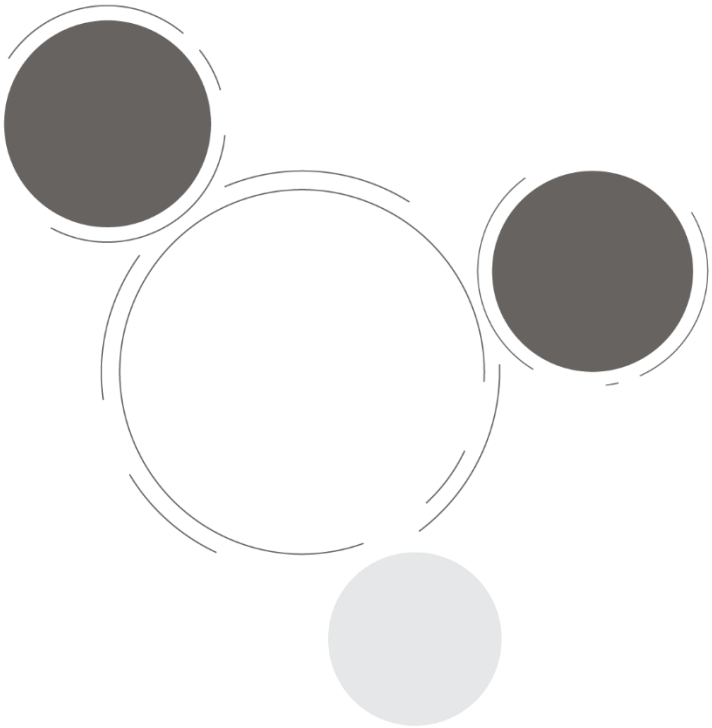
BAAL BONE UNDERGROUND

GLENCORE



Annual Review 2023

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 2023
Annual Review End Date	31st December 2023

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	27 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	Yes
EPL 765	Yes
Mining Leases	Yes
Water Licences	Yes

Table 1.2 Details of non-compliances in 2023.

Relevant Approval	Condition #	Condition description	Risk	Comment	Reference
-	-	-	-	No non-compliances during 2023.	-

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 2023 to 31 December 2023.

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.

In accordance with the new standard conditions introduced to all mining leases, in 2022 Baal Bone Colliery prepared and submitted a Rehabilitation Management Plan (RMP) to replace the existing Mining Operations Plan. During 2023 the RMP was revised and resubmitted following comments from DPIE – Biodiversity, Conservation and Science.

During 2023 rehabilitation monitoring and maintenance was carried out onsite.

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 2023 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 2024 reporting period.

2.3 Mine Contacts

Baal Bone Colliery can be contacted via telephone on (02) 6350 6920. 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*

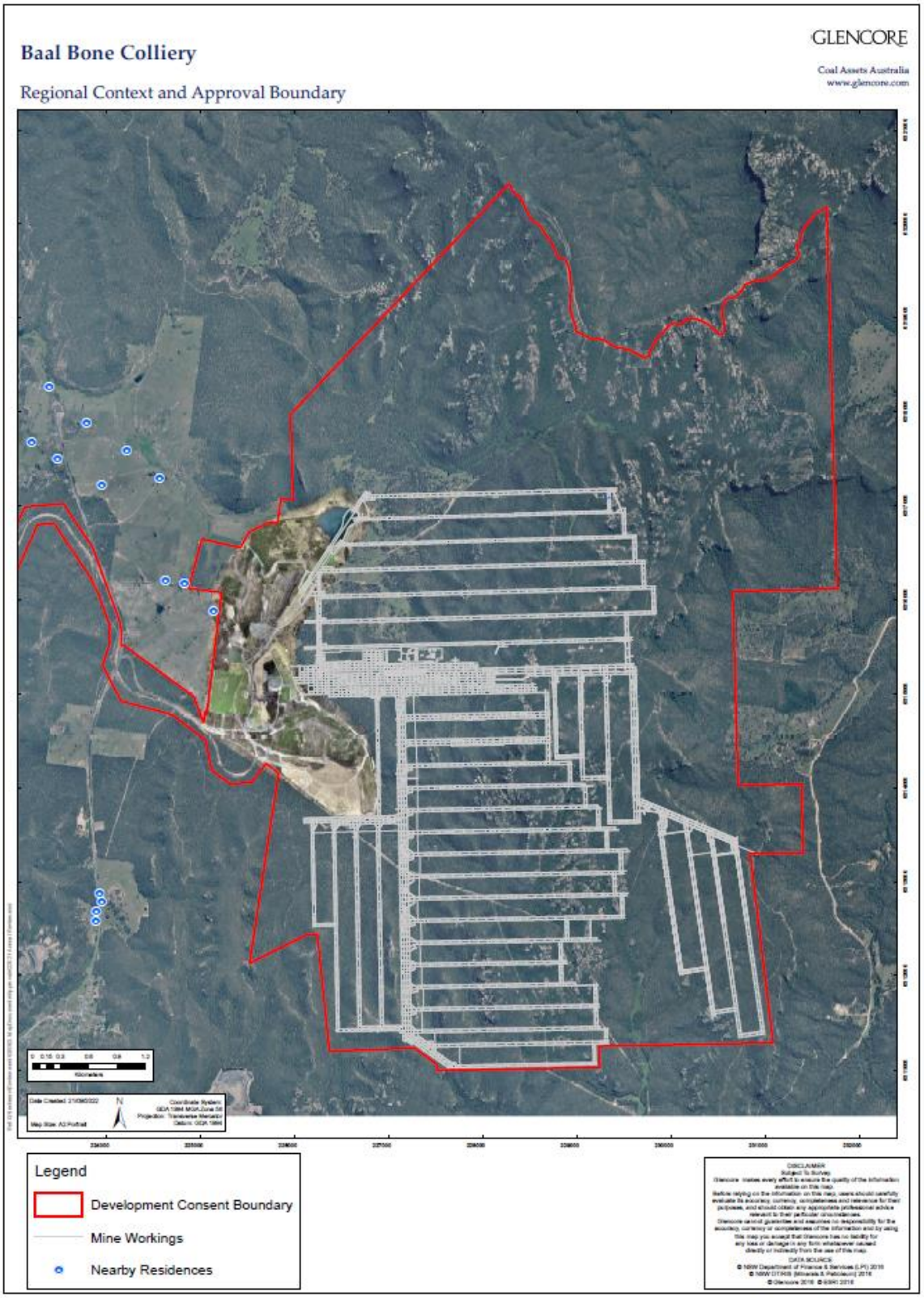


Figure 1.1: Locality plan showing approval boundary.

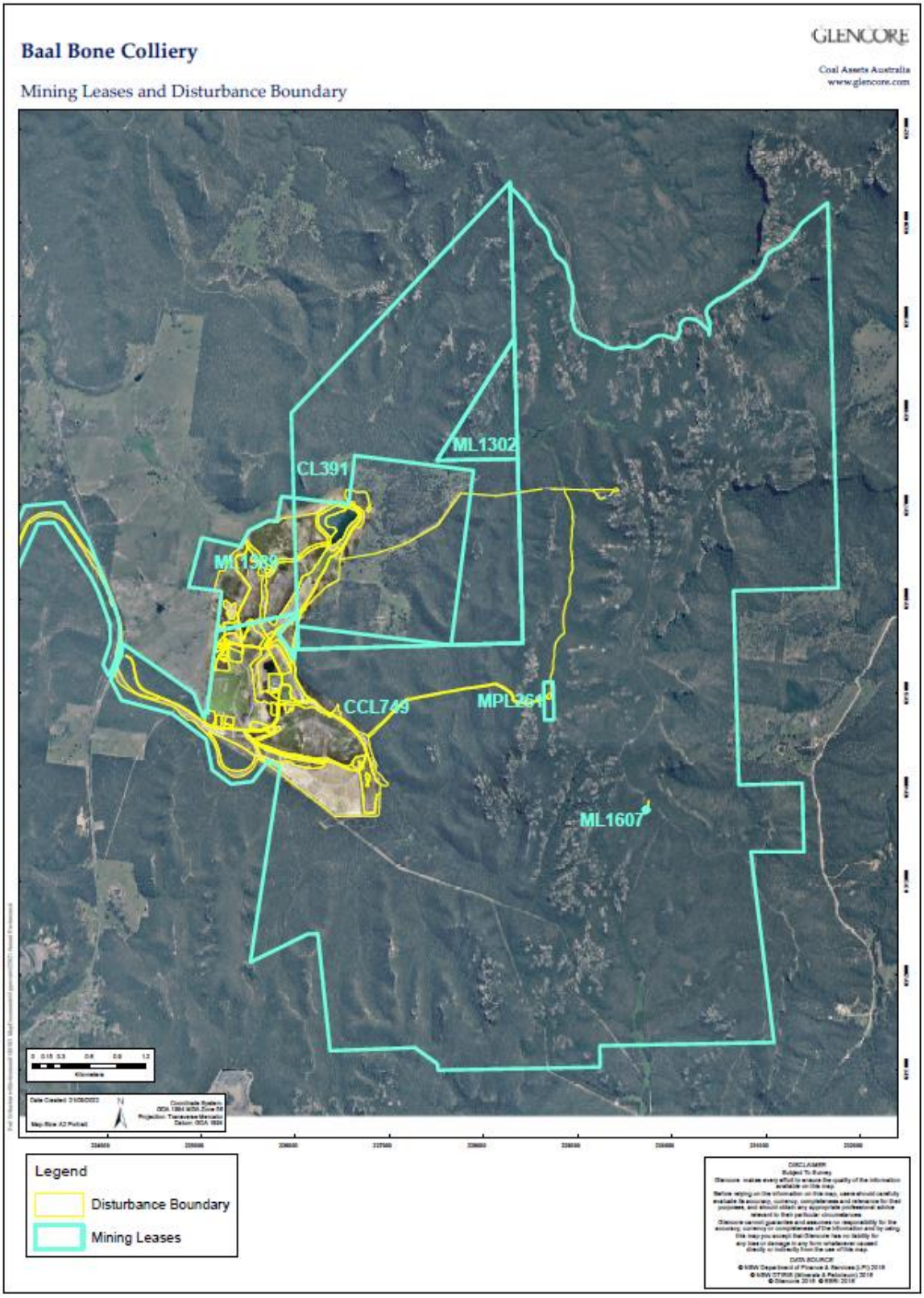


Figure 1.2: Mining lease boundaries and disturbance area.

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 2023 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.	Yes
Environment Protection Licence	EPA	765	The Wallerawang Collieries Pty Ltd	26/10/2023	Until surrendered, suspended or revoked.	Premises and Scheduled Activity (Coal Mining/ Washery) Licence	Yes
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, Depth: Surface - 10m	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?
	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 Mgmt Act 2000) replaces bore licences: 80BL135509 & 80BL136703. Both bores have been 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
	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

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.

Refer to **Section 10** for details of findings from 2022 Independent Environmental Audit.

3.1 Amendments during the Reporting Period

Rehabilitation Management Plan
On 6 March 2023, Baal Bone Colliery submitted a revised RMP to stakeholders in accordance with Schedule 3, Condition 25 of PA 09_0178. The revised RMP addressed comments from DPIE – Biodiversity, Conservation and Science.

On 13 October 2023, The Resources Regulator approved the Rehabilitation Objectives Statement for Baal Bone Colliery following various consultation through2022 and 2023.

Environment Protection Licence
On 26 October 2023, licence condition P1.2 of EPL 765 was varied to update the location description for licence discharge point 16.

Environmental Management Strategy
On 16 May 2023 an update to the consolidated Environmental Management Strategy was submitted to DPIE.

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

There was no demolition during 2023.

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 through LDPs

LDP	Volume (ML)
2023 Estimated discharge from LDP16 - Overshot Dam*	638.75 ML
2023 Total discharge from LDP17	-
2023 ANNUAL DISCHARGE (estimated)	**638.75 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 2022 Baal Bone Annual Review was submitted on 25 March 2023. In correspondence dated 24 April 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). Please make publicly available a copy of the 2022 Annual Review on the company website."

A copy of the 2022 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

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 depositional dust and meteorological monitoring.

Dust monitoring accordingly ceased in October 2022.

6.2 Blasting

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

6.3 Operational Noise

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.

6.4 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 conducted six-monthly testing of groundwater monitoring wells in the vicinity of the underground diesel storage tank (UST) during its operation. Refer to **Plan 3** and **Plan 4** for locations.

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.

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 - FY2023

Site	Scope 1 EERS Reported Value tCO2e	Scope 2 EERS Reported Value tCO2e
Baal Bone	4	9

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 Gardens of Stone State Conservation Area warning of mine subsidence.

6.10 Visual Amenity and Lighting

During 2020 and 2021 the majority of structures onsite were demolished as part of mine closure activities. Since 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 2023 Baal Bone Colliery carried out a weed spraying program predominantly targeting Blackberry and St Johns Wort.

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.

On 26 October 2023, EPL 765 was varied to relocate LDP16 approximately 50m downstream of its previous location on Ben Bullen Creek. LDP16 was relocated to enable water from a newly constructed drainage line to be monitored.

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 previous 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. Approx 50m below spillway of Overshot 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
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: 2023 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	1602	<5	453	<0.05	<5	7.3
	Feb	1606	<5	469	0.24	<5	6.6
	Mar	1290	<5	469	0.26	<5	7
	Apr	1361	<5	483	0.16	<5	6.7
	May	1336	<5	453	<0.05	<5	7.3
	June	1558	<5	368	0.16	<5	7
	Jul	1413	<5	424	<0.05	9	7.2
	Aug	1664	<5	458	0.12	<5	7
	Sept	1787	<5	473	<0.05	<5	7.2
	Oct	1958	<5	465	0.12	<5	7.2
	Nov	1659	<5	551	0.14	6	6.9
	Dec	1332	<5	506	0.18	<5	6.6
EPL Point 17 (LDP17)	*No flow through LDP17 since early January 2023, therefore no results captured during monthly sample events in 2023.*						

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

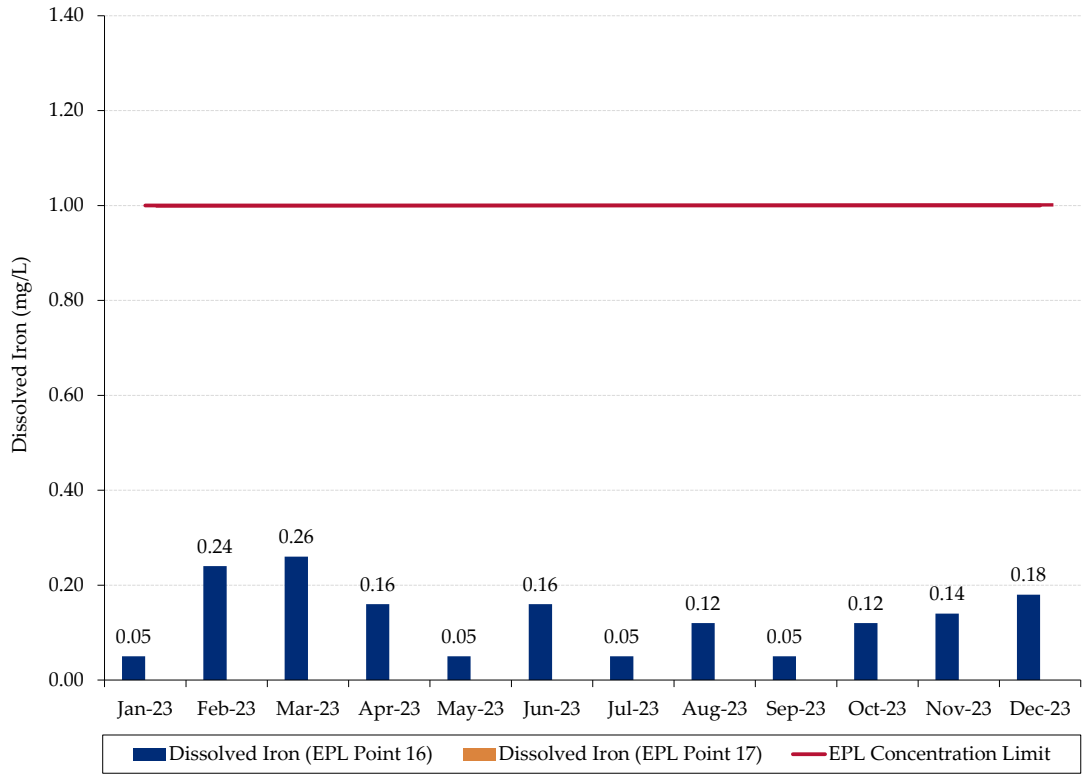


Figure 7.1: Dissolved Iron

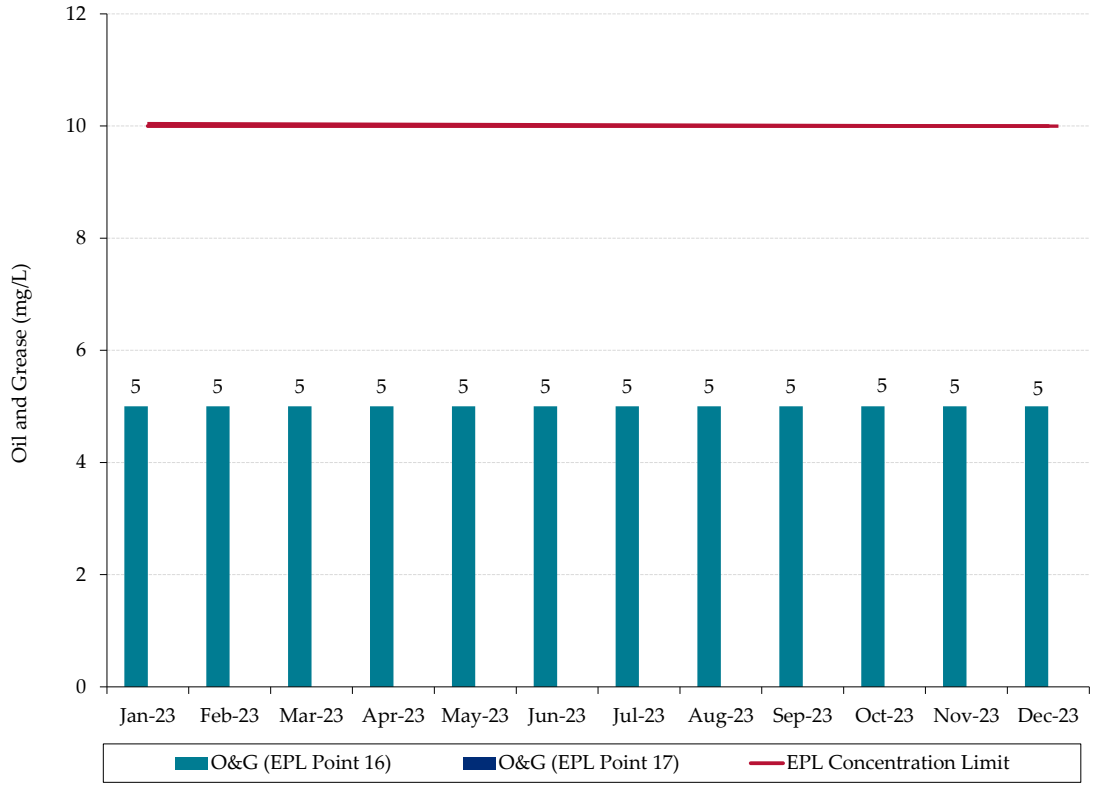


Figure 7.2: Oil & Grease

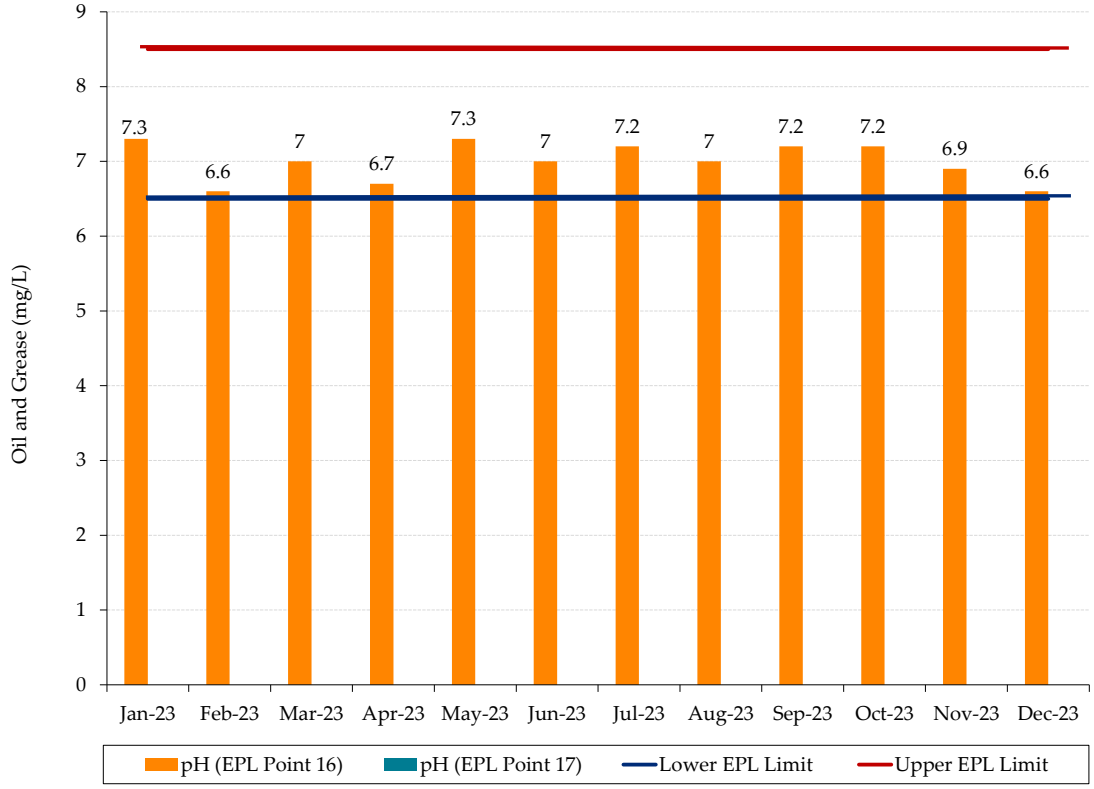


Figure 7.3: pH

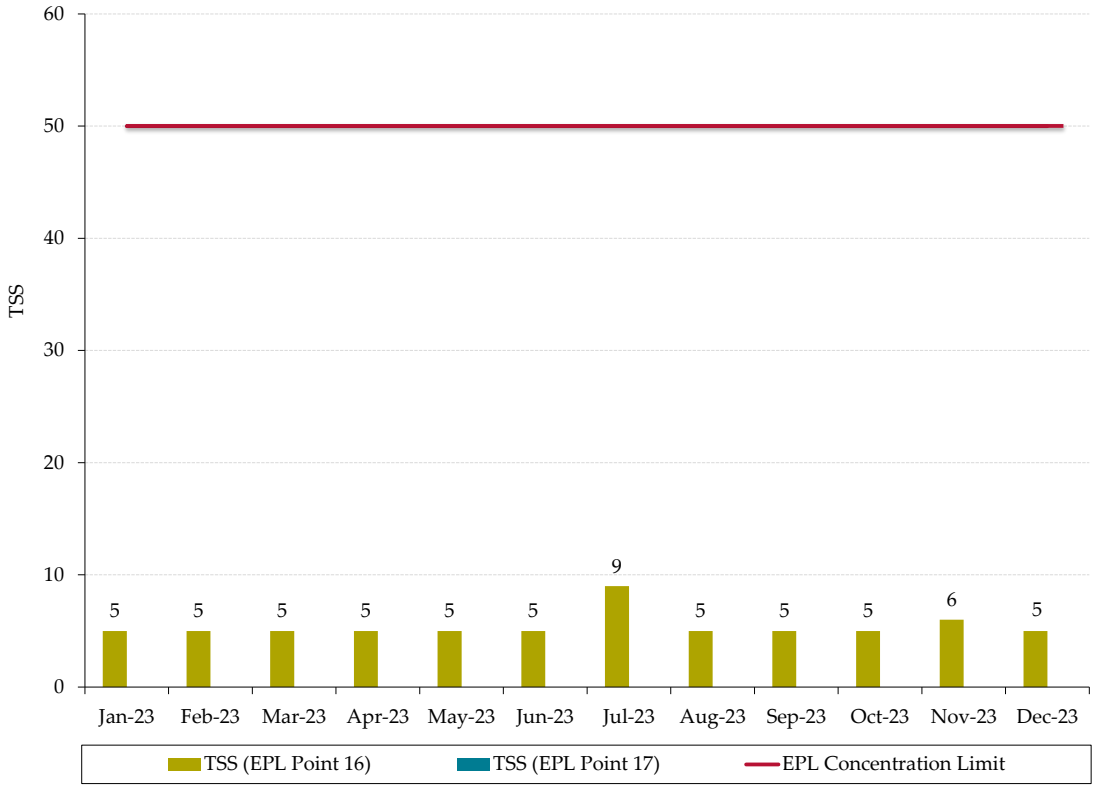


Figure 7.4: Total Suspended Solids

A summary of monitoring results for EPL discharge and monitoring points (those with specified concentration limits) can be found below for the 2023 reporting period to date:

- All monthly monitoring results for dissolved iron, pH, oil and grease, and total suspended solids were within EPL concentration limits.

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 - 2023

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
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

Annual Review Year	Iron	Oil and Grease	pH	TSS
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
2023	Compliant	Compliant	Compliant	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 2023.

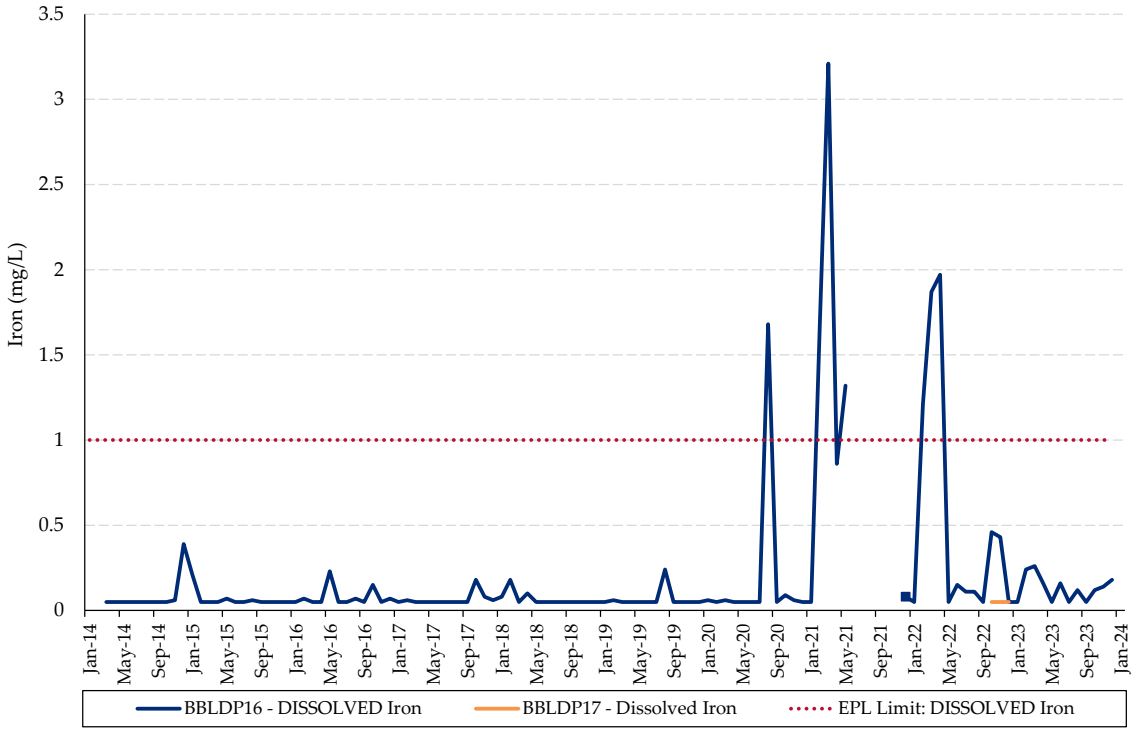


Figure 7.5: Iron Dissolved (2014 – 2023)

Figure 7.6 shows oil and grease levels for the period 2014-2023. 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.

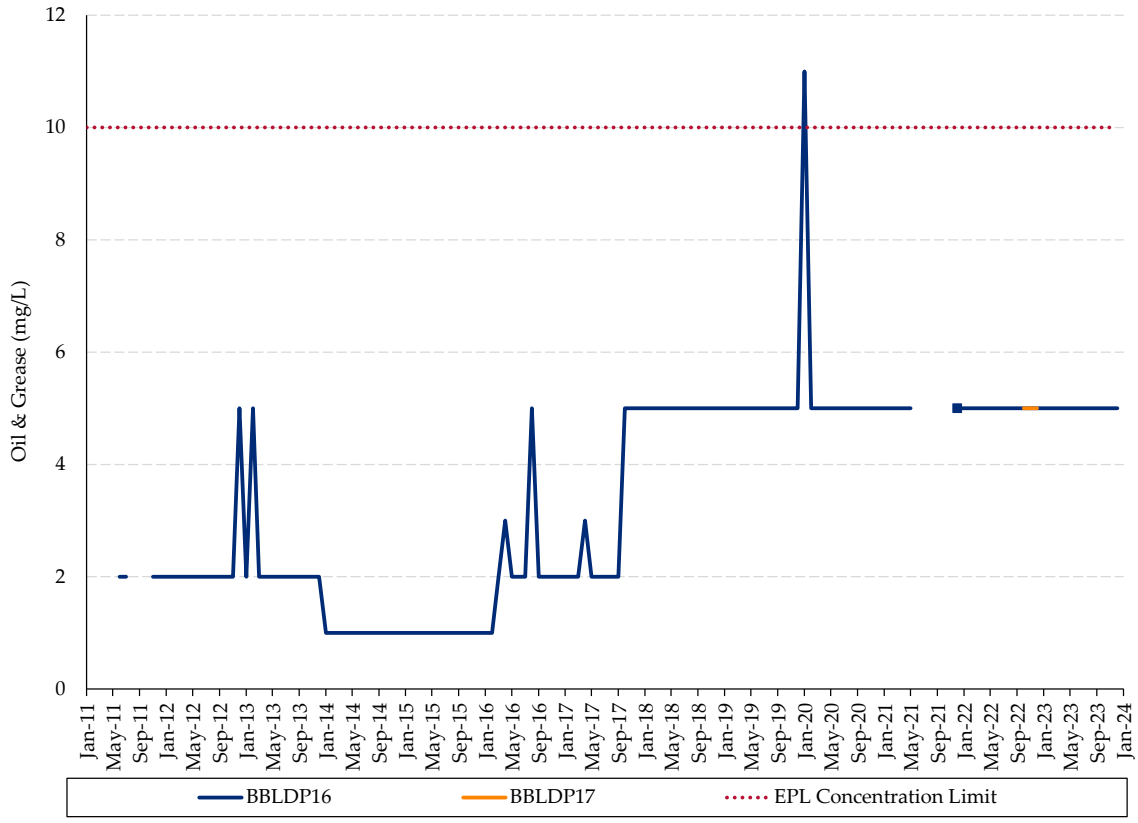


Figure 7.6: Oil and grease levels from 2011 to 2023

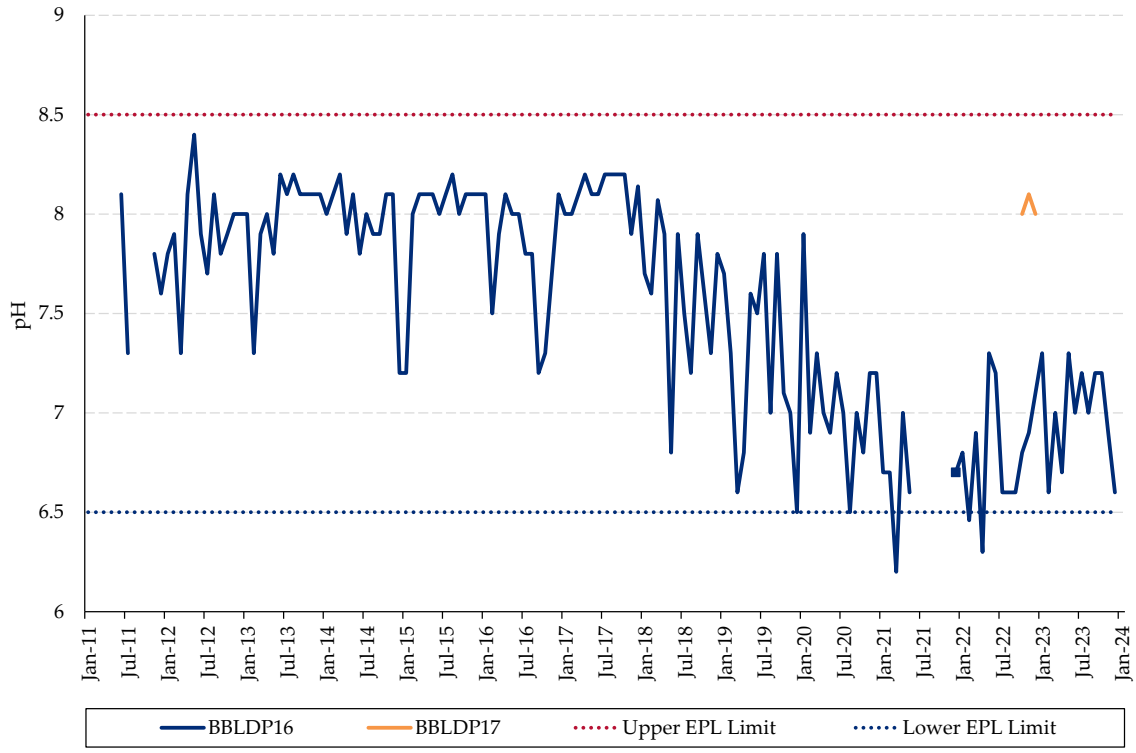


Figure 7.7: pH levels from 2011 to 2023

Figure 7.7 shows the long term pH trends.

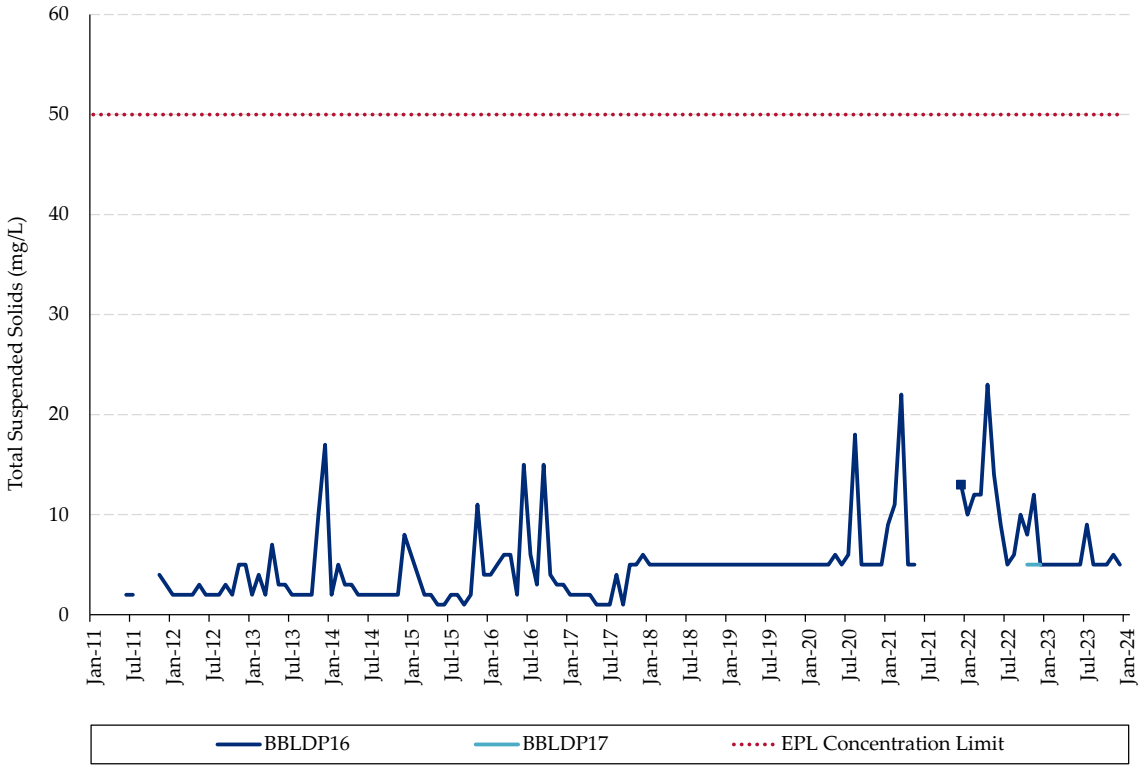


Figure 7.8: Total suspended solids levels from 2011 to 2023

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: BBPB4 is the background bore.

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.

Due to the relatively limited pre-mining baseline data, **Section 9.4.4.3 of the Consolidated Environmental Management Strategy** outlines a procedure for background data correction using data collected from the background bore: BBPB4.

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 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.	• Notify the Baal Bone Colliery ECC, or delegate; • Review all groundwater data; • Identify if the installation of additional piezometers is required; and • Investigate any external influence which may be affecting the results including climatic data.	• Review the frequency of groundwater monitoring in the affected area; • 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).	• Amend the groundwater model if required; • Acquire additional water entitlements if required, and • Amend the Groundwater Monitoring Plan if required.	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).

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	• 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	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.

Trigger	Action	Response	Plan	Timeframe
	Mgr) will initiate the PIRMP[3] immediately. • Inform regulatory agencies as required.		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.	

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.

The majority of 2023 (eight months) saw monthly rainfall totals below long-term averages. In January 2023 the deficit was -194.7 mm, compared to -348.8 mm by end 2023. The total rainfall

[3] PIRMP- Pollution Incident Response Management Plan

received in Lithgow during 2023 was 748 mm, which is 110 mm less than the long term average annual rainfall in Lithgow of 859 mm, or 87% of the long term average rainfall.

The water levels in bores BBPB3 and BBPB4 decreased during 2023, while water levels in BBPB5 remained stable. Due to poor road conditions in the now Gardens of Stone State Conservation Area, bores BBPB1-2 and BBPB6 were unable to be reached during 2023 for sampling or measurement of water heights. Extensive road repairs completed by NPWS during the end of 2023 has enabled sampling of all bores to recommence in January 2024.

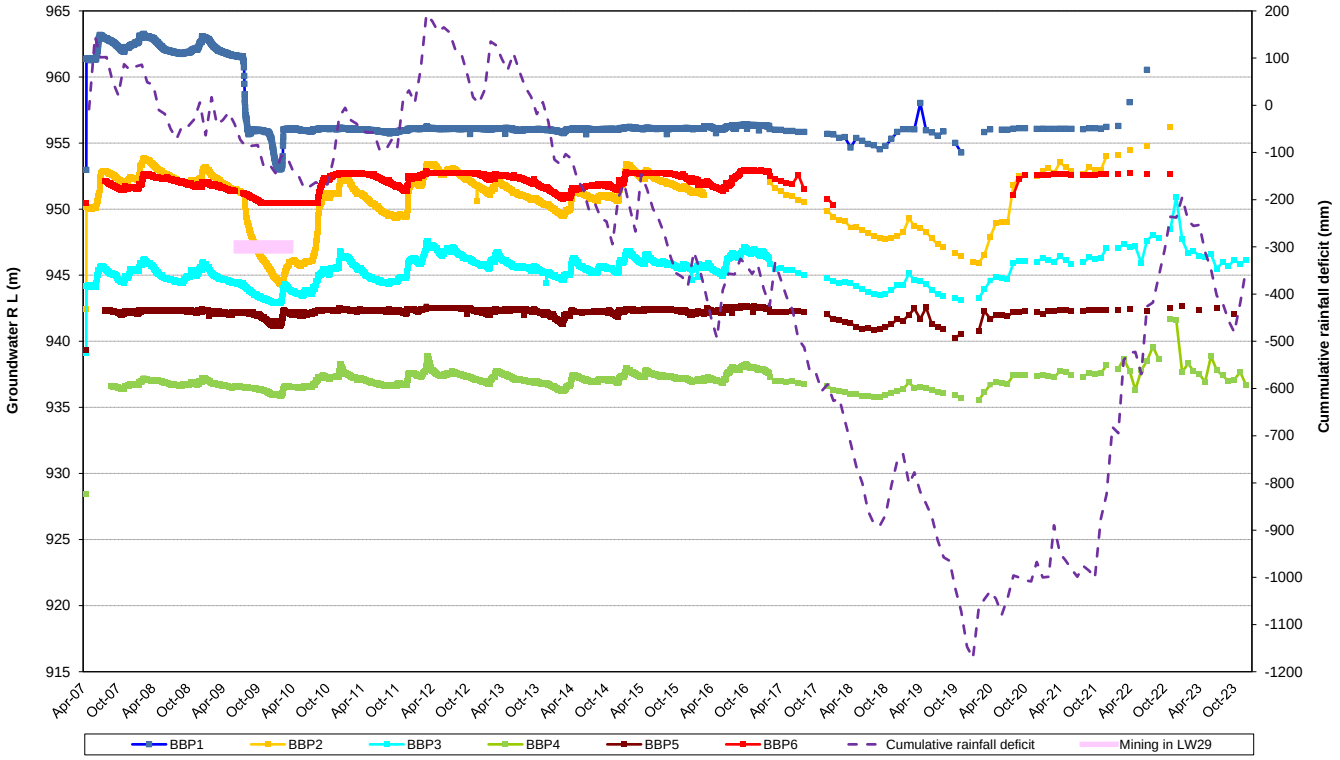


Figure 7.9: Coxs River Swamp groundwater levels and rainfall deficit

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.

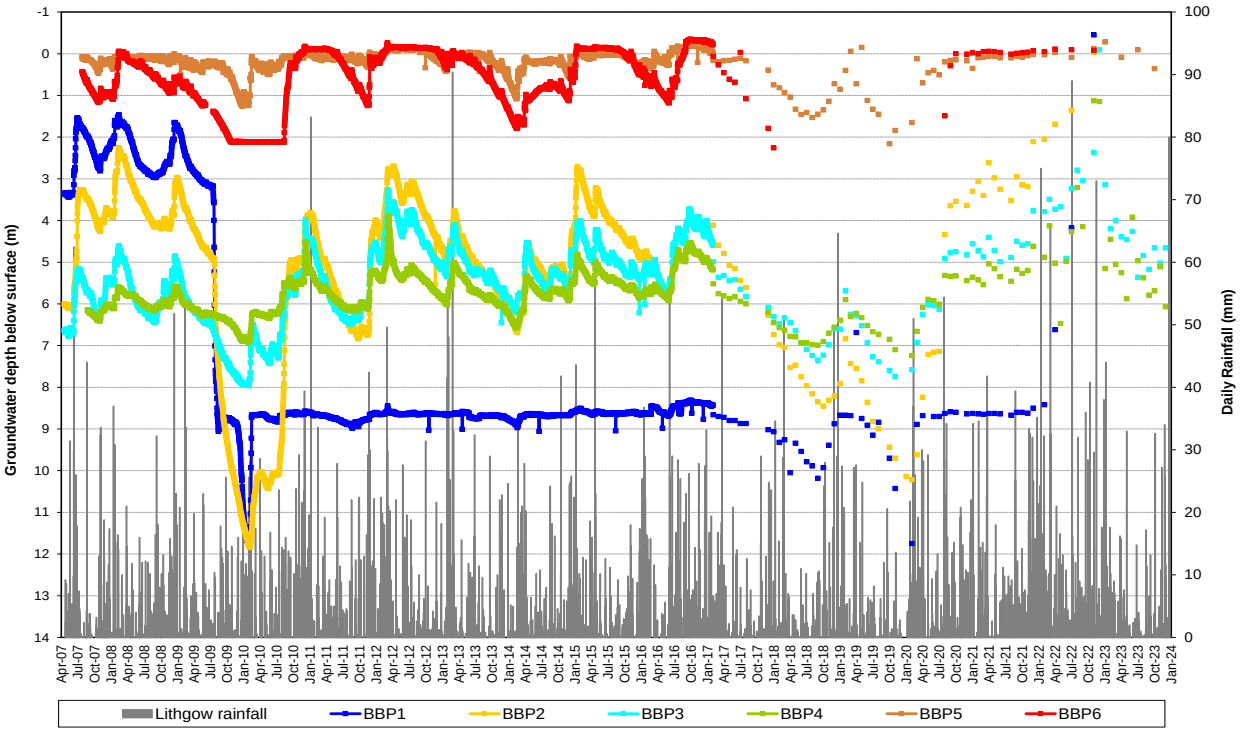


Figure 7.10: Longterm groundwater trends

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 BBPB1, BBPB2 and BBPB6 were unable to be sampled during 2023 due to the poor condition of roads within Gardens of Stone State Conservation Area (SCA). NPWS subsequently carried out repairs on the roads within the SCA from mid 2023 and trails were closed to enable these repairs. Sampling of all bores recommenced in January 2024 following the completion of road repairs.

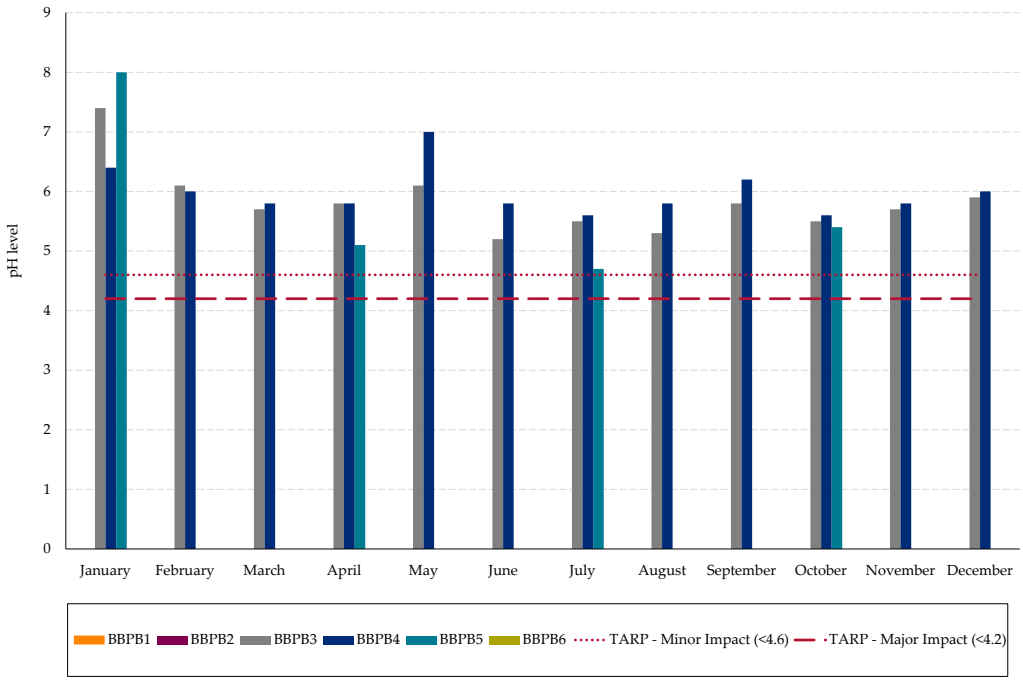


Figure 7.11: 2023 Groundwater pH levels.

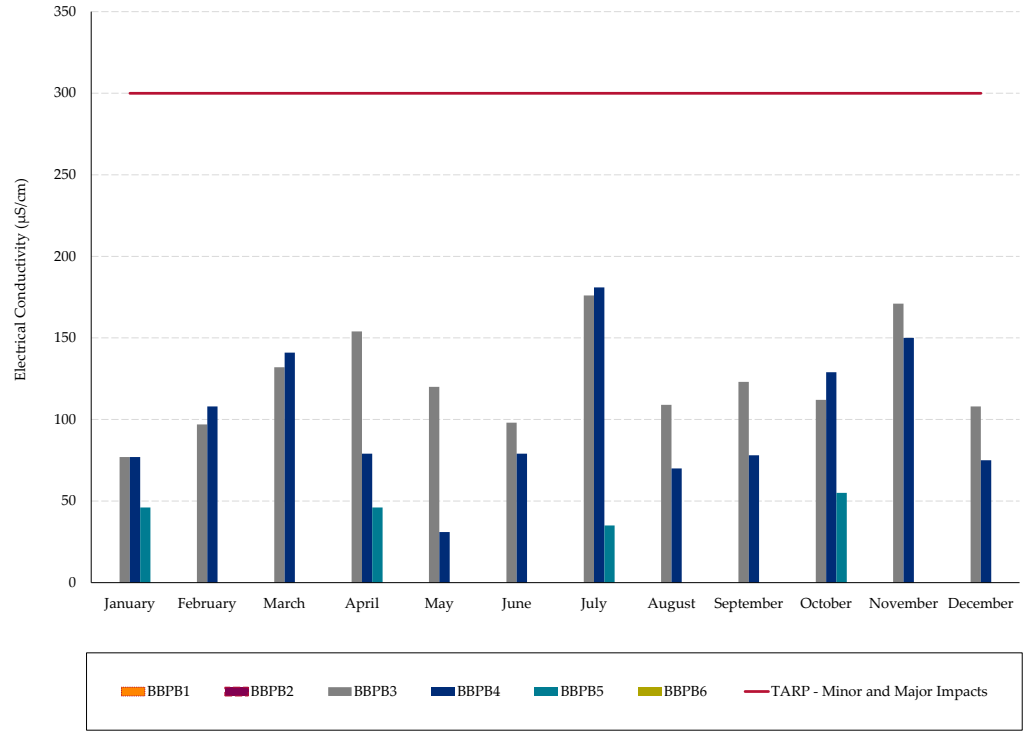


Figure 7.12: 2023 Groundwater Electrical Conductivity.

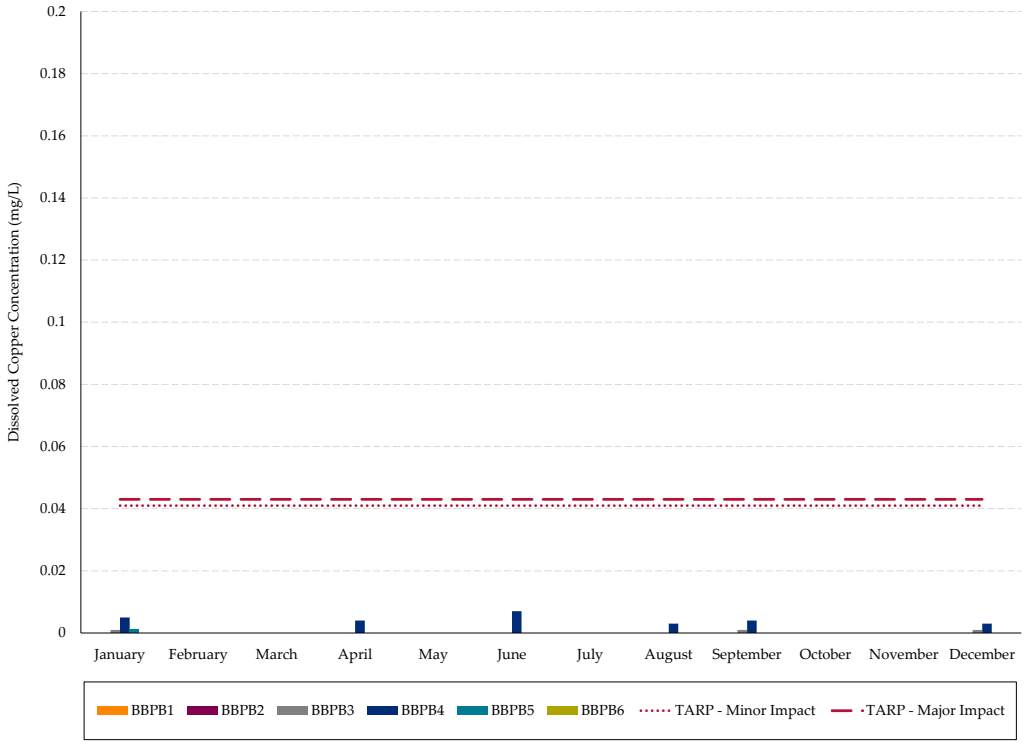


Figure 7.13: 2023 Groundwater Copper levels.

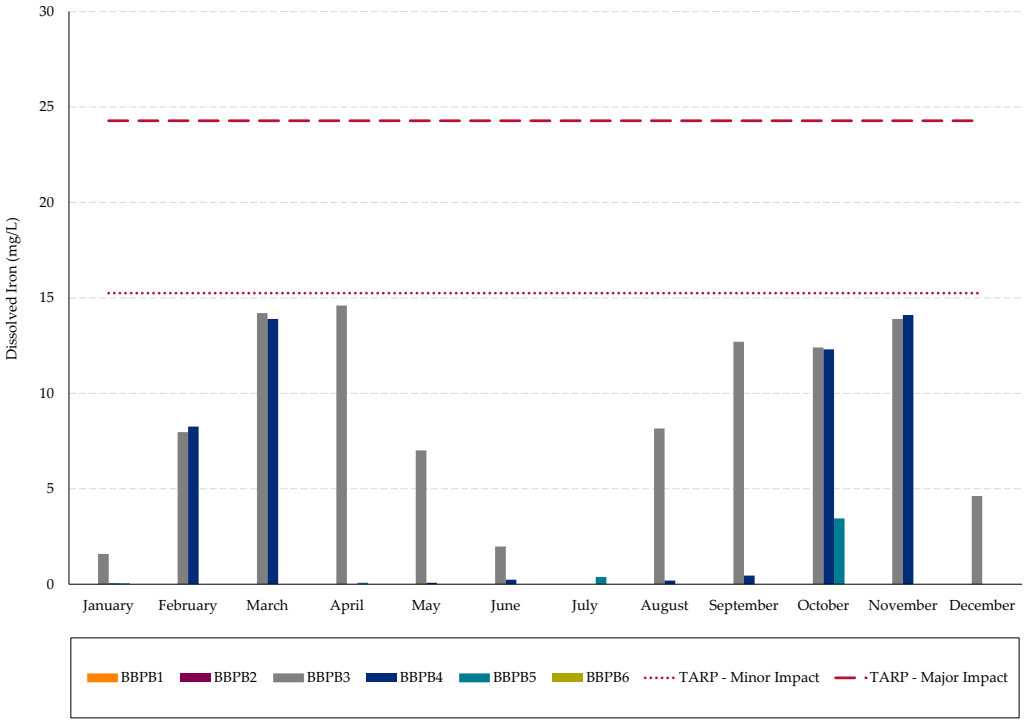


Figure 7.14: 2023 Groundwater Iron (dissolved) levels.

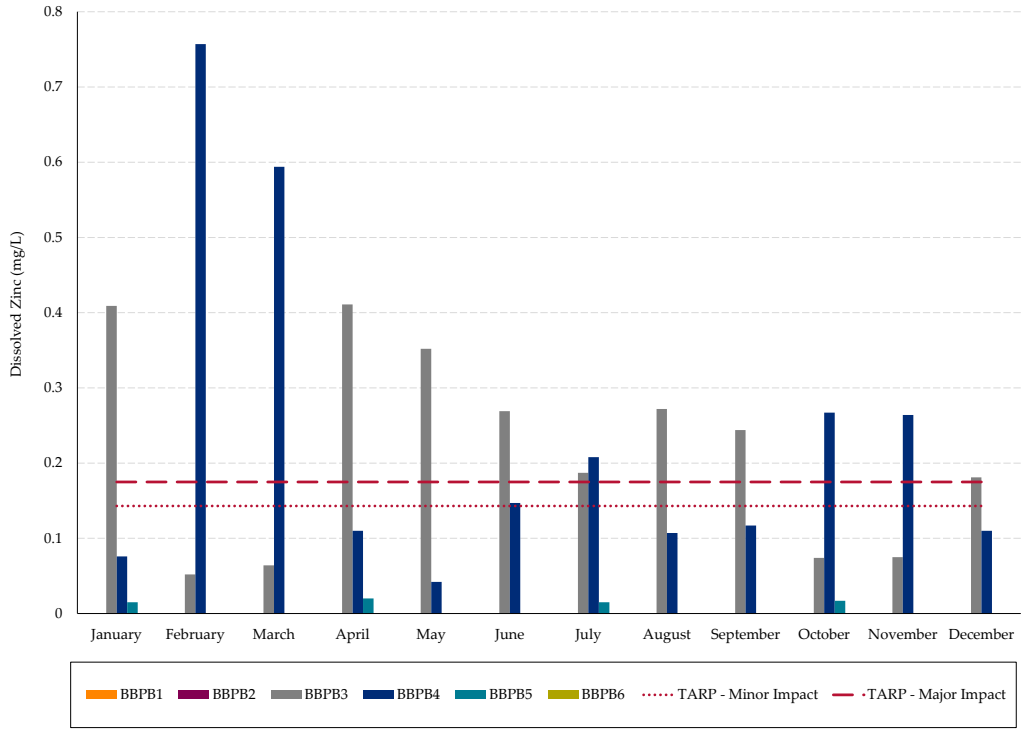


Figure 7.15: 2023 Groundwater Zinc Levels – background corrected (See Section 9.4.4.3 of the Consolidated Environmental Management Strategy for more information).

As shown in **Figure 7.11** above, all pH levels for all sampled bores were within both the minor and major impact criteria during 2023.

As shown in **Figure 7.12** above: electrical conductivity (EC) levels were within both the minor and major impact criteria for all sampled groundwater monitoring bores during 2023.

As shown in **Figure 7.13**, copper levels were also within impact criteria for all sampled groundwater monitoring bores during 2023.

As shown above in **Figure 7.14**, 2023 iron levels were below the minor and major impact trigger levels for all sampled bores.

As shown above in **Figure 7.15**, 2023 zinc levels were above impact trigger level for BBPB3 and BBPB4 groundwater monitoring wells for a number of months during 2023.
After background correction BBPB3 exceeded the major impact trigger levels in January, April, May, June, July, August, September and December 2023. The Loss of Water Quality TARP was therefore triggered twice in 2023. Investigations were carried out and notifications sent to DPIE on 3 July 2023 and 9 October 2023. These notifications also detailed the ongoing access issues at BBPB1, BBPB2 and BBPB6 during 2023 due to the deterioration of a number of trails in the Gardens of Stone SCA following prolonged wet weather.

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 – 2023.

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 Zinc**: Jan, Feb, Aug, Nov, Dec	**Dissolved Copper**: Aug – Dec	No TARP exceedance	No TARP exceedance
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
2023	No access during 2023	No access during 2023	**Dissolved Zinc:** Jan, Apr-Sept, Dec	**Dissolved Zinc:** Feb, Mar, Jul, Oct, Nov	No TARP exceedance	No access during 2023

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 major trigger level events during 2023 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.

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.

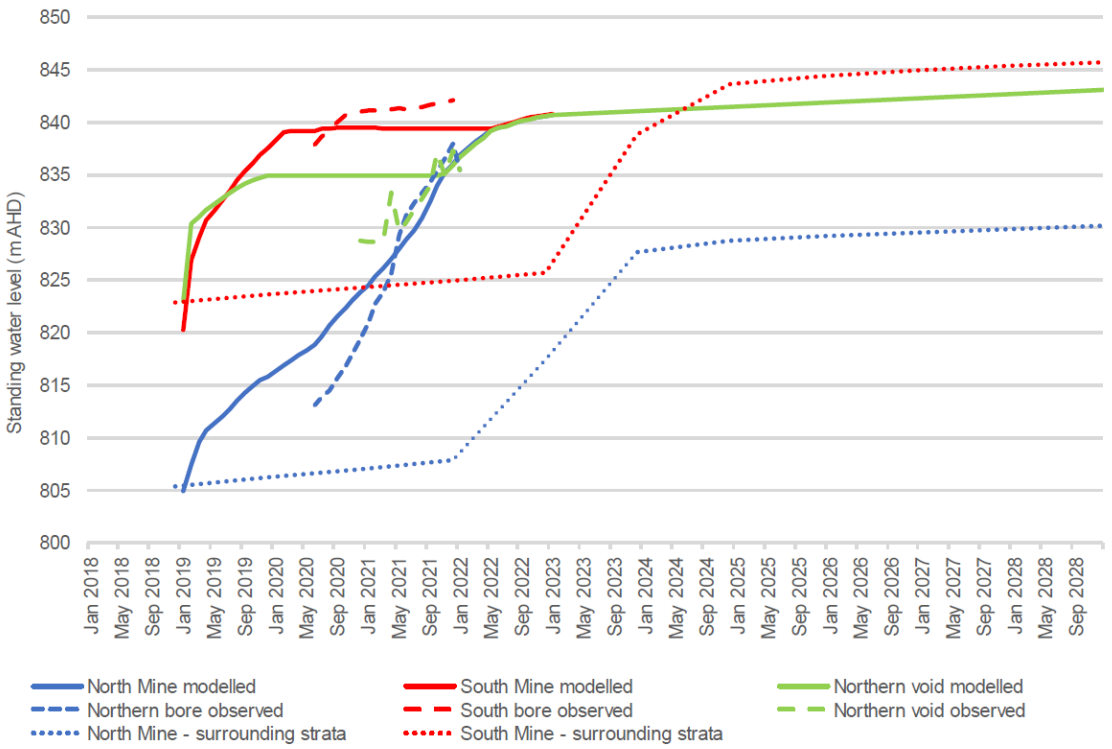


Figure 7.16 Observed and modelled post-closure groundwater level

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 23 and 24 October 2023 by Umwelt.

The 2023 Channel Stability Monitoring Report concluded that:

"During the 2023 channel stability assessment, it was observed that some assessment points show differences in condition when compared to previous years. These changes are likely due to the system regressing from a combination of bushfire activity at the beginning of 2020 and extreme rainfall events from 2021 to 2022. Generally, the calculated activity ratings are similar to those reported from 2022 and therefore the conclusions regarding the cause of erosion remain consistent with those detailed in the 2022 monitoring report (Umwelt 2022b)."

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 - 2023 Aquatic Fauna Monitoring.

Table 7.11: Outcomes of 2020 - 2023 aquatic fauna monitoring

	2020		2021		2022		2023	
Site	Signal2 Grade	No. of Macro-Invertebrate Families	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	5.8	7
WC-AQ1	3.48	17	3.556	5	2.1	5	3.8	6
CR-AQ1	4.79	17	4.473	11	4	12	4.7	9
Rehabilitated Sites								
BBC-R1	-	-	2.259	9	2.9	18	3	7
BBC-R2	-	-	-	-	4	14	4.3	9
BBC-R3	-	-	3.375	4	2.7	14	2.6	11

Umwelt (2023) concluded that:
"The SIGNAL2 grades for the newly established sites within the rehabilitated creek line of Ben Bullen Creek were slightly lower than those of the analogue sites. However, this does not necessarily indicate that the water quality of these areas is impaired as the macro-invertebrate assemblages among the sites were generally comparable. As this is the third year of monitoring of the rehabilitated creek line for monitoring points BBC-R1 and BBC-R3 and the second year of monitoring for monitoring point BBC-R2, 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)
	2022	2023	2024
A. Total mine footprint	372.3	372.3	372.3
B. Total active disturbance	21.7	21.7	21.7
P Land being prepared for rehabilitation	49.5	0	0
D. Land under active rehabilitation	358.5	358.5	358.5
E. Completed rehabilitation	0	102[5]	102[5]

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 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 DPIE – Resources Regulator. In correspondence dated 4 April 2023 DPIE – Resources Regulator advised that the rehabilitation of the 102 ha had been determined to be satisfactory.

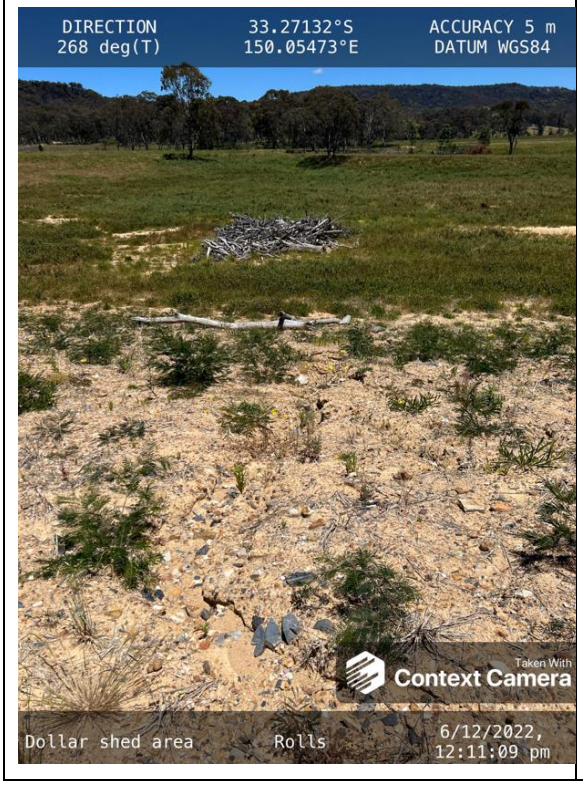
During 2023, rehabilitation works consisted of augmentation and repairs of existing rehabilitation, including erosion repairs and works to improve groundcover.

Plate 2 provides photos showing examples of rehabilitation works completed in 2023.

BEFORE: Rill Repair – Northern Void

AFTER: Rill Repair – Northern Void

BEFORE: Rill Repair – Dollar Shed



AFTER: Rill Repair – Dollar Shed

8.1.1 Subsidence Remediation

There were no subsidence repairs carried out during 2023. During 2023 subsidence inspections were attempted in February and May 2023, however due to the poor condition of the roads in Gardens of Stone SCA these inspections were only able to be partially completed. NPWS completed road repairs in the area by end 2023, and a subsidence inspection was able to be completed in December 2023.

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 2023 Annual Environmental Rehabilitation Inspection was conducted by DnA Environmental on 8 November 2023.

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.

2023 Annual Ecological Rehabilitation Monitoring Results

The results of the 2023 monitoring, undertaken by DnA Environmental from the 30th October – 3rd November 2023 are summarised in **Table 8.2** 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 rehabilitation sites against completion criteria and primary performance indicators in 2023

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measure (*desirable)	NOC3	NOC5	ROM01	ROM02	PTP01	DWD01	CVD01	NVD01	SOC5	REA5	RLP01	RLP02	SVD01	SVD02	SVD03	BBCW01	BBCW02	BBCS01	BBCS02
Performance indicators are quantified by the range of values obtained from representative reference sites					Pasture rehabilitation sites 2023								Mixed woodland rehabilitation sites 2023									Sedgeland rehabilitation sites 2023	
Phase 2: Landform establishment and stability	**Landform slope, gradient**	Landform suitable for final land use and generally compatible with surrounding topography	Slope	< Degrees (°)	7	1	1	2	2	4	3	8	15	2	0	1	2	5	1	15	20	12	12
	Active erosion	Areas of active erosion are limited	Cross-sectional area of rills	m2	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0	0	0.35	0	0.611	0.560
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)	6.2	7.5	7.2	7.6	7.5	7.4	5.7	6.7	6.8	6.1	6.8	6.4	6.3	5.7	6.0	5.4	5.7	5.4	8.0
			EC	< dS/m (<0.150)	0.057	0.085	0.513	0.272	0.245	0.423	0.261	0.4	0.148	0.034	0.079	0.388	0.357	0.216	0.205	0.107	0.061	0.044	0.351
			Phosphorous	mg/Kg (50)	7.0	2.4	29.5	13.9	30.1	58.0	16.9	57.6	10.9	6.9	53.7	8.8	44.2	46.1	65.2	12.7	8.4	4.4	4.8
			Nitrate	mg/Kg (>13)	0.5	0.4	1.4	0.8	2.0	2.2	4.1	61.0	5.3	0.4	0.4	0.4	0.4	1.5	0.4	7.3	0.5	0.5	0.4

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measure (*desirable)	NOC3	NOC5	ROM01	ROM02	PTP01	DWD01	CVD01	NVD01	SOC5	REA5	RLP01	RLP02	SVD01	SVD02	SVD03	BBCW01	BBCW02	BBCS01	BBCS02
			ESP	% (<5)	1.5	2.2	1.7	0.7	1.0	1.0	7.4	0.9	0.6	2.4	1.6	1.5	4.3	5.6	4.5	7.8	2.6	1.1	2.3
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	%	69.5	68.9	71.5	71.8	72.0	70.3	65.8	66.0	66.5	72.0	66.0	66.8	53.5	68.2	67.2	53.4	66.7	53.2	63.2
			LFA Landscape organisation	%	100	90	100	95	100	99	72	100	100	100	83	69	3	78	79	11	71	42	92.0
	Herbage Biomass	Pasture productivity is comparable to analogue sites.	Green Dry Matter Biomass	kg/ha	1700	20	400	1400	2500	1000	400	100	na	na	na	na	na	na	na	na	na	na	na
	Vegetation diversity	Vegetation contains a diversity of species comparable to that of the local remnant vegetation	Diversity of shrubs and juvenile trees	species/area	na	na	na	na	na	na	na	na	8	8	18	12	12	6	9	15	16	12	11
				% endemic	na	na	na	na	na	na	na	na	90	99	100	100	100	100	100	100	89	82	71
			Total species richness	No./area	na	na	na	na	na	na	na	na	26	41	65	50	51	34	47	45	57	67	71
			Native species richness	>No./area	na	na	na	na	na	na	na	na	10	15	48	31	25	17	24	28	30	42	38
			Exotic species richness	<No./area	na	na	na	na	na	na	na	na	16	26	17	19	26	17	23	17	27	25	33
	Shrubs and juvenile tree	Vegetation contains a	Density of eucalypts	No./area	na	na	na	na	na	na	na	na	0	15	66	22	120	0	13	470	348	2	8

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measure (*desirable)	NOC3	NOC5	ROM01	ROM02	PTP01	DWD01	CVD01	NVD01	SOC5	REA5	RLP01	RLP02	SVD01	SVD02	SVD03	BBCW01	BBCW02	BBCS01	BBCS02
	(<5cm dbh) density	density of shrubs and juvenile trees (<5cm dbh) comparable to the local remnant vegetation	Density of acacias	No./area	na	na	na	na	na	na	na	na	66	0	100	332	38	105	13	92	134	79	11
			Density of other endemic shrubs	No./area	na	na	na	na	na	na	na	na	249	334	975	26	128	24	21	84	40	31	10
			Density of exotic / non endemic species	< No./area	na	na	na	na	na	na	na	na	36	4	0	0	0	0	0	0	66	24	12
			The percentage of eucalypts	No./area	na	na	na	na	na	na	na	na	0	4	6	6	42	0	28	73	59	1	20
			Total density of endemic shrubs and/or juvenile trees	No./area	na	na	na	na	na	na	na	na	315	349	1141	380	286	129	47	646	522	112	29
	Ecosystem composition	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Tree species	No./area	na	na	na	na	na	na	na	na	0	4	6	6	7	0	3	8	6	1	2
			Shrub species	No./area	na	na	na	na	na	na	na	na	8	4	13	9	5	6	6	8	11	12	9
			Herb species	No./area	na	na	na	na	na	na	na	na	13	23	29	22	27	20	29	13	24	31	32
			Grass species	No./area	na	na	na	na	na	na	na	na	5	5	10	9	9	6	5	12	12	10	15
			Reed species	No./area	na	na	na	na	na	na	na	na	0	5	5	3	3	2	4	3	2	11	10

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measure (*desirable)	NOC3	NOC5	ROM01	ROM02	PTP01	DWD01	CVD01	NVD01	SOC5	REA5	RLP01	RLP02	SVD01	SVD02	SVD03	BBCW01	BBCW02	BBCS01	BBCS02
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	%	47.7	30	37.2	38.3	39.6	39.3	30.2	36.8	50.8	42.6	31.3	28.1	17.7	31.6	28.2	21.8	30.4	20.7	31
			LFA Nutrient recycling	%	49.9	34.0	39.5	41.1	42.3	39.8	31.7	37.2	49.6	42.7	33.8	29.7	15.4	33.1	29.9	18.0	32.5	19.1	32.7
	Protective ground cover	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Perennial plant cover (< 0.5m)	%	32.5	7.5	20.5	26.5	43.0	27.5	26.5	11	7.2	9.5	32.5	33	3.0	0.5	7.0	4.5	21.3	10.5	17.2
			Total Ground Cover	%	100	83	92.5	93	100	99	82.5	92	99	99.5	76.5	87	24.5	53.6	92	18.5	76.7	35.5	77.5
	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	2.6	2.4	0	0	0	0.2	0.2	0	2.8	1.8	5.8	2.2	3.0	1.6	4.6	2.2	2.8	3.6	3.2
			Exotic understorey abundance/ m2	< species/m^2	5.6	5.2	4	4	3	4	4	4.8	1.4	7.4	2.8	4	6.6	5.6	8.2	2.6	5.8	4.8	6.2
		Native ground cover abundance is comparable to that of the local remnant vegetation	Percent ground cover provided by native vegetation <0.5m tall	%	26.3	27.9	0	0	0	2.2	2.1	0	69.0	19.1	74.2	35.7	25.4	14	28.4	46.9	31	51.6	40.2

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measure (*desirable)	NOC3	NOC5	ROM01	ROM02	PTP01	DWD01	CVD01	NVD01	SOC5	REA5	RLP01	RLP02	SVD01	SVD02	SVD03	BBCW01	BBCW02	BBCS01	BBCS02
	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	na	na	na	na	na	na	na	na	101	243	885	114	285	117	47	426	254	77	23
			shrubs and juvenile trees 1.5 - 2m in height	No./area	na	na	na	na	na	na	na	na	26	19	36	54	0	0	0	0	14	4	1
	Ecosystem structure	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5 - 2 m	% cover	10	0	0	0	0	2	0	0	4.5	11.0	42.0	10.0	0	0	0	0	2	3	0
			Foliage cover 2 - 4m	% cover	12	0	0	0	0	0	0	0	14.5	0.0	15.5	0.0	0	0	0	0	0	0	0
			Foliage cover >6m	% cover	0	0	0	0	0	0	0	0	19.5	0	0	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	na	na	na	na	na	na	na	na	100	0	100	0	0	0	0	0	0	0	0

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Unit of measure (*desirable)	NOC3	NOC5	ROM01	ROM02	PTP01	DWD01	CVD01	NVD01	SOC5	REA5	RLP01	RLP02	SVD01	SVD02	SVD03	BBCW01	BBCW02	BBCS01	BBCS02
	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	na	na	na	na	na	na	na	na	24	0	2	0	0	0	0	0	0	0
			Density of eucalypts	No./area	na	na	na	na	na	na	na	na	0	0	2	0	0	0	0	0	0	0
			Density of acacias	No./area	na	na	na	na	na	na	na	na	24	0	0	0	0	0	0	0	0	0
			Density of other endemic species	No./area	na	na	na	na	na	na	na	na	0	0	0	0	0	0	0	0	0	0
			Density of exotic / non endemic species	<No./area	na	na	na	na	na	na	na	na	0	0	0	0	0	0	0	0	0	0
			Percentage of eucalypts	% population	na	na	na	na	na	na	na	na	0	0	100	0	0	0	0	0	0	0
	Ecosystem health	The vegetation is in a condition comparable to that of the local remnant vegetation.	Healthy trees	% population	na	na	na	na	na	na	na	na	6	0	50	0	0	0	0	0	0	0
			Flowers/fruit: Trees	% population	na	na	na	na	na	na	na	na	15	0	50	0	0	0	0	0	0	0

The 2023 Annual Ecological Rehabilitation Monitoring Report also recommends the following management actions:

- Addressing lack of groundcover and resulting erosion in Ben Bullen Creek rehabilitation areas;
- Weed control and increasing eucalypts at SOC5;
- Addressing the "hotspots" noted in the annual walkover;
- Targeting priority weeds onsite including Blackberry and St John's Wort; and
- Feral animal inspections and control.

Rehabilitation monitoring and maintenance work will continue during 2024.

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.

9 Community

9.1 Community Consultative Committee

The Baal Bone Colliery Community Consultative Committee (CCC) was 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 2023 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*.

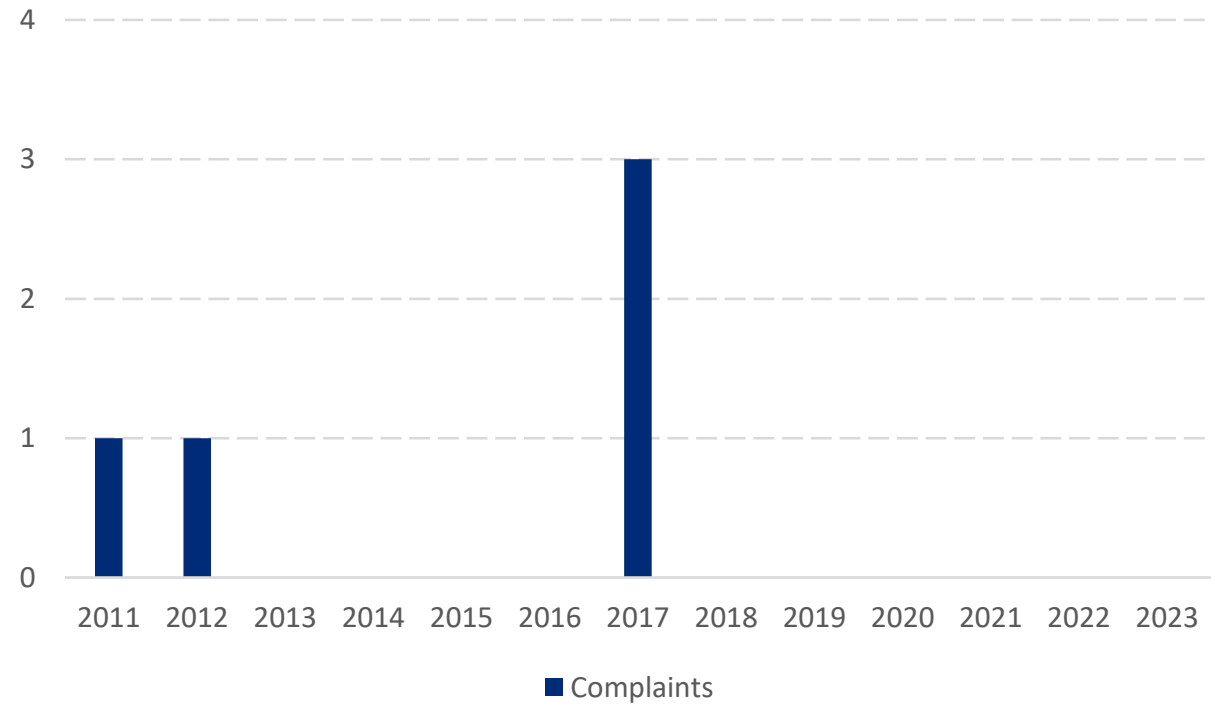


Figure 9.1: Community complaints by year

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	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	Complete. EMS updated and resubmitted to DPIE on 16/05/2023.
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	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 – currently being developed. Ongoing

Sch and Cond Number	Audit Recommendation	Response/Action Plan	Proposed Action Due Date or Status
Project Approval 09_0178			
	the land over the historical mining areas.		
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 – engineer design of spillway developed and currently being refined and finalised. 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.	Complete. Various works completed during 2023 and early 2024.
Sch 3 Cond 25	PACKAGE 1: Implement the rehabilitation, erosion, and sediment control maintenance program	As above	Complete. Various works completed during 2023 and early 2024.

Sch and Cond Number	Audit Recommendation	Response/Action Plan	Proposed Action Due Date or Status
Project Approval 09_0178			
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 constructed section of Ben Bullen Creek.	Complete.
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.[6]

11.1 Reportable Incidents

There were no reportable incidents during the 2023 reporting period.

11.2 Non-Compliances

There were no non-compliances during the 2023 reporting period.

As detailed in **Section 7.2.4** there were months during 2023 when zinc levels at BBPB3 exceeded trigger levels, and in previous Annual Reviews these exceedances have been recorded as non-compliances. However as determined during the 2022 IEA these are not considered non-compliances as *"IEMA does not believe this is a non - compliance as the site investigated and responded accordingly."*

[6] 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 2024 reporting period include:

Demolition

- Demolition of sewage treatment system.

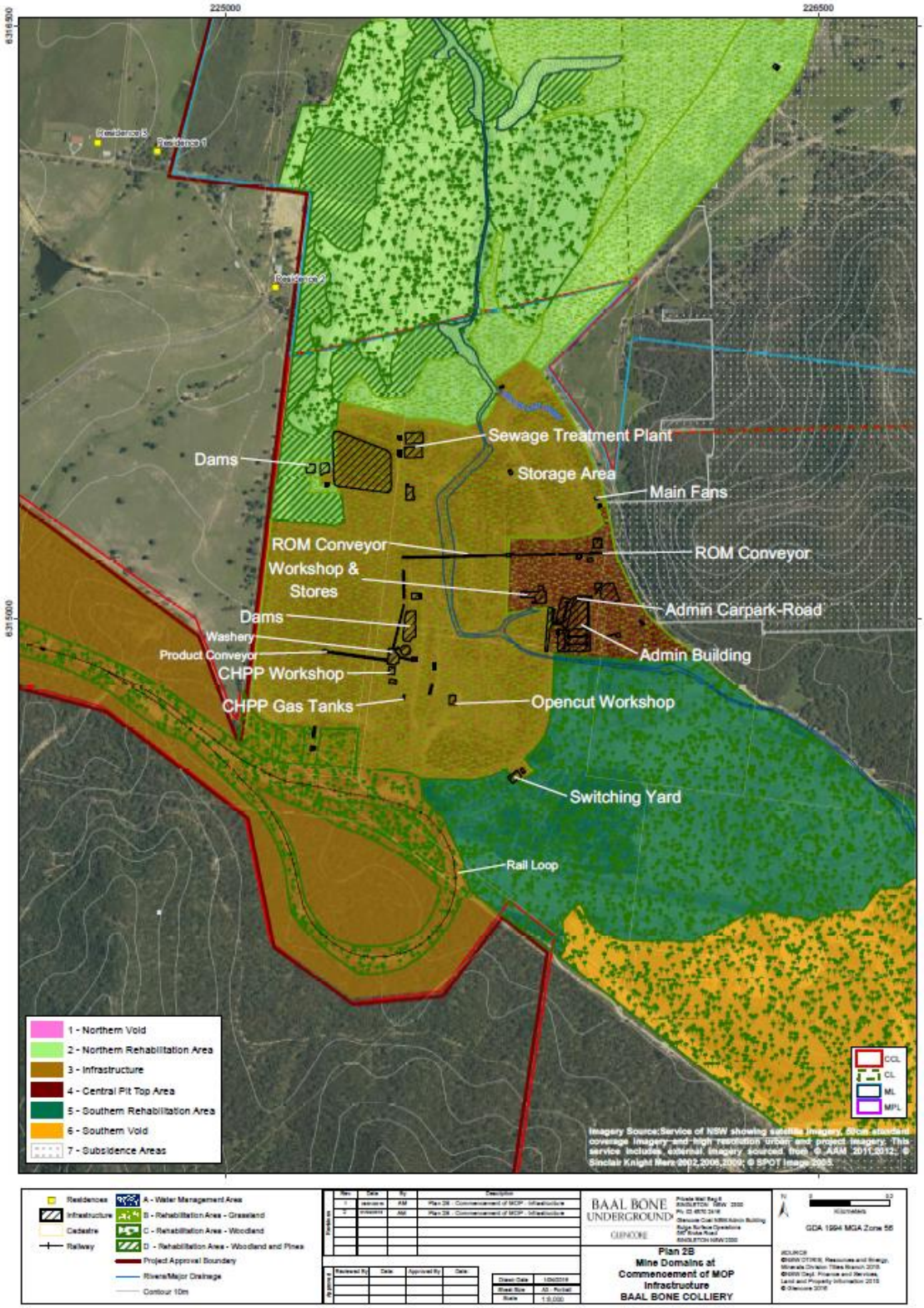
Rehabilitation

- Sealing of borehole south dewatering borehole and removal of monitoring piezo.
- Maintenance and monitoring of rehabilitation as per recommendations of Annual Rehabilitation Monitoring. Report.
- Spraying of priority weeds including blackberry and St Johns Wort.
- Erosion and sediment control repairs as per recommendations of Annual Rehabilitation Inspection.

Management Systems

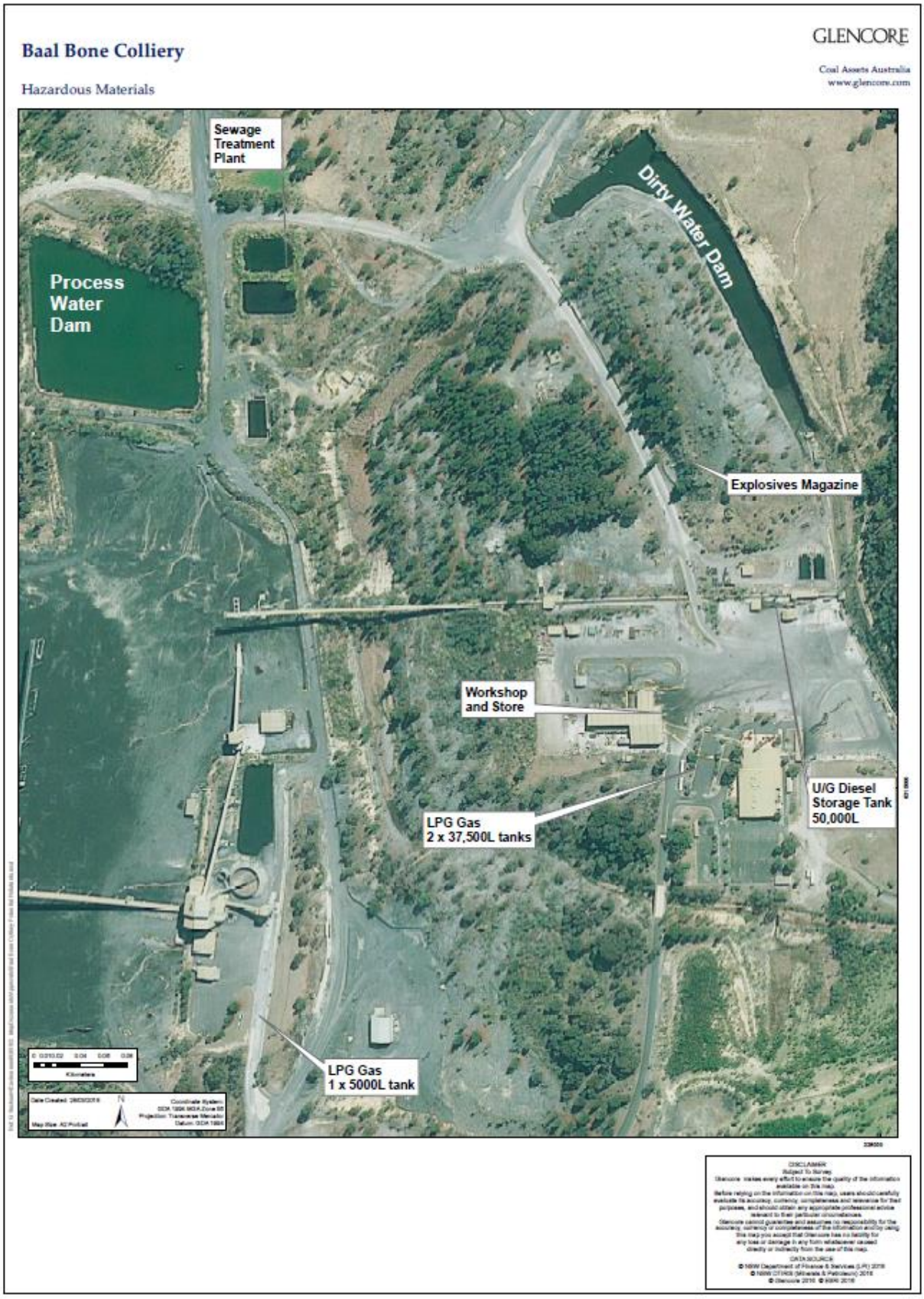
- Continued consolidation of subsidence location information and repair details as per IEA recommendation.

A.1 Appendix A – Plans

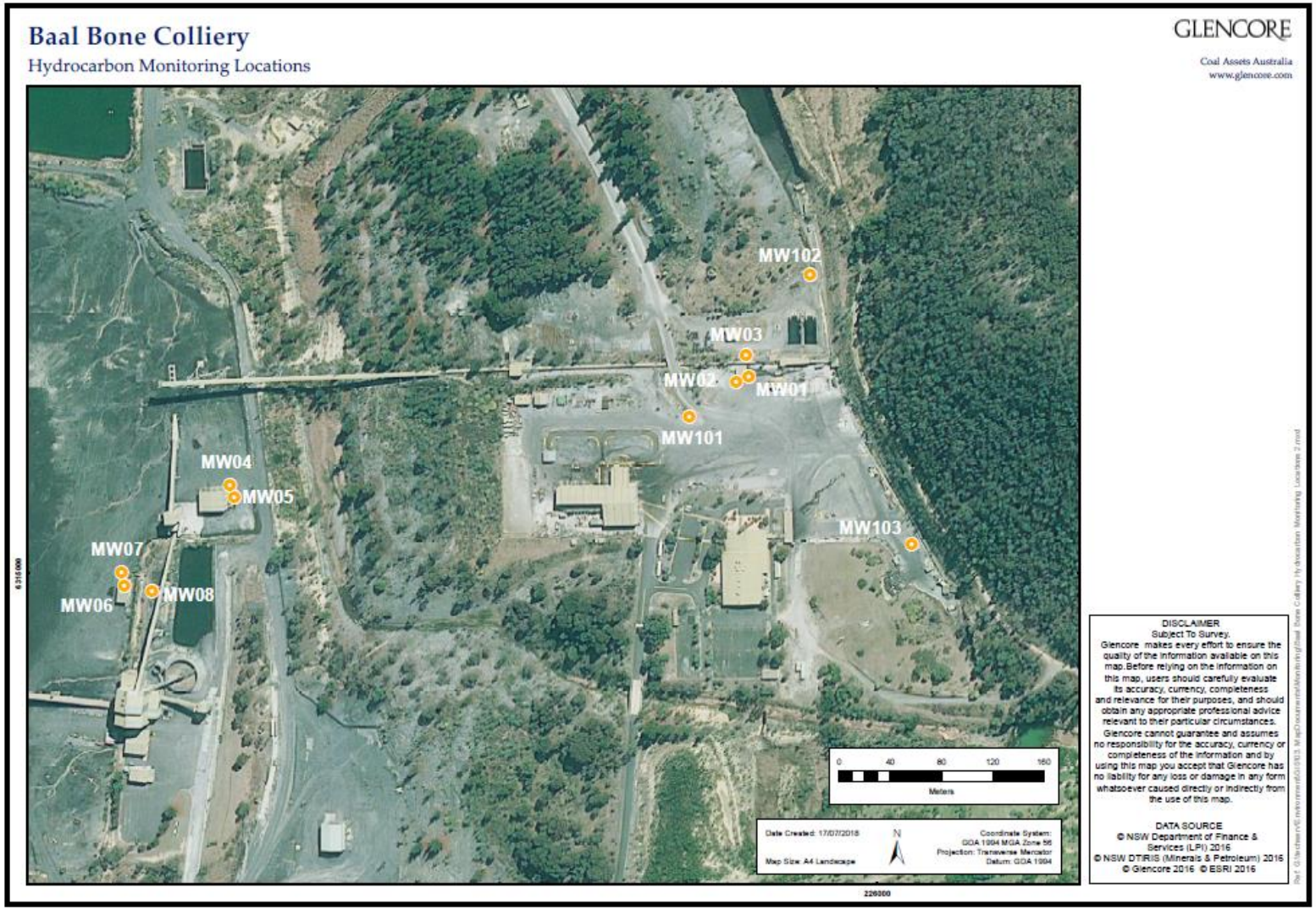


Plan 1 – Site Infrastructure (Prior to demolition and closure activities)

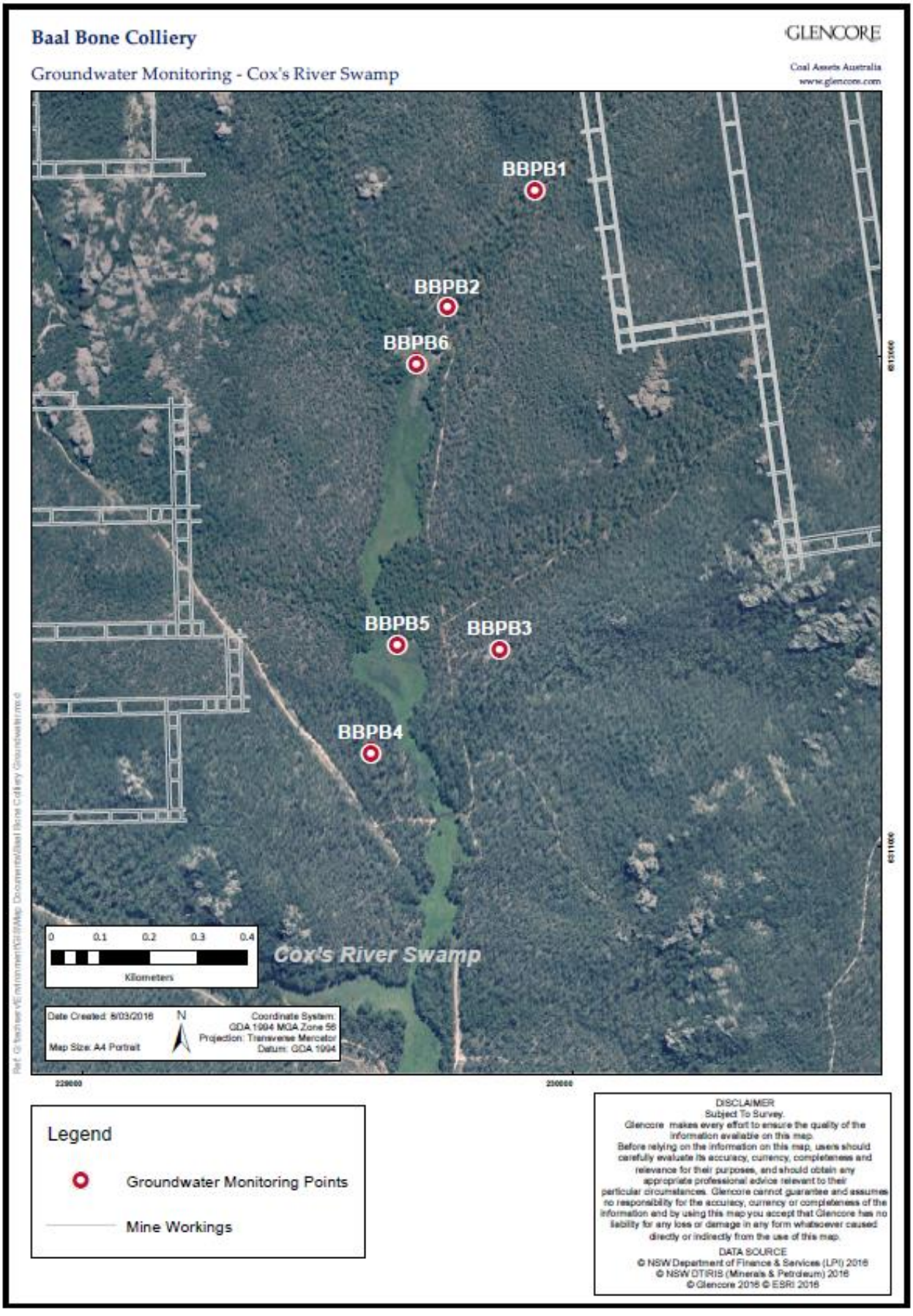
Plan 2 – Licensed Monitoring Locations



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, Housing and Infrastructure

NSW Planning ref: MP09_0178-PA-34

Ms Elizabeth Fishpool
Environment and Community Coordinator
THE WALLERAWANG COLLIERIES LIMITED
Castlereagh Highway
Cullen Bullen New South Wales 2790

08/04/2024

Subject: Baal Bone Coal - Annual Review 2023

Dear Ms Fishpool

Reference is made to your post approval matter, MP09_0178-PA-34, Annual Review for the period 1 January 2023 to 31 December 2023 for Baal Bone Coal, submitted as required by Schedule 5, Condition 3 of MP09_0178 as modified (the consent) to the NSW Department of Planning, Housing and Infrastructure (NSW Planning) on 27 March 2024.

NSW Planning has reviewed the Annual Review and considers it to generally satisfy the reporting requirements of the consent and the NSW Planning Annual Review Guideline (October 2015).

Please make publicly available a copy of the 2023 Annual Review on the company's website within 30 days.

Please note that the NSW Planning'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 email compliance@planning.nsw.gov.au

Yours sincerely

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

4 Parramatta Square, 12 Darcy Street, Parramatta NSW 2150
Locked Bag 5022, Parramatta NSW 2124
www.dphi.nsw.gov.au
1

A.2 Appendix C – 2023 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.

Estimated life of mine: 0 years

Current development consents, leases and licences

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

Changes to Approvals

On 26 October 2023, licence condition P1.2 of EPL 765 was varied to update the location description for licence discharge point 16.

Land ownership and land use

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

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.

During 2023, rehabilitation works consisted of augmentation and repairs of existing rehabilitation, including erosion repairs and works to improve groundcover.

Rehabilitation progress is in accordance with previous annual rehabilitation report and forward program.

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 major rehabilitation planning activities were carried out in 2023.

Annual rehabilitation monitoring was completed in November 2023 - 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 2023. During 2023 subsidence inspections were attempted in February and May 2023, however due to the poor condition of the roads in Gardens of Stone SCA these inspections were only able to be partially completed. NPWS completed road repairs in the area by end 2023, and a subsidence inspection was able to be completed in December 2023.

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 February and March 2023.

* Spraying for St Johns Wort was completed in November 2023

* Erosion and sediment control works have been completed on site throughout the 2023 reporting period as required. Examples can be found in the 2023 Annual Review.

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.

On 4 April 2023, the Resources Regulator approved 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 8 November 2023.

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 2023 monitoring was undertaken by DnA Environmental from the 30th October – 3rd November 2023. The results from this monitoring are summarised in Table 8.2 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 2023 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;
- 2 sedgeland rehabilitation sites;
- 2 sedgeland reference sites;
- 8 pasture rehabilitation site transects; and

- 2 pasture reference site transects.

(Unfortunately sites associated with the ventilation shaft were unable to be accessed in 2022 or 2023 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 Table 8.1 in the Annual Review for performance of the mixed eucalypt woodland and pasture rehabilitation monitoring sites against primary completion performance indicators in 2023.

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 2023 Annual Ecological Rehabilitation Monitoring Report also recommends the following management actions:

- Addressing lack of groundcover and resulting erosion in Ben Bullen Creek rehabilitation areas;
- Weed control and increasing eucalypts at SOC5;
- Addressing the “hotspots” noted in the annual walkover;

- Targeting priority weeds onsite including Blackberry and St John's Wort; and
- Feral animal inspections and control.

Rehabilitation monitoring and maintenance work will continue during 2024.

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.