPB4 monitor groundwater levels and chemistry in the deeper sandstone aquifer, while piezometers BBPB5 and BBPB6 monitor groundwater levels and chemistry in the shallower Coxs River Swamp.

Note that on 24 February 2022, DPIE approved the Consolidated Environmental Management Strategy, and the frequency of groundwater monitoring at Cox's Swamp was reduced. From March 2022 onwards, bores BBPB1-2 and BBPB5-6 are sampled on a quarterly basis only. BBPB3 and BBPB4 continue to be sampled on a monthly basis. Refer to Section 7.2.4 for more information.

Baal Bone's Surface and Groundwater Response Plan includes Trigger, Action, and Response Plans (TARP), which include triggers for assessing changes to groundwater levels and groundwater chemistry. Additionally, there are water quality trigger values for a number of water chemistry parameters contained in Baal Bone's approved Groundwater Monitoring Plan. The TARP and trigger levels are used as a measure of impacts to groundwater levels and quality in both the deep sandstone and shallower swamp groundwater aquifers. The groundwater level and quality trigger levels are presented below. Response and rehabilitation methodologies have also been included where appropriate.

Table 7.7: Groundwater Model TARP

Trigger	Action	Response	Plan	Timeframe
• Groundwater monitoring results deviate from predictions made in the EA; • Increased groundwater make in	• Notify the Baal Bone Colliery ECC, or delegate; • Review all groundwater data; • Identify if the installation of additional	• Review the frequency of groundwater monitoring in the affected area;	• Amend the groundwater model if required; • Acquire additional water	Notification to Secretary and any other relevant agencies (e.g. EPA, DPI Water) as soon as practicable (Schedule 5,

Trigger	Action	Response	Plan	Timeframe
the underground workings compared to predictions made in the EA (AECOM, 2010); • Consecutive pressure monitoring data from the North/South piezometers, shows an adverse impact from the previous data or groundwater model predictions; or • Groundwater make in Northern Void above model predictions.	piezometers is required; and • Investigate any external influence which may be affecting the results including climatic data.	• Review adequacy of current water entitlements for actual and predicated groundwater take; and • Notify and consult with relevant government agencies on investigation and outcomes (e.g. DPI Water, DPE, EPA).	entitlements if required, and • Amend the Groundwater Monitoring Plan if required.	Condition 5 of PA 07_0178).

Table 7.8: Loss of Water Quality TARP

Trigger	Action	Response	Plan	Timeframe
Monitoring results outside the relevant trigger levels in the SWMP or GWMP: ECM determines that the deviation from background trends and adopted impact assessment criteria could result in environmental harm; three (3) consecutive values are outside the adopted impact assessment criteria; or the measurement varies significantly from background water quality trends.	• Notify the Baal Bone Colliery ECM, or delegate; • Review monitoring results against historical monitoring data; • Review recent monitoring results for adjacent monitoring sites; • Review any relevant operational data (i.e. clearing activities, UG mining activities, meteorological data etc.); • Determine if an incident has potentially occurred; • Complete investigation IF Investigation reveals actual or potential material harm to the environment, the EO (together with the Ops Mgr) will initiate the PIRMP[3] immediately. • Inform regulatory agencies as required.	• A remedial action plan is developed and implemented to address the investigation findings. • Remedial action plan could include: o Increase monitoring frequency where relevant; o Undertake additional monitoring (stream health monitoring, etc.) if necessary. o Corrective/preventative actions based on the outcomes of the investigation and/or additional monitoring;	• Follow up information is provided to regulatory agencies as /where requested; and • A summary of monitoring results, investigations and remedial actions plans are provided within the Annual Review. • Monitor the completion of actions to ensure they have been effective. IF • Material Harm Incident occurred- Internal and External Reporting requirements are completed in accordance with Section 5 of Baal Bone's PIRMP, and reporting obligations detailed in EPL No. 765 and the Project Approval.	Notification to Secretary and any other relevant agencies (e.g. EPA, DPI Water) as soon as practicable (Schedule 5, Condition 5 of PA 07_0178). ***Immediate*** reporting of material harm incident required by POEO Act.

[3] PIRMP- Pollution Incident Response Management Plan

Table 7.9: Groundwater Quality Trigger Levels

Element	Short Term Minor Change Criteria^	Short Term Major Change Criteria^	All Bore 80th Percentile	BBP4 80th Percentile
pH	4.6	4.2	5.0*	5.5*
Electrical Conductivity (µS/cm)	300	300	90	90
Copper (mg/L)	0.041	0.043	0.011	0.007
Iron (mg/L)	15.25	24.28	11	11
Zinc (mg/L)	0.143	0.175	0.098	0.074

Source: ^Aurecon (2012)

*Note: * 20th Percentile*

Note: 300 µS/cm is ANZECC (2000) guideline

Note: Minor change criteria apply for periods of 1 or 2 consecutive months while Major Change Criteria apply for periods of more than 2 months.

7.2.3 Groundwater Levels

Rainfall deficit and groundwater levels in the six groundwater monitoring piezometers are presented in **Figure 7.9**. Long term trends of groundwater levels and daily rainfall are shown in **Figure 7.10.**

Rainfall deficit is plotted on **Figure 7.9.** The rainfall deficit uses data from the Lithgow BOM weather stations, and is calculated by accumulating monthly differences between observed and average rainfall. A negative value indicates that the month is drier than average, and a positive value indicates a wetter month. Falling legs on the deficit plot indicate a move towards drought conditions; rising legs indicate a retreat from drought.

During 2022, the rainfall deficit has seen a general reduction trend. The majority of 2022 (nine months) saw monthly rainfall totals above long term averages. In January 2022 the deficit was -682 mm, compared to -238 mm by end 2022. The total rainfall received in Lithgow during 2022 was 1445 mm, which is 586 mm more than the long term average annual rainfall in Lithgow of 859 mm, or 168% of the long term average rainfall.

The water levels in all the bores (BBPB1 – BBPB5) increased during 2022, which is interpreted to be due to wetter conditions compared to previous years.

BBPB6 was recorded as dry from February 2018 until groundwater levels dropped throughout 2017 in response to the dry conditions, and in February 2018 the piezometer has been recorded as dry. BBPB6 has remained dry from February 2018 until July 2020. From August 2020 until Oct 2020 water levels in BBPB6 have increased. Throughout 2021 and 2022 the water levels in BBPB5 and BBPB6 were stable, with water at ground level at these bores within the swamp.

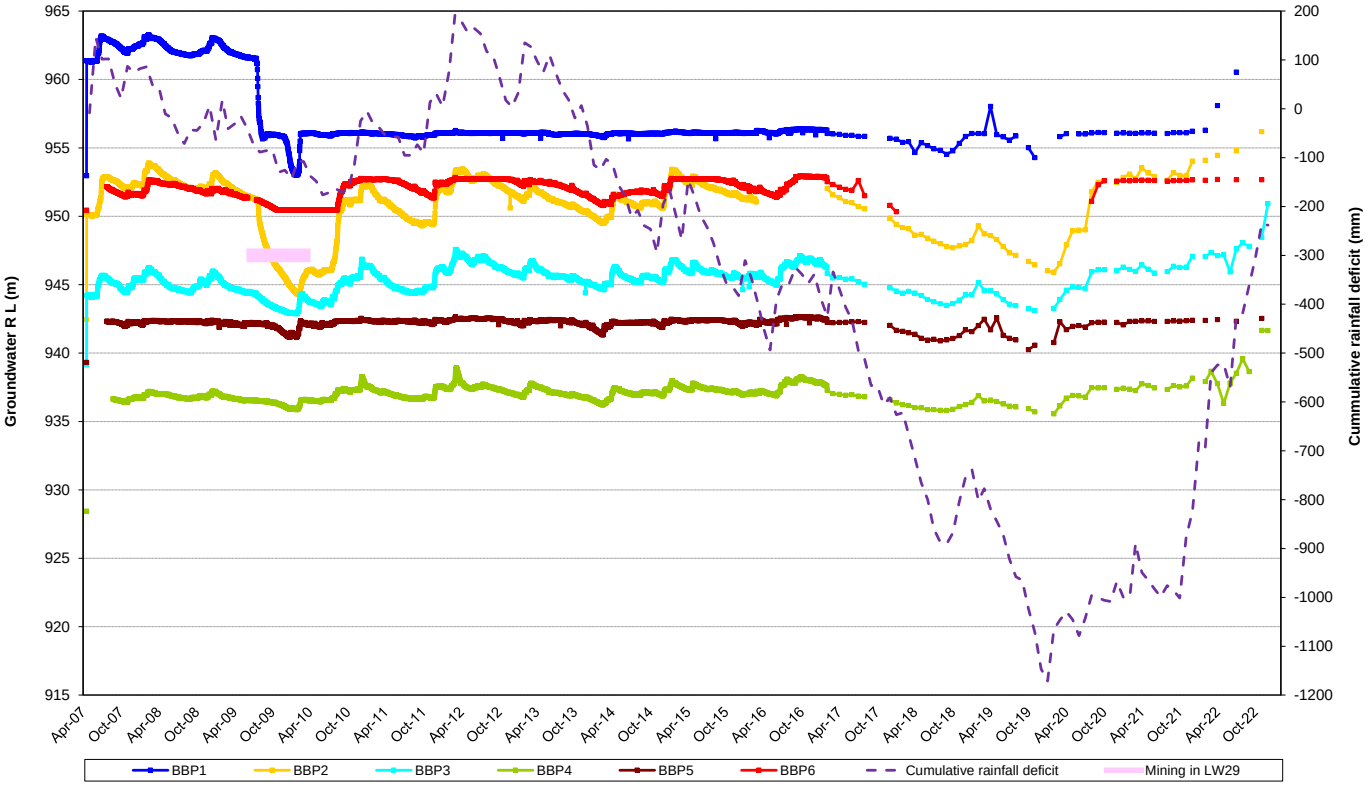


Figure 7.9: Coxs River Swamp groundwater levels and rainfall deficit

7.2.3.1 Comparison against Previous Annual Reviews

Groundwater data are plotted on **Figure 7.9** and **Figure 7.10**. The north – to – south downstream groundwater gradient has been broadly maintained (highest level observed in BBPB1 and lowest level observed in BBPB4), indicating that overall flow has been maintained down through the swamp.

All groundwater levels appear to be approximately at pre-mining levels, with the only exception being at piezometer BBP1, where a groundwater level re-stabilised at RL 956 m from 2009 to 2021 (approximately 5 m below pre-mining level). High rainfall during 2022 has seen the groundwater RL at BBP1 increase to near pre-mining levels.

All bores saw a decrease in groundwater RL corresponding to the prolonged drought period and rainfall deficit from early 2017 until end 2019. From 2020 to 2022 the higher volume of rainfall received comparative to previous years, corresponded with an increase in groundwater RLs in all bores.

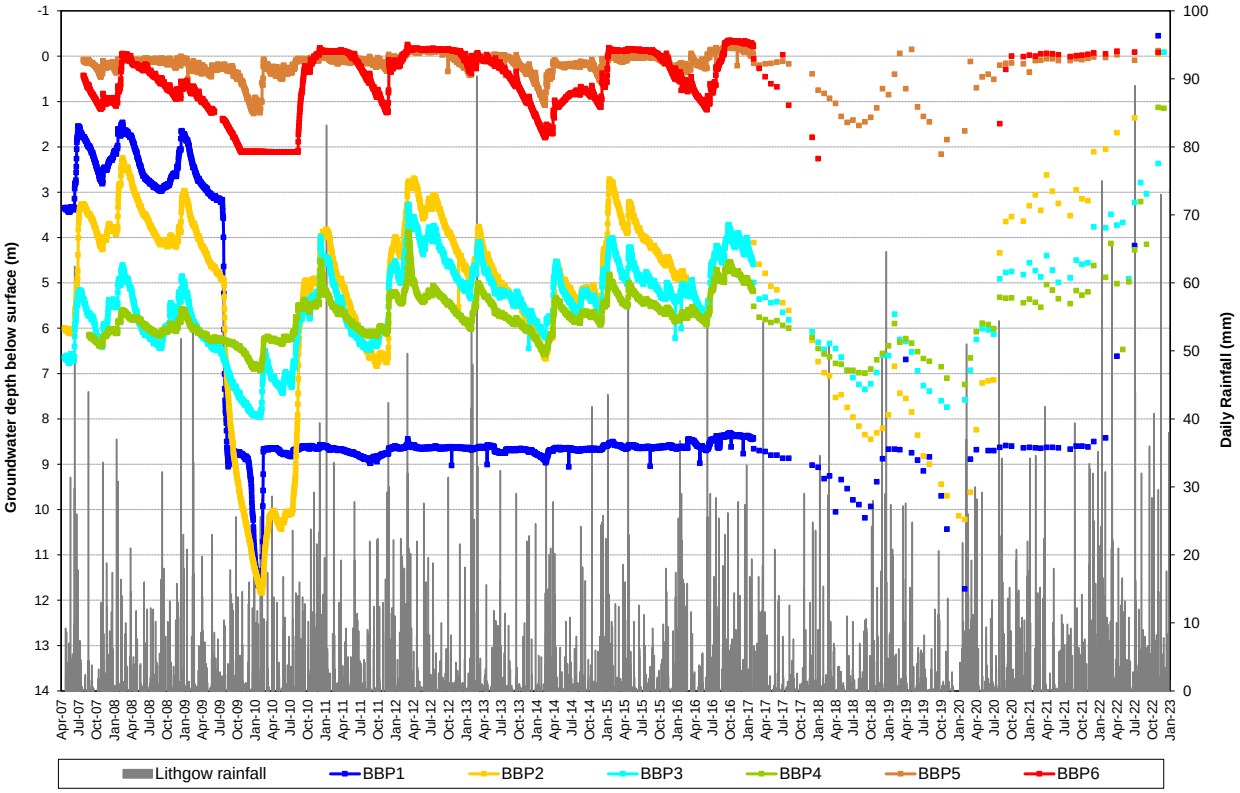


Figure 7.10: Longterm groundwater trends

7.2.3.2 Comparison against EA

The EA concluded that the likelihood of extraction of LW29-31 resulting in a significant impact on the Coxs River Swamp was considered extremely low.

All groundwater levels appear to be approximately at pre-mining levels, with the only exception being BBPB1, where groundwater has re-stabilised at RL956 (approximately 5 metres below pre-mining level).

Over the long-term, an emerging trend shows that groundwater levels in BBPB2, BBPB3 and BBPB4 all appear to correlate well with the overall cumulative rainfall deficit (difference between the monthly rainfall and the long-term average). The other remaining piezometers (BBPB5 and BBPB6), all appear resistant to short-term weather variances, due to the location of BBPB5 and BBPB6 in the centre of the swamp, which generally remains saturated. The prolonged drought period, as evidenced by the steady rainfall deficit from early 2017 until early 2020, saw all bores respond with decreasing water levels, and BBPB6 was recorded as dry from February 2018 until July 2020.

7.2.4 Groundwater Chemistry

Groundwater chemistry monitoring results for the reporting period are provided below in **Figures 7.11 to 7.15**.

Note that on 24 February 2022, DPIE approved the Consolidated Environmental Management Strategy, and the frequency of groundwater monitoring at Cox's Swamp was reduced. From March 2022 onwards the Cox's Swamp bores (BBPB1 – BBPB6) were sampled according to schedule outlined below.

Piezometer ID	Water Level	pH	Electrical Conductivity (µS/cm)	Copper	Zinc	Iron	Speciation
BBPB1–2, and BBPB5-6	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly
BBPB3 and BBPB4	Quarterly	Monthly	Monthly	Monthly	Monthly	Monthly	Quarterly

Cox's Swamp bores were unable to be sampled during October 2022 as National Parks and Wildlife Service closed the area due to high rainfall.

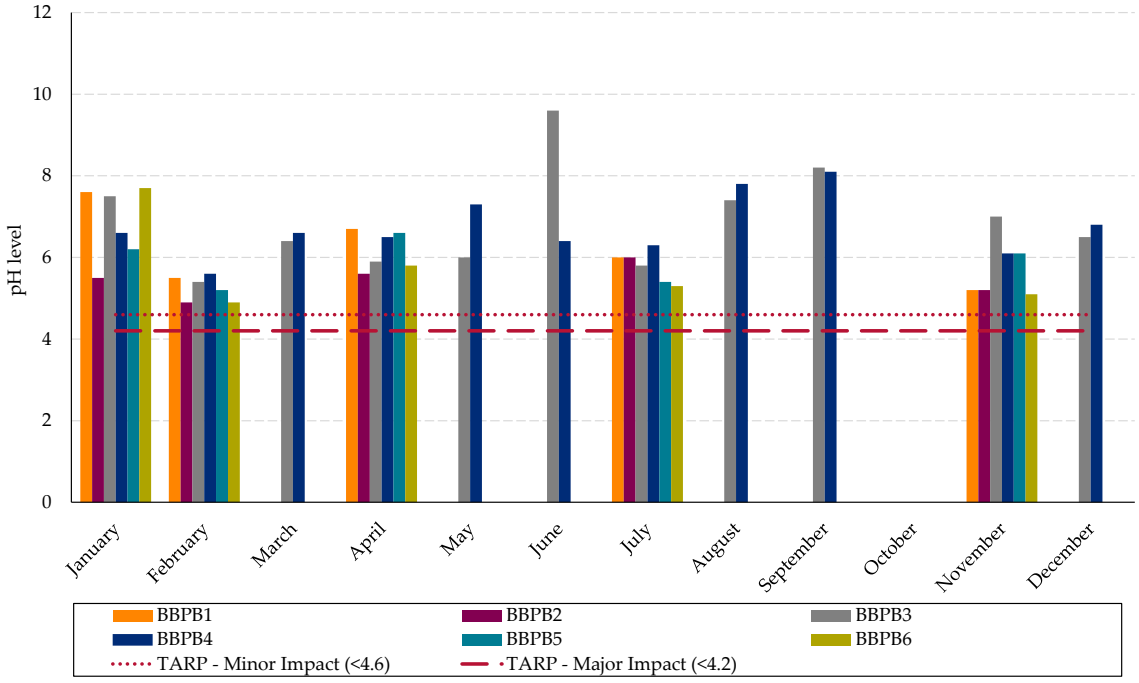


Figure 7.11: 2022 Groundwater pH levels.

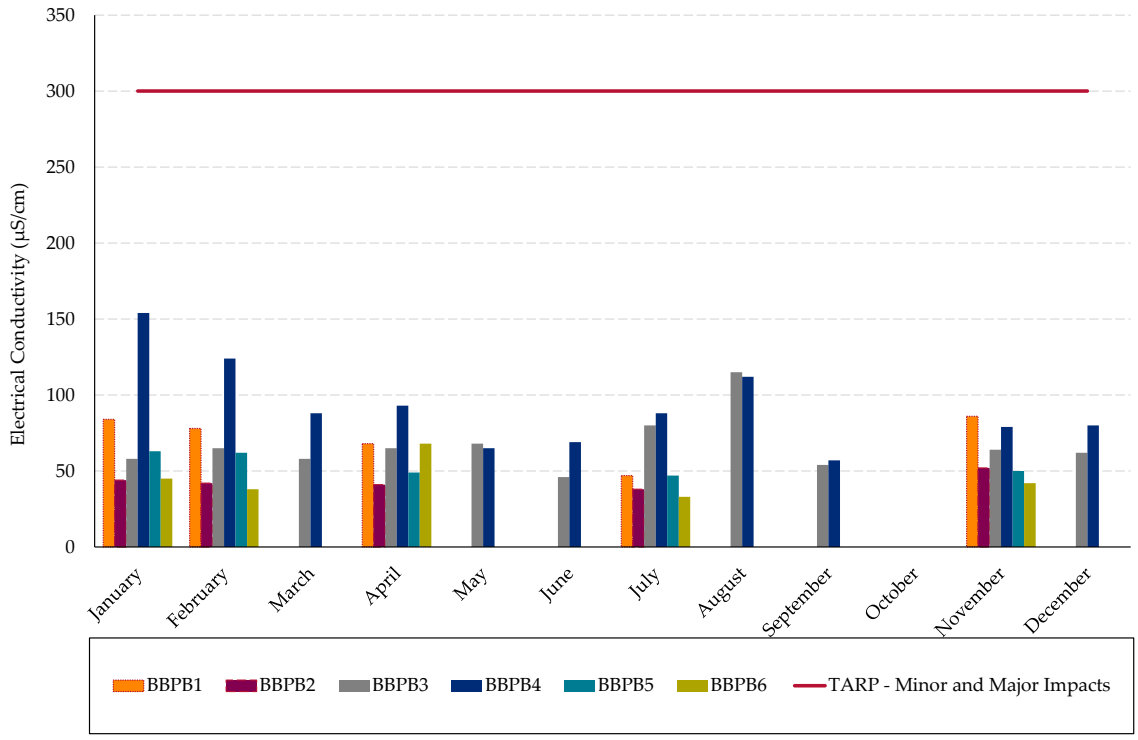


Figure 7.12: 2022 Groundwater Electrical Conductivity.

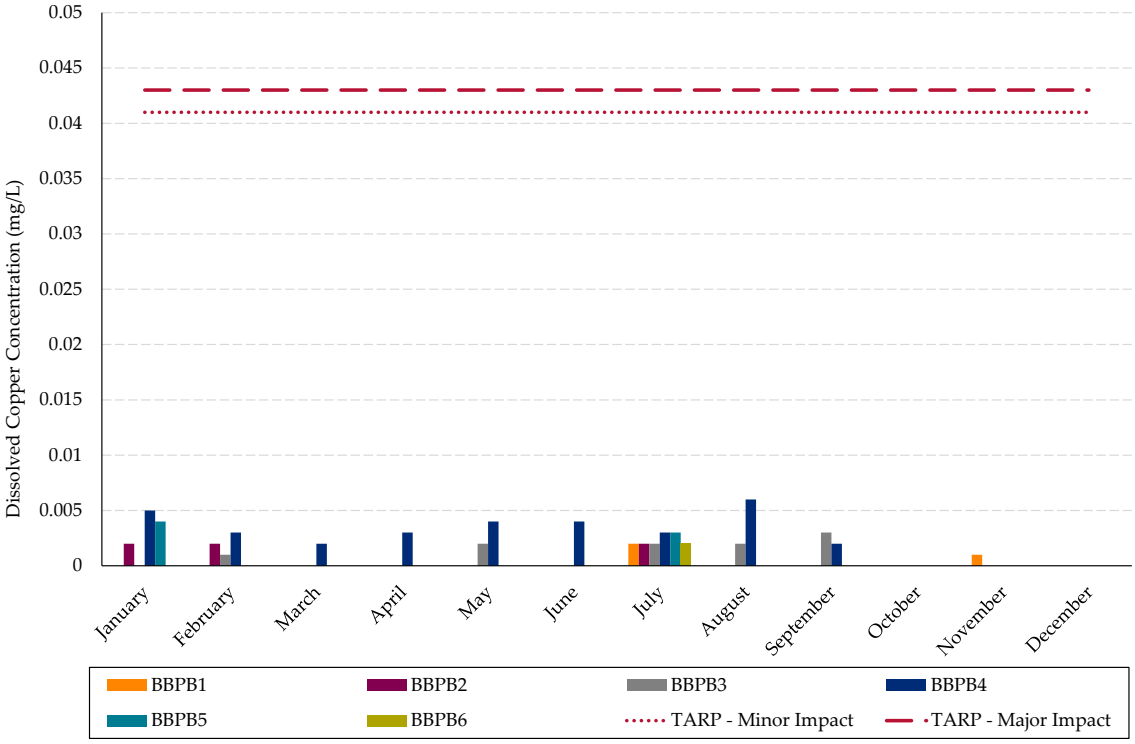


Figure 7.13: 2022 Groundwater Copper levels.

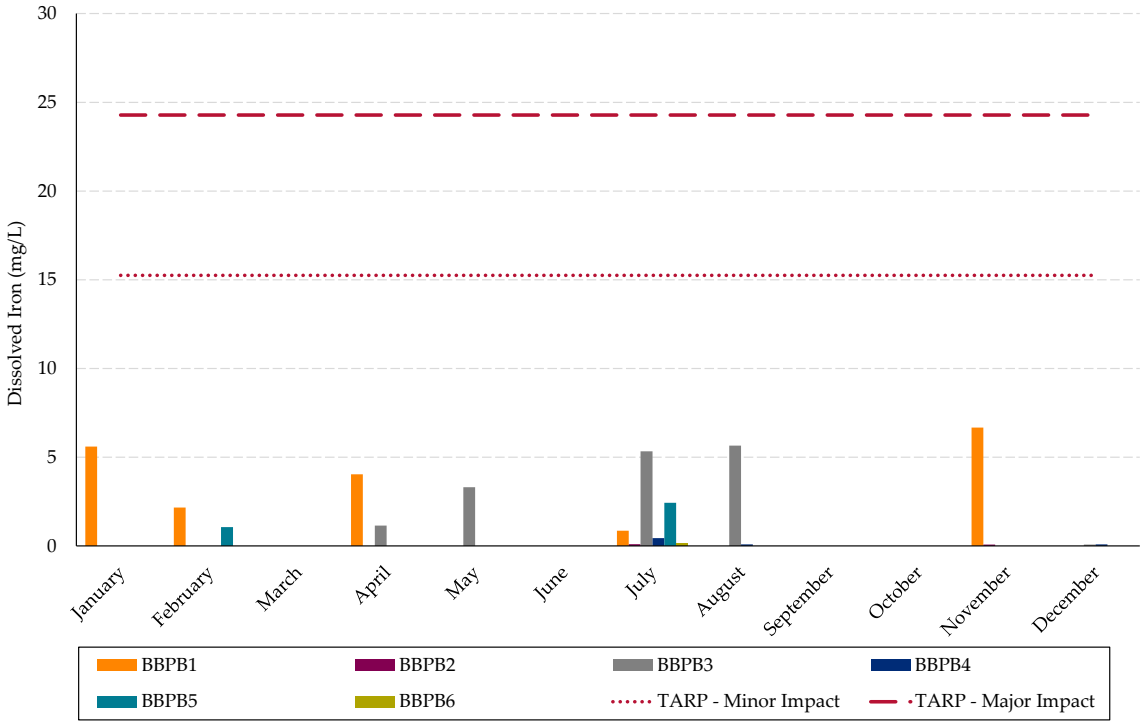


Figure 7.14: 2022 Groundwater Iron (dissolved) levels.

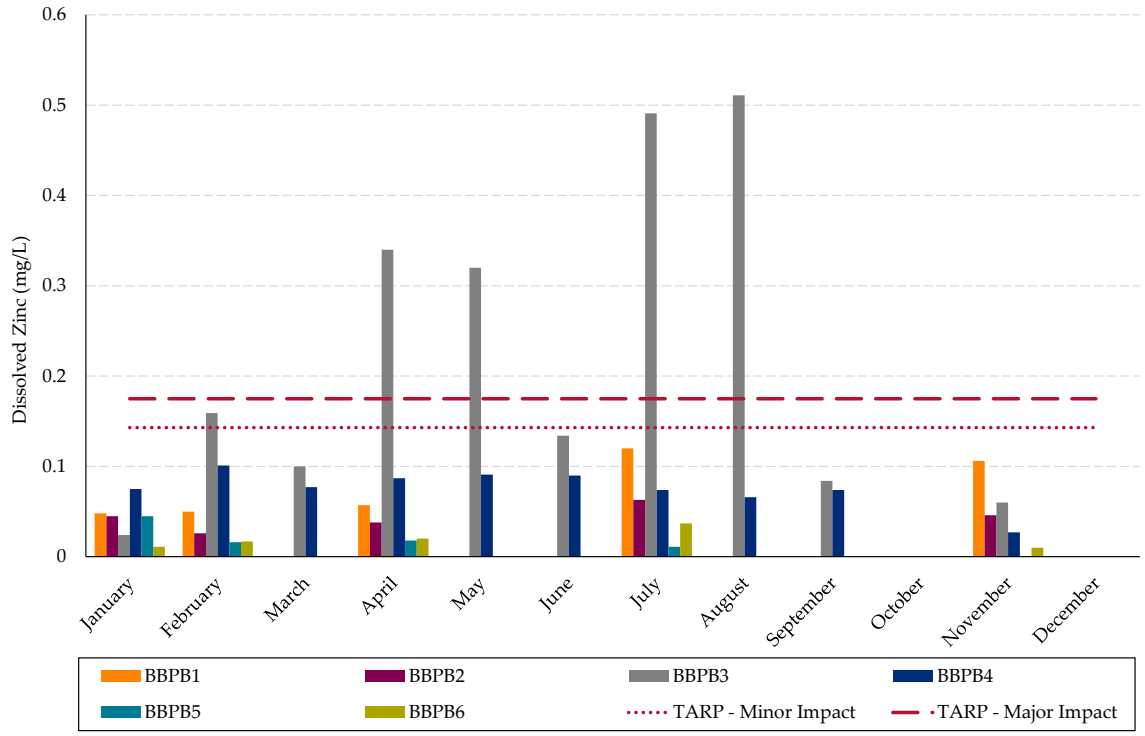


Figure 7.15: 2022 Groundwater Zinc Levels.

As shown in **Figure 7.11** above, all pH levels for all bores were within both the minor and major impact criteria during 2022.

As shown in **Figure 7.12** above: electrical conductivity (EC) levels were within both the minor and major impact criteria for all groundwater monitoring bores during 2022.

As shown in **Figure 7.13**, copper levels were also within impact criteria for all groundwater monitoring bores during 2022.

As shown above in **Figure 7.14**, 2022 iron levels were below the minor and major impact trigger levels for all bores.

As shown above in **Figure 7.15**, 2022 zinc levels were below the minor impact trigger level for all groundwater monitoring wells with the exception of BBPB3. BBPB3 exceeded the major impact trigger levels in April, May, July and August 2022. BBPB3 also exceeded the minor impact trigger level for the month of February 2022. As none of the exceedances involved three consecutive values, the Loss of Water Quality TARP was not triggered in 2022.

In 2012, Baal Bone Colliery commissioned a report by Aurecon which investigated groundwater quality and the TARP trigger levels. The Aurecon report (March 2012) investigated the increases in zinc at BBPB3 however was unable to find obvious reasons for these increases. The Aurecon investigation suggested that variable rainfall and corresponding changes in groundwater levels could be contributing to changes in zinc levels.

The 2019 Independent Environmental Audit (IEA) carried out by Hansen Bailey determined that the ongoing exceedance of Water Quality Trigger Levels for dissolved zinc at BBPB3 was a low risk non-compliance. The audit recommended that Baal Bone Colliery, "revisit the zinc trigger levels for BBP3 in consultation with DPIE for the closure stage".

In the 2019 IEA Action Plan, Baal Bone Colliery committed that by 30 March 2021 a consultant will be engaged to further investigate the exceedance with consideration to be given to calibrating the groundwater triggers to site specific conditions if appropriate.

In 2020, Umwelt were engaged in part to determine the potential causes of elevated zinc concentrations at BBP3 and identify whether the existing groundwater minor and major change criteria (trigger values) should be updated. In relation to zinc Umwelt found that "t*he peak concentrations during many of these events was recorded shortly after increased rainfall following a prolonged dry period. This suggests that rainfall-runoff infiltration has mobilised zinc from dry strata within the BBP3 catchment and that a wetting and drying process could be a significant contributor to groundwater zinc concentrations."* Also that *"Elevated zinc concentrations were observed to occur pre-mining, during mining and post-mining. Elevated zinc concentrations at times followed a rise in groundwater level in BBP3".*

Baal Bone Colliery provided a copy of the 2020 groundwater investigation report to DPIE in correspondence dated 17 November 2020.

7.2.4.1 Comparison against previous Annual Reviews

Table 7.10 summarises previous Annual Review results and any exceedances of TARP trigger levels (minor and major) in BBPB1 – BBPB6 during the period 2011 – 2022.

Table 7.10: Summary of TARP exceedances and previous Annual Review results

	BBPB1	BBPB2	BBPB3	BBPB4	BBPB5	BBPB6
2011	No TARP exceedance	No TARP exceedance	**Dissolved Iron**: Feb to Dec	**Dissolved Copper**: Aug – Dec	No TARP exceedance	No TARP exceedance

			Dissolved Zinc: Jan, Feb, Aug, Nov, Dec			
2012	No TARP exceedance	No TARP exceedance	**Dissolved Iron**: Jan **Dissolved Zinc**: Jan, Jun, Aug to Dec	**Dissolved Copper:** Jan, Jul to Oct **Dissolved Zinc:** Oct	No TARP exceedance	No TARP exceedance
2013	No TARP exceedance	No TARP exceedance	**Dissolved Iron:** Jan, May, Oct to Dec **Dissolved Zinc:** Jan to Dec	**Dissolved Copper:** Sep to Dec **Dissolved Zinc:** Dec	No TARP exceedance	No TARP exceedance
2014	No TARP exceedance	No TARP exceedance	**Dissolved Iron:** Jan to Mar, Jul **Dissolved Zinc:** Jan to Dec	**Dissolved Copper:** Jan, Sep	No TARP exceedance	No TARP exceedance
2015	No TARP exceedance	No TARP exceedance	**Dissolved Iron:** Jan, Feb, Apr, Jun, Dec **Dissolved Zinc**: Jan to Dec	No TARP exceedance	No TARP exceedance	No TARP exceedance
2016	**Dissolved Copper:** Feb	No TARP exceedance	**Dissolved Iron:** Feb, Mar **Dissolved Zinc**: Jan, Feb, Mar, Apr, Jun, Jul, Aug, Oct, Dec	No TARP exceedance	No TARP exceedance	No TARP exceedance
2017	No TARP exceedance	**Dissolved Iron**: Oct **Dissolved Zinc:** Oct	**Dissolved Iron**: Oct **Dissolved Zinc:** Jan, Feb, Mar, May, June, July, Aug, Sept, Nov, Dec	No TARP exceedance	No TARP exceedance	**Dissolved Copper**: Nov and Dec **Dissolved Iron**: Oct
2018	**Dissolved Iron**: July	**pH:** Nov	**Dissolved Iron:** Jan, Mar, Jun, Jul **Dissolved Zinc:** Jan to Jul, Sept to Dec	No TARP exceedance	**Dissolved Iron:** Mar, Jul **Dissolved Copper:** Mar, Jun, Jul	No TARP exceedance **(**BBPB6 dry during 2018)
2019	**EC:** July	No TARP exceedance	**Dissolved Iron:** Jun, July, Nov **Dissolved Zinc:** Jan to Nov	No TARP exceedance	No TARP exceedance	No TARP exceedance
2020	**Dissolved Iron:** April	No TARP exceedance	**Dissolved Zinc:** Apr to Jul, Sept to Dec **Dissolved Iron:** Mar, Apr, Jun, Jul, Dec	No TARP exceedance	**pH:** Apr to Dec **EC:** May	**Dissolved Zinc:** Aug **pH:** Aug to Dec **EC:** Aug
2021	No TARP exceedance	No TARP exceedance	**Dissolved Iron:** Feb, Mar, Sep **Dissolved Zinc:** Jan to Aug, Oct, Nov	**pH:** May **Dissolved Zinc:** Jun	**Dissolved copper:** Feb **pH:** Feb, May, Jul, Sep to Nov	**Dissolved copper:** Feb **pH:** Jan, Oct, Nov
2022	No TARP exceedance	No TARP exceedance	**Dissolved Zinc:** Feb, Apr, May, Jul, Aug	No TARP exceedance	No TARP exceedance	No TARP exceedance

7.2.4.2 Comparison against EA

The EA concluded that the likelihood of extraction of LW29-31 resulting in a significant impact on the Coxs River Swamp water quality and quantity (levels) is considered extremely low.

In terms of groundwater quality, minor and major changes have been noted for pH and trace metals at some bores however electrical conductivity has generally remained below its trigger level of 300 µS/cm. This indicates that the local groundwater has a very low salinity and is consistent with the local background of only 100µS/cm.

As noted in **Section 7.2.4**, there were a number of minor and major trigger level events during 2022 at BBPB3 for zinc. Both the 2012 Aurecon report and the 2020 Umwelt report on groundwater quality conclude that minor changes to groundwater quality can occur by chance in the variable conditions of rainfall and the resulting groundwater level changes. The 2022 reporting period saw higher rainfall in comparison to previous reporting periods.

In terms of both groundwater levels and quality, monitoring confirms that there has been no measurable impact from mining on the swamp.

7.2.5 Groundwater Model

As part of the mine closure planning process, a groundwater model was developed to estimate the long-term recovery of the regional groundwater table post mining (GHD, 2017). The predictions of the groundwater model informed a numerical water balance model that was used to estimate the flooding of the underground workings and the water level and quality of the Northern Void.

The Groundwater Monitoring Plan requires the validation of the groundwater model predictions of groundwater inflow into the mine workings every three years.

In 2020 GHD was commissioned to validate and compare monitoring data to MODFLOW model predictions. The validation concluded that the model provides a reasonable representation of the current rate of recovery of the underground water level (GHD 2020).

In early 2022 GHD validated the groundwater model again, comparing the latest water level recovery monitoring data for the underground workings against model predictions. Water levels collected for the north and southern dewatering bores and the Northern Void were compared against the model predictions.

Figure 7.16 shows observed standing water levels compared to the water levels predicted by the hydrogeological model and the underground recovery water balance model.

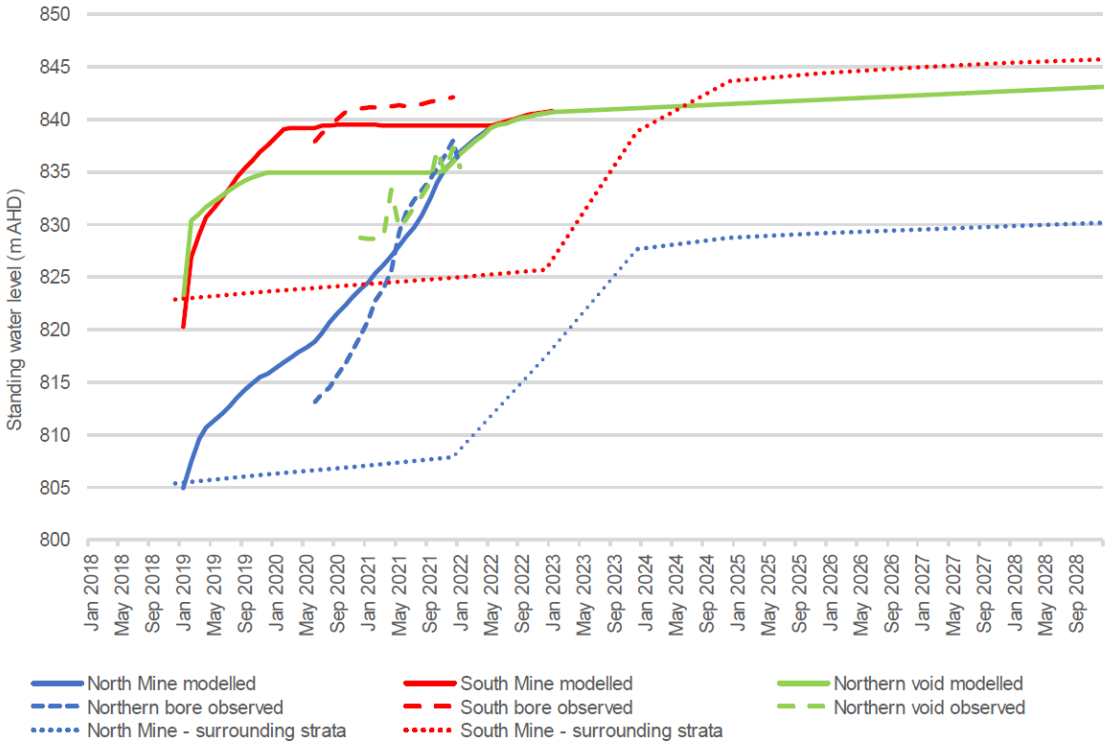


Figure 7.16 Observed and modelled post-closure groundwater level

The 2022 GHD Groundwater Model validation report found that:
" Review of seam floor contours indicates that the southern area of the workings is likely spilling into the northern area of the workings and the northern void. This is causing the water level at the south dewatering bore to remain relatively constant while the water level at the north dewatering bore and northern void continues to rise. The hydrogeological model assumed that the water level in the workings and the goaf would rise relatively uniformly throughout the workings.

The underground recovery water balance model was intended to provide a more realistic representation of water levels during the early part of the recovery, before the water level in the workings, goaf and surrounding strata equilibrated. Comparison of the observed and modelled water levels in Figure 7.16 shows that observed water levels are generally within 3 m of the predictions, although some uncertainty remains due to the partially dewatered initial conditions when dewatering ceased."

7.3 Channel Stability Monitoring

The Surface Water Monitoring Plan requires that Channel Stability Monitoring be undertaken annually for Coxs River, Ben Bullen Creek, Baal Bone Creek and Jews Creek to assess the condition of the watercourse.

Channel Stability Monitoring was first undertaken in 2014 (mining ceased in 2011). Following the initial monitoring in 2014, the scope of the monitoring program was limited to only areas of active erosion as identified in the 2014 monitoring program (Stream Health Monitoring Recommendations – Umwelt, dated 30 November 2015).

Therefore, as mining will not recommence, only monitoring locations Co-2, Co-3 and Co-4 on Cox's Creek, Be-2, Be-3, Be-4, Be-5 and Be-6 on Ben Bullen Creek, and Ba-2 and Ba-3 on Baal Bone Creek need to be inspected as part of the annual monitoring program.

Channel Stability Monitoring was undertaken on 7 and 8 November 2022 by Umwelt.

The 2022 Channel Stability Monitoring Report concluded that:

"During the 2022 channel stability assessment, it was observed that some assessment points show differences in condition when compared to those observed in previous years. These changes are likely due to a combination of bushfire activity at the beginning of 2020 and recent extreme rainfall events. Generally, the calculated activity ratings are similar to those reported from 2021 and therefore the conclusions regarding the cause of erosion remain consistent with those detailed in the 2021 monitoring report (Umwelt 2021b)."

7.4 Stream Health Monitoring

The Surface Water Monitoring Plan required that Stream Health Monitoring be undertaken for Coxs River, Ben Bullen Creek, Baal Bone Creek and Jews Creek to determine the overall health and condition of each of the four watercourses

Stream Health Monitoring was commenced in 2014. Following the results of the 2014 monitoring and due to the care and maintenance status of Baal Bone Colliery, annual Stream Health Monitoring was suspended.

As per advice from Umwelt (Stream Health Monitoring Recommendations – Umwelt, dated 30 November 2015) and the **Surface Water Monitoring Plan**:

Prior to the commencement of Ben Bullen Creek Rehabilitation works, aquatic fauna monitoring sites will be identified in Jew's Creek and in analogue sites in order to establish baseline completion criteria. Following the completion of physical Ben Bullen Creek rehabilitation works, the monitoring will be extended to sites in the rehabilitated creek line with rehabilitation success being assessed against the analogue site(s).

Accordingly in June 2020 an aquatic fauna monitoring event was completed by Umwelt to establish analogue sites and collect baseline aquatic fauna data prior to rehabilitation works commencing in Ben Bullen Creek. Three analogue aquatic fauna monitoring sites were established in Ben Bullen Creek, Wangcol Creek and Coxs River, as these are considered permanent creeks during drought conditions.

In November 2022 aquatic fauna monitoring was carried out in the three analogue sites established in 2020, as well as two monitoring sites within the rehabilitated sections of Ben Bullen Creek.

The methodology involved collecting macro-invertebrate samples at each site near edge habitats and macrophytes. Macro-invertebrates were sorted to a family or subfamily level (depending on requirements of the AUSRIVAS model). These macro-invertebrates were then used to assign a Stream Invertebrate Grade Number – Average Level version 2 (SIGNAL2) score for water quality (based upon pollution tolerance).

Table 7.11 provides the outcomes of the 2020 - 2022 Aquatic Fauna Monitoring.

Table 7.11: Outcomes of 2020 - 2022 aquatic fauna monitoring

	2020		**2021**		**2022**	
Site	Signal2 Grade	No. of Macro-Invertebrate Families	Signal2 Grade	No. of Macro-Invertebrate Families	Signal2 Grade	No. of Macro-Invertebrate Families
Analogue Sites						
BBC-AQ1	4.17	11	4.167	4	3.7	7
WC-AQ1	3.48	17	3.556	5	2.1	5
CR-AQ1	4.79	17	4.473	11	4	12
Rehabilitated Sites						
BBC-R1	-	-	2.259	9	2.9	18
BBC-R2	-	-	-	-	4	14
BBC-R3	-	-	3.375	4	2.7	14

Umwelt (2022) concluded that:
"The SIGNAL2 grades for the newly established sites within the rehabilitated creek line of Ben Bullen Creek were generally consistent with those of the analogue sites. As this is the second year of monitoring of the rehabilitated creek line, the similarity of aquatic fauna assemblages among rehabilitated and analogue sites is encouraging. It is expected that the aquatic fauna assemblages and respective SIGNAL2 grades of the sites within the rehabilitated creek line of Ben Bullen Creek will remain similar to the analogue sites over time."

Given that the rehabilitation of Ben Bullen Creek was only recently completed, Umwelt (2022) did not provide any recommendations for improving current management actions, other than the continuation of aquatic fauna monitoring.

8 Rehabilitation

8.1 Status of Rehabilitation

Rehabilitation activities have been carried out in accordance with the Baal Bone Colliery Mine Closure MOP 2019 -2025, and the Rehabilitation Management Plan. The primary objective of rehabilitation is to create a safe, stable final landform with self-sustaining native vegetation communities.

A summary of rehabilitation works for the previous, current and next reporting periods are detailed in **Table 8.1**.

Table 8.1: Summary of Rehabilitation Performance[4]

Mine Area Type	Previous Reporting Period (Actual) (ha)	Current Reporting Period (Actual) (ha)	Next Reporting Period (Forecast) (ha)
	2021	2022	2023
A. Total Mine Footprint[5]	475	475	475
B. Total active disturbance	61.2	11.7	11.7
C. Land being prepared for rehabilitation	91.6	49.5	0
D. Land under active rehabilitation	309	358.5	358.5
E. Completed rehabilitation	0	0	102[6]

In 2007 and 2008 110ha in the Northern and Southern open cut areas were shaped to final landform, covered with clay loam free-dig material and treated with a range of structural soil conservation and stormwater management works. Soils were ameliorated with agricultural lime and gypsum and seeded with a range of native and improved pasture seed mixes.

During 2019, eleven entries into the underground mine, and the Longwall 19 ventilation shaft were filled and sealed in accordance with MDG6001 Guidelines for Permanent Filling and Capping of Surface Entries to Coal Seams. In 2020 a further eight buried adits were drilled, grouted and sealed.

In January 2020 demolition of infrastructure on the Baal Bone site commenced, which included the demolition of the Coal Handling Preparation Plant (CHPP), bathhouse and workshop, as well as all coal conveyors, reclaim tunnels, transfer towers, bins, sheds and other associated ancillary infrastructure. The rail loop linking the site to the Main Western Railway line was also decommissioned and all rail lines, ballast and sleepers were removed from the corridor. The

[4] Values at A and B are given as at the end of the reporting period whilst values at C and D reflect areas rehabilitated during the period
5 This figure excludes the Subsidence Domain as per Annual Review Guideline (2015).
6 ESF2 application submitted in June 2022 for 102 ha of completed rehabilitation.

remaining infrastructure: the administration building, workshop and other ancillary infrastructure were demolished during 2021.

The civil works and rehabilitation component of the closure activities commenced in September 2020. The remediation of the CHPP and Run of Mine (ROM) areas and the former rail corridor was undertaken over the remaining period of 2020. Activities included the addition of topsoil, fertiliser, lime and gypsum followed by the areas being ripped. The CHPP ROM area was then seeded with a pasture seed mix and the rail loop was seeded with a woodland seed mix – completing approximately 45 ha of rehabilitation during 2020.

During 2020 and 2021 filling of voids including the Leachate Dam, REA 6 Tailings Dam, Central Void and the Southern Void was also undertaken. In total over 1,000,000m3 was introduced into these areas.

In 2021 rehabilitation works commenced on sections of Ben Bullen Creek where it passes through the site. Remediation works included large amounts of rock revetment along the banks of the creek, the installation of high and low flow channels, and highwall safety and stabilisation work. Over 10,000 tubestock plants, including the threatened Captertee Stringybark were planted along the remediated sections of Ben Bullen Creek.

During 2021, approximately 90 ha was rehabilitated and seeded including areas surrounding the Northern and Central Voids, the Southern Void and the banks of Ben Bullen Creek.

In 2022, shaping, ripping and seeding of the former pit top area, haul roads and Central Void was undertaken (approximately 49 ha). Following the completion of mine closure works in April 2022, the site entered a monitoring and maintenance phase.

During 2022 an ESF2 certification application for 102 hectares of older rehabilitation that has achieved completion criteria was lodged with with DPIE – Resources Regulator.

Plate 2 provides photos demonstrating rehabilitation progress.

Pit top – January 2021	Pit Top – January 2023
	
CHPP ROM – July 2019	CHPP ROM – January 2023
	
Southern REA – January 2021	Southern REA - January 2023
	
BB Creek Reach 2 – January 2021	BB Creek Reach 2 – January 2023
	

8.1.1 Subsidence Remediation

There were no subsidence repairs carried out during 2022. During 2022 a subsidence inspection was only able to be completed in April due to prolonged wet weather and poor road conditions in Gardens of Stone SCA.

The assessment and remediation criteria set out the **Rehabilitation Management Plan** will be used as a guide for future remediation activities. Remediation activities will be undertaken in response to monitoring until rehabilitation has been achieved.

8.2 Performance Indicators and Completion Criteria

The Baal Bone Colliery RMP divides the lease area into different domains. **Section 4 of the Baal Bone Colliery Rehabilitation Management Plan** outlines the rehabilitation performance indicators and closure criteria that must be met to demonstrate that the rehabilitation objectives for each domain have been achieved over the six different rehabilitation phases (i.e. (1) Decommissioning, (2) Landform Establishment, (3) Growth Medium Development, (4) Ecosystem and Land Use Establishment, (5) Ecosystem and Land Use Sustainability, and (6) Relinquished Lands).

A range of different environmental monitoring and inspections are used to measure progress towards the rehabilitation completion criteria for each phase, including; landform surveys and inspections, water monitoring, soil tests, flora and fauna monitoring. In particular the completion criteria outlined in the Ecosystem and Land Use Establishment phase, and Ecosystem and Land Use Sustainability phase are tracked via the Annual Ecological Rehabilitation Monitoring outlined below at **Section 8.3.2.**

8.3 Rehabilitation Inspections and Monitoring

Three types of rehabilitation monitoring/inspections are undertaken at Baal Bone. These include;

- Regular inspections by site personnel,
- An annual environmental rehabilitation walk around inspection and
- Annual Ecological Rehabilitation Monitoring which was implemented in 2009.

8.3.1 Annual Environmental Rehabilitation Inspection

The 2022 Annual Environmental Rehabilitation Inspection was conducted by DnA Environmental on 29 November 2022.

The inspection noted some isolated areas needing additional work to remediate weeds; erosion and rilling; and other minor issues. Recommended actions have been entered into CMO - Baal Bone's compliance tracking system.

8.3.2 Annual Ecological Rehabilitation Monitoring

An Annual Ecological Rehabilitation Monitoring program is undertaken at Baal Bone Colliery to evaluate the success of rehabilitation and Baal Bone Colliery's progress towards fulfilling long term land use objectives. The monitoring program will continue within rehabilitation areas until all rehabilitation closure criteria are satisfied, and mining leases are relinquished.

Monitoring sites and reference sites have been established to monitor flora, fauna, landscape function and habitat values aimed at assessing ecosystem function in remnant vegetation and rehabilitation areas (**Appendix A – Plan 6).**

Monitoring of these sites is undertaken annually until rehabilitation areas reach acceptable levels of establishment, and then monitoring will be undertaken periodically. Monitoring of these sites assesses:

- Plant community structural attributes;
- Cover, species density, height and structural diversity;
- Species richness (the number of plant species present in each structural layer of each vegetation community);
- The presence and abundance of any weed species; and
- Assessment of natural regeneration/recruitment of new species.

The findings of this monitoring program are used to assist in management recommendations for appropriate rehabilitation works within Baal Bone Colliery holdings. Where necessary, rehabilitation procedures are amended accordingly to continually improve rehabilitation standards.

The findings of the Annual Ecological Rehabilitation Monitoring program are also used to assess progress towards rehabilitation commitments in the Baal Bone Colliery Rehabilitation Management Plan. **Section 4** of the **Baal Bone Colliery Rehabilitation Management Plan** sets out performance indicators and completion criteria. Baal Bone Colliery will demonstrate achievement of all completion criteria prior to seeking relinquishment of the site.

2022 Annual Ecological Rehabilitation Monitoring Results

The results of the 2022 monitoring, undertaken by DnA Environmental from the 22nd – 25th November 2022 are summarised in **Table 8.2** and **Table 8.3** below. The table indicates the performance of the mixed eucalypt woodland and exotic pasture rehabilitation monitoring sites against 70% primary completion performance indicators (with the exception of the Vent Shaft site where 100% performance indicators are applied). The selection of criteria has been presented in order of rehabilitation phases according to the ESG3 MOP guidelines. The range values of the ecological performance targets are amended annually. Rehabilitation sites meeting or exceeding the range values of their representative target community type have been identified with a coloured box and have therefore been deemed to meet these primary completion performance targets this year. Hashed coloured boxes associated with soil condition indicate they may be outside of the reference target ranges, but within acceptable agricultural limits.

Table 8.2: Performance of the **woodland** rehabilitation sites against completion criteria and primary performance indicators in 2022

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measure (*desirable)	Woodland ecosystem KPI range 2022	SOC5 2022	REA5 2022	RLP01 2022	RLP02 2022	SVD01 2022	SVD02 2022	SVD03 2022	BBCW01 2022	BBCW02 2022
Performance indicators are quantified by the range of values obtained from representative reference sites					**70% KPI target**	**70% meet criteria**								
Phase 2: Landform establishment and stability	**Landform slope, gradient**	Landform suitable for final land use and generally compatible with surrounding topography	Slope	< Degrees (°)	**<18**	**15**	**2**	**0**	**1**	**2**	**5**	**1**	**15**	**20**
	Active erosion	Areas of active erosion are limited	Cross-sectional area of rills	m2	**0**	**0**	**0**	**0**	**0**	**0.016**	**0**	**0**	**0.291**	**0**
Phase 3: Growth medium development	**Soil chemical, physical properties and amelioration**	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH (5.6-7.3)	**na**	**6.8**	**6.5**	**6.9**	**7.2**	**6.5**	**5.9**	**5.8**	**6.0**	**6.1**
			EC	< dS/m (<0.150)	**na**	**0.050**	**0.045**	**0.029**	**0.464**	**0.260**	**0.109**	**0.135**	**0.032**	**0.031**
			Phosphorous	mg/Kg (50)	**na**	**5.6**	**7.5**	**7.5**	**18.0**	**27.9**	**50.5**	**38.4**	**5.2**	**5.9**
			Nitrate	mg/Kg (>13)	**na**	**1.7**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**
			ESP	% (<5)	**na**	**0.7**	**2.0**	**1.1**	**0.5**	**4.4**	**2.2**	**3.2**	**4.4**	**1.0**
Phase 4: Ecosystem& Land Use Establishment	**Landscape Function Analysis (LFA): Landform stability and organisation**	Landform is stable and performing as it was designed to do	LFA Stability	%	**46.9**	**67.9**	**77.5**	**65.3**	**64.8**	**48.9**	**59.1**	**58.8**	**55.2**	**66.3**
			LFA Landscape organisation	%	**70**	**100**	**100**	**76**	**63**	**2**	**47**	**36**	**29**	**75**

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measure (*desirable)	Woodland ecosystem KPI range 2022	SOC5 2022	REA5 2022	RLP01 2022	RLP02 2022	SVD01 2022	SVD02 2022	SVD03 2022	BBCW01 2022	BBCW02 2022
	Vegetation diversity	Vegetation contains a diversity of species comparable to that of the local remnant vegetation	Diversity of shrubs and juvenile trees	species/area	6	7	10	19	11	10	6	4	14	15
				% endemic	66	79	94	100	100	100	100	100	100	94
			Total species richness	No./area	34	35	46	79	52	68	48	55	49	63
			Native species richness	>No./area	32	16	18	60	31	29	24	22	23	28
			Exotic species richness	<No./area	25	19	25	19	21	39	24	33	26	35
	Shrubs and juvenile tree (<5cm dbh) density	Vegetation contains a density of shrubs and juvenile trees (<5cm dbh) comparable to the local remnant vegetation	Density of eucalypts	No./area	63	0	15	76	18	58	0	6	318	282
			Density of acacias	No./area	7	190	6	98	320	24	106	16	28	74
			Density of other endemic shrubs	No./area	10	168	77	972	40	108	11	3	58	18
			Density of exotic / non endemic species	< No./area	10	96	6	2	0	0	0	0	0	8
			The percentage of eucalypts	No./area	18	0	14	7	5	31	0	24	79	74
			Total density of endemic shrubs and/or juvenile trees	No./area	237	358	98	1146	378	190	117	25	404	358
	Ecosystem composition	The vegetation is comprised by a range of growth forms	Tree species	No./area	2	0	4	6	4	5	0	1	8	6

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measure (*desirable)	Woodland ecosystem KPI range 2022	SOC5 2022	REA5 2022	RLP01 2022	RLP02 2022	SVD01 2022	SVD02 2022	SVD03 2022	BBCW01 2022	BBCW02 2022
		comparable to that of the local remnant vegetation	Shrub species	No./area	4	8	6	16	8	5	6	3	6	9
			Herb species	No./area	14	23	19	37	24	32	27	33	20	31
Phase 5: Ecosystem & Land Use Development	**Landscape Function Analysis (LFA): Landform function and ecological performance**	Landscape Function Analysis (LFA): Landform function and ecological performance	LFA Infiltration	%	34.8	49.6	41.6	34.2	26.9	16	23.9	21.9	21.9	28.8
			LFA Nutrient recycling	%	35.1	50.9	44.1	35.4	28	12	24.1	22.7	18.4	30
	Protective ground cover	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	%	22.1	53	11.5	30.5	65.5	3.5	0.0	1	10.5	39
			Total Ground Cover	%	66.6	100	100	59.5	77.0	33.5	45.5	53	27.5	80
	Ground cover diversity	Native ground cover abundance is comparable to that of the local remnant vegetation	Percent ground cover provided by native vegetation <0.5m tall	%	53.2	45	16.1	60.9	36.9	37.5	13.3	39.3	27.8	25.5
	Ecosystem growth and natural recruitment	The vegetation is maturing and/or natural recruitment is occurring at rates similar to those of the local remnant vegetation	shrubs and juvenile trees 0 - 0.5m in height	No./area	123	170	27	936	156	190	117	25	334	296
			shrubs and juvenile trees 1.5 - 2m in height	No./area	13	16	12	32	4	0	0	0	0	0
	Ecosystem structure	The vegetation is developing in structure and complexity	Foliage cover 0.5 - 2 m	% cover	2.1	7.7	13.5	18.5	2	0	0	0	0	0

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measure (*desirable)	Woodland ecosystem KPI range 2022	SOC5 2022	REA5 2022	RLP01 2022	RLP02 2022	SVD01 2022	SVD02 2022	SVD03 2022	BBCW01 2022	BBCW02 2022
		comparable to that of the local remnant vegetation	Foliage cover 2 - 4m	% cover	0.7	9	0	0	0	0	0	0	0	0
			Foliage cover >6m	% cover	6.3	12	0	0	0	0	0	0	0	0
	Tree diversity	Vegetation contains a diversity of maturing tree and shrubs species comparable to that of the local remnant vegetation	Endemic Species	% endemic	70	100	0	100	0	0	0	0	0	0
	Tree and mature shrub (>5cm dbh) density	Vegetation contains a density of maturing tree and shrubs (>5cm dbh) species comparable to the local remnant vegetation	Total tree and mature shrub density	No./area	3.5	24	0	2	0	0	0	0	0	0
			Density of eucalypts	No./area	3.5	0	0	2	0	0	0	0	0	0
			Density of acacias	No./area	0	24	0	0	0	0	0	0	0	0
			Density of other endemic species	No./area	0	0	0	0	0	0	0	0	0	0
			Density of exotic / non endemic species	<No./area	0	0	0	0	0	0	0	0	0	0
			Percentage of eucalypts	% population	70	0	0	100	0	0	0	0	0	0

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measure (*desirable)	Woodland ecosystem KPI range 2022	SOC5 2022	REA5 2022	RLP01 2022	RLP02 2022	SVD01 2022	SVD02 2022	SVD03 2022	BBCW01 2022	BBCW02 2022
	Ecosystem health	The vegetation is in a condition comparable to that of the local remnant vegetation.	Healthy trees	% population	0	20	0	50	0	0	0	0	0	0
			Flowers/fruit: Trees	% population	10.5	0	0	50	0	0	0	0	0	0

Table 8.3: Performance of the **pasture** rehabilitation sites against completion criteria and primary performance indicators in 2022

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measure (*desirable)	Pasture ecosystem KPI range 2022	NOC3 Pasture 2022	NOC5 Pasture 2022	ROM01 Pasture 2022	ROM02 Pasture 2022	PTP01 Pasture 2022	DWD01 Pasture 2022	CVD01 Pasture 2022	NVD01 Pasture 2022
Performance indicators are quantified by the range of values obtained from representative reference sites					70% KPI target	70% meet criteria	70% meet criteria	70% meet criteria	70% meet criteria	70% meet criteria	70% meet criteria	70% meet criteria	70% meet criteria
Phase 2: Landform establishment and stability	**Landform slope, gradient**	Landform suitable for final land use and generally compatible with surrounding topography	Slope	< Degrees (°)	**<18**	**7**	**1**	**1**	**2**	**2**	**4**	**3**	**8**
	Active erosion	Areas of active erosion are limited	Cross-sectional area of rills	m2	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.11**
Phase 3: Growth medium development	**Soil chemical, physical properties and amelioration**	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH (5.6-7.3)	**na**	**6.1**	**7.3**	**7.7**	**7.8**	**7.6**	**7.3**	**7.1**	**5.4**
			EC	< dS/m (<0.150)	**na**	**0.020**	**0.058**	**0.195**	**0.237**	**0.386**	**0.709**	**0.183**	**0.126**
			Phosphorous	mg/Kg (50)	**na**	**3.6**	**2.3**	**19.0**	**17.4**	**44.6**	**32.8**	**34.4**	**15.4**
			Nitrate	mg/Kg (>13)	**na**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.6**
			ESP	% (<5)	**na**	**0.6**	**0.7**	**1.2**	**0.5**	**0.9**	**0.5**	**1.4**	**0.9**

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measure (*desirable)	Pasture ecosystem KPI range 2022	NOC3 Pasture 2022	NOC5 Pasture 2022	ROM01 Pasture 2022	ROM02 Pasture 2022	PTP01 Pasture 2022	DWD01 Pasture 2022	CVD01 Pasture 2022	NVD01 Pasture 2022
Phase 4: Ecosystem& Land Use Establishment	**Landscape Function Analysis (LFA): Landform stability and organisation**	Landform is stable and performing as it was designed to do	LFA Stability	%	**54.2**	**66.0**	**69.9**	**72.0**	**74.0**	**74.0**	**69.7**	**65.6**	**74.5**
			LFA Landscape organisation	%	**70**	**100**	**89**	**100**	**90**	**100**	**99**	**74**	**100**
	Herbage Biomass	Pasture productivity is comparable to analogue sites.	Green Dry Matter Biomass	kg/ha	**1120**	**70**	**40**	**>3000**	**>3000**	**>3000**	**>3000**	**>3000**	**>3000**
Phase 5: Ecosystem & Land Use Development	**Landscape Function Analysis (LFA): Landform function and ecological performance**	Landscape Function Analysis (LFA): Landform function and ecological performance	LFA Infiltration	%	**38.2**	**47.6**	**30.9**	**40.7**	**36.5**	**38.2**	**33.8**	**29.3**	**37**
			LFA Nutrient recycling	%	**36.6**	**49.7**	**34.2**	**44.6**	**41.1**	**39.1**	**33.2**	**27.8**	**37.4**
	Protective ground cover	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	%	**25.6**	**33.5**	**12.0**	**85**	**90**	**98.2**	**87.5**	**94**	**90**
			Total Ground Cover	%	**69.3**	**96.5**	**85.5**	**100.0**	**100**	**100**	**96**	**94**	**100**
	Ground cover diversity	Vegetation contains a diversity of species per square meter comparable to that of the local remnant vegetation	Native understorey abundance/m2	> species/m^2	**2.5**	**1.6**	**2.0**	**0**	**0**	**0**	**0.2**	**0**	**0**
			Exotic understorey abundance/m2	< species/m^2	**6.0**	**5.2**	**7.4**	**4.0**	**4.4**	**3.0**	**5.6**	**5.6**	**3.0**

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measure (*desirable)	Pasture ecosystem KPI range 2022	NOC3 Pasture 2022	NOC5 Pasture 2022	ROM01 Pasture 2022	ROM02 Pasture 2022	PTP01 Pasture 2022	DWD01 Pasture 2022	CVD01 Pasture 2022	NVD01 Pasture 2022
		Native ground cover abundance is comparable to that of the local remnant vegetation	Percent ground cover provided by native vegetation <0.5m tall	%	**30.4**	**27.0**	**13.8**	**0**	**0**	**0**	**1.4**	**0**	**0**

The 2022 Annual Ecological Rehabilitation Monitoring Report concludes that the older NOC and SOC woodland rehabilitation areas have met almost all of the 70% completion criteria targets, demonstrating that diverse and self sustaining mixed eucalypt woodlands have established on these older areas. During 2022 an ESF2 certification application was lodged with DPIE – Resources Regulator for 102 ha of older rehabilitation areas that have achieved completion criteria.

The 2022 Annual Ecological Rehabilitation Monitoring Report also recommends the following management actions

- Weed control and increasing eucalypts at SOC5;
- Increasing native trees and shrubs at REA5;
- Addressing the "hotspots" noted in the annual walkover;
- Targeting priority weeds onsite including Blackberry and St John's Wort.

Rehabilitation monitoring and maintenance work will continue during 2023.

8.4 Ben Bullen Creek Rehabilitation Project

From 2007 to 2009 stabilisation and restoration works were completed along two sections (Reach 1 and 3) of the Ben Bullen Creek including riparian vegetation (tube stock) planting in upper and lower reaches.

Under Project Approval 09_0178, Baal Bone was required to review its water management systems which included a review of the Ben Bullen Creek Natural Channel Design and Restoration Plan, originally prepared in 2007.

A review of the Ben Bullen Creek Natural Channel Design and Restoration Plan during 2012/2013 indicated that remediation of the current Ben Bullen Creek diversion through the pit top area may be optimal to the reinstatement of the creek to its pre-disturbance pathway (approximately pathway post Ben Bullen Mine 1952).

URS were commissioned in 2013 to carry out a Phase 1 assessment of Ben Bullen Creek. Findings from the assessment recommended that the existing diversion be maintained for Ben Bullen Creek.

Following discussions held with DP&E in 2014, a modification was sought by Baal Bone to modify the approved final landform plan and associated conditions for the Baal Bone Coal Project under Project Approval 09_0178. The modification was sought under Section 75W of the Environmental Planning and Assessment Act 1979 (EP&A Act), and will facilitate the changes to final alignment and rehabilitation of Ben Bullen Creek. In December 2015, DP&E approved the modification to allow Ben Bullen Creek to remain in its current alignment.

On the 13 December 2016, the Ben Bullen Creek Rehabilitation Plan was submitted to DP&E for review and approval. It was also sent to OEH, Fisheries NSW, DRE and DPI Water for consultation purposes as required by PA 09_0178. The Ben Bullen Creek Rehabilitation Plan was approved by the DP&E on 13 December 2017.

In 2021 and 2022 rehabilitation works were completed on Reach 2 of Ben Bullen Creek. Works included large amounts of rock revetment along the banks of the creek, the installation of high and low flow channels, and highwall safety and stabilisation work. Over 10,000 tubestock plants, including the threatened Captertee Stringybark were planted along the remediated sections of Ben Bullen Creek, and the creek banks direct seeded with a woodland mix.

8.5 Other Infrastructure

During 2022, the electrical substation and feeder line was demolished as outlined in **Section 4.3.**

9 Community

9.1 Community Consultative Committee

The Baal Bone Colliery Community Consultative Committee (CCC) has been established to provide a formal conduit for exchange of information and views between the local community and Baal Bone's Management Team.

The final CCC meeting was held on 7 December 2021. No further CCC meetings are planned given mine closure works were completed in early 2022.

9.2 Community Complaints

There were no community complaints received during the 2022 reporting period.
A community complaint summary is available from the Baal Bone website: *https://www.glencore.com.au/operations-and-projects/coal/past-operations/baal-bone-colliery/community-documents*.

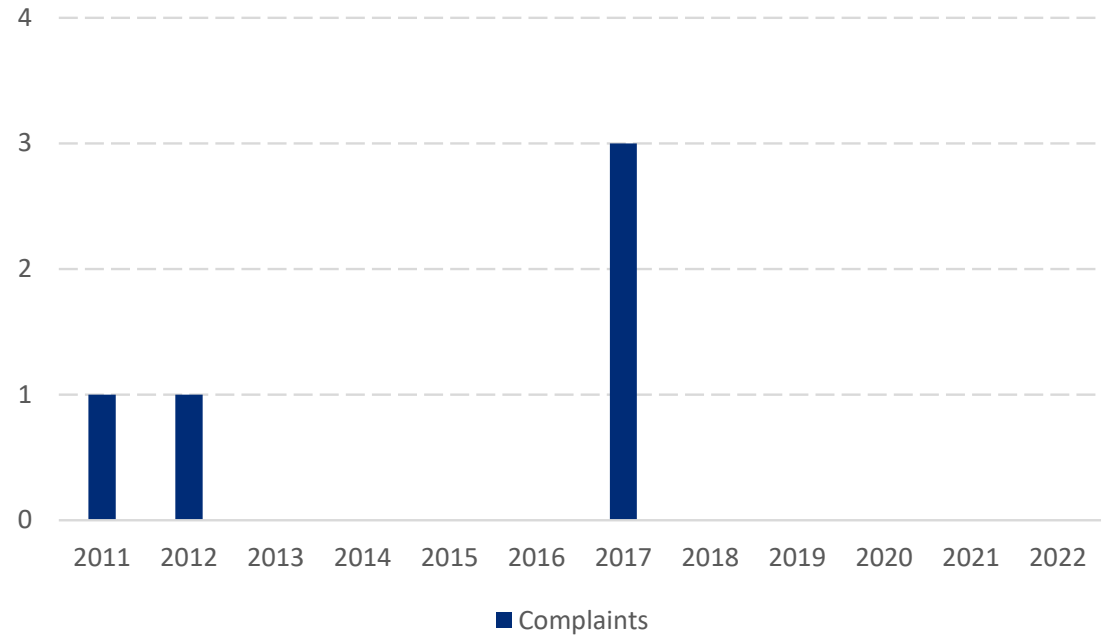


Figure 9.1: Community complaints by year

9.3 Community Sponsorship

Glencore invests in Health, Arts and Culture, Education and Enterprise, Environment and the Community, including, as an example, education grants to NSW Government Schools.

10 Independent Audit

Baal Bone Colliery underwent an Independent Environmental Audit (IEA), as per Schedule 5, Condition 7 of PA 09_0178 in December 2022. The site component of the audit was conducted on 5 and 6 December 2022 by IEMA. Baal Bone Colliery received the final audit report from IEMA on 28 February 2022.

A copy of the most recent as well as previous audit reports, and responses to audit recommendations can be found on the Baal Bone Colliery website. Audit actions have been entered into CMO - Baal Bone's compliance tracking system.

The next Independent Environmental Audit of Baal Bone Colliery will occur in 2025.

Tables 10.1 and **10.2** outline the actions arising from the 2022 Audit.

Table 10.1: Status of actions arising from non-compliances identified during 2022 Independent Environmental Audit

Sch and Cond Number	Audit Recommendation	Response/Action Plan	Proposed Action Due Date or Status
(EPL 765) L 2.4	Continue to monitor the spring around the Overshot dam. If exceedances continue - implement methods outlined in the Gauge report. It should be noted that the spring can only be accessed for sampling when the Overshot Dam is almost empty. As the spring is only a few metres from the Overshot Dam/LDP16, there is little value/difference when full.	Surface Water Monitoring Plan will be altered to include monthly sampling at the spring (OSD Bay NW) if there is no flow over/through the Overshot Dam.	31 May 2023
PA 09_0178 Sch 3 Cond 14	(As Above)	As above	As above

Table 10.2: Status of ongoing continual improvement actions from IEA.

Sch and Cond Number	Audit Recommendation	Response/Action Plan	Proposed Action Due Date or Status
Project Approval 09_0178			
Sch 3 Cond 1	The subsidence inspections that are prepared should assess against the criteria in S3 C1 (Subsidence performance measures). This would include public safety as a key feature. A consolidated figure and table of subsidence impacts should be developed within the Project Approval area, noting this is likely to include historical subsidence areas. Continue the liaison with National Parks that now manage the land over the historical mining areas.	Subsidence inspections currently assess public safety risks through use of a risk matrix, which considers the size of subsidence cracking, proximity to existing tracks and public accessibility. Consolidated figure and table of subsidence impacts to be developed. Consultation with NPWS is ongoing.	Complete 30 November 2023 Ongoing

Sch and Cond Number	Audit Recommendation	Response/Action Plan	Proposed Action Due Date or Status
Project Approval 09_0178			
Sch 3 Cond 17	IEMA recommends the installation of a longer-term spillway at the Northern Void (LDP17) to control the discharge of water with this be based on an engineering design. This will need to be a long-term stable design with minimal maintenance and should be capable of measuring volumes of discharge; and A permanent height gauge should be installed for the northern void.	Baal Bone Colliery is currently undertaking regular water level monitoring at the Northern Void and other key locations onsite to determine if high water levels are primarily due to above average rainfall associated with ongoing La Nina conditions. Following a data gathering period of at least 6 months, the most appropriate long-term solution for Northern Void water levels will be determined. A permanent water height gauge at the Northern Void has already been installed.	31 March 2024 Complete
Sch 3 Cond 18	PACKAGE 1: Implement the rehabilitation, erosion, and sediment control maintenance program	Rehabilitation maintenance (including ESC) is ongoing at Baal Bone Colliery and will continue to be implemented until the site achieves certification and final sign off. Rehabilitation maintenance requirements are identified during monthly rehabilitation inspections completed by site personnel; and annual rehabilitation monitoring and annual rehabilitation inspection completed by a third party. Baal Bone Colliery will remediate erosion and sediment control issues identified during the IEA site inspection including: • Rill erosion near the 'Dollar Shed' area; • Southern REA engineered drain where geo fabric is exposed; and Sections along Southern REA batters where seed has not taken.	31 December 2023
Sch 3 Cond 25	PACKAGE 1: Implement the rehabilitation, erosion, and sediment control maintenance program	As above	As above
Sch 3 Cond 25A	Implement any recommendations from Umwelt report regarding stability of Ben Bullen Creek.	The Spring 2022 Channel Stability and Aquatic Fauna Monitoring Report (Umwelt) was received in March 2023. There are no recommendations regarding the stability of the	Complete.

Sch and Cond Number	Audit Recommendation	Response/Action Plan	Proposed Action Due Date or Status
Project Approval 09_0178			
		constructed section of Ben Bullen Creek.	
Sch 3 Cond 30	Removal of old lubricant drums and containers from behind 'Dollar Shed'	Empty lubricant drums and containers removed from workshop area.	Complete
EPL 765			
A1	The site should provide an update on the volume that discharges from site in the Annual Review as this is a requirement and it will cover this condition.	Further detail to be added to future Annual Reviews estimating discharge volume from site	Complete. Refer to Section 4 of this document.

11 Incidents and Non-Compliances during the Reporting Period

Incidents are notified to the EPA, DPI&E and other relevant agencies immediately on becoming aware of a notifiable incident.[7]

11.1 Reportable Incidents

There were no reportable incidents during the 2022 reporting period.

11.2 Non-Compliances

There were two non-compliances during the 2022 reporting period, as summarised in **Table 11.1** below.

Table 11.1: Non-Compliances

Relevant Approval	Date(s)	Details of non-compliance	Cause of Non-compliance	Action to address Non-compliance
PA 09-0178 **Schedule 3, Condition 14**	February, March and April 2022	Dissolved iron and PH exceedances at LDP16 (Overshot Dam).	Investigation determined that potential contributors may have been: * Increased rainfall following a prolonged drought period; * Changes to hydrogeology including the cessation of pumping from the underground workings at end 2019, resulting in decreased water levels in the Overshot Dam and the subsequent recharge of groundwaters.	Continued water sampling. And environmental inspections. Additional water sampling location as per 2022 IEA recommendation.
L2.4	February, March and April 2022	Dissolved iron and pH results outside of EPL concentration limits at LDP16 during monthly sampling events in February, March and April 2022.		

[7] PA09_0178 Schedule 5, Condition 5 and Condition 6 and Protection of the Environment Operations Act 1997, Section 153 - Pollution Incident Response Management Plan (PIRMP, BBNUG-882012935-2894).

12 Activities to be completed in the Next Reporting Period

Activities to be completed during the 2022 reporting period include:

Demolition

- All major demolition has been completed onsite.
- Minor infrastructure removal to be completed during 2023 including removing air quality monitoring points and dismantling weather station.

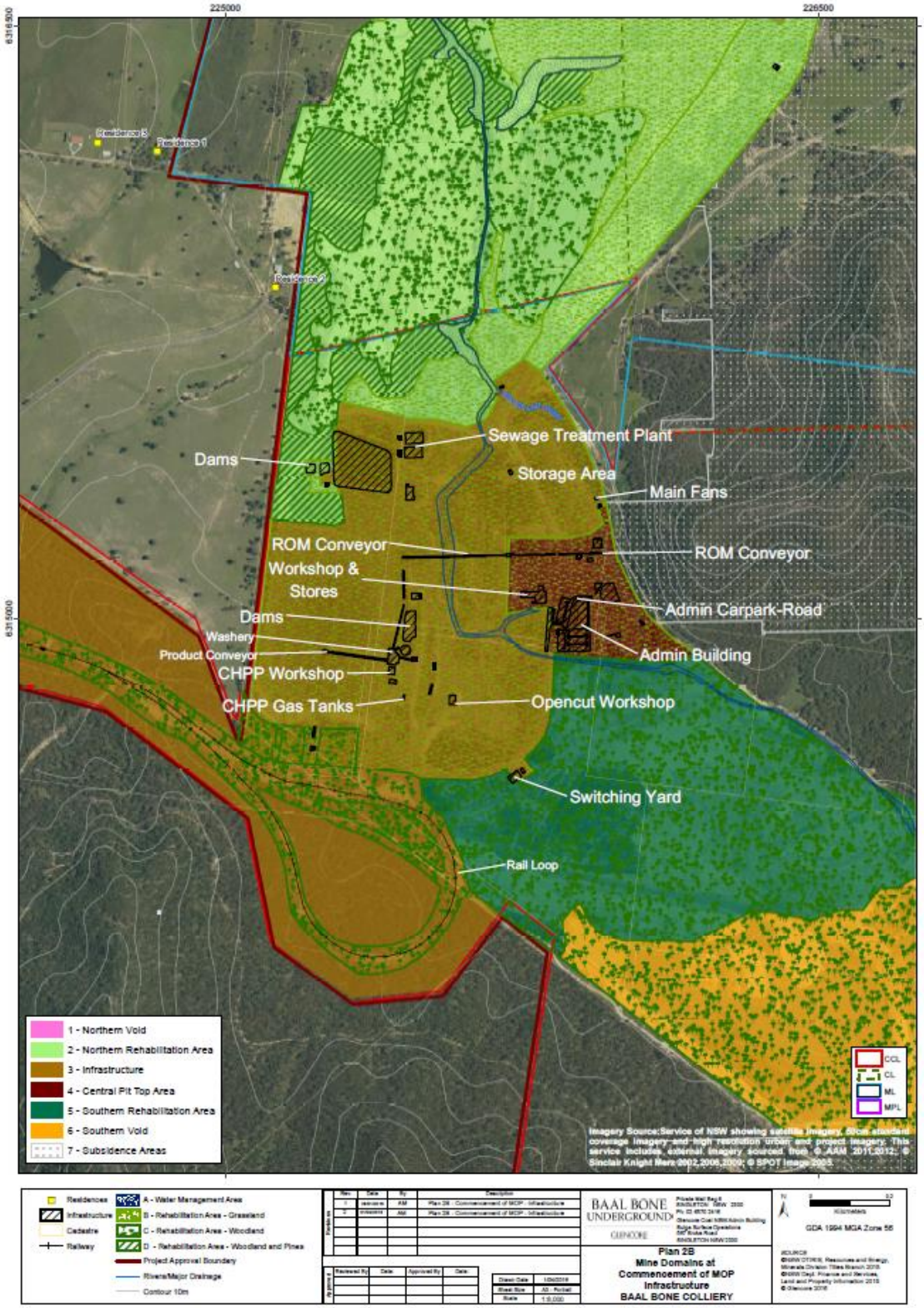
Rehabilitation

- Maintenance and monitoring of rehabilitation.
- Spraying of priority weeds including blackberry and St Johns Wort.
- Erosion and sediment control repairs as per recommendations of 2022 IEA.

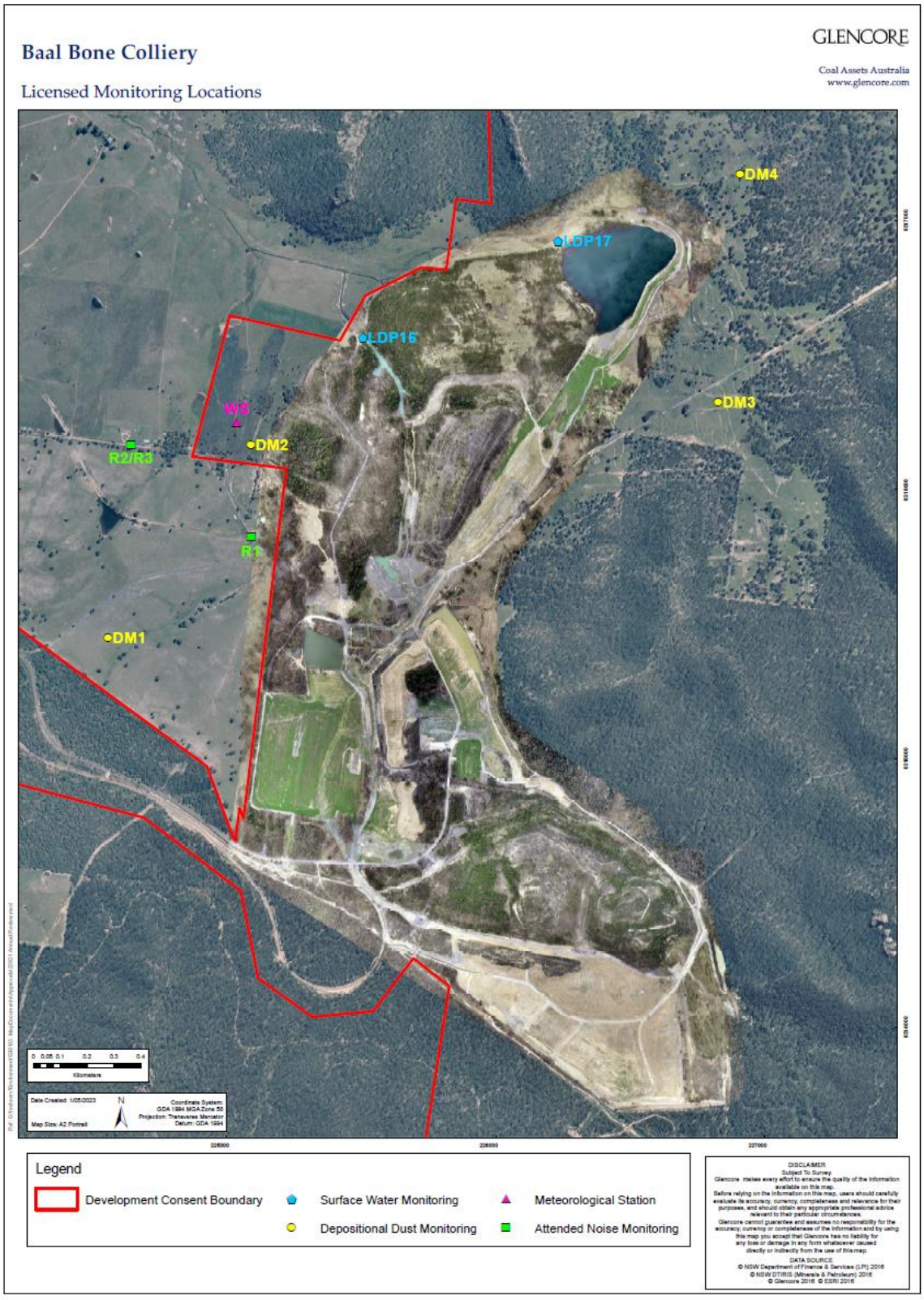
Management Systems

- Consolidation of subsidence location information and repair details as per IEA

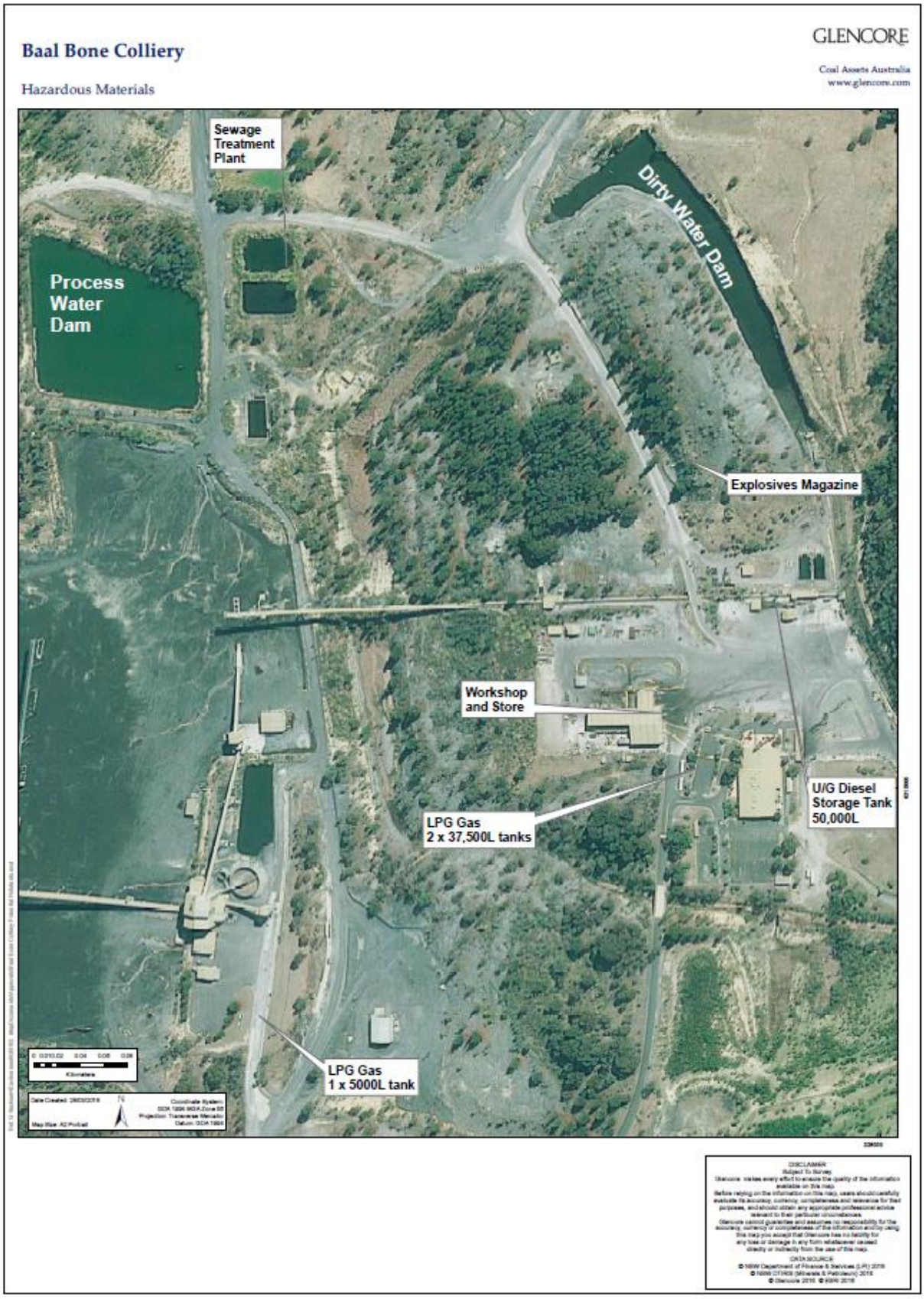
A.1 Appendix A – Plans



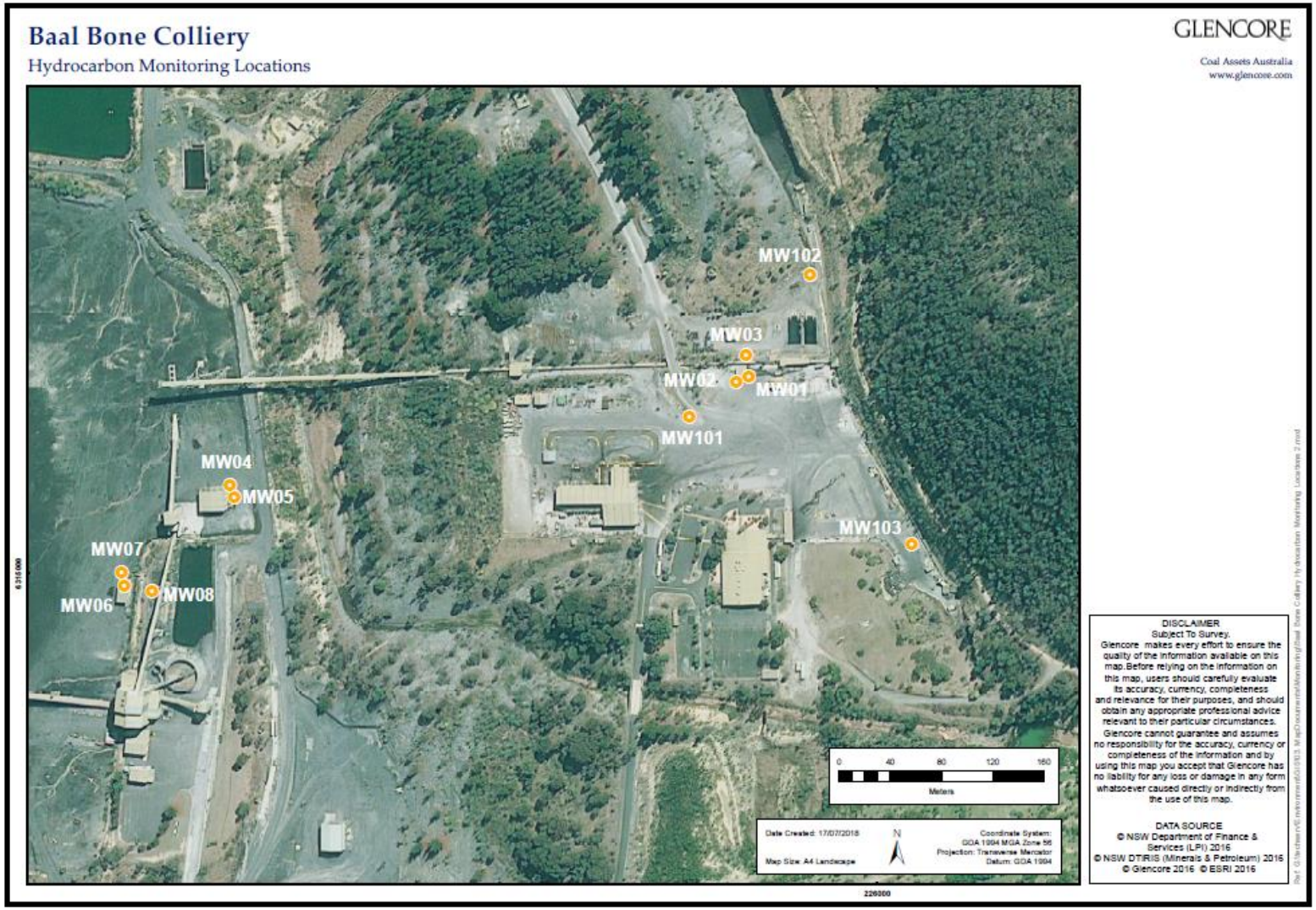
Plan 1 – Site Infrastructure (Prior to demolition and closure activities)



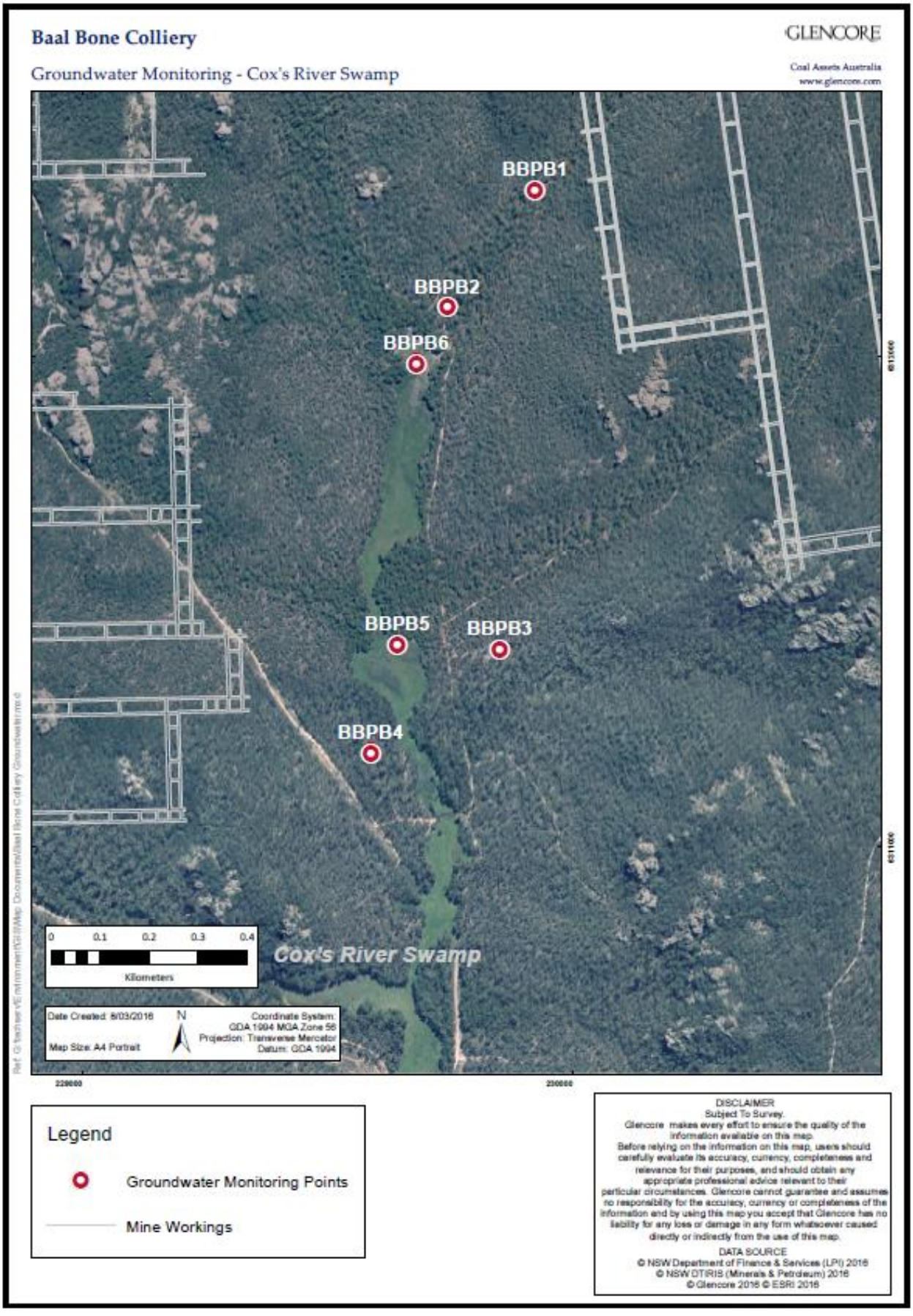
Plan 2 – Licensed Monitoring Locations



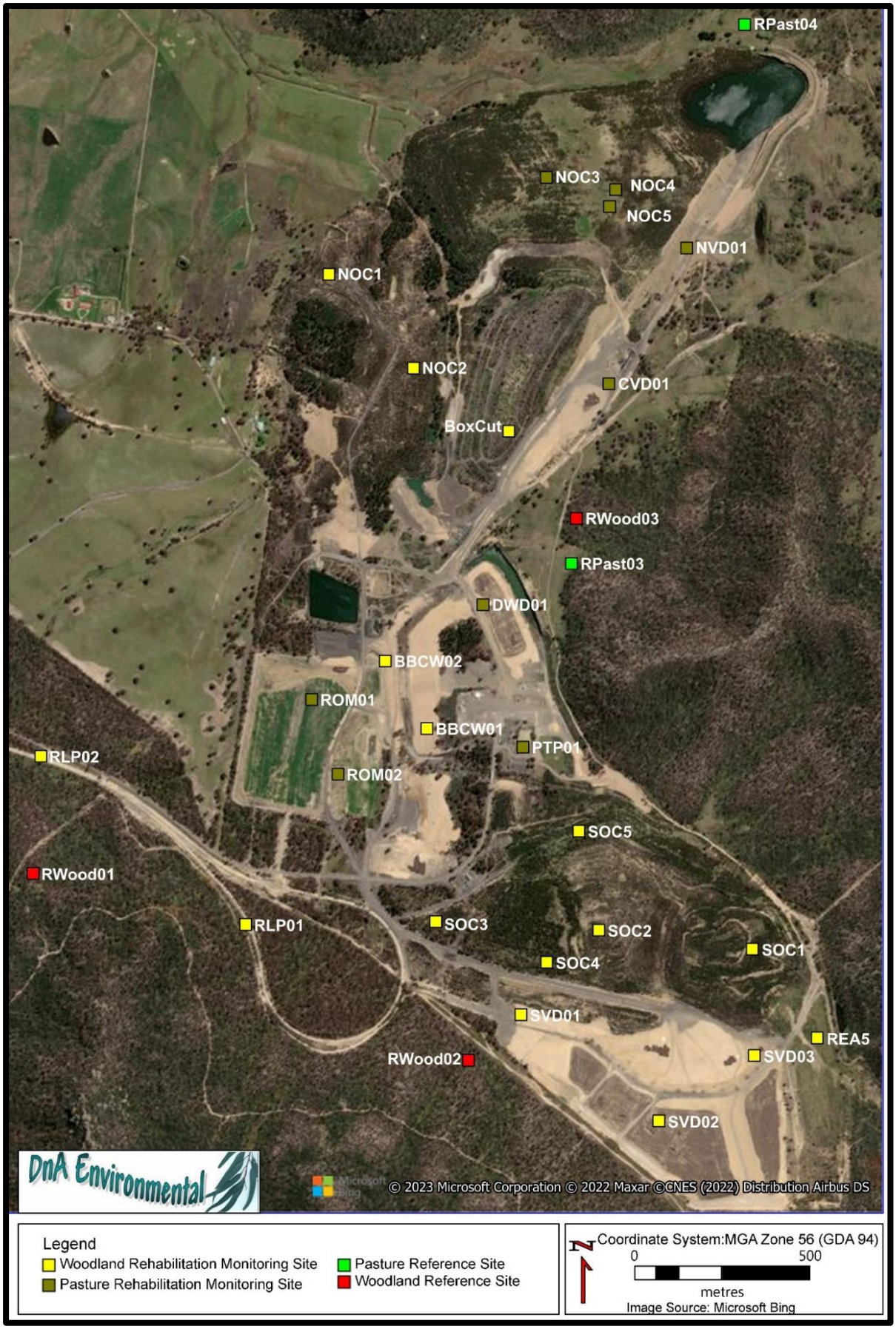
Plan 3 – Hazardous Materials (prior to demolition and closure activities)



Plan 4 – Hydrocarbon Monitoring Locations



Plan 5 – Groundwater Monitoring Cox's River Swamp



Plan 6 – Ecological Rehabilitation Monitoring Points

A.1 Appendix B – Approval

Department of Planning and Environment

Ms Elizabeth Fishpool
Castlereagh Highway
Cullen Bullen
New South Wales 2790

24/04/2023

Baal Bone Coal - MP09_0178
Annual Review 2022

Dear Ms Fishpool

Reference is made to the Annual Review for the period 1 January 2022 to 31 December 2022, submitted to the Department of Planning and Environment (the department) on 25 March 2023 as required under Schedule 5 Condition 3 of MP09_0178 (the approval, as modified).

The department has reviewed the Annual Review and considers it to generally satisfy the reporting requirements of the approval/consent and the department's *Annual Review Guideline* (October 2015). Please make publicly available a copy of the 2022 Annual Review on the company website.

The department notes the non-compliances recorded in the Annual Review and that these were reported to the department at the time.

Please note that the department's acceptance of this Annual Review is not an endorsement of the compliance status of the project.

Should you wish to discuss the matter further, please contact Michael Wood, on 0459890661 or compliance@planning.nsw.gov.au

Yours sincerely

Katrina O'Reilly
Team Leader - Compliance
Compliance
As nominee of the Planning Secretary

A.2 Appendix C – Annual Rehabilitation Report for Resources Regulator Portal

As per clause 9 in Schedule 8A of the Mining Regulation 2016, Baal Bone Colliery is required to prepare and submit an Annual Rehabilitation Report. The Annual Rehabilitation Report must be submitted via a form on the Resources Regulator Portal.

The information entered into the Portal is reproduced below.

Section 1: Applicant

The Wallerawang Collieries Pty Limited

ACN: 000 001 436

Mine: Baal Bone Colliery

Section 2: Mine Details

Project Description:

* Baal Bone Colliery is located approximately 35km northwest of Lithgow and lies within the Lithgow Council local government area.

* Mining in the Baal Bone area began in the 1940s with both open cut and long-wall mining occurring since that time.

* Baal Bone underground mine was established in 1983 at the site of the old Ben Bullen open cut mine, which was abandoned in 1952.

* 31 longwall panels were extracted.

* Baal Bone moved into detailed mine closure planning in early 2019 after a proposed sale of the operation was not able to be completed.

* Following approval of the site's Mine Closure Mining Operations Plan in December 2019, work to completely close and rehabilitate the site commenced.

* Mine closure works were completed in mid-2022, after which Baal Bone Colliery entered a land management and monitoring phase.

Current development consents, leases and licences

- PA09-0178
- ML 1389 (1992)
- MPL 261 (1973)
- CL 391 (1973)
- ML 1302 (1992)
- ML 1607 (1992)
- CCL 749 (1973
- EPL 765

Changes to Approvals

On 10 August 2022, EPL 765 was varied to remove dust and weather monitoring points (EPA Identification Points 7, 13, 14 and 15) and all corresponding monitoring requirements.

On 5 October 2022, EPL 765 was varied to add a second licence discharge point (LDP17) at the Northern Void into Jews Creek.

Land ownership and land use

No changes to land owned by The Wallerawang Collieries Pty Ltd.

The majority of Ben Bullen SF has changed ownership to National Parks and is now Gardens of Stone SCA.

Section 3: Complaints

No complaints received during the reporting period in relation to rehabilitation.

Section 4: Stakeholders

See Resources Regulator Portal

Section 5: Surface disturbance activities

Describe the surface disturbance and rehabilitation activities that were conducted, and, an analysis of the progress against the schedule presented in the previous annual rehabilitation report and forward program, as well as any relevant development consent.

In 2022, shaping, ripping and seeding of the former pit top area, haul roads and Central Void was undertaken (approximately 49 ha). Following the completion of mine closure works in April 2022, the site entered a monitoring and maintenance phase.

During 2022 an ESF2 certification application for 102 hectares of older rehabilitation that has achieved completion criteria was lodged with DPIE – Resources Regulator.

Describe any rehabilitation planning activities that were conducted, including any specialist studies. Examples: contamination, heritage, landform design and demolition.

The BBC Mine Closure MOP was approved back in December 2019. Mine closure works were completed by April 2022, therefore no rehabilitation planning activities were carried out in 2022.

Annual rehabilitation monitoring was completed in November 2022 - as outlined in Section 8.3 of the Annual Review.

Provide an overview of any subsidence repair and/or remediation works undertaken.

There were no subsidence repairs carried out during 2022. During 2022 a subsidence inspection was only able to be completed in April due to prolonged wet weather and poor road conditions in Gardens of Stone SCA.

Provide an overview of rehabilitation management and maintenance activities. Examples: reseeding, weed and feral animal control and erosion control works.

* Extensive spraying of blackberries was undertaken in January and February 2022.

* A feral dog baiting program was undertaken in August and September 2022.

* Minor erosion and sediment control works have been completed on site throughout the 2022 reporting period as required.

Detail any rehabilitation actions taken as required by any letters, notices or directions issued by government agencies, including the NSW Resources Regulator.

Not applicable.

Detail any rehabilitation areas that have achieved the final land use (as set out in clause 6 of Schedule 8A to the Mining Regulation 2016, in the reporting period. That is, rehabilitation areas where the NSW Resources Regulator has determined in writing that the relevant rehabilitation obligations have been fulfilled following submission of the relevant application by the lease holder.

In June 2022 an ESF2 certification application for 102 hectares of older rehabilitation that has achieved completion criteria was lodged with DPIE – Resources Regulator.

As at end March 2023, the Resources Regulator is still assessing the ESF2 application.

Section 6: Plan 1

See Resources Regulator Portal

Section 7: Disturbance and rehabilitation

See Resources Regulator Portal

Section 8: Rehabilitation Monitoring

Rehabilitation monitoring summary

Three types of rehabilitation monitoring/inspections are undertaken at Baal Bone. These include;

- Regular inspections by site personnel,
- An annual environmental rehabilitation walk around inspection and
- Annual Ecological Rehabilitation Monitoring which was implemented in 2009.

Annual Rehab Inspection: The 2022 Annual Environmental Rehabilitation Inspection was conducted by DnA Environmental on 29 November 2022.

Annual Ecological Rehabilitation Monitoring: An Annual Ecological Rehabilitation Monitoring program is undertaken at Baal Bone Colliery to evaluate the success of rehabilitation and Baal Bone Colliery's progress towards fulfilling long term land use objectives. The monitoring program will continue within rehabilitation areas until all rehabilitation closure criteria are satisfied, and mining leases are relinquished.

Monitoring sites and reference sites have been established to monitor flora, fauna, landscape function and habitat values aimed at assessing ecosystem function in remnant vegetation and rehabilitation areas.

Monitoring of these sites is undertaken annually until rehabilitation areas reach acceptable levels of establishment, and then monitoring will be undertaken periodically. Monitoring of these sites assesses:

- Plant community structural attributes;
- Cover, species density, height and structural diversity;
- Species richness (the number of plant species present in each structural layer of each vegetation community);
- The presence and abundance of any weed species; and
- Assessment of natural regeneration/recruitment of new species.

The findings of this monitoring program are used to assist in management recommendations for appropriate rehabilitation works within Baal Bone Colliery holdings. Where necessary, rehabilitation procedures are amended accordingly to continually improve rehabilitation standards.

The findings of the Annual Ecological Rehabilitation Monitoring program are also used to assess progress towards rehabilitation commitments in the Baal Bone Colliery Rehabilitation Management Plan. Section 4 of the Baal Bone Colliery Rehabilitation Management Plan sets out performance indicators and completion criteria. Baal Bone Colliery will demonstrate achievement of all completion criteria prior to seeking relinquishment of the site.

The 2022 monitoring was undertaken by DnA Environmental from the 22nd – 25th November 2022. The results from this monitoring are summarised in Table 8.2 and Table 8.3 of the Annual Review.

Provide details about the monitoring program that has been implemented to evaluate how rehabilitation is progressing against the approved, or if not yet approved, the proposed rehabilitation objectives, rehabilitation completion criteria and final landform and rehabilitation plan.

During 2022 there were a total of 12 woodland and 10 pasture monitoring sites made up of:

- 9 mixed woodland rehabilitation site quadrats;
- 3 mixed woodland reference site quadrats;
- 8 pasture rehabilitation site transects; and
- 2 pasture reference site transects.

(Unfortunately sites associated with the ventilation shaft and new sedge/shrub community riparian reference sites and associated riparian rehabilitation along the edges of Ben Bullen Creek were unable to be accessed in 2022 due to extensive flooding preventing safe access to these areas.)

Monitoring methodologies used included a combination of Landscape Function Analyses (LFA), accredited soil analyses and an assessment of ecosystem characteristics using an adaptation of the Biometric Assessment Method (BAM). Permanent transects and photo-points have been established to record changes in these attributes over time. A range of ecological data obtained from the relevant reference site communities were used to provide upper and lower Key Performance Indicator (KPI) ranges. KPI's have been separated into “Primary performance indicators” and “Secondary performance indicators” as not all indicators are considered to be fundamental to completion. Primary performance indicators are those chosen as completion criteria targets and rehabilitation sites should equal, exceed or show positive trends towards those attributes of the reference sites. Range values of each performance indicator are adapted annually.

Are all rehabilitation areas in the Landform Establishment phase or higher represented in the monitoring program to assess performance against the approved, or if not yet approved, the proposed rehabilitation objectives, rehabilitation completion criteria and final landform and rehabilitation plan?

Yes

Include an appraisal of whether rehabilitation is moving towards achieving the approved, or if not yet approved, the proposed rehabilitation objectives, rehabilitation completion criteria and final landform and rehabilitation plan.

Refer to Tables 8.1 and 8.2 in the Annual Review for performance of the mixed eucalypt woodland and pasture rehabilitation monitoring sites against primary completion performance indicators in 2022.

Please select the best description of the appraisal:

Rehabilitation is moving towards achieving the final land use as soon as reasonably practicable.

Include summaries of the findings of the rehabilitation monitoring program, including specialist reports (e.g. ecology, water quality, agronomy).

The Annual Environmental Rehabilitation Inspection noted some isolated areas needing additional work to remediate weeds; erosion and rilling; and other minor issues.

The 2022 Annual Ecological Rehabilitation Monitoring Report concludes that the older NOC and SOC woodland rehabilitation areas have met almost all of the 70% completion criteria targets, demonstrating that diverse and self sustaining mixed eucalypt woodlands have established on these older areas. During 2022 an ESF2 certification application was lodged with DPIE – Resources Regulator for 102 ha of older rehabilitation areas that have achieved completion criteria.

The 2022 Annual Ecological Rehabilitation Monitoring Report also recommends the following management actions

- Weed control and increasing eucalypts at SOC5;
- Increasing native trees and shrubs at REA5;
- Addressing the “hotspots” noted in the annual walkover;
- Targeting priority weeds onsite including Blackberry and St John’s Wort.

Rehabilitation monitoring and maintenance work will continue during 2023.

Include any performance issues and their causes including identification of any knowledge gaps that must be addressed to rectify identified performance issues. If none identified, type "Nil".

Nil

No active or inactive rehabilitation research and trials.