



BENGALLA MINE ANNUAL REVIEW 2024

Prepared by:

BENGALLA MINING COMPANY PTY LIMITED
LOCKED BAG 5
MUSWELLBROOK NSW 2333

Frazer, Hayley (BMC)

Annual Review Title Block

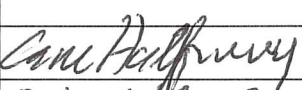
Name of operation	Bengalla Mine
Name of operator	Bengalla Mining Company Pty Limited
Development consent	SSD-5170 (as modified)
Name of holder of development consent	Bengalla Mining Company Pty Limited
Mining Leases	See Table 6
Name of holder of mining leases	Bengalla Mining Company Pty Limited
Water licences	See Table 6
Name of holder of water licences	Bengalla Mining Company Pty Limited and the Bengalla Joint Venturers (New Hope Bengalla Pty Limited in 8/10 share and Taipower Bengalla Pty Limited in 2/10 share)
Annual Review start date	1 January 2024
Annual Review end date	31 December 2024
I, Cam Halfpenny, certify that this audit report is a true and accurate record of the compliance status of Bengalla Mining Company Pty Limited for the period 1 January 2024 to 31 December 2024 (as described in Section 1 of this report) and that I am authorised to make this statement on behalf of Bengalla Mining Company Pty Limited. 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	Cam Halfpenny
Title of authorised reporting officer	General Manager
Signature of authorised reporting officer	
Date	31.12.2024

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ACRONYMS

ACARP	Australian Coal Association Research Programme
ACHMP	Aboriginal Cultural Heritage Management Plan
AGE	Australasian Groundwater and Environmental Consultants Pty Limited
AQMP	Air Quality Management Plan
ARD	Acid Rock Drainage
AS/NZS	Australian/New Zealand Standard
BDMP	Biodiversity Management Plan
Bengalla	Bengalla Mine
BJV	Bengalla Joint Venture
BMC	Bengalla Mining Company Pty Limited
BMP	Blast Management Plan
BOAs	Biodiversity Offset Areas
BOMP	Biodiversity Offset Management Plan
CCC	Bengalla Community Consultative Committee
CDF	Community Development Fund
CHPP	Coal Handling Preparation Plant
CO₂-eq	Carbon Dioxide Equivalent
CST	Community Support Team
CW1	Clean Water Dam 1
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment
DPHI	NSW Department of Planning, Housing and Infrastructure
DW1	Bengalla Discharge Dam (Existing), also referred to as EPA26 under EPL6538
EC	Electrical Conductivity
ED3	Mt Pleasant Environmental Dam 3
EIS	Environmental Impact Statement titled <i>Continuation of Bengalla Mine, Environmental Impact Statement</i> (6 volumes), dated September 2013, as modified by the <i>Response to Submissions</i> dated March 2014
EMS	Environment Management Strategy
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
EPBC	Environment Protection Biodiversity Conservation Approval
EPL 6538	Environment Protection Licence 6538
ERT	Emergency Response Team
FY	Financial Year (1 July - 30 June)
GDP	Ground Disturbance Permit
GHG	Greenhouse Gas
GJ	Gigajoule
Ha	Hectare
HDVV	High Density Woody Vegetation
HHMP	Historic Heritage Management Plan
HRSTS	Hunter River Salinity Trading Scheme

HVAS	High Volume Air Sampler
IEA	Independent Environmental Audit
IR	Infrared
LETA	Low Emissions Technology Australia
MAC	Mt Arthur Coal
MACH Energy	MACH Energy Australia Pty Ltd
Mbcm	Million Bank Cubic Meters
MEG	Department of Regional NSW, Mining Exploration and Geoscience
Mining Regulation	<i>Mining Regulation 2016</i> (NSW)
ML	Mining Lease (Followed by Number)
ML	Mega Litres (Preceded by Number)
MOD	SSD-5170 Modification (Followed by Number)
MSC	Muswellbrook Shire Council
Mt	Million Tonnes
Mtpa	Million Tonnes per annum
NGER	National Greenhouse and Energy Reporting
Night	Period between 10pm and 7am on Monday to Saturday and 10pm and 8am on Sundays
NMP	Noise Management Plan
NPI	National Pollutant Inventory
NSW	New South Wales
OEA	Overburden Emplacement Area
PIRMP	Pollution Incident Response Management Plan
PM₁₀	Particulate Matter less than 10 micrograms
PM_{2.5}	Particulate Matter less than 2.5 micrograms
POEO Act	Protection of Environment Operations Act 1997
RAP	Registered Aboriginal Party
Reporting Period	1 January 2024 - 31 December 2024
RL	Relative Level
RMP	Rehabilitation Management Plan
RMS	NSW Roads and Maritime Services
ROM	Run of Mine
RR	NSW Resources Regulator
Safeguard Mechanism	National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015 Cth
SEE (MOD1)	Statement of Environmental Effects titled 'Bengalla Mine Development Consent Modification Statement of Environmental Effects' dated August 2015 and prepared by Hansen Bailey, including the Response to Submissions document dated October 2015
SEE (MOD2)	Statement of Environmental Effects titled 'Bengalla Mine Development Consent Modification Statement of Environmental Effects' dated April 2016 and prepared by Hansen Bailey, including the Response to Submissions document dated June 2016
SEE (MOD3)	Statement of Environmental Effects titled 'Bengalla Mine Development Consent Modification 3 Statement of Environmental Effects' dated September 2016 and prepared by Hansen Bailey, including the Response to Submissions document dated November 2016
SEE (MOD4)	Statement of Environmental Effects titled 'Bengalla Mine Development Consent Modification 4 Statement of Environmental Effects' dated December 2017 and prepared

	by Hansen Bailey, including the Response to Submissions document dated May 2018 and additional information dated July 2018 and November 2018
SEE (MOD5)	Modification Report titled 'Bengalla Mine Modification 5 Report' dated November 2021 and prepared by Bengalla Mining Company Pty Limited, including the Response to Submissions document dated 29 July 2022 (Prepared by James Bailey & Associates)
SSD-5170 (as modified)	State Significant Development 5170
t	Tonnes
TEOM	Tapered Element Oscillating Microbalance
TfNSW	Transport for NSW
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
VMP	Visual Impact Mitigation Plan
VPA	Voluntary Planning Agreement
WAL	Water Access Licence
WMP	Water Management Plan

1 STATEMENT OF COMPLIANCE

1.1 INTRODUCTION

This Annual Review has been prepared to provide a summary of the environmental performance of Bengalla Mine (Bengalla) over the period 1 January 2024 – 31 December 2024 (Reporting Period). The compliance status of Bengalla against relevant approvals for the Reporting Period is summarised in **Table 1**.

Any non-compliances recorded during the Reporting Period were ranked according to the risk matrix included in **Table 2** and a brief description of each is provided in **Table 3**. Further information about the non-compliances is provided in **Section 11**.

The compliance status described in this Annual Review (**Section 1** and **Section 11**) relates to the conditions of the relevant approvals listed in **Table 1** during the Reporting Period.

Table 1: Statement of Compliance

Were all conditions of the relevant approvals complied with?	Yes/No
State Significant Development consent (SSD-5170 (as modified))	No
Rehabilitation Management Plan and Forward Program	No
Environment Protection Biodiversity Conservation (EPBC) Approval 2012/6378	No

Table 2: Non-Compliance Risk Matrix

Risk Level	Risk Level	Description
High	High	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Medium	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	Low	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	Administrative non-compliance	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).

Source: Annual Review Guideline, Post-approval requirements for State significant mining developments.
(NSW Government, October 2015)

Table 3: Non- Compliances in the Reporting Period

Approval	Cond. #	Condition Description (Summary)	Non-compliance Status*	Comment	Section described in this Annual Review
(1) EPBC Approval 2012/6378	Condition 4	The approval holder must secure the lands identified as the Offset Areas at Schedule 2 (Figures 1-6) of this notice as a biodiversity offset, in accordance with NSW Approval condition 28.	Administrative non-compliance	All Biodiversity Offset Areas identified in Schedule 2 (Figures 1-6) of the EPBC Approval are owned by the Bengalla Joint Venturers (BJV) and managed by BMC. All Biodiversity Offset Areas are managed in accordance with the BOMP. By letter dated 6 October 2020, the Secretary agreed to an extension of time until 30 June 2022 to finalise the long-term security of the Biodiversity Offset Areas under Schedule 3 Condition 28 of SSD-5170 (Condition 28). At this stage, the DPE has not granted a further extension in which to comply with Condition 28. BMC corresponded with the relevant NSW government departments during 2022 to determine the appropriate long-term mechanism for securing the offsets. Following that correspondence, BMC has taken steps to progress Biodiversity Stewardship Agreements (BSAs) for the offset areas. BMC notified the non-compliance with Condition 28 to DCCEEW on 7 September 2022. By letter dated 12 October 2022, DCCEEW advised that it had reviewed the matter and <i>“concluded that the issuing of an infringement notice would not be an appropriate course of action in this case. Consequently, no further action will be taken regarding this matter”</i>. During the reporting period, BMC further engaged Government Departments including the Department of Climate Change, Energy, the Environment and Water (DCCEEW) Nature Markets and Offset Division (Previously BCT) and the Department of Planning, Housing and Infrastructure (DPHI) regarding finalising the BSAs. The most recent	See Section 6.11 for further comments

Approval	Cond. #	Condition Description (Summary)	Non-compliance Status*	Comment	Section described in this Annual Review
				communication received by BMC from the BCT on 12 December 2024 acknowledging BMC are awaiting response from the BCT on this matter.	
(2) SSD-5170	Condition 28 of Schedule 3	Implementation for long term security for biodiversity offsets	Administrative non-compliance	Commentary as per the above.	See Section 6.11 for further comments
(3)	Condition 6 of EPBC Approval 2012/6378 Condition 23 of Schedule 3 of SSD 5170 Condition L1 of EPL 6538	Protection of waters	Non-compliance	On 24 July 2024, BMC experienced a discharge of sediment laden water from site during the decommissioning of a small sediment dam associated with the construction of an on-site clean water diversion drain. Notifications under the relevant authorities were immediately made to the NSW Environmental Protection Authority (EPA), NSW Department of Planning, Housing and Infrastructure (DPHI) and the federal Department of Climate Change Energy, the Environment and Water (DCCEEW) as required. BMC was issued a Penalty Infringement Notice and Official Caution from the NSW Environmental Protection Authority	See Section 11.1.1 for further comments

2 INTRODUCTION

This section provides an overview of Bengalla, outlines the purpose of this Annual Review, and provides contact details for relevant BMC personnel.

2.1 BACKGROUND

Bengalla Mining Company Pty Limited (BMC) operates Bengalla in the Upper Hunter Valley of New South Wales (NSW), approximately 130 km north-west of Newcastle and 4 km west of the township of Muswellbrook, as illustrated in **Figure 1** and **Figure 2**.

On 7 August 1995, the then Minister for Urban Affairs and Planning granted Development Consent DA 211/93 for the construction and operation of a surface coal mine, coal preparation plant, rail loop, loading facilities and other associated infrastructure (which was subsequently modified on various occasions). DA 211/93 was surrendered to the NSW Department of Planning and Environment (DPE) (now Department of Planning, Housing and Infrastructure (DPHI)) in December 2016 following the grant of SSD-5170.

On 3 March 2015, the Secretary of what is now the DPHI, as delegate for the Minister for Planning, granted SSD-5170 for the continuation of Bengalla to 2039 at a rate of up to 15 Mtpa Run of Mine (ROM) coal production. BMC commenced operations under SSD-5170 on 1 October 2015. Since 2015, five modifications to SSD-5170 have been approved with the latest Mod 5 being approved in February 2023.

The approved Bengalla layout is shown on **Figure 3**, mining leases held by BMC are shown on **Figure 4**. The location of the approved Biodiversity Offset Areas in relation to Bengalla is shown on **Figure 8**.

2.2 DOCUMENT PURPOSE

This Annual Review summarises the environmental performance of Bengalla for the Reporting Period. Subject to comments below, the requirements of SSD-5170 and mining leases held by BMC relevant to the preparation of this Annual Review and where they have been addressed in the document are included in

Table 4.

The structure and content of this Annual Review was prepared in accordance with the '*Annual Review Guideline, Post-Approval requirements for State significant mining developments*' (NSW Government, October 2015) (Guidelines).

The 2024 Annual Rehabilitation Report will be submitted by 31 March 2025.

Table 4: Development Consent and Mining Lease Requirements for Annual Review

Document	Where Addressed
SSD-5170 (Schedule 5, Condition 4)	
4. By the end of March each year (or as otherwise agreed by the Secretary), the Applicant must review the environmental performance of the development for the previous calendar year to the satisfaction of the Secretary. This review must:	This document
a) describe the development (including any rehabilitation) that was carried out in the past calendar year, and the development that is proposed to be carried out over the current calendar year;	Sections 8 and 12
b) include a comprehensive review of the monitoring results and complaints records of the development over the past year, which includes a comparison of these results against: - relevant statutory requirements, limits or performance measures/criteria; - monitoring results of previous years; - relevant predictions of the EIS;	Sections 6 to 9
c) identify any non-compliance over the last 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 development;	Sections 6 to 8
e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and	Sections 6 to 8
f) describe what measures will be implemented over the next year to improve the environmental performance of the development.	Section 12

BMC CONTACTS

The relevant contacts for environmental management at Bengalla are outlined in **Table 5**.

Table 5: BMC Contacts

Contact	Contact Details
Cam Halfpenny General Manager	Phone: 02 6542 9500 Email: cam.halfpenny@newhopegroup.com.au
Hayley Frazer Environment Superintendent	Phone: 02 6542 9500 Email: hayley.frazer@newhopegroup.com.au
BMC Website (Copies of public notices, environmental management documents, monitoring results and other information relating to Bengalla's operations)	https://newhopegroup.com.au/bengalla-mining-company/
Phone	Bengalla General Enquiries 02 6542 9500; or Community Complaints Hotline 1800 178 984.



Figure 1: Regional Locality

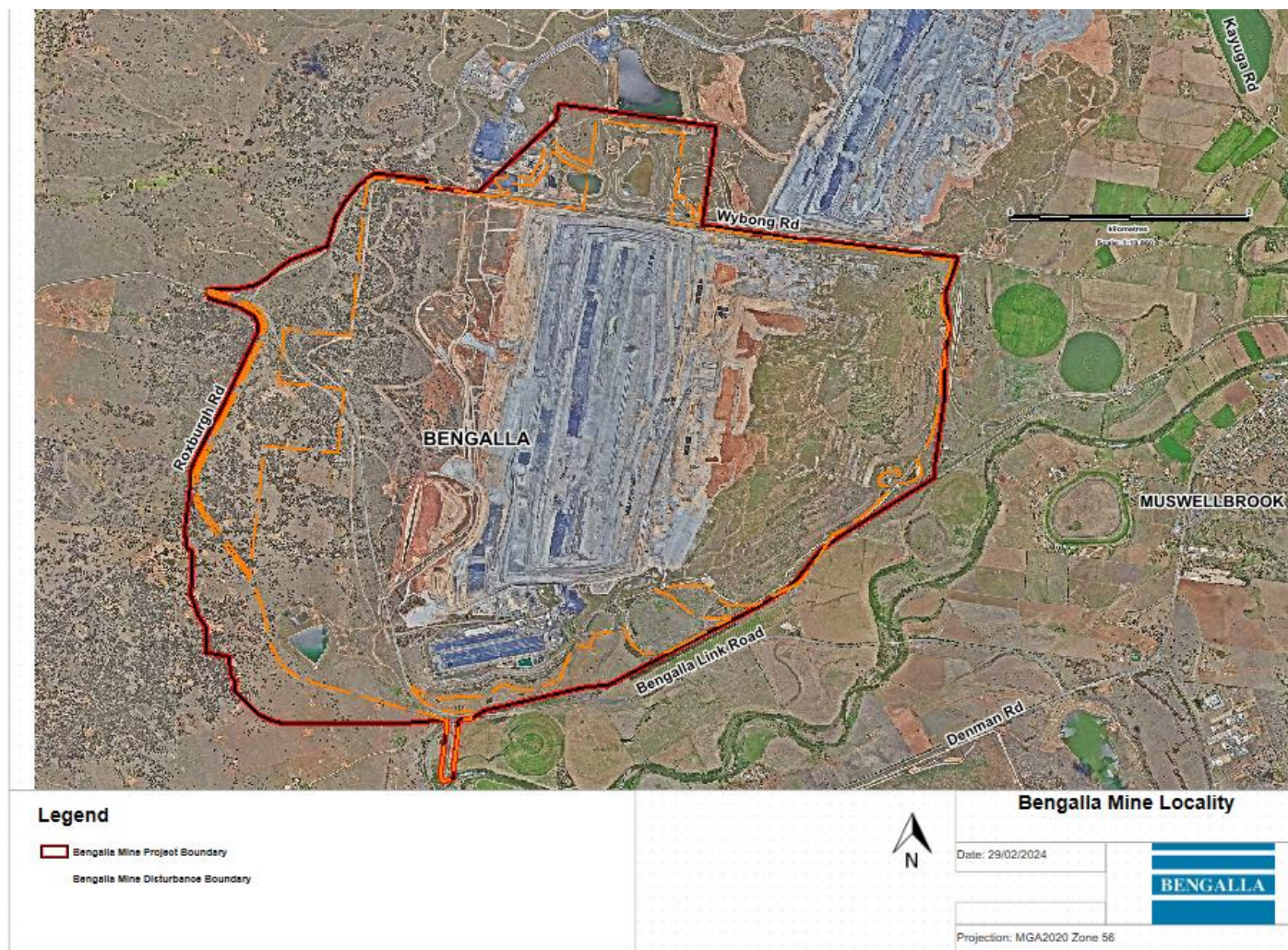
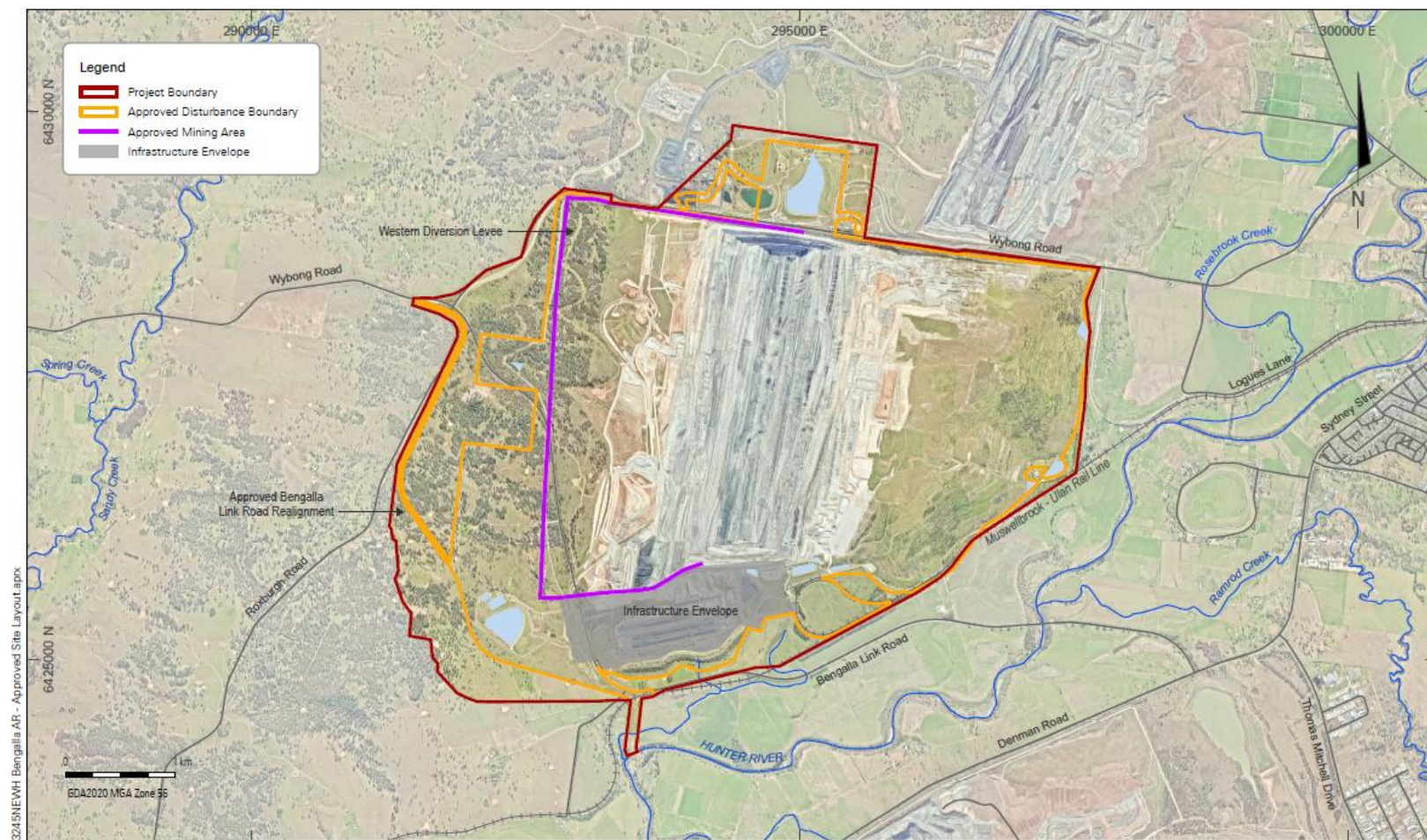


Figure 2: Muswellbrook Locality

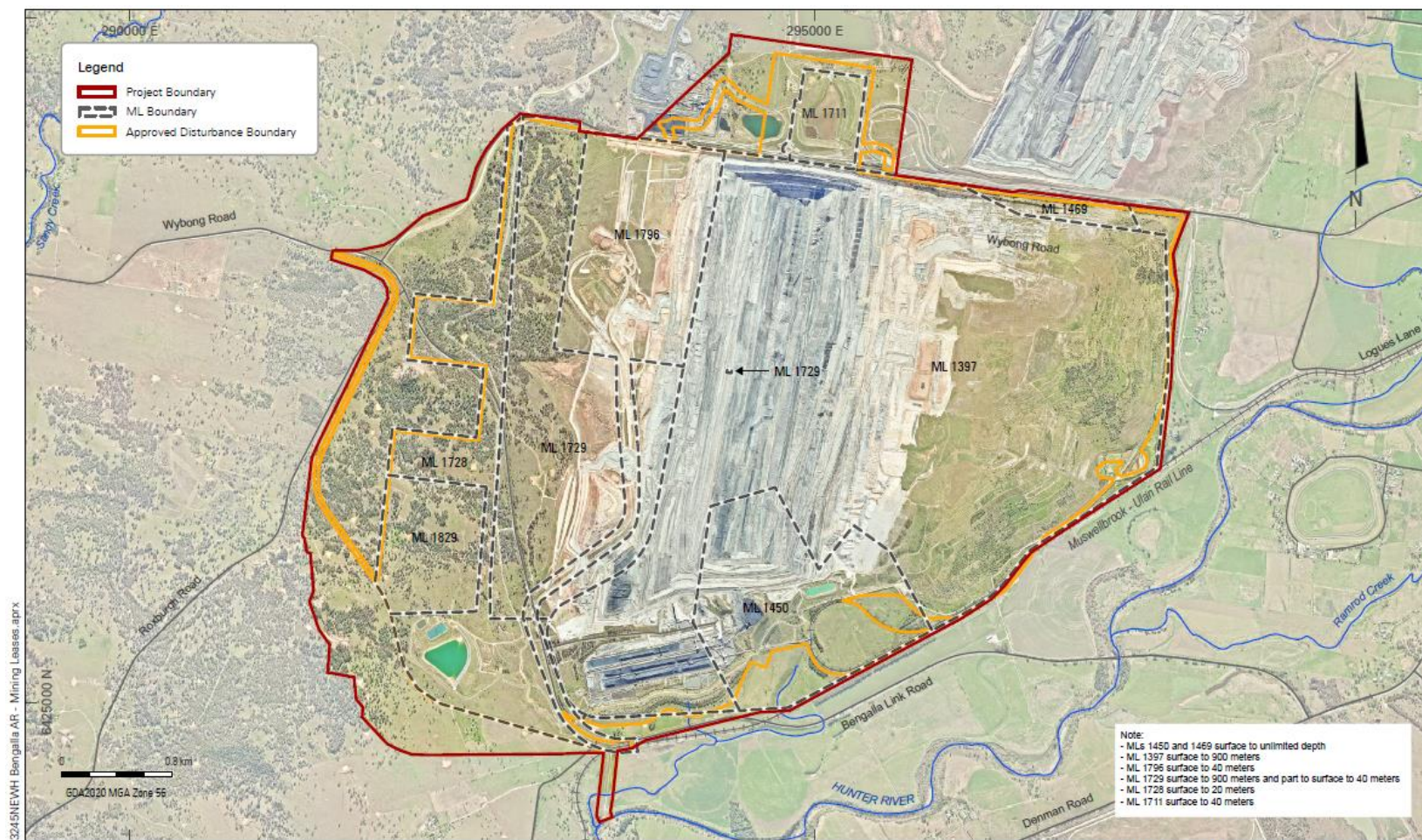


BENGALLA MINE ANNUAL REVIEW

Approved Site Layout



Figure 3: Approved Site Layout



BENGALLA MINE ANNUAL REVIEW

Mining Leases



Figure 4: Mining Leases

3 APPROVALS

This section provides a summary of leases, licences and approvals that regulate operations at Bengalla.

3.1 OVERVIEW

A summary of the key mining leases, licences and approvals for activities at Bengalla during the Reporting Period is provided in **Table 6**. Copies of the Bengalla approvals and supporting documentation are available on the BMC website: <https://newhopegroup.com.au/>

Table 6: Bengalla Approvals Summary

Document	Approval Period(s)	Authority
Development Consent SSD-5170 (as modified)	03/03/2015 – 28/02/2039*	DPHI
Development Consent SSD-5170 MOD 1 – approved 16 December 2015	03/03/2015 – 28/02/2039	DPHI
Development Consent SSD-5170 MOD 2 – approved 1 July 2016	03/03/2015 – 28/02/2039	DPHI
Development Consent SSD-5170 MOD 3 – approved 23 December 2016	03/03/2015 – 28/02/2039	DPHI
Development Consent SSD-5170 MOD 4 – approved 19 December 2018	03/03/2015 – 28/02/2039	DPHI
Development Consent SSD-5170 MOD 5 – approved 24 February 2023	03/03/2015 – 28/02/2039	DPHI
DA 273/2006 – Explosives Facility	06/09/2006 – Perpetuity	Muswellbrook Shire Council (MSC)
EPBC Act 1999 Cth Approval 2012/6378	27/05/2015 – 31/12/2050	Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW)
Mining Lease (ML) 1397	27/06/1996 – 27/06/2038	Department of Regional NSW, Mining Exploration and Geoscience (MEG)
ML 1450	10/06/1999 – 09/06/2043	MEG
ML 1469	05/06/2000 – 04/06/2042	MEG
ML 1711	29/09/2015 – 17/12/2031	MEG
ML 1728	10/02/2016 – 10/02/2037	MEG
ML 1729	10/02/2016 – 10/02/2037	MEG
ML 1796	30/03/2021 – 17/12/2031	MEG
Exploration Licence (EL) 9431	04/07/2022 – 04/07/2028	MEG
EPL 6538	Anniversary Date 11 September	NSW Environment Protection Authority (EPA)
Water Access Licence (WAL) 1106**	Tenure Continuing	Water NSW
WAL 41547 (formerly 20BL169798)***	Tenure Continuing	Water NSW
20PE001354 (Hunter Pump River Permit)	01/05/1997 – Annual Renewal	Water NSW

Document	Approval Period(s)	Authority
XSTR200130 (Licence to Store Explosives)	10/08/2022 – 07/08/2027	SafeWork NSW
5061036 (Radiation Management Licence)	Expiry date: 08/08/2025	NSW EPA

* Schedule 2, Condition 5 of SSD-5170 provides that mining operations may be carried out until 28 February 2039. The consent continues to apply in all other respects other than the right to conduct mining operations until rehabilitation and other relevant obligations have been carried out satisfactorily.

** WAL 1106 is for the Hunter Regulated River Water Source (High Security with 1,449 units).

*** WAL 41547 is for the Sydney Basin-North Coast Groundwater Source (category aquifer with 365 units) authorising extraction of groundwater from the pit. These are the main WALs used in connection with take of water for mining operations at Bengalla. The Bengalla Joint Venturers (BJV) and BMC also hold other WALs for various water sources.

3.2 PENDING APPLICATIONS AT END OF REPORTING PERIOD

The following applications were made during the Reporting Period and were pending as at 31 December 2024:

- Application for modification of Development Consent SSD-5170 (Modification 7).

3.3 VARIATIONS

No variations were issued during the reporting period.

3.4 STATUS OF MANAGEMENT PLANS

Table 7 outlines the environmental management plans and the approval status of each at the end of the Reporting Period.

Table 7: Status of BMC Management Plans

Management Strategy / Plan	Regulatory Approval
Aboriginal Cultural Heritage Management Plan (ACHMP)	18 August 2017
Air Quality Management Plan (AQMP)	14 December 2022
Biodiversity Management Plan (BDMP)	18 August 2017
Biodiversity Offset Management Plan (BOMP)	18 August 2017
Blast Management Plan (BMP)	22 August 2023
Environmental Management Strategy (EMS)	24 August 2023
Historic Heritage Management Plan (HHMP)	18 August 2017
Rehabilitation Management Plan (RMP)	19 January 2024
Forward Program	28 March 2024*
Noise Management Plan (NMP)	10 August 2023
Visual Impact Mitigation Plan (VMP)	30 March 2016
Water Management Plan (WMP)	21 December 2023
Pollution Incident Response Management Plan (PIMP)	5 February 2024*

* Forward Program and Pollution Incident Response Management Plan are not subject to approval of the Secretary.

4 OPERATIONS SUMMARY

This section provides a summary of exploration, mining and other activities undertaken at Bengalla during the Reporting Period. It also includes a summary of operations proposed for 2024.

4.1 MINING OPERATIONS

During 2024, mining operations at Bengalla continued to progress to the west as approved by SSD-5170.

Table 8 provides actual waste rock, ROM coal, reject material and saleable product volumes for 2023 and 2024 and forecast volumes for 2025.

Table 8: Production and Waste Summary

Material	Unit	Approved Limit	Previous Reporting Period (2023 Actual)	This Reporting Period (2024 Actual)	Next Reporting Period (2025 Plan)
Waste Rock / Overburden	Mbcm	-	60.34	58.39	61.79
ROM Coal	Mt	15	12.01	13.74	12.95
Reject Material	Mt	-	3.03	3.74	4.27
Saleable Product	Mt	-	9.66	10.51	10.30

Notes:

1. Forecast data sourced from Forecast Plans.
2. Waste Rock/Overburden is prime waste.
3. Reject material includes fine and coarse material.

4.2 OTHER OPERATIONS

Mining operations at Bengalla occur 24 hours a day except Christmas Day and Boxing Day. Rail activities operate 24 hours a day dependent upon rail schedules.

Exploration drilling: Bengalla complete (as part of normal mining operations) coal quality exploration drilling to inform mine planning. BMC is undertaking an exploration program within ML 1729 and EL9431. Activities within EL9431 are subject to separate Annual Activity Report in accordance with the licence conditions and the approval to undertake Assessable Prospecting Operations (APO0001424) granted on 20 November 2023, however a summary is included. During the 2024 reporting period, in ML 1729 and ML 1796 a total of 20 boreholes were drilled. 1 hole was cored and sampled for gas content and composition for fugitive gas emissions modelling, 1 cored hole was drilled for geotechnical investigation, another 10 holes were cored for coal quality testing, and 8 holes were rotary-open chipped holes for structure definition.

During the calendar year of 2024 in EL9431 a total of 25 boreholes were drilled, including 11 cored holes sampled for coal quality, 3 cored holes sampled for gas content and composition and 11 rotary-open chipped holes, targeting structure. All holes targeted down to the Edinglassie seam, except for the 3 gas holes, which targeted the Ramrod Creek seams.

Coal Transport: During the Reporting Period, 10,604,467 tonnes (t) of product coal were transported via rail to the Port of Newcastle.

The total number of train movements during the Reporting Period was 1,170 with a maximum of 6 train movements per day.

Infrastructure, Construction and Management

The following projects were commenced, progressed or completed during the Reporting Period:

- Bengalla Link Rd Refurbishment Completed.
- In Pit Water Cart Fill Point – Completed.
- New Coal Handling Preparation Plant (CHPP) Building – Completed.
- New Infrastructure Workshop – Completed.
- Undercover Employee Carpark – Completed.
- Western Diversion Levee Stage 2 – Completed.
- Old Bengalla Road refurbishment – Completed.
- Third In-Pit water cart fill point - Scheduled for completion 2025.

4.3 EMPLOYMENT AND OTHER DETAILS

As of 31 December 2024, we had a total of 729 permanent employees and 237 CAT 1 contractors. Of the 729 permanent employees, 87% reside in the Muswellbrook, Upper Hunter and Singleton LGAs.

4.4 NEXT REPORTING PERIOD

Forecast mining operations and related activities for the next reporting period include:

- Continue open cut coal mining westward.
- Pre-production and exploration drilling.
- Rehabilitation according to the RMP and Forward Program.
- Clean water diversion drain (Western Diversion Levee) Stage 3 construction.
- CHPP and other infrastructure upgrades.

A summary of key environmental approval and management activities proposed for 2025 is provided in **Section 12**.

5 ACTION REQUIRED FROM PREVIOUS ANNUAL REVIEW

BMC received correspondence from the NSW Department of Planning and Environment on 9 October 2024, stating that the Department had reviewed the 2023 Annual Review and considered it generally satisfied the requirements of the consent and the NSW Planning Annual Review Guideline (October 2015). The letter also requested BMC provide the following in the next (2024) Annual Review in accordance with Schedule 2, Condition 3 of SSD-5170.

Table 9: 2023 DPHI Annual Review Requested Information

Information request from DPHI	Section addressed in the 2024 Annual Review
Biodiversity Offset Strategy (BOS) – please report on the progress of the long-term security for the land within the BOS.	Update on retirement of credits and progress to Stewardship Agreements provided in Section 6.11.2
Community complaints – please report on complaint trends and compare to previous 5 years.	Figure 13 provided in Section 9.3

6 ENVIRONMENTAL MANAGEMENT AND PERFORMANCE

This section describes BMC's environmental monitoring, management and performance during the Reporting Period. Environmental management actions planned to be implemented in 2025 are also described.

*Surface water and groundwater environmental management and performance are discussed in **Section 7.2** and **Section 7.3**, respectively. Rehabilitation is discussed in **Section 8**.*

6.1 METEOROLOGY

6.1.1 Environmental Management

BMC operates a meteorological station and inversion tower in accordance with the requirements of SSD-5170 and EPL 6538 (see Error! Reference source not found.).

Maintenance and calibration activities were completed on the meteorological station on 20/02/2024, 27/05/2024, and 4/09/2024.

6.1.2 Environmental Performance

Wind speed, wind direction, air temperature, relative humidity, solar radiation, rainfall are recorded at the meteorological station. A summary of monthly rainfall, temperatures and wind roses being part of the 2024 meteorological data is included as **Appendix A**.

6.1.3 Further Actions

There are no major actions planned for 2025 regarding meteorological monitoring. BMC will continue routine maintenance and calibration activities.

6.2 NOISE

6.2.1 Environmental Management

BMC manages noise in accordance with the approved NMP, which describes measures for monitoring and managing noise from Bengalla.

Three methods of noise monitoring are utilised at Bengalla being:

- compliance attended noise monitoring;
- supplementary attended monitoring; and
- unattended (real-time) monitoring.

6.2.2 Environmental Performance

Compliance Attended Noise Monitoring

During the Reporting Period, compliance attended monitoring was undertaken by an appropriately qualified acoustic consultant nominally once per calendar month (but at least two weeks apart) during the night period (10 pm to 7 am) at three locations representative of the nearest private residences being AN01, AN03 and AN04 (see **Figure 5**).

The NMP outlines the applicable criterion for each of the three monitoring locations. Bengalla noise was measured at each monitoring location and assessed against the applicable criterion (see **Appendix B**).

Supplementary Attended Monitoring

Supplementary attended monitoring continued to be undertaken during the Reporting Period for night periods. Measurements are recorded by BMC personnel at five monitoring locations, including the compliance attended monitoring sites.

Results from the supplementary attended monitoring are not used to determine compliance, however, will result in operational change where and if monitoring deems necessary.

Unattended (Real-time) Monitoring

BMC operates two continuous, unattended real-time noise monitoring units as a management tool. The locations of the two real-time noise monitoring units are shown on **Figure 5**.

The noise levels recorded at the real-time monitors are not used to determine compliance, however, are used for operational management as described in the BMC Noise Management Plan.

Noise Monitoring Results

Compliance with noise criteria in SSD-5170 was assessed via the compliance attended noise monitoring program. No exceedances of the noise monitoring criteria were recorded during the Reporting Period. A summary of the compliance criteria and compliance attended noise monitoring results for 2024 is provided in **Appendix B**.

Trend over Life of Project

Average noise levels at AN01, AN03 and AN04 during the Reporting Period had consistent with the previous reporting periods and continue to remain within the noise compliance criteria (see **Table 10**).

Table 10: 2021-2024 Noise Trends

Location	Noise Criteria dBA	BMC Only LAeq dBA							
		2024		2023		2022		2021	
		Ave	Max	Ave	Max	Ave	Max	Ave	Max
AN01	35	28.2	33	30	38 ¹	29.4	35 ¹	30	42 ¹
AN03	40	31.1	37	32.3	34	32	36	36.7	48 ¹
AN04	35	33.4	40 ¹	33	37 ¹	32.2	36 ¹	36.5 ²	49 ¹

1 Maximum monthly results that exceeded criteria were assessed and re-tested as per the requirements of the NMP and determined to be not licensable due to invalid meteorological conditions. No exceedances recorded in the relevant reporting periods.

2 Average monthly result for AN04 in 2021 above criteria due to elevated results during five sampling events where meteorological conditions were not licensable. No exceedances recorded in the 2021 reporting period.

Comparison to Assessment Predictions

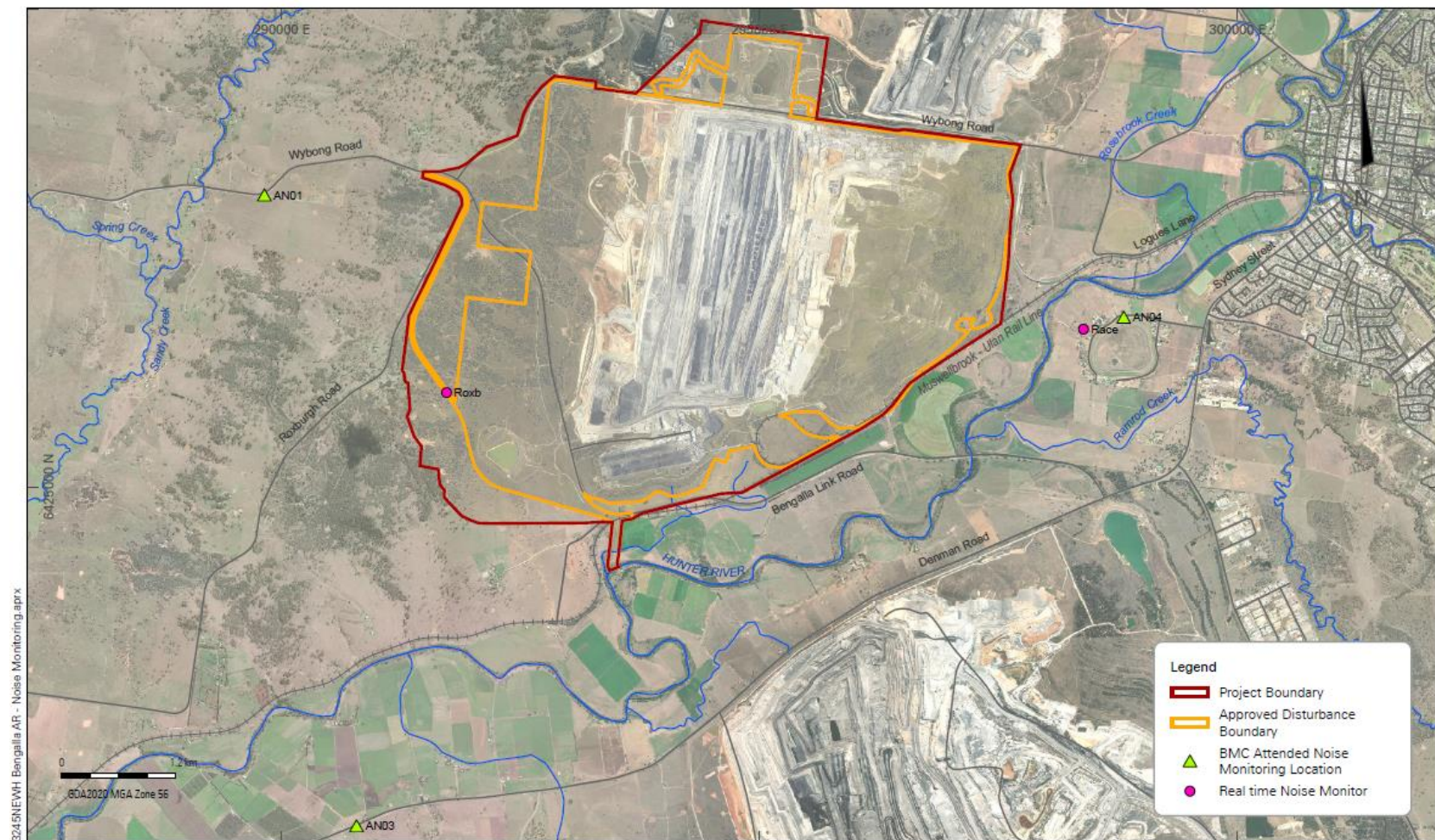
Noise monitoring results recorded during the Reporting Period were generally consistent with the predictions in the Environmental Impact Statement for the Bengalla Continuation of Mining Project (EIS).

Private Residence Mitigation

In accordance with Schedule 3, Condition 3 of SSD-5170, BMC is required to implement reasonable and feasible noise mitigation measures upon receiving a written request from the owner of relevant residences listed in SSD-5170. No such noise mitigation requests were received during the Reporting Period.

6.2.3 Further Actions

BMC will continue to implement the NMP in accordance with SSD-5170. If amendments to the NMP are required, BMC will lodge the revised NMP with relevant regulatory agencies for comment and then with the DPHI for approval.



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Noise Monitoring Network



Figure 5: Noise Monitoring Network

6.3 BLASTING

6.3.1 Environmental Management

BMC manages blasting according to the approved BMP, which describes measures for blast monitoring and management at Bengalla. Fume generation is managed in accordance with BMC's Post Blast Fume Generation Mitigation and Management Plan.

6.3.2 Environmental Performance

Blast Monitoring Program

Schedule 3, Condition 10 of SSD-5170 allows a maximum of 2 blasts per day and 6 blasts per week, averaged over a calendar year (except in certain circumstances). A blast refers to a single blast event, which may contain a number of individual blasts.

A total of 180 blast events occurred during the Reporting Period with no more than 2 blasts per day and 6 blasts per week when averaged over a calendar year. Blast overpressure and vibration criteria are presented in **Table 11**, with monitoring locations shown on **Figure 6**.

In accordance with the BMP, blast monitoring is now undertaken at 21 blast monitors that record the following data for each blast event:

- Time and date;
- Peak vector sum (mm/s);
- Air overpressure peak (dB Linear Peak) where applicable; and
- Waveform trace, where applicable.

Assessment of compliance with blast criteria for privately owned residences is undertaken at one blast monitor located on non-mine owned land being MRE (see **Table 11**).

Blast Monitoring Results

A summary of performance against the applicable blasting criteria for the Reporting Period is provided in **Table 12** with monitoring results for locations representative of private receivers included in **Appendix C**. During the Reporting Period, results from the compliance blast monitor in EPL 6538 on non-mine owned land (MRE) did not exceed relevant criteria for overpressure or ground vibration.

During 2024, no fume event in relation to blasting was reported to the relevant Authorities.

Trend and Comparison to Assessment Predictions

Table 12 details the 2024 blast performance compared to 2023 and 2022. A review of blast monitoring measurements over the period 2022 – 2024 indicates that results have remained generally consistent throughout that period.

The EIS predicted that blasting at Bengalla is unlikely to exceed relevant ground vibration and overpressure criteria. The blasting results in **Appendix C** show no exceedances of the blast criteria for compliance monitors.

Table 11: Blast Monitoring Locations and Criteria

Location	Blast Monitoring ID	Criteria	
		Vibration	Overpressure
Private Receivers			
Moore	MRE	10 mm/s and 5% ≥ 5mm/s	120 dB (linear Peak) and 5% ≥ 115dB (linear Peak)
Mine Owned Historic Heritage Site Monitoring Locations			
Edinglassie Homestead	EGL	10 mm/s	120 dB (linear Peak)
Overdene Homestead	CTR		
Bengalla Homestead	BHS		
ARTC Infrastructure			
Wantana	WAN	100 mm/s	-
Dam Monitoring Locations			
Environmental Dam	ED3	100 mm/s	-
Clean Water Dam	CW1	100 mm/s	-
Discharge Water Dam	DW1	50 mm/s	-

Table 12: Blast Performance Summary 2022-2024

	2024		2023		2022	
Blast Summary	Number of Blasts	% of Blasts	Number of Blasts	% of Blasts	Number of Blasts	% of Blasts
Total blasts	180		175		172	
Average number of blasts per week	3.5		3.4		3.2	
Days with 2 blast events	30	16.7	29	16	25	15
Days with 3 blast events	3	1.7	0	0	0	0
Number of road closures – Wybong Road	33	17.7	45	26	40	23
Number of road closures – Bengalla Road	4	2	2	1	0	0
Number of rail loop closures	0	0	0	0	0	0
Number of blast events within Clean Water Dam 1 (CW1) Notification Area	57	30.6	71	41	60	35
Number of blast events within Mt Pleasant Environmental Dam 3 (ED3) Notification Area	56	30.1	71	41	60	35
Number of blast events within Dirty Water Dam (DW1) Notification Area	11	5.9	2	1	60	35
• Private Receivers Monitoring Locations Vibration (10 mm/sec)	0	0	0	0	0	0
• Private Receivers Monitoring Locations Vibration (5 % $\geq 5\text{mm/sec}$)	0	0	0	0	0	0
• Private Receivers Monitoring Locations Overpressure (120dB)	0	0	0	0	0	0
• Private Receivers Monitoring Locations Overpressure (5% $\geq 115\text{dB}$)	0	0	1	0.6	5	3
• Historic Heritage Site Monitoring Locations Vibration (10 mm/sec)	0	0	0	0	0	0
• Historic Heritage Site Monitoring Locations Overpressure (120 dB)	0	0	0	0	0	0
• ARTC Infrastructure (100 mm/sec)	0	0	0	0	0	0
Blast result capture rate, all non-mine owned monitors	180	100	175	100	172	100
Fume events ($\geq$ Rating 3)	1	0.5	4	2	8	5

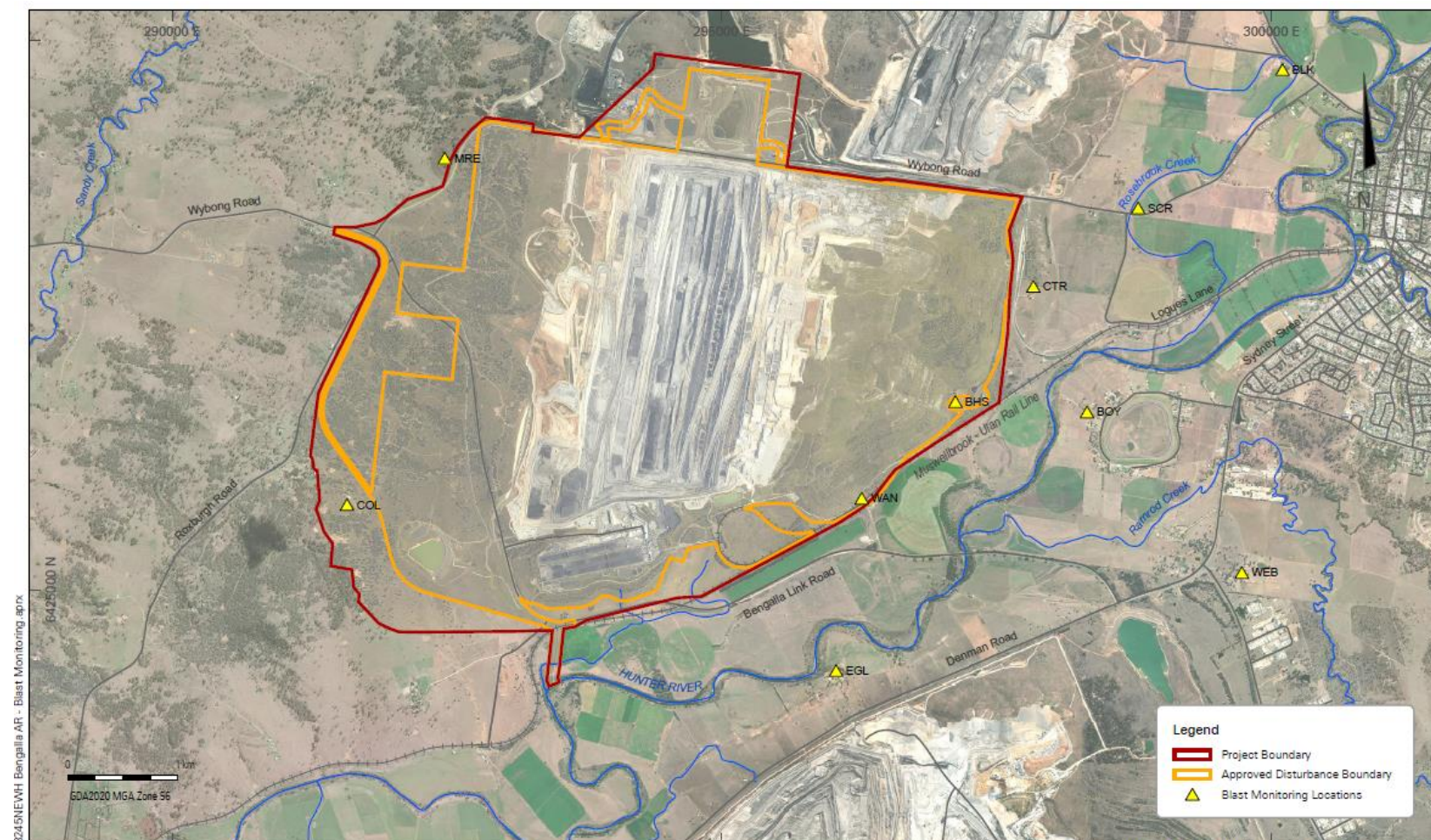
Property Investigation Report

Schedule 3, Condition 12 of SSD-5170 requires a property investigation to be commissioned within 2 months of receiving a claim by the owner of privately-owned land within 3 kilometres of the approved open cut mining area that buildings and/or structures on the land have been damaged as a result of blasting on site.

BMC did not receive a written request for a property investigation from any property owners during 2024.

6.3.3 Further Actions

Any additional blasting actions planned for implementation in 2025 will be in accordance with the BMP and interactions with other mines.



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Blast Monitoring Network



Figure 6: Blast Monitoring Network

6.4 AIR QUALITY

6.4.1 Environmental Management

BMC manages air quality according to the approved AQMP, which sets out procedures management of odour, dust and greenhouse gas emissions at Bengalla.

6.4.2 Environmental Performance

Air Quality Monitoring Program

SSD-5170 sets out air quality criteria for Particulate Matter less than 10 microns (PM₁₀), Particulate Matter less than 2.5 microns (PM_{2.5}), Total Suspended Particulates (TSP) and deposited dust. Compliance with these criteria is assessed via BMC's air quality monitoring network approved under the AQMP. As described further below, EPL 6538 also requires air quality monitoring for PM₁₀ at certain locations.

During the reporting period, the interim air quality monitoring program approved under section 6.2.3 of the AQMP (2022) was implemented. The interim air quality monitoring network as shown in **Figure 7**, comprises of:

- One meteorological station and one inversion tower.
- Three real-time air quality monitors (E-Bam monitors), linked to the Real Time Environment Management System. These monitors are used as operational management tools.
- Four High Volume Air Samplers (HVAS) with two measuring TSP and two measuring PM₁₀. The HVAS monitors are used to measure compliance against the relevant criteria in SSD-5170 (as modified).
- 3 Deposition Dust Gauges were used to measure compliance against the relevant criteria in SSD-5170.
- PM_{2.5} is currently monitored through the Upper Hunter Air Quality Monitoring Network Muswellbrook monitor.
- BMC is also required to monitor PM₁₀ at EPA22 and EPA24 in accordance with EPL 6538. Monitoring points EPA22 and EPA24 remain in place and are located on the primary wind axis relative to Bengalla.

During 2024, eight Tapered Element Oscillating Microbalance (TEOMs) were installed. The TEOMs will measure varying combinations of PM_{2.5} and PM₁₀ concentration limits from locations around Bengalla. All units were assembled offsite, delivered, and installed onsite. Four units were commissioned during the reporting period and are currently undergoing testing, with the remaining units to be activated progressively.

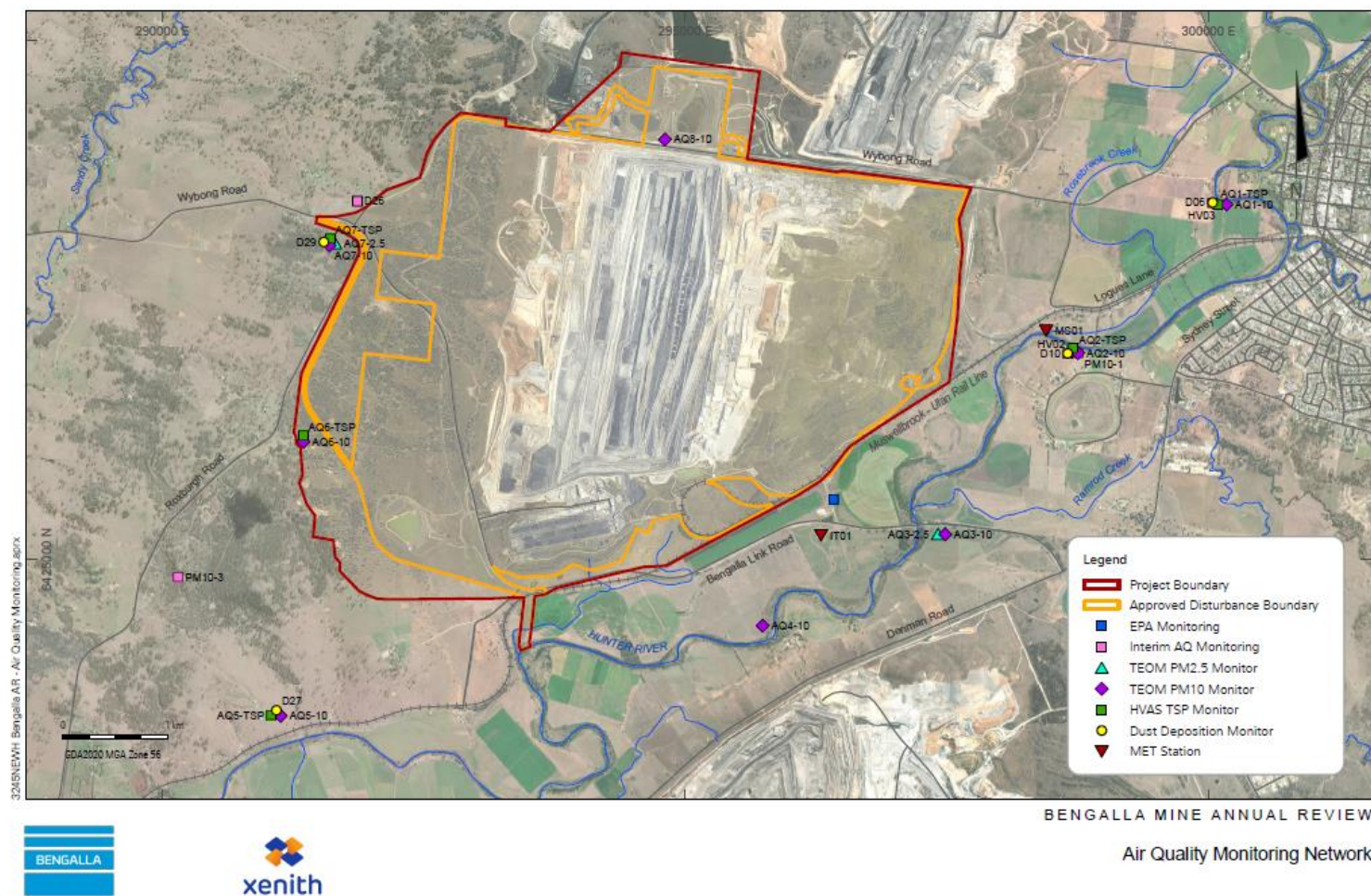


Figure 7: Air Quality Monitoring Locations

Figure source: AQMP (2022)

Air Quality Monitoring Results

There were no exceedances of the annual average air quality criteria for TSP, PM₁₀, PM_{2.5} or deposited dust under Schedule 3, Condition 16 of SSD-5170 for the reporting period.

Elevated PM₁₀ 24-hour all source measurements were recorded at PM-1 and PM-3 on various dates during the Reporting Period. DPE (now DPHI) was notified on each occasion and an air quality expert was engaged to prepare an investigation report. In all cases, the expert concluded that BMC had complied with Schedule 3, Condition 16. Further details about the PM₁₀ 24-hour investigation reports are provided in **Section 11.2**.

Detailed air quality monitoring results for 2024 are included in **Appendix D**. A summary of the 2024 monitoring data is presented below.

- Deposited Dust

Table 13 details annual average deposited dust monitoring results for the Reporting Period (and for the previous two years). All compliance dust gauges recorded results for 2024 that are compliant with the applicable criteria for annual average total deposited dust (4g/m²/month). The annual increase in deposited dust levels were -1.8 g/m²/month for D06, -0.9 g/m²/month for D10 and 0.5 g/m²/month for D26 indicating compliance with the maximum annual increase in deposited dust levels (2g/m²/month).

Table 13: Summary of Deposited Dust Annual Average Monitoring Results

Site	Annual Average Deposited Dust Criteria (g/m ² /month)	2022 Annual Average Deposited Dust (g/m ² /month)	2023 Annual Average Deposited Dust (g/m ² /month)	2024 Annual Average Deposited Dust (g/m ² /month)
D06	4.0	1.4	3.4	1.6
D10	4.0	1.6	3.1	2.2
D26	4.0	1.5	1.8	2.3
D27 ¹	4.0	-	-	4.1 ²
D29 ¹	4.0	-	-	2.5 ²

¹ New depositional dust gauge locations (D27 (May 2024) & D29 (May 2024)) installed through the reporting as required under the AQMP.

² Results are an average of the incomplete year and therefore not assessed against annual average.

- TSP

Table 14 details annual average TSP monitoring results for the Reporting Period (and for the previous two years). All TSP compliance monitors recorded results for 2024 that are compliant with the applicable criterion for annual average TSP (90 µg/m³). This criterion excludes extraordinary events; however, the occurrence of extraordinary events was not examined for the Reporting Period as the monitoring results were already below 90 µg/m³.

Table 14: Summary of Annual Average TSP Monitoring Results

Site	Annual Average TSP Criteria ($\mu\text{g}/\text{m}^3$)	Period	2022 Annual Average TSP ($\mu\text{g}/\text{m}^3$)	2023 Annual Average TSP ($\mu\text{g}/\text{m}^3$)	2024 Annual Average TSP ($\mu\text{g}/\text{m}^3$)
HV2	90	All run days	48.2	85.1	61.2
		Excluding extraordinary events	-	-	-
HV3	90	All run days	34.5	51.5	41.1
		Excluding extraordinary events	-	-	-

- PM₁₀

Table 15 presents PM₁₀ annual average monitoring results for the Reporting Period and the previous two years. The cumulative annual average PM₁₀ concentration for the Reporting Period was below the annual average criterion (25 $\mu\text{g}/\text{m}^3$) at all compliance monitoring sites.

Table 15: Summary of Annual Average PM10 Monitoring Results

Site	Annual Average PM10 Criteria ($\mu\text{g}/\text{m}^3$)	Period	2022 Annual Average PM10 ($\mu\text{g}/\text{m}^3$)	2023 Annual Average PM10 ($\mu\text{g}/\text{m}^3$)	2024 Annual Average PM10 ($\mu\text{g}/\text{m}^3$)
TPM-1	25	All Run days	16.5	28.5*	20.6
		Excluding extraordinary events	-	-	-
PM-3	25	All Run days	16.0	26.1*	21.6
		Excluding extraordinary events	-	-	-

* Value represents monitored results. Further investigation indicated results were below criterion as described in Section 0

- PM_{2.5}

As detailed in the approved AQMP (2022), during the Reporting Period BMC relied upon the Upper Hunter Air Quality Monitoring Network to record and monitor PM_{2.5} concentrations. The monitor utilised by BMC is the Muswellbrook monitor located approximately 5 km east of Bengalla. The cumulative annual average PM_{2.5} concentration for the Reporting Period at the Muswellbrook monitor was 7.1 $\mu\text{g}/\text{m}^3$, below the criterion of 8 $\mu\text{g}/\text{m}^3$.

The cumulative annual average PM_{2.5} has decreased over the 2024 reporting period, mainly attributable to a relatively wetter meteorological conditions experienced in 2024.

Trend and Comparison to Assessment Predictions

Table 13, Table 14 and **Table 15** present the annual average air quality monitoring results for deposited dust, TSP and PM₁₀ progressively against the respective criteria over the 2022 – 2024 period. The cumulative measurements decreased over the 2024 reporting period compared to 2023 period. This can be attributed to a wetter condition experienced in 2024.

Private Residence Mitigation

In accordance with Schedule 3, Condition 3 of SSD-5170, BMC is required to implement reasonable and feasible air quality mitigation measures upon receiving a written request from the owner of relevant residences listed in SSD-5170.

BMC did not receive a written mitigation request for implementation of air quality control measures during 2024.

Independent Review

Schedule 4, Condition 4 of SSD-5170 provides for an independent review of impacts from the development on privately-owned land to be carried out where requested by a landowner and agreed to by the Secretary of DPHI.

There were no requests made for an independent review of impacts from Bengalla (for air quality or otherwise) during 2024.

6.4.3 Further Actions

BMC will continue the implementation of the revised air quality monitoring network during 2025 (as described in the 2022 AQMP). Until it is fully commissioned and operational, BMC will continue operating under the interim monitoring network described in the 2022 AQMP.

6.5 SPONTANEOUS COMBUSTION

Occurrences of spontaneous combustion are relatively infrequent at Bengalla.

6.5.1 Environmental Management

If spontaneous combustion occurs in the pit, the affected area is capped with inert material where reasonable and feasible to minimise smoke or odour generation. If spontaneous combustion occurs on the Coal Handling Preparation Plant coal stockpiles sprays can be activated and the affected material can be removed and capped where reasonable and feasible.

6.5.2 Environmental Performance

During the reporting period, six instances of spontaneous combustion were reported within the mining area. Two occurred on the in-pit coal stockpiles due to extended residence times, one occurred on the south endwall and three occurred on advancing highwall benches, all instances were notified to the NSW Resources Regulator.

6.5.3 Further Actions

During this period, Bengalla implemented a Spontaneous Combustion TARP aimed at intervening before self-heating coal turns into spontaneous combustion.

6.6 GREENHOUSE GAS

6.6.1 Environmental Management

SSD-5170 requires BMC to implement reasonable and feasible measures to minimise the release of greenhouse gas (GHG) emissions from Bengalla.

BMC contributes to research and development initiatives that investigate GHG minimisation (see **Table 16**).

Table 16: Greenhouse Gas Emission Reduction Research and Development Initiatives

Program	Outcomes
Low Emissions Technology Australia (LETA)	Certain Australian black coal producers contribute a voluntary levy on a quarterly basis to the LETA Fund to support the development of low emission coal technology in Australia.
Australian Coal Association Research Programme (ACARP)	Certain Australian black coal producers contribute five cents per tonne of product coal to fund research and the development of technologies that lead to the safe, sustainable production and utilisation of coal.

6.6.2 Environmental Performance

At the end of each Financial Year (FY) BMC reports on the emissions of certain substances to the National Pollutant Inventory (NPI). GHG emissions, energy consumption and production data are also reported under the National Greenhouse and Energy Reporting (NGER) Scheme requirements. The *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015* Commonwealth (Safeguard Mechanism) also applies to emissions at Bengalla.

National Pollutant Inventory

For the 2023 – 2024 FY reporting period BMC reported on 28 of the 31 reportable substances.

National Greenhouse and Energy Reporting

During the 2023 – 2024 FY reporting period Bengalla reported total emissions of 677,667 t Carbon Dioxide Equivalent (CO₂-e) (Scope 1 and Scope 2).

The results for FYs 2022 – 2024 are presented in **Table 17** and

Table 18.

Table 17: Energy Consumed and Produced FY 2022 to 2024

Energy	FY 2021-2022	FY 2022-2023	FY 2023-2024
Consumed Gigajoule (GJ)	2,636,980	2,870,837	3,284,653
Produced (GJ)	259,316,316	241,384,833	268,528,215

Table 18: GHG Emissions FY 2022 to 2024

Greenhouse Gas Emissions	FY 2021-2022	FY 2022-2023	FY 2023-2024
Scope 1 (t CO ₂ -e)	725,774	573,941	626,512
Scope 2 (t CO ₂ -e)	61,521	54,854	51,155
Total (t CO₂-e)	787,295	628,795	677,667

GHG Emissions for Calendar Years 2021-2024 and Comparison to Predictions

Annual GHG emissions (Scope 1 and Scope 2) have been compared against the predictions in the *Air Quality and Greenhouse Gas Impact Assessment Continuation of Bengalla Mine* (AQIA) being Appendix G to the EIS. The method used to calculate Scope 1 and Scope 2 emissions is the method that was used in the EIS.

Overall, the annual Scope 1 and Scope 2 GHG emissions estimated for the 2022, 2023 and 2024 calendar years are generally lower than the AQIA predictions for Years 4 to 13 primarily due to reduced materials movement compared to the EIS.

Reasonable and feasible steps have been undertaken during the Reporting Period to improve energy efficiency and reduce greenhouse gas emissions generated by the mine.

BMC has continued to undertake activities to reduce greenhouse gas emissions from Bengalla being:

- Use of fuel-efficient machinery, electric motors and energy efficient lighting systems.
- Regular maintenance in accordance with OEM specifications and recommendations.
- Efficient fuel use by optimising mine design, to reduce travel and queueing time by haul trucks during resource and overburden extraction.
-

6.6.3 Further Actions

In 2024, BMC underwent an Emissions Intensity Determination assessment and subsequent independent audit regarding the data and methodology used in the calculations and submitted to the Clean Energy Regulator (CER).

BMC are required to manage and/or offset their emissions in response to this baseline until otherwise required from the CER. BMC was in excess of their emissions in 2024 and retired Australian Carbon Credit Units (ACCUs) as a result. BMCs baseline is available on the CER website.

6.7 NON-MINERAL WASTE

6.7.1 Environmental Management

Non-mineral waste generated at Bengalla during 2024 was 3,029t. A total of 2,388t was recycled, representing 79% of the total waste. These figures generally increased from 2023 and 2022. **Table 19** details non-mineral waste tonnes for the period 2021 to 2024.

Table 19: Non-mineral Waste Management

	2024	2023	2022	2021
Total (t)	3,029	2,775	1,916	1,827
Recycled (t)	2,388	2,226	1,474	1,422

6.7.2 Environmental Performance

A total of 3,029t of non-mineral waste was disposed of in 2024 consisting of predominantly scrap metal, oil and general waste.

The major waste streams recycled at Bengalla in 2024 were waste oil 859t, oil filters 40t, batteries 28t, scrap metal 1,266t and timber 215t.

2,515t of effluent from onsite facilities was disposed of through Bengalla's wastewater treatment plant.

Comparison to Assessment Predictions and Trends

The EIS Volume 1 Table 84 contains predictions for waste streams. Relative to the two major waste streams:

- the waste oil volume of 859t t is slightly above the EIS prediction of 526t; and
- the scrap metal volume of 1,266t t is slightly below the EIS prediction of 1,902t.

6.7.3 Further Actions

There are no additional actions planned for 2025 regarding the management of non-mineral waste. Normal waste management practice will continue and BMC are always looking for improvement opportunities for their waste management process.

6.8 MINERAL WASTE

6.8.1 Environmental Management

Management of mineral waste at Bengalla in 2024 was undertaken in accordance with the BMC Acid Rock Drainage (ARD) and Mineral Waste Management Plan.

6.8.2 Environmental Performance

In accordance with the BMC ARD and Mineral Waste Management Plan, BMC maintains a mineral waste inventory of the volumes of inert and potentially acid forming waste disposed of on site and the disposal locations.

The volumes of total mineral waste generated and stored at Bengalla in 2024 (and the previous calendar year) are summarised in **Table 8**.

Comparisons to Assessment Predictions and Trends

The trends for waste rock are influenced by operational decisions. It is anticipated that increased volumes will occur for 2025 relative to 2024.

The EIS predicted at Year 8 overburden removal of 55 Million Bank Cubic Meters¹.

The waste rock/overburden volume referenced in **Table 8** for 2024 was above the EIS prediction.

6.8.3 Further Actions

There are no additional actions other than normal practices planned for 2025 regarding the management of mineral waste.

¹ Bengalla EIS Volume 1, Table 10.

6.9 ABORIGINAL ARCHAEOLOGY AND CULTURAL HERITAGE

6.9.1 Environmental Management

The management of Aboriginal archaeology and cultural heritage at Bengalla is undertaken in accordance with the approved ACHMP.

6.9.2 Environmental Performance

All relevant Aboriginal heritage artefacts within the Bengalla Disturbance Boundary were salvaged in 2016.

Activities involving ground disturbance in 2024 were subject to desktop assessment for potential impacts to Aboriginal archaeology as part of Bengalla's Ground Disturbance Permit (GDP) process.

During the Reporting Period, no additional Aboriginal artefacts were discovered within the Bengalla Project Boundary.

Previously identified Aboriginal sites located in ML 1728 and EL 9431 were inspected and some perimeter fences were repaired.

6.9.3 Further Actions

Should any amendments to the ACHMP be required, BMC will lodge the revised plan with the relevant regulatory agencies and stakeholders for comment and then for approval by DPHI.

6.10 NON-ABORIGINAL HERITAGE

6.10.1 Environmental Management

BMC has developed and implements the approved HHMP, which describes the requirements for ongoing management and conservation of the existing non-Aboriginal heritage sites identified in the EIS. Four sites are located within the Project Boundary and five are located adjacent to the Project Boundary. Photos of the sites are presented in **Appendix J**.

6.10.2 Environmental Performance

Annual inspections are undertaken at each site. Annual dilapidation surveys and structural assessments were conducted at the two most significant heritage sites, Bengalla Homestead and Overdene Homestead. These were conducted on 22 October 2024. The results of the inspections and surveys are summarised below.

Bengalla Homestead

The 2024 dilapidation survey of Bengalla Homestead and associated buildings concluded that there appeared to be no further major degradation since the 2023 survey.

Externally, the condition of the homestead and service wing remained stable, and the building is generally in good repair. Minor cracks were observed in the wall plaster and the ceiling in both the main building and the service wing at isolated locations.

Full renovation of the interior of the cottage services building has been undertaken and externally the building is generally in a good state of repair.

Full renovation of the interior of the book keepers cottage has been undertaken and externally the building is generally in a good state of repair.

The garden shed was in a good state of repair and has not deteriorated since the previous inspection.

The condition of the other remaining structures are consistent with previous inspections including the tool shed, and steel water tower.

All buildings and their repair work should continue to be monitored for any signs of cracks caused by foundation movement or mine workings nearby. Regular inspections should be carried out to ensure there is no termite activity in the vicinity of the buildings.

Overdene Homestead

The 2024 dilapidation survey of Overdene Homestead concluded that there appeared to be no further major degradation since the 2023 inspection.

The works carried out in the previous years have been successful. The replacement of the roof sheeting and diversion of stormwater away from the building and the previous restoration of the sandstone and brickwork has stabilised the deterioration.

The remaining outstanding items for the external part of the building included the replacement of missing pipe props from the tie rod ends to assist in continually stabilising the structure. The veranda flooring and roof framing, sheeting and flashings still require reinstatement.

Internally, the condition of the cottage appeared to be stable. Installation of a new floor system, restoration of all windows, doors and internal walls was still outstanding. The external downpipe next to entry door is dislodged and the water is seeping into the soil and moistening the foundation soil and progressing internally.

A summary of the 2024 maintenance and preservation works completed by BMC at the Bengalla and Overdene Homesteads is presented in **Table 20**.

Appendix J contains photos from the 2024 inspections at Bengalla and Overdene Homesteads.

Ad hoc opportunistic inspections of several heritage sites were undertaken throughout the reporting period when carrying out other field inspections.

Keys Family Private Cemetery

An annual inspection was undertaken on the Keys Family Private cemetery in January 2025. The cemetery was in good condition with headstones remaining in good condition with no evidence of vandalism or deterioration.

Stockyards

An annual inspection was undertaken of the Stockyards in January 2025. The area was in good repair with a maintenance program being implemented for ongoing ground maintenance. The stockyards remain in good condition.

Old Bengalla

An annual inspection was undertaken of Old Bengalla in January 2025. The existing sandstone wall remains in good condition. The area remains fenced and signage still present.

House Site 1

An annual inspection was undertaken of House Site 1 in January 2025. The site was fenced and signage erected. This remains within Appendix J for this reporting period.

This site is now located within a new Mining Lease ML 1829, which was granted to MACH Energy Australia Pty Ltd in 2023.

House Site 2

An annual inspection was undertaken of House Site 2 in January 2025. The site remained fenced and signage erected. No further work was required.

Blunts Butter Factory

An annual inspection was undertaken of Blunts Butter Factory in January 2025. Fencing around the site remained in good condition. Signage was erected. No further works were required.

Table 20: Medium Term Maintenance of the Bengalla and Overdene Homesteads 2024

Reference	Maintenance	Response	Status
OVERDENE HOMESTEAD			
HHMP Appendix D, Section 6.5	Repair internal render all rooms	Continued being quoted through 2024 for works planned in 2025.	Upcoming
HHMP Appendix D, Section 6.5	Repair remaining damage caused by termites (i.e. that determined not to be integral to structural integrity).	Bait station system installed around house and maintained as per termite management plan. Damage continued being quoted through 2024 for works planned in 2025.	Ongoing
HHMP Appendix D, Section 6.5	Reinstate veranda.	Restoration continued to be designed in 2024 with works planned in 2025.	Upcoming
HHMP Appendix D, Section 6.5	Reinstate veranda flooring, including repair of sandstone dwarf wall supporting veranda joists and eastern veranda slab.	Restoration continued to be designed in 2024 with works planned in 2025.	Upcoming
HHMP Appendix D, Section 6.5	Restore or replace woodwork around external openings and paint.	Restoration continued to be designed in 2024 with works planned in 2025.	Upcoming
HHMP Appendix D, Section 6.5	Replace steel vent grate or block from under Door 7.	This was carried out in 2018 repair works.	Completed
HHMP Appendix D, Section 6.5	Replace floor boards with like for like.	Restoration continued to be designed in 2024 with works planned in 2025.	Upcoming
HHMP Appendix D, Section 6.5	Replace ceiling boards with like for like.	Restoration continued to be designed in 2024 with works planned in 2025.	Upcoming
HHMP Appendix D, Section 6.5	Repair remaining cracks in brick and stonework (D7).	This was carried out in 2018 repair works.	Completed

Reference	Maintenance	Response	Status
HHMP Appendix D, Section 6.5	External - Raked cracking in mortar about sandstone lintels above doorways D1, D3 and D5, and Doorway D7 with erosion of sandstone blocks - Eastern chimney: brickwork collapsed - Steel vent under W3 dislodged	This was carried out in 2018 repair works.	Completed
HHMP Appendix D, Section 6.5	Internal - Room R1 – large amount of cracking to render in walls, worst above fireplace - Room R2 – render cracking adjacent fireplace, doors D1 and D2 to ceiling and corners of room - Room R3 – cracks at W3, previous termite damage, concrete hearth dropped further since last inspection (2014) to 40 mm, crack in brickwork of northern wall at 15 mm, doorway cracking at D12, ceiling loose at D6 and above fireplace - Room R4 – old water damage, cracking at W2 and separation of ceiling, some mortar fallen down - Room R5 – cracking of render, loose in various areas, south-western corner full height of wall with separating at the corner, and above window W1; and mortar missing in bottom 3 courses - Hallway – extensive cracking to render in walls, and at #8 and D9, render at D3 and D9 leaning out and should be removed, erosion of mortar with cracks above D12 and skirting board at D7	Restoration continued to be designed in 2024 with works planned in 2025.	Upcoming
BENGALLA HOMESTEAD			
HHMP Appendix C, Section 7.4	Building 1 – Homestead and Service Wing		

Reference	Maintenance	Response	Status
HHMP Appendix C, Section 7.4	Maintain Homestead to ensure stability and prevent further damage to all features	All works carried out in 2019.	Completed
HHMP Appendix C, Section 7.4	Remediate external faults to service wing including, but not limited to the following: - Repoint/repair mortar in lower courses of brickwork to northern face of service wing. - Repoint/repair mortar between Window 19 and Door 30; - Fix gap on northern side of Window 18 between window frame and brickwork; - Loss of mortar and brickwork to single lead brick projections on eastern side; - Damaged air vent grate on eastern elevation; - Loose mortar joints above Window 17; - Address D30 frame deterioration; - Replace missing brickwork on high window on the southern side of service wing; - Minor cracking to brickwork in various locations; and - Remove earthen bund from western wall adjacent to Window 7 as this is preventing water drainage and has caused damage to the plinth. Fix damage to plinth.	All works carried out in 2019.	Completed
HHMP Appendix C, Section 7.4	Investigate the cause of separation, splitting and warping of ceiling planks in Rooms 3 and 4. Repair or replace, if necessary, ceiling planks	All works carried out in 2019.	Completed
HHMP Appendix C, Section 7.4	Remediate external damage caused by footing defects, including, but not limited to the following: - Cracking above Door 14; - Cracking above Window 10; - Cracking above Window 7; - Cracking above and below Window 17.	All works carried out in 2019.	Completed
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 1, including, but not limited to the following:	All works carried out in 2019.	Completed

Reference	Maintenance	Response	Status
	- Repair cracking in brickwork where exposed by missing plaster; - Repair plaster missing or removed; - Reinstate/replace tiles in fireplace; and - Repair crack in metal plinth.		
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 2, including, but not limited to the following: - Cracking in render above archway between Rooms 2 and 3; - Cracking in render above Door 4 and above and below W3; - Cracking in render in southern wall; and - Cracking in brickwork where exposed by removed plaster	All works carried out in 2019.	Completed
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 3, including, but not limited to the following: - Cracking in render above Door 3; - Cracked brickwork in south eastern corner; - Cracking below Window 2.	All works carried out in 2019.	Completed
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 4, including, but not limited to the following: - Render on southern side of Window 1; - Refix skirting board; and - Cracking between ceiling cornice and western wall.	All works carried out in 2019.	Completed
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 5, including, but not limited to the following: - Cracking in render above Doors 2,3,4,5,7 and 8; - Cracking of archway and cracking of ceiling between archway and ceiling; - Cracking between Doors 7 and 8; and - Cracking around air vent	All works carried out in 2019.	Completed

Reference	Maintenance	Response	Status
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 7, including, but not limited to the following: - Cracking below Window 12; and - Cracking above and adjacent to Door 10.	All works carried out in 2019.	Completed
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 9, including, but not limited to the following: - Cracking above Door 9	All works carried out in 2019.	Completed
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 25, including, but not limited to the following: - Active moisture erosion of brick work, possibly rising damp; - Mortar loss to southern wall; and - Loose brickwork below Window 18.	All works carried out in 2019.	Completed
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 26, including, but not limited to the following: - Cracks in brickwork above Door 33 and 34; - Ceiling vent dropped; and - Cracking above Window 14, Window 20 and below 14.	All works carried out in 2019.	Completed
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 27, including, but not limited to the following: - Cracks in brickwork on southern and eastern walls; - Loss of mortar in western wall, investigate active moisture erosion and possible rising damp; - Replace missing brick adjacent to Door 28; and - Repair/replace damp floorboards, if not already remediated as part of rising damp assessment.	All works carried out in 2019.	Completed
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 28, including, but not limited to the following: - Thinning mortar on western wall;	All works carried out in 2019.	Completed

Reference	Maintenance	Response	Status
	- Missing brickwork adjacent to Door 33; - Cracking in brickwork above Doors 32 and 33; - Investigate cause and remediate of concrete floor crack; - Cracking above Window 15.		
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 29, including, but not limited to the following: - Cracking above Doors 31 and 32 and western wall; - Replace missing doorframe; and - Cracking in brickwork above and below Window 16.	All works carried out in 2019.	Completed
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 30, including, but not limited to the following: - Cracking above Door 31 and extending to western wall; - Cracking above Window 17 and 18; - Replace removed skirting boards; - Termite damage in northern wall and Door 31 woodwork, if not already remediated.	All works carried out in 2019.	Completed
HHMP Appendix C, Section 7.4	Building 2 – 1960 addition Remove if this addition is impacting on integrity of the 1895 section of the Homestead, with due care that potential archaeological deposits relating to an earlier timber structure are not impacted or are archaeologically investigated	Garage maintained and refurbished for storage and toilet amenities.	Completed
HHMP Appendix C, Section 7.4	Building 3 – Underground cistern Maintain as required to ensure cistern does not deteriorate	Maintained as per maintenance schedule.	Ongoing
HHMP Appendix C, Section 7.4	Building 4 – Garden Lodge The Garden Lodge has been assessed as being unsafe and is recommended for removal (Archaeology Australia, 2009)	Restored to original condition 2019.	Completed
HHMP Appendix C, Section 7.4	Building 5 – Toilet/Shower	Repointed and roofed to maintain building integrity.	Completed

Reference	Maintenance	Response	Status
	Undertake required maintenance to ensure long-term stability of building		
HHMP Appendix C, Section 7.4	Building 6 - Gazebo Undertake on-going maintenance	Repointed and roofed to maintain building integrity.	Completed
HHMP Appendix C, Section 7.4	Building 7 – Laundry The current structure has been archivally recorded and is earmarked for demolition due to termite damage (Archaeology Australia, 2009)	Restored to original condition 2019.	Completed
HHMP Appendix C, Section 7.4	Building 8 – Book-keeper’s Cottage Maintain Book-keeper’s Cottage to ensure stability and prevent further damage to all features	Restored and improved to liveable condition 2022.	Completed
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 6, including, but not limited to the following: - termite damage to northern walls; - loss of mortar to fireplace brickwork; - ceiling collapse in south-west corner; and - remove wallpaper, using non damaging techniques, if impacting on the integrity of the walls.	Restored and improved to liveable condition 2022.	Completed
HHMP Appendix C, Section 7.4	Remediate internal damage to Room 7, including, but not limited to the following: - buckling of ceiling lining.	Restored and improved to liveable condition 2022.	Completed
HHMP Appendix C, Section 7.4	Building 9 – Tennis Court Maintain in current condition	Maintained as per maintenance schedule.	Ongoing
HHMP Appendix C, Section 7.4	Building 10 – Water-tower The water tower has been slated for removal (Archaeology Australia, 2009)	Fell over in 2018 storm and was removed because of safety concerns.	Completed

Reference	Maintenance	Response	Status
HHMP Appendix C, Section 7.4	Building 11 – Machinery shed Undertake on-going maintenance.	Maintained as per maintenance schedule.	Ongoing
HHMP Appendix C, Section 7.4	Building 12 – Modern Water-Tower Undertake on-going maintenance.	Maintained as per maintenance schedule.	Ongoing
HHMP Appendix C, Section 7.4	Building 13 – Stockyards Maintain in current condition	Maintained as per maintenance schedule.	Ongoing
HHMP Appendix C, Section 7.4	Building 14 – Stables (archaeological site) No works required. Ensure the area is not impacted by works – fence if necessary.	Removed in 2022 because of safety concerns.	Completed
HHMP Appendix C, Section 7.4	Building 15 – Hay-shed The hay-shed has been earmarked for removal and an archival recording has been completed (Archaeology Australia, 2009)	Removed in 2022 because of safety concerns.	Completed
HHMP Appendix C, Section 7.4	Building 16 – Shed and Yard The shed has been earmarked for removal and an archival recording has been completed (Archaeology Australia, 2009).	Removed in 2022 because of safety concerns.	Completed

6.10.3 Further Actions

Should any amendments to the HHMP be required, BMC will lodge the revised HHMP with relevant regulatory agencies for comment and then with DPHI for approval.

BMC will continue to implement the program of inspections, maintenance and preservation works as identified by the HHMP in the next Reporting Period.

6.11 BIODIVERSITY OFFSET MANAGEMENT

6.11.1 Environmental Management

BMC manages approximately 6,215 ha of offset land. There are three distinct BOAs being Kenalea, Black Mountain and Merriwa River. The location of the BOAs in relation to Bengalla is illustrated on **Figure 8**. SSD-5170 and EPBC Approval 2012/6378 (the EPBC Approval) require BMC to manage in its Biodiversity Offset Areas (BOAs).

Appendix E includes an annual compliance report for 2024 against the conditions of EPBC Approval 2012/6378 (EPBC Compliance Report).

Biodiversity management at the offset properties is undertaken in accordance with the approved Biodiversity Offset Management Plan (BOMP).

The EPBC Compliance Report includes a summary of commitments from the BOMP against activities undertaken during the Reporting Period. There were no non-compliances with these commitments.

During the Reporting Period, BMC undertook management programs on the BOAs including but not limited to:

- weed inspections and weed spraying;
- dog baiting and trapping;
- fox management;
- feral pig management;
- wild deer management;
- fire trail maintenance in all BOAs; and
- summer and winter ecological surveys.

6.11.2 Environmental Performance

Ecological Monitoring

A total of 28 permanent flora monitoring sites were surveyed. A suite of additional surveys by a suitably qualified expert were undertaken, including bird census, terrestrial infra-red (IR) camera surveys for the Spotted-tailed Quoll and feral animals, arboreal IR camera surveys for the Squirrel Glider, ultrasonic bat detection and opportunistic observations.

The data collected for this report represents the eighth year of annual monitoring in 2024. This year, another suite of 12 additional monitoring plots was added to the annual monitoring surveys and these sites will be incorporated into the annual monitoring surveys and reporting hereafter.

The BOMP contains measurable indicators and completion criteria for Years 5, 10 and 20 of the Project. Error! Reference source not found. The Offsets monitoring program in Appendix E compares the measurable indicators and performance criteria for Year 10 against the results of Year 8 (2024) annual monitoring.

The report concluded that, given that the monitoring program is still in the first half of the 20-year lifespan, few definite measurable changes in survey results were detected in year eight annual monitoring surveys. It was noted that most woodland sites are within or above benchmark for most values and the majority of Performance Criteria have consistently been met by many of the monitoring sites. Further, there was a noticeable reduction in year eight (2024) monitoring of feral species diversity and abundance compared to baseline data and previous years. It is expected that greater changes will be observed over time due to a combination of the implementation of management activities and natural regeneration. The performance and full report can be found in **Appendix E**.

Refer to **Appendix E** for details regarding the continued dialogue on this matter. **Section 1.1** and **Section 11** further details compliance matters associated with EPBC 2012/6378.

Bushfire Hazard Reduction Burns

There were no hazard reduction burns undertaken on the Biodiversity Offset properties during 2024. BMC specialist consultants however, completed a post-burn ecological monitoring in response to the ecological burns that occurred in 2023.

The ecological monitoring indicated for most floristic values, there is evidence of a trend towards increased native plant species richness across woodland and grassland monitoring sites that also coincides with an increase in exotic plant species richness across woodland and grassland sites post-burn. Evidence of natural regeneration was observed at a number of monitoring sites within the Offset Areas both pre-burn and post-burn; and following an initial general drop in benchmark values for most sites in round one and round two surveys following the hazard reduction burn (as expected), at the last monitoring survey for each burnt site values have generally returned towards baseline or in some cases have exceeded it. Of particular note, at most sites native forb cover and richness appears to have benefited from the hazard reduction burn and these values have predominantly increased across the sites.

Credit Retirement and Stewardship Agreements

During the reporting period, BMC have been actively working towards the retirement of credits and finalising Biodiversity Stewardship Agreements (BSA) since 2022. BMC prepared a BSA Application Plan in August 2023. During the reporting period stakeholder consultation with the relevant Authorities included:

- Pre-lodgement meetings with the Department of Climate Change, Energy, the Environment and Water (DCCEEW) Credit Supply Task Force division (now Nature Markets and Offsets Division)
- BSA lodgement to DCCEEW
- Follow-up correspondence with DPHI and DCCEEW throughout 2024

The most recent correspondence was received in December 2024 from DCCEEW notifying of staffing changes and indicated they were progressing the BSA and associated matters. In the meantime, the offset areas will continue to be owned by the BJV and managed by BMC in accordance with the BOMP.

6.11.3 Further Actions

The assessment against performance criteria indicated that assisted regeneration would be required for the sites to meet the performance criterion by Year 10. BMC are preparing an assisted regeneration plan for the BOAs in order to achieve its targets to be implemented in 2025 and 2026.

A study was conducted to assess actions required to meet the Year 10 Performance Criteria. A draft report was prepared and is currently under review.

BMC will continue to work with DCCEEW and the Nature Markets Offset Division on finalising the BSAs.

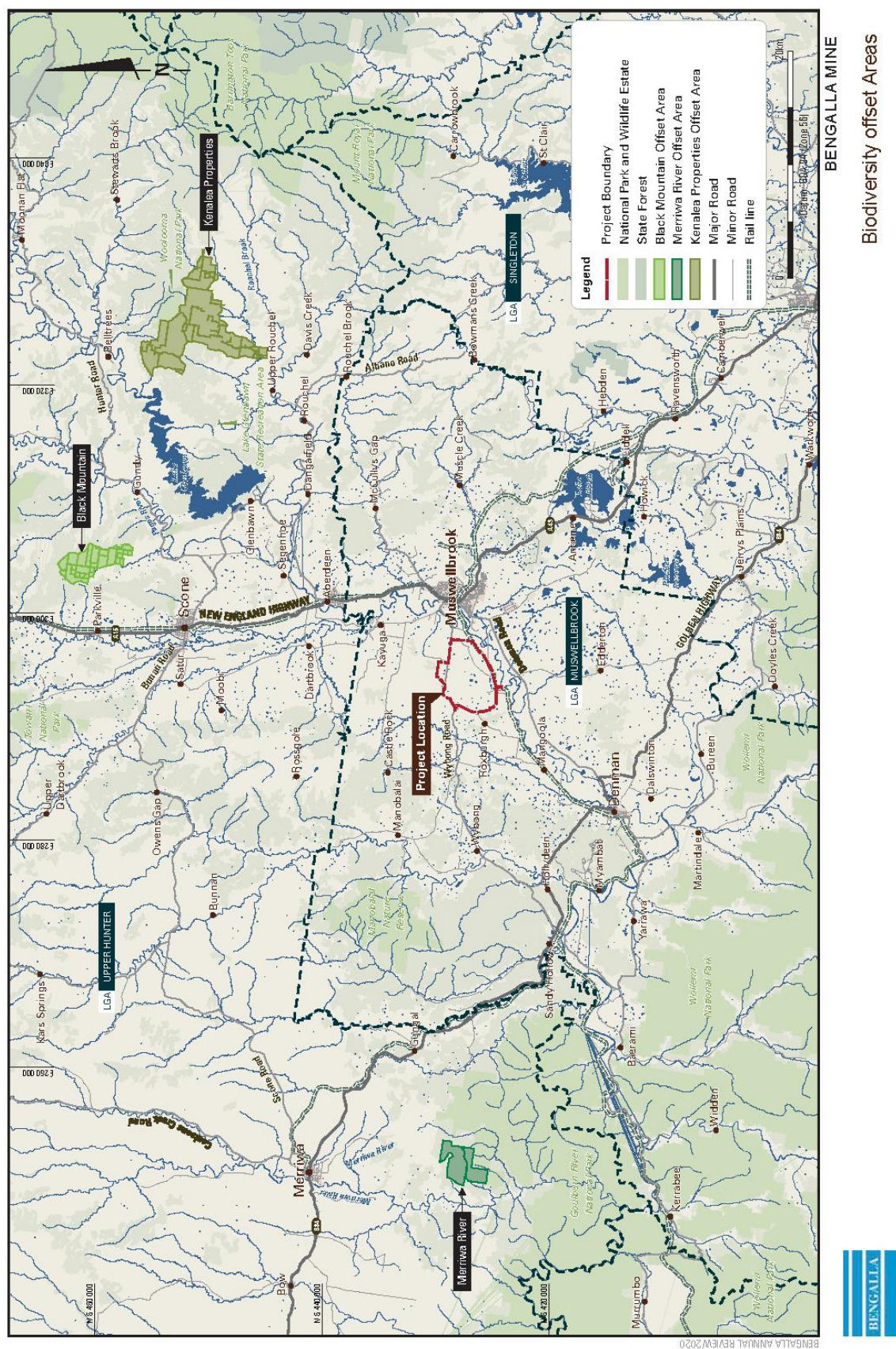


Figure 8: Locality Map of Biodiversity Offset Areas

6.12 ON-SITE BIODIVERSITY MANAGEMENT AND MITIGATION

6.12.1 Environmental Management

BMC implements management activities and conducts annual ecological monitoring on mine rehabilitation at varying frequencies in accordance with the following:

- Biodiversity Management Plan (BDMP).
- Rehabilitation Strategy and Rehabilitation Objectives.
- Rehabilitation Forward Program.
- Rehabilitation Management Plan (RMP).
- Ground Disturbance Permits (GDP).

During the Reporting Period, BMC undertook management programs on the on the mine site and buffer lands including but not limited to:

- weed inspections and weed spraying;
- feral pest management
 - pig trapping and cull program
 - wild dog and fox baiting
 - opportunistic shooting.

6.12.2 Environmental Performance

Biodiversity management at Bengalla is undertaken in accordance with the approved BDMP.

The EPBC Compliance Report (Appendix E) contains a summary of commitments from the BDMP against activities undertaken during the Reporting Period. There were no non-compliances with these commitments.

The management, monitoring and performance of rehabilitation at Bengalla during the Reporting Period is described in **Section 8**.

During 2022, the presence of an isolated *Cymbidium canaliculatum* (species of Tiger Orchid) was identified during Stage 1 pre-clearing surveys for vegetation earmarked for clearing for mine progression. The orchid was successfully translocated to a recipient tree and relocated to an area of mine rehabilitation in early 2024. A second orchid was also translocated from Bengalla's Exploration Lease (EL) 9431 area the mine rehabilitation to in preparation for an exploration drilling program in 2024.

6.12.3 Further Actions

BMC will use the results of the monitoring reports to focus pest and weed management efforts in 2025. BMC will also continue to utilise the GDP management process to identify opportunities to reduce the impact to local ecology on the mine site.

6.13 WEEDS AND PEST MANAGEMENT

6.13.1 Environmental Management

Weed and pest management at Bengalla and its BOA's is undertaken in accordance with the BDMP and BOMP, respectively.

Inspections are undertaken for weeds and pests resulting in targeted weed and pest control programs relating to seasonal herbicide application and baiting as well as opportunistic pest management activities.

6.13.2 Environmental Performance

Weed Management

Weed management is undertaken using boom spray, spot spraying or stem application dependent upon weather, target species and local geography.

- **Bengalla**

During 2024, approximately 196 ha was treated for the management of weeds. Target weed species primarily included African boxthorn, African olive, St John's Wort, Galenia and other environmental weeds. Priority areas for treatment included the pre-clearing areas and rehabilitation areas.

- **Biodiversity Offset Areas**

Weed management across the BOA's involves quarterly inspections and weed control programs.

Quarterly inspections are undertaken to determine weed control required for each quarter in each of the offset areas. Following identification, weed control commences and quarterly work records of site attendance are submitted which detail the sites treated, area (ha) treated, techniques and chemicals utilised and rates of application.

The chemicals to be utilised are based on their effectiveness depending on the type of weeds present.

The weeds controlled during the Reporting Period included Prickly Pear, Fire Weed, Spear Thistle, African Boxthorn, St Johns Wort, Blue Heliotrope, Fleabane and several environmental weeds across each BOA.

Particularly higher infestations of seasonal weeds were found in Kenalea and Echo, specifically in disturbed areas, riparian zones, gullies, and grasslands while minimal seasonal weeds were observed in Merriwa and Black Mountain.

Table 21 shows total area of weed treatment completed at Bengalla Mine and Bengalla Offset properties from 2022 to 2024.

Table 21: Total Area of Weed Treatment

Description	2024 (ha)	2023 (ha)	2022 (ha)
Bengalla Mine	196	211	255
Offsets	387	114	93

Pest Management

• Bengalla

A pig control program was conducted throughout 2024 at various locations across Bengalla. Feral pig traps were installed utilising a penning system using grain and molasses as the main attractant.

Dog baiting programs at Bengalla occurred in the Autumn and Spring 2024. Each program was undertaken in conjunction with Local Land Services and local wild dog associations and additionally forms part of a broader scale baiting program targeting foxes and wild dogs in the Hunter Valley.

During the autumn baiting program, 35 bait stations were laid over a three-week period with a total of 105 baits. Results indicate 70 takes of which 41 takes were by target species being foxes only. No bait shyness was detected during the campaign.

During the spring baiting program, 29 stations were laid over a three-week period with a total of 87 baits. Results indicate 26 takes were by target species being foxes. No wild dog takes were recorded. Evidence of bait shyness was also detected. Trail cameras were used in conjunction with the baiting program to record species taking the baits.

• Offset Properties

During the Reporting Period, BMC undertook two 4-week dog ground baiting programs across the BOA's in Autumn and Spring 2024 in consultation with Local Land Services.

During the 2024 ground baiting program targeting foxes and wild dogs, a total of 752 baits were laid. Of these, 120 baits were taken by the targeted species, with 93% consumed by foxes and 7% by wild dogs.

Analysis of trends over the past three years indicates variability in wild dog bait uptake: 28 in 2021, 39 in 2022, 36 in 2023, and 8 in 2024. This data suggests a decline in wild dog numbers on the offset properties during this period. However, it is important to note that wild dogs have been observed to be present in the area.

Opportunistic feral animal control was also undertaken during weed control works targeting 10 pigs and 45 deer and 1 additional wild dog utilising open range opportunistic shooting. BMC will continue its annual dog baiting program and opportunistic shooting to manage the wild dog population.

6.13.3 Further Actions

Ongoing management of weeds and feral animals at Bengalla and BOA's will continue during 2025.

6.14 VISUAL AMENITY AND LIGHTING

6.14.1 Environmental Management

BMC is required to implement reasonable and feasible measures to mitigate the visual and offsite lighting impacts of the development in accordance with SSD-5170.

6.14.2 Environmental Performance

Tree Screening Along Public Roads

Schedule 3, Condition 40 of SSD-5170 requires BMC to plant trees along sections of Denman Road, Roxburgh Road and Wybong Road that will have direct views of Bengalla in consultation with Council (and where relevant the NSW Roads and Maritime Services (RMS) (now Transport for NSW (TfNSW)). This condition was modified on 24 February 2023 (Mod 5) so as to require the tree screening (or alternative visual screening measure such as visual bunding) to be completed within 12 months of approval of Mod 5. Condition 41A of Schedule 3 (inserted by Mod 5) provides that tree screening may not be required where BMC can demonstrate, to the satisfaction of the Planning Secretary, that the screening works are not possible due to constraints.

BMC had undertaken tree screen planting on Wybong Road (in September 2019) and Roxburgh Road (in March 2019 and July 2020). Ongoing maintenance work on the trees will consist of replacement of failed plantings where significant and replacement of guards.

During the previous reporting period, BMC completed consultation with relevant private residences and TfNSW to identify opportunities for visual screening measures along Denman Road. Following this consultation, no stakeholders (including Transport for NSW) permitted the installation of visual screening measures along areas of Denman Road that provided visual mitigations to mine activity.

6.14.3 Further Actions

BMC have identified areas of Wybong Road that present opportunities for further plantings along the earthen visual bund as the mine progresses westwards. This work will be completed in 2025.

6.15 THE DETAIL DESIGN FOR THE REALIGNED OF BENGALLA LINK ROAD IS IN PROGRESS. UPON COMPLETION OF THE DETAILED DESIGN, AN ASSESSMENT REGARDING PLANTINGS THAT CAN BE UNDERTAKEN IN LOCATIONS THAT HAVE DIRECT

VIEWS OF MINING OPERATIONS WILL BE COMPLETED AND EXECUTED.EMERGENCY RESPONSE PREPAREDNESS

BMC has an Emergency Response Team which is trained to respond to emergencies and conducts simulated emergency exercises. BMC have developed a Pollution Incident Response Management Plan (PIRMP) as required under the *Protection of the Environment Operations Act 1997* NSW (POEO Act).

The BMC Environment Department conducted a pollution incident response test exercise on 9 April 2024. The simulated scenario was a significant fume event leaving the premises as a result of a fire at the explosive reload facility. The exercise confirmed that the response procedure included in the PIRMP was appropriate however the mock identified updates required to near neighbour contact lists.

7 WATER MANAGEMENT

This section describes the Bengalla water management objectives and performance during the Reporting Period.

7.1 WATER BALANCE

The take of water associated with mining operations at Bengalla during the Reporting Period is summarised in **Table 22**. An overview of the site water balance is presented in **Table 23**.

A discussion of surface water and groundwater monitoring and management during the Reporting Period is provided in **Section 7.2** and **Section 7.3**, respectively.

Table 22: Site Water Take 2024

Water Licence	Water Sharing Plan, Source and Management Zone	Entitlement	Passive Take / Inflows (ML)	Active Pumping (ML)	Total (ML)
WAL1106 (High Security)	Hunter Regulated River Water Source (Zone 1A) <i>Water Sharing Plan for the Hunter Regulated River Water Source 2016 NSW</i>	1,449 units ¹	-	1,585 ⁴	1,585
WAL41547 (Aquifer)	Sydney Basin-North Coast Groundwater Source <i>Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016 NSW</i>	365 units	183	-	183
Harvestable Rights	Muswellbrook Water Source <i>Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009 NSW</i>	109 ML ²	39 ²	-	39
Total					1,807

¹ Permanent entitlement to a share of the water source per water year (1 July to 30 June) which generates water allocation based on available water determinations made by the Minister for Water (generally at the start of each water year).

² Harvestable rights entitlement calculation and maximum forecast harvestable rights take (EIS).

³ Groundwater inflow to open cut pit estimated by WSP Report for 2024.

⁴ This value includes portions from period from 2 reporting periods as water year follows financial year (Jul-Jun).

Table 23: Site Water Balance 2024

Aspect	Volume (ML)
Water Inputs	
Raw water sourced from Hunter River (ML/yr)	1585
Rainfall and catchment runoff (ML/yr)	1013
Groundwater inflow to open cut pits (ML/yr)	183
Water entrained in ROM coal processed (ML/yr)	1237
Third party	17
Total Inputs	4035
Outputs	
Water entrained in product coal	2279
Other CHPP plant losses	24
Dust suppression (stockpiles and haul roads)	1145
Vehicle wash-down losses	174
Hunter River Salinity Trading Scheme (HRSTS) discharge	0
Other offsite discharges from mine water management system	1
Evaporation from dams	502
Total outputs	4125
Water Balance for 2024	-91 ML

During the Reporting Period, no water discharges occurred under the HRSTS.

7.2 SURFACE WATER

7.2.1 Environmental Management

BMC has an approved WMP which describes the surface water management infrastructure and procedures in place at Bengalla.

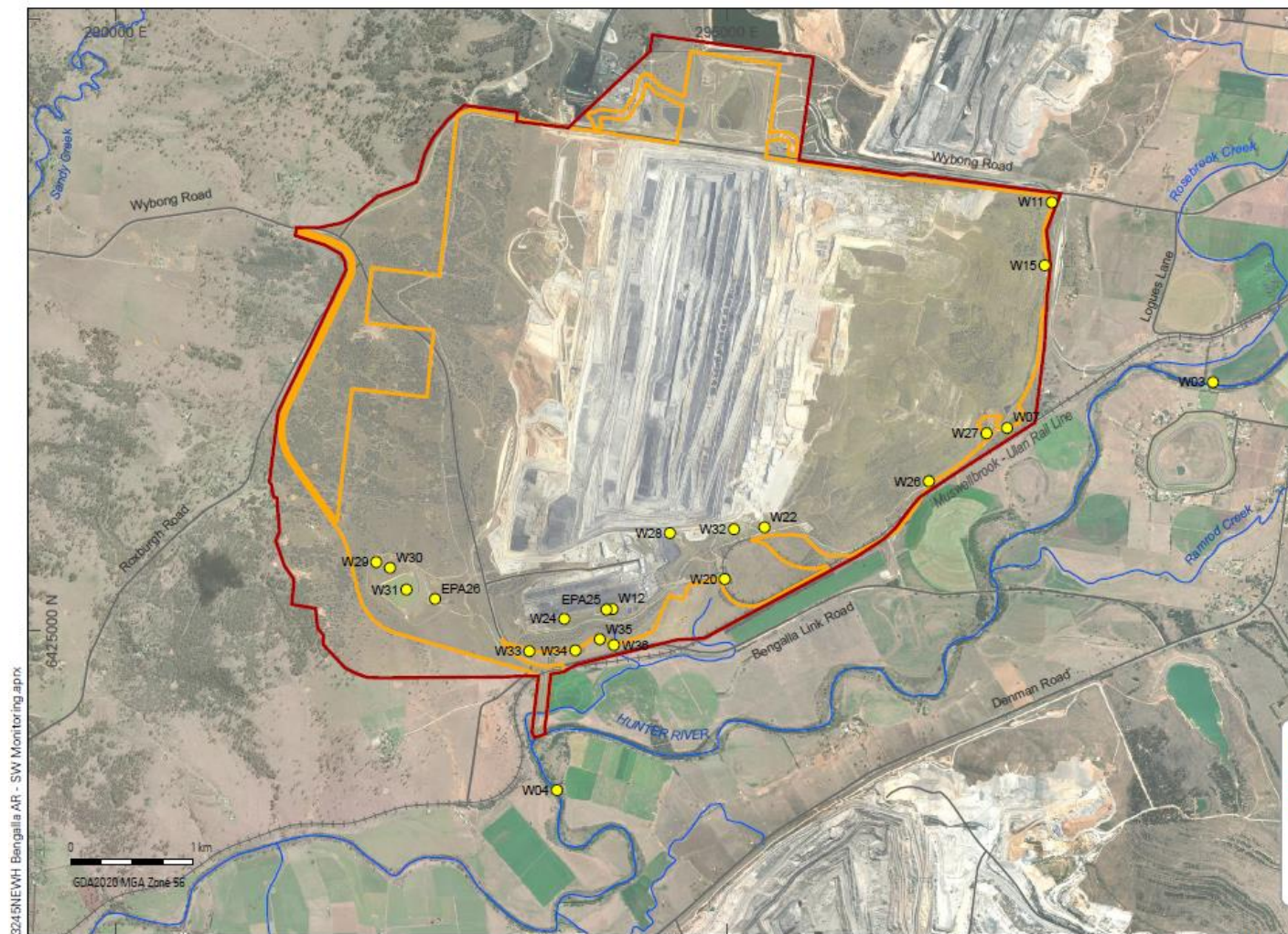
7.2.2 Environmental Performance

Surface Water Use

During the Reporting Period, BMC pumped 1,585 ML from the Hunter River. This value accounts for 756 ML during the period 1 January 2024 – 30 June 2024 and 829 ML during the period 1 July 2024 – 31 December 2024. The Bengalla site water balance for 2024 is provided in **Section 7.1**.

Surface Water Monitoring Program

Surface water monitoring is undertaken in accordance with the approved WMP. Surface water monitoring locations are shown on



Figure

9.

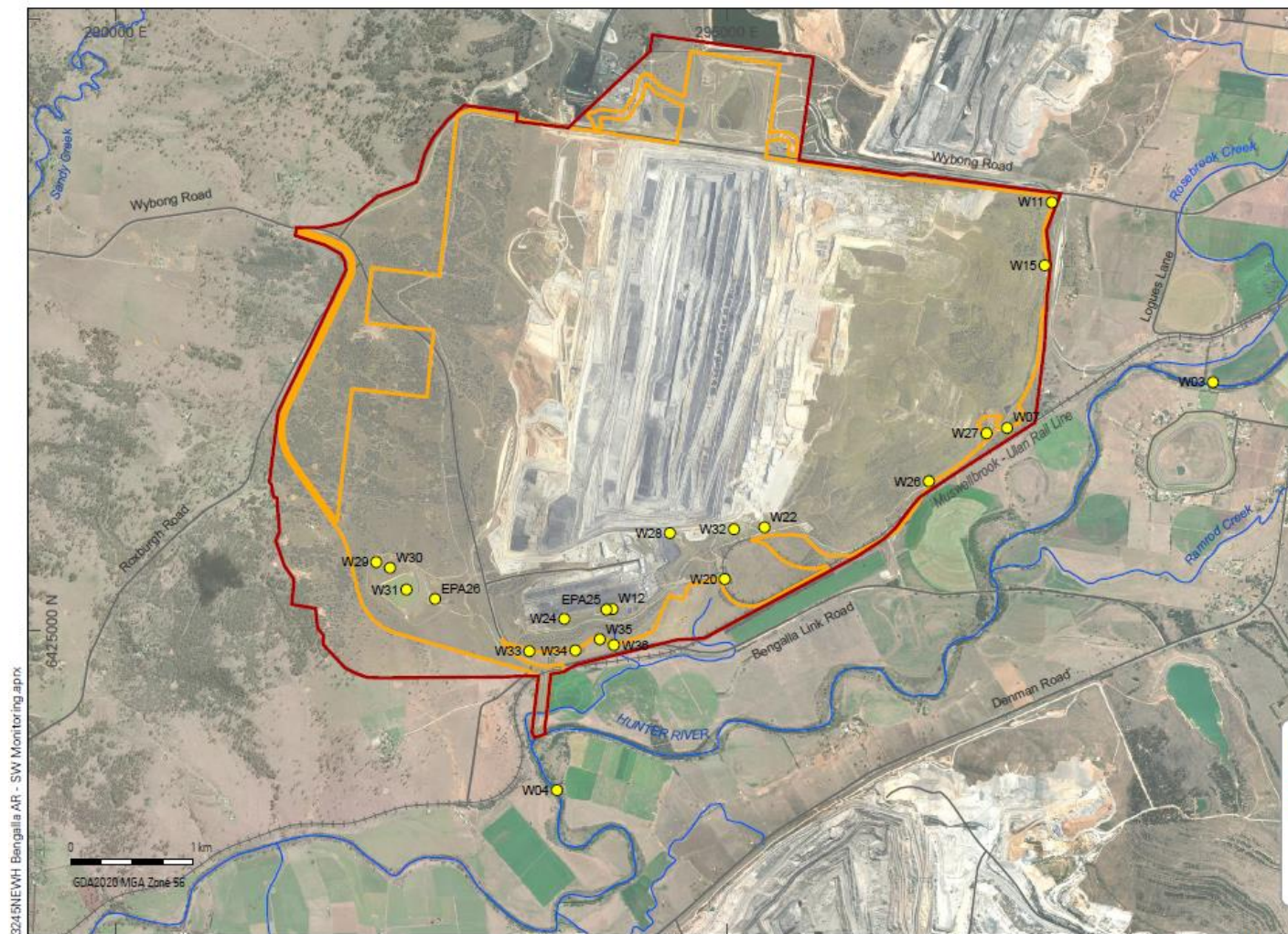
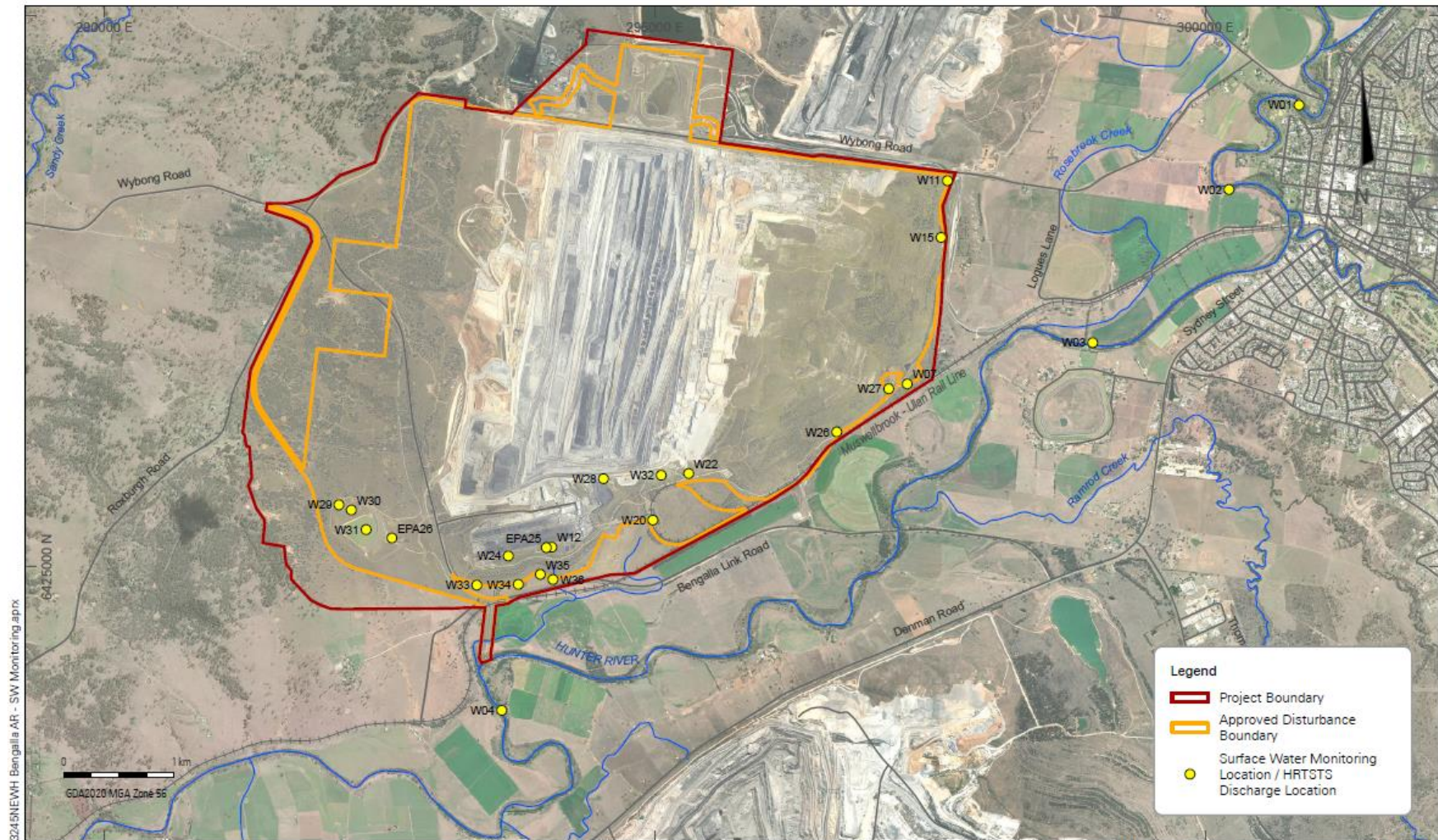


Figure 9

BENGA
Existing S



BENGALLA MINE ANNUAL REVIEW

Existing Surface Water Monitoring Network



Figure 9: Existing Surface Water Monitoring Locations

Surface Water Monitoring Results

A comparison of the 2024 surface water average monitoring results with the results for previous years for the Hunter River is presented in **Table 24**. **Appendix F** details monthly data collected from the four Hunter River water monitoring sites.

Table 24: Summary of Surface Water Monitoring Results (2022 – 2024)

Year	Site W01 Average			Site W02 Average			Site W03 Average			Site W04 Average		
	pH	TSS	EC	pH	TSS	EC	pH	TSS	EC	pH	TSS	EC
2022 ¹	8.0	177	487	8.1	180	530	8.1	104	487	8.0	97	592
2023 ²	8.0	14	731	8.1	14	739	8.0	19	813	8.0	21	829
2024 ³	8.1	15	623	8.2	35	625	8.1	20	656	8.1	21	613

¹ 15 sampling events

² 13 sampling events

³ 14 sampling events

Trends Over the Life of the Project

The Hunter River water quality trigger values in the WMP are used to investigate potential surface water impacts from operations at Bengalla. Trigger values for the surface water parameters monitored monthly include:

- pH: 6.5 – 8.1;
- Total Suspended Solids (TSS): 40 mg/L; and
- Electrical Conductivity (EC): 650 μ S/cm.

Bengalla only recorded two rain events¹ during 2024 which occurred on the 8th of April, and the 3rd of June.

Appendix F details monthly data collected from the four Hunter River water monitoring sites. Water quality results largely reflected background conditions in the Hunter River catchment, with relatively stable pH results throughout the reporting period and EC and TSS results that have fluctuated with increases and decreases in water flow levels in the Hunter River.

Comparison to Assessment Predictions

Surface water monitoring of pH, TSS and EC at the four Hunter River water monitoring sites in 2024 confirmed that water quality remains generally within the relevant WMP impact criteria for pH, TSS and EC. All surface water quality exceedances were investigated by a suitably qualified water consultant and determined to be reflective of in situ water conditions in the background Hunter River.

An overview of the Bengalla site water balance for 2024 is provided in **Section 7.1**. In comparing the 2024 water balance results to the EIS, Year 8 average results were selected as

¹ Rain Event is defined as 25mm rainfall in 24-hour period in the WMP.

the most appropriate. It should be noted that the Year 8 water balance also assumed a production rate of up to 15 Million tonnes per annum of product coal.

The EIS predicted a gross water balance deficit of 89 ML for Year 8¹ which closely aligns to the deficit of 91 ML that occurred in 2024.

7.2.3 Further Actions

Should any amendments to the WMP be required, BMC will lodge the revised plan with relevant regulatory agencies for comment and then with DPHI for approval.

7.3 GROUNDWATER

7.3.1 Environmental Management

BMC has an approved WMP which describes groundwater management at Bengalla.

¹ Bengalla EIS Volume 1 Table 51.

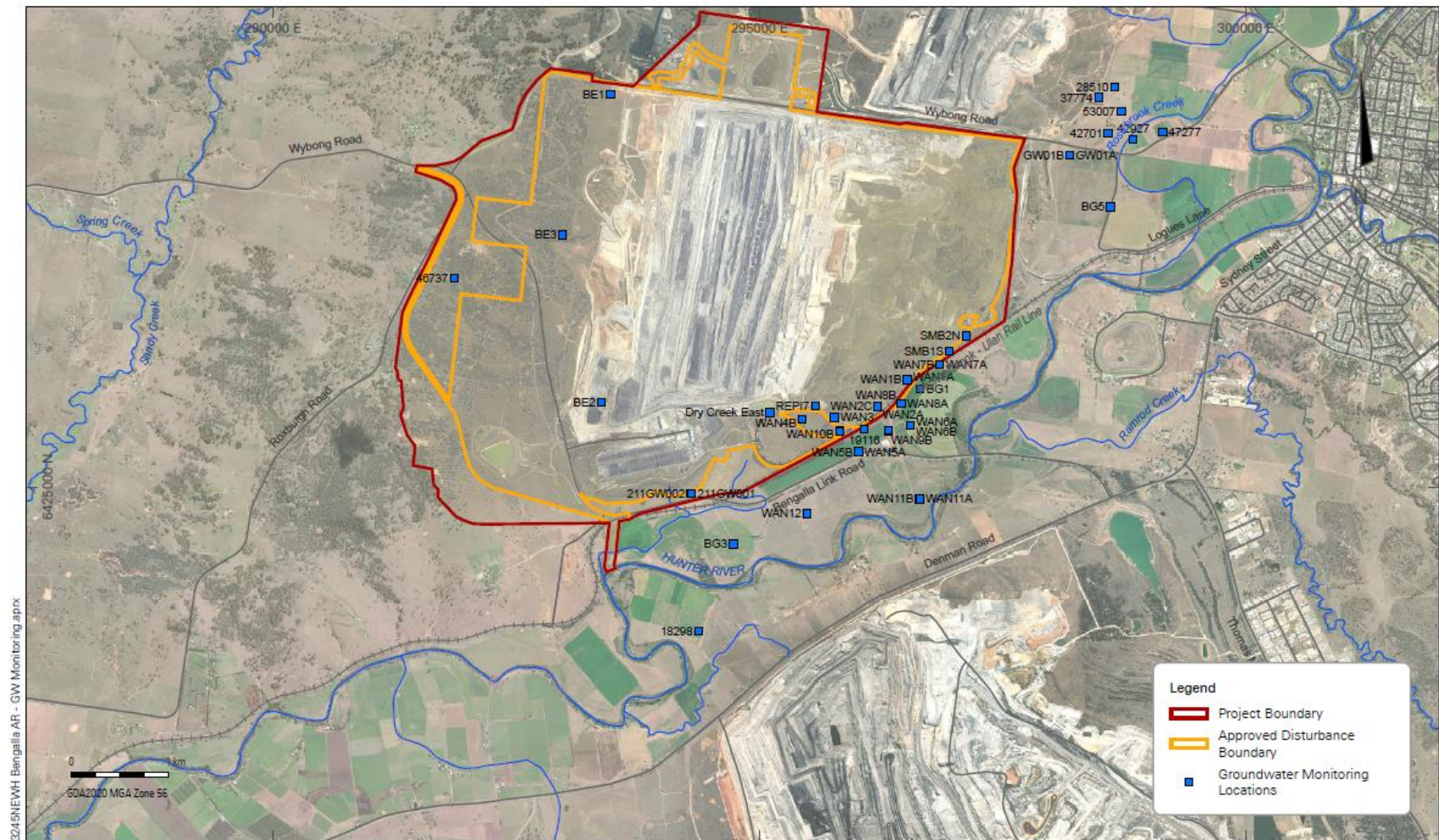
activities. BMC also previously undertook a Groundwater Validation Review (AGE, 2022) in accordance with Condition 25 of Schedule 3 of SSD-5170 in 2022.

Appendix G (see **Section 9**) reviews the trends via a summary of the 2024 groundwater monitoring results and comparison with EIS predictions for selected bore groundwater levels and EC in certain locations.

7.3.2 Further Actions

BMC will consider the groundwater monitoring and management recommendations identified in **Appendix G** (see **Section 10**) and if reasonable and feasible, implement the relevant 2024 actions.

BMC will review and where necessary update the WMP. BMC will lodge the revised plan with relevant regulatory agencies for comment and then with DPHI for approval.



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Existing Groundwater Monitoring Network



Figure 10: Existing Groundwater Monitoring Locations

8 REHABILITATION

This section describes the Bengalla rehabilitation objectives and performance during 2024. Rehabilitation activities planned for the next Reporting Period are also discussed.

REHABILITATION OBJECTIVES AND FINAL LAND USE

The rehabilitation objectives for Bengalla are as described in Schedule 3 Condition 44 of SSD-5170 and the status of each is provided in **Table 25**. It should be noted that BMC have revised Rehabilitation Objectives issued on 22 December 2023. Compliance with these objectives are reported against in the Annual Rehabilitation Report completed by Koru Environmental in **Appendix H**.

Table 25: Bengalla Rehabilitation Objectives (from SSD-5170 (as modified))

Feature	Objective	Status
Mine site (as a whole)	Safe, stable and non-polluting	Ongoing. See Section 6.8.1 for a description of Bengalla mineral waste management during 2023.
	Final landforms designed to incorporate natural micro-relief and natural drainage lines, which, where reasonable and feasible, further avoid straight run drainage drop structures, to integrate with surrounding landforms	Overburden emplacement and rehabilitation activities are undertaken with the objective of achieving the conceptual final landform approved under SSD-5170 (as modified), Forward Program and Rehabilitation Management Plan.
Overburden Emplacement Area – exposed to Muswellbrook and Denman	Rehabilitate the entire face with high density woody vegetation as soon as practicable following the completion of mining operations¹	Ongoing. Rehabilitation Management Plan describes implementation of HDWV.
Final void	- Designed as a long-term groundwater sink and to maximise groundwater flows across back-filled pits to the final void - Minimise to the greatest extent practicable: - the size and depth of the final void; - the drainage catchment of the final void; - any high wall instability risk; and - risk of flood interaction (flows in and out of the void)	Final void designs approved under SSD-5170 to be reviewed at least five years from closure of Bengalla.

Feature	Objective	Status
	Maximise to the greatest extent practicable the final void landform to be in keeping with the natural terrain features of the surrounding landscape	
Agricultural land	Restore or maintain land capability generally as described in the EIS and shown conceptually in Appendix 9 of SSD-5170.	Ongoing. Rehabilitation activities are undertaken with the objective of achieving the land capability approved under SSD-5170 and the Rehabilitation Management Plan.
Revegetation areas	- Restore a minimum 10% treed coverage at the mine site - Higher density planting along the riparian zone of the Dry Creek reinstatement, and around the final void	- Noted per Appendix 9 of SSD-5170. - The rehabilitation of riparian areas along Dry Creek and the final void are not within the current Forward Program period.
Dry Creek reinstatement	- No net loss of creek length; - Restore, maintain and/or improve hydrological and ecological function, quality and geomorphic stability; - Incorporate erosion control measures based on vegetation and engineering revetments; and - Revegetate with suitable native species	Dry Creek reinstatement planned to commence from around 2030 subject to operational progress.
Surface infrastructure	To be decommissioned and removed, unless RR agrees otherwise	A new area of the existing western diversion levee was under construction during 2023. This section of the existing western diversion levee will be commissioned in early 2024.
Community	- Ensure public safety; - Minimise the adverse socio-economic effects associated with mine closure	- Mining areas restricted to BMC personnel and contractors; - Socio-economic impacts to be reviewed at least five years from closure of Bengalla.

As described in Section 8.21.5 of the EIS, a mixture of native bushland and cattle grazing have been identified as the most suitable post-mining land uses for most of the land within the Project Boundary except for the eastern face of the OEA (which will be re-vegetated to contain higher density natural woodland). Grazing and native bushland regeneration has therefore been adopted as the preferred post-mining land use in suitable areas of the site.

8.2 REHABILITATION MANAGEMENT

Rehabilitation Status

Rehabilitation at Bengalla is undertaken in accordance with SSD-5170, the current Bengalla Mine Forward Program (1 January 2023 – 31 December 2025) and the RMP.

The proposed area for new rehabilitation in 2024 was approximately 10ha consisting of HDWV on the northern face of the OEA. The rehabilitation planned for 2024 was not completed due to challenges relating to radio and Global Positioning System (GPS) communication. This resulted in BMC unable to achieve the necessary safety requirements. The GPS system challenges resulted in an inability to accurately achieve the final landform shaping tolerances. BMC have approached Mount Pleasant Operations to host a communications trailer to achieve adequate coverage to complete the 2024 forecasted rehabilitation as well as adjacent 2025 rehabilitation in the 2025 reporting period.

The rehabilitation completed for 2023 (previous reporting period), 2024 (this Reporting Period) and the predicted rehabilitation activities for 2025 is summarised in **Table 26**.

Table 26: Bengalla Rehabilitation Status Summary

Mine Area Type	Previous Reporting Period 2023 (ha)	This Reporting Period 2024 (ha)	Next Reporting Period 2025 (ha) ⁶
A. Total mine footprint¹	1,443	1,562.7	1,617.57
B. Total Active Disturbance²	1,115	1,153.94	1,235.18
C. Land being prepared for rehabilitation³	20	0	26.3
D. Land Under Active Rehabilitation⁴	327	327.7	354
E. Completed Rehabilitation⁵	0	0	0

Notes:

1. Total mine footprint includes all areas within a mining lease that either have at some point in time or continue to pose a rehabilitation liability due to mining and associated activities. As such it is the sum of total active disturbance, decommissioning, landform establishment, growth medium development, ecosystem establishment, ecosystem development and relinquished lands.

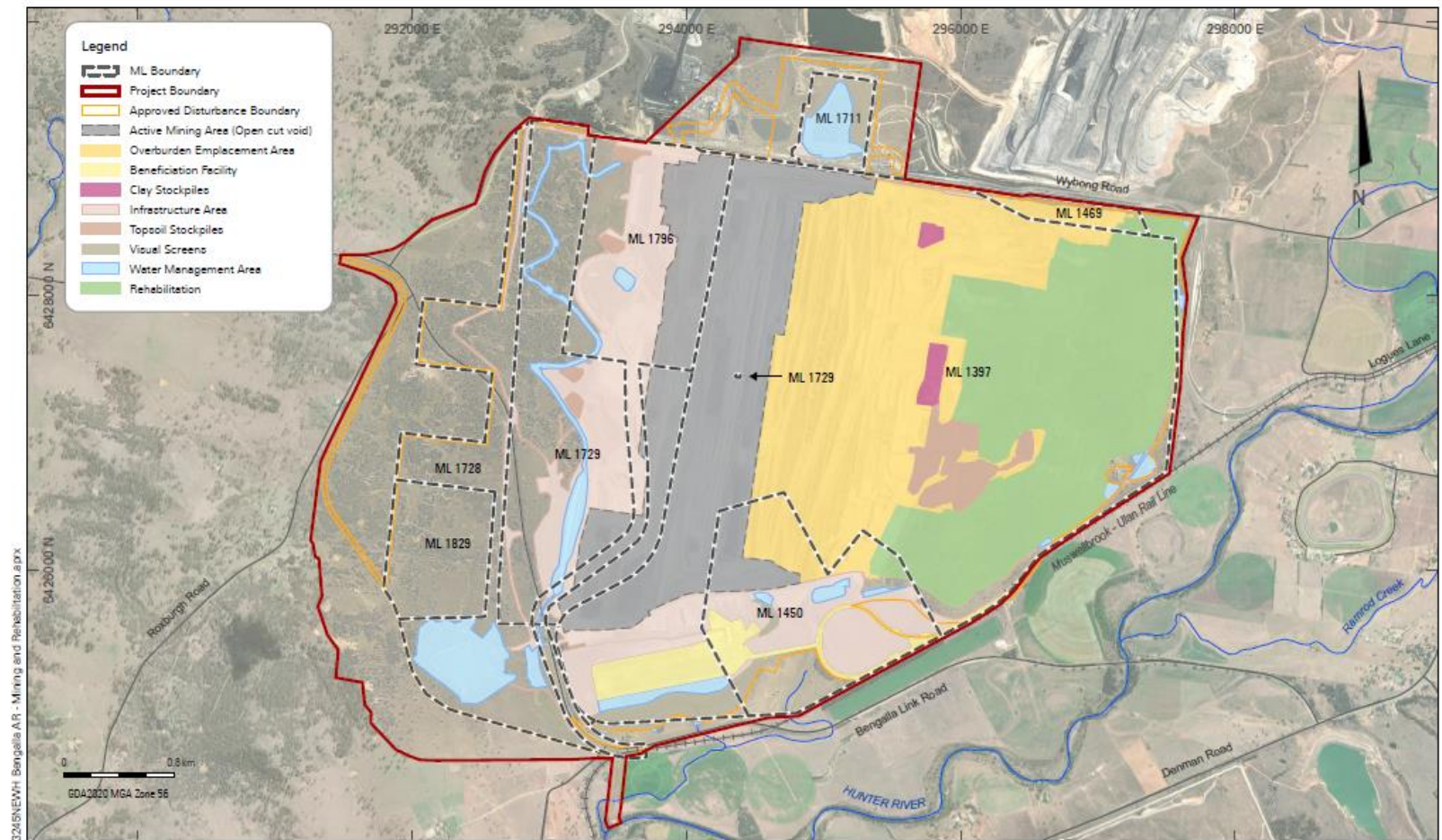
2. Includes all areas ultimately requiring rehabilitation including exploration areas, stripped areas ahead of mining, infrastructure and water management areas, sewage treatment facilities, access tracks and haul roads, topsoil stockpiles, active mining areas, overburden emplacements, tailings dams, etc.

3. Disturbed land that is under decommissioning, landform establishment and growth medium development.

4. Areas under rehabilitation that are being managed to achieve relinquishment.

5. Areas of rehabilitation that have been formally signed off by the RR as having successfully met agreed land use objectives and rehabilitation completion criteria.

6 Data presented for "Next Reporting Period 2025" is consistent with Bengalla Mine Forward Program and RMP.



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Mining and Rehabilitation Status



Figure 11: Mining and Rehabilitation Status 2024

8.3 REHABILITATION MONITORING PROGRAM

Rehabilitation monitoring at Bengalla is undertaken annually through the implementation of the following:

- a transect-based monitoring program; and
- a rehabilitation audit.

Historically, all monitoring transects established across the rehabilitation were monitored on an annual basis. However, as mining progressed and additional rehabilitation was completed at the site, the density of transects (which is correlated to the area of rehabilitation) increased to the point that the monitoring effort required to assess every transect annually became impractical. In addition, ongoing annual monitoring of transects was deemed excessive, especially as the rehabilitation becomes better established, mature and ecological successional processes start to slow down.

Consequently, a decision was made to change the monitoring frequency for each transect to biennial and establish a rotational schedule whereby half of the transects are monitored in Year A and the second half in Year B (and the alternance then repeats).

Starting in 2024 (current monitoring campaign), all transects coded with an even number will be monitored in even years and those coded with odd number in odd years. This approach will allow to maintain a relatively consistent and reasonable monitoring effort every year, without compromising on the quality or scientific validity of the collected datasets.

Accordingly, the geographical scope for the annual rehabilitation audit will generally be limited to the areas containing the transects for the given monitoring year, i.e. assessing the broader areas surrounding the transects and whilst travelling to and between monitoring transects. This way, comprehensive coverage of the rehabilitation will be achieved every two years.

During the Reporting Period, rehabilitation monitoring was undertaken during October 2024 and assessed 23 existing rehabilitation sites.

The transect based monitoring conducted for 2024 is presented in **Table 27**, with the locations of each transect shown in Rehabilitation Monitoring report in **Appendix H**.

Table 27: Bengalla Rehabilitation Monitoring Program Transects (2023)

Transect Name	Description	Rehabilitation Established	Monitoring Established
PAS 04	Pasture	2023	2023
NW2 (HDWV 2)	High density woodland on Class IV or V land	2004	2011
NW4 (HDWV 4)	High density woodland on Class IV or V land	2007	2017
NW6 (HDWV 6)	High density woodland on Class IV or V land	2014	2017
NW8 (HDWV 8)	High density woodland on Class IV or V land	2016	2016
NW10 (HDWV 10)	High density woodland on Class IV or V land	2006	2018
NW12 (HDWV 12)	High density woodland on Class IV or V land	2024	2024
NW14 (HDWV 14)	High density woodland on Class IV or V land	2020	2020

Transect Name	Description	Rehabilitation Established	Monitoring Established
HDWV16	High density woodland on Class IV or V land	2020	2020
HDWV18	High density woodland on Class IV or V land	2020	2020
HDWV20	High density woodland on Class IV or V land	2020	2020
HDWV22	High density woodland on Class IV or V land	2020	2021
HDWV24	High density woodland on Class IV or V land	2020	2021
HDWV26	High density woodland on Class IV or V land	2020	2021
HDWV28	High density woodland on Class IV or V land	2020	2021
HDWV30	High density woodland on Class IV or V land	2021	2022
HDWV32	High density woodland on Class IV or V land	2021	2022
HDWV34	High density woodland on Class IV or V land	2021	2022
HDWV36	High density woodland on Class IV or V land (tubestock)	2022	2022
HDWV38	High density woodland on Class IV or V land (Direct seeding)	2021	2022
HDWV40	High density woodland on Class IV or V land (tubestock)	2022	2022
HDWV42	High density woodland on Class IV or V land (Aerial seeding)	2021	2022
HDWV44	High density woodland on Class IV or V land (Direct seeding)	2023	2023

Source: KORU Environmental Pty Ltd, 2024

8.3.1 Rehabilitation Monitoring Results

Bengalla area experienced slightly above-average annual rainfall during the year preceding the 2024 monitoring event, with a cumulative ~760 mm of rainfall received or ~112% of the long-term annual average.

Only one monitoring transect in pasture rehabilitation was assessed in 2024 (PAS 04), located in Class IV/V rehabilitation established in 2023. Overall, pasture establishment performance at PAS 04 was very poor more than a year after seeding and will need to be closely monitored. Pasture grasses may still germinate and establish and progressively outcompete annual weeds (to be determined the next time this site is monitored).

Consistent with records from previous monitoring years, four transects displayed past evidence of rill erosion including HDWV 32, HDWV 34, HDWV 38 and HDWV 42, with residual channels to 10-20cm deep. However, in all cases the erosion was assessed as either fully stabilised (HDWV 32 and HDWV 34) or stabilising (HDWV 38 and HDWV 42) as a function of progressive vegetation establishment. No tunnel or gully erosion was recorded at any of the 22 monitoring site locations in 2024. Low severity tunnelling was reported at HDWV 22 during the 2023 monitoring campaign; however, impacts were not detected in 2024.

Protective ground cover levels measured in 2024 were satisfactory at 19 of the 22 transects monitored, ranging between 72.0-100.0%. The ground layer vegetation in these areas is generally well established with low to negligible amounts of bare ground present.

The Floristics species richness results indicate that native species in the establishing vegetation communities across the monitored rehabilitation zones was highly variable with an average of 28.4 species/transect in 2024. For the same suite of transects, this compared against an average of 19.0 species/transect in 2023 and 26.3 species/transect in 2022. These results clearly highlighted the seasonal variations in species dynamics that occur as influenced by climatic conditions, the 2022 and 2024 monitoring events being conducted at the back of wetter conditions compared to the drier conditions of 2023.

Overall, it is considered that there is adequate potential for the established communities to be self-sustainable. It is an acceptable outcome for the rehabilitation to include both densely treed areas of sparser stem densities, provided that the average for the zone is within target benchmarks.

Shrub and tree species diversity continue to be, on average, higher in areas planted with tubestock than in all seeded areas (irrespective of the substrate); indicating variable and inconsistent strike rates and germination success where seeding was undertaken.

The 2024 results continue to show woody species assemblage performance was generally better in areas of new rehabilitation.

Soil sampling and analysis was undertaken at all sites monitored in 2024. Testing results generally indicated no key deficiencies in the various growth media, with the exception of pH at 46% of the monitored sites and sodicity at 23% of the monitored sites.

Weed incursion remained a key issue in 2024, with most problematic species including Galenia, fireweed and African boxthorn. For all these species ongoing management will continue.

Erosion on part of the rehabilitation area was identified including breached contour banks, localised gully erosion and an eroded rock-lined drainage channel. BMC has commissioned a review of the original engineering design of the drop structure and a full assessment of all drainage structures in the rehabilitation. Outcomes of this assessment will inform management strategy for identified eroded areas.

Key observations and actions of the rehabilitation monitoring program are detailed in **Appendix H**.

8.3.2 Actions For the Next Reporting Period

Rehabilitation activities for 2025 will be carried out generally in accordance with the Forward Program and Rehabilitation Management Plan subject to operational progress.

Weed control measures will be implemented prior to HDWV establishment in previously rehabilitated land and weed management will continue over the remaining areas of previous rehabilitation as part of Bengalla overall weed management program.

Remediation works identified in GeoFluv structures are under review to define ongoing maintenance strategy. This will be continued during 2025.

BMC will undertake the recommended actions detailed in **Appendix H** for 2025 where reasonable and feasible that have been identified as part of the 2024 rehabilitation monitoring program.

BMC is in the process of gaining modification of SSD-5170 which in part has elements associated with the final landform. As part of this modification application and ongoing closure planning, BMC engage suitably qualified experts to complete Landform Evolution Modelling to assess the long-term stability of structures and the post-mining landform in accordance with the relevant legislation and best-practice industry information.

9 COMMUNITY RELATIONS

This section includes a summary of the environmental complaints received at Bengalla and community engagement and support activities undertaken during the Reporting Period.

9.1 COMMUNITY ENGAGEMENT

BMC undertook a range of community engagement activities during 2024:

- Bengalla Community Consultative Committee (CCC) meetings. The meetings were held in February, May, August, and November 2024. Minutes of each of these meetings are available at the Muswellbrook Library, Denman Library and on the BMC website. The CCC provides a forum for constructive dialogue and discussion enhancing the relationship between the community and Bengalla. The CCC representatives act as a point of contact to provide feedback between Bengalla and the community.
- Near neighbour consultation regarding impacts, sale of land and other interactions.
- During 2024, three Upper Hunter Mining Dialogue School Mines Tours were held with a total of 87 students from Muswellbrook Public School, Denman Public School, Sandy Hollow Public School, and St Mary's Primary School Scone participating.
- Bengalla Community Open Day- On October 26 Bengalla held their bi-annual Community Open Day at Muswellbrook Showground and tours were held to the mine site throughout the day. This was an opportunity for the community to interact with us and find out more about mining.

The following photographs are from the school mine tour and Bengalla Open Day.







9.2 COMMUNITY CONTRIBUTIONS

BMC contributes to programs identified by, and preferably in partnership with, the local community. The BMC Community Support Team (CST) meets regularly to assess requests from the local community for donations, sponsorship, and in-kind contributions. Many projects and events have been developed and supported through sponsorship funding and assistance from the BMC CST who provide their time and expertise towards these initiatives. During the Reporting Period some of the groups, schools and clubs supported through approved applications with the CST include:

- Muswellbrook CATS AFL Club.
- Denman and District Heritage Village.
- Aberdeen Highland Games.
- Kayuga Rural Fire Brigade.
- Muswellbrook Public School.
- Martindale Public School.
- Denman chamber of Commerce and Industry.
- Denman Swimming Club.
- Aberdeen Junior Rugby League Club.
- Blackroo Community Indigenous Corporation.

- Upper Hunter Homeless Support.

During 2024, BMC contributed to the education and career development of students from Muswellbrook, Aberdeen, Singleton and Scone High Schools with the provision of undergraduate scholarships. BMC awarded eight (8) scholarships valued at \$5,000 each to local students pursuing an undergraduate degree. Bengalla will also continue to award the Bengalla Scholarship for students pursuing a career in Engineering, Human Relations, Accounting, Health and Safety, Surveying, Information Technology and Geology which includes paid vacation work at Bengalla. BMC will continue to support local students with scholarship programs again in 2025. In addition, each year in partnership with MIGAS, BMC takes on local apprentices so that at any one time there are a minimum 16 apprentices employed by BMC. In 2024, five first year apprentices commenced employment, and they will be undertaking their diesel mechanic and electrical studies whilst also working onsite. This brings the total number of apprentices onsite in 2024 to 26.

The work experience/placement program with local High Schools continued in 2024, offering 10 placements to local students and the opportunity to experience the various careers in the mining industry. In addition to this Bengalla attended 3 Careers Information sessions aimed at providing information on careers in mining.

The BMC Community Development Fund (CDF) provides funding that is allocated by BMC to support the local community to build community capacity, address development challenges and to take advantage of emerging opportunities. Some of the organisations and projects funded from the CDF in 2024 included:

- Merriwa Festival of the Fleeces.
- Murrurundi King of the Ranges.
- Edinglassie Rural Fire Brigade.
- Polly Farmer Foundation- Follow the Dream Program.
- Muswellbrook Public School Water Awareness Program.
- Warbirds Over Scone.
- Muswellbrook Chamber of Commerce and Industry TV and Movie Nostalgia Festival.



In 2024, BMC sponsored and partnered with local community groups including:

- Muswellbrook Shire Council (MSC) for the Blue Heeler Film Festival, Muswellbrook Art Prize and the Easter Family Fun Day.
- The Bengalla Upper Hunter Show.
- Muswellbrook Race Club Bengalla Race Day.
- Muswellbrook PCYC Health and Fitness Resource.
- Upper Hunter Conservatorium of Music.
- Upper Hunter Education Fund.
- Group 21 Rugby League Competition Naming Rights.
- Muswellbrook Chamber of Commerce and Industry Business Awards.
- Muswellbrook Netball Association Major Sponsor.
- Muswellbrook Touch Football Association Major Sponsor.
- Sponsorship of School Presentation Days in Muswellbrook, Aberdeen, Scone, and Denman.

BMC provides funds to MSC according to the Voluntary Planning Agreement (VPA). A total of \$823,636 was provided/allocated under the VPA to MSC during the Reporting Period.

In addition, BMC provides funds towards events, organisations, clubs, and charities in the local community. The following funds were allocated/provided during the Reporting Period:

- Community Development Fund: **\$319,800**
- Scholarships: **\$108,000**
- CST and Sponsorships: **\$423,238**

9.3 COMMUNITY COMPLAINTS

BMC maintains a register of complaints and a complaints hotline (1800 178 984) which operates 24 hours, 7 days per week. BMC received 37 complaints during the Reporting Period, a decrease compared to the 46 complaints in 2023.

During the Reporting Period, the most common environmental complaints raised by complainants related to blasting (27) and air quality (8) making up 94.4% of the total complaints received. The final two complaints related to noise (1) and a non-mining related issue (1). One complainant accounted for 65% of all complaints during 2024. **Figure 12** shows the environmental complaints trend from 2019 to 2024.

A summary of complaints received during the Reporting Period is provided in **Figure 13**.

BMC responds to complaints by assessing whether any action is required. If action is undertaken those actions are generally recorded and displayed in the complaints register displayed on the BMC website.

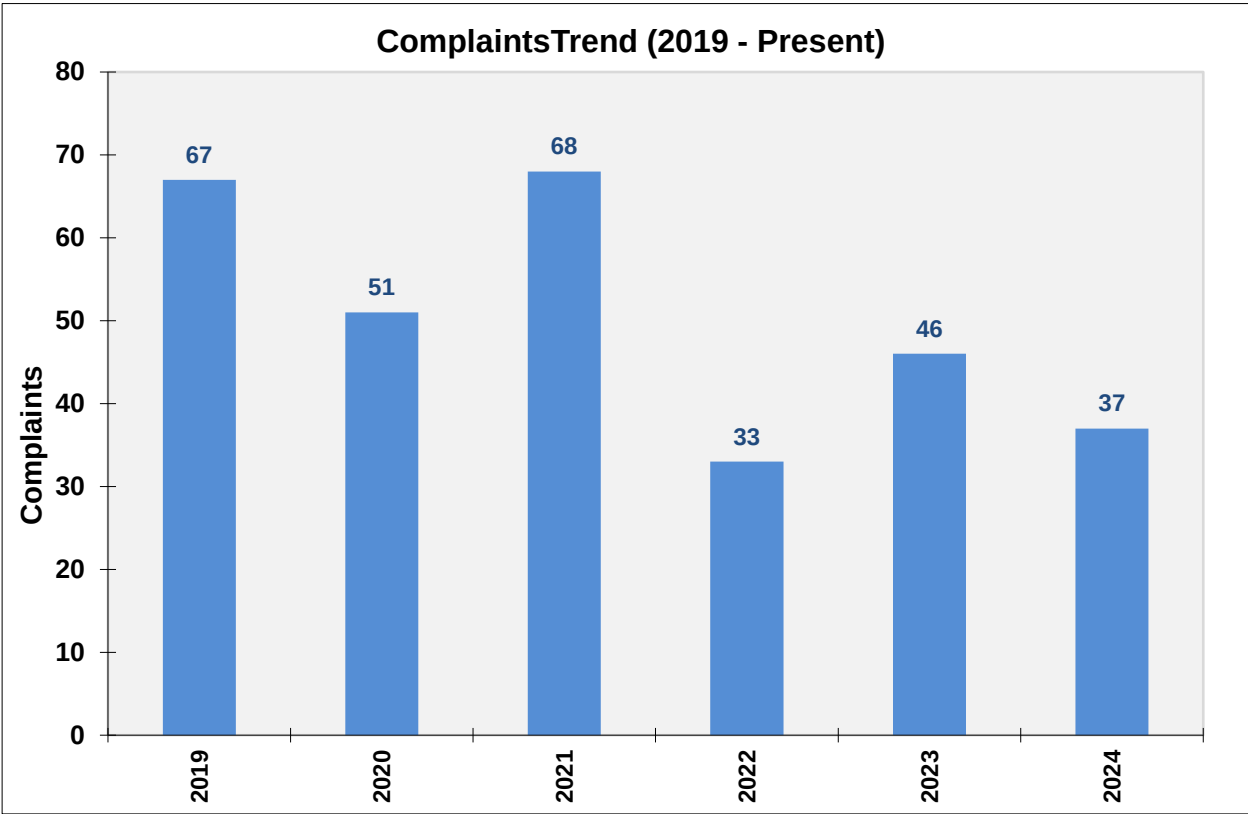


Figure 12: Environmental complaints received for the previous 6 years

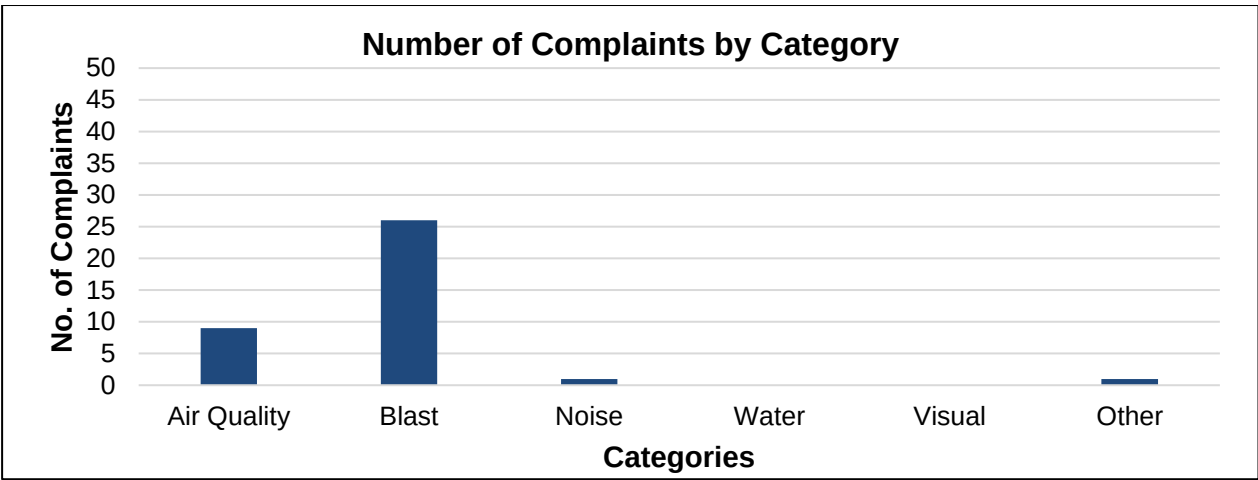


Figure 13: Environmental Complaints Received 2024

10 INDEPENDENT ENVIRONMENTAL AUDIT

This section discusses the requirement for an Independent Environmental Audit (IEA) of the development the subject of SSD-5170 and Dams Safety NSW audit of Dams Safety Regulation 2019 and Mining Approvals 1-3.

10.1 SSD-5170

In accordance with Schedule 5, Condition 9 of SSD-5170, BMC is required to commission an IEA of Bengalla within 1 year of the commencement of SSD-5170 (i.e. 2016) and every 3 years thereafter.

The most recent IEA was conducted in August 2023. Actions arising from this audit are being addressed and are detailed in **Appendix K**.

Two non-compliance actions identified in the IEA were being actioned as of 31 December 2023 and were finalised in March 2024. These include a review of waste procedures and training of relevant staff, and a review of the ROM hopper dust suppression system and commissioning of any identified works required.

Further, in 2023 the DPHI requested a review and re-issue of the IEA in particular how review dates of site Management Plans are recorded. BMC committed to adding review history to the document control register to better capture when Management Plans are reviewed, even if no changes are required.

The next IEA is scheduled to be completed in 2025.

10.2 DAMS SAFETY REGULATION 2019 AND MINING APPROVALS 1-3

Dams Safety Regulation 2019 commenced on 1 November 2019. As of 1 November 2021, any transitional arrangements and savings provisions have concluded, and all clauses of the regulation has commenced.

In December 2023, Dam Safety NSW recommended changes to BENGALLA-2, BENGALL-3 and BENGALLA-4 conditions. BMC subsequently received approval to amend BENGALLA-2, BENGALLA-3 & BENGALLA-4 in early 2024.

The conditions amended 24 January 2024 included the following:

- BENGALLA-2 (CW1) approves mining within the CW1 Notification Area to 30 June 2040.
- BENGALLA-3 (ED3) approves mining within the ED3 (operated by MACH Energy Australia Pty Ltd) Notification Area to 30 June 2040.
- BENGALLA-4 (DW1) is approved to 30 June 2040.

BMC also notified of intent to commence mining within the Notification Area of DW1 under BENGALLA-4 approval, which was approved on 5 April 2024.

11 INCIDENTS AND NON-COMPLIANCES

*This section provides further information about the non-compliances identified in **Section 1** and describes the reportable incidents and exceedances that occurred at Bengalla during the Reporting Period.*

11.1 FURTHER INFORMATION ABOUT NON-COMPLIANCES

11.1.1 Item 4: Condition 6 of EPBC Approval 2012/6378 and Condition 23 of Schedule 3 of SSD 5170

On 24 July 2024, BMC experienced a discharge of sediment laden water from site during the decommissioning of a small sediment dam associated with the construction of an on-site clean water diversion drain – namely the “Western Diversion Levey” (**WDL**). Notifications under the relevant authorities were immediately made to the NSW Environmental Protection Authority (EPA), NSW Department of Planning, Housing and Infrastructure (DPHI) and the federal Department of Climate Change Energy, the Environment and Water (DCCEEW) as required.

The Western Diversion Levy (**WDL**) is a clean water diversion channel at the Premises that directs “clean water” away from operational areas involved with coal mining activities, which would produce dirty water classified as “mine waters” that have been in contact with coal or carbonaceous materials.

Prior to and around the time of the Incident, earthworks were being carried out to realign the WDL, which required the construction and then decommissioning of sediment retention basins during the project.

On 22 July 2024, decommissioning of the Basin began by pumping water from the Basin to the “dirty water system”. The decommissioning process was planned to take a number of days. During this process sediment laden water was released offsite to the Hunter River.

Upon becoming aware of the regrettable incident, BMC took immediate action to stop the water draining into the Corridor.

BMC was issued a Penalty Infringement Notice and Official Caution from the NSW Environmental Protection Authority on the 21 March 2025.

11.2 REPORTABLE INCIDENTS OR EXCEEDANCES

Table 28 provides details of matters or exceedances during the Reporting Period that were reported by BMC to regulatory authorities. Matters addressed at **Section 11** are not reproduced in **Table 28**.

Table 28: Reportable Matters or Exceedances 2024

No	Date	Reported To	Nature	Details	Action Taken	Matter Status
1.	5 February 2024	DPHI	Air Quality	Potential exceedance of 24-hour air quality criteria at PM10-1	Expert report (concluding BMC did not exceed criteria) supplied to DPHI. BMC also supplied operations summary for relevant date to DPHI.	No further action required. Completed and closed.
2.	1 March 2024	DPHI	Rehabilitation	Administrative non-compliance relating to review of Rehabilitation Strategy under Schedule 3, Condition 47 of SSD 5170.	Delays in submitting revised Rehabilitation Strategy by the anniversary date resulted from delays in receiving required feedback from relevant stakeholder consultation. Feedback incorporated and revised Rehabilitation Strategy submitted within two weeks of receipt of final consultation from BCD.	No further action required. Completed and closed.
3.	12 March 2024	DPHI	Air Quality	Potential exceedance of 24-hour air quality criteria at PM10-3	Expert report (concluding BMC did not exceed criteria) supplied to DPHI. BMC also supplied operations summary for relevant date to DPHI.	No further action required. Completed and closed.

No	Date	Reported To	Nature	Details	Action Taken	Matter Status
4.	27 August 2024	EPA	Air Quality	Dust complaint received by EPA.	BMC supplied requested air quality monitoring data and operations summary for relevant date to EPA.	No further action required. Completed and closed.
5.	28 August 2024	EPA	Air Quality	Dust complaint (x2) received by EPA.	BMC supplied requested air quality monitoring data and operations summary for relevant date to EPA.	No further action required. Completed and closed.
6.	17 September 2024	EPA	Air Quality	Dust complaint received by EPA.	BMC supplied requested air quality monitoring data and operations summary for relevant date to EPA.	No further action required. Completed and closed.
7.	12 December 2024	DPHI	Air Quality	Potential exceedance of 24-hour air quality criteria at PM10-3	Expert report (concluding BMC did not exceed criteria) supplied to DPHI. BMC also supplied operations summary for relevant date to DPHI.	No further action required. Completed and closed.

ACTIONS TO BE TAKEN TO PREVENT ENVIRONMENTAL INCIDENTS

BMC seeks to improve environmental and community performance through training of employees and contractors and implementation of the BMC environmental management system.

12 ACTIVITIES PROPOSED IN THE NEXT REPORTING PERIOD

This section summarises the operational and environmental management activities proposed to be undertaken during 2025.

A summary of key environmental management activities proposed for 2025 is presented in Error! Reference source not found.. Progress against these activities will be reported in the next Annual Review.

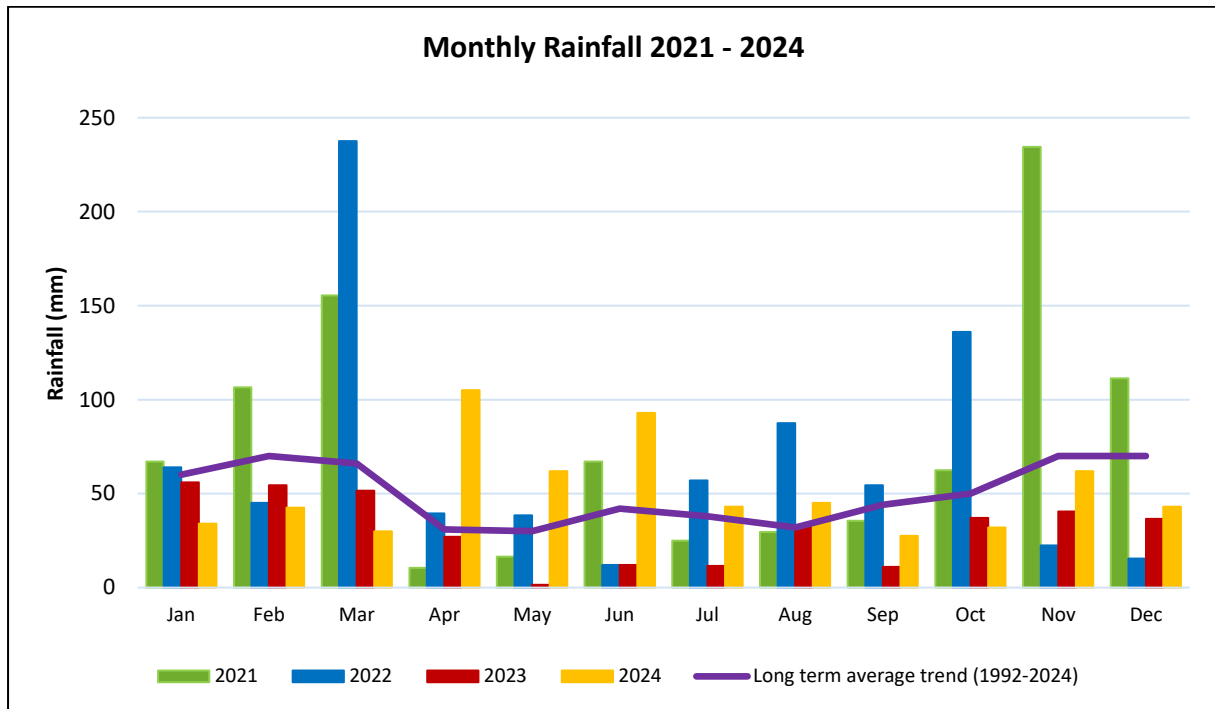
Table 29:Environmental Management Activities Proposed for 2025

Area / Issue	Actions Proposed	Timeline for Implementation
Air quality	Continue installation and commissioning of updated Air Quality monitoring network.	December 2025 (subject to change due to delivery time of monitors and mains power supply to monitor site).
Regulatory	SSD-5170 Modification Application 6 currently on hold.	On hold.
Regulatory	SSD-5170 Modification Application 7 currently on hold.	Modification report issued February 2025
Regulatory	SSD-5170 Modification Application 8 currently on hold.	Q2 2025
Audit	Engage independent environmental auditor as per the 3-yearly audit requirements.	To be progressed during 2025.
Management Plans	Undertake reviews of management plans in accordance with SSD-5170 (as required)	To be progressed during 2025.
Tree Screening	Progress Wybong Road tree screening (Schedule 3, Condition 40 and 41A of SSD-5170).	To be progressed during 2025.
Offsets	Progress long-term security of biodiversity offset areas (Schedule 3, Condition 28 of SSD-5170).	To be progressed during 2025.
Rehabilitation	Undertake new rehabilitation and installation of HDWV into existing rehabilitation according to the Rehabilitation Management Plan and Forward Program.	To be progressed during 2025.

Area / Issue	Actions Proposed	Timeline for Implementation
	Continue implementation of Rehabilitation Strategy (Schedule 3, Condition 47 of SSD-5170).	

Appendix A

Meteorological Monitoring Summary



Graph A1
Bengalla Monthly Rainfall 2021 to 2024

Table A1
Monthly Temperatures 2024

Month	Minimum Daily Temperature (°C)	Maximum Daily Temperature (°C)
January	11.9	41.3
February	15.1	40.2
March	10.7	36.7
April	4.9	30.4
May	0.5	23.3
June	-1.7	21.4
July	-1.5	20.3
August	-1.7	28.1
September	- 0.6	28.3
October	5.4	31.5
November	7.0	38.7
December	8.6	40.0

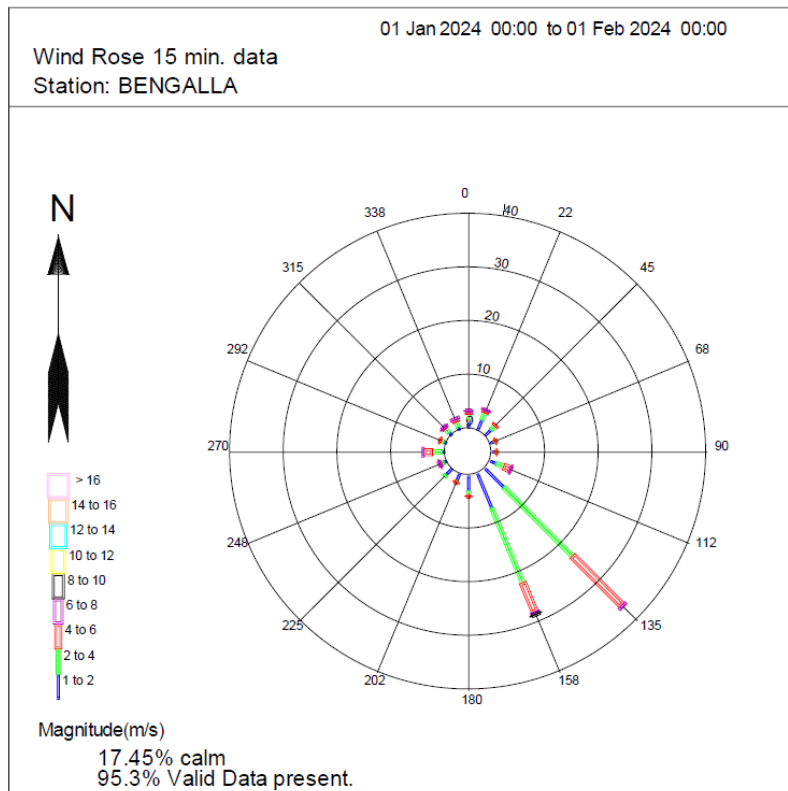


Figure A1
Bengalla January 2024 Windrose

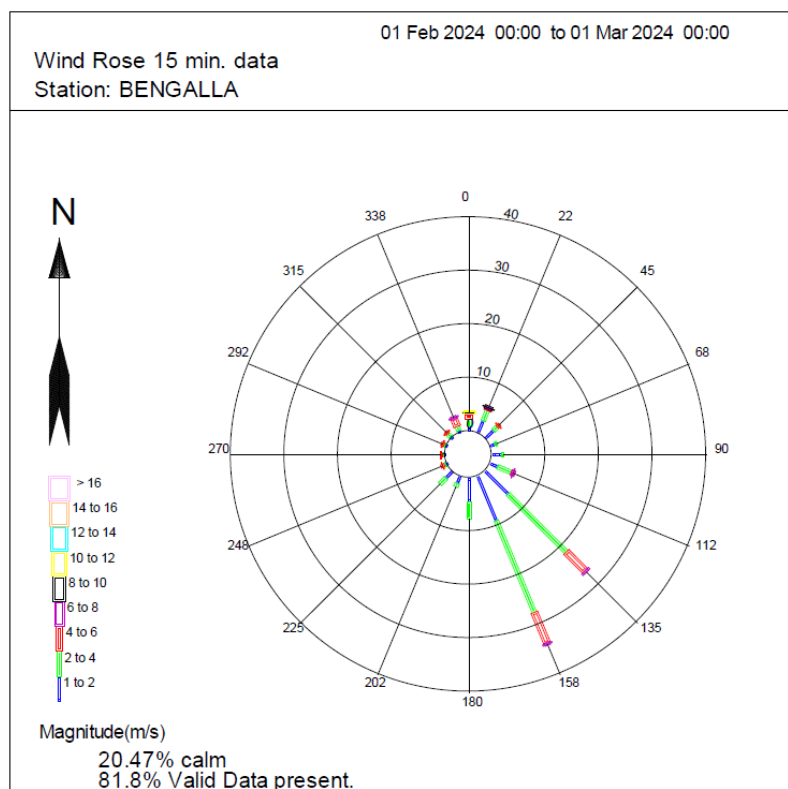


Figure A2
Bengalla February 2024 Windrose

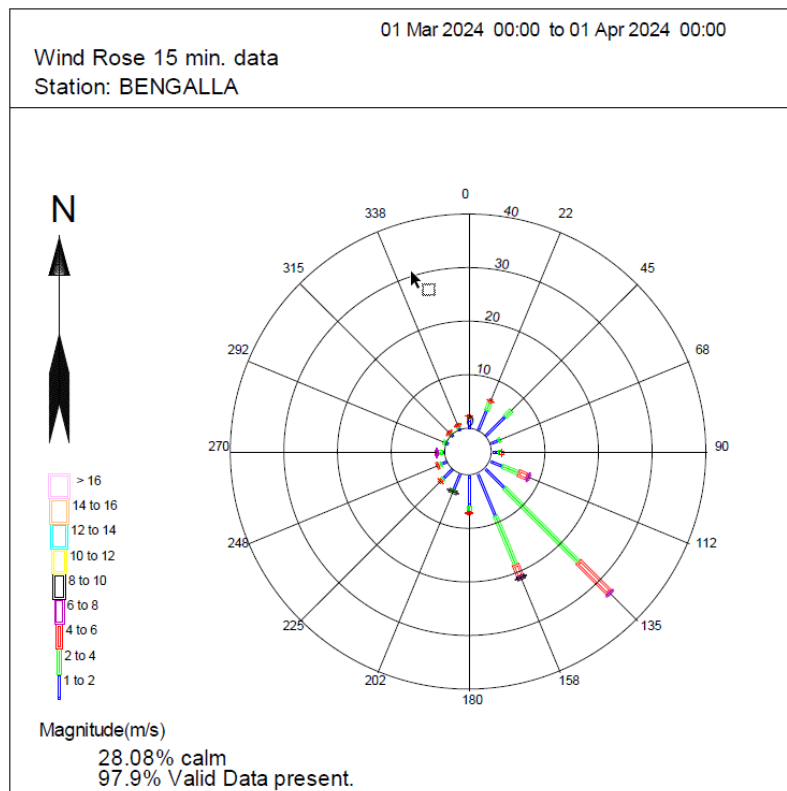


Figure A3
Bengalla March 2024 Windrose

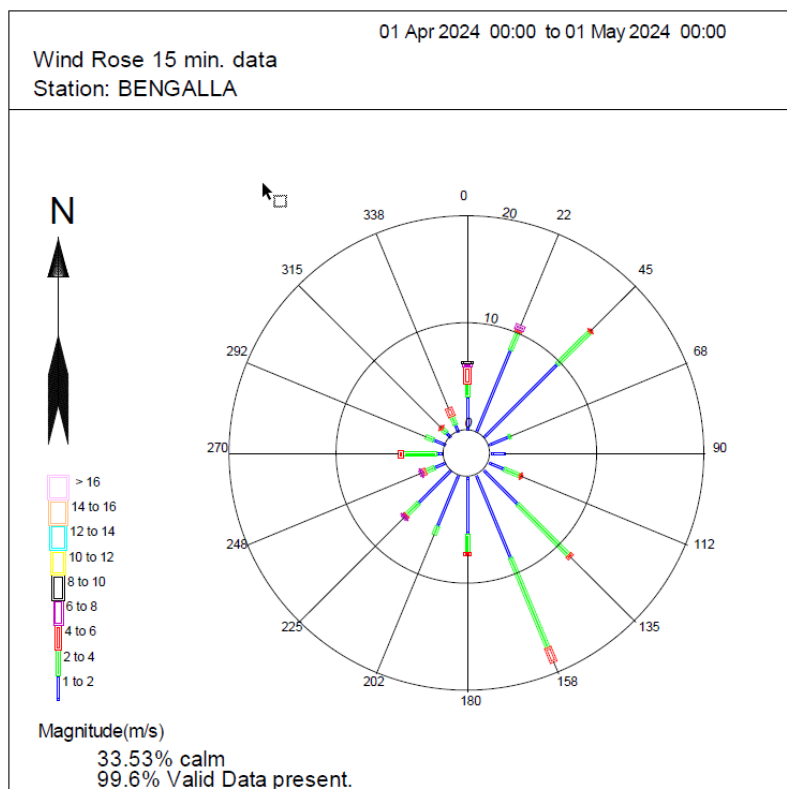


Figure A4
Bengalla April 2024 Windrose

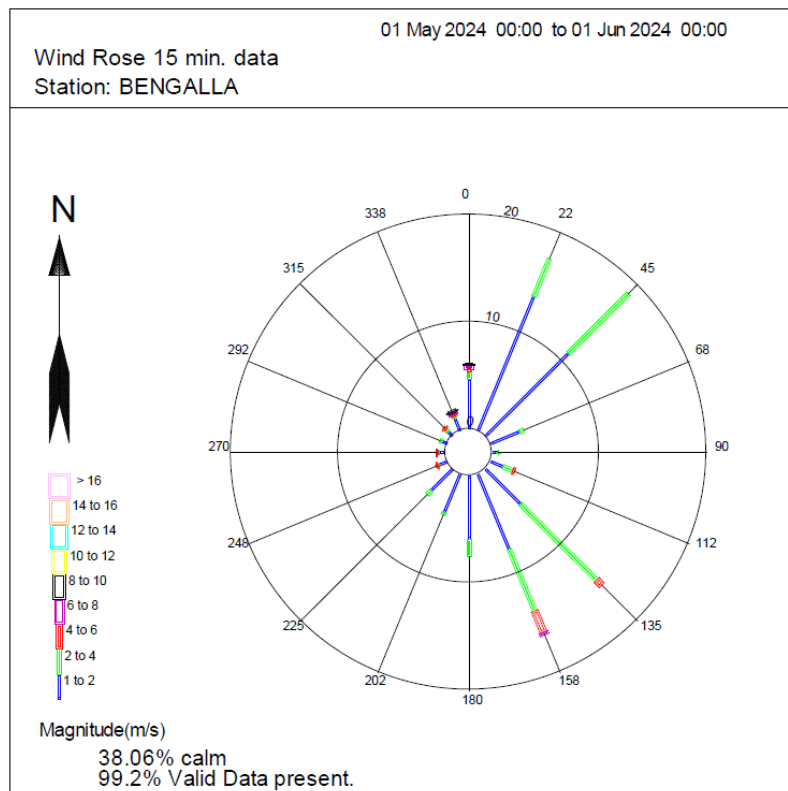


Figure A5
Bengalla May 2024 Windrose

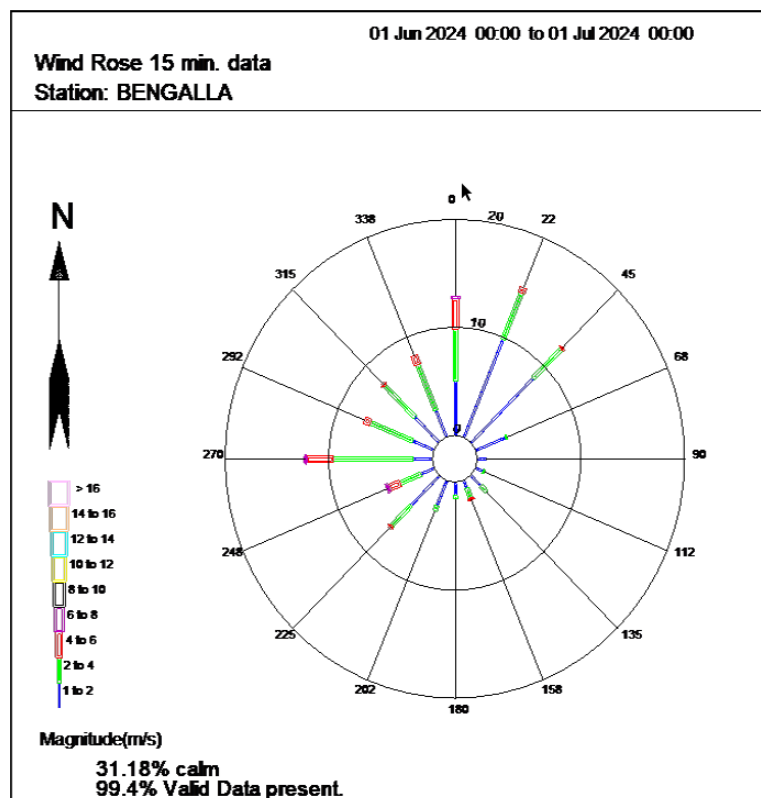


Figure A6
Bengalla June 2024 Windrose

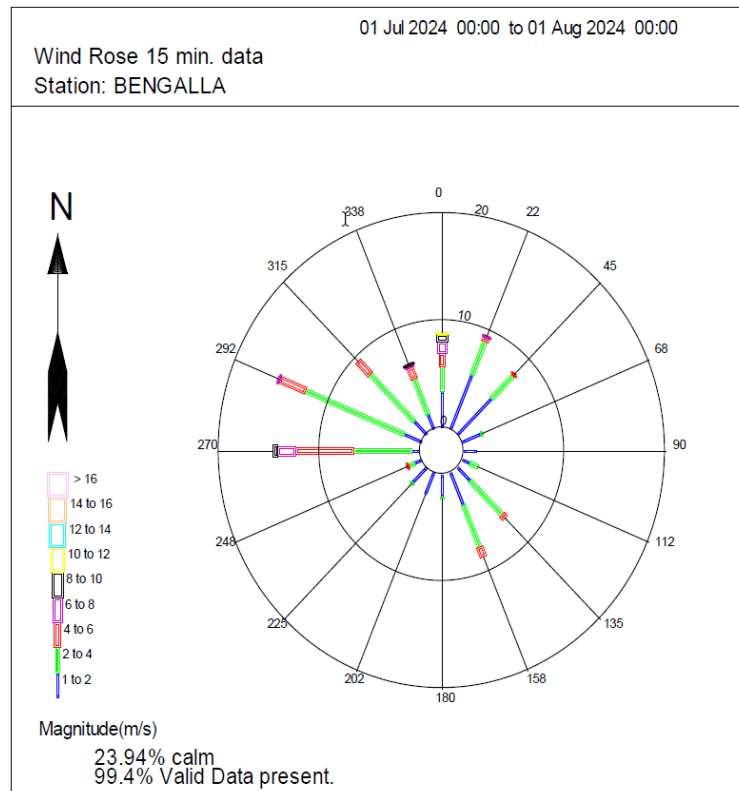


Figure A7
Bengalla July 2024 Windrose

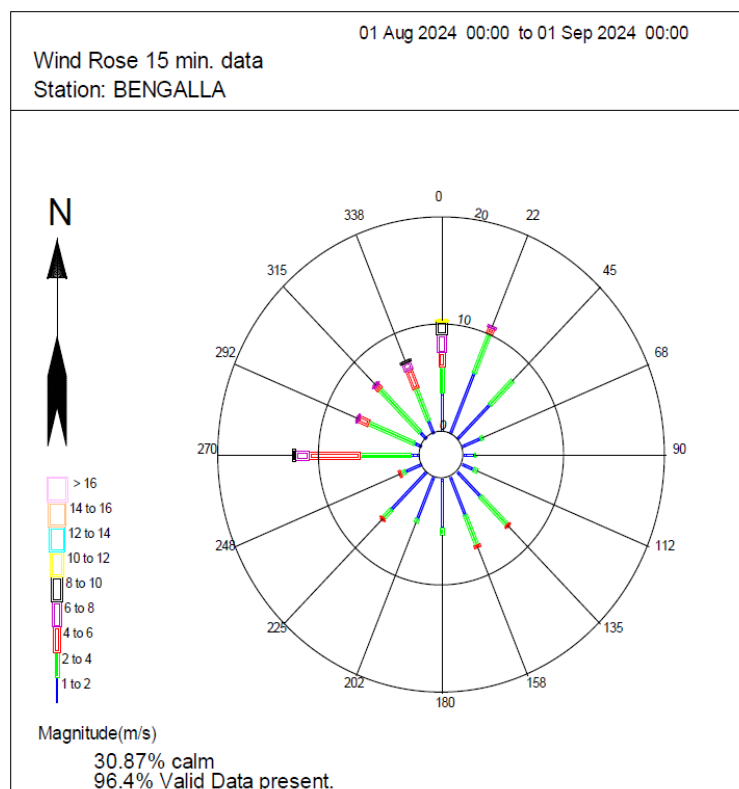


Figure A8
Bengalla August 2024 Windrose

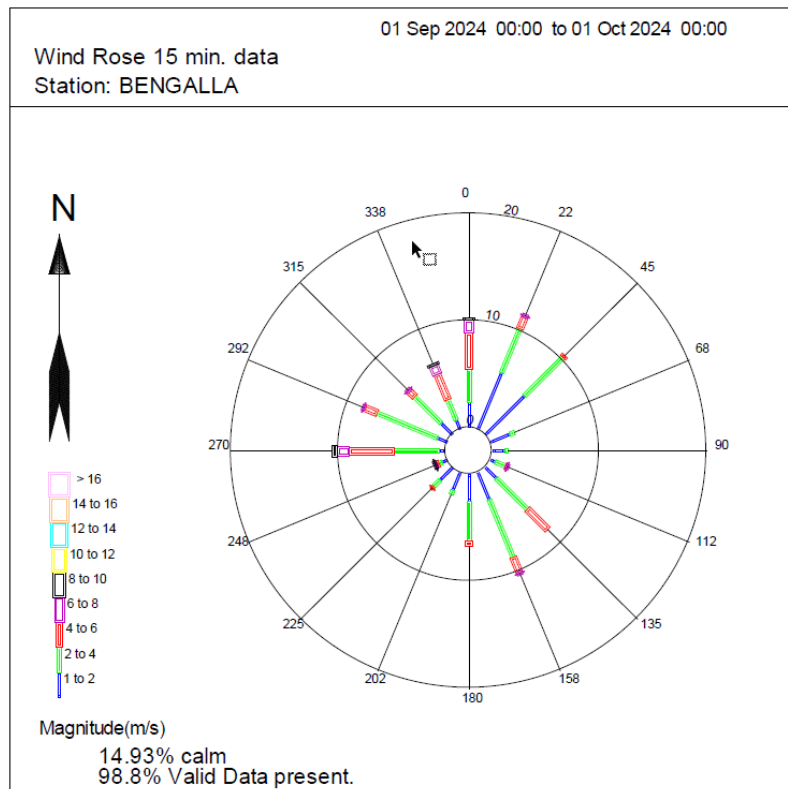


Figure A9
Bengalla September 2024 Windrose

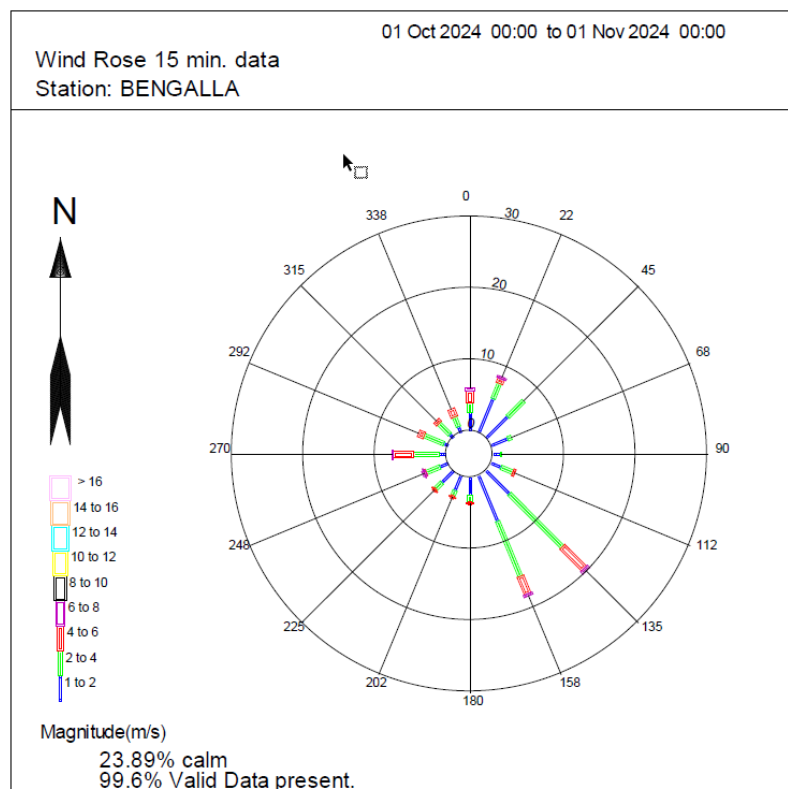


Figure A10
Bengalla October 2024 Windrose

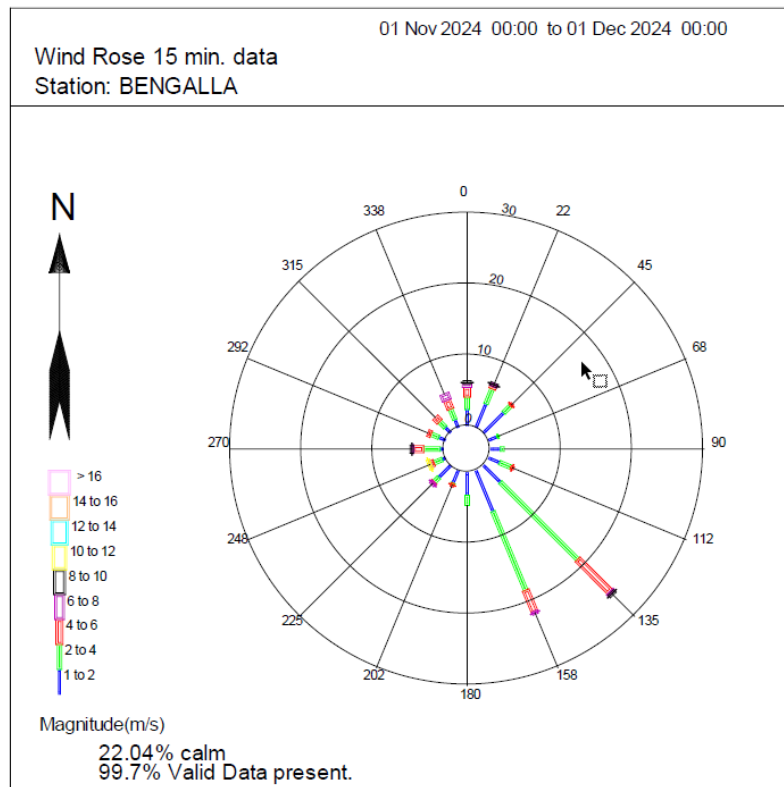


Figure A11
Bengalla November 2024 Windrose

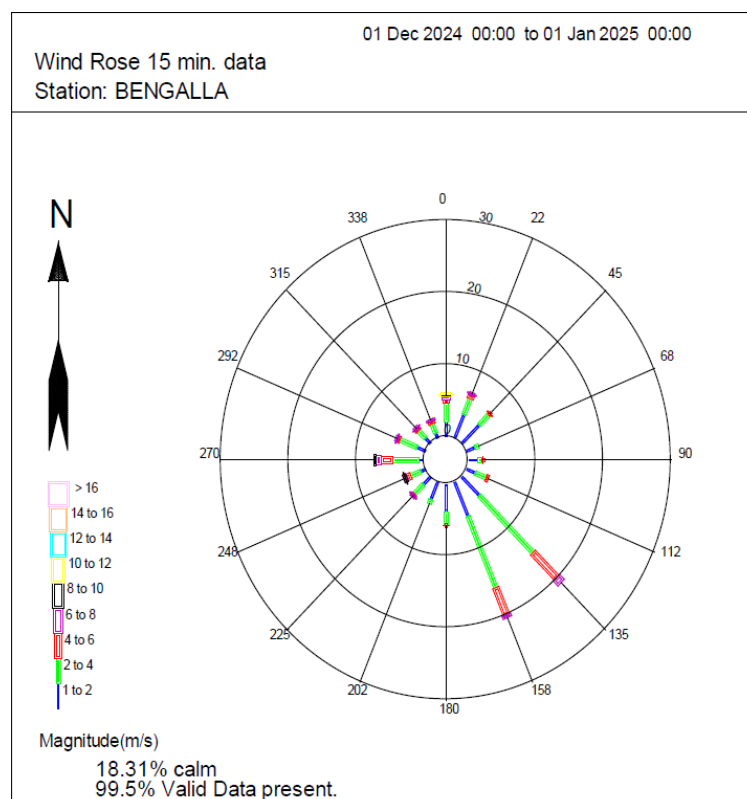


Figure A12
Bengalla December 2024 Windrose

Notes:
Sourced from Benchmark Monitoring.

Appendix B

Noise Monitoring Summary

Table B1
Summary of Compliance Attended Noise Monitoring Results 2024

Site	Month	Met Conditions within Range? ³	BMC only LA _{eq} dB ¹	BMC Impact Assessment LA _{eq} criterion _{1, 4}	BMC only LC _{eq} dB ₂	BMC Impact Assessment LC _{eq} criterion _{2, 4}	BMC only LA _{1,1 min} dB ₅	BMC LA _{1,1 min} criterion ₄	Exceedance dB
AN01	Jan-24	Yes	30	35	44	60	33	45	No
	Feb-24	Yes	24	35	46	60	30	45	No
	Mar-24	No	29	35	47	60	37	45	No
	Apr-24	Yes	33	35	54	60	39 ^{#6}	45	No
	May-24	No	30	35	52	60	38 ^{#6}	45	No
	Jun-24	Yes	33	35	57	60	40 ^{#6}	45	No
	Jul-24	No	30	35	59	60	36	45	No
	Aug-24	Yes	29	35	52	60	37 ^{#6}	45	No
	Sep-24	No	23	35	47	60	39 ^{#8}	45	No
	Oct-24	Yes	1A	35	1A	60	1A	45	No
	Nov-24	Yes	22	35	46	60	30 ^{#6}	45	No
	Dec-24	No	27	35	49	60	38 ^{#8}	45	No

Site	Month	Met Conditions within Range? ³	BMC only LA _{eq} dB ¹	BMC Impact Assessment LA _{eq} criterion _{1, 4}	BMC only LC _{eq} dB ₂	BMC Impact Assessment LC _{eq} criterion _{2, 4}	BMC only LA _{1,1 min} dB ₅	BMC LA _{1,1 min} criterion ₄	Exceedance dB
AN03	Jan-24	No	IA	40	IA	60	IA	45	No
	Feb-24	Yes	31	40	55	60	39 ^{#6}	45	No
	Mar-24	No	30	40	51	60	31	45	No
	Apr-24	Yes	32	40	54	60	35	45	No
	May-24	No	33	40	52	60	45 ^{#6}	45	No
	Jun-24	Yes	IA	40	IA	60	IA	45	No
	Jul-24	No	37	40	59	60	41	45	No
	Aug-24	Yes	IA	40	IA	60	IA	45	No
	Sep-24	No	34	40	55	60	31	45	No
	Oct-24	Yes	Est 25	40	Not meas	60	36	45	No
	Nov-24	No	31	40	55	60	38 ^{#6}	45	No
	Dec-24	No	27 ^{#10}	40	50	60	34 ^{#8}	45	No

Site	Month	Met Conditions within Range? ³	BMC only LA _{eq} dB ¹	BMC Impact Assessment LA _{eq} criterion _{1, 4}	BMC only LC _{eq} dB ₂	BMC Impact Assessment LC _{eq} criterion _{2, 4}	BMC only LA _{1,1 min} dB ₅	BMC LA _{1,1 min} criterion ₄	Exceedance dB
AN04	Jan-24	No	Est 30	35	Not meas	60	Est 33	45	No
	Feb-24	Yes	32	35	58	60	39	45	No
	Mar-24	No	36	35	54	60	46	45	No ^{#7}
	Apr-24	Yes	31	35	54	60	41 ^{#6}	45	No
	May-24	Yes	35	35	53	60	42 ^{#6}	45	No
	Jun-24	Yes	IA	35	IA	60	IA	45	No
	Jul-24	No	35	35	55	60	47 ^{#6}	45	N/A
	Aug-24	Yes	Est 25	35	Not meas	60	Not meas	45	No
	Sep-24	No	37	35	57	60	46 ^{#8}	45	N/A
	Oct-24	No	40 ^{#9}	35	59	60	47 ^{#6}	45	N/A
	Nov-24	No	33	35	52	60	38	45	No
	Dec-24	No	29	35	49	60	40 ^{#8}	45	No

Source: Bridges Acoustics (2024)

Notes (modified from Bridges Acoustics, 2024)

1. LA_{eq},15minute operational noise levels for BMC in the absence of all other noise sources.
2. LC_{eq},15minute operational noise levels for BMC in the absence of all other noise sources.
3. 'Yes' denotes meteorological conditions result in relevant criteria being applicable. 'No' denotes meteorological conditions are outside those specified in NSW Industrial Noise Policy.
4. From SSD-5170 (as modified) and EPL 6538. Monitoring locations AN02 and AN03 are closer to mining operations than the nearest private receiver. A correction factor has been applied based on noise modelling for the continuation of Bengalla Mine EIS (Hanson Bailey, 2013) as outlined in the approved NMP.
5. LA_{1,1}minute operational noise levels for BMC in the absence of all other noise source.
6. The reported LA_{1,1}min level includes a +5 dBA correction to periods of tonal noise.
7. Mine-attributed noise levels at AN04 were 1 dBA above both LA_{eq},15min and LA_{1,1}min noise limits specified in SSD-5170, however weather conditions were invalid at this time and the noise limits therefore did not apply. On this basis, no exceedance of the SSD-5170 noise limits occurred during this noise survey.
8. The reported sleep disturbance levels at all locations include a +5 dBA tonal correction.
9. The reported LA_{eq},15min level at AN04 (second measurement) includes a +2 dBA low frequency correction.
10. A +5 dBA correction to 11 seconds of tonal mine noise increased the measured level from 26.4 to 26.6 LA_{eq},15min at AN03, resulting in the reported noise level rounded to the nearest 1 dBA changing from 26 to 27 LA_{eq},15min.

N/A – Noise criteria do not apply due to a strong temperature inversion at the time of the survey (Bridges Acoustics – 2024).

IA = inaudible.

Est = Estimated.

Not meas = Not measurable.

Appendix C

Blast Monitoring Summary

Table C1
Blast Monitoring Summary – 2024

BLAST DETAILS				GROUND VIBRATION (mm/s)	OVERPRESSURE (dB)
Event No.	Date	Time of Blast	Blast Code	Moore	Moore
1	2/01/2024	4:16:38 PM	S41-02-PS-BR1	0.76	107.20
2	2/01/2024	4:20:10 PM	S41-14-IB-BR1	0.74	108.20
3	2/01/2024	4:18:14 PM	S43-20-IB-PF2	1.10	100.30
4	6/01/2024	10:55:38 AM	S41-07-IB-BR1	2.84	113.20
5	8/01/2024	4:00:25 PM	S43-30-CI-MAPF	1.47	93.00
6	10/01/2024	11:59:00 AM	S43-17-IB-PF2	0.32	110.20
7	12/01/2024	12:32:37 PM	S43-19-IB-PF2	0.08	109.50
8	12/01/2024	12:33:38 PM	S43-12-CI-MAPF	1.45	115.20
9	17/01/2024	11:11:35 AM	S41-02-IB-BR1	3.30	102.90
10	20/01/2024	11:09:51 AM	S47-33-IB-WW3	0.92	95.40
11	22/01/2024	2:59:26 PM	S42-19-PS-BYWN	1.65	110.60
12	22/01/2024	3:00:50 PM	S43-23-IB-PF2	1.42	113.40
13	23/01/2024	2:53:45 PM	S41-19-PS-BYWN	1.59	110.00
14	24/01/2024	2:58:24 PM	S41-15-PS-BYWN	0.63	88.60
15	27/01/2024	3:03:33 PM	S41-19-IB-BR2C	0.17	109.70
16	27/01/2024	3:06:05 PM	S41-23-PS-BYWN	1.00	112.50
17	29/01/2024	4:04:31 PM	S41-26-IB-BR2C	0.16	92.10
18	1/02/2024	3:02:49 PM	S41-11-PS-BYWN	0.71	92.30
19	1/02/2024	3:03:33 PM	S41-22-IB-BR2C	0.27	103.50
20	2/02/2024	12:50:13 PM	S41-25-IB-BR2C	0.16	100.20
21	3/02/2024	2:57:34 PM	S43-26-IB-PF2	1.26	102.60
22	5/02/2024	12:08:53 PM	S43-01-IB-MA1	1.56	110.30
23	6/02/2024	12:02:32 PM	S43-09-CI-MAPF	1.16	113.00
24	9/02/2024	2:54:42 PM	S43-07-CI-MAPF	1.07	108.00
25	10/02/2024	2:56:34 PM	S43-18-IB-BR	0.26	114.80

26	12/02/2024	4:00:26 PM	S43-18-IB-VARL	1.41	102.60
27	14/02/2024	1:09:02 PM	S41-12-IB-BY1	1.53	97.10
28	15/02/2024	3:06:58 PM	S41-03-PS-BYWN	2.11	111.90
29	17/02/2024	10:58:31 AM	S43-19-IB-VARL	2.54	100.30
30	20/02/2024	3:08:31 PM	S41-07-PS-BYWN	1.74	98.90
31	20/02/2024	3:09:15 PM	S41-15-IB-BY1	1.20	105.10
32	21/02/2024	3:02:36 AM	S42-25-PS-BYWN	0.68	105.84
33	23/02/2024	4:19:07 PM	S41-10-PS-BYWN	1.21	113.00
34	23/02/2024	4:19:58 PM	S44-12-IB-WW4	2.20	108.50
35	26/02/2024	3:07:07 PM	S44-19-CI-MAPF	1.82	107.00
36	1/03/2024	3:33:31 PM	S41-24-IB-BR2A	0.49	102.20
37	2/03/2024	10:55:27 AM	S41-08-IB-BY1	1.98	94.10
38	5/03/2024	3:55:31 PM	S41-19-IB-BR2A	0.10	97.18
39	8/03/2024	2:55:11 PM	S43-21-IB-VARL	2.48	103.30
40	9/03/2024	3:58:27 PM	S43-03-CI-MAPF	0.94	108.20
41	14/03/2024	2:34:23 PM	S41-03-IB-BY1	1.83	103.10
42	15/03/2024	11:25:57 AM	S43-23-IB-VARL	2.46	103.20
43	18/03/2024	3:27:06 PM	S43-13-IB-PF2	0.40	101.50
44	22/03/2024	3:57:22 PM	S41-25-PS-BYWN	0.37	104.50
45	22/03/2024	3:59:36 PM	S43-26-IB-VARL	1.99	98.00
46	23/03/2024	3:58:05 PM	S44-26-IB-WW4	1.96	104.30
47	25/03/2024	12:41:08 PM	S44-03-IB-WW2	1.06	105.50
48	26/03/2024	3:10:03 PM	S44-09-IB-WW3	1.67	118.80
49	28/03/2024	12:04:54 PM	S46-26-IB-WW1	1.13	114.50
50	3/04/2024	3:49:48 PM	S41-23-IB-BY1	0.85	98.50
51	3/04/2024	3:52:05 PM	S43-15-IB-VARL	2.16	101.70
52	3/04/2024	3:54:14 PM	S46-17-IB-WW3	1.26	107.50
53	4/04/2024	3:32:42 PM	S44-24-CI-MAPF	0.57	103.40
54	8/04/2024	4:02:50 PM	S41-19-IB-BY1	1.05	95.40
55	11/04/2024	4:12:23 PM	S41-11-IB-WN	0.16	102.20

56	11/04/2024	4:14:17 PM	S43-29-IB-PF2	1.35	100.20
57	13/04/2024	3:33:42 PM	S43-13-IB-VA1	1.89	118.00
58	15/04/2024	1:17:45 PM	S43-02-CI-MAPF	0.97	92.30
59	17/04/2024	3:02:08 PM	S41-22-IB-BY1	0.14	101.50
60	17/04/2024	3:03:35 PM	S43-09-IB-PF2	1.93	102.50
61	18/04/2024	4:15:35 PM	S44-01-IB-WW2	1.57	102.50
62	20/04/2024	2:57:38 PM	S46-22-IB-WW4	2.16	104.50
63	22/04/2024	4:01:52 PM	S44-30-IB-WW2	0.54	102.40
64	26/04/2024	3:10:56 PM	S41-12-IB-WN	0.64	103.50
65	26/04/2024	3:12:51 PM	S44-33-IB-WW2	0.44	101.20
66	29/04/2024	4:37:40 PM	S43-06-IB-PF2	4.10	102.80
67	3/05/2024	11:05:51 AM	S41-10-IB-WN	0.37	108.20
68	3/05/2024	11:07:59 AM	S42-09-IB-BR1	3.93	100.30
69	4/05/2024	3:34:51 PM	S41-07-IB-WN	0.53	107.90
70	10/05/2024	3:07:21 PM	S41-03-IB-WN	0.49	105.50
71	11/05/2024	2:59:39 PM	S43-03-IB-PF2	1.62	104.50
72	15/05/2024	4:06:09 PM	S43-26-IB-VA1	1.00	98.30
73	18/05/2024	10:57:46 AM	S43-11-IB-VA1	2.68	109.30
74	20/05/2024	2:58:24 PM	S42-07-IB-BR1	1.77	98.60
75	21/05/2024	4:08:10 PM	S41-25-IB-WN	0.59	116.20
76	21/05/2024	4:09:19 AM	S44-28-IB-WW2	0.45	101.50
77	25/05/2024	3:02:22 PM	S42-03-IB-BR1	2.89	99.50
78	25/05/2024	3:05:08 PM	S43-22-IB-VA1	1.61	106.10
79	27/05/2024	4:00:03 PM	S46-26-IB-WW2 & S46-25-IB-WW4	2.13	105.70
80	31/05/2024	3:26:04 PM	S43-16-IB-VA1	1.55	100.50
81	6/06/2024	4:04:34 PM	S44-10-IB-WW4	1.44	103.40
82	8/06/2024	4:00:34 PM	S44-29-IB-WW4	0.83	105.10
83	11/06/2024	3:25:25 PM	S42-15-PS-BYWN	1.81	100.80
84	13/06/2024	12:17:36 PM	S44-04-IB-WW3 (A)	2.07	107.70
85	13/06/2024	2:11:18 PM	S44-04-IB-WW3 (B)	1.66	106.60

86	15/06/2024	11:05:11 AM	S43-08-IB-VA1	2.30	103.20
87	15/06/2024	11:04:34 AM	S42-12-PS-BYWN	1.89	97.80
88	22/06/2024	10:59:30 AM	S42-12-IB-BR2C	0.09	89.70
89	22/06/2024	11:00:50 AM	S43-04-IB-VA1	1.94	99.90
90	24/06/2024	3:57:30 PM	S46-26-IB-WW3	0.82	104.30
91	28/06/2024	11:06:32 AM	S46-19-IB-WW4	2.56	102.60
92	29/06/2024	3:38:23 PM	S41-19-IB-WN	0.52	109.70
93	4/07/2024	4:03:53 PM	S44-30-IB-WW3	0.49	107.70
94	6/07/2024	12:14:34 PM	S42-12-IB-BY1	2.66	105.00
95	9/07/2024	10:37:39 AM	S42-16-IB-BR2A	0.69	103.40
96	11/07/2024	2:24:39 PM	S44-22-CI-MAPF	0.79	97.80
97	12/07/2024	1:00:57 PM	S42-03-PS-BYWN	2.18	99.30
98	17/07/2024	2:41:00 PM	S44-02-IB-WW3	2.69	97.80
99	17/07/2024	2:39:28 PM	S46-17-IB-WW4	1.92	102.10
100	20/07/2024	10:03:08 AM	S42-07-PS-BYWN	2.17	109.40
101	22/07/2024	10:59:18 AM	S46-15-IB-WW4	3.72	100.20
102	24/07/2024	3:38:09 PM	S42-16-IB-BY1	1.40	100.10
103	24/07/2024	3:39:32 PM	S42-16-IB-BY1 & S43-15-IB-VA1	1.66	93.80
104	24/07/2024	3:40:11 PM	S43-15-IB-VA1	0.52	104.30
105	29/07/2024	3:09:33 PM	S42-21-IB-BY1	0.35	100.50
106	29/07/2024	3:11:57 PM	S43-03-IB-VA1 & S43-02-IB-PF2	2.53	101.60
107	1/08/2024	3:55:41 PM	S44-06-IB-WW4	2.15	105.90
108	5/08/2024	12:05:49 PM	S42-10-IB-BY1	1.64	98.20
109	6/08/2024	3:00:18 PM	S42-19-IB-BY1	1.00	101.80
110	9/08/2024	2:23:09 PM	S42-06-IB-BY1	1.82	93.70
111	12/08/2024	2:36:49 PM	S42-23-IB-BY1	0.73	103.00
112	13/08/2024	3:11:41 PM	S43-02-PS-VA1	0.71	93.90
113	15/08/2024	3:38:05 PM	S43-24-PS-BYWN	0.71	96.40
114	17/08/2024	2:57:49 PM	S44-03-IB-WW4	1.99	104.20
115	19/08/2024	3:59:02 PM	S43-30-IB-VA1	0.13	101.60

116	19/08/2024	4:00:22 PM	S44-29-IB-WWRL	0.95	99.10
117	22/08/2024	3:02:54 PM	S42-03-IB-BY1	1.56	100.50
118	22/08/2024	3:03:51 PM	S43-02-IB-VA1	1.68	95.60
119	24/08/2024	3:28:57 PM	S44-26-CI-MAPF	0.24	97.20
120	26/08/2024	11:08:58 AM	S42-11-IB-WN	0.37	99.90
121	27/08/2024	2:55:07 PM	S43-19-PS-BYWN	2.40	96.00
122	29/08/2024	12:02:42 PM	S46-01-IB-RL181	3.81	107.20
123	31/08/2024	2:04:57 PM	S44-11-IB-MA1	0.94	112.50
124	3/09/2024	3:59:16 PM	S44-16-IB-MAPF	1.22	103.20
125	5/09/2024	2:57:20 PM	S43-17-IB-BR1	0.25	101.20
126	7/09/2024	1:58:08 PM	S42-12-IB-WN	0.47	104.40
127	10/09/2024	3:02:55 PM	S42-16-IB-WN	0.64	102.50
128	10/09/2024	3:04:13 PM	S43-21-IB-BR2C	0.21	110.20
129	11/09/2024	3:27:58 PM	S44-02-IB-WW4	1.66	100.40
130	14/09/2024	3:05:43 PM	S43-27-IB-BR2C	0.09	101.80
131	14/09/2024	3:07:30 PM	S43-15-IB-BR1	1.37	98.20
132	17/09/2024	10:52:54 AM	S43-12-IB-BR1	3.37	103.10
133	18/09/2024	1:34:00 PM	S42-10-IB-WN	0.49	108.80
134	20/09/2024	3:29:04 PM	S42-07-IB-WN	0.42	103.20
135	24/09/2024	2:54:52 PM	S42-03-IB-WN	0.47	104.00
136	26/09/2024	3:29:54 PM	S43-16-PS-BYWN	1.75	109.90
137	26/09/2024	3:30:54 PM	S43-10-IB-BR1	3.74	109.70
138	1/10/2024	10:22:33 AM	S43-07-IB-BR1	2.60	101.70
139	3/10/2024	12:01:53 PM	S43-24-IB-BR2C	1.82	107.30
140	5/10/2024	3:28:41 PM	S43-16-IB-BR2C	0.17	106.30
141	10/10/2024	11:57:53 PM	S43-02-PS-BR1 & S43-03-IB-BR1	2.62	100.60
142	10/10/2024	4:12:28 PM	S52-33-IB-WW2	1.46	97.60
143	11/10/2024	2:30:31 PM	S44-30-IB-WW4	1.05	94.80
144	14/10/2024	12:15:27 PM	S44-19-IB-PF2	0.22	101.30
145	14/10/2024	12:17:35 PM	S52-30-IB-WW2	1.53	88.80

146	18/10/2024	1:03:27 PM	S44-13-CI-MAPF	1.53	102.70
147	21/10/2024	12:02:36 PM	S44-20-IB-PF2	1.11	109.20
148	23/10/2024	11:55:34 AM	S43-02-IB-BR1 & S43-04-IB-BR1	4.10	102.80
149	25/10/2024	3:04:33 PM	S44-05-IB-MA1	1.50	101.70
150	26/10/2024	3:56:39 PM	S43-12-PS-BYWN	1.96	97.40
151	28/10/2024	12:59:57 PM	S44-03-IB-MA1	2.28	101.30
152	30/10/2024	4:02:25 PM	S44-28-IB-PF2	1.18	94.40
153	1/11/2024	3:00:46 PM	S42-25-IB-WN	0.62	116.20
154	1/11/2024	3:06:43 PM	S43-12-IB-BR2C	0.06	103.30
155	4/11/2024	3:01:41 PM	S42-19-IB-WN & S42-21-IB-WN	0.56	112.20
156	6/11/2024	4:20:34 PM	S43-20-IB-BR2A	0.61	104.30
157	8/11/2024	12:08:00 PM	S52-28-IB-WW1	1.40	97.00
158	12/11/2024	10:55:24 AM	S44-23-IB-PF2	1.31	104.20
159	13/11/2024	1:54:17 PM	S43-12-IB-BY1	1.63	97.60
160	13/11/2024	1:58:25 PM	S50-28-IB-WW2	1.77	103.80
161	15/11/2024	4:11:20 PM	S44-10-CI-MAPF	1.25	110.30
162	15/11/2024	4:08:50 PM	S44-30-CI-MAPF	0.29	106.00
163	18/11/2024	3:02:40 PM	S44-07-CI-MAPF	1.92	97.20
164	20/11/2024	3:09:13 PM	S43-13-IB-BY1	1.05	107.40
165	22/11/2024	3:04:27 PM	S43-03-PS-BYWN	2.75	98.70
166	22/11/2024	3:05:55 PM	S43-16-IB-BR2A	0.99	104.00
167	26/11/2024	2:59:02 PM	S52-27-IB-WW1	2.19	103.10
168	28/11/2024	1:48:40 PM	S43-07-PS-BYWN	2.72	95.30
169	28/11/2024	1:49:15 PM	S44-26-IB-PF2	1.35	99.80
170	4/12/2024	12:31:38 PM	S44-03-CI-MAPF	1.83	103.10
171	6/12/2024	11:42:17 AM	S43-16-IB-BY1	0.82	99.70
172	9/12/2024	4:20:54 PM	S43-24-IB-BR2A	0.55	108.60
173	10/12/2024	3:32:02 PM	S43-21-IB-BY1	0.47	95.70
174	14/12/2024	11:29:00 AM	S46-22-CI-MAPF	1.53	111.20
175	17/12/2024	1:03:53 PM	S44-20-IB-VARL	2.52	103.00

176	21/12/2024	3:25:09 PM	S43-08-IB-BY1	1.62	100.60
177	21/12/2024	3:27:27 PM	S46-26-IB-WW4	2.53	95.70
178	23/12/2024	11:28:15 AM	S43-06-IB-BY1	1.60	108.10
179	30/12/2024	12:34:34 PM	S43-19-IB-WN	0.28	91.10
180	30/12/2024	12:35:34 PM	S44-23-IB-VARL	2.70	107.20

Appendix D

Air Quality Monitoring Summary

Table D1
Particulate Matter <10µm (PM₁₀) Summary (Compliance Monitors Only)

Run Date	PM ₁₀₋₁		PM ₁₀₋₃		24-hour Assessment Criteria (µg/m ³)	Annual Assessment Criteria (µg/m ³)
	Run Date Reading (µg/m ³)	Annual Rolling Average (µg/m ³)	Run Date Reading (µg/m ³)	Annual Rolling Average (µg/m ³)		
06/01/2024	19	28.3	25.3	26.3	50	25
12/01/2024	24.9	28.3	24.2	26.1	50	25
18/01/2024	22.7	28.4	6.2	25.6	50	25
24/01/2024	36.3	28.7	29.6	25.7	50	25
30/01/2024	42.4	28.9	49	26.1	50	25
05/02/2024	51.2	29.1	41.7	26.1	50	25
11/02/2024	18.2	29.1	25	26.2	50	25
17/02/2024	25.5	29.0	49.6	26.4	50	25
23/02/2024	30.2	29.2	19.8	26.7	50	25
29/02/2024	32.3	29.2	26	26.7	50	25
06/03/2024	36.3	28.7	39.9	27.0	50	25
12/03/2024	33.2	28.6	53.5	27.4	50	25
18/03/2024	9.6	28.1	17	27.0	50	25
24/03/2024	19.3	28.1	29.2	27.1	50	25
30/03/2024	24.2	28.1	37.6	27.6	50	25
05/04/2024	4.3	28.3	6.5	27.4	50	25
11/04/2024	19.2	28.5	24.3	27.7	50	25
17/04/2024	20.1	28.5	27.5	27.7	50	25
23/04/2024	19.1	28.6	17	27.8	50	25
29/04/2024	18.6	28.7	18.9	27.8	50	25

05/05/2024	6.2	28.4	6.2	27.5	50	25
11/05/2024	7.2	28.3	7.2	27.3	50	25
17/05/2024	13.3	28.2	13.3	27.3	50	25
23/05/2024	13.4	27.7	13.4	26.8	50	25
29/05/2024	12.4	27.0	12.4	26.8	50	25
04/06/2024	19.2	27.0	3.7	26.4	50	25
10/06/2024	7.5	26.8	5.4	26.3	50	25
16/06/2024	6	26.5	2.3	26.3	50	25
22/06/2024	7	26.2	3.3	25.6	50	25
28/06/2024	18	26.1	22.6	25.9	50	25
04/07/2024	10.9	26.1	15.4	25.9	50	25
10/07/2024	4.9	25.7	5.3	25.9	50	25
16/07/2024	7.6	25.3	2.7	25.7	50	25
22/07/2024	8.2	25.1	6.8	25.5	50	25
28/07/2024	7.7	24.6	1.9	25.3	50	25
03/08/2024	14.4	24.4	10.2	24.8	50	25
09/08/2024	11.1	24.2	16	24.6	50	25
15/08/2024	6.8	24.1	8.3	24.5	50	25
21/08/2024	23.6	24.2	15.9	24.6	50	25
27/08/2024	22.4	24.3	10.3	24.3	50	25
02/09/2024	43	24.5	41.8	24.1	50	25
08/09/2024	29.5	24.8	23.3	24.4	50	25
14/09/2024	14.7	24.6	8.6	23.8	50	25
20/09/2024	24.5	23.8	15.7	23.7	50	25
26/09/2024	15.7	23.4	7.7	23.2	50	25
02/10/2024	11	22.6	23.2	22.5	50	25
08/10/2024	23.2	22.7	36.7	22.5	50	25
14/10/2024	11.2	22.1	16.5	22.6	50	25

20/10/2024	15.6	21.7	22.2	22.3	50	25
26/10/2024	21.3	21.7	48	22.8	50	25
01/11/2024	24.9	21.6	41.1	22.7	50	25
07/11/2024	46.8	21.9	42.5	23.0	50	25
13/11/2024	30.5	21.9	15.9	22.4	50	25
19/11/2024	15.8	21.7	28.9	22.2	50	25
25/11/2024	33.9	22.1	44	22.8	50	25
01/12/2024	17.1	21.8	11.6	22.8	50	25
07/12/2024	28.6	21.5	13.2	21.9	50	25
13/12/2024	34.2	21.1	61.2	22.4	50	25
19/12/2024	13.8	20.3	26.8	21.4	50	25
25/12/2024	12.4	20.3	12.3	21.4	50	25
31/12/2024	34.6	20.6	44.0	21.6	50	25

Source: AECOM (2024)

Table D2
Total Suspended Particulates (TSP) Summary

Run Date	HV2		HV3		Annual Assessment Criteria (µg/m³)
	Run Date Reading (µg/m³)	Annual Rolling Average (µg/m³)	Run Date Reading (µg/m³)	Annual Rolling Average (µg/m³)	
06/01/2024	40.9	85.2	26.7	51.4	90
12/01/2024	102	85.6	35	51.1	90
18/01/2024	56.7	85.6	50.1	51.5	90
24/01/2024	107	86.4	66.5	51.8	90
30/01/2024	69.1	86.4	61.1	51.9	90
05/02/2024	105	85.4	65.8	51.2	90
11/02/2024	43	85.3	32.8	51.1	90
17/02/2024	66.7	85.1	41.2	50.8	90
23/02/2024	82.4	85.7	81	51.7	90
29/02/2024	80.6	85.7	60.7	52.0	90
06/03/2024	89.5	84.0	70	51.9	90
12/03/2024	98.5	83.6	64.4	51.8	90
18/03/2024	42.5	82.5	19	50.8	90
24/03/2024	47.7	82.3	28.6	50.6	90
30/03/2024	69.6	82.7	42.9	50.3	90
05/04/2024	18.4	83.3	13.4	49.9	90
11/04/2024	51.1	83.4	20.5	49.5	90
17/04/2024	39	83.0	40.2	49.5	90
23/04/2024	56.6	83.2	27.5	49.4	90
29/04/2024	57.5	82.7	36.1	49.0	90
05/05/2024	15.8	81.6	8.3	48.3	90

11/05/2024	12.6	81.1	11.2	48.1	90
17/05/2024	41.7	80.8	20.8	47.9	90
23/05/2024	36.3	79.1	18.8	47.2	90
29/05/2024	31.2	76.1	26.1	46.7	90
04/06/2024	59.5	75.7	8.1	46.2	90
10/06/2024	33.8	75.0	15.9	45.5	90
16/06/2024	44.6	74.8	38.9	45.7	90
22/06/2024	42	74.2	18.9	45.3	90
28/06/2024	52.7	72.8	32.6	45.1	90
04/07/2024	32.4	72.7	22.5	45.0	90
10/07/2024	46.1	70.8	15.8	44.6	90
16/07/2024	59.2	70.3	23	44.1	90
22/07/2024	50.4	69.7	21.5	43.6	90
28/07/2024	35.1	68.5	21.9	43.3	90
03/08/2024	41.7	67.8	23	42.6	90
09/08/2024	43.6	67.4	31	42.4	90
15/08/2024	23.2	67.1	13	42.0	90
21/08/2024	87	67.3	70.3	42.7	90
27/08/2024	89.7	67.9	27	42.5	90
02/09/2024	183	70.3	122	43.8	90
08/09/2024	101	71.1	68.3	44.3	90
14/09/2024	64.6	71.3	72.3	44.7	90
20/09/2024	85.2	70.1	102	45.2	90
26/09/2024	48.1	69.2	35.2	44.8	90
02/10/2024	25.8	67.6	18.9	43.7	90
08/10/2024	70.3	68.0	49.7	44.1	90
14/10/2024	29.5	66.6	23.7	43.3	90
20/10/2024	27	65.3	28	42.5	90

26/10/2024	55.9	65.0	50.5	42.6	90
01/11/2024	52.5	64.6	50	41.9	90
07/11/2024	131	65.3	93	42.3	90
13/11/2024	105	65.4	51.2	42.2	90
19/11/2024	34.8	64.2	35.8	42.0	90
25/11/2024	94.1	65.4	63.4	42.8	90
01/12/2024	37.3	64.2	32.5	41.8	90
07/12/2024	71.8	63.5	55.8	41.6	90
13/12/2024	85.8	62.2	57.2	41.1	90
19/12/2024	41.2	60.5	32.3	40.2	90
25/12/2024	55.2	61.0	34.8	40.4	90
31/12/2024	86.3	61.2	81.4	41.1	90

Source: AECOM (2024)

Table D3
Total Deposited Dust Summary

Month	D06	D10	D26	D27	D29
January	3.3	2.6	3.8		
February	1.3	1.9	2.7		
March	2.0	1.0	7.4c		
April	0.8	1.4	2.2		
May	0.7	1.1	1.7		
June	1.8	-	1.9	*	1.2
July	28.7c	2.6	0.9	3.4	1.0
August	2.1	3.4	1.8	4.6	2.2
September	1.5	7.5c	1.3	4.6	1.7
October	0.7	2.1	1.9	3.2	2.3
November	1.0	2.8	5.3	40.9c	5.1
December	2.3	3.0	1.6	4.9	3.7
Annual Average	1.6	2.2	2.3	4.1[#]	2.5[#]
Criteria (g/m²/month)	4	4	4	4	4

D27 & D29 locations installed May 2024 as required under approved AQMP
c = contaminated sample

*Newly installed dust gauge at D27 dislodged and broken, reinstalled June

[#]Average results calculated from six/seven months data since installed

Table D4
Increase in Deposited Dust

Month	D06	D10	D26	D27	D29
January	3.5	3.1	1.9		
February	3.2	3.1	2.0		
March	3.2	3.0	2.1		
April	3.0	3.0	2.1		
May	2.6	2.7	2.1		
June	3.0	3.0	2.1		
July	2.5	2.4	2.1		
August	2.2	2.4	2.1		
September	2.2	2.2	2.0		
October	1.9	2.0	1.9		
November	1.7	2.1	2.2		
December	1.6	2.2	2.3		
Annual Increase	-1.8	-0.9	0.5	-	-
Criteria (g/m²/month)	2	2	2	2	2

D27 & D29 installed May 2024 and therefore have not been in place for full calendar year to be able to assess Annual Increase

Table D5
Particulate Matter <2.5µm (PM_{2.5}) Summary

<i>PM_{2.5} (µg/m³)</i>		
Monitor	Annual Assessment Criteria	Result
DPIE Upper hunter Air Quality Monitoring Network "Muswellbrook" Monitor	8.0	7.1

Note: BMC currently relies upon the Upper Hunter Air Quality Monitoring Network managed by the DPIE to record and monitor particulate matter less than 2.5 microns (PM_{2.5}) levels. The monitor adopted by BMC is the Muswellbrook monitor located approximately 5 km to the east of Bengalla.

Table D6
Continuous PM₁₀ Monitoring
(EPA22 and EPA24) 24 Hour Average
Summary

Date	EPA-22 PM10 Avg (ug/m3)	EPA-24 PM10 Avg (ug/m3)
1/01/2023	4.8	-
2/01/2023	4.1	-
3/01/2023	6.1	10.3
4/01/2023	6.2	11.3
5/01/2023	14.9	24.5
6/01/2023	3.8	8.7
7/01/2023	3.9	9.6
8/01/2023	5.8	13.6
9/01/2023	6.8	6.1
10/01/2023	5.9	6.1
11/01/2023	10.2	14.1
12/01/2023	13.3	16.1
13/01/2023	3.6	5.8
14/01/2023	7.8	11.4
15/01/2023	4.1	6.1
16/01/2023	3.8	5.5
17/01/2023	4.2	5.8
18/01/2023	4.3	6.6
19/01/2023	6.9	1.6
20/01/2023	4.2	3.2
21/01/2023	6.5	9.3
22/01/2023	7.1	8.4
23/01/2023	12.8	17.7
24/01/2023	4.2	5.9
25/01/2023	5.9	9.2
26/01/2023	10.8	9.7
27/01/2023	14.0	10.3
28/01/2023	7.8	9.5
29/01/2023	7.9	9.5
30/01/2023	6.7	10.3
31/01/2023	12.5	17.0
1/02/2023	10.7	16.8
2/02/2023	15.3	17.8
3/02/2023	13.5	20.6
4/02/2023	13.6	20.7
5/02/2023	22.9	25.9
6/02/2023	13.4	14.5
7/02/2023	14.4	17.3
8/02/2023	4.3	6.8
9/02/2023	4.8	7.3

10/02/2023	4.3	9.5
11/02/2023	5.4	7.8
12/02/2023	7.3	12.0
13/02/2023	4.9	10.5
14/02/2023	3.7	4.2
15/02/2023	7.6	8.9
16/02/2023	12.5	16.1
17/02/2023	5.7	10.0
18/02/2023	4.6	13.9
19/02/2023	10.2	19.0
20/02/2023	10.6	8.3
21/02/2023	7.9	11.3
22/02/2023	11.4	15.0
23/02/2023	12.5	15.2
24/02/2023	7.8	5.4
25/02/2023	5.9	10.3
26/02/2023	11.3	15.3
27/02/2023	14.7	20.1
28/02/2023	14.2	18.1
29/02/2024	16.6	23.4
1/03/2023	12.0	9.0
2/03/2023	12.9	16.5
3/03/2023	16.7	13.2
4/03/2023	11.5	13.8
5/03/2023	7.3	14.8
6/03/2023	1.2	11.1
7/03/2023	4.1	15.9
8/03/2023	4.8	18.0
9/03/2023	2.8	9.7
10/03/2023	1.9	9.3
11/03/2023	1.1	8.7
12/03/2023	1.2	10.7
13/03/2023	2.6	15.4
14/03/2023	4.1	17.7
15/03/2023	5.4	13.7
16/03/2023	0.5	7.6
17/03/2023	0.4	7.7
18/03/2023	2.1	7.0
19/03/2023	3.4	11.8
20/03/2023	4.0	15.7
21/03/2023	2.2	5.1
22/03/2023	0.3	9.0
23/03/2023	1.0	9.6
24/03/2023	1.9	14.9
25/03/2023	1.8	9.1
26/03/2023	3.7	8.3
27/03/2023	5.6	23.6

28/03/2023	12.1	20.6
29/03/2023	16.0	16.6
30/03/2023	11.9	14.0
31/03/2023	20.8	22.8
1/04/2023	15.1	16.2
2/04/2023	20.7	23.7
3/04/2023	16.2	8.5
4/04/2023	7.6	7.5
5/04/2023	6.0	8.4
6/04/2023	3.6	4.5
7/04/2023	5.3	3.3
8/04/2023	10.4	8.6
9/04/2023	10.9	5.9
10/04/2023	9.1	2.0
11/04/2023	3.0	3.1
12/04/2023	5.9	14.1
13/04/2023	8.5	12.9
14/04/2023	11.6	18.4
15/04/2023	27.0	26.7
16/04/2023	19.6	23.8
17/04/2023	18.1	19.7
18/04/2023	21.8	26.8
19/04/2023	13.0	12.0
20/04/2023	16.3	16.5
21/04/2023	4.0	3.5
22/04/2023	3.9	7.1
23/04/2023	5.6	9.7
24/04/2023	8.4	13.8
25/04/2023	7.8	9.5
26/04/2023	8.3	11.0
27/04/2023	10.8	13.3
28/04/2023	11.9	20.8
29/04/2023	14.8	21.2
30/04/2023	12.5	28.0
1/05/2023	11.1	11.9
2/05/2023	4.3	7.7
3/05/2023	3.2	7.1
4/05/2023	5.1	11.8
5/05/2023	4.8	6.9
6/05/2023	3.6	4.0
7/05/2023	2.7	2.1
8/05/2023	4.2	7.0
9/05/2023	7.2	14.3
10/05/2023	8.3	11.3
11/05/2023	4.3	7.6
12/05/2023	4.0	6.0
13/05/2023	12.7	16.1

14/05/2023	11.0	8.3
15/05/2023	14.5	22.6
16/05/2023	15.1	28.8
17/05/2023	26.9	40.8
18/05/2023	30.3	20.2
19/05/2023	13.5	8.4
20/05/2023	6.6	2.9
21/05/2023	7.1	9.4
22/05/2023	5.5	8.3
23/05/2023	15.8	14.2
24/05/2023	12.0	28.9
25/05/2023	17.5	36.9
26/05/2023	22.5	32.8
27/05/2023	36.9	19.0
28/05/2023	22.2	23.8
29/05/2023	32.0	47.7
30/05/2023	23.3	33.0
31/05/2023	18.3	20.3
1/06/2023	14.1	4.7
2/06/2023	7.0	2.3
3/06/2023	6.0	1.1
4/06/2023	4.8	2.7
5/06/2023	11.0	3.4
6/06/2023	17.1	8.7
7/06/2023	14.0	7.1
8/06/2023	-	4.9
9/06/2023	8.2	2.3
10/06/2023	9.8	4.9
11/06/2023	9.4	6.6
12/06/2023	9.5	10.9
13/06/2023	4.0	2.5
14/06/2023	9.7	19.4
15/06/2023	9.0	15.5
16/06/2023	-	3.4
17/06/2023	8.7	7.5
18/06/2023	9.7	2.4
19/06/2023	9.1	16.3
20/06/2023	10.7	3.6
21/06/2023	13.0	12.6
22/06/2023	5.9	4.7
23/06/2023	-	7.0
24/06/2023	-	7.9
25/06/2023	16.9	12.8
26/06/2023	17.0	35.2
27/06/2023	-	15.7
28/06/2023	-	10.4
29/06/2023	-	19.2

30/06/2023	-	20.4
1/07/2023	-	4.5
2/07/2023	-	5.9
3/07/2023	-	9.9
4/07/2023	2.2	9.2
5/07/2023	5.4	9.0
6/07/2023	9.4	9.9
7/07/2023	4.0	8.2
8/07/2023	9.4	14.1
9/07/2023	18.6	20.6
10/07/2023	11.5	4.9
11/07/2023	6.6	1.9
12/07/2023	9.5	15.7
13/07/2023	14.6	15.7
14/07/2023	8.3	3.0
15/07/2023	4.4	1.4
16/07/2023	2.8	0.8
17/07/2023	1.8	0.4
18/07/2023	2.2	0.6
19/07/2023	6.6	4.3
20/07/2023	2.6	1.1
21/07/2023	3.8	2.2
22/07/2023	6.2	3.9
23/07/2023	9.5	2.8
24/07/2023	11.3	4.7
25/07/2023	11.5	8.1
26/07/2023	12.6	7.7
27/07/2023	10.5	5.3
28/07/2023	16.9	11.9
29/07/2023	3.2	1.1
30/07/2023	3.1	3.5
31/07/2023	5.1	12.0
1/08/2023	8.8	6.2
2/08/2023	9.6	17.6
3/08/2023	8.7	13.9
4/08/2023	12.4	22.2
5/08/2023	16.6	13.7
6/08/2023	19.6	27.2
7/08/2023	20.0	10.4
8/08/2023	13.6	13.0
9/08/2023	20.6	36.5
10/08/2023	19.1	20.0
11/08/2023	25.6	28.2
12/08/2023	34.1	35.6
13/08/2023	16.1	15.0
14/08/2023	9.7	11.2
15/08/2023	12.3	12.8

16/08/2023	9.8	10.8
17/08/2023	11.8	9.4
18/08/2023	5.4	2.0
19/08/2023	3.0	2.8
20/08/2023	4.8	8.6
21/08/2023	26.8	22.7
22/08/2023	27.0	19.4
23/08/2023	6.6	5.1
24/08/2023	8.4	15.9
25/08/2023	12.7	8.4
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30/08/2023	7.0	5.0
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2/09/2023	10.0	5.2
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12/09/2023	22.3	19.5
13/09/2023	10.3	8.2
14/09/2023	4.0	6.5
15/09/2023	9.9	6.6
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27/09/2023	20.5	18.9
28/09/2023	2.3	4.1
29/09/2023	3.7	6.0
30/09/2023	7.2	8.6
1/10/2023	8.6	8.8

2/10/2023	9.6	19.2
3/10/2023	10.2	12.2
4/10/2023	7.4	9.9
5/10/2023	10.4	14.0
6/10/2023	7.7	5.4
7/10/2023	7.4	3.4
8/10/2023	12.3	14.4
9/10/2023	12.0	13.7
10/10/2023	3.6	5.8
11/10/2023	8.8	9.4
12/10/2023	13.7	21.5
13/10/2023	13.0	12.5
14/10/2023	5.8	8.2
15/10/2023	9.2	7.7
16/10/2023	14.8	13.1
17/10/2023	5.9	8.9
18/10/2023	14.1	12.8
19/10/2023	15.3	11.9
20/10/2023	6.6	5.7
21/10/2023	13.0	15.1
22/10/2023	5.0	8.0
23/10/2023	9.9	12.1
24/10/2023	12.5	9.3
25/10/2023	13.0	10.9
26/10/2023	5.4	5.7
27/10/2023	4.8	9.2
28/10/2023	6.9	10.2
29/10/2023	9.6	8.5
30/10/2023	10.7	14.3
31/10/2023	12.2	13.7
1/11/2023	7.6	9.8
2/11/2023	11.5	14.3
3/11/2023	7.2	10.8
4/11/2023	12.1	11.5
5/11/2023	15.2	15.6
6/11/2023	13.4	16.5
7/11/2023	15.5	15.1
8/11/2023	16.2	14.2
9/11/2023	9.7	6.4
10/11/2023	7.3	15.2
11/11/2023	10.5	16.3
12/11/2023	16.1	22.7
13/11/2023	34.0	16.3
14/11/2023	14.5	11.0
15/11/2023	13.6	16.5
16/11/2023	6.2	8.4
17/11/2023	6.2	9.8

18/11/2023	7.7	7.5
19/11/2023	6.9	6.1
20/11/2023	6.0	9.4
21/11/2023	5.7	11.5
22/11/2023	3.3	6.8
23/11/2023	3.4	8.3
24/11/2023	6.0	12.8
25/11/2023	8.9	13.4
26/11/2023	7.6	13.0
27/11/2023	8.5	11.2
28/11/2023	10.6	9.5
29/11/2023	15.0	14.7
30/11/2023	36.8	37.4
1/12/2023	10.8	13.5
2/12/2023	5.8	4.9
3/12/2023	6.8	7.4
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6/12/2023	15.8	16.7
7/12/2023	19.0	17.5
8/12/2023	10.4	8.7
9/12/2023	6.7	6.0
10/12/2023	12.2	14.3
11/12/2023	15.3	16.5
12/12/2023	10.6	13.8
13/12/2023	11.2	10.9
14/12/2023	10.0	13.1
15/12/2023	23.9	29.6
16/12/2023	30.6	31.0
17/12/2023	15.7	18.5
18/12/2023	8.6	8.1
19/12/2023	6.3	8.0
20/12/2023	5.4	9.1
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23/12/2023	12.9	16.2
24/12/2023	12.9	10.2
25/12/2023	5.1	5.1
26/12/2023	4.3	5.2
27/12/2023	6.9	6.9
28/12/2023	9.3	10.2
29/12/2023	13.1	14.0
30/12/2023	8.8	14.8
31/12/2023	10.7	13.1

Appendix E

Annual Compliance Report for EPBC Approval 2012/6378

BENGALLA MINING COMPANY



Bengalla Mine (EPBC APPROVAL 2012/6378)

2024 ANNUAL COMPLIANCE REPORT



Prepared by:
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March 2024





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BENGALLA MINE

ANNUAL COMPLIANCE REPORT FOR EPBC APPROVAL 2012/6378

1 INTRODUCTION

1.1 Background

Bengalla Mining Company Pty Limited (BMC) operates the Bengalla Mine (Bengalla) on behalf of the Bengalla Joint Venture (comprising New Hope Bengalla Pty Ltd as to 8/10 share and Taipower Bengalla Pty Limited as to 2/10 share). Bengalla is located 130 km north-west of Newcastle and 4 km west of the township of Muswellbrook.

Bengalla commenced operations in 1998 and is approved to extract up to 15 Million tonnes per annum of run of mine coal until 2039.

On 3 March 2015, State Significant Development Consent (SSD-5170) for the Bengalla Continuation of Mining Project was granted by the Secretary of the NSW Department of Planning and Environment (DPE) under the *Environmental Planning and Assessment Act 1979* NSW. SSD-5170 has since been modified on various occasions.

On 27 May 2015, BMC was granted *Environment Protection and Biodiversity Conservation Act 1999* Cth (EPBC Act) Approval 2012/6378 (the EPBC Approval).

Both the EPBC Approval and SSD-5170 (as originally granted) are supported by (relevantly) the 'Continuation of Bengalla Mine Environmental Impact Statement' (Hansen Bailey, 2013) (EIS) and *Continuation of Bengalla Mine Response to Submissions* (Hansen Bailey, 2014) (RTS).

The Biodiversity Offset Management Plan (BOMP) has been developed to meet relevant requirements under the EPBC Approval and SSD-5170. The current version of the BOMP was approved by what was then the Commonwealth Department of Environment and Energy (DoEE)¹ on 8 March 2017 and by DPE on 18 August 2017.

The Biodiversity Management Plan (BDMP) has also been developed to meet relevant requirements under the EPBC Approval and SSD-5170. The current version of the BDMP was approved by DPE on 18 August 2017 and by DoEE on 20 September 2017. The BDMP incorporates the Vegetation Clearance Protocol and Landscape Management Plan (VCPLMP) referred to in the EPBC Approval.

1.2 Purpose and Scope

This report has been prepared in accordance with Condition 12 of the EPBC Approval which states:

"By the end of March each year, the approval holder must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of the BOMP and VCLMP as specified in the conditions. Documentary evidence providing proof of the date of publication must be provided to the Department at the same time as the compliance report is published."

Note: The Annual Review required under NSW Approval condition 4 (of Schedule 5) may be used to satisfy this condition if it meets the above content and submission requirements)."

This report applies to the period 1 January 2024 to 31 December 2024 (Reporting Period).

This report is published as a stand-alone report and will also form an Appendix to the 2024 Annual Review for Bengalla required under SSD-5170 Schedule 5 Condition 4.

¹ Now the Department of Climate Change, Energy, the Environment and Water (DCCEEW).

1.3 Clearing Activities in 2024

Table 1 is a reproduction of Figure 6 from the BDMP. It provides details of the staged clearing approach undertaken at Bengalla.

Table 1
Staged Clearing Approach

Stage	Actions
Pre-Clearing Survey	- Performed within one month of clearing - All fauna, flora and <i>Cymbidium canaliculatum</i> recorded - Vegetation health assessed and documented - Habitat features marked and flagged - Fauna captured and relocated
Clearing – Stage 1	- Removal of all vegetation other than habitat trees - Habitat features left standing overnight
Clearing – Stage 2	- A final pre-clearing inspection will be conducted to identify and capture any fauna - Habitat trees lightly shaken by machinery prior to felling - Appropriate machinery used to fell the tree - Any <i>Cymbidium canaliculatum</i> (Tiger Orchid) translocated - Remaining fauna captured and relocated - Felled habitat trees left overnight and then appropriate sections are removed and relocated to a storage location, rehabilitation areas or disposed

The Bengalla Mine Annual Clearing Report for 2024 (Clearing Report) is presented in **Appendix B** and contains details about the procedures and results for all pre-clearing and clearing activities completed at Bengalla during the Reporting Period.

Clearing works in 2024 were undertaken in relation to, but not limited to the following:

- General pit progression and relocation of infrastructure,
- Construction of new infrastructure, and
- Maintenance works.

The Clearing Report summarises the 2024 pre-clearance and clearance surveys, which included:

- Identification of 21 hollow-bearing / habitat trees during pre-clearance inspections late in the reporting period (Dec);
- Approximately 180 hollow-bearing / habitat trees which were felled during Stage 2 clearing activities completed early in the reporting period (Jan/Feb);
- 3 animals were relocated or captured during pre-clearance and clearance surveys;
- Observation of 9 animals that evaded capture during clearing;
- No animals were killed as a result of tree felling;
- No animals required euthanasia following tree felling;



Bengalla Mine 2024 Annual Compliance Report

- One *Cymbidium canaliculatum* (listed as endangered under the EPBC Act) was identified in the 2024 clearing area. This individual was translocated to a donor tree, and that donor tree translocated to a recipient site within a rehabilitation area.
- A second *Cymbidium canaliculatum* (listed as endangered under the EPBC Act) was translocated from the exploration lease area to allow for exploration activities.

Figure 1 is a reproduction of Figure 3 from the approved BOMP and has been updated to illustrate areas cleared during the Reporting Period, including Critically Endangered Ecological Communities (CEEC) listed under the EPBC Act.

CEEC identified in environmental assessments completed for the EIS and RTS included the following four communities identified as conforming to Upper Hunter White Box-Ironbark Grassy Woodland (Box Gum Woodland):

- Grey Box/White Box Intergrade Grassy Woodland;
- Upper Hunter White Box -Ironbark Grassy Woodland;
- Central Hunter Ironbark – Spotted Gum Forest; and
- Derived Native Grassland.

1.4 Weed and Pest Management in 2024

Information about the weed and pest management programs implemented at Bengalla and the offset areas during the Reporting Period is presented in **Appendix D**.

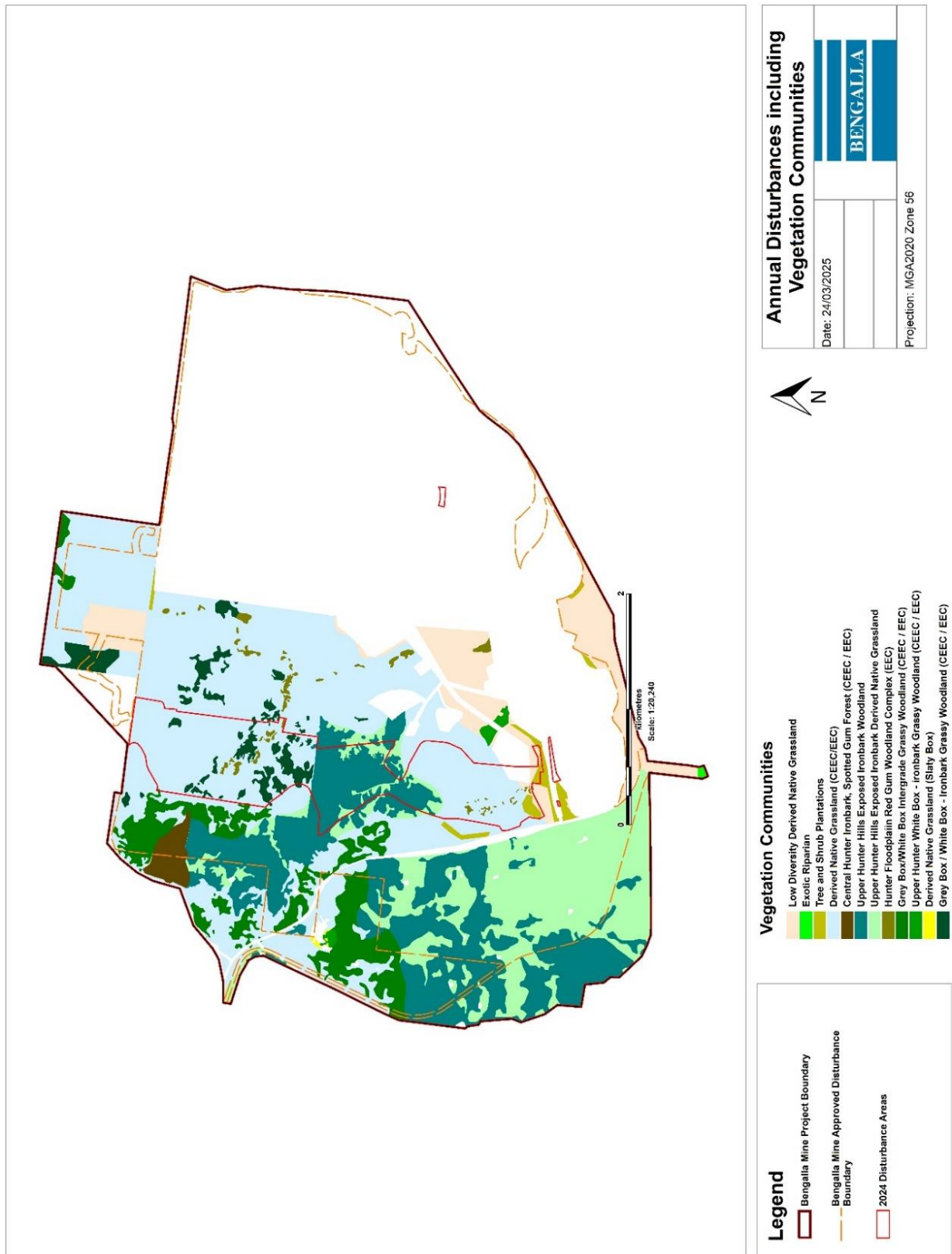


Figure 1 – Vegetation Communities

1.5 Compliance Report

The commitments made in the approved BDMP and BOMP, along with the compliance status of each for the Reporting Period, are presented in **Appendix A** and **Appendix B** respectively with comments provided against each where required.

Table 2 lists the conditions of the EPBC Approval and indicates the compliance status of each for the Reporting Period as 'compliant', 'not compliant' or 'not triggered'. Comments are provided against each condition, where required.

Table 2
BMC Compliance Status against Conditions of EPBC Approval for 2024

Ref	Condition	Status	Comment
1	The approval holder must not clear more than 535 hectares of <i>White Box-Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland</i> ecological community (Box Gum Woodland) and must limit clearing to within the project disturbance boundary defined at Schedule 1.	Compliant	In 2024 clearing was undertaken within the Project Disturbance Boundary shown on the plan at Schedule 1 of the EPBC Approval. BMC has not cleared more than 535 hectares of Box Gum Woodland (see Figure 1).
2	To mitigate impacts of the action on Box Gum Woodland, the Grey Headed Flying Fox, Large-eared Pied Bat, South-eastern Long-eared Bat, Regent Honeyeater, Swift Parrot and Spotted-tail Quoll, the approval holder must prepare and submit, prior to the proposed date of commencement of the action, a mine site Vegetation Clearance Protocol and Landscape Management Plan (VCPLMP) for the Minister's written approval. The VCPLMP must: a. Delineate areas to be cleared, describe pre-clearance survey methods, specify actions to minimise fauna impacts and detail vegetation clearance procedures b. Require collection and stockpiling of habitat features important to threatened fauna species for reinstatement in rehabilitation areas c. Require use of native, locally sourced seed for propagation for rehabilitation activities d. Include measures to avoid, suppress and control the spread of plant pathogens (such as <i>Phytophthora cinnamomi</i>) e. Specify a two stage clearing protocol where non-habitat trees are cleared 24 hours prior to any habitat trees being cleared, to encourage fauna to move out of an area. The approval holder must not commence the action until the VCPLMP is approved by the Minister. The approved VCPLMP must be implemented.	Compliant	A BMP was developed to meet this requirement and is implemented at Bengalla. Appendix A sets out the commitments from the BMP and the compliance status of each for the Reporting Period. The original BMP was approved by each of (then) DPE and DoEE on 14 August 2015. BMC commenced implementation of the BMP from that date (before operations commenced under SSD-5170). The current (revised) version of the BMP was approved by DPE on 18 August 2017 and DoEE on 20 September 2017. The BMP addresses each of the requirements in Condition 2(a)-(e) of the EPBC Approval (refer to Table 1 of the BMP).

Ref	Condition	Status	Comment
	Note: The Biodiversity Management Plan required under NSW Approval condition 29 may be used to satisfy this condition if it meets the above content and submission requirements.		
3	To compensate for the loss of 535 hectares of Box Gum Woodland ecological community and 272 hectares of habitat for the Grey Headed Flying Fox, Large-eared Pied Bat, South-eastern Long-eared Bat, Regent Honeyeater, Swift Parrot and the Spotted-tail Quoll, the approval holder must prepare and submit, by 3 September 2015, a Biodiversity Offset Management Plan (BOMP) for the Minister's written approval. The BOMP must: - Identify those lands described as the Offset Areas at Schedule 2 (Figures 1- 6) of this notice. This must include offset attributes, shape files, textual descriptions and maps to clearly define the location and boundaries of the offset area(s) - Provide a survey and description of the current condition (prior to any management activities) of the offset areas identified in Condition 3a - Detail management actions and regeneration and revegetation strategies to be undertaken on the offset areas to improve the ecological quality of these areas, including: - a description and timeframe of measures that would be implemented to improve the condition of Box Gum Woodland and habitat for the Grey Headed Flying Fox, Large-eared Pied Bat, South-eastern Long-eared Bat, Regent Honeyeater, Swift Parrot and the Spotted-tail Quoll on the offsets sites; - performance and completion criteria for evaluating the management of the offset areas, and criteria for triggering remedial action; - a program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria;	Compliant	A BOMP was developed to meet this requirement and is implemented at Bengalla. Appendix B sets out the commitments from the BOMP and the compliance status of each for the Reporting Period. The draft BOMP was submitted to then DoEE and DPE on 2 September 2015. Following an extensive consultation process (see Appendix A of the BOMP), the BOMP was approved by DoEE on 8 March 2017 and by DPE on 18 August 2017. The BOMP addresses each of the requirements in Condition 3(a)-(c) of the EPBC Approval (refer to Table 1 of the BOMP). The approved BOMP was published on Bengalla's website within 1 month after being approved and continues to be available on the website. As noted in last year's report, BMC has taken preliminary steps towards entering into a Biodiversity Stewardship Agreement for each of the three offset properties (refer to Condition 4 below). The currently approved BOMP continues to be implemented in the interim.

Ref	Condition	Status	Comment
	(iv) a description of potential risks to the successful implementation of the plan, a description of the measures that will be implemented to mitigate against these risks and a description of the contingency measures that will be implemented if defined triggers arise; and (v) details of who would be responsible for monitoring, reviewing, and implementing the plan. The approved BOMP must be implemented. The approved BOMP must be published on the approval holder's internet web site within 1 month of being approved. The most recently approved version of the BOMP must be published on the approval holder's internet web site for a period of 5 years after it is approved. Note: The Biodiversity Management Plan required under NSW Approval condition 29 may be used to satisfy this condition if it meets the above content and submission requirements.		
4	The approval holder must secure the lands identified as the <i>Offset Areas</i> at Schedule 2 (Figures 1- 6) of this notice as a biodiversity offset, in accordance with NSW Approval condition 28.	DCCEEW concluded not compliant with Condition 4 – no further action taken	All Biodiversity Offset Areas identified in Schedule 2 (Figures 1-6) of the EPBC Approval are owned by the Bengalla Joint Venturers (BJV) and managed by BMC. All Biodiversity Offset Areas are managed in accordance with the BOMP. By letter dated 6 October 2020, the Secretary agreed to an extension of time until 30 June 2022 to finalise the long-term security of the Biodiversity Offset Areas under Schedule 3 Condition 28 of SSD-5170 (Condition 28). At this stage, the DPE has not granted a further extension in which to comply with Condition 28. BMC corresponded with the relevant NSW government departments during 2022 to determine the appropriate long-term mechanism for securing the offsets. Following that correspondence, BMC has taken steps to progress Biodiversity Stewardship Agreements (BSAs) for the offset areas. BMC notified the non-compliance with Condition 28 to DCCEEW on 7 September 2022. By letter dated 12 October 2022, DCCEEW advised that it had reviewed the matter and “concluded that the issuing of an infringement notice would not be an appropriate course of action in this case. Consequently, no further action will be taken regarding this matter”.

Ref	Condition	Status	Comment
			During the Reporting Period communication continued between BMC and the DPHI and the Biodiversity Conservation Trust (BCT) being: - BMC letter dated 6 April 2023 to what is now the NSW Department of Planning, Housing and Infrastructure (DPHI) where BMC confirmed the 'Department's [DPHI] advice that it considers that the establishment of a BSA to be the appropriate mechanism for securing the required offset areas. Based on that advice, BMC has instructed its consultants to proceed with preparing the relevant BSAs' - Meeting 20 July 2023 with BMC and its advisors presented to the DPHI and the BCT, discussion occurred regarding: - o Background and Biodiversity Stewardship Agreement Site Overview; - o Long Term Security Process; - o Biodiversity Stewardship Agreement Applications; - o Consultation with Local Land Services and Council; and - o Future Land Management. - BMC Action Plan dated 18 August 2023 provided by email to DPHI and BCT outlining steps to establishment of BSA's for each offset property. - The BSA's applications continue to be prepared for each offset property during the Reporting Period. During the 2024 reporting period, BMC have been actively working towards the retirement of credits and finalising Biodiversity Stewardship Agreements (BSAs). Stakeholder consultation with the relevant Authorities included: - Pre-lodgement meetings with the Department of Climate Change, Energy, the Environment and Water (DCCEEW) Credit Supply Task Force division (now Nature Markets and Offsets Division) 18 January 2024. Relevant officers provided an outline of the process of entering in to a BSA. - BSA lodgement to DCCEEW on 11 April 2024 seeking clarification in regards to clarification on the terms associated with the BSA.

Ref	Condition	Status	Comment
			- Follow-up correspondence with DPHI and DCCEEW throughout 2024. - BMC received email from DCCEEW 02 December 2024 notifying of staffing changes and indicated they were "looking into" the BSA and associated matters, and would provide an update as soon as possible. In the meantime, the offset areas will continue to be owned by the BJV and managed by BMC in accordance with the BOMP
5	In order to protect listed threatened species and listed threatened ecological communities, the approval holder must undertake rehabilitation activities in accordance with NSW approval conditions 44, 45 and 46.	Compliant	Condition 44 • <u>Requirement</u> Schedule 3 Condition 44 of SSD-5170 (Condition 44) requires BMC to rehabilitate the site to the satisfaction of what is now the Resources Regulator.² The rehabilitation must comply with the objectives in Table 15 of SSD-5170 and be consistent with the conceptual final landform shown in Appendix 9 of SSD-5170. • <u>Status</u> Rehabilitation at Bengalla is ongoing. It is undertaken in accordance with SSD-5170 (as modified) and the current Forward Program and Rehabilitation Management Plan. The current Forward Program covers a period from 27 June 2025 to 26 June 2027. The proposed rehabilitation activities for 2025 include rehabilitation on the northern overburden emplacement area (OEA) comprising of Pasture and High Density Woody Vegetation (HDWV). During the Reporting Period, planned rehabilitation was not completed due to challenges relating to radio and Global Positioning System (GPS) communication. This resulted in BMC unable to achieve the necessary safety requirements. The GPS system challenges resulted in an inability to accurately achieve the final landform shaping tolerances. BMC continue the retrofit of HDWV tubestock in to existing rehabilitation on the Eastern OEA. Further detail about the rehabilitation carried out at Bengalla during the Reporting Period will be available in Section 8 of the Annual Review for 2023. Condition 45 • <u>Requirement</u> Schedule 3 Condition 45 of SSD-5170 requires BMC to carry out progressive rehabilitation. Interim

² This requirement was modified slightly as a result of Mod 5 to SSD-5170 (approved on 24 February 2023, after the end of the Reporting Period). The first part of Schedule 3 Condition 44 of SSD-5170 now requires BMC to "rehabilitate the site in accordance with the provisions under the Mining Act 1992".

Ref	Condition	Status	Comment
			stabilisation measures are to be used where reasonable and feasible to control dust emissions in disturbed areas that are not active but not ready for final rehabilitation. <u>Status</u> Rehabilitation is carried out progressively at Bengalla, as soon as reasonably practicable following disturbance. Interim stabilisation measures are used where required. Condition 46 <u>Requirement</u> During the Reporting Period, Schedule 3 Condition 46 of SSD-5170 (Condition 46) required BMC to prepare a Rehabilitation Management Plan to the satisfaction of what is now the Resources Regulator. The plan was to be prepared in accordance with and incorporate the elements specified in Condition 46. BMC was required to implement the plan as approved by the Resources Regulator.³ <u>Status</u> The Rehabilitation Management Plan and Forward Program were updated in 2023 and are implemented at Bengalla as part of mining operations.
6	The approval holder must undertake management and monitoring of water resources in accordance with NSW approval conditions 23 to 25.	Not Compliant	Condition 23 <u>Requirement</u> Schedule 3 Condition 23 of SSD-5170 requires BMC must comply with section 120 of the <i>Protection of the Environment Operations Act 1997</i> and the <i>Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002</i>. <u>Status</u> During the 2024 reporting period, BMC experience a small discharge of sediment laden water from site in late July. Upon becoming aware of the uncontrolled discharge, steps were immediately taken to prevent further release of sediment laden waters from site. Downstream water sampling was undertaken and notifications the NSW Environmental Protection Agency (under EPL 6538), NSW Department of Planning, Housing and Infrastructure (under SSD 5170) and the federal Department of Climate Change Energy, the Environment and Water (under EPBC 2012-6378) as required, immediately after becoming aware of the incident. BMC was issued a Penalty Infringement Notice and Official Caution from the NSW Environmental Protection Authority

³ Schedule 3 Condition 46 of SSD-5170 was modified on 24 February 2023, after the end of the Reporting Period. It now requires BMC to “prepare a Rehabilitation Management Plan for the development in accordance with the provisions under the Mining Act 1992 and carry out the development in accordance with this plan.”

Ref	Condition	Status	Comment
			Condition 24 <u>Requirement</u> Schedule 3 Condition 24 of SSD-5170 requires BMC to ensure that mining operations comply with the performance measures in Table 12 of SSD-5170 to the satisfaction of the Secretary. <u>Status</u> Water management at Bengalla during the Reporting Period was undertaken in accordance with the performance measures in Table 12 of SSD-5170. The approved Water Management Plan (WMP) also addresses the performance measures (see Table 1 of the WMP). Further detail about the site water balance and results of surface water monitoring and groundwater monitoring during the Reporting Period will be available in the Annual Review for 2024. Condition 25 <u>Requirement</u> Schedule 3 Condition 25 of SSD-5170 requires BMC to prepare a Water Management Plan to the satisfaction of the Secretary. The plan must be prepared in accordance with and incorporate the elements specified in Condition 25. BMC must implement the plan as approved by the Secretary. <u>Status</u> The WMP was developed to meet this requirement and is implemented at Bengalla. The current WMP was updated in 2023 and was approved by the Secretary on 8 August 2023. The WMP was prepared in consultation with the relevant authorities and addresses each of the requirements of Schedule 3 Condition 25 of SSD-5170 (see Table 2 of the WMP).
7	In order to protect water resources, the approval holder must undertake rehabilitation activities in accordance with NSW approval conditions 44 and 46.	Compliant	Refer to comments at Conditions 5 above.
8	Upon request, the approval holder shall supply the groundwater monitoring data for the Bengalla Mine to the Department, NSW Government agencies, operators of the Mt Arthur and/or Mount Pleasant mines or other adjacent mine operators. A protocol for the supply of the data must be included in the approval holder's Water Management Plan.	Not Triggered	No request was made during the Reporting Period. In accordance with Schedule 5 Condition 11 of SSD-5170 and BMC's approved Water Management Plan, groundwater monitoring results are published as part of the Annual Review on Bengalla's website each year.
9	The approval holder must make available to the Minister on request, all plans or programs and any review of plans or programs required under the Project Approval issued for the project under the Environmental Planning and	Not Triggered	No request was made during the Reporting Period. Approved Bengalla management plans are available on Bengalla's website.

Ref	Condition	Status	Comment
	Assessment Act, 1979 (NSW), including the Biodiversity Management Plan, the Rehabilitation Management Plan and the Water Management Plan, which must include a Site Water Balance, Surface Water Management Plan and Groundwater Management Plan.		BMC's approved Water Management Plan includes a Site Water Balance, Surface Water Management Plan and Groundwater Management Plan.
10	Within 30 days after the commencement of the action, the approval holder must advise the Department in writing of the actual date of commencement.	Compliant	By email dated 30 October 2015, BMC advised the then DoEE that the action the subject of the EPBC Approval commenced on 1 October 2015.
11	The approval holder must maintain accurate records substantiating all activities associated with or relevant to these conditions of approval, including measures taken to implement the BOMP and VCPLMP, and make them available upon request to the Department. Such records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the Department's website. The results of audits may also be publicised through the general media.	Not Triggered	BMC maintains accurate records substantiating all activities associated with or relevant to the EPBC Approval conditions, including measures to implement the BOMP and the BDMP (which incorporates the VCPLMP). No request was made during the Reporting Period to make any records available to DCCEEW. Appendix A describes the commitments made in the approved BDMP and how each has been addressed in the Reporting Period. Appendix B describes the commitments made in the approved BOMP and how each has been addressed in the Reporting Period. Appendix A describes pre-clearing and clearing activities implemented in accordance with the BDMP during the Reporting Period.
12	By the end of March each year, the approval holder must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of the BOMP and VCPLMP as specified in the conditions. Documentary evidence providing proof of the date of publication must be provided to the Department at the same time as the compliance report is published. Note: The Annual Review required under NSW Approval condition 4 (of Schedule 5) may be used to satisfy this condition if it meets the above content and submission requirements.	Compliant	This report addresses compliance with each of the conditions of the EPBC Approval for the Reporting Period. Appendix A describes the commitments made in the approved BDMP and how each has been addressed in the Reporting Period. Appendix B describes the commitments made in the approved BOMP and how each has been addressed in the Reporting Period. Appendix A describes pre-clearing and clearing activities implemented in accordance with the BDMP during the Reporting Period. This report will be uploaded to Bengalla's website by the end of March 2025 and documentary evidence of publication will be provided to DCCEEW at the same time.
13	Non-compliance with any of the conditions of this approval must be reported to the Department within 2 business days of the approval holder becoming aware of the non-compliance.	Compliant	The discharge of sediment laden water which occurred on 24 July 2024 (refer to details in Condition 6 above) was notified in writing to the Department of Climate Change Energy, the Environment and Water (DCCEEW) on 25 July 2024.
14	Upon the direction of the Minister, the approval holder must ensure that an independent audit of compliance with the	Not Triggered	No direction was made during the Reporting Period.

Ref	Condition	Status	Comment
	conditions of approval is conducted, and a report submitted to the Minister. The independent auditor must be approved by the Minister prior to the commencement of the audit. Audit criteria must be agreed to by the Minister and the audit report must address the criteria to the satisfaction of the Minister.		
15	If the approval holder wishes to carry out any activity other than in accordance with a Plan as specified in the conditions, the approval holder must submit to the Department for the Minister's written approval a revised version of that Plan. The approval holder must not commence the varied activity until the Minister has approved the varied Plan in writing. The Minister will not approve a varied Plan unless the revised Plan would result in an equivalent or improved environmental outcome over time. If the Minister approves the revised Plan, that Plan must be implemented in place of the Plan originally approved.	Not Triggered	No relevant activities other than those described in the BMP or BOMP were required during the Reporting Period.
16	If the Minister believes that it is necessary or convenient for the better protection of listed threatened species and ecological communities to do so, the Minister may request that the approval holder make specified revisions to a Plan specified in the conditions and submit the revised Plan for the Minister's written approval. The approval holder must comply with any such request. The revised approved Plan must be implemented. Unless the Minister has approved the revised Plan then the approval holder must continue to implement the Plan originally approved, as specified in the conditions.	Not Triggered	No request was made during the Reporting Period.
17	If, at any time after 5 years from the date of this approval, the approval holder has not commenced the action, then the approval holder must not commence the action without the written agreement of the Minister.	Not Triggered	By email dated 30 October 2015, BMC advised the then DoEE that the action the subject of the EPBC Approval commenced on 1 October 2015.

1.6 Conclusion

During the Reporting Period, there was one non-compliance with EPBC Approval conditions reported to the DCCEEW. This related to Condition 6 (relating to a discharge of sediment laden water from site). At the time of this report no further correspondence from DCCEEW has been received relating to this matter.

BMC will continue to review and document all relevant activities at Bengalla during the 2025 reporting period to assist in maintaining compliance with the EPBC Approval conditions.



Bengalla Mine2024 Annual Compliance Report

Appendix A and **Appendix B** provide comments about the implementation of the BMP and BOMP commitments respectively during the Reporting Period. In summary, BMC has generally complied with the BMP and BOMP commitments for the Reporting Period.

Appendix A Biodiversity Management Plan Commitments

BDMP Section	Control / Action	Timing / Trigger	Responsibility	Monitoring	Reporting	Status	Comment
4.1	Marking Limits of Clearing	Prior to clearing	Environment Superintendent / Mining Manager / Surveyors	Inspection to be undertaken throughout duration of clearing.	Documented in Ground Disturbance Permit (GDP) form and signed off.	Compliant	GDP boundaries are demarcated prior to clearing, where required. Refer section 2.2 of Appendix A .
4.2	Identification of suitable fauna relocation sites	Prior to clearing	Environment Superintendent / Mining Manager	N/A	Documented in GDP form and/or pre-clearing report.	Compliant	Refer Section 2.2.6 of Appendix A .
4.2	Pre-clearing surveys	Within one month prior to clearing	Suitably qualified person	Monitoring of fauna and flora (including Tiger Orchid, pest and weed species), habitat features and plant pathogens.	Documented and signed off in the pre-clearing report. Results are reported in Annual Review. OEH notified if new threatened species identified.	Compliant	Refer Section 3.1 of Appendix A .
4.2	Clearing Surveys	Within one month of the pre-clearing survey	Suitably qualified person	Monitoring of fauna and flora (including Tiger Orchid, pest and weed species), habitat features and plant pathogens.	Documented and signed off in the clearing report. Results are reported in Annual Review. OEH notified if new threatened species identified.	Compliant	Refer Section 3.2 of Appendix A .
4.3	Pre-clearing weed management	Prior to clearing and during clearing	Suitably qualified person and Environment Superintendent	Inspection to be undertaken prior to clearing.	Documented and signed off in the GDP. Results are reported in Annual Review.	Compliant	Refer Section 3.1.7 of Appendix A .
4.2.3	Relocation of habitat features to rehabilitation areas, adjacent vegetation or storage location.	During and/or after clearing	Environment Superintendent	N/A	Documented and signed off in the GDP. Results are reported in Annual Review.	Compliant	Refer Section 3.1.8 and Section 3.2 of Appendix A .



Bengalla Mine 2024 Annual Compliance Report

BDMP Section	Control / Action	Timing / Trigger	Responsibility	Monitoring	Reporting	Status	Comment
4.1	Inductions and Staff Education	Ongoing as part of the existing induction process or as part of toolbox talks prior to commencement of ground disturbance works.	Environment Superintendent	N/A	As per BMC Induction procedure	Compliant	Inductions provided to BMC staff and contractors include a component on biodiversity management.
4.2	Vehicle Driving Policy and Signage	Ongoing or when wildlife crossing areas are identified	Mining Manager / Environment Superintendent	N/A	N/A	Compliant	No wildlife crossing areas were identified by the suitably qualified expert (SLR) during 2024. Site access tracks and controls are included in site procedures.
4.2.5	Seed collection	Targeted throughout year and opportunistically before and immediately after clearing	Environment Superintendent	Observations to be made throughout year to check flowering / seeding development of key species. Ensure correct licences are held by any contractors.	To be documented and reported in Annual Review.	Compliant	Refer Section 3.1.6 of Appendix A .
4.3	Weed control	Ongoing over life of mine	Environment Superintendent	Routine field observations and management undertaken in Weed Control Zones, including rehabilitation areas.	Results to be reported in Annual Review.	Compliant	Refer Appendix D .
4.4	Feral animal control	Ongoing over life of mine	Environment Superintendent	Routine field observations undertaken and management undertaken including rehabilitation areas.	Results to be reported in Annual Review.	Compliant	Refer Appendix D .
5.0	Ecological Monitoring and Inspections	Ongoing over life of mine	Ecologist	N/A	Results to be reported in Annual Review.	Compliant	The purpose of the ecological monitoring program is primarily to monitor the risks posed by plant pathogens, exotic weeds



Bengalla Mine 2024 Annual Compliance Report

BDMP Section	Control / Action	Timing / Trigger	Responsibility	Monitoring	Reporting	Status	Comment
							and feral animals in biodiversity offsets, residual vegetation and rehabilitation areas and to indicate where management actions are required. For weed and feral animal monitoring programs for Bengalla and the biodiversity offset areas refer to Appendix D. Rehabilitation monitoring was completed during October 2024 for 2024 reporting period. Details of results are presented in Section 8 of the 2024 Annual Review. As stated at section 5.4 of the BMP, no immediate management actions are required for the management of plant pathogens at Bengalla. However, signs of pathogens outbreaks (e.g. in pre-clearing surveys) may require measures to be taken in the future.



Bengalla Mine 2024 Annual Compliance Report

Appendix B Biodiversity Offset Management Plan Commitments

BOMP Section	Commitment	Status	Comment
Notification			
2.3	Following approval, all actions detailed within this BOMP will be implemented. Within one month of receiving approval, this BOMP will be made available to the public on the BMC website.	Compliant	The BOMP is implemented as part of BMC's operations. The BOMP (with regulatory approval letters) (August 2017) is publicly available on Bengalla's website.
Fencing, Gates and Signage			
8.1	Boundary fencing will remain around all BOS Areas and will be inspected annually to identify areas that may require maintenance.	Compliant	An annual inspection of boundary fencing for all biodiversity offset areas (BOS Areas) was undertaken in 2024.
8.1	Internal fencing within Kenalea properties and Black Mountain will be maintained (where appropriate) to allow for the management of controlled grazing in these properties.	Compliant	No internal fence repairs were required in 2024 at Kenalea or Black Mountain.
8.1	Stock proof fencing will be utilised where existing fences are absent to protect sensitive areas.	Not Triggered	Not required during the Reporting Period.
8.1	Current gates for access to BOS Areas will be retained and kept locked.	Compliant	Gates to BOS Areas remained secured and locked during 2024.
8.1	BMC will install signage at the entrances to the BOS Areas to inform the public of restricted access to properties.	Compliant	Restricted access signage at the entrances to the BOS Areas has been installed prior to 2024.
Controlled Activities			
8.2	All contractors, stakeholders and visitors to the BOS Areas will be inducted. The induction will include information on activities prohibited in BOS Areas unless explicitly undertaken for the purposes of ongoing management.	Compliant	BMC has established internal policies which require all staff/contractors, stakeholders and visitors working at Bengalla (or BOS Areas) to be inducted prior to undertaking specified work. The BOS Areas induction identifies relevant compliance obligations including under applicable management plans.



Bengalla Mine 2024 Annual Compliance Report

BOMP Section	Commitment	Status	Comment
Control Grazing			
8.3	Control grazing will only be permitted in Zone 1 and Zone 2 management areas.	Not Triggered	No control grazing was undertaken during 2024.
8.3	Best practice for control grazing will be implemented wherever control grazing is employed, including: • Providing adequate rest periods and adjusting rest periods to suit the recovery needs and growth rates of the desirable plants; • Targeting defined areas with high fuel loads or weed infestations; • Cattle stocking numbers kept below 4 dry sheep equivalent; • Pre and post grazing monitoring; • Periods of grazing must be kept as short as practicable; and • Control grazing will not be conducted during declared drought periods.	Not Triggered	No control grazing was undertaken during 2024.
8.3	Control grazing will be monitored against Trigger and Performance Criteria.	Not Triggered	No control grazing was undertaken during 2024.
7.1	Should monitoring results indicate that regeneration is not occurring naturally after Year 5, assisted revegetation will take place in areas that require this management action.	Not Triggered	An assisted regeneration program will be developed and implemented to mid and over storey covers in identified areas as required.
8.3	Stock will be excluded from riparian areas and will access water primarily from farm dams or water troughs.	Not Triggered	No cattle grazing was undertaken during 2024.
8.3	Monitoring will be undertaken pre and post grazing with the use of photo reference points. Areas subject to control grazing will be monitored as part of annual monitoring program.	Not Triggered	No cattle grazing was undertaken during 2024
Bushfire management			
8.4	BMC will take practicable steps to prevent the occurrence of bushfires on the land and minimise the spread of bushfire.	Not Triggered	No bushfire hazard reduction burns were conducted on any of the offset areas in 2024.



Bengalla Mine 2024 Annual Compliance Report

BOMP Section	Commitment	Status	Comment
8.4	BMC will provide maps (including water fill points) and contact details of the properties to the RFS.	Compliant	Maps, keys and relevant contact information have previously been provided to local RFS captains. An update to locations of water fill points were provided to the RFS in 2024.
Weed Control			
8.5	Weed management actions will target Weeds of National Significance and Noxious Weeds across BOS Areas.	Compliant	Enright Land Management undertook a weed monitoring and control program in BOS Areas during the Reporting Period. Records of the locations of weed control are detailed in Appendix D .
8.5	Weed control will focus on species that exclude or have the potential to exclude native species, disrupt the recruitment of native species or impede ecological progress.	Compliant	A summary of the weed monitoring and control program undertaken during the Reporting Period is provided in Appendix D .
8.5	Weed management will be undertaken in accordance with the management principles listed in Section 8.5 of the BOMP.	Compliant	Weed management practices were undertaken during the Reporting Period in accordance with Section 8.5 of the BOMP.
8.5	The results and outcomes of weed management will be documented and analysed for each year in the Annual Review. This will include documentation of areas subject to weeding, techniques used, target species controlled, new species identified, chemicals used and revised approaches to weed control in light of learnings during the previous reporting period.	Compliant	A summary of the weed monitoring and control program for the Reporting Period is provided in Appendix D .
8.5	Weed infestation maps will be updated annually and annotated as required with information about previously implemented weed controls.	Compliant	A weed monitoring and control program was undertaken during the Reporting Period. The location of weeds identified during the program were recorded for GIS input and is presented in Appendix D .
Feral Animal Control			
8.6	BMC will conduct an annual feral animal control program in conjunction with current Local Land Services programs.	Compliant	A feral animal control program was undertaken in 2024. This was undertaken in line with neighbouring properties and the Local Land Services baiting program and is described in Appendix D .
8.6	Should any native fauna deaths be recorded during 1080 baiting and if sufficient carcass is available the animal will be sent to a veterinarian to provide a cause of death should there be any evidence of poisoning.	Not triggered	No native fauna deaths were reported during the 2024 feral animal control program.

Bengalla Mine 2024 Annual Compliance Report

BOMP Section	Commitment	Status	Comment
8.6	The results and outcomes of feral animal management will be documented for each year in the Annual Review. This will include documentation of the techniques used for each feral species, the quantity of bait material purchased and deployed, the areas subject to control, estimate of the numbers of animals culled, new species identified (if any) and any other chemicals used.	Compliant	A summary of the 2024 feral animal control program is provided in Appendix D .
8.6	All personnel involved in feral animal management must hold relevant and valid licences/permits, including any relevant chemical licences for pesticide use or a firearms licence for shooting.	Compliant	Staff and/or contractors involved in feral animal management held all relevant licences and accreditations to undertake the feral animal control works in 2024.
Maintenance Track Improvement and Additional Infrastructure			
8.7	Maintenance of existing tracks and installation of additional infrastructure may be required to provide safe access to BOS Areas. Maintenance or construction works may result in minor/localised disturbance. BMC will ensure compliance with all legal and environmental protection measures prior to any significant disturbance.	Compliant	All existing access tracks in all offsets were assessed and regraded (where necessary) in 2024.
8.7	BMC will record and store all relevant GIS information related to the improvement or installation of additional infrastructure.	Compliant	BMC has recorded and stored GIS information for all improvements and installation of additional infrastructure on the BMC GIS database.
8.7	BMC will undertake routine inspections and maintenance of BOS infrastructure (eg. tracks, fence lines, gates)	Compliant	Inspections and maintenance of tracks was undertaken in 2024. Fence lines and gates were also inspected.
Contingency Measures			
8.8	Contingency measures will be utilised should monitoring indicate that performance measures or contingency measures are not being met.	Not Triggered	No contingency measures were required during the Reporting Period.



Appendix C

Annual Clearing Report 2024



Bengalla Annual Clearing Report

2024 Annual Clearing Report

Bengalla Mining Company Pty Ltd (BMC)

Prepared by:

SLR Consulting Australia

SLR Project No.: 610.032334.00002

26 March 2025

Revision: 1.1

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
1.1	26 March 2025	Elise Newberry	Jeremy Pepper	Jeremy Pepper

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Bengalla Mining Company Pty Ltd (BMC) (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.



Executive Summary

Bengalla is an open-cut coal mine situated four kilometres west of Muswellbrook in the Upper Hunter Valley, NSW. Pre-clearing and clearing operations were undertaken at Bengalla mine over the course of 2024 for the construction of new infrastructure, the relocation and maintenance of infrastructure and service roads, and the westward extension of the open-cut mining pit. All procedures and works were conducted in accordance with the Bengalla Mine Biodiversity Management Plan.

Pre-clearance surveys included the assessment of vegetation prior to clearing to identify fauna habitat features, specifically hollow bearing trees and stick nests, which were subsequently marked and recorded as habitat trees. Other habitat features including salvageable logs and Wombat burrows were also recorded. A total of 21 habitat trees were identified during the 2024 pre-clearance survey period, all located within the Dam Area and Stage 3 Diversion Levee.

A previously identified clump of Tiger Orchids *Cymbidium canaliculatum*, which formed part of an endangered population listed under the *NSW Biodiversity Conservation Act 2016* located on a single tree within the disturbance area was translocated prior to 2024 clearing works commencing. The Tiger Orchids were attached to a donor tree, which was relocated to a recipient site within an existing rehabilitation area outside of the future mine disturbance area.

Clearing works during 2024 were undertaken in a two stage process with Stage 1 involving removing all vegetation, with the exception of habitat trees. Stage 2 included the removal of habitat trees under the supervision of the project ecologist. Stage 2 clearing occurred over six days (non-consecutive) in January and February 2024. All habitat trees were checked by an ecologist after being felled. A total of 15 displaced fauna were found. Three of these fauna were relocated and 12 dispersed into adjoining habitats. No fauna required transport to a wildlife rescue association and no fauna were killed during the works. All habitat trees felled during Stage 2 clearing works were left for a minimum of 24 hrs to allow any resident fauna to relocate overnight.



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Appendix B	Fauna Species List
Appendix C	Bengalla Clearing Procedure
Appendix D	Pre-clearing Surveys Habitat Trees



Acronyms and Abbreviations

BC Act	<i>NSW Biodiversity Conservation Act 2016</i>
BMC	Bengalla Mining Company Pty Ltd.
BMP	Biodiversity Management Plan
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
GDP	Ground Disturbance Permit
LGA	Local Government Area
SLR	SLR Consulting Australia Pty Ltd



1.0 Introduction

1.1 Background

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Bengalla Mining Company (BMC) to prepare the 2024 Bengalla Annual Clearing Report.

1.2 Existing Operation

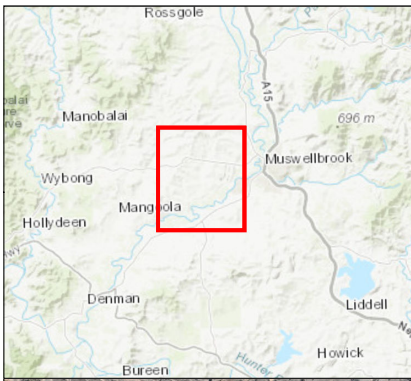
BMC operates Bengalla Mine, an open-cut coal mine situated approximately four kilometres west of Muswellbrook in the Upper Hunter Valley, NSW (Figure 1). During the reporting period, clearing operations were carried out for the construction of new infrastructure, the relocation and maintenance of infrastructure and service roads, and the westward extension of the open-cut mining pit.

1.3 Aims and Objectives

The purpose of this Annual Clearing Report is to outline the procedures and outcomes of all pre-clearing and clearing activities conducted at Bengalla in 2024. This includes:

- Ecology pre-clearing operations
- Stage 1 and Stage 2 clearing operations
- Fauna handling and relocation
- Habitat salvage and procedures.





0 250 500
m

Coordinate System: GDA2020 MGA Zone 56

Scale: 1:793,592 at A4

Project Number: 610.032334

Date: 26-Mar-2025

Drawn by: JG

Watercourse

Project Boundary

BENGALLA ANNUAL CLEARING 2025

Site Location



Data Sources:
NSW Spatial information exchange catalogue,
Nearmap imagery WMS (March 2025)

FIGURE 1

2.0 Methods

2.1 Personnel

The roles and qualifications of all staff responsible for the preparation of this report are listed in Table 1.

Table 1: Staff Roles and Qualifications

Staff Name & Title	Qualifications and Training	Role
Jeremy Pepper Technical Director	BSc (Hons 1), UNSW, Cert II Bushland Regeneration (TAFE) Cert III Horticulture (Arboriculture)(TAFE) BAM Accredited Assessor (BAAS17104)	Report technical review, Pre-clearing surveys
Vander Bertoldo Project Ecologist	MMESM - SCU BBs (Hons 1) – UNESC	Report drafting
Elise Newberry Project Ecologist	Bachelor of Environmental Biotechnology – University of Technology Sydney	Report drafting, project management
David Condor Associate Ecologist	Bachelor of Applied Science, Southern Cross University	Clearing supervision

2.2 Licences and Permits

The SLR ecology team operates under a Scientific Licence (licence number SL100176, issued under the *NSW Biodiversity Conservation Act 2016 BC Act*), which authorises field staff to trap, capture, harm, hold and release plants and animals protected under the BC Act and *National Parks and Wildlife Act 1974*, as well as Animal Research Authority (issued by the Secretary of the NSW Animal Care and Ethics Committee of DPIE), which allows trapping of animals in NSW for ‘animal research’.

2.3 Pre-clearing survey procedure

Ecology pre-clearance surveys were undertaken throughout 2024 in alignment with section 4.2.1 of the *Bengalla Biodiversity Management Plan (BMP)* (Hansen Bailey 2017), which specifies management actions for vegetation pre-clearance procedures. The objectives of the ecology pre-clearance surveys include:

- Identifying the presence or absence of threatened species and their habitats, including the Tiger Orchid (*Cymbidium canaliculatum*).
- Identification of hollow bearing trees as habitat trees and marked with an ‘H’ to be removed during stage 2 clearing.
- Suitable salvage habitat features such as hollow bearing logs to be marked with an ‘S’ for relocation to provide fauna habitat.
- Identification of threatened flora and fauna species located within the disturbance boundaries and locations recorded.



2.3.1 Fauna habitat identification

Pre-clearance areas were assessed for trees with important habitat features that are suitable for arboreal fauna (e.g. gliders, birds, microchiropteran bats). Trees with suitable hollows or stick nests were identified as habitat trees and marked accordingly with an 'H' on the trunk and flagged with pink flagging tape to be cleared under stage 2 of the two stage clearing procedure as outlined in the Bengalla BMP (Hansen Bailey 2017).

2.3.2 Species inventory

Flora and Fauna species recorded during the preclearance surveys and clearing surveys are included in Appendix A and Appendix B.

2.3.3 Surveys for Tiger Orchid

All preclearance areas were surveyed for evidence of the Tiger Orchid *Cymbidium canaliculatum*, which is listed as an 'endangered population' in the Hunter Valley¹ under Schedule 1, Part 2, Division 4 of the *NSW Biodiversity Conservation Act 2016* (BC Act). Tiger Orchids found within the clearing zones were translocated to a recipient site prior to stage 2 clearing in accordance with section 4.2 of the Bengalla BMP. Refer to Appendix C for the clearing procedure.

2.3.4 Salvageable habitat material

Salvageable habitat material was assessed as outlined in 4.2.3 of the Bengalla BMP which identifies selection criteria including:

- *Woody ground debris selected based on size, structural integrity and presence of good hollows.*
- *Stags will be selected if they appear solid and have good hollows in the trunk*
- *Rocks >500 mm width that appear solid enough to survive translocation.*

The presence of suitable salvageable habitat material were assessed during the preclearance surveys and GPS recorded. Due to the limited number of pre-clearance surveys undertaken in 2024, no salvageable material was identified.

2.3.5 Surveys for *Phytophthora cinnamomi*

The preclearance surveys included assessing the presence of Root Rot (or Cinnamon Fungus) *Phytophthora cinnamomi*, which is listed as a key threatening process under the Schedule 4 of the BC Act and under the EPBC Act and can cause permanent damage to native trees and their ecosystems. Any visual signs of the disease (e.g. wilting and discolouration of leaves, dieback of canopy foliage) was recorded, where present.

2.3.6 Fauna relocation sites

Areas of appropriate habitat for fauna rescued during clearing supervision were assessed and recorded as fauna relocation sites. The features assessed as to their suitability for fauna relocation include:

- Areas outside of the impacted clearing zone with suitable habitat connectivity to prevent fauna relocating back within the clearing zone limits after release.

¹ Listed as '*Cymbidium canaliculatum* population in the Hunter Catchment' under BC Act



- The prevalence of suitable hollow bearing trees to provide habitat to fauna, specifically arboreal fauna (e.g. possums, gliders, microchiropteran bats).
- Presence of hollow-bearing logs to provide habitat and protection from predators for relocated reptiles.

Identified fauna relocation areas were used for displaced fauna found during Stage 2 clearing in 2024.

2.3.7 Collection of seeds for rehabilitation purposes

The Bengalla BMP outlines the following in relation to native seed collection:

“Harvest of native species at Bengalla will be conducted throughout the year to coincide with the seeding period for target species”

Native flora species were assessed as to their viability for seed collection purposes for future rehabilitation during the 2024 pre-clearing surveys. Due to the limited number of pre-clearing surveys undertaken in 2024 and the lack of seed availability, no seeds were collected for rehabilitation purposes.

2.3.8 Identification of weed and pests species infestations

An assessment of significant infestations of weed species was conducted during the pre-clearing surveys, specifically focussed on noxious weed and Weeds of National Significance (WONS) as outlined in section 4.1.1 of the Bengalla BMP.

2.4 Clearing Procedure

2.4.1 Overview

Section 4.2.2 of the Bengalla BMP outlines the required two-stage clearing procedure:

- **Stage 1:** Removal of all vegetation other than habitat trees. Habitat features left standing overnight.
- **Stage 2:** Removal of habitat trees 24hrs or more after Stage 1 clearing. Habitat trees lightly shaken prior to felling and subsequently checked for fauna by an ecologist once felled. Felled habitat trees were left overnight to allow any remaining fauna to relocate.

Refer to Appendix C for the full clearing procedure.

2.4.2 Fauna handling and relocation

Fauna species found during the clearing procedure were identified and location was recorded. The following outlines the procedures undertaken when displaced fauna are identified. All activities were undertaken in accordance with the Animal Research Authority Code of Practice (National Health and Medical Research Council):

- Uninjured fauna were relocated to identified fauna relocation areas with suitable habitat (e.g. Hollow bearing trees) outside of the clearing footprint.
- Injured fauna were handed over to wildlife rehabilitation agencies.

Severely injured fauna that were assessed as non-viable for rescue were euthanised on site.



3.0 Results

3.1 Stage 1 pre-clearance surveys

All pre-clearance works undertaken in 2024 are listed in Table 2.

Table 2 Pre-clearance surveys undertaken in 2024

Date	Type of Works	Location	Vegetation Community
19 December 2024	Pre-Clearance	Dam area, Stage 3 Diversion Levee	Central Hunter Ironbark Grassy Woodland

3.1.1 Vegetation community structure

The vegetation on site consists predominantly of a mixture of native and exotic species. The canopy is dominated by Narrow-leaved Ironbark *Eucalyptus crebra* with occasional Grey Box *Eucalyptus moluccana* and Forest Red Gum *Eucalyptus tereticornis*. The shrub layer is predominantly weed species including dense thickets of African Boxthorn *Lycium ferocissimum* and patches of Purpletop *Verbena bonariensis*. The groundcover consists of a mixture of native species, including Wallaby Grass *Rytidosperma caespitosum* and Slender Bamboo Grass *Austrostipa verticillata* and weed species, such as African Lovegrass *Eragrostis curvula* and occasional Rhodes Grass *Chloris gayana*.

The vegetation communities recorded and mapped within the 2024 pre-clearance areas are outlined in Table 3.

Table 3 Vegetation communities on site

Location	Vegetation Community
Dam Area	Central Hunter Ironbark Grassy Woodland
Stage 3 Diversion Levee	Central Hunter Ironbark Grassy Woodland

3.1.2 Habitat, hollow-bearing and significant trees

A total of 21 habitat trees were identified within the disturbance areas during the 2024 pre-clearing survey. These trees were identified over a one-day period in December and primarily consist of hollow bearing *E. crebra*. Habitat trees identified in the pre-clearing surveys are shown in Appendix D.

3.1.3 Species inventory

Flora and fauna species recorded on site are listed in Appendix A.

3.1.4 Tiger Orchid *Cymbidium canaliculatum*

Tiger Orchids located on a tree (Photo 1) within the clearing zone were relocated prior to clearing being undertaken in January 2024 (Photo 2). The orchids were attached to a large over-mature Narrow-leaved Ironbark *E. crebra* (as the donor tree) which was located within the clearing area and which was moved to a location outside of the clearing zone to a recipient site. The location of the Tiger Orchid, donor site and recipient site are shown in Figure 3.



The host tree containing the Tiger Orchids was cut into three sections for transport to the donor site, as advised by arborists due to fragility of the hollow trunk. The orchid was strapped firmly to its donor trunk to mitigate risk of detachment during transport over internal unsealed tracks and uneven ground within the mine property. All three sections were transported simultaneously to the recipient site and mounted on a single support tree consisting of a large (~15m tall above ground) solid ironbark trunk.

The largest orchid on the biggest section of host trunk was in gentle contact with and therefore may bridge to the standing recipient log.

The orchids were predominantly positioned on a south westerly aspect to best retain morning dew for longer periods and to best emulate donor position and conditions.



Photo 1 Tiger Orchid *Cymbidium canaliculatum* host tree

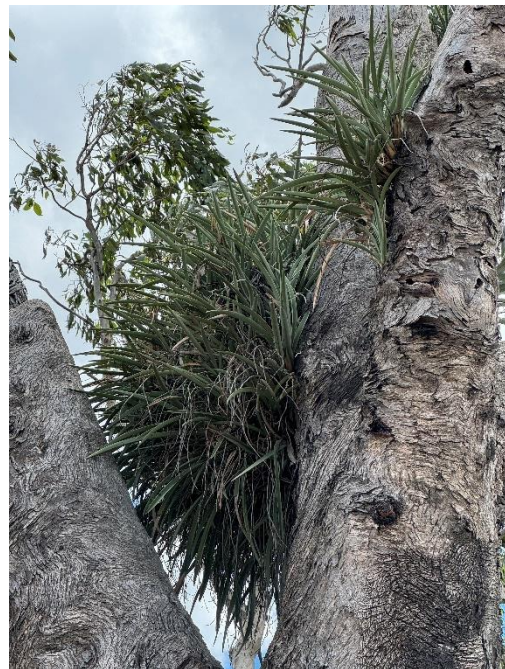


Photo 2 Translocated Tiger Orchid *Cymbidium canaliculatum*

3.1.5 *Phytophthora cinnamomi* surveys

No visible signs of *Phytophthora cinnamomi* were observed during the 2024 pre-clearing survey.

3.1.6 Collection of seeds for rehabilitation purposes

No collection of seeds was undertaken during the 2024 pre-clearing surveys due to the limited availability of seed and limited duration of pre-clearing surveys undertaken in 2024.

3.1.7 Weed species

Weed species recorded during the 2024 pre-clearing surveys are listed in Table 4



Table 4 Weed species recorded on site

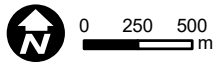
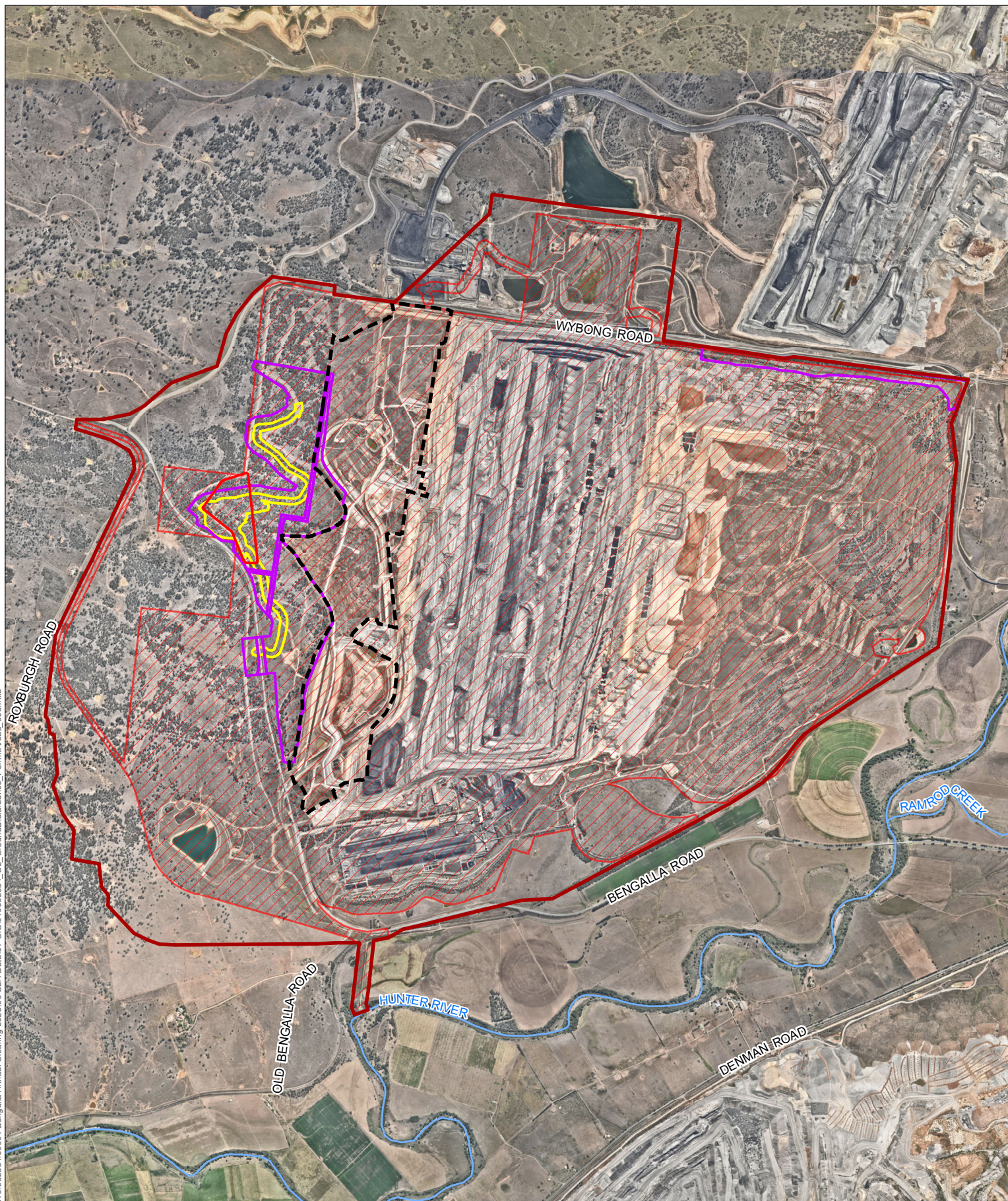
Scientific Name	Common Name	Weed of National Significance (WONS)	Noxious Weed Class
Cirsium vulgare	Spear Thistle	No	n/a
Eragrostis curvula	African Lovegrass	No	n/a
Lycium ferocissimum	African Boxthorn	Yes	4
Verbena bonariensis	Purpletop	No	n/a
Cirsium vulgare	Spear Thistle	No	n/a
Chloris gayana	Rhodes Grass	No	n/a

3.1.8 Salvageable material

No salvageable habitat features were identified in the 2024 pre-clearing surveys.



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Coordinate System: GDA2020 MGA Zone 56
Scale: 1:35,000 at A4
Project Number: 610.032334
Date: 26-Mar-2025
Drawn by: JG



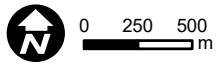
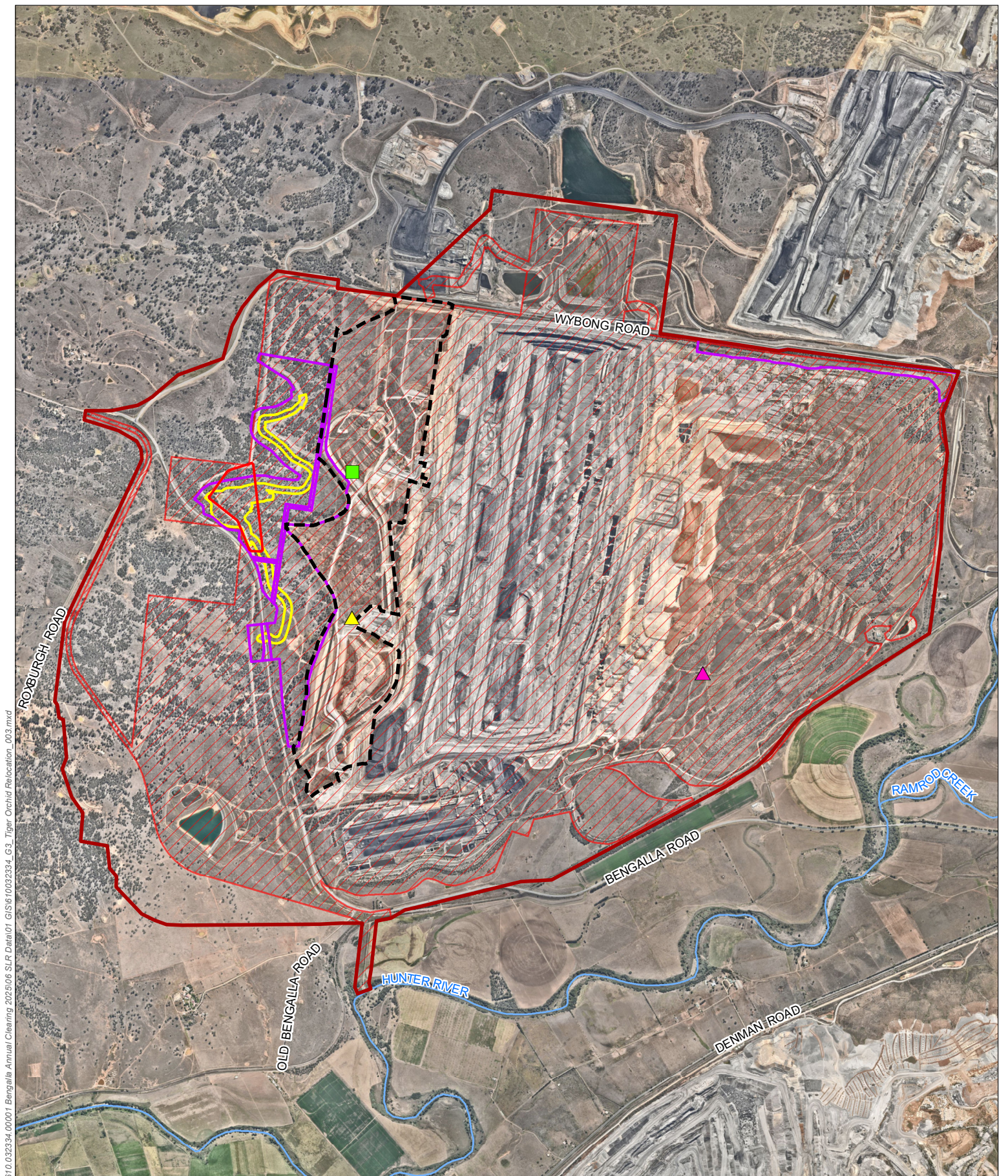
- Watercourse
- GDP 2401
- Client Boundary Digitised
- Broad Inspection Area Mulching 2025
- Stage 3 Diversion Levee Disturbance Boundary
- Approved Disturbance Boundary
- 2024 Clearing

Data Sources:
NSW Spatial information exchange catalogue,
Nearmap imagery WMS (March 2025)

BENGALLA ANNUAL CLEARING 2025

Ground Disturbance Permit Areas

FIGURE 2



Coordinate System: GDA2020 MGA Zone 56
 Scale: 1:35,000 at A4
 Project Number: 610.032334
 Date: 26-Mar-2025
 Drawn by: JG

- ▲ Donor Location
- ▲ Recipient Site
- Tiger Orchid Location
- Watercourse
- GDP 2401
- Client Boundary Digitised
- 2024 Clearing
- Broad Inspection Area Mulching 2025
- Stage 3 Diversion Levee Disturbance Boundary
- Approved Disturbance Boundary

BENGALLA ANNUAL CLEARING 2025

Tiger Orchid Relocation

Data Sources:
 NSW Spatial information exchange catalogue,
 Nearmap imagery WMS (March 2025)



FIGURE 3

\\slr.local\Corporate\Projects\SLR\610-Srvs\SYD\610-SYD\610.032334\00001 Bengalla Annual Clearing 2025\06 SLR Data\01 GIS\610032334_G3_Tiger Orchid Relocation_003.mxd

3.2 Stage 2 tree clearing

Table 5 outlines the clearing schedule undertaken in 2024

Table 5 Clearing works undertaken in 2024

Date	Works Undertaken	Location	Vegetation Community
10 January 2024	Stage 2 Clearing	GDP2401	Central Hunter Ironbark Grassy Woodland
11 January 2024	Stage 2 Clearing	GDP2401	Central Hunter Ironbark Grassy Woodland
12 January 2024	Stage 2 Clearing	GDP2401	Central Hunter Ironbark Grassy Woodland
25 January 2024	Stage 2 Clearing	GDP2401	Central Hunter Ironbark Grassy Woodland
28 February 2024	Stage 2 Clearing	GDP2401	Central Hunter Ironbark Grassy Woodland
29 February 2024	Stage 2 Clearing	GDP2401	Central Hunter Ironbark Grassy Woodland

3.2.1 Fauna recorded and relocated

Table 6 outlines the relocation details of captured fauna.

Table 6 Relocated Fauna

Common Name	Scientific Name	Number	Relocation Details
Tree Skink	<i>Egernia striolata</i>	1	Relocated 200 m north of clearing area
Eastern Bearded Dragon	<i>Pogona Barbata</i>	1	Relocated 2 km north-west of clearing zone in area of identified suitable habitat.
Common Brushtail Possum	<i>Trichosurus vulpecula</i>	1	Relocated 2 km north-west of clearing zone in area of identified suitable habitat (Prevalence of hollow bearing trees).
Total		3	

Table 7 outlines the number of fauna found, relocated and injured during the clearing process in 2024.



Table 7 Fauna recorded during Stage 2 clearing

Common Name	Scientific Name	Fled	Relocated	Injured	Killed
Tree Skink	<i>Egernia striolata</i>	1	1	0	0
Eastern Bearded Dragon	<i>Pogona Barbata</i>	0	1	0	0
Common Brushtail Possum	<i>Trichosurus vulpecula</i>	3	1	0	0
Lace Monitor	<i>Varanus varius</i>	6	0	0	0
Unidentified Microbat	-	2	0	0	0
Total		12	3	0	0

3.2.2 Salvage of habitat resources

17 logs were salvaged during the 2024 clearing period, equivalent to approximately 51 m of salvageable material.

3.2.3 Stage 2 clearing works completed outside approved clearing time

No Stage 2 clearing works were completed outside of the determined clearing area during 2024.



4.0 Conclusion

Pre-clearing and clearing works were undertaken over January, February and December 2024. All works undertaken by qualified ecologists and were in accordance with the Bengalla BMP, which outlines the required processes for pre-clearance and staged clearing.

A total of 21 habitat trees was identified within the Dam area and Stage 3 Diversion Levee. Of these, 18 were located within the Dam area and three located within the Stage 3 Diversion Levee (Appendix D). These were made up of predominantly hollow-bearing trees that may provide habitat for arboreal fauna; however also included trees with identified stick nests.

The translocation of identified Tiger Orchids located within the impacted clearing zone was undertaken prior to Stage 2 clearing works commencing in that area and in accordance with the BMP. The orchids were attached a donor tree (large over-mature Narrow-leaved Ironbark), which was relocated to a recipient site located outside of the impacted clearing area (Figure 3). The location and position of the translocated orchids was established to best mimic the original conditions they were found in.

Stage 2 clearing was undertaken over the course of six non-consecutive days within GDP 2401 (Figure 2) with an estimated 30 habitat trees cleared per day. All habitat trees were checked for displaced fauna after being felled. Three fauna species were relocated by hand, with two (Eastern Bearded Dragon and a Common Brushtail Possum) relocated approximately 2 km north-west of the clearing area in an area identified as suitable habitat, and one Tree Skink approximately 200 m north of the clearing area. A total of 12 fauna species were displaced and dispersed naturally to outside of the clearing area.

All clearing activities in 2025 will continue to follow the same methodology outlined in the BMP.



5.0 References

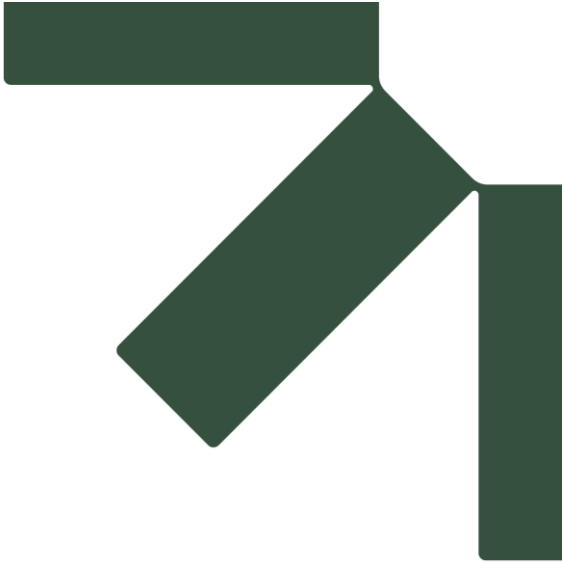
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WSP (2024). 2023 Annual Clearing Report. Prepared by WSP





Appendix A Flora Species List

Bengalla Annual Clearing Report

2024 Annual Clearing Report

Bengalla Mining Company Pty Ltd (BMC)

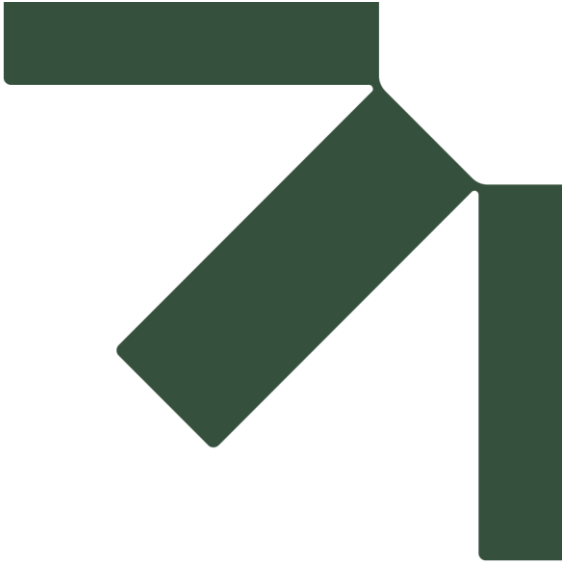
SLR Project No.: 610.032334.00002

26 March 2025

Table A-1: Flora Species List

Scientific Name	Common Name	Native/Exotic	EPBC Act	BC Act
<i>Acacia implexa</i>	Hickory Wattle	N	Not Listed	Not Listed
<i>Allocasuarina luehmannii</i>	Bull Oak	N	Not Listed	Not Listed
<i>Angophora floribunda</i>	Rough-barked Apple	N	Not Listed	Not Listed
<i>Austrostipa verticillate</i>	Bamboo Grass	N	Not Listed	Not Listed
<i>Bothriochloa macra</i>	Red Grass	N	Not Listed	Not Listed
<i>Brachychiton populneus</i>	Kurrajong	N	Not Listed	Not Listed
<i>Cirsium vulgare</i>	Spear Thistle	E	Not Listed	Not Listed
<i>Chrysocephalum apiculatum</i>	Golden Buttons	N	Not Listed	Not Listed
<i>Corymbia maculata</i>	Spotted Gum	N	Not Listed	Not Listed
<i>Cymbidium canaliculatum</i>	Tiger Orchid	N	Not Listed	Endangered
<i>Dichondra repens</i>	Kidney Weed	N	Not Listed	Not Listed
<i>Einada hastata</i>	Berry Saltbush	N	Not Listed	Not Listed
<i>Eragrostis curvula</i>	African Lovegrass	E	Not Listed	Not Listed
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	N	Not Listed	Not Listed
<i>Eucalyptus moluccana</i>	Grey Box	N	Not Listed	Not Listed
<i>Eucalyptus tereticornis</i>	Forest Red Gum	N	Not Listed	Not Listed
<i>Lycium ferocissimum</i>	African Boxthorn	E	Not Listed	Not Listed
<i>Verbena bonariensis</i>	Purpletop	E	Not Listed	Not Listed





Appendix B Fauna Species List

Bengalla Annual Clearing Report

2024 Annual Clearing Report

Bengalla Mining Company Pty Ltd (BMC)

SLR Project No.: 610.032334.00002

26 March 2025

Table B-2: Fauna Species List

Scientific Name	Common Name	Native/Exotic	EPBC Act	BC Act
Ave				
<i>Gymnorhina tibicen</i>	Australian Magpie	N	Not listed	Not listed
<i>Manorina melanocephala</i>	Noisy Miner	N	Not listed	Not listed
<i>Falco cenchroides</i>	Nankeen Kestrel	N	Not listed	Not listed
<i>Corvus coronoides</i>	Australian Raven	N	Not listed	Not listed
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	N	Not listed	Not listed
<i>Eolophus roseicapilla</i>	Galah	N	Not listed	Not listed
<i>Pardalotus punctatus</i>	Spotted Pardalote	N	Not listed	Not listed
<i>Platycercus elegans</i>	Crimson Rosella	N	Not listed	Not listed
<i>Malurus cyaneus</i>	Superb Fairywren	N	Not listed	Not listed
<i>Aquila audax</i>	Wedge-tailed Eagle	N	Not listed	Not listed
<i>Platycercus eximius</i>	Eastern Rosella	N	Not listed	Not listed
<i>Rhipidura leucophrys</i>	Willie Wagtail	N	Not listed	Not listed
Mammals				
<i>Macropus giganteus</i>	Eastern Grey Kangaroo	N	Not listed	Not listed
<i>Oryctolagus cuniculus</i>	European Rabbit	E	-	-
<i>Vombatus ursinus</i>	Common Wombat	N	Not listed	Not listed
<i>Trichosurus vulpecula</i>	Common Brushtail Possum	N	Not listed	Not listed
-	Unidentified Microbat	N	-	-
Reptiles				
<i>Varanus varius</i>	Lace Monitor	N	Not listed	Not listed
<i>Egernia striolata</i>	Tree Skink	N	Not listed	Not listed
<i>Nebulifera robusta</i>	Robust Velvet Gecko	N	Not listed	Not listed
<i>Ctenotus taeniolatus</i>	Copper-tailed Skink	N	Not listed	Not listed
<i>Pogona barbata</i>	Eastern Bearded Dragon	N	Not listed	Not listed



Appendix C Bengalla Clearing Procedure

Bengalla Annual Clearing Report

2024 Annual Clearing Report

Bengalla Mining Company Pty Ltd (BMC)

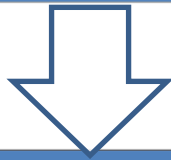
SLR Project No.: 610.032334.00002

26 March 2025



Pre-clearing Survey

- Performed within one month of clearing.
- All fauna, flora and *Cymbidium canaliculatum* recorded.
- Vegetation health assessed and documented.
- Habitat features marked and flagged.
- Fauna captured and relocated.



Clearing – Stage 1

- Removal of all vegetation other than habitat trees.
- Habitat features left standing overnight.

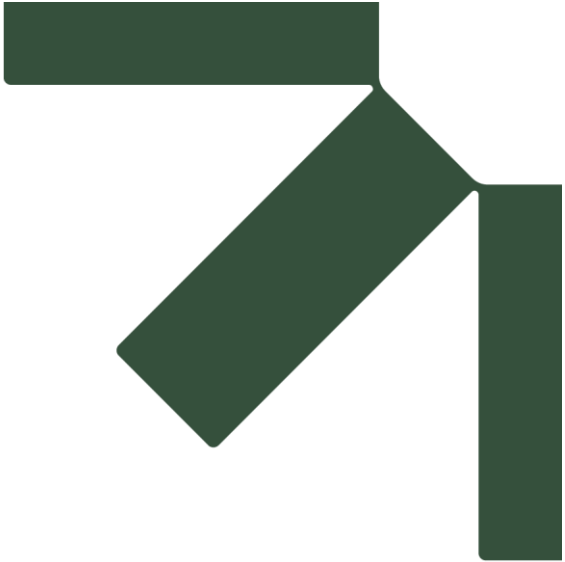


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Clearing – Stage 2

- A final pre-clearing inspection will be conducted to identify and capture any fauna.
- Habitat trees lightly shaken by machinery prior to felling.
- Appropriate machinery used to fell the tree.
- Any *Cymbidium canaliculatum* (Tiger Orchid) translocated.
- Remaining fauna captured and relocated.
- Felled habitat trees are left overnight and then appropriate sections are removed and relocated to a storage location, rehabilitation areas or disposed.

Figure 6
Clearance Procedure



Appendix D Pre-clearing Surveys Habitat Trees

Bengalla Annual Clearing Report

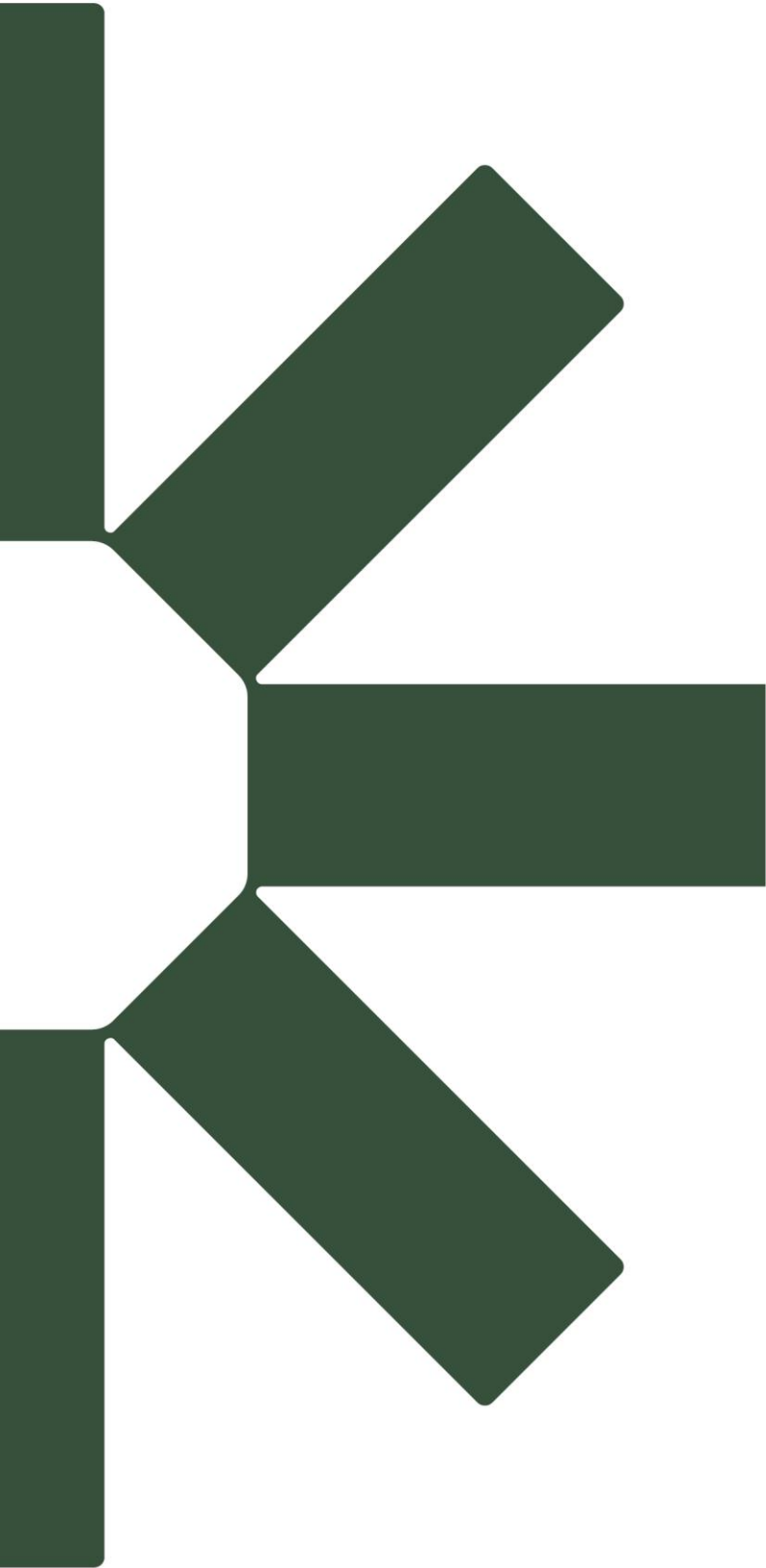
2024 Annual Clearing Report

Bengalla Mining Company Pty Ltd (BMC)

SLR Project No.: 610.032334.00002

26 March 2025





Making Sustainability Happen



Appendix D Weed and Pest Management

WEED AND PEST MANAGEMENT

1 Environmental Management

Weed and pest management at Bengalla and on the offset properties is undertaken in accordance with the BMP and BOMP, respectively.

Inspections are undertaken for weeds and pests, as required. Weed and pest control at Bengalla and on the offset properties is undertaken through targeted chemical and baiting applications.

2 Environmental Performance

Weed Management

Weeding is undertaken using boom spray, spot spraying or stem application dependent upon the specific weed and the terrain.

- Bengalla

During 2024, approximately 196 ha was treated for the management of weeds. Target weed species primarily included African boxthorn, African olive, St John's Wort, Galenia and other environmental weeds. Priority areas for treatment included the pre-clearing areas and rehabilitation areas.

Weed management areas at Bengalla are shown on **Figure 2** below.

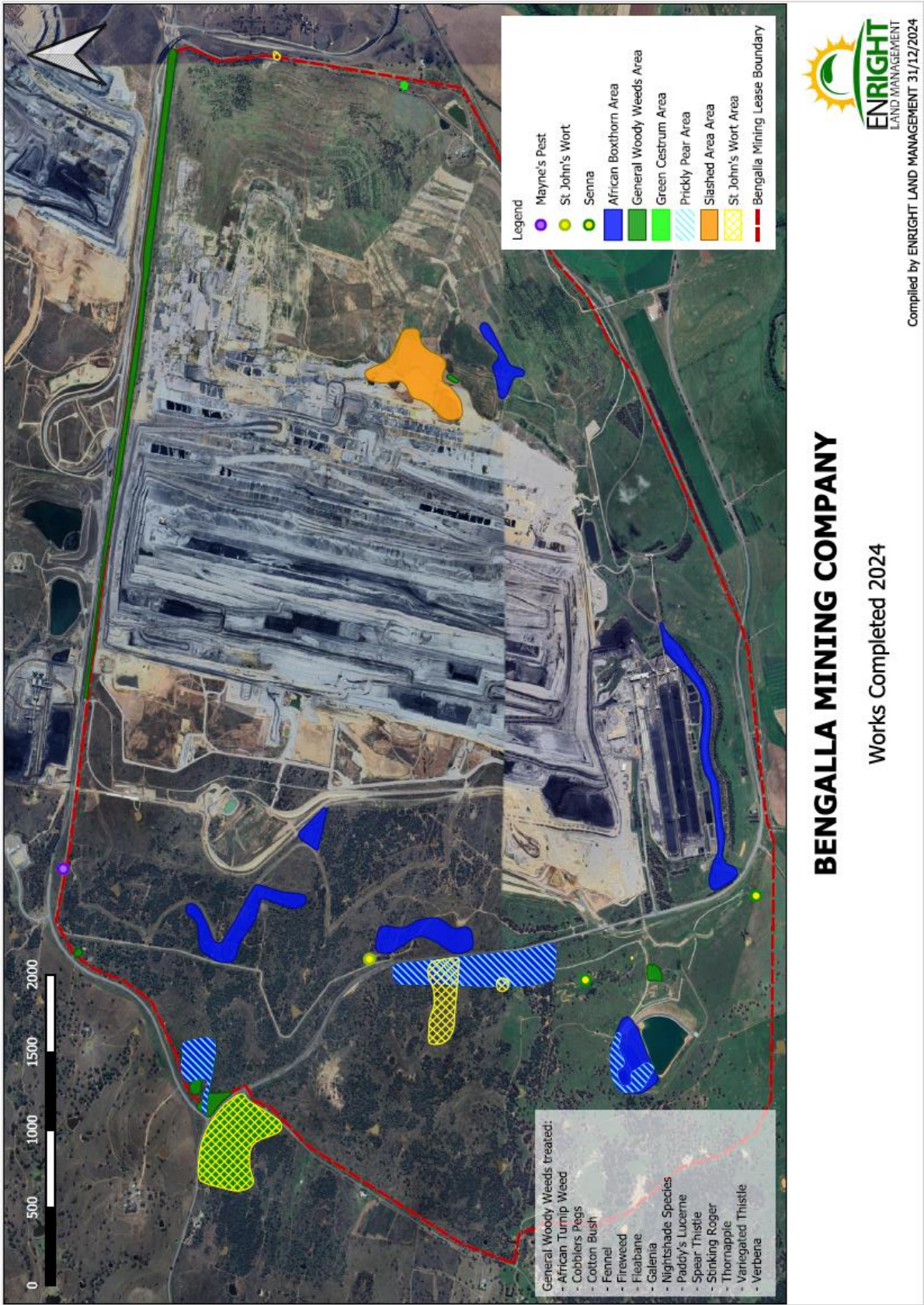


Figure 2 – Bengalla Mine Weed Management Areas 2024



- *Biodiversity Offset Areas*

Weed management across the BOA's involves quarterly inspections and weed control programs.

Quarterly inspections are undertaken to determine weed control required for each quarter in each of the offset areas. Following identification, weed control commences and quarterly work records of site attendance are submitted which detail the sites treated, area (ha) treated, techniques and chemicals utilised and rates of application.

The chemicals to be utilised are based on their effectiveness depending on the type of weeds present.

The weeds controlled during the Reporting Period included Prickly Pear, Fire Weed, Spear Thistle, African Boxthorn, St Johns Wort, Blue Heliotrope, Fleabane and several environmental weeds across each BOA.

Particularly higher infestations of seasonal weeds were found in Kenalea and Echo, specifically in disturbed areas, riparian zones, gullies, and grasslands while minimal seasonal weeds were observed in Merriwa and Black Mountain. Figures 3 to 5 below show locations of weed control in 2024 at the Black Mountain, Kenalea and Merriwa offset properties.

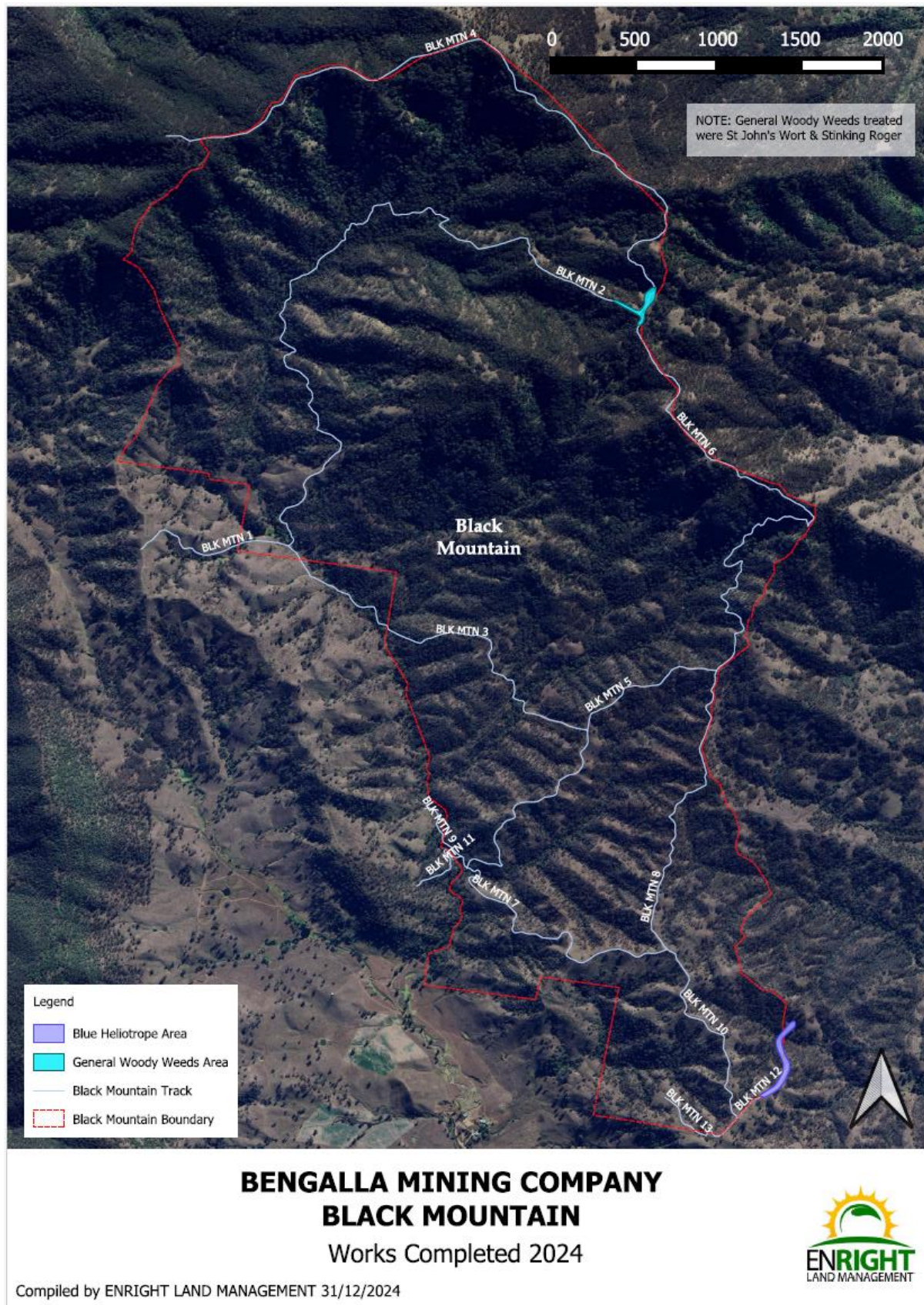


Figure 3 – Black Mountain Weed Management Locations 2024

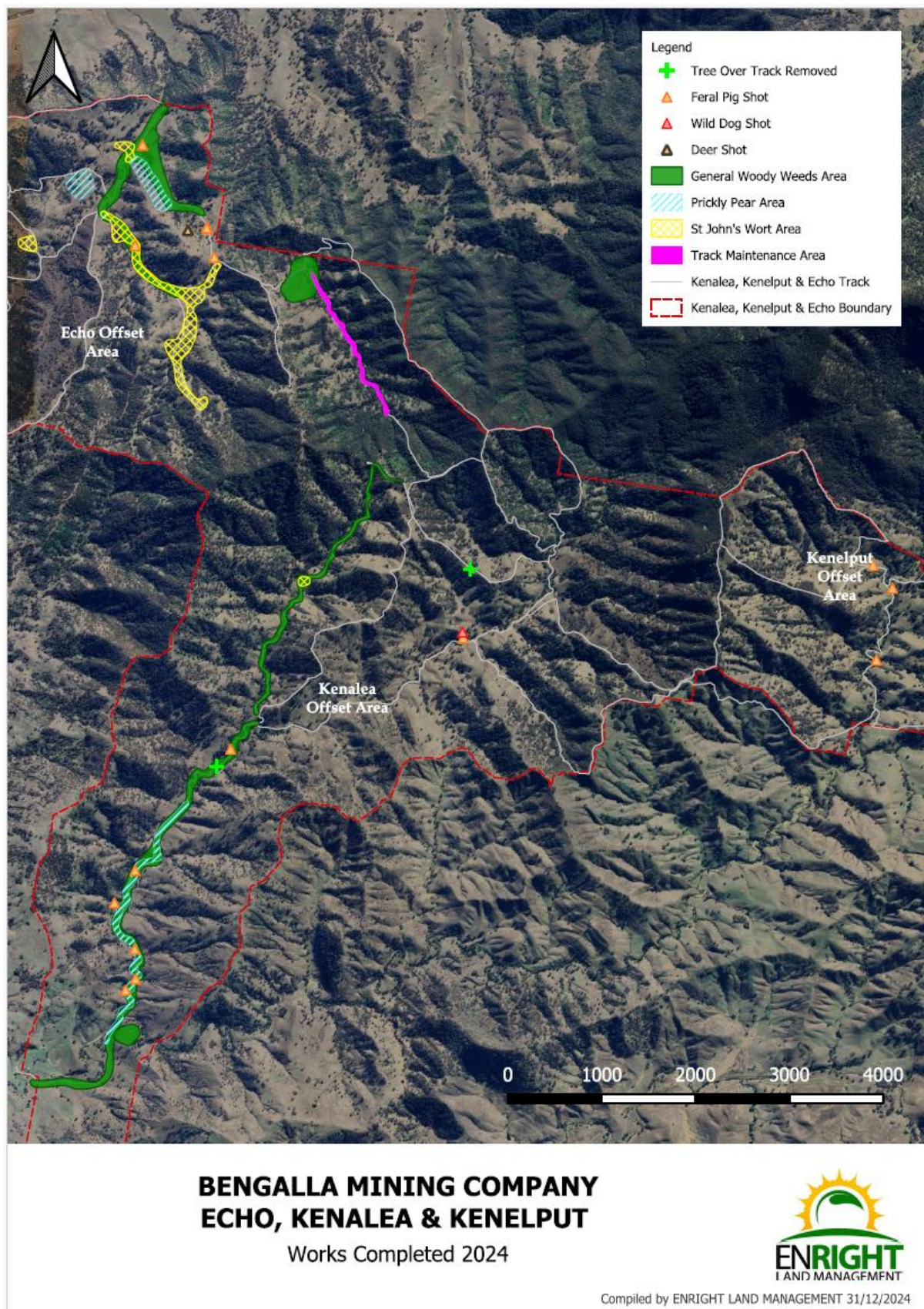


Figure 4 – Kenalea Weed Management Locations 2024

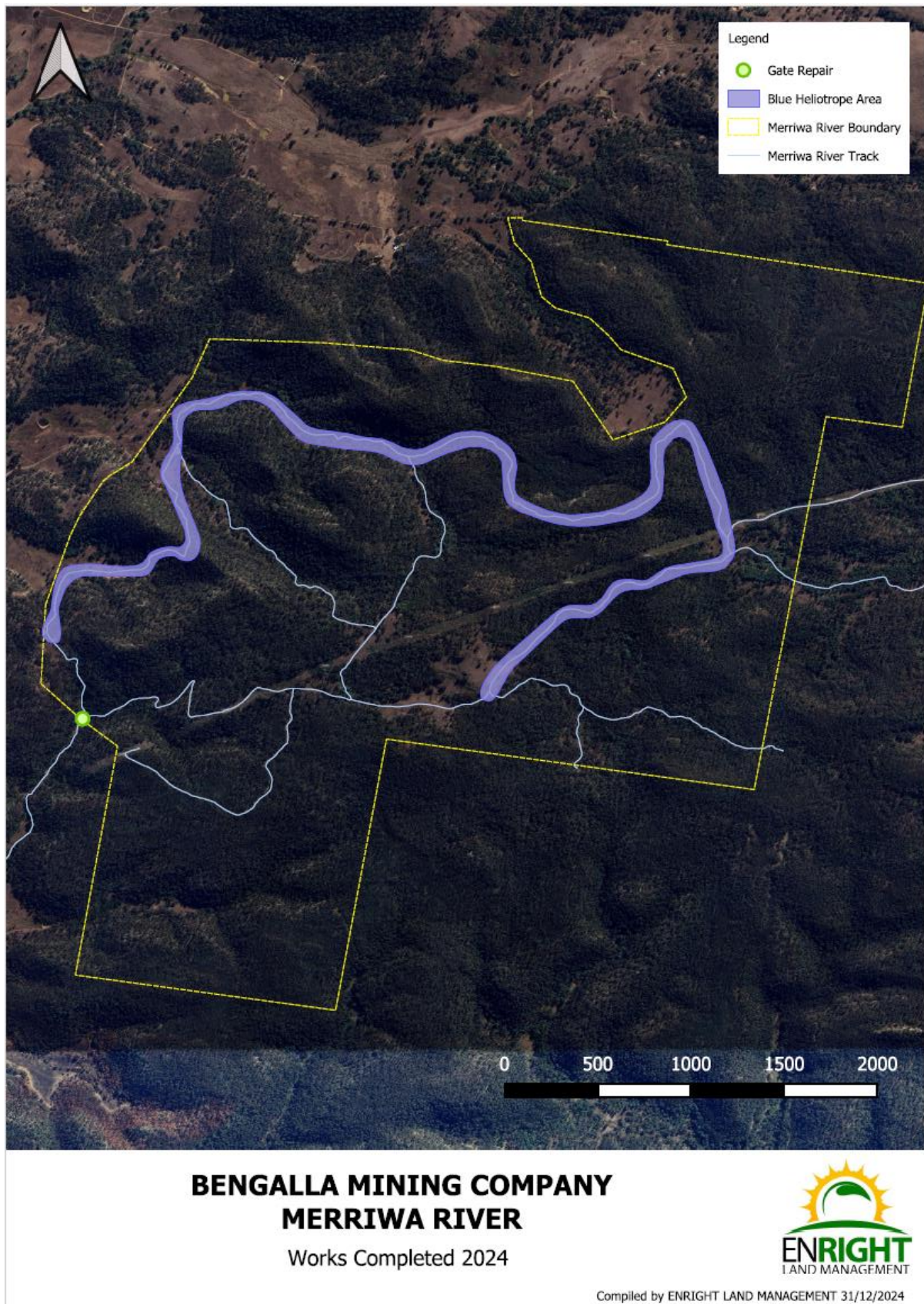


Figure 5 – Merriwa River Weed Management Locations 2024



Pest Management

- *Bengalla*

A pig control program was conducted throughout 2024 at various locations across Bengalla. Feral pig traps were installed utilising a penning system using grain and molasses as the main attractant. A total of 10 feral pigs were trapped and humanely dispatched during the reporting period.

Dog baiting programs at Bengalla occurred in the Autumn and Spring 2024. Each program was undertaken in conjunction with Local Land Services and local wild dog associations and additionally forms part of a broader scale baiting program targeting foxes and wild dogs in the Hunter Valley.

Both buffer lands and rehabilitation areas were utilised in the programs. **Figure 6** and **Figure 7** shows the location of wild dog bait stations utilised at Bengalla. The distribution of bait locations covered both buffer land west of the mine site and rehabilitation areas.

During the autumn baiting program, 35 bait stations were laid over a three-week period with a total of 105 baits. Results indicate 70 takes of which 41 takes were by target species being foxes only. No bait shyness was detected during the campaign.

During the spring baiting program, 29 stations were laid over a three week period with a total of 87 baits. Results indicate 26 takes were by target species being foxes. No wild dog takes were recorded. Evidence of bait shyness was also detected. Trail cameras were used in conjunction with the baiting program to record species taking the baits.

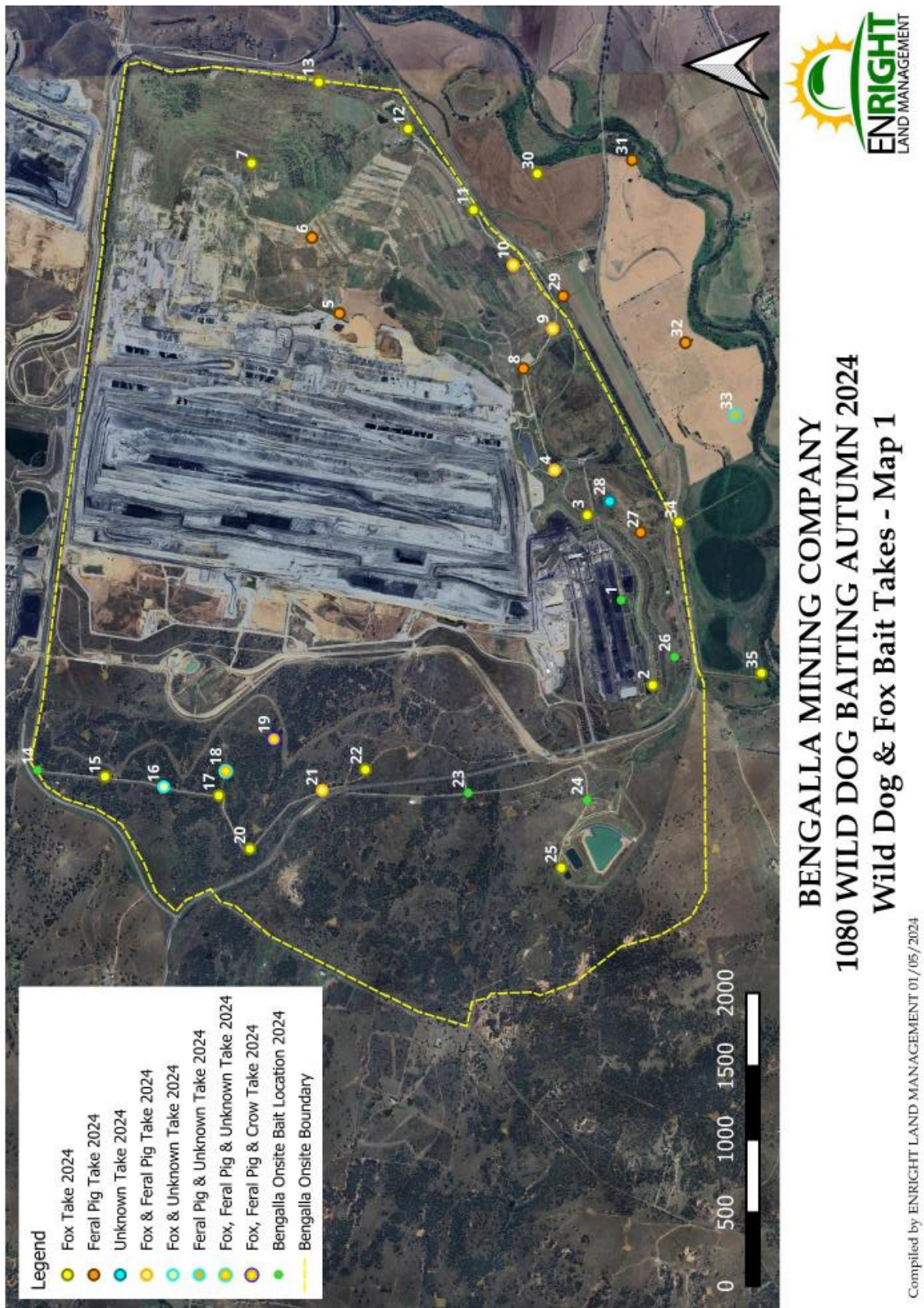


Figure 6 – Bengalla Mine Wild Dog Bait Locations Autumn 2024



BENGALLA MINING COMPANY
1080 WILD DOG BAITING SPRING 2024
Wild Dog & Fox Bait Takes - Map 1

Compiled by ENRIGHT LAND MANAGEMENT 07/11/2024

Figure 7 – Bengalla Mine Wild Dog Bait Locations Spring 2024



- Offset Properties

During the Reporting Period, BMC undertook two 4-week dog ground baiting programs across the BOA's in Autumn and Spring 2024 in consultation with Local Land Services.

During the 2024 ground baiting program targeting foxes and wild dogs, a total of 752 baits were laid. Of these, 120 baits were taken by the targeted species, with 93% consumed by foxes and 7% by wild dogs.

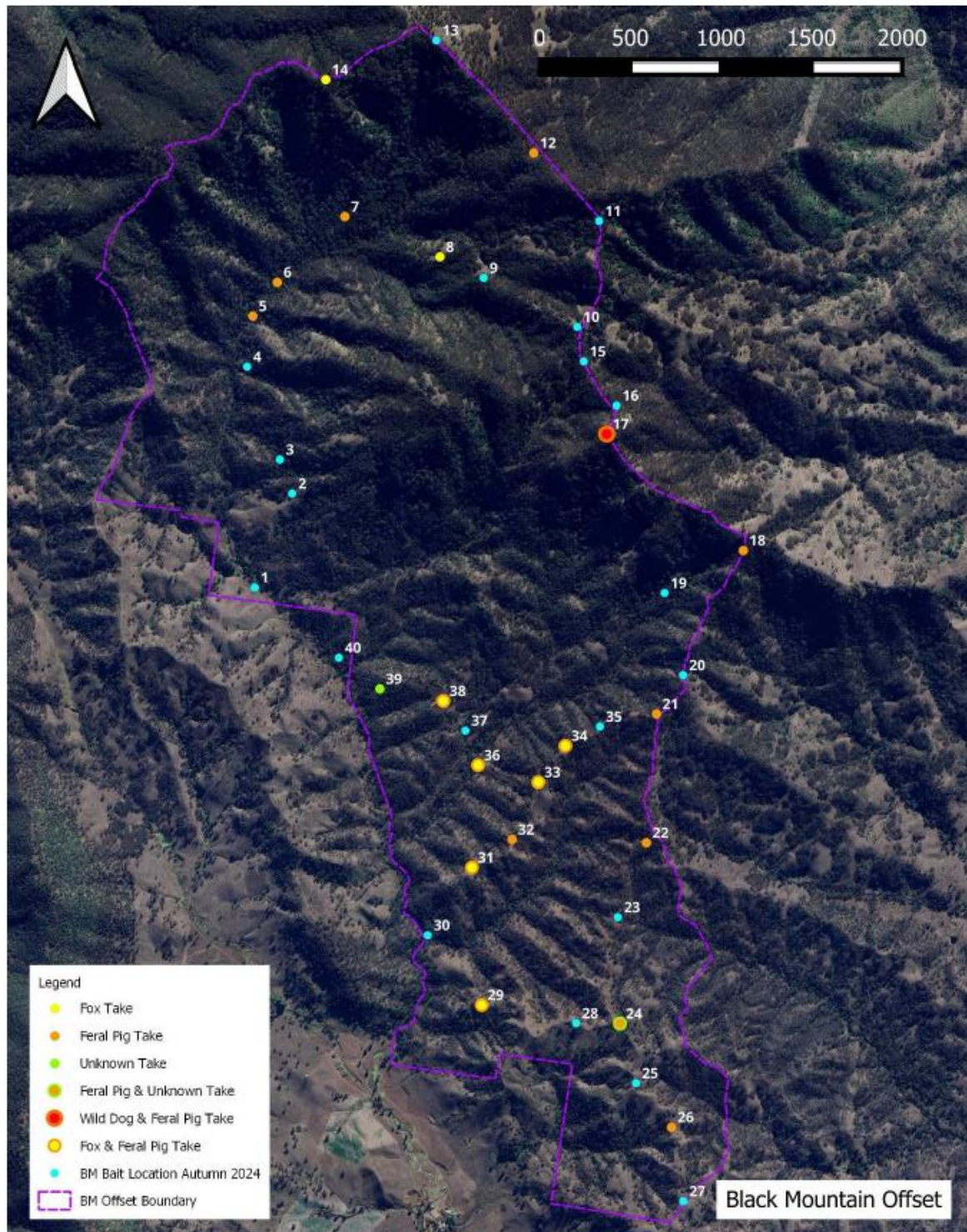
Figure 8 to Figure 13 show locations of wild dog baiting locations on each BOA for each baiting period in 2024.

Analysis of trends over the past three years indicates variability in wild dog bait uptake: 28 in 2021, 39 in 2022, 36 in 2023, and 8 in 2024. This data suggests a decline in wild dog numbers on the offset properties during this period. However, it is important to note that wild dogs are have been observed to be present in the area.

Opportunistic feral animal control was also undertaken during weed control works targeting 32 pigs and 8 deer and 1 additional wild dog utilising open range opportunistic shooting. BMC will continue its annual dog baiting program and opportunistic shooting to manage the wild dog population.

Further Actions

Ongoing management of weeds and feral animals at Bengalla and BOA's will continue during 2025.

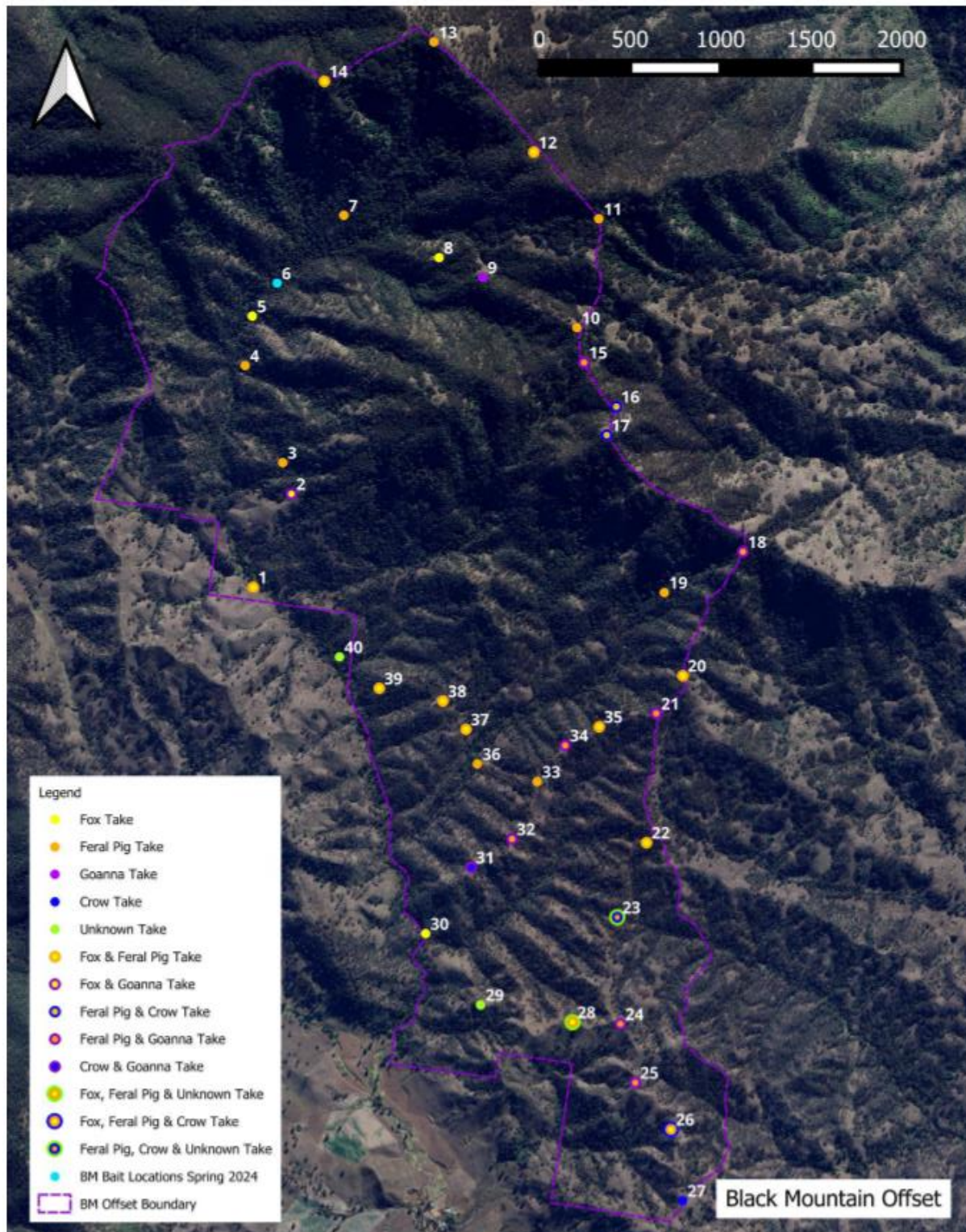


**BENGALLA MINING COMPANY
1080 BAITING PROGRAM AUTUMN 2024
Wild Dog & Fox Bait Taken - Map 1**

Compiled by ENRIGHT LAND MANAGEMENT 12/06/2024



Figure 8 – Black Mountain Wild Dog Bait Locations Autumn 2024

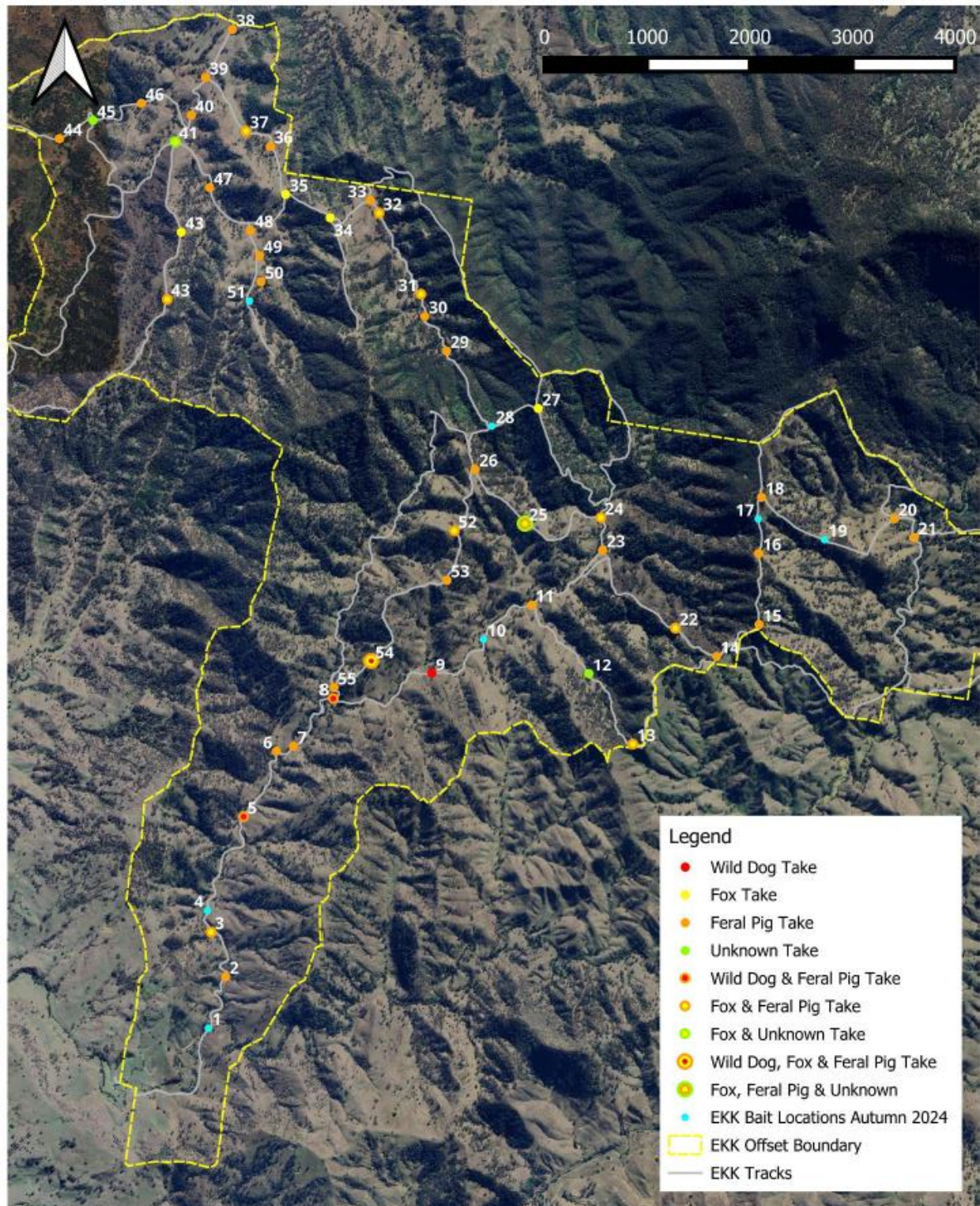


BENGALLA MINING COMPANY
1080 BAITING PROGRAM SPRING 2024
Wild Dog & Fox Bait Taken - Map 1

Compiled by ENRIGHT LAND MANAGEMENT 04/11/2024



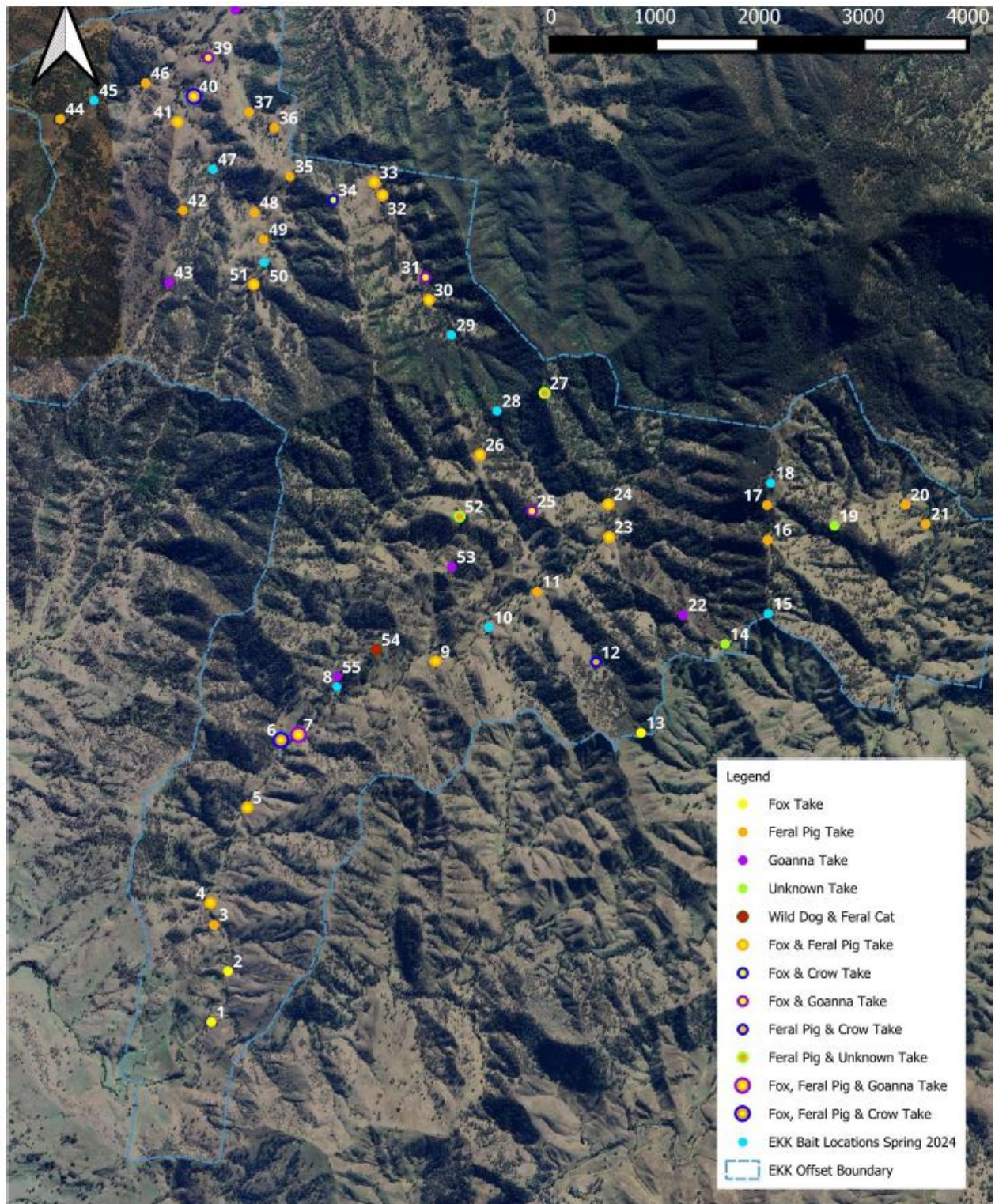
Figure 9 – Black Mountain Wild Dog Bait Locations Spring 2024



BENGALLA MINING COMPANY
1080 BAITING PROGRAM AUTUMN 2024
Echo/Kenalea/Kenelput Offset
Wild Dog & Fox Bait Takes - Map 1



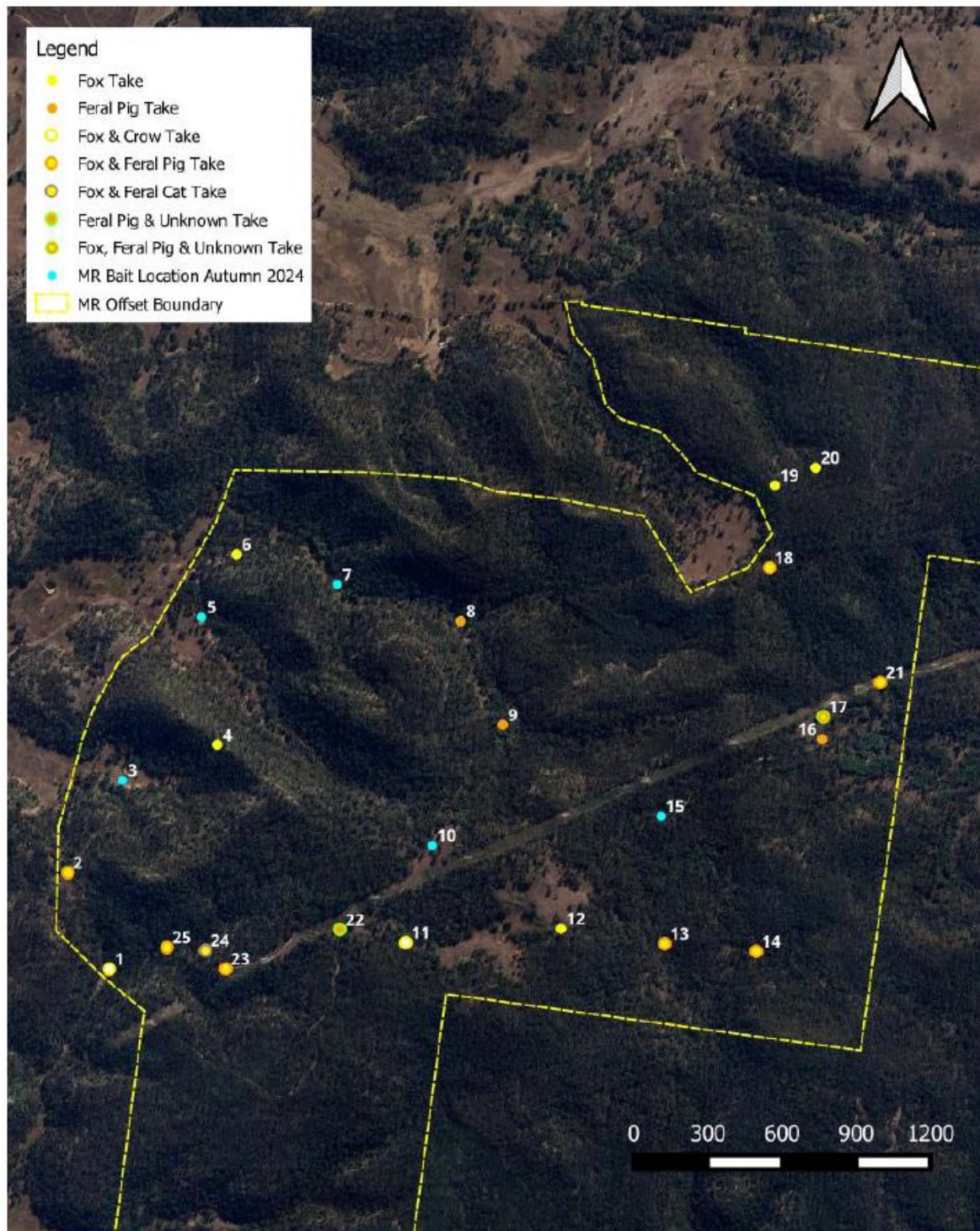
Figure 10 – Kenalea Wild Dog Bait Locations Autumn 2024



BENGALLA MINING COMPANY
1080 BAITING PROGRAM SPRING 2024
Echo/Kenalea/Kenelput Offset
Wild Dog & Fox Bait Takes - Map 1



Figure 11 – Kenalea Wild Dog Bait Locations Spring 2024

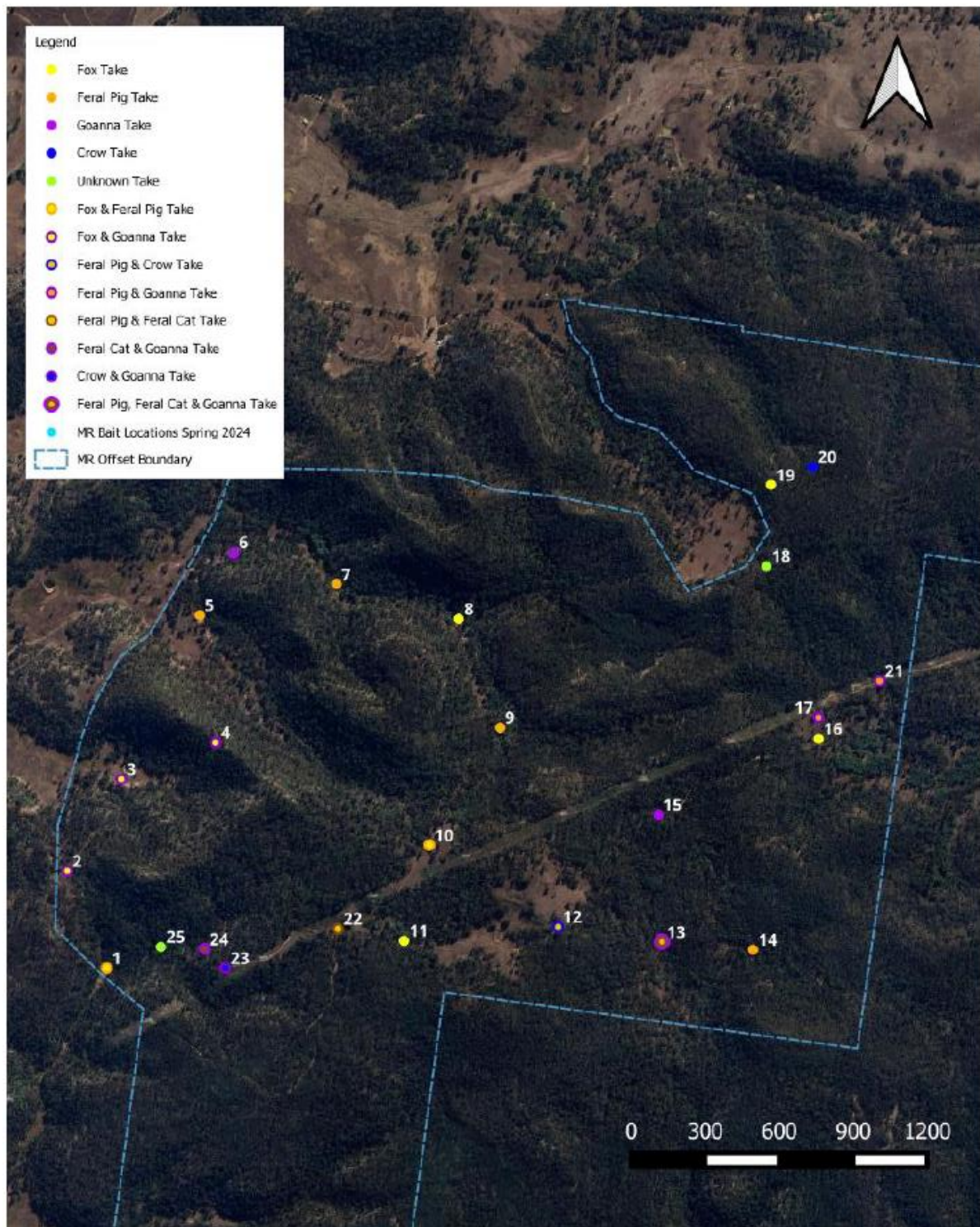


BENGALLA MINING COMPANY
1080 BAITING PROGRAM AUTUMN 2024
Wild Dog & Fox Baits Taken - Map 1

Compiled by ENRIGHT LAND MANAGEMENT 11/06/2024



Figure 12 – Merriwa River Wild Dog Bait Locations Autumn 2024



BENGALLA MINING COMPANY
1080 BAITING PROGRAM SPRING 2024
Wild Dog & Fox Baits Taken - Map 1

Compiled by ENRIGHT LAND MANAGEMENT 05/11/2024



Figure 13 – Merriwa River Wild Dog Bait Locations Spring 2024

Appendix F

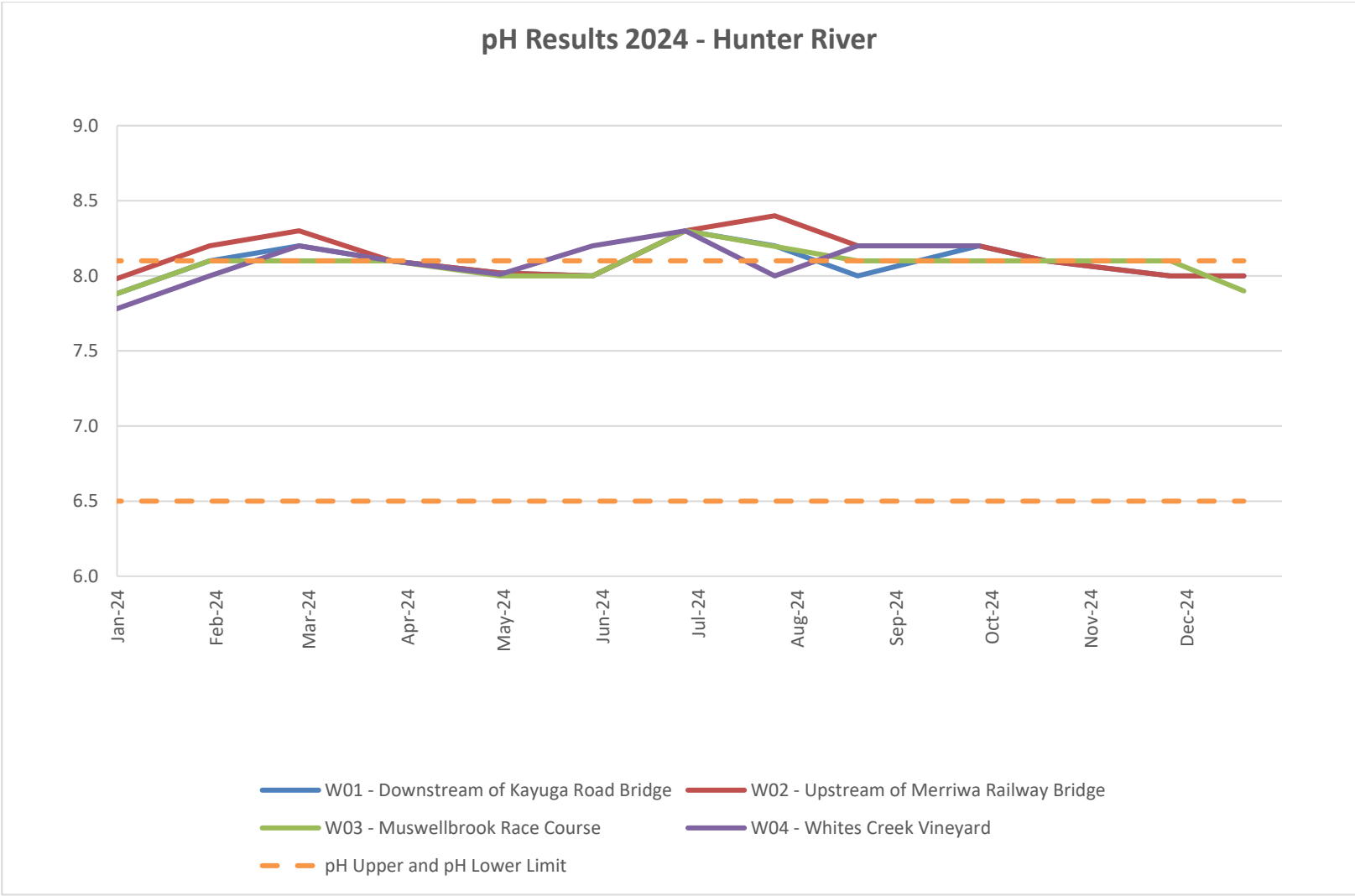
Surface Water Monitoring Summary

Table F1
Hunter River (W01 – W04) Surface Water Monitoring Results 2024

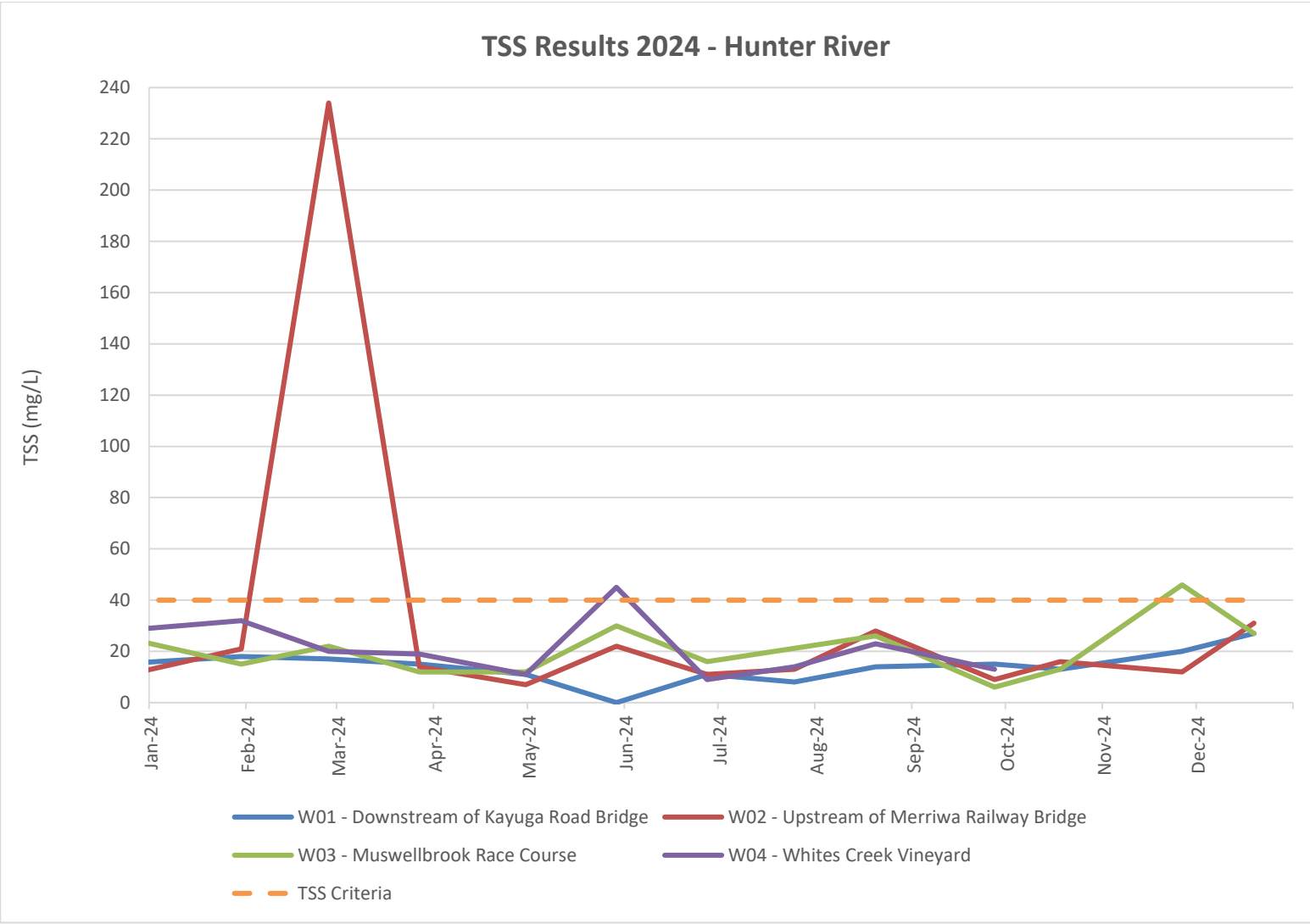
Criteria		30-Jan-24	27-Feb-24	27-Mar-24	30-Apr-24	29-May-24	27-Jun-24	25-Jul-24	20-Aug-24	27-Sep-24	18-Oct-24	26-Nov-24	19-Dec-24
W01													
pH	6.5 – 8.1	8.1	8.2	8.1	8.0	8.0	8.3	8.2	8.0	8.2	8.1	8.0	8.0
TSS (mg/L)	40	18	17	15	11	<5	11	8	14	15	13	20	27
EC (µS/cm)	650	466	461	466	503	490	740	739	485	883	777	803	662
W02													
pH	6.5 – 8.1	8.2	8.3	8.1	8.0	8.0	8.3	8.4	8.2	8.2	8.1	8.0	8.0
TSS (mg/L)	40	21	234	14	7	22	11	13	28	9	16	12	31
EC (µS/cm)	650	542	511	453	499	477	718	717	468	872	759	810	675
W03													
pH	6.5 – 8.1	8.1	8.1	8.1	8.0	8.0	8.3		8.1	8.1	8.1	8.1	7.9
TSS (mg/L)	40	15	22	12	12	30	16		26	6	13	46	27
EC (µS/cm)	650	486	609	460	523	490	788		473	922	817	895	750
W04													
pH	6.5 – 8.1	8.0	8.2	8.1	8.0	8.2	8.3	8.0	8.2	8.2			
TSS (mg/L)	40	32	20	19	11	45	9	14	23	13			
EC (µS/cm)	650	594	495	478	588	401	816	758	476	911			

Greyed out cells denote, unable to access to sample.

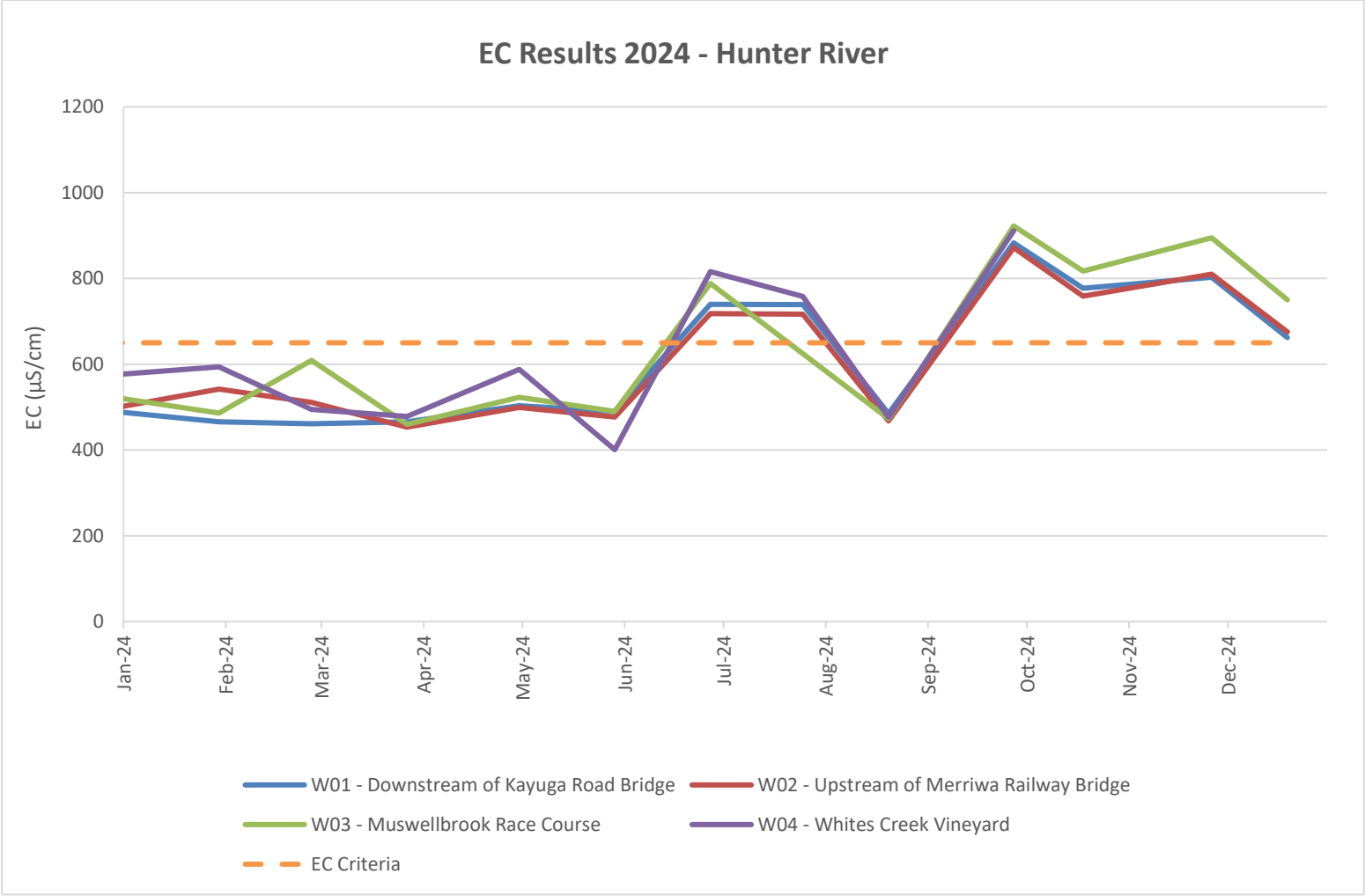
Data sourced from AECOM.



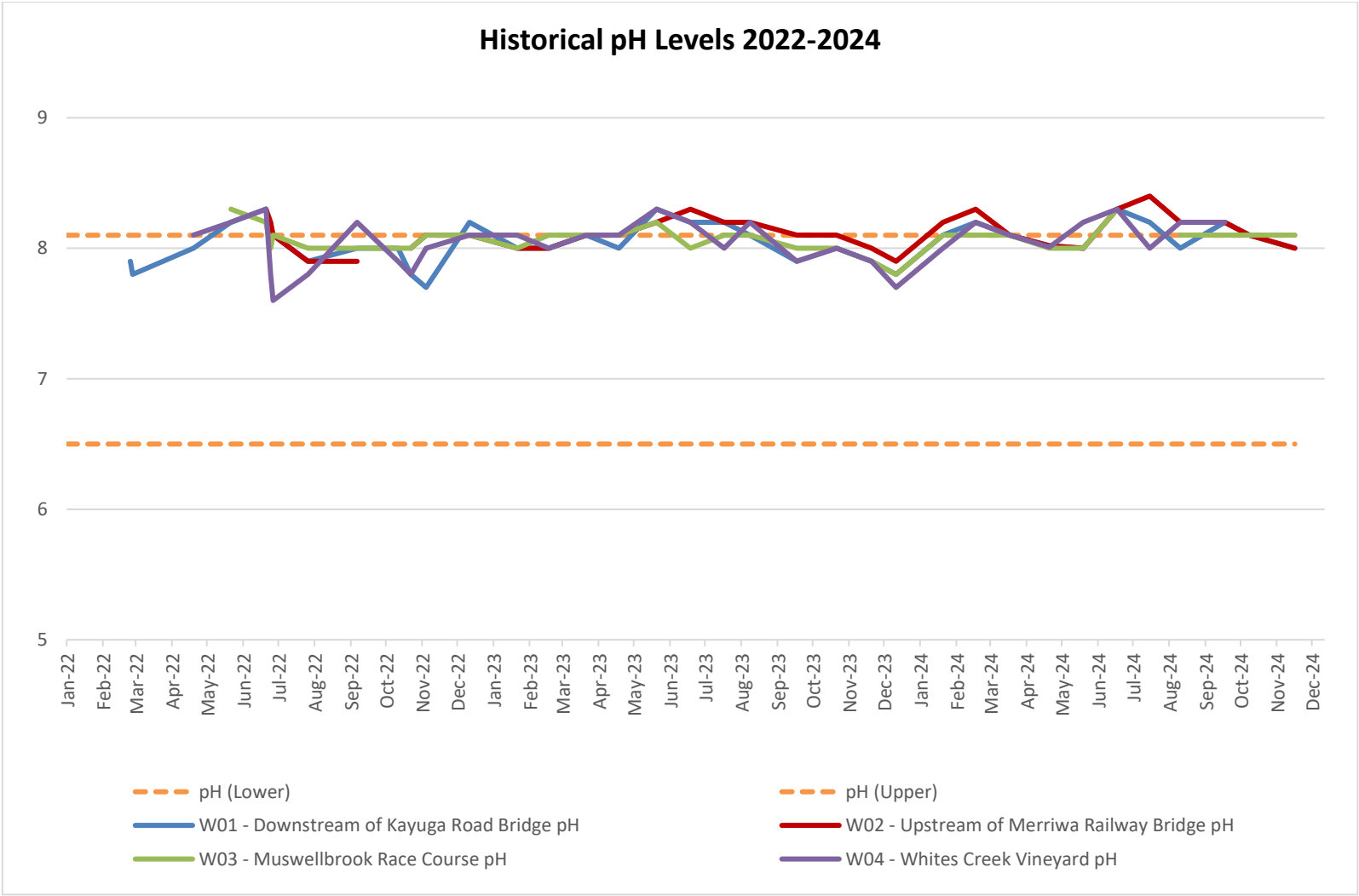
Graph F1
Hunter River pH Results 2024



Graph F2
Hunter River TSS Results 2024

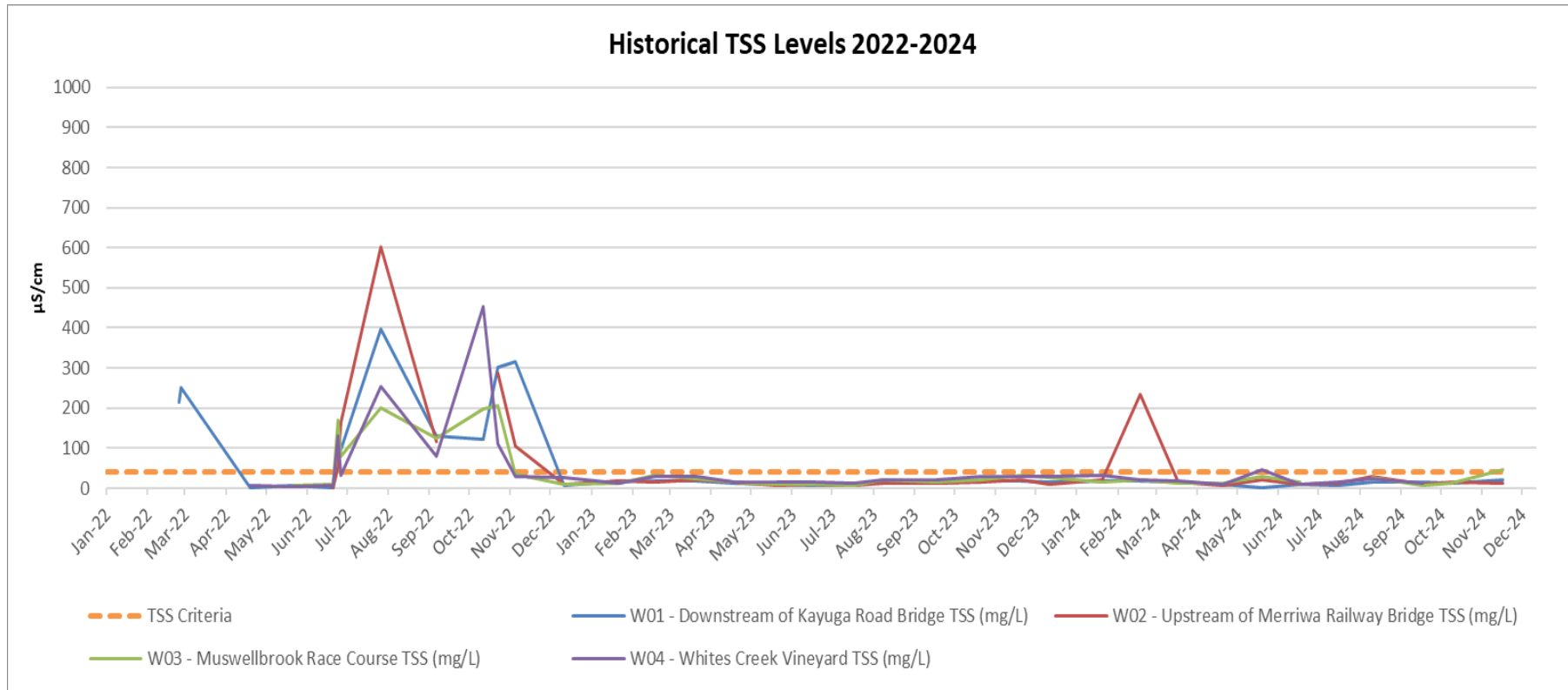


**Graph F3
Hunter River EC Results 2024**



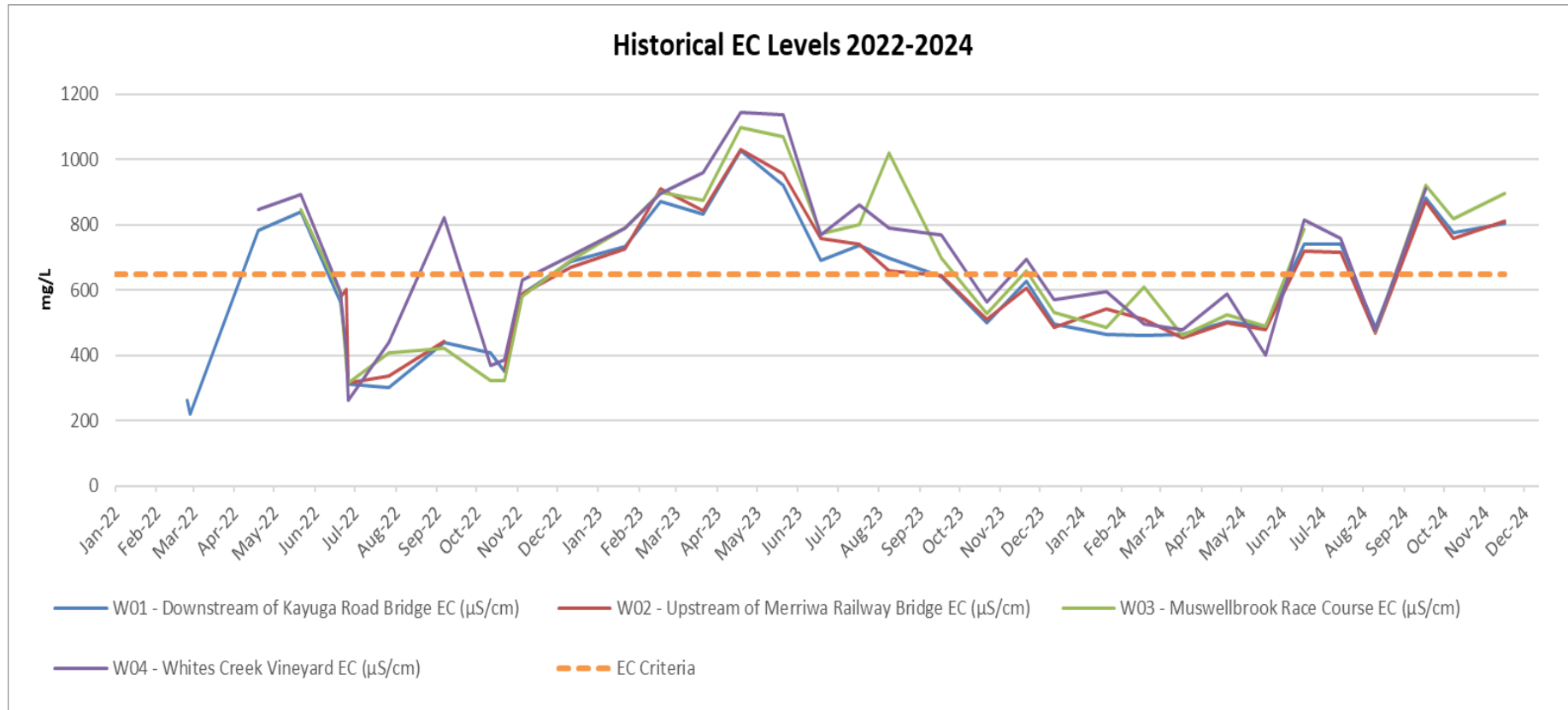
Nb. Jan to July 2022 data missing due to unsafe access from weather conditions and environmental factors.

Graph F4
Hunter River pH Results 2022 - 2024



Nb. Jan to July 2022 data missing due to unsafe access from weather conditions and environmental factors.

Graph F5
Hunter River TSS Results 2022 – 2024



Nb. Jan to July 2022 data missing due to unsafe access from weather conditions and environmental factors.

Graph F6
Hunter River EC Results 2022 – 2024

Appendix G

Annual Groundwater Monitoring Report 2024



Australasian
Groundwater
& Environmental
Consultants

Report on

Bengalla Mine Annual Groundwater Monitoring Report for 2024

Prepared for
Bengalla Mining Company Pty Ltd

Project No. BEN5023.001
March 2025

ageconsultants.com.au

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Bengalla Mine

Annual Groundwater Monitoring Report for 2024

1 Introduction and scope of works

The Bengalla Mining Company Pty Ltd (BMC) is a joint venture ownership between New Hope Group (80%) and Taipower (20%). BMC operate the Bengalla open cut coal mine (Bengalla), which was officially opened in 1999. Bengalla is located approximately 4 km west of Muswellbrook in the Upper Hunter Valley of New South Wales (NSW). Mining operations target coal from the Warkworth to Edderton Seams of the Permian Wittingham Coal Measures.

Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) were commissioned by BMC to undertake review and reporting of groundwater conditions for 2024. This report is a review of groundwater monitoring data collected during the one-year monitoring period 1 January 2024 to 31 December 2024 and includes the following scope of work:

- update all groundwater monitoring hydrographs;
- discuss how groundwater levels respond to rainfall and mining over the reporting period;
- discuss groundwater chemistry trends;
- identify any changes or observations made during the past 12 months;
- assess the adequacy of the existing monitoring bore network and monitoring program; and
- provide recommendations where necessary.

The review shall also address the additional scope:

- fulfil the requirements of Schedule 5, Condition 4 of SSD-5170 (as modified) which states:

“By the end of March each year (or as otherwise agreed by the Secretary), the Applicant must review the environmental performance of the development for the previous calendar year to the satisfaction of the Secretary. This review must:

- a) describe the development (including any rehabilitation) that was carried out in the past calendar year, and the development that is proposed to be carried out over the current calendar year;*
- b) include a comprehensive review of the monitoring results and complaints records of the development over the past year, which includes a comparison of these results against the:*
 - *relevant statutory requirements, limits or performance measures/criteria;*
 - *monitoring results of previous years; and*
 - *relevant predictions in the EIS;*
- c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;*
- d) identify any trends in the monitoring data over the life of the development;*
- e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and*
- f) describe what measures will be implemented over the next year to improve the environmental performance of the development.”*

This report addresses the above items with regards to groundwater issues, for all items except item (a).

AGE has also been commissioned by BMC to review water quality data collected by Bengalla for surface water sites along the Hunter River. Several of these sites have recorded elevated electrical conductivity (EC) in the past year and the WMP requires investigation, which has been included as Appendix B.

2 Climate

The climate at Bengalla is temperate and is characterised by hot, wet summers and mild, dry winters. Temperature data for 2024 were sourced from the Bureau of Meteorology weather station at Scone, NSW (Station ID: 061363) which is 25 km from Bengalla. The maximum monthly mean temperature for the year was recorded in December 2024 (26.9°C), whilst a minimum monthly mean temperature of 11.4°C was recorded in June 2024, consistent with annual climate.

Long-term rainfall data covering the period 1992 to 2024 were obtained from the onsite Bengalla weather station and are summarised in Table 2.1. The total annual rainfall recorded at Bengalla for 2024 was 621 mm. April was the wettest month, with 105 mm of rain recorded, and September the driest month with 29.5 mm recorded. A comparison of the total annual 2024 rainfall (621 mm) with the longer-term 1992 to 2024 average (597 mm) shows a slightly above average rainfall trend for 2024 (Table 2.1).

Table 2.1 Rainfall data 2024 – Bengalla weather station

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Bengalla Monthly Total Rainfall (mm) 2024	34.0	42.5	30.0	105.0	62.0	93.0	43.0	45.0	29.5	32.0	62.0	43.0	621
Bengalla long term monthly average rainfall (mm) 1992 - 2024	54.3	68.1	65.9	38.1	34.1	44.8	34.5	34.5	35.7	46.9	69.4	70.6	597

Historical rainfall was contextualised using the Cumulative Rainfall Departure (CRD) method (Figure 2.1). This method is a summation of the monthly departure of rainfall from the long-term average monthly rainfall. A rising trend in the CRD plot indicates periods of above average rainfall, whilst a falling slope indicates periods when rainfall is below average. The Hunter River water level was also plotted with rainfall (Figure 2.1) using data from the Muswellbrook Bridge monitoring station (Station ID: 210002), which is located approximately 5 km up-stream of Bengalla.

The overall pattern is consistent with regional historic climate, most notably identifying significant drought periods from 2002 through 2007 and again from 217 to 2022. More recently the CRD displayed an increasing trend during early to mid-2024 following periods of heavy rain during April 2024 and a decreasing trend for the remainder of the year as rainfall reduced to below average levels (Figure 2.1). The Hunter River water level data indicates that, whilst periods of higher rainfall correlate with elevated river levels, the Hunter River generally displays relatively stable water levels due to being regulated by the Glenbawn Dam.

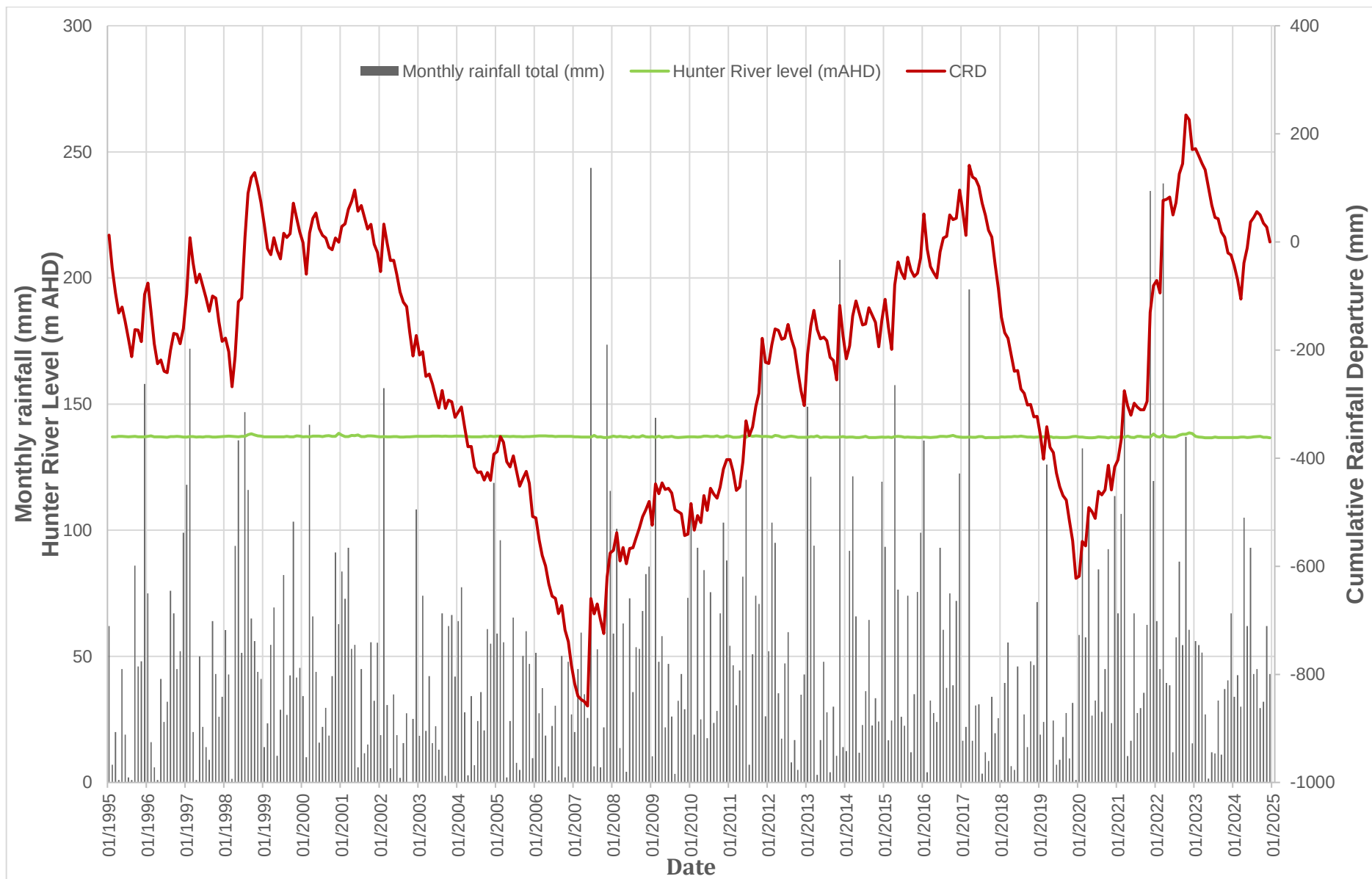


Figure 2.1 Cumulative rainfall departure (1995 to 2024) for Bengalla weather monitoring station

3 Groundwater regime

The groundwater regime at Bengalla consists primarily of two systems:

- the porous-medium aquifer of the Hunter River alluvial deposits, which is up to 14 m thick and consists of a silty clay layer overlying a basal gravel; and
- the Permian coal measures, comprising a multi-layered bedrock aquifer in which the coal seams are the prime water bearing strata and the interburden is hydrogeologically “tight” and very low yielding to essentially dry.

The coal seams and interburden strike in a generally north-south direction, and dip westward at approximately 5 degrees. The seams subcrop beneath the Hunter River alluvium to the south of Bengalla. Table 3.1 summarises the approximate thicknesses of coal seam and interburden units at Bengalla.

Table 3.1 Coal seams and interburden at Bengalla Mine

	Seam name	Average seam thickness (m)	Average thickness of overlying interburden (m)
Mined at Bengalla	Warkworth	1.0	35
	Mount Arthur	4.5	5
	Piercefield	2.3	12
	Vaux	4.0	35
	Broonie	1.3	13
	Bayswater	2.5	10
	Wynn	2.5	5
	Edderton	2.0	10
Not mined at Bengalla	Clanricard	1.8	10
	Bengalla	2.5	10
	Edinglassie	3.9	30
	Ramrod Creek	6.5	-

Generally, in undisturbed conditions, the potentiometric surface (pressure head) of groundwater in the coal seams is higher than the alluvial water table (i.e. an upward hydraulic gradient). Therefore, in areas where the coal seams subcrop beneath the alluvium, there is potential for groundwater from the coal measures to discharge upward into the Hunter River alluvium. Depressurisation of the coal seams by open cut mining has the potential to impact the Hunter River alluvial aquifer in the following ways:

- reduced discharge rate from the coal seams to the alluvium; and
- reversed hydraulic gradients, resulting in leakage from the alluvium into the coal seams where they subcrop beneath the alluvium to the south of Bengalla, and possibly even discharge of this alluvial water to the Bengalla pit.

Generally, the Hunter River stage level is above the water table in the Hunter River alluvium and the river is losing water to the alluvium near Bengalla. The level of the Hunter River is relatively constant under normal conditions due to the regulation of water discharge from Glenbawn Dam (refer Figure 2.1).

The objective of the groundwater monitoring program at Bengalla is to assess these potential impacts.

4 Bengalla groundwater monitoring network

BMC has established a groundwater monitoring network around Bengalla with data from 1992 onwards. Table 4.1 summarises the monitoring bore network and the Vibrating Wire Piezometer (VWP) locations. Figure 4.1 shows the bore and VWP locations. The following text provides a chronological summation of monitoring bore network upgrades.

In March 2009 and June 2010, nine bores were installed in the alluvial fringe area as part of a commitment from the Wantana Extension Statement of Environmental Effects (SEE; March 2009). Three of these were bore clusters, with one bore screened in the alluvium and one in an underlying coal seam at each monitoring location (e.g. WAN8A/B, WAN9A/B and WAN10A/B). WAN9A was replaced by bore WAN9A2 in July 2017. A bedrock bore (REPI7) was installed to replace bore I7. Two alluvial monitoring bores, SMB1S and SMB2N, were installed in June 2010 to the east of Wantana Extension as part of investigations to obtain approval for spoil placement on an alluvial embayment adjacent to the mine.

Monitoring bore A10 was mined out in 2014. This was the sole bore monitored for potential effects to the north of the Bengalla pit. The removal of A10 left a gap in coverage in this area.

In 2017, two new VWPs, BE4 and BE5, were installed between ML 1645 and the westward advancing pit. The BE4 and BE5 VWPs are positioned to replace the A10 and E12 bores (E12 was mined out in 2017) and to complement the existing BE1 and BE3 VWPs further to the west.

In 2018, a downhole bore survey was undertaken by AGE on WAN2, WAN5, WAN7 and WAN8 bore clusters. The construction details of these bores are included in Table 4.1. The locations WAN5A and WAN5B have historically been mistakenly interchanged. Following the downhole investigation, it was found that WAN5A targeted the deep Permian and WAN5B targeted the alluvium. In recent versions of the WMP, the borehole details were updated to reflect the correct borehole details – WAN5A targeting the alluvium and WAN5B targeting the deep Permian (see Table 4.1).

In late 2018 BMC drilled five new monitoring bores that target both alluvial and shallow Permian strata (GW01A, GW01B, WAN11A, WAN11B and WAN12). These bores have been included in the monitoring bore network summary (Appendix A) for completeness however they do not form part of this compliance review.

As the neighbouring Mount Pleasant Project progresses, site 64092 has been covered by a visual bund and access to groundwater monitoring sites 11953 has become restricted. No data have been recorded for these bores since 2023. Monitoring bore E12 was mined through in May 2017. VWP BE4 was removed 27 October 2021 due to blasting operations. VWP sites BE3 and BE5 were decommissioned in October 2023, and April 2024 respectively due to the westward progression of the pit.

In December 2021, BMC installed a nested monitoring site comprising two bores: one targets the alluvial aquifer (211GW001) and the other targets the shallow Permian (211GW002) strata. The site is south of Bengalla along strike of the actively mined seams in the region and near to BG3 (approximately 1 km) and was recommended in Bengalla Mine Groundwater Annual Report 2020 (AGE, 2021). The purpose of these bores is to provide a control point that enables a comparison of the two sites. These bores have been included in the monitoring bore network summary (Appendix A) for record completeness however are not part of this compliance review.

Table 4.1 Current Bengalla groundwater monitoring network

Bore ID	Easting MGA94 z56	Northing MGA94 z56	Ground level (mAHD)	Top of casing (mAHD)	Stick- up (m)	Screen Interval / Sensor Depth (mbGL)	Total depth (mBGL)	Bore base elevation (mAHD)	Geology / Target Seam
11953 _a	298129	6428693	148	148	0.97	-	-	-	Deep Permian
18298 _b	294375	6423521	132.86	133.47	0.61	-	-	-	Alluvium
19116 _b	296078	6425589	135.6	136.43	0.82	-	-	-	Alluvium
28510 _b	298649	6429105	142.7	144	1.3	-	-	-	Deep Permian
37774 _b	298488	6428998	145.6	146	0.4	-	-	-	Deep Permian
42701 _b	298586	6428632	144	144.91	0.97	-	-	-	Deep Permian
42927 _b	298843	6428570	144.26	145.36	1.1	-	-	-	Alluvium
46737 _b	291862	6427143	227.69	227.9	0.21	-	-	-	Shallow Permian
47277 _b	299145	6428643	143.54	144.59	1.06	-	-	-	Alluvium
53007 _b	298720	6428857	143.97	144.01	0.04	-	-	-	Deep Permian
BE1 (bore)	293469	6429033	241.48	242.67	1.19	69-75	75	166.48	Permian Sandstone
BE2 (bore)	293374	6425866	175.2	176.4	1.18	48-54	54	121.21	Permian Sandstone
BG1 _b	296656	6426003	138.2	138.78	0.58	-	-	-	Alluvium
BG3 _b	294731	6424413	133.6	133.76	0.16	-	-	-	Alluvium
BG5 _b	298609	6427874	142.2	142.51	0.31	-	-	-	Alluvium
REPI7	295575	6425832	135.47	136.38	0.91	49-52	52	83.47	Vaux Seam
SMB1S	296955	6426391	141.2	142.47	1.27	13-19	19	122.2	Alluvium
SMB2N	297124	6426549	141.69	142.61	0.92	15-21	21	120.69	Alluvium
WAN10A	295828	6425571	135.07	136.13	1.06	41-54	13.83	121.24	Alluvium
WAN10B	295825	6425578	135.04	136.1	1.06	44-47	47	88.04	Vaux Seam
WAN1A	296519	6426099	140.6	141.35	0.75	16-20	20	120.6	Alluvium/ Wynn seam
WAN1B	296519	6426099	140.6	141.35	0.75	29-33	33	107.6	Edderton Seam
WAN2A	296217	6425824	137.7	138.4	0.7	13-16	16	121.7	Alluvium/ Vaux seam
WAN2B	296217	6425824	137.7	138.44	0.74	36-39	39	98.7	Wynn Seam
WAN2C	296217	6425824	137.7	138.43	0.73	51-54	55	83.7	Edderton Seam
WAN3 _b	295772	6425713	136.4	136.7	0.3	2.5-87	87	49.4	Deep Permian
WAN4A	295442	6425690	135.1	135.93	0.83	11.5-14.5	14.5	120.6	Alluvium
WAN4B	295442	6425690	135.1	135.89	0.79	21-24	24	111.1	Deep Permian
WAN5A _b	296019	6425360	135.9	136.78	0.88	26-29	28.98	107.8	Deep Permian

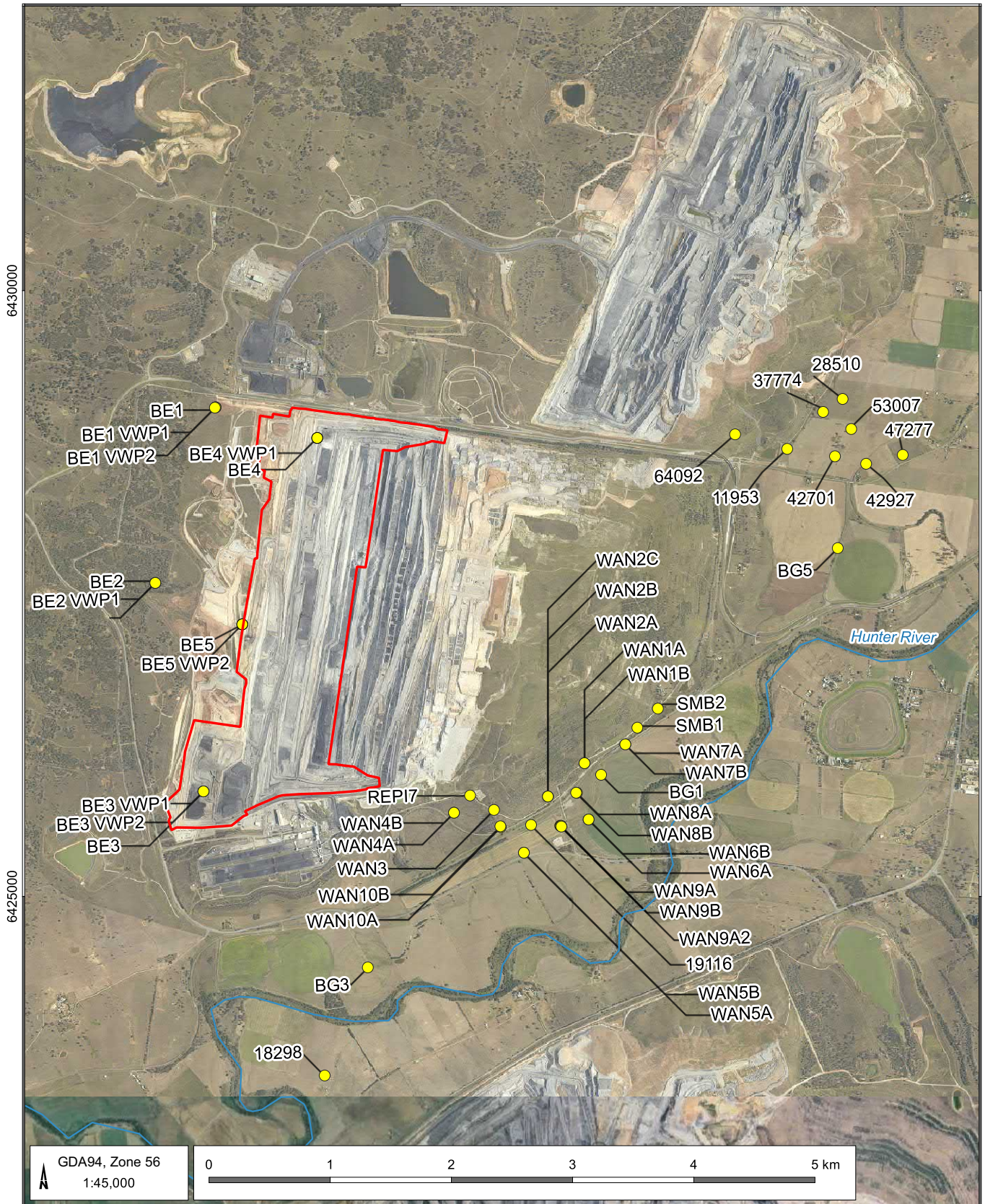
Bore ID	Easting MGA94 z56	Northing MGA94 z56	Ground level (mAHD)	Top of casing (mAHD)	Stick- up (m)	Screen Interval / Sensor Depth (mbGL)	Total depth (mBGL)	Bore base elevation (mAHD)	Geology / Target Seam
WAN5B _{bc}	296019	6425360	135.9	136.74	0.84	10.5-13.5	15.57	121.17	Alluvium
WAN6A	296553	6425634	136.9	137.67	0.77	7.5-10.5	10.5	126.4	Alluvium
WAN6B	296553	6425634	136.9	137.66	0.76	30-33	33	103.9	Edderton Seam
WAN7A	296856	6426254	138.1	138.86	0.76	12.0-15.0	15	123.1	Alluvium
WAN7B	296856	6426254	138.1	138.89	0.79	80-83	83	55.1	Edinglassie Seam
WAN8A	296457	6425854	136.41	137.47	1.07	10.7-11.9	12.94	124.53	Alluvium
WAN8B	296450	6425855	136.33	137.42	1.09	15-18.6	19.6	117.82	Wynn Seam
WAN9A2	296326	6425582	136.88	137.98	1.1	8.5-10.5	10.5	126.38	Alluvium
WAN9B	296328	6425576	136.93	137.88	0.95	21-24	24	112.93	Wynn Seam
BE1 (VWP)	293475	6429036	241.48	-	-	120	120	121.48	Warkworth/Mt Arthur
BE1 (VWP)	293475	6429036	241.48	-	-	264.5	264.5	-23.02	Edderton Seam
BE2 (VWP)	293374	6425866	204.22	-	-	97.8	97.8	106.42	Warkworth/Mt Arthur
BE2 (VWP)	293374	6425866	204.22	-	-	212.5	212.5	-8.28	Edderton Seam
BE5 (VWP)	293696	6427245	181.3	-	-	74	210.15	-28.85	Mt Arthur
BE5 (VWP)	293696	6427245	181.3	-	-	197.5	210.15	-28.85	Edderton Seam
GW01A _c	298190	6428409	TBC	TBC	TBC	46000	12	TBC	Alluvium
GW01B _c	298190	6428409	TBC	TBC	TBC	24-27	27	TBC	Shallow Permian
WAN11A _c	296649	6424875	135.4	136.44	1.05	46000	12	123.4	Alluvium
WAN11B _c	296645	6424876	135.5	136.45	0.95	24-27	27	108.5	Shallow Permian
WAN12A _{bc}	295491	6424725	135.3	136.06	0.76	41944	14	121.3	Alluvium
211GW001 _d	294301	6424930	138.33	139.2	0.87	49.4-55.4	55.4	83.8	Shallow Permian
211GW002 _d	294294	6424927	138.3	139.2	0.9	14.8-20.8	20.8	118.4	Alluvium

Notes: _a no access or mined through for 2024 monitoring.

_b recommended camera survey on bores to determine screened interval and bore depth.

_c survey data to be added to WMP.

_d not included in groundwater management plan to date.



LEGEND

- 2024 Void boundary
- Monitoring Sites

Drainage
— Major

Note: Aerial image capture date: December 2024

Bengalla Annual Review 2024
 (BEN5023.001)

Monitoring Bore Network



AGE

DATE
21/03/2025

FIGURE No:
4.1

5 Water management plan

Bengalla manages its water resources as per the Bengalla Water Management Plan (WMP), of which the most recent version was approved December 2023.

The current WMP groundwater quality triggers are summarised in Table 5.1 and the water level triggers are summarised in Table 5.2. The 2024 monitoring data are compared to these triggers.

Table 5.1 Bengalla WMP water quality triggers (Version 6 – December 2023)

Site	Easting	Northing	Min pH trigger	Max pH trigger	Stage 1 EC Trigger – 95 th Percentile (µS/cm)	Stage 2 EC Trigger – Maximum (µS/cm)	Target aquifer
18298	294375	6423521	6.0	8.5	1226	1432	Alluvium
19116	296078	6425589	6.0	8.5	1231	1350	Alluvium
211GW001	294301	6424930	-	-	-	-	Alluvium
211GW002	294294	6424927	-	-	-	-	Shallow Permian
28510	298649	6429105	6.0	8.5	1041	1052	Deep Permian
37774	298488	6428998	6.0	8.5	2511	2560	Deep Permian
42701	298586	6428632	6.0	8.5	991	1035	Deep Permian
42927	298843	6428570	6.0	8.5	1254	1280	Alluvium
46737	291862	6427143	6.0	8.5	9059	9290	Shallow Permian
47277	299145	6428643	6.0	8.5	1244	1247	Alluvium
53007	298720	6428857	6.0	8.5	947	975	Deep Permian
BE1	293469	6429033	6.0	8.5	7420	8280	Permian Sandstone
BE2	292977	6427587	6.0	8.5	6585	6740	Permian Sandstone
BG1	296656	6426003	6.0	8.5	1042	1450	Alluvium
BG3	294731	6424413	6.0	8.5	3463	3660	Alluvium
BG5	298609	6427874	6.0	8.5	1309	1341	Alluvium
Dry Creek East	295108.5	6425762	-	-	-	-	Alluvium
REPI7	295575	6425832	6.0	8.5	4370	4470	Vaux Seam
SMB1S	296955	6426392	6.0	8.5	2140	2790	Alluvium
SMB2N	297125	6426550	6.0	8.5	2420	2460	Alluvium
WAN1A	296519	6426099	6.0	8.5	2109	2510	Alluvium
WAN1B	296519	6426099	6.0	8.	1880	2000	Shallow Permian
WAN2A	296217	6425824	6.0	8.5	1358	1881	Alluvium

Site	Easting	Northing	Min pH trigger	Max pH trigger	Stage 1 EC Trigger – 95 th Percentile (µS/cm)	Stage 2 EC Trigger – Maximum (µS/cm)	Target aquifer
WAN2B	296217	6425824	6.0	8.5	3800	3930	Edderton Seam
WAN2C	296217	6425824	6.0	8.5	3746	4180	Edderton Seam
WAN3	295772	6425713	6.0	8.5	4348	4550	Deep Permian
WAN4A	295442	6425690	6.0	8.5	3654	4170	Alluvium
WAN4B	295442	6425690	6.0	8.5	3450	3570	Deep Permian
WAN5A	296019	6425360	6.0	8.5	6062	6240	Alluvium
WAN5B	296019	6425360	6.0	8.5	1290	1900	Deep Permian
WAN6A	296553	6425634	6.0	8.5	1063	1280	Alluvium
WAN6B	296553	6425634	6.0	8.5	1294	1461	Edderton Seam
WAN7A	296856	6426254	6.0	8.5	2220	2300	Alluvium
WAN7B	296856	6426254	6.0	8.5	3100	3220	Edinglassie Seam
WAN8A	296457	6425855	6.0	8.5	8804	8870	Alluvium
WAN8B	296450	6425855	6.0	8.5	3216	3550	Wynn Seam
WAN9A2	296320	6425583	6.0	8.5	959	1230	Alluvium
WAN9B	296328	6425576	6.0	8.5	2090	2370	Wynn Seam
WAN10A	295828	6425571	6.0	8.5	1367	1647	Alluvium
WAN10B	295825	6425578	6.0	8.5	5290	5440	Vaux Seam

Notes: ‘-’ Indicates insufficient data for statistical analysis.

Grey highlighted cells indicate trigger values from previous WMP (2019 version).

Table 5.2 Bengalla WMP water level triggers (Updated December 2023)

Bore ID	Geology / Target Seam	Max. drawdown (m)	Trigger water level (mAHD)
11953	Deep Permian	7.1	129.3
18298	Alluvium	0.3	123.2
19116	Alluvium	4.2	123.2
28510	Deep Permian	3.3	129
37774	Deep Permian	5.4	128.7
42701	Deep Permian	1.9	131.3
42927	Alluvium	1.2	131.1
46737	Shallow Permian	0.7	185.3
47277	Alluvium	0.8	132.8
53007	Deep Permian	1.8	131.9
BE1	Permian Sandstone	15.5	156.8
BE2	Permian Sandstone	148.9	18.8*
BG1	Alluvium	1.4	126.8
BG3	Alluvium	0.2	126.3
BG5	Alluvium	0.9	132.4
REPI7	Vaux Seam	39	63.1
SMB1S	Alluvium	1.5	127.2
SMB2N	Alluvium	1.6	127.3
WAN10A	Alluvium	4.6	122.2
WAN10B	Vaux Seam	20.9	98.3
WAN1A	Alluvium	4.2	117.5
WAN1B	Edderton Seam	15.8	100.1
WAN2A	Alluvium	6.8	118.5
WAN2B	Wynn Seam	25.4	86.4
WAN2C	Edderton Seam	25.4	75
WAN3	Deep Permian	26.3	100.3
WAN4A	Alluvium	5.5	121.2
WAN4B	Deep Permian	26.3	98.2
WAN5A	Alluvium	2.4	124.3
WAN5B	Deep Permian	10.7	116
WAN6A	Alluvium	1.1	126.9
WAN6B	Edderton Seam	4.1	123.8
WAN7A	Alluvium	1.4	125.4
WAN7B	Edinglassie Seam	2.3	126.4
WAN8A	Alluvium	2.4	123.3
WAN8B	Wynn Seam	9.5	108.5
WAN9A	Alluvium	2.6	123.7
WAN9B	Wynn Seam	8.1	111.4

Note: * indicates that drawdown trigger level is as displayed in WMP but is incorrect.

6 Water levels assessment

6.1 Alluvium aquifer water levels

Hydrographs of groundwater levels for the monitoring bores installed in the Hunter River alluvium were analysed in two sub-sets, as follows:

- bores to the immediate south of the current pit and in the approved Wantana Extension; these bores are referred to as the Wantana Extension Bores; and
- bores located in the alluvium at a greater distance from Bengalla, which are unlikely to be impacted by mining and are referred to as Regional Hunter River alluvial bores.

6.1.1 Wantana Extension Bores

None of the Wantana Extension bores recorded water levels below their respective trigger levels in 2024 (see Appendix A).

Figure 6.1 shows the alluvial groundwater level trends in the Wantana Extension area overlain with the CRD and Hunter River level. Water levels in the Wantana Extension bores increased following the first half of 2024, coincident with an increasing CRD during April, May and June, and declined in response to reduced rainfall in the second half of the year.

The groundwater level trends in Figure 6.1 also indicate a strong correlation with both the CRD and the Hunter River stage at Muswellbrook Bridge (Station ID: 210002).

Groundwater levels in WAN1A demonstrate a considerably inconsistent pattern when compared to Hunter River level, the CRD, and the other Wantana Extension bores, showing much greater variability and spikes uncorrelated to CRD or river stage. This may be due to this bore being located on the fringe of the alluvium, with the screened interval not being completely representative of the Hunter River alluvium.

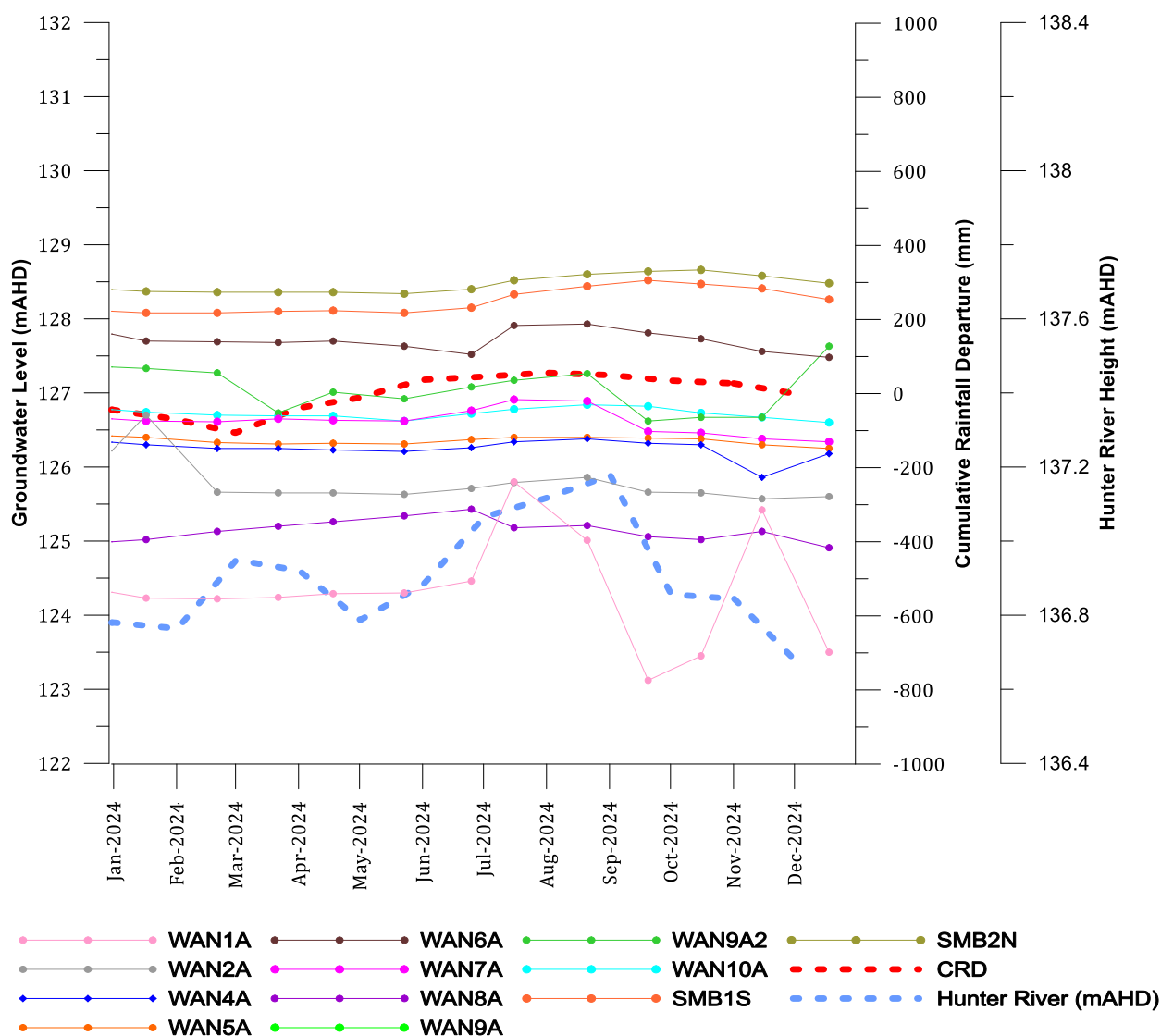


Figure 6.1 Hydrographs of alluvial bores - Wantana extension area

6.1.2 Regional Hunter River alluvial bores

Figure 6.2 shows groundwater levels measured in the Regional Hunter River alluvial monitoring bores. Groundwater levels in BG1 and BG5 remained above established triggers during 2024. Groundwater levels in BG5 have remained above the trigger value since April 2018.

Groundwater levels in BG3 marginally exceeded the groundwater level trigger criteria during January and April 2024. Water levels recovered during July but again declined below the trigger level during October. Although the groundwater levels were below the trigger levels at times during 2024, the exceedances were not part of three consecutive exceedance and so do not require any additional investigation per the WMP.

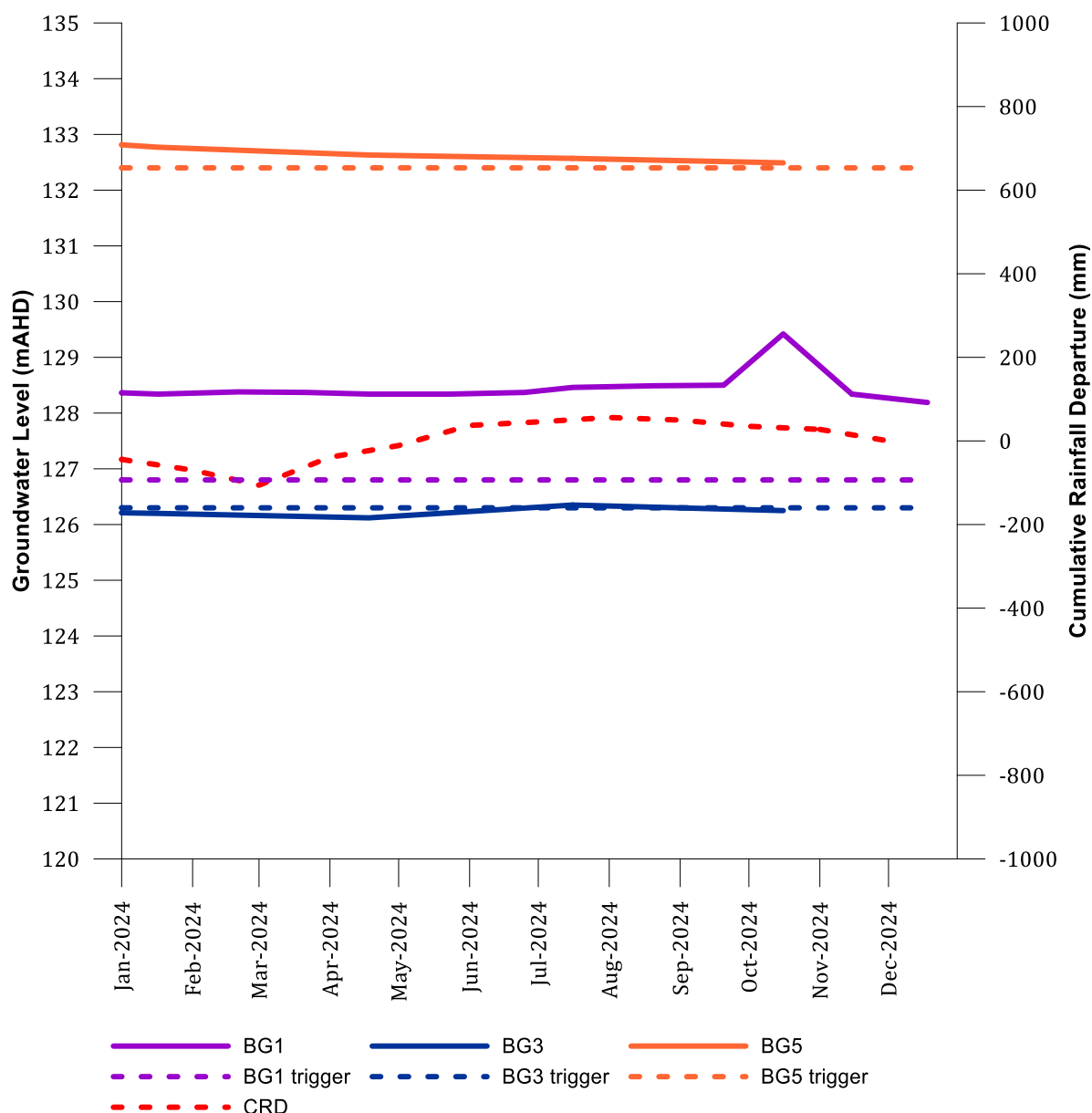
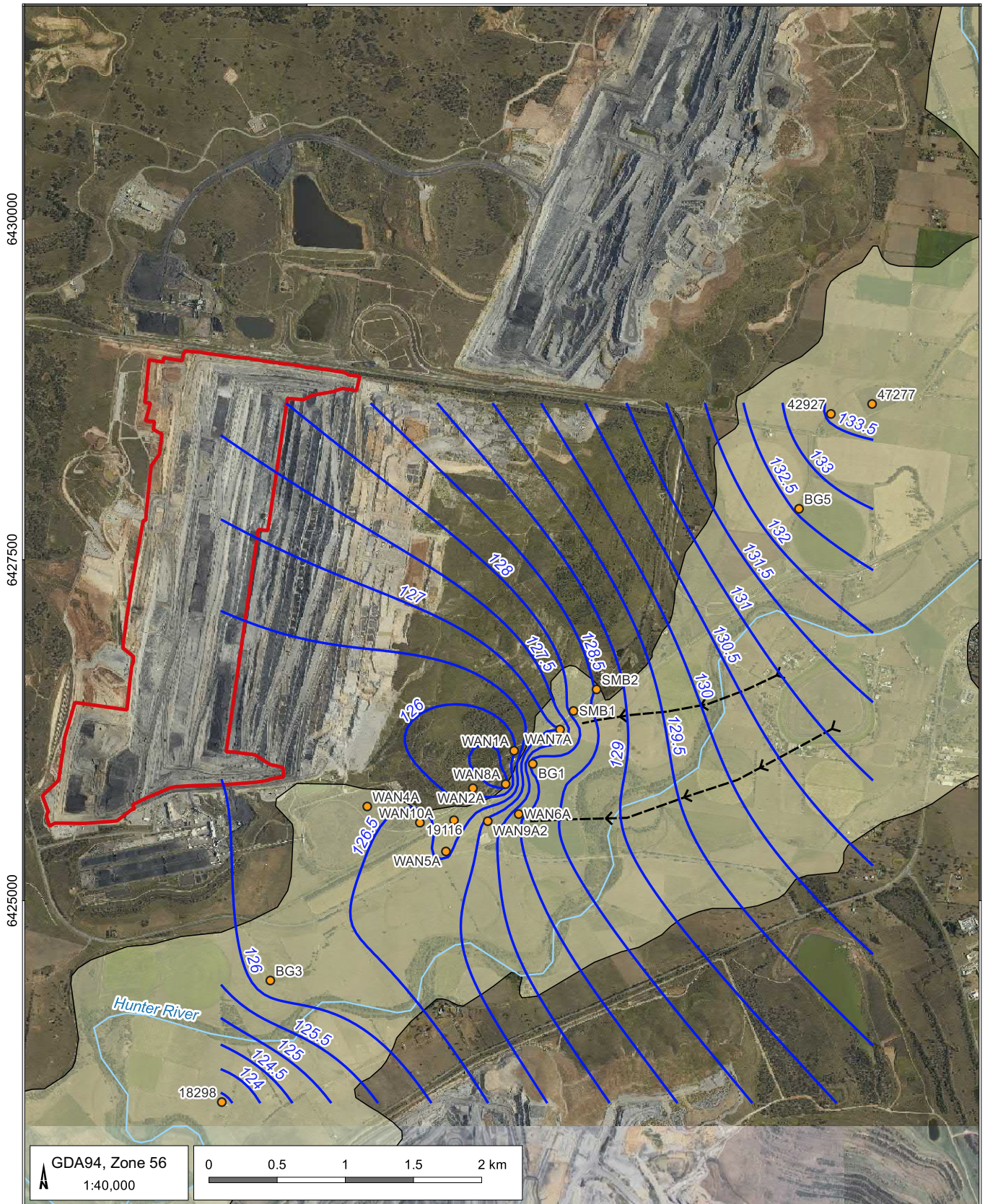


Figure 6.2 Hydrographs of Regional alluvial bores

6.1.3 Alluvial groundwater level contours

Figure 6.3 shows the water table within the Hunter River alluvium interpolated from groundwater elevation measurements observed during July 2024. The water level contours and flow directions remain consistent with those of previous years.

As was the case in previous years, a steep hydraulic gradient is present adjacent to WAN8A and BG1 (Figure 6.3). This is likely due to a combination of the proximity of bore WAN8A to the open cut and to the edge of the alluvium (refer Figure 6.3). It is likely that mining related depressurisation of shallow Permian strata at the southern margin of the pit continues to cause movement of alluvial water towards Bengalla. This would account for the decline of water levels to below the screened interval of the bore in WAN8B (screened in the shallow Permian/Wynn Seam; refer Section 6.2.1). Indeed, groundwater levels in WAN8A are also very close to the base of the bore, and it may be stagnant water in the bore sump (i.e. between the base of the screen and the base of the bore). The latest 2024 groundwater elevation in WAN8A was 124.91 mAHd, whereas the base of the bore is 124.51 mAHd (see Appendix A). Therefore, there was only 0.4 m of screened casing below the water level, which is a decrease of 0.09 m from the previous year. Regardless of water available in WAN8, any loss of water to the pit from the alluvium fringe is likely to be masked by both the regulated nature of the Hunter River and the Hunter River recharge to the alluvium (the river is considered a losing stream along this reach).



LEGEND

- Alluvium Bores (June/July 2024)
- Drainage
- Alluvium groundwater contours (1m)
- Groundwater flow direction
- December 2024 Void Boundary
- Alluvium boundary

NOTE:
Aerial Image Capture Date : December 2024
Source: BMC

Bengalla annual review 2024 (BEN5023)

Alluvium groundwater levels (June/July 2024)



AGE

DATE
07/03/2025

FIGURE No:
6.3

6.2 Coal seam/interburden water levels

6.2.1 Permian monitoring bore hydrographs

Groundwater levels in all Permian monitoring bores remained above established trigger values throughout 2024. Figure 6.4 shows long-term shallow Permian groundwater levels monitored in the Wantana Extension area to the south of Bengalla. Key observations are outlined below:

- The mined seams have been depressurised to varying extents, depending on their stratigraphic position and the proximity of the bore to the pit.
- Pressure head in several seams shows evidence of stabilising as the pit progresses westward and after a prolonged period of above average rainfall recharging groundwater in shallower strata (e.g. WAN1A, WAN1B, WAN2A, WAN5A, WAN6B and WAN7B).
- The Edinglassie Seam is not mined at Bengalla and therefore water elevations recorded in this seam is considered most representative of the pre-mining potentiometric surface in the Wantana Extension area. Monitoring bore WAN7B screens the Edinglassie Seam and groundwater elevation remained steady during 2024 at approximately 129.50 mAHD.
- The measured water level in WAN8B has been below the base of the screened interval in this bore since 2016, indicating that the bore is dry. The downhole camera survey showed that this bore has a 1 m sump at the base of the bore but should not be considered hydraulically connected to the aquifer. This bore should be replaced.
- Groundwater levels in bore WAN1A (screened in the Wynn Coal seam) decreased overall throughout 2024 after being relatively static since 2007. After being recorded as almost dry in April 2020, the observed water level (as of December 2024) at WAN1A is now 2.78 m above the base of the bore.
- WAN3 was found to contain insufficient water for groundwater level and sampling throughout 2024. The last recorded groundwater measurement was taken in December 2021, which was one of only three measurements recorded at this bore in six years. AGE has previously recommended this bore be replaced.
- Monitoring bore WAN2C was blocked prior to October 2019. Measurements for 2024 show consistent groundwater levels of approximately 100 mAHD.
- Monitoring bore WAN2B displayed a gradual but steady recovery in water level from mid-2013. As with WAN1B, the recovery noted in WAN2B may represent a gradual recovery in pressure as mining operations move further away from this bore.
- Monitoring bore REPI7 groundwater levels were relatively static, following an initial recovery as mining operations progressed away from the monitoring bore.

Figure 6.5 and Figure 6.6 show the groundwater levels for the Permian monitoring bores (WAN4B, WAN5A, and WAN1B). Key observations can be summarised as follows:

- Groundwater levels in WAN4B and WAN5A were relatively stable in 2024.
- Figure 6.6 shows monitoring bore WAN1B (Edderton Seam) plotted against the CRD. Groundwater elevation in WAN1B has remained stable in 2024, compared to a decrease of approximately 3 m in 2023. This is likely due to the westward progression of mining operations away from WAN1B.
- WAN4B, WAN5A, and WAN1B remained above established triggers throughout 2024.

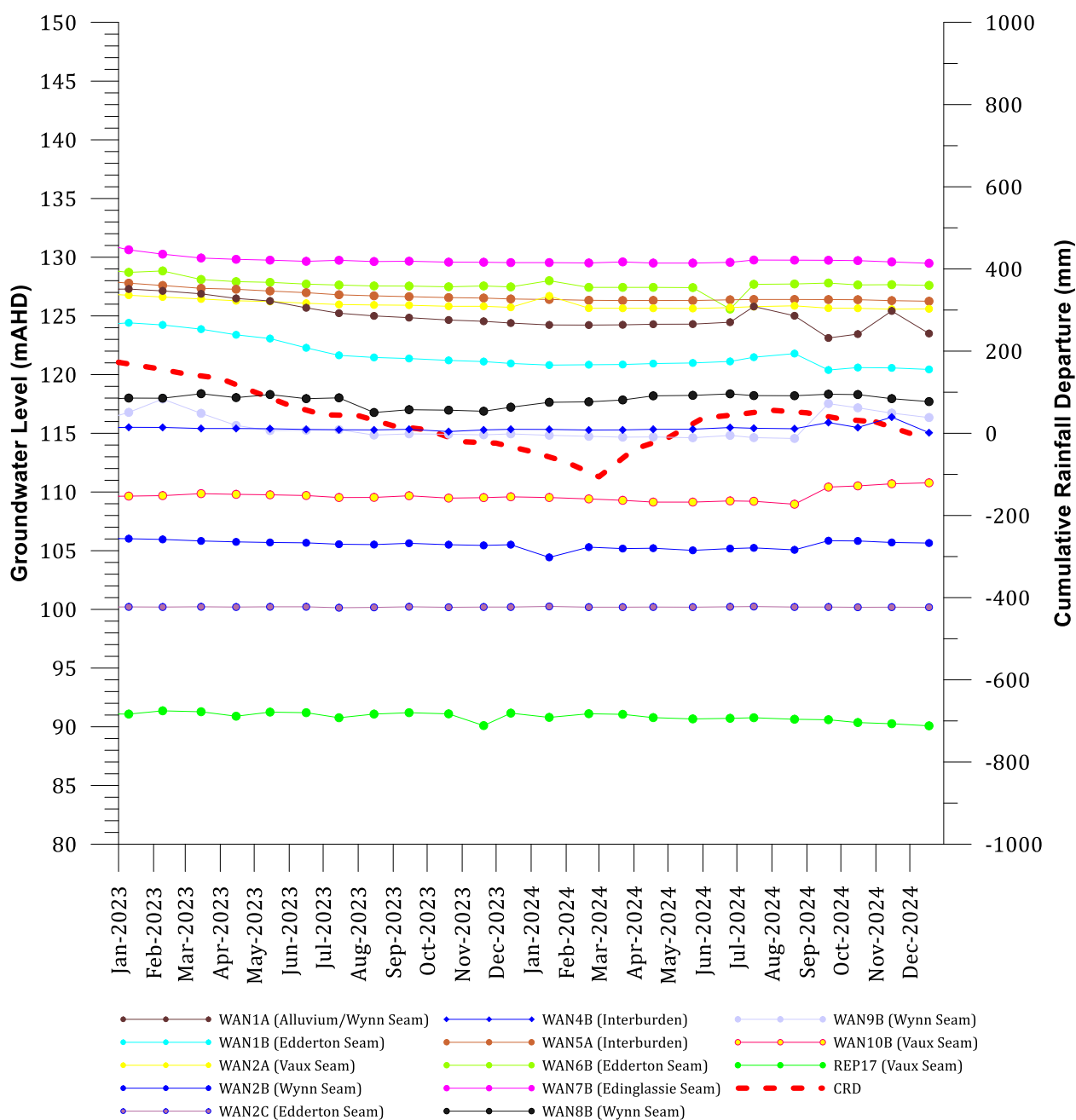


Figure 6.4 Hydrographs of coal seam/interburden bores – Wantana extension area

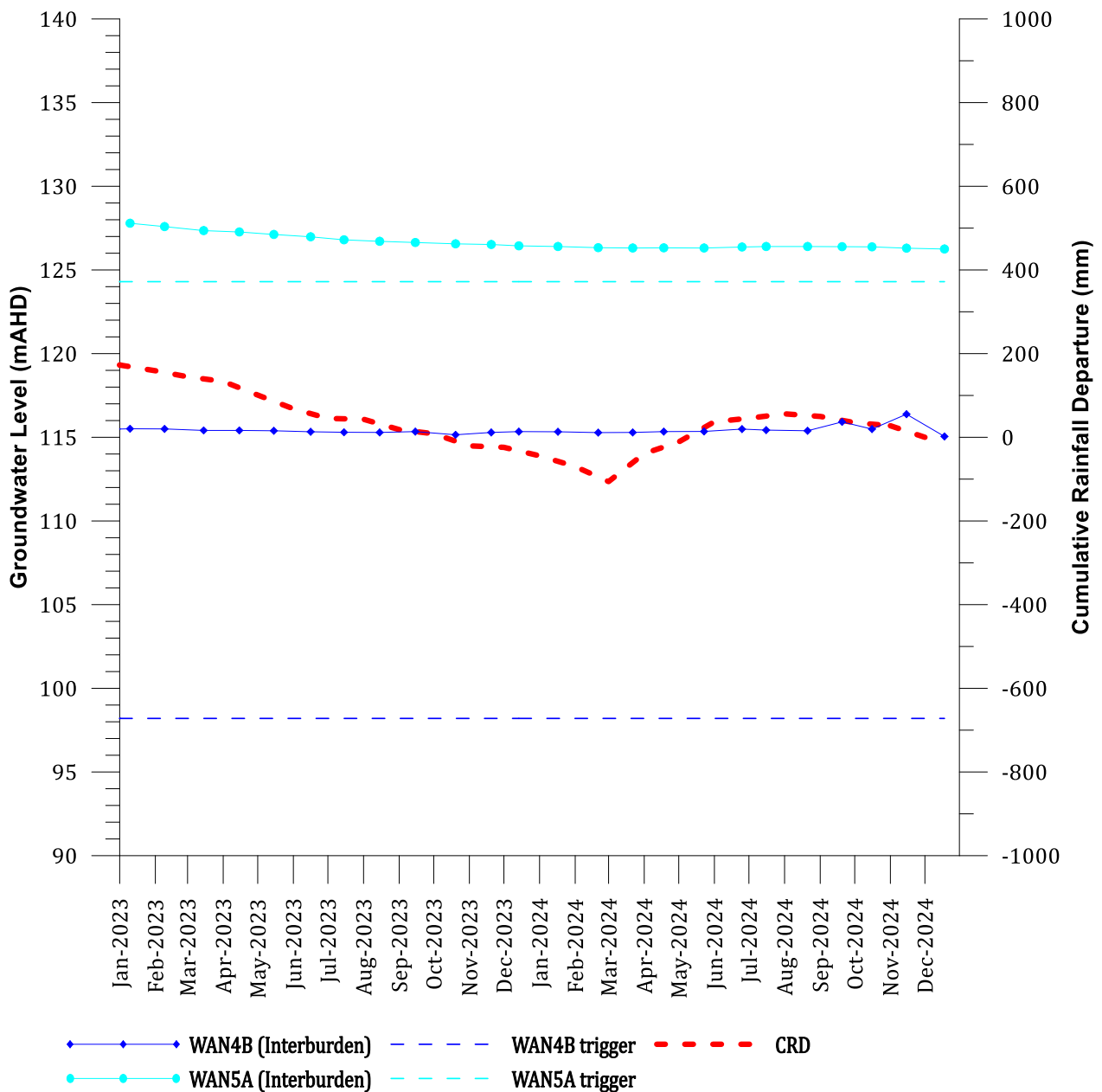


Figure 6.5 Hydrographs of deep Permian monitoring bores

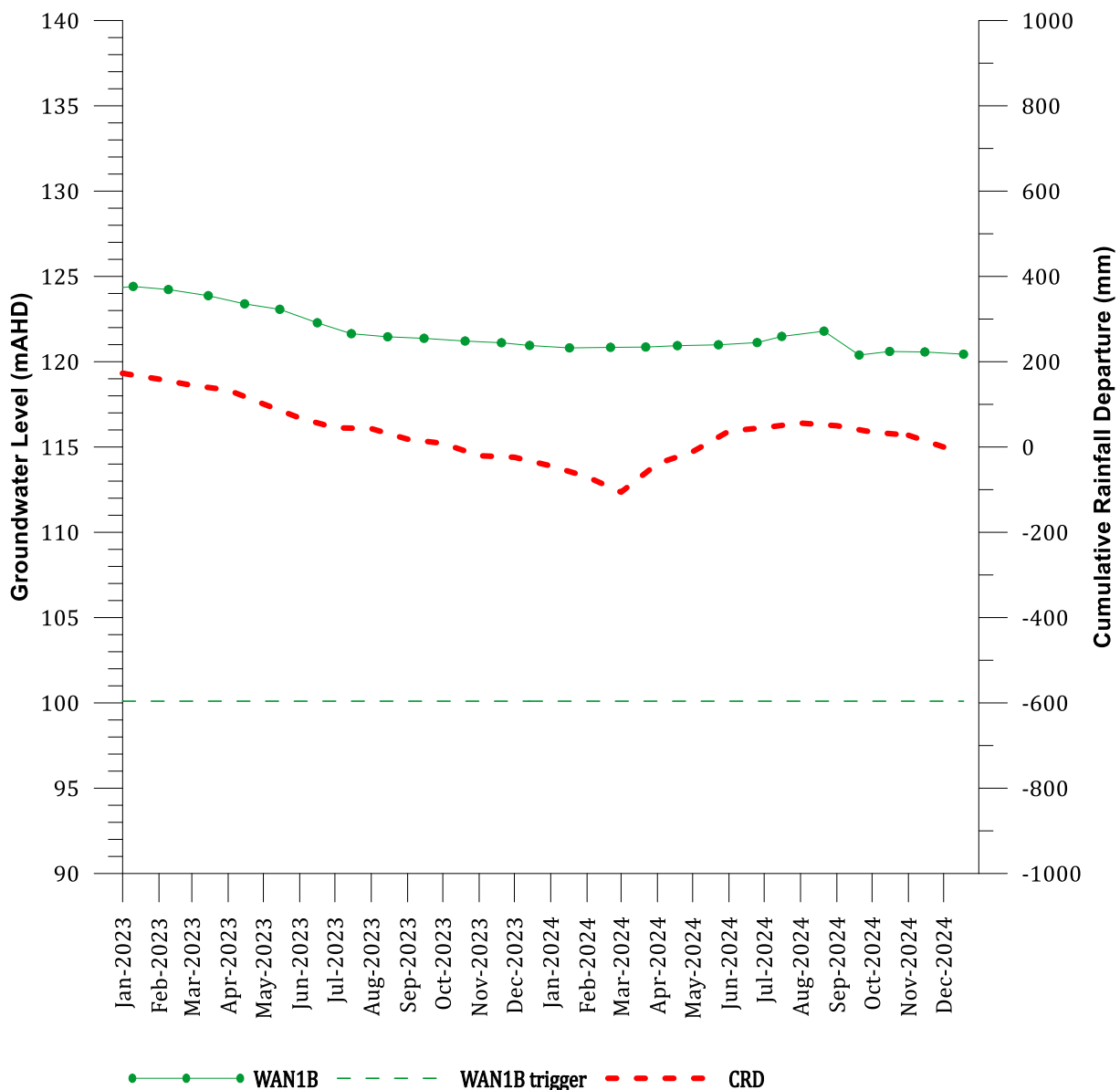


Figure 6.6 Hydrograph of shallow Permian monitoring bores

6.2.2 Nested monitoring bore hydrographs

Nested/clustered monitoring bore installations in the Wantana Extension are used to monitor water levels in multiple aquifers at one location. Each nested installation generally comprises one alluvium bore, and one (or more) coal seam bores. Groundwater levels in all nested monitoring bores remained above their trigger levels for 2024. The hydrographs of the clustered bores (Figure 6.9 to Figure 6.15) are discussed in the following sections. WMP trigger levels for the Wantana bores are summarised in Section 5, and are based on groundwater modelling for Bengalla (AGE, 2013b). The trigger levels were further revised in 2017 to avoid false exceedances and to reflect potential mining related impacts (AGE, 2017). The trigger values are also displayed in the hydrographs.

Figure 6.7 shows the WAN1 nested site water levels. WAN1 bores retained levels above the trigger levels throughout 2024. WAN1A is screened in the Wynn seam but also possibly into the alluvium. At this location, the Wynn seam subcrops close to the base of the alluvium. WAN1A remained relatively stable, recording a slight decrease in water level throughout the year (124.23 mAHD in January to 123.5 mAHD in December -0.73 m decrease). WAN1B (Edderton seam) also remained mostly stable and recorded a negligible decrease in groundwater elevation in 2024 (0.37 m decrease in pressure head). The water level of 120.44 mAHD (December 2024) has recovered to above the pre-mining level of 115.87 mAHD, demonstrating that water levels in depressurised coal seams is recovering in a post-mining phase.

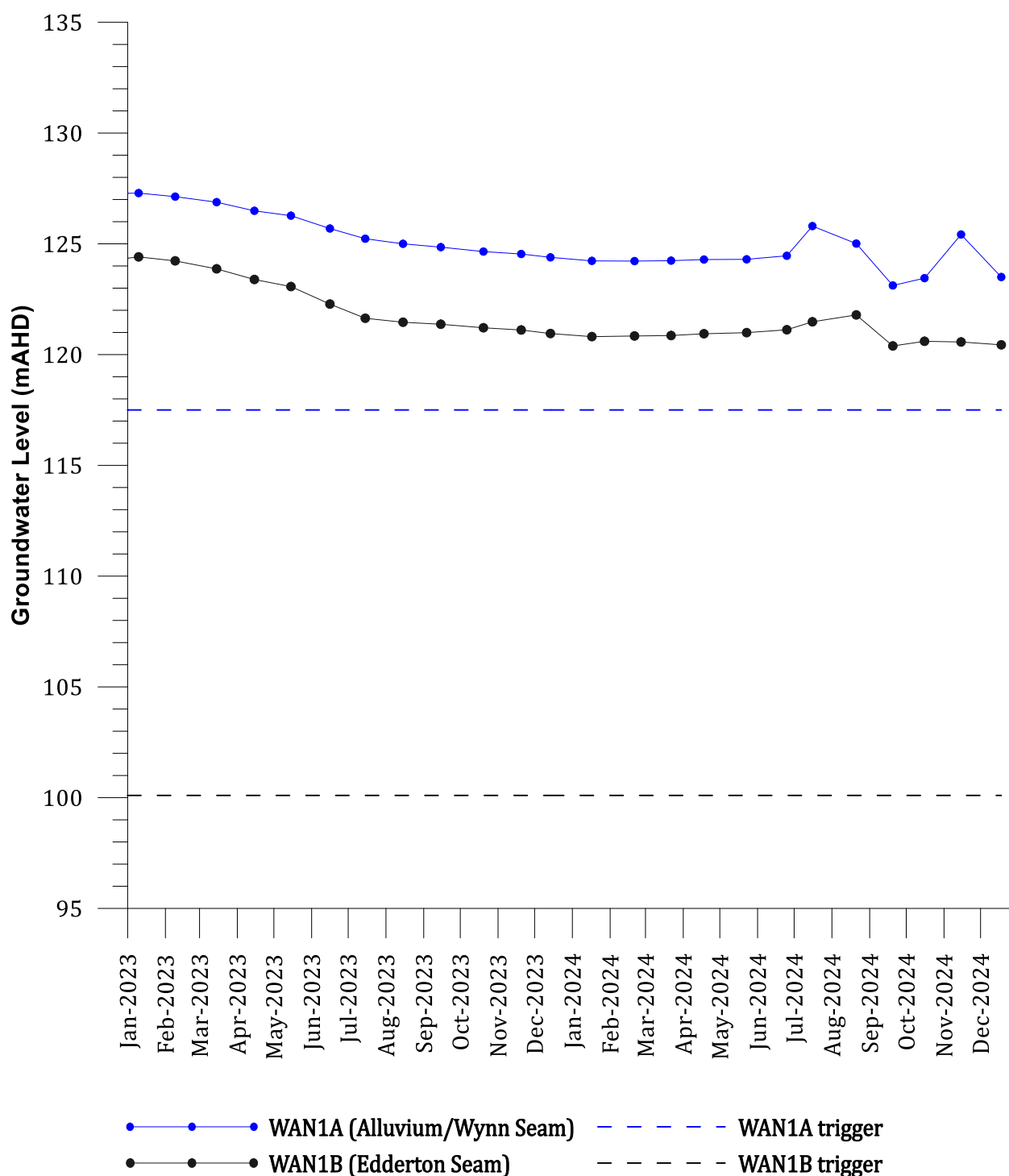


Figure 6.7 Alluvium and coal seam hydrographs – WAN1

Figure 6.8 shows the WAN2 nested site water levels. All WAN2 bores retained levels above the trigger levels throughout 2024. Water levels in WAN2A (Vaux Seam) remained stable during the 2024 monitoring period. Levels in WAN2B (Wynn Seam) steadily declined from 2005 to December 2013 as a result of mining, remaining relatively stable thereafter (i.e. to December 2024). Monitoring bore WAN2C recorded a steady water level throughout 2024.

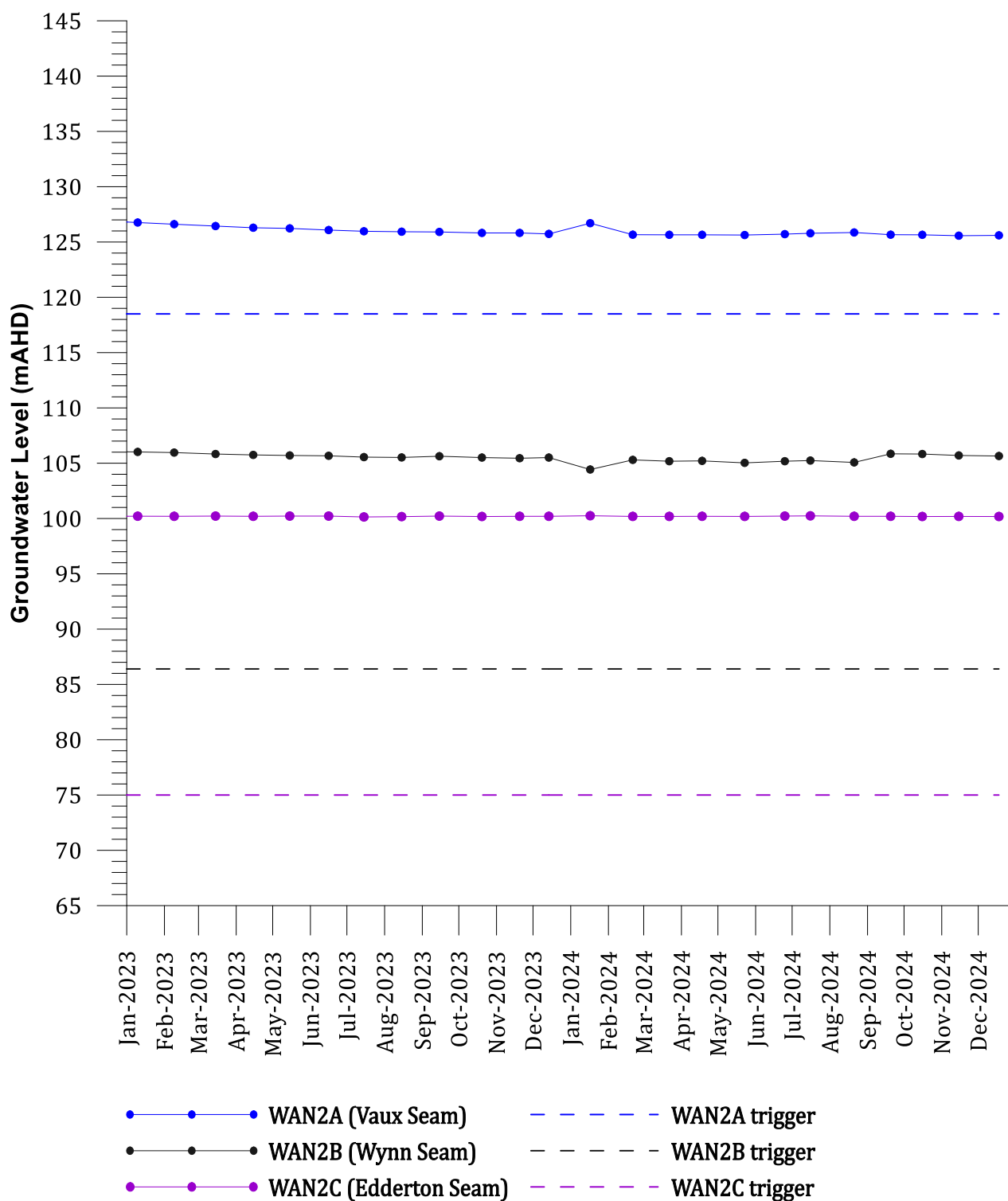


Figure 6.8 Alluvium and coal seam hydrographs – WAN2

WAN4 bores retained groundwater levels above the trigger values throughout 2024 (Figure 6.9). At WAN4B, the groundwater level in the interburden prior to 2011 was 2 m lower than the water level observed in the alluvium (WAN4A). Since December 2011, the water level in the interburden bore (WAN4B) declined by 9.32 m. This rate of decline appears to have stabilised, reaching an elevation approximately 115.4 mAHD (115.05 mAHD in December 2024). WAN4A water levels in the alluvium remained stable overall throughout 2024. This relatively minor response indicates little local connection between the alluvium and the interburden, or suggests the alluvium is constantly recharged by the Hunter River. WAN4A and WAN4B were above established trigger levels throughout the entirety of 2024.

WAN4A/B is located closer to the pit than WAN5A/B and WAN6A/B (see Figure 4.1). WAN5A/B and WAN6A/B have coal seam/interburden and alluvium water levels at similar elevations (Figure 6.10 and Figure 6.11), whereas those from WAN4A/B are separated by >10 m (Figure 6.9). This suggests that either the water levels in the interburden and Edderton Seam at WAN5A/B and WAN6A/B show minimal response to mining (refer Figure 6.10 and Figure 6.11) or that the rate of recharge from the alluvium to the interburden is greater than the rate of seepage to the pit at this location. WAN5A/B (Figure 6.10) and WAN6A/B (Figure 6.11) were above established trigger levels throughout the entirety of 2024.

Notably, WAN6B saw a significant decrease in water level during the July monitoring period in 2024 of 1.83 m, but successive measurements were back to being consistent with previous values. The July reading likely represents either an error in measurement or error in reporting and can be disregarded. Despite this decrease, the July water level remained above the trigger criteria. Overall declines are expected for this bore as it is related to depressurisation due to mining.

Data from 2024 (Figure 6.12) show the groundwater level in the Edinglassie Seam is approximately 3 m above the groundwater level in the alluvium, indicating that the Edinglassie Seam is pressurised relative to the alluvium. The Edinglassie Seam is not mined at Bengalla and hence has not been impacted by mining related drawdown. The water level in WAN7A remained steady during 2024 but historically has shown an overall declining trend. WAN7A and WAN7B were above established trigger levels throughout the entirety of 2024 (Figure 6.12).

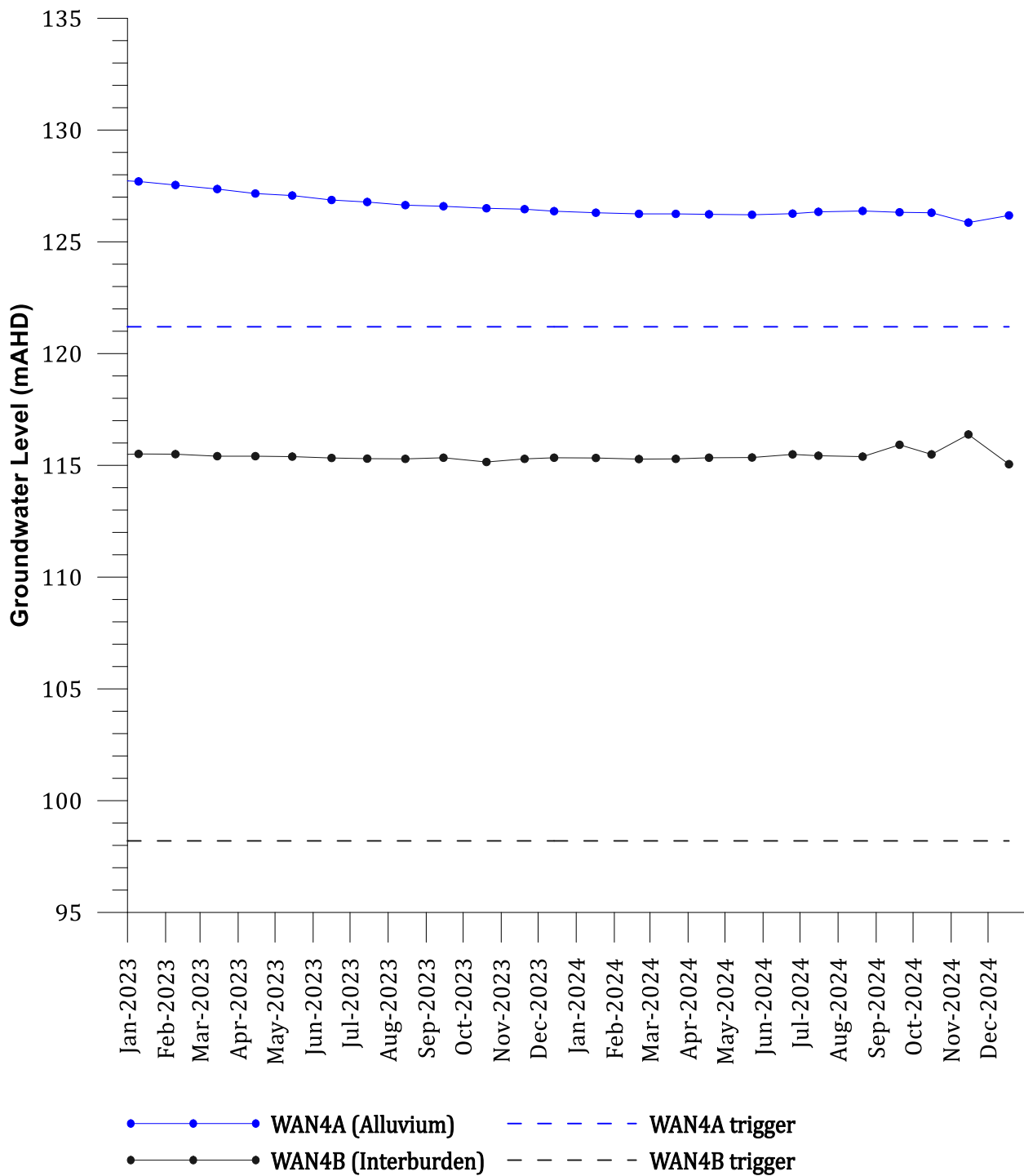


Figure 6.9 Alluvium and interburden hydrographs – WAN4

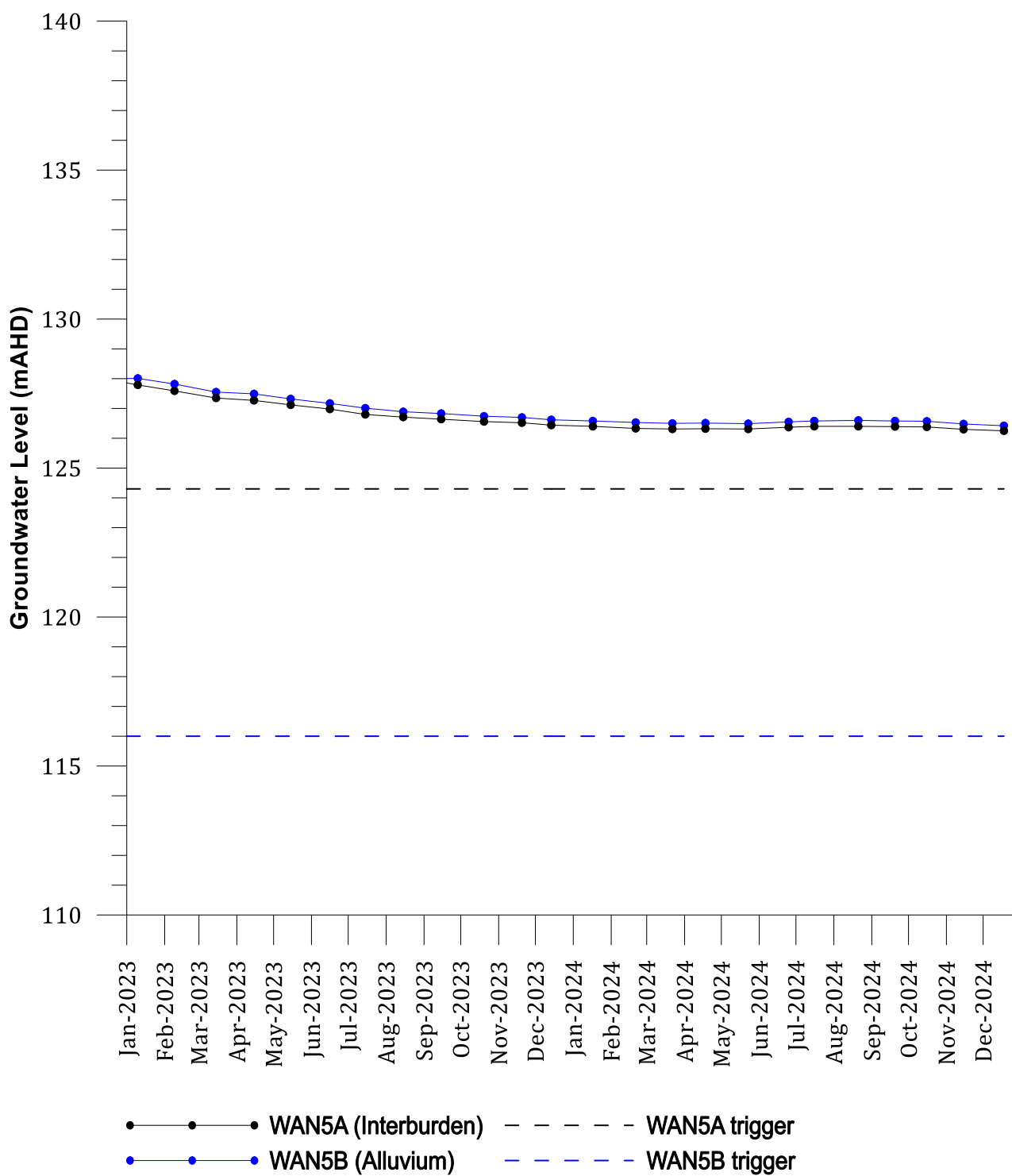


Figure 6.10 Alluvium and interburden hydrographs – WAN5

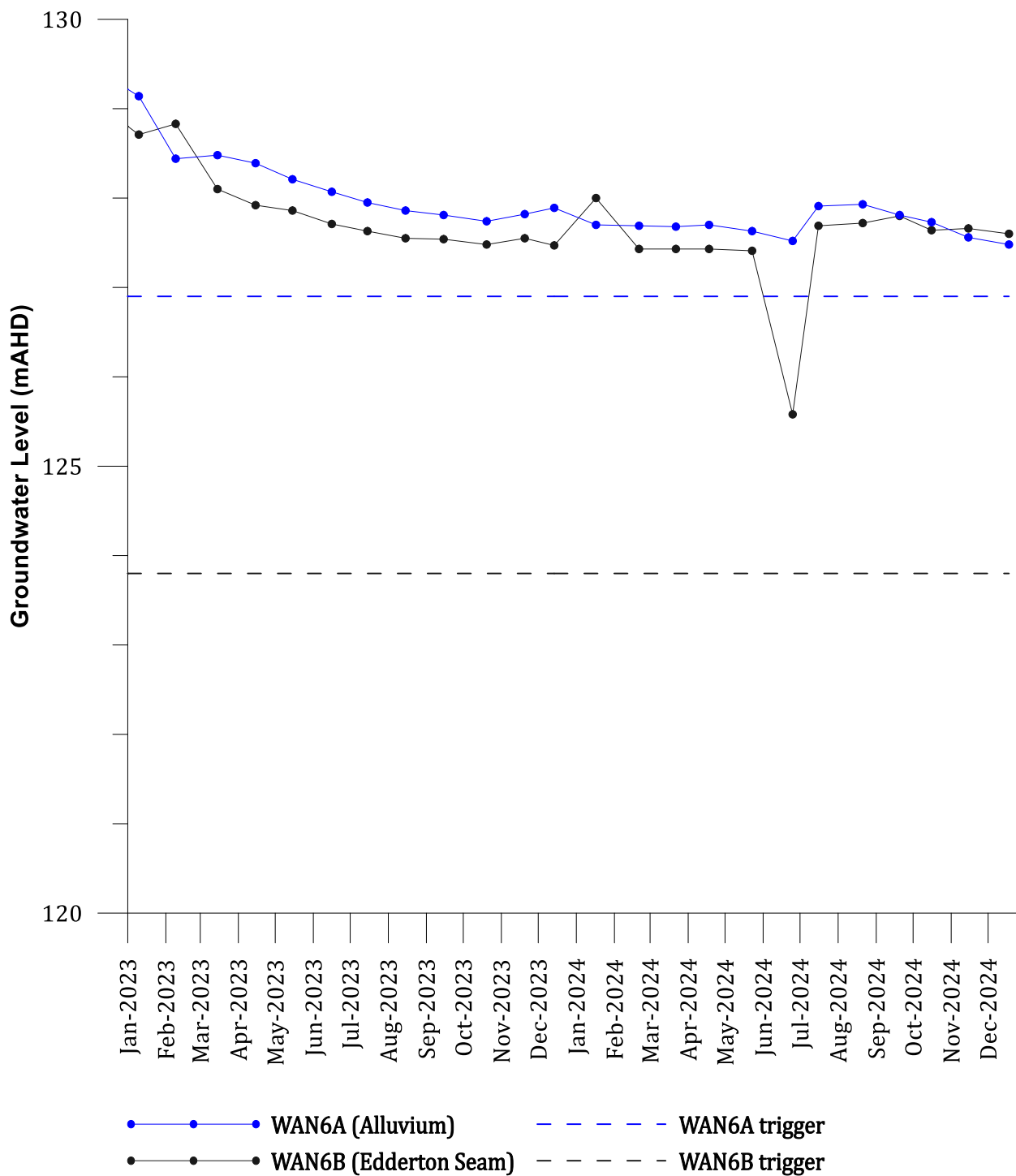


Figure 6.11 Alluvium and interburden hydrographs – WAN6

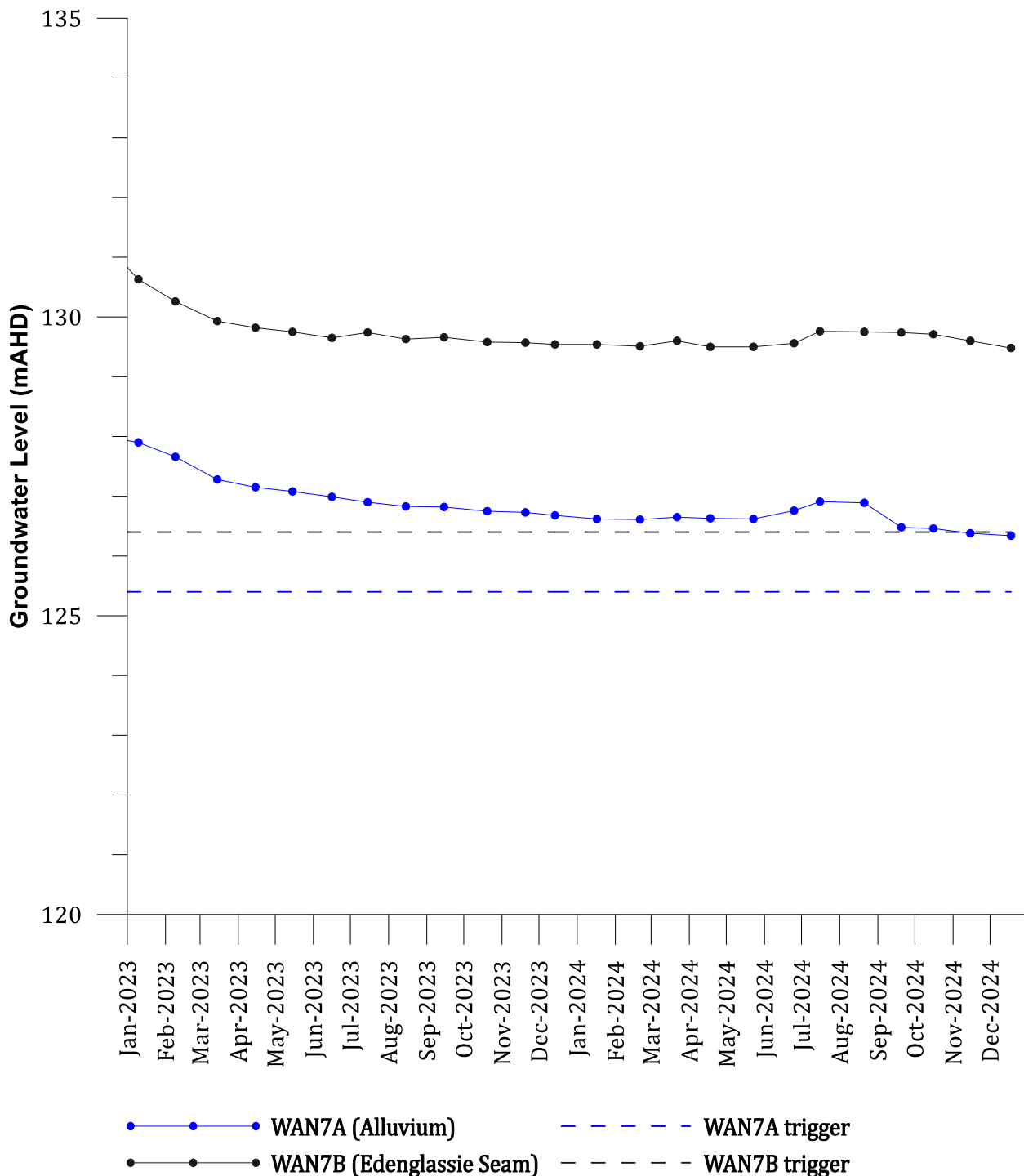


Figure 6.12 Alluvium and coal seam hydrographs – WAN7

Figure 6.13, Figure 6.14, and Figure 6.15 show groundwater levels at nested sites WAN8, WAN9 and WAN10. Monitoring bore WAN9A2 has replaced the previously dry WAN9A bore.

Figure 6.13 shows the water levels at the nested site WAN8. The water levels are approximately 125 mAHD and 118 mAHD for the alluvium and the Wynn seam, respectively. The alluvium is approximately 7 m higher than the Wynn seam head, potentially demonstrating a separation of the aquifers. The head trends are relatively constant for the monitoring period, indicating that there has been no mining induced change to groundwater water levels through 2024. WAN8 groundwater levels remained above established triggers in 2024. WAN8A has previously been identified as nearly dry by comparison of groundwater levels to bore depth and has been recommended for replacement.

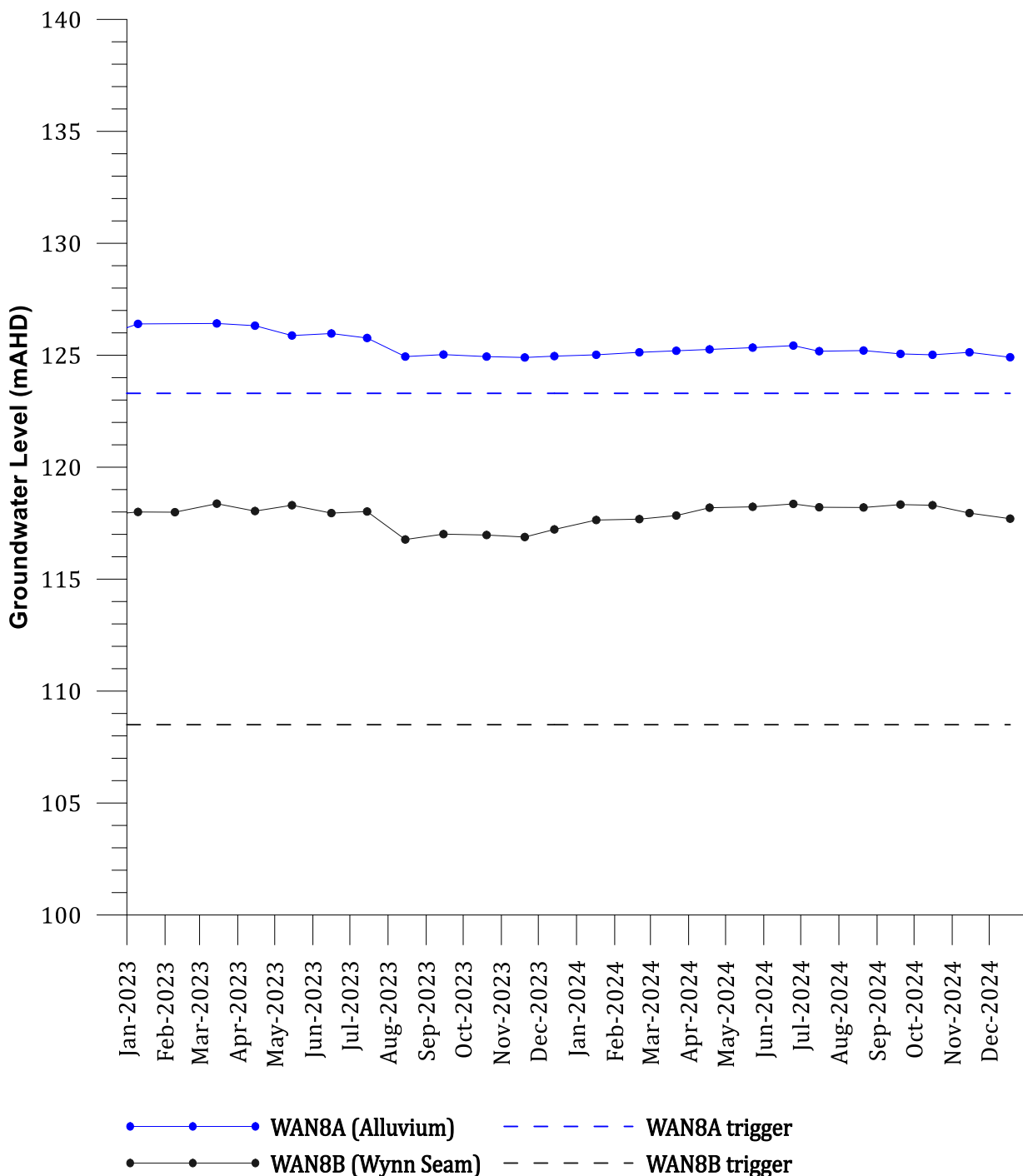


Figure 6.13 Alluvium and coal seam hydrographs – WAN8

Groundwater levels in WAN9A2 (Figure 6.14) decreased overall during the monitoring period. The groundwater level in WAN9B gradually declined throughout 2024. The final recorded groundwater level at WAN9B in 2024 was 116.34 mAHD (December 2024) representing an overall increase in groundwater level of approximately 1.5 m over 2024. This recent level is close to the peak groundwater level recorded at this bore in January 2023. All WAN9 monitoring bores continued to remain above established trigger values.

WAN10 monitoring bores (Figure 6.15) remained above trigger values for 2024. WAN10B shows the groundwater level in the Vaux Seam increased by approximately 1 m during 2024, whilst WAN10A alluvial water levels remained fairly stable with only a slight declining trend. Since September 2012, the water level in the Vaux Seam (WAN10B) has been steadily declining (as expected). The head differential between the bores at WAN10 remains at approximately 16 m, indicating some level of disconnection between the two aquifers but also the potential for alluvial groundwater to leak to the coal seams, where they subcrop below the alluvium.

The initial groundwater level at WAN10B (119.2 mAHD, May 2009) has declined overall to 110.78 mAHD by December 2024 (a change of 8.42 m). This represents a decline in groundwater level of approximately 50% of the range above the adopted trigger level (Figure 6.15). Despite this, the decline is still within the limits of predicted impacts.

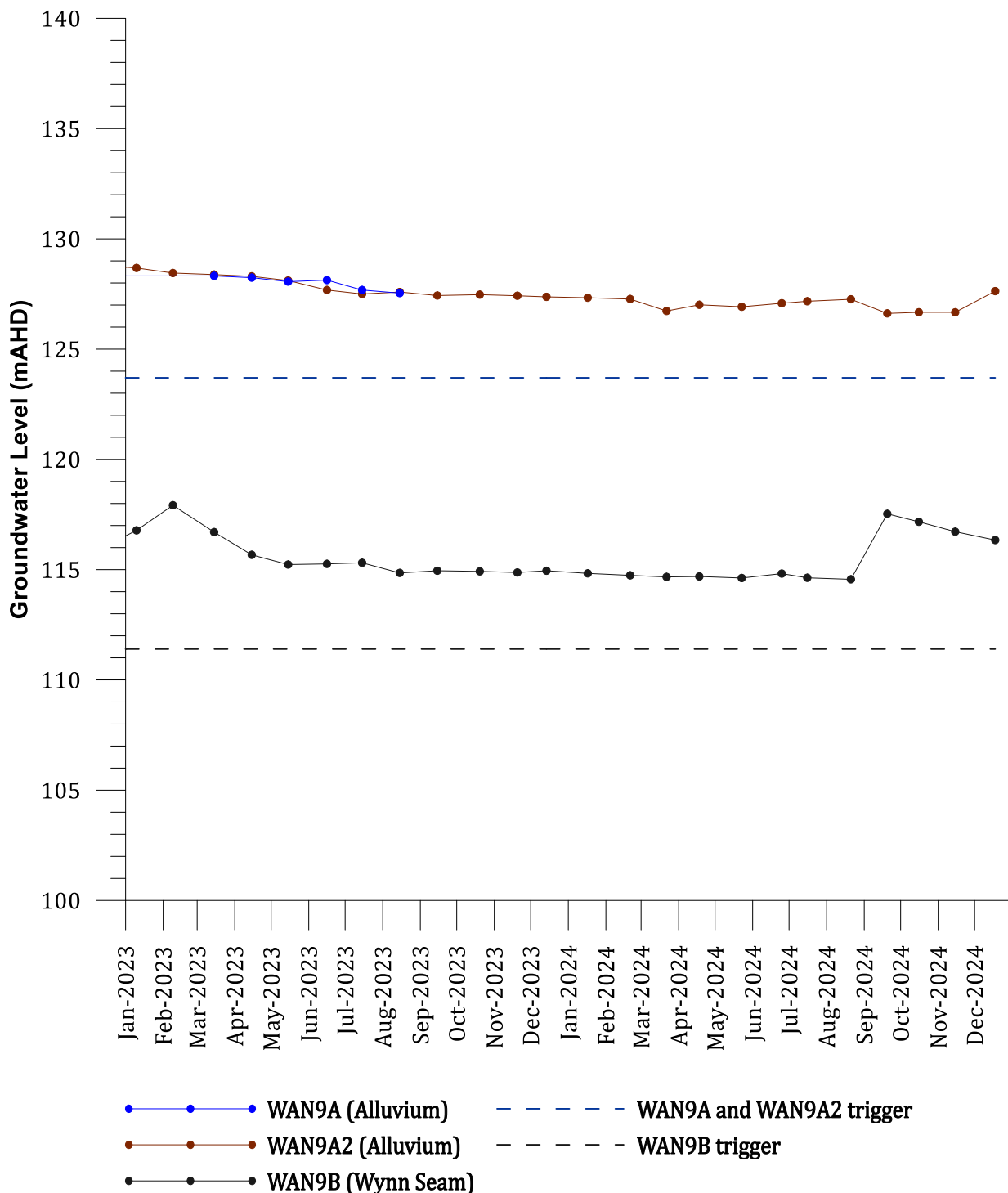


Figure 6.14 Alluvium and coal seam hydrographs – WAN9

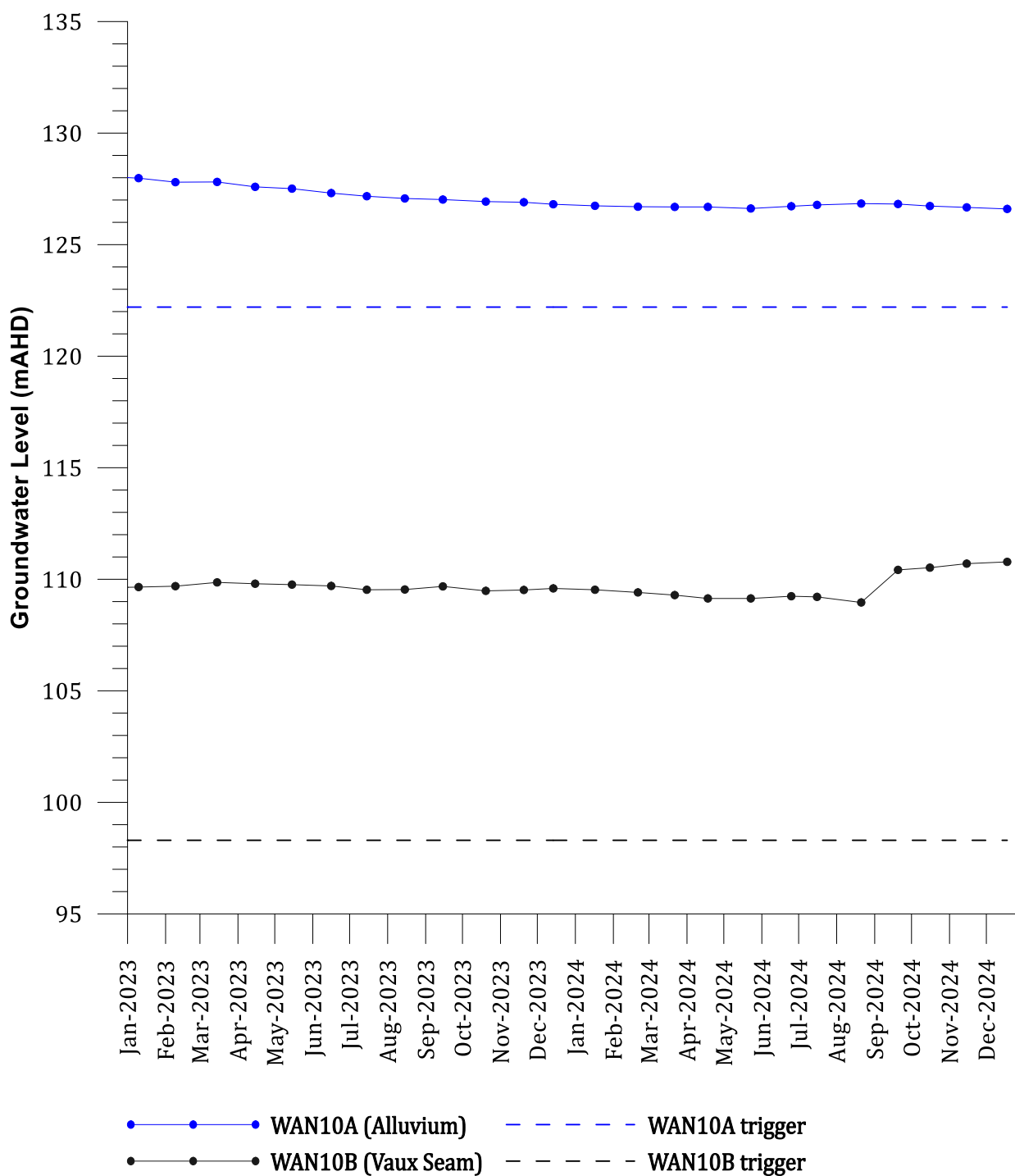


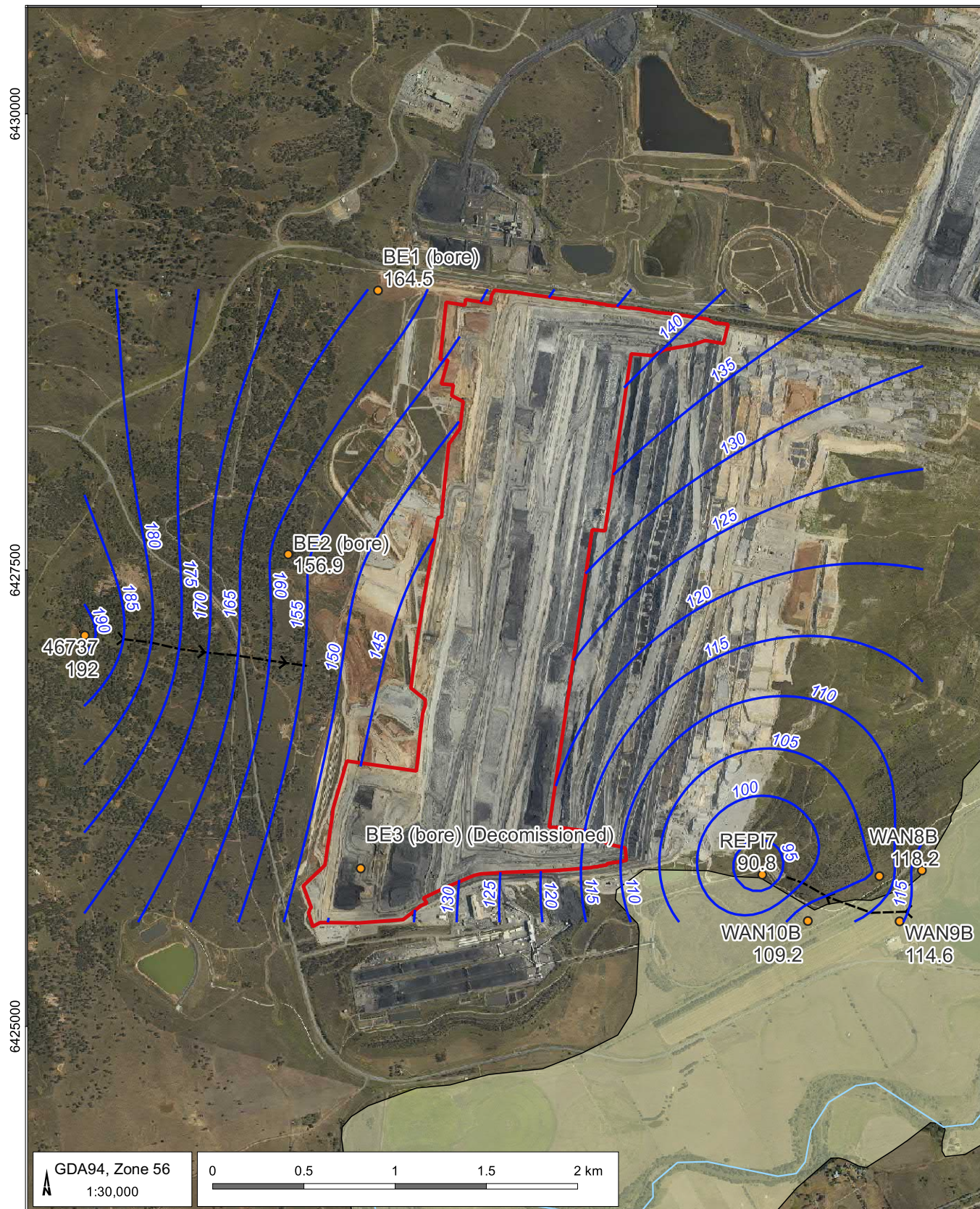
Figure 6.15 Alluvium and coal seam hydrographs – WAN10

6.2.3 Permian groundwater level contours

Figure 6.16 and Figure 6.17 show the interpreted groundwater flow contours for the shallow Permian units (Wynn and Vaux Seams and interburden) and deeper Permian units (Edderton and Edinglassie Seams and interburden), respectively. The depressurisation of the coal seams by open cut mining and the hydraulic gradient towards the mine is evident in the water level contours of both layers. Whilst the impact of the coal seam depressurisation is evident in the Permian units, the impact to the alluvial aquifer is minimal (refer Figure 6.3 and Section 6.1.3).

When compared to the previous year (2023), shallow Permian groundwater levels as monitored to the west (BE1, BE2) show greater signs of depressurisation, depending on their proximity to the encroaching pit. Whilst equivalent monitoring sites to the east have slightly increased groundwater levels reflective of increased rainfall recharge and more distal mining operations (Figure 6.16). Alternatively, the deeper Permian strata displays a greater comparative reduction in pressure head due to the difference in hydraulic conductivity enabling enhanced lateral propagation of drawdown in these seams.

The water level contours, and flow directions are consistent with historic data and the drawdown is within predicted and approved ranges.



LEGEND

- Shallow Permian monitoring bores
- Drainage
- Alluvium groundwater contours (1m)
- Groundwater flow direction
- December 2024 Void Boundary
- Alluvium boundary

NOTE:
Aerial Image Capture Date : December 2024
Source: BMC

Bengalla annual review 2024 (BEN5023)

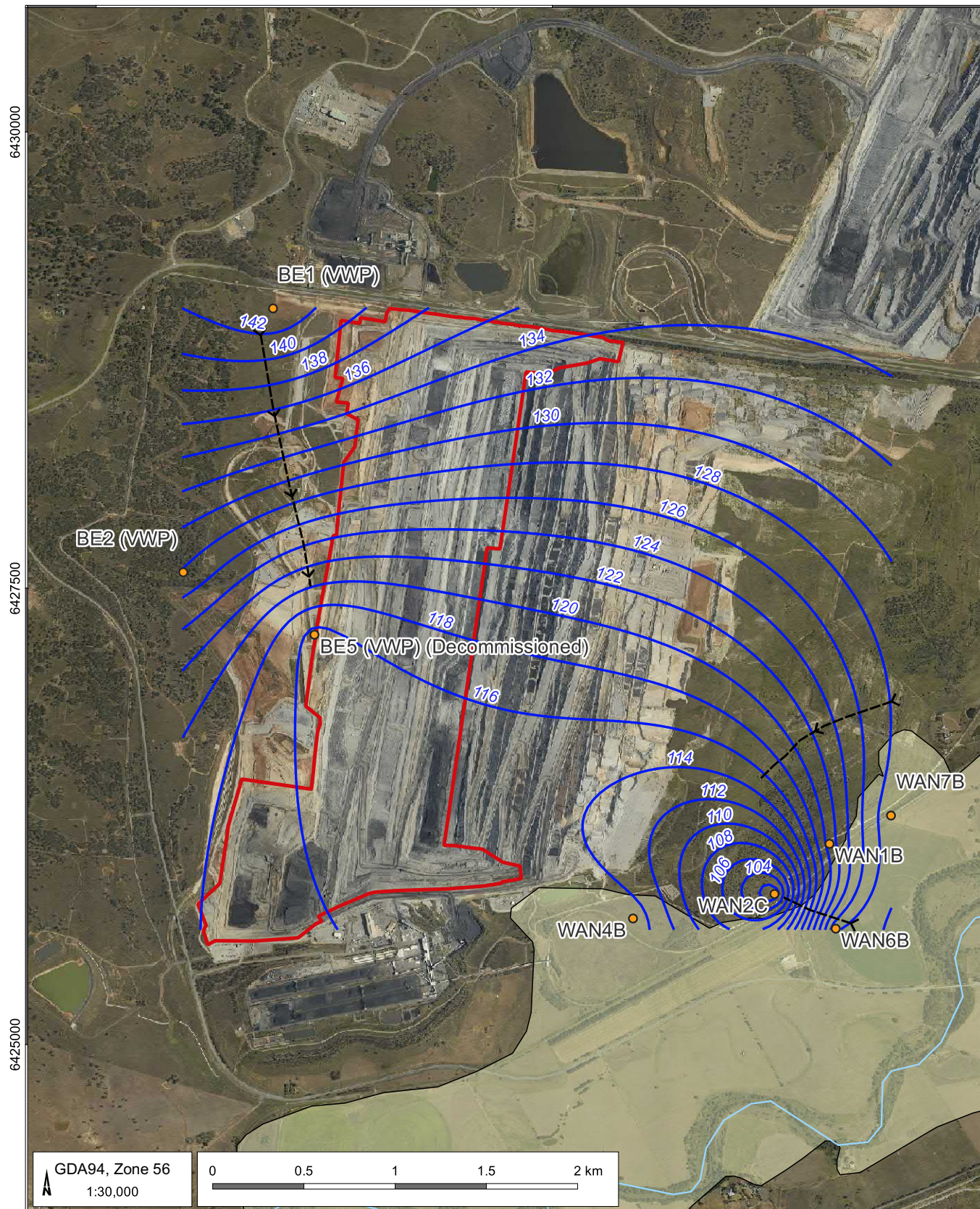
Shallow Permian groundwater levels (June/July 2024)



AGE

DATE
07/03/2025

FIGURE No:
6.16



LEGEND

Deep Permian bores June/July 2024

- Drainage
- Alluvium groundwater contours (1m)
- Groundwater flow direction
- December 2024 Void Boundary
- Alluvium boundary

NOTE:
Aerial Image Capture Date : December 2024
Source: BMC

Bengalla annual review 2024 (BEN5023)

Deep Permian groundwater levels (June/July 2024)



AGE

DATE
07/03/2025

FIGURE No:
6.17

6.3 Permian groundwater level – northwest of active mining

Figure 6.18 to Figure 6.22 below show the groundwater level hydrographs for those bores and VWP's located to the northwest of the active mining area, including:

- 46737;
- BE1 (overburden monitoring bore);
- BE2 (overburden monitoring bore);
- BE3 (overburden monitoring bore);
- BE1 (Mt Arthur Seam VWP);
- BE1 (Edderton Seam VWP);
- BE2 (Mt Arthur Seam VWP);
- BE2 (Edderton Seam VWP);
- BE3 (Mt Arthur Seam VWP);
- BE3 (Edderton Seam VWP);
- BE4 (Mt Arthur Seam VWP);
- BE4 (Edderton Seam VWP);
- BE5 (Mt Arthur Seam VWP); and
- BE5 (Edderton Seam VWP).

Little change is evident in the groundwater levels in the monitoring bore sites to the northwest of the active mining area over 2024 (BE1 and BE2). Groundwater level in 46737 increased overall in response to historical rainfall recharge. These bores are all above their prescribed groundwater level triggers.

Figure 6.19 to Figure 6.22 show the potentiometric heads measured in VWP installations at BE1, BE2, BE3, BE4 and BE5. Each of these installations has one VWP sensor in the Mt Arthur Seam and another sensor in the Edderton Seam. Site BE4 was removed on 27 October 2021 due to blasting operations, BE3 was decommissioned in November 2023 and BE5 was decommissioned April 2024 due to mining progress. The water levels from monitoring bores BE1 through BE3 have also been plotted for comparison. Observations include:

- VWP's and bore at BE1 (Figure 6.19):
 - head pressure in both the Mt Arthur Seam and the Edderton Seam have continued trends from 2022, gradually declining throughout 2024; and
 - a rapid increase in pressure head occurred in July/August 2023 at the Edderton seam sensor (ED1) but through 2024, pressure head continued to slowly decline at a rate similar to that observed prior to August 2023 but remains above 2023 levels.
- VWP's and bore at BE2 (Figure 6.20):
 - the Mt Arthur Seam VWP sensor (MA2) recorded a slow rate of decline throughout the beginning to middle of 2024, recovering slightly towards the end of the year; and
 - the head in the Edderton Seam VWP (ED1) is declining at a greater rate than that of the Mt Arthur Seam VWP.
- VWP's and bore at BE3 (Figure 6.21):
 - BE3 VWP's were decommissioned in October 2023 due to mining progress. It is recommended that a replacement VWP be installed for continued monitoring in the area west of the pit.
- VWP's at BE5 (Figure 6.22):
 - BE5 VWP's were decommissioned in April 2024 due to mining progress. Prior to this, the sensor located in the Mount Arthur seam (MA2) recorded declining pressure head consistent with predictions for mining related drawdown. It is recommended that a replacement VWP be installed to continued monitoring in the area west of the pit.

The reason for the discrepancy in groundwater level trends between the VWP sensors and the monitoring bores is that pressure dissipation is greatest in the deeper coal seams, due to differences in hydraulic conductivity in comparison to the shallow coal overburden. Additionally, the 'BE' series monitoring bores are screened in Permian sandstone/overburden, which may not yet be intersected by the pit, and is continuing to receive recharge via seepage from overlying strata and lateral groundwater flow from the north and west.

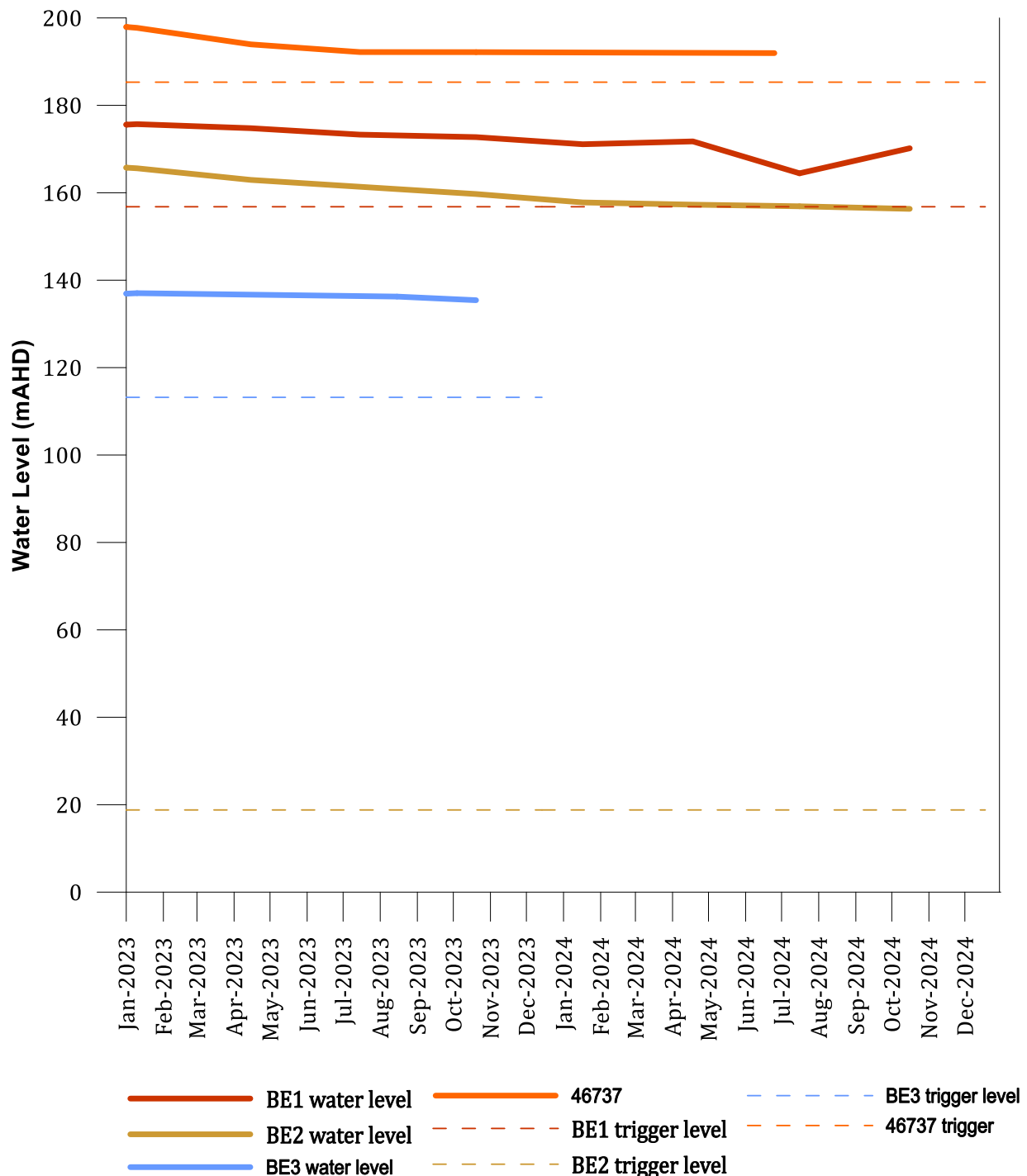


Figure 6.18 Northwest Permian monitoring bore groundwater levels

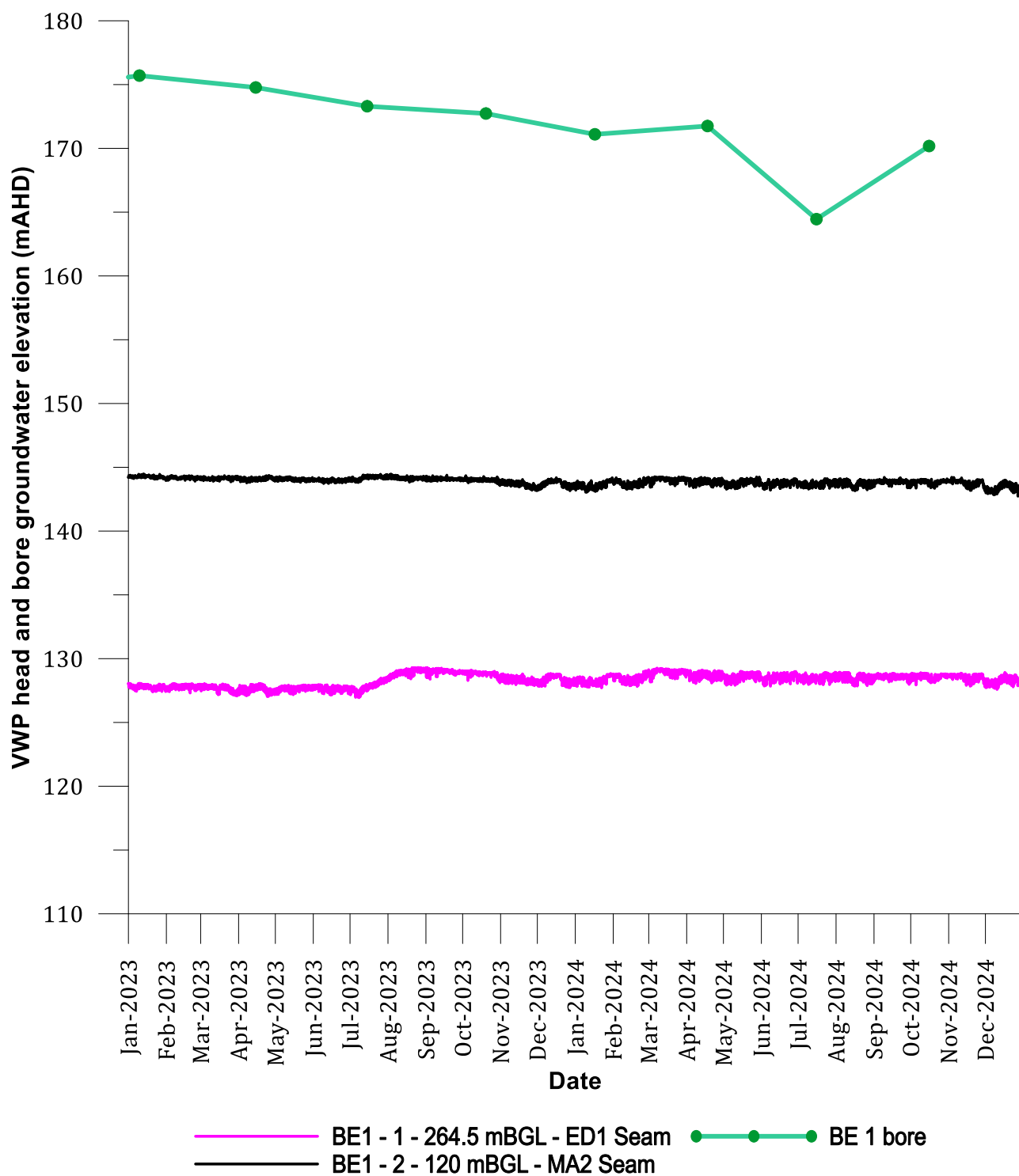


Figure 6.19 Northwest Permian VWP potentiometric heads – BE1

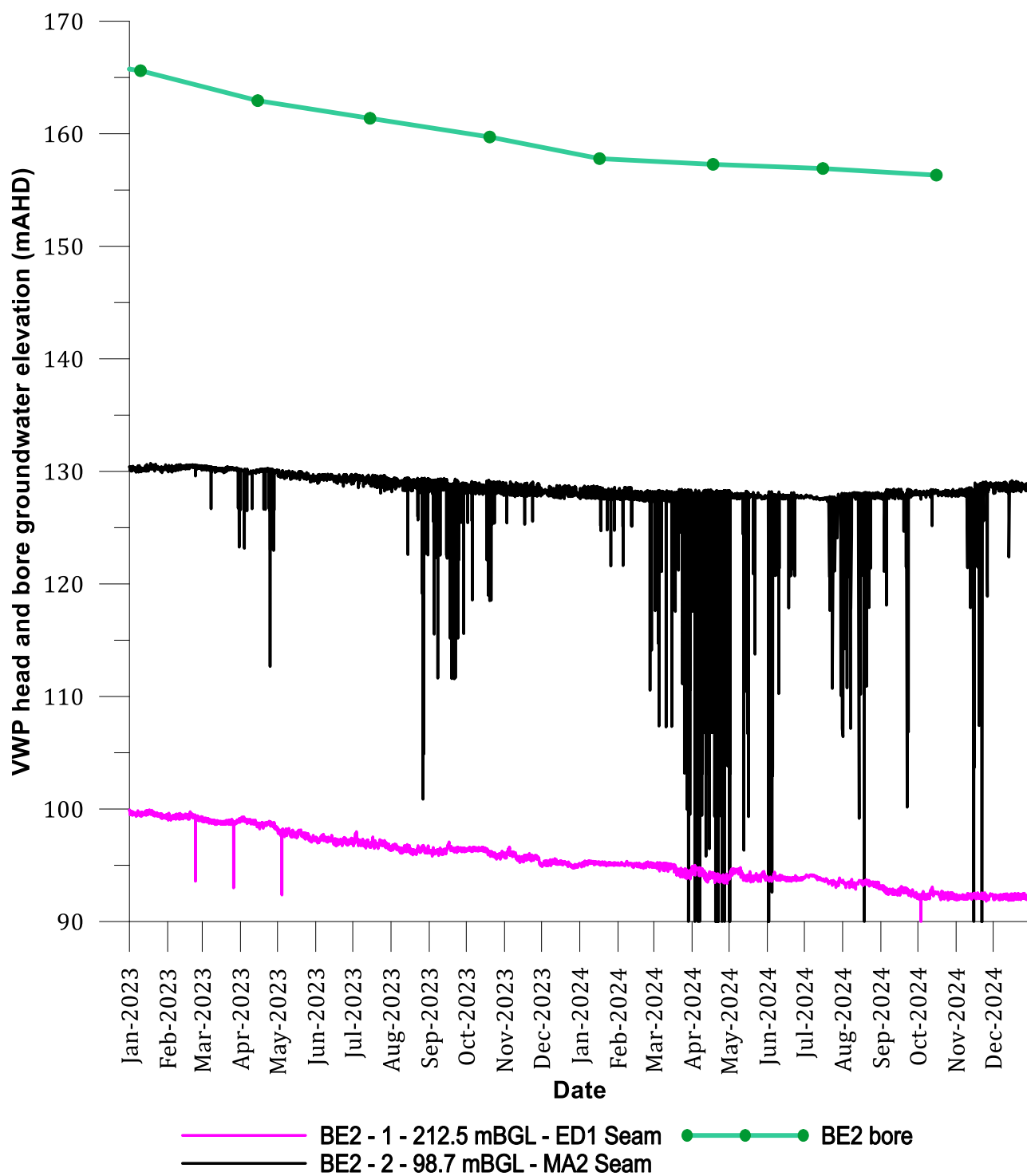


Figure 6.20 Northwest Permian VWP potentiometric heads – BE2

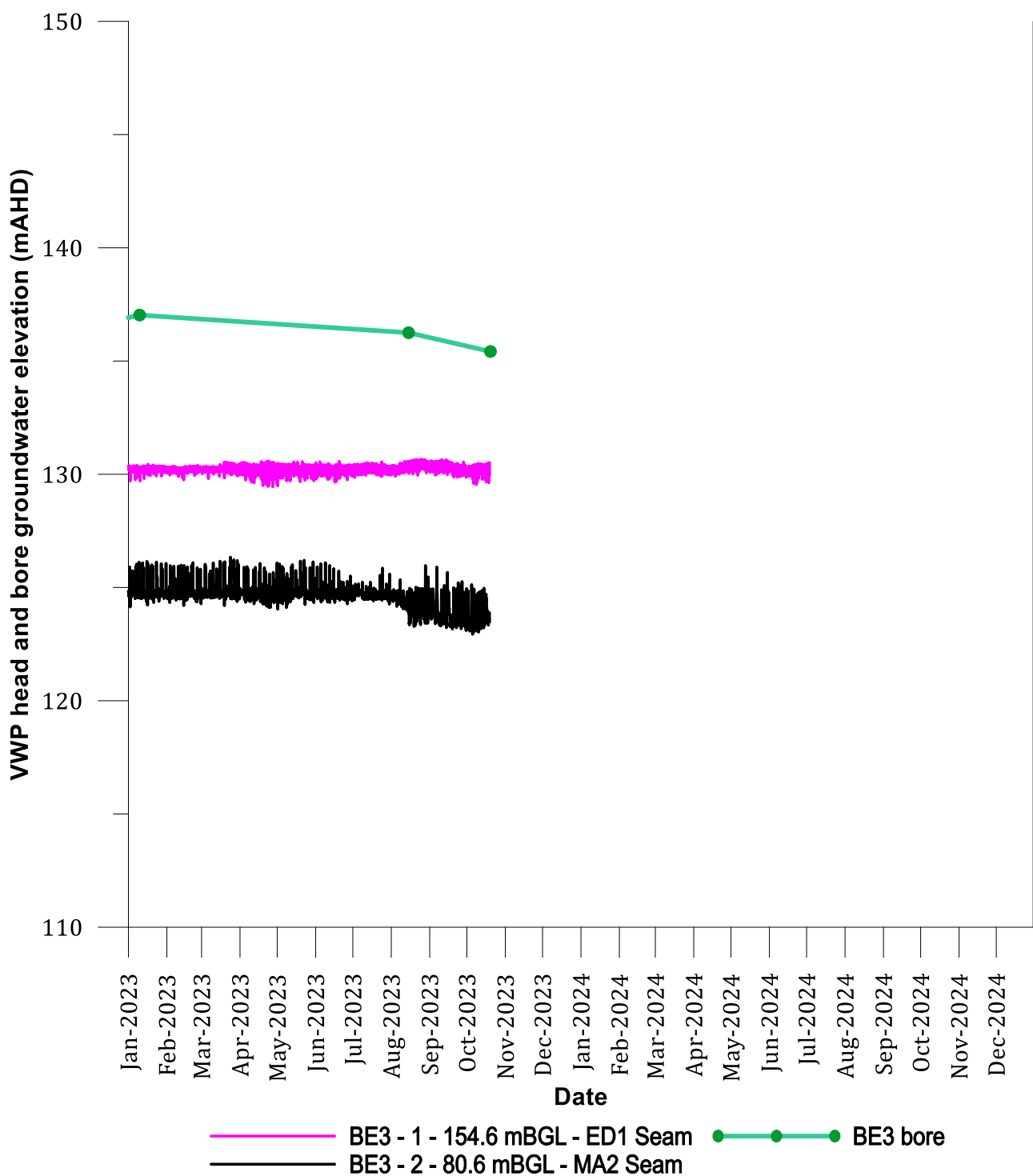


Figure 6.21 Northwest Permian VWP potentiometric heads – BE3, decommissioned September 2023

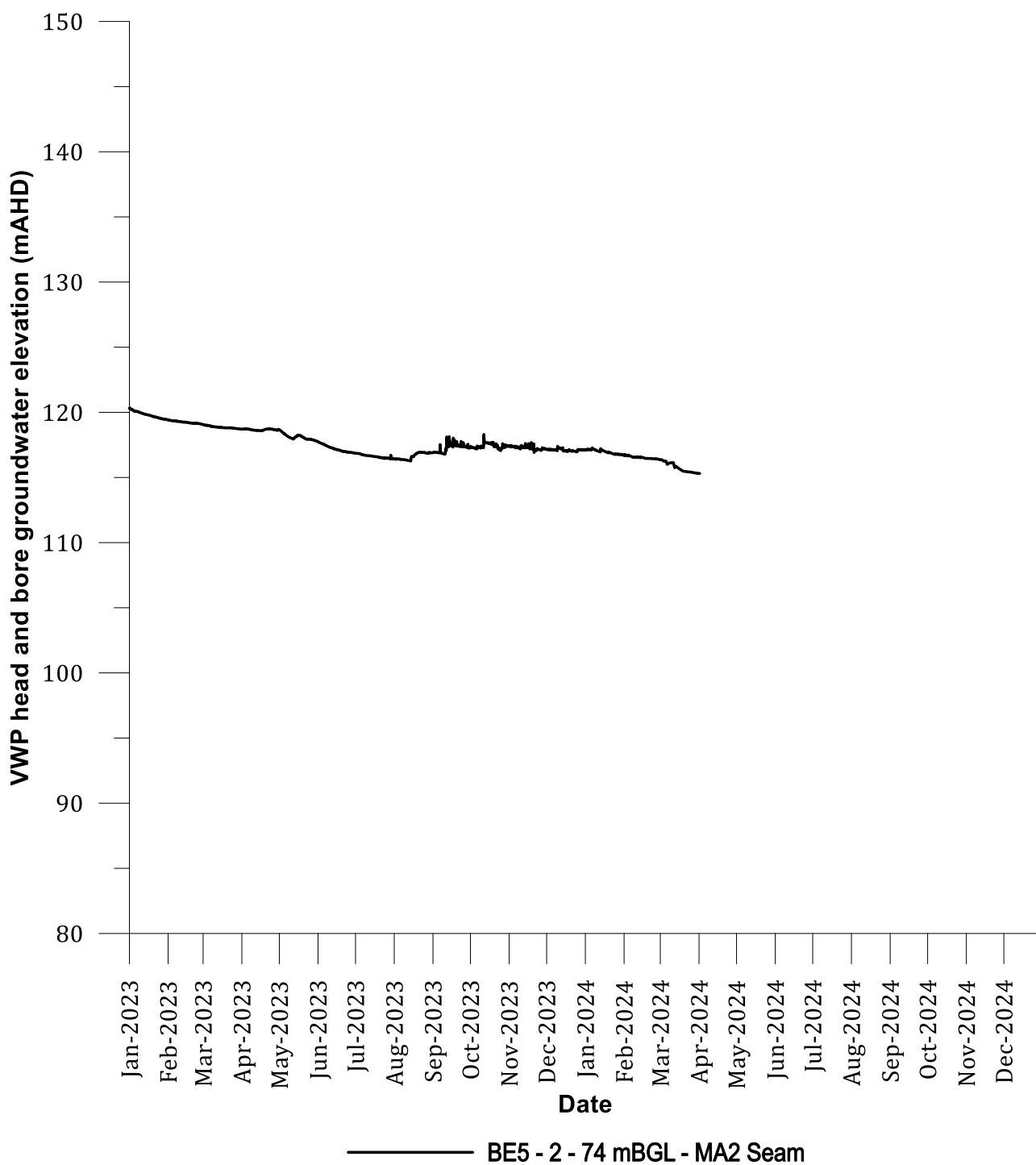


Figure 6.22 Northwest Permian VWP potentiometric heads – BE5

6.4 Groundwater level assessment against baseline data

Groundwater level data recorded over the 2024 reporting period has been compared against baseline data. Maximum predicted drawdown (trigger level) data is also reviewed, as set out in the Bengalla WMP (December 2023). A summary of the data is presented in Appendix A.

6.4.1 Baseline assessment

Appendix A shows the difference between the last measured groundwater level for the 2024 reporting period and the baseline data for each monitoring bore.

During the 2024 reporting period, monitoring bores 18298, 19116, 47277, 53007, BE1, BE2, BG3, BG5, REP17, SMB1S, SMB2N, WAN2B, WAN2C, WAN4A, WAN4B, WAN5A, WAN5B, WAN6A, WAN6B, WAN8A, WAN8B, WAN9B, and WAN10B had groundwater levels below their respective baseline water levels, see Appendix A – column 'Difference baseline vs. 2024 groundwater level'. Of the bores with groundwater levels below their respective baselines; BE1, BE2, BE3, REP17, WAN2B, WAN4B and WAN9B, had groundwater levels of more than one metre below their respective baseline water level, due to drawdown related to mining. Monitoring bore REP17 showed the greatest negative difference (-11.32 m) compared to its baseline, whereas 46737 showed the greatest positive difference (6.64 m).

6.4.2 Trigger level assessment

Groundwater trigger levels have been developed based on the maximum drawdown predicted from the groundwater model. The trigger level is equal to the most applicable pre-mining groundwater level (sourced from historic data) minus the predicted drawdown.

Appendix A shows the difference between the measured groundwater level for 2024 mid-year period (June/July) and the trigger level for each monitoring bore. There were no bores with a groundwater level below the maximum expected drawdown in 2024.

Groundwater level are considered to have triggered a response when:

- three or more alluvial bore levels fall below the trigger levels in one round of monitoring; or
- water levels in any bores fall below the trigger levels for three consecutive readings.

The groundwater level for bore BG3 has fluctuated around its trigger level throughout 2024, with water level exceedances recorded in October 2023, in January and April 2024, and in October 2024 (Figure 6.23). These readings do not collectively indicate an exceedance per the WMP but this bore should continue to be monitored. No groundwater elevation exceedances were recorded in any other monitoring bores in 2024.

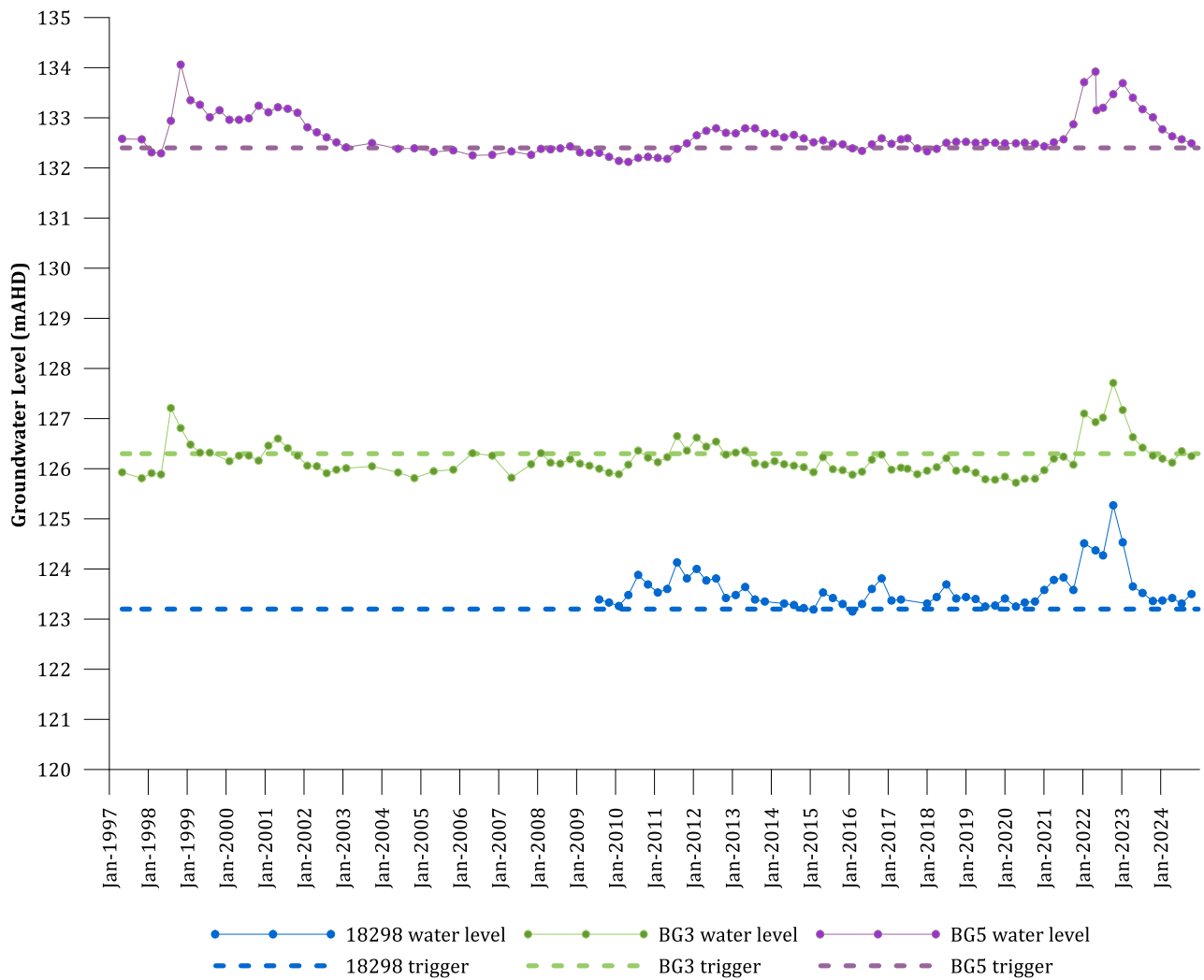


Figure 6.23 Hydrograph of bores with groundwater levels near maximum predicted drawdown

7 Groundwater quality and monitoring

7.1 Quality monitoring overview

Groundwater quality monitoring at Bengalla has included the following analyses:

- Electrical Conductivity (EC);
- Total Dissolved Solids (TDS);
- pH;
- sulphate; and
- dissolved metals (Al, As, Be, B, Cd, Cr, Co, Cu, F, Fe, Pb, Li, Hg, Mo, Ni, Se, V, and Zn).

EC, TDS and pH have been monitored in the Wantana Extension sites – WAN1, WAN2, WAN3, WAN4, WAN5, WAN6 and WAN7 since September 2005, and in the Regional bores since 1999. SMB1S and SMB2N were added to the monitoring program in 2010.

Sulphate and metals have been monitored in the Wantana Extension bores WAN8, WAN9 and WAN10 since May 2009, and in all Wantana bores from August 2009. Monitoring of sulphate and metals commenced in eleven of the Regional monitoring bores in 2003, and in the remaining eight Regional monitoring bores in August 2009.

7.2 Alluvial water quality

7.2.1 pH

Figure 7.1, Figure 7.2 and Figure 7.3 show pH trends in alluvial bores. Groundwater pH trends for Hunter River alluvial bores have remained consistent across 2024 with some minor fluctuations evident. With the exception of WAN8A (discussed below), all bores remained within the pH trigger criteria.

Groundwater pH in WAN8A remained anomalously high. The bore has historically contained insufficient water to sample and groundwater levels near the base of the bore. Throughout 2024, there was less than 0.5 m of water in the bore below the bore screen. These observations of water level and water quality together indicate that the water being sampled from WAN8A is stagnant water from the bore sump, rather than a representative sample of the screened formation. The monitoring procedure for this bore should be redressed to exclude sampling if there is insufficient water to provide a representative sample and AGE has recently recommended that this bore be replaced. The high pH values at this site therefore do not pose an environmental risk.

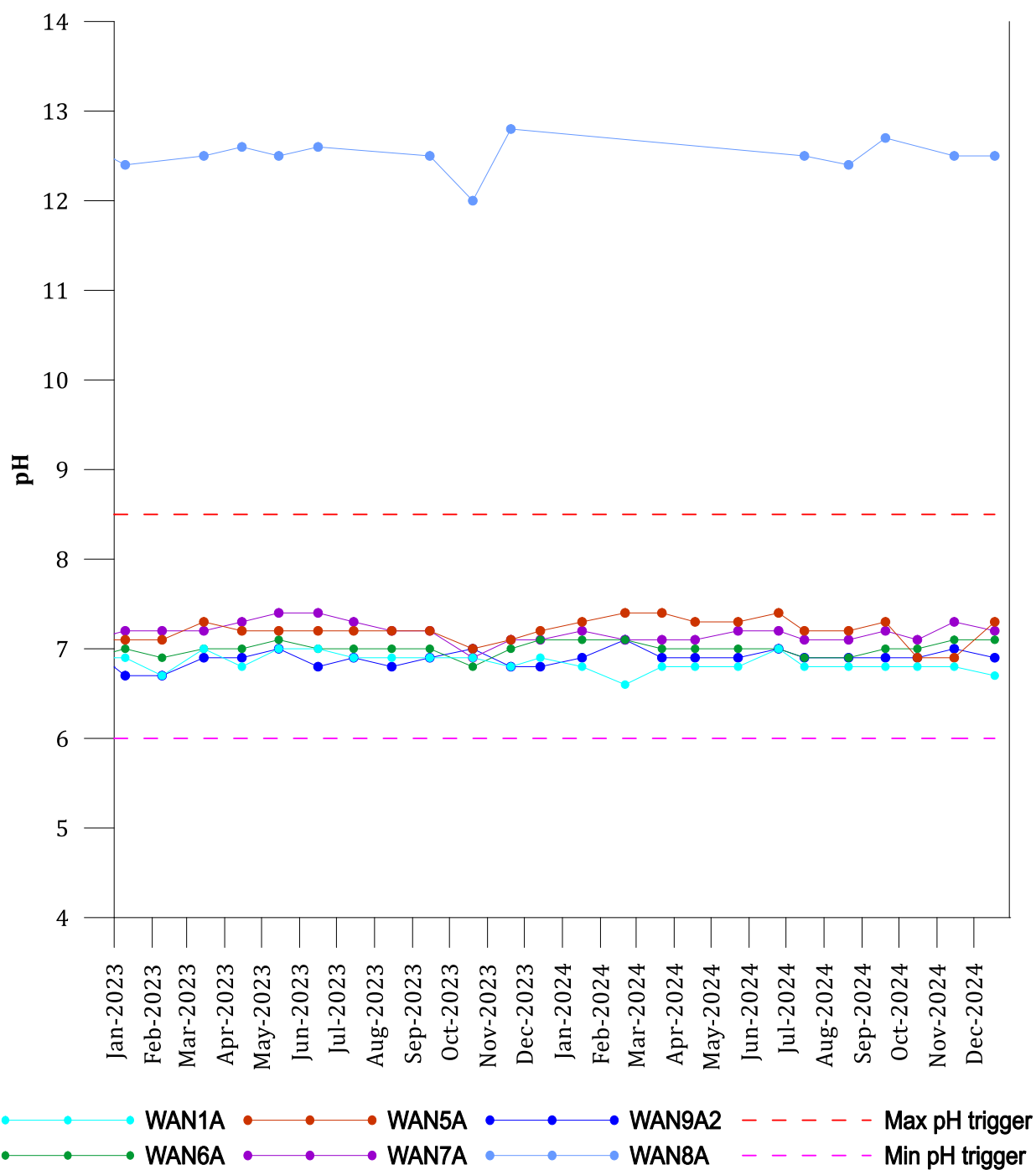


Figure 7.1 pH trends – Hunter River alluvial bores

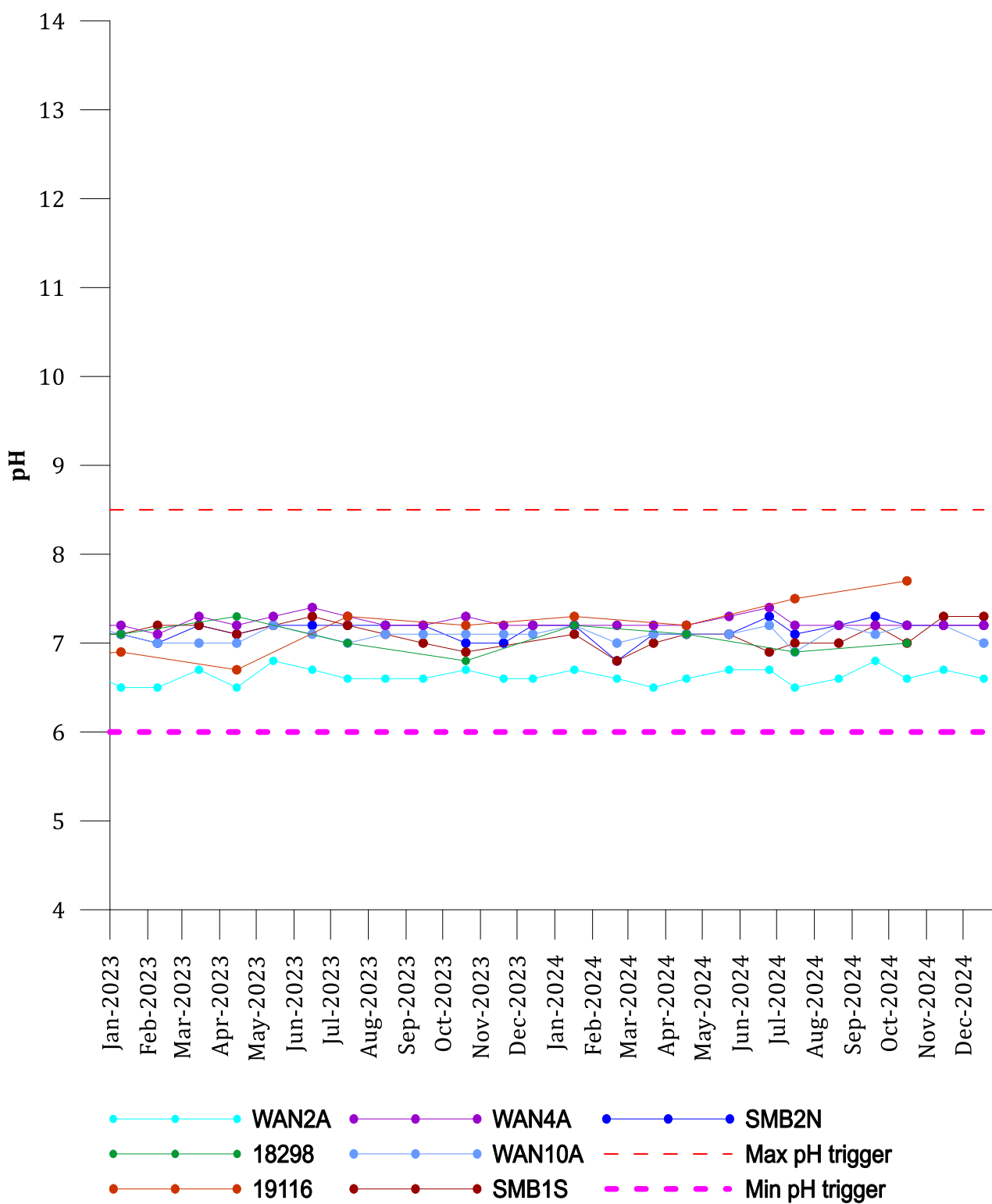


Figure 7.2 pH trends – other alluvial bores

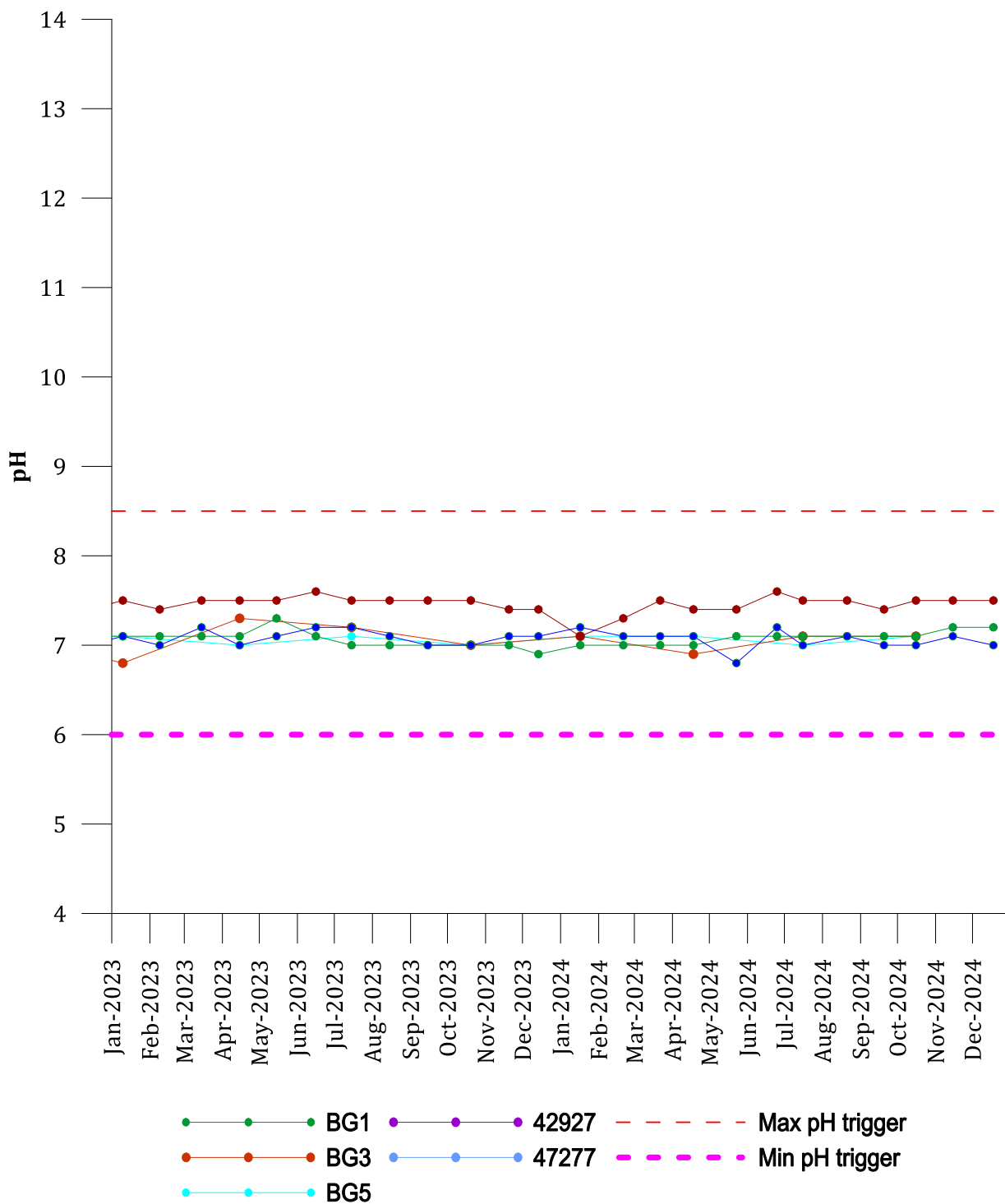


Figure 7.3 pH trends – Regional alluvial bores

7.2.2 EC

Figure 7.4 and Figure 7.5 show EC trends in alluvial bores in the Wantana Extension Area and Regional alluvial monitoring bores, respectively.

Generally, the EC in the alluvium is less than 1,500 $\mu\text{S}/\text{cm}$, indicating that the alluvial groundwater in the Wantana Extension area is similar to groundwater in the regional alluvial bores. The exceptions were SMB1S and SMB2N in which groundwater EC was around 2,000 $\mu\text{S}/\text{cm}$, and WAN8A in which groundwater EC was around 8,000 $\mu\text{S}/\text{cm}$.

Water quality trigger events in 2024 are described in Section 7.5.

WAN4A has been recording a steady decline in EC since early 2015, with the last recorded value 1,150 $\mu\text{S}/\text{cm}$ (December 2024). WAN4A is on a “spur” of alluvium to the south of Bengalla’s southern endwall. The coal seams in this area have been depressurised due to mining and the decrease in pressure has allowed local infiltration of less saline river water in the alluvium causing a decrease in EC (see Appendix B for discussion of Hunter River salinity). The water level in this bore does not appear to be impacted. The EC values in this bore should continue to be monitored.

The EC values for WAN8A, which is screened in the alluvium, have historically ranged between 1,282 $\mu\text{S}/\text{cm}$ (Nov 2007) and 8,870 $\mu\text{S}/\text{cm}$ (May 2010). Groundwater EC values in 2024 continue to be elevated, likely representing stagnant water accumulated in the sump of WAN8A, rather than a representative sample of the screened formation. Groundwater levels (Section 6.1.3) and pH (Section 7.2.1) also support this conclusion and WAN8A has been recommended for replacement.

For most of 2024, monitoring bores WAN7A and SMB1S reported EC values between 1,500 $\mu\text{S}/\text{cm}$ and 2,000 $\mu\text{S}/\text{cm}$. Although some of these results are above 1,500 $\mu\text{S}/\text{cm}$, these bores have generally remained consistent throughout 2024 and are comparable to historical values (Figure 7.4). EC readings in SMB2N remained mostly consistent with readings around 2,000 $\mu\text{S}/\text{cm}$ but recorded abnormally high readings during the end of 2024 of 2,400 $\mu\text{S}/\text{cm}$ (November) and 2,612 $\mu\text{S}/\text{cm}$ (December). The last reading is above the Stage 2 trigger and requires further investigation. Similar to 2023, monitoring bore WAN10A recorded multiple anomalously high EC values above the Stage 1 trigger criteria (1,367 $\mu\text{S}/\text{cm}$) throughout 2024 but not three consecutive exceedances, so to further investigation is required.

Regional monitoring bore BG3 is situated along strike to seams currently being mined at Bengalla (and north of Mt Arthur Mine where the same geological profile is mined), and has historically shown significant variation in EC, following a generally decreasing trend since 2015. EC values generally decreased in this bore through 2024 (Figure 7.5). This follows a period of higher EC in 2023 (average EC of 1,825 $\mu\text{S}/\text{cm}$ during 2023 and 1,498 $\mu\text{S}/\text{cm}$ during 2024).

EC values in alluvial bores generally remained stable between 2023 and 2024, with fluctuations coincident with increased rainfall over 2024 or natural variability. There does not appear to be any long-term trends that would indicate mine related impacts on EC within these bores.

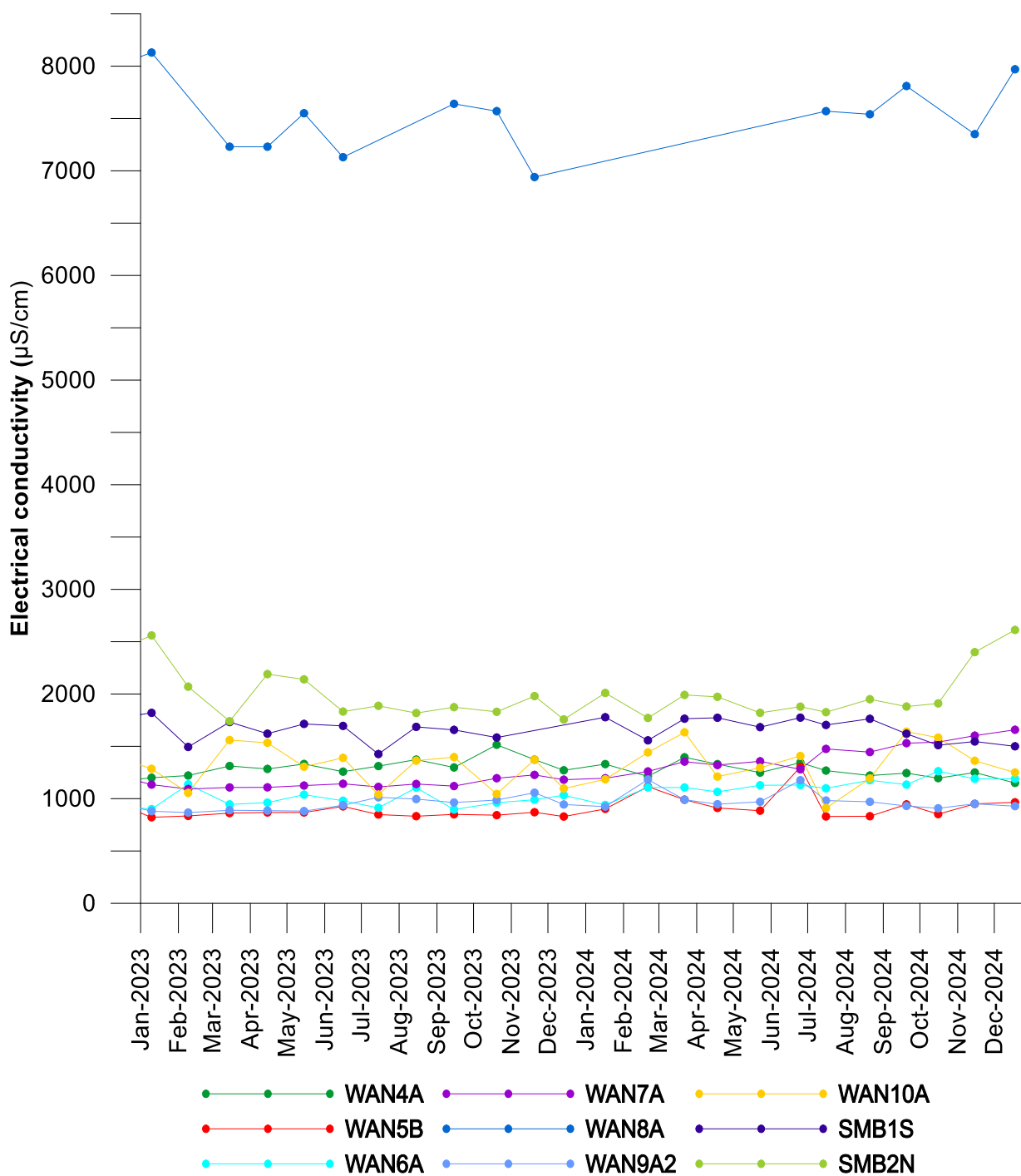


Figure 7.4 EC trends – Hunter River Alluvium (Wantana Extension)

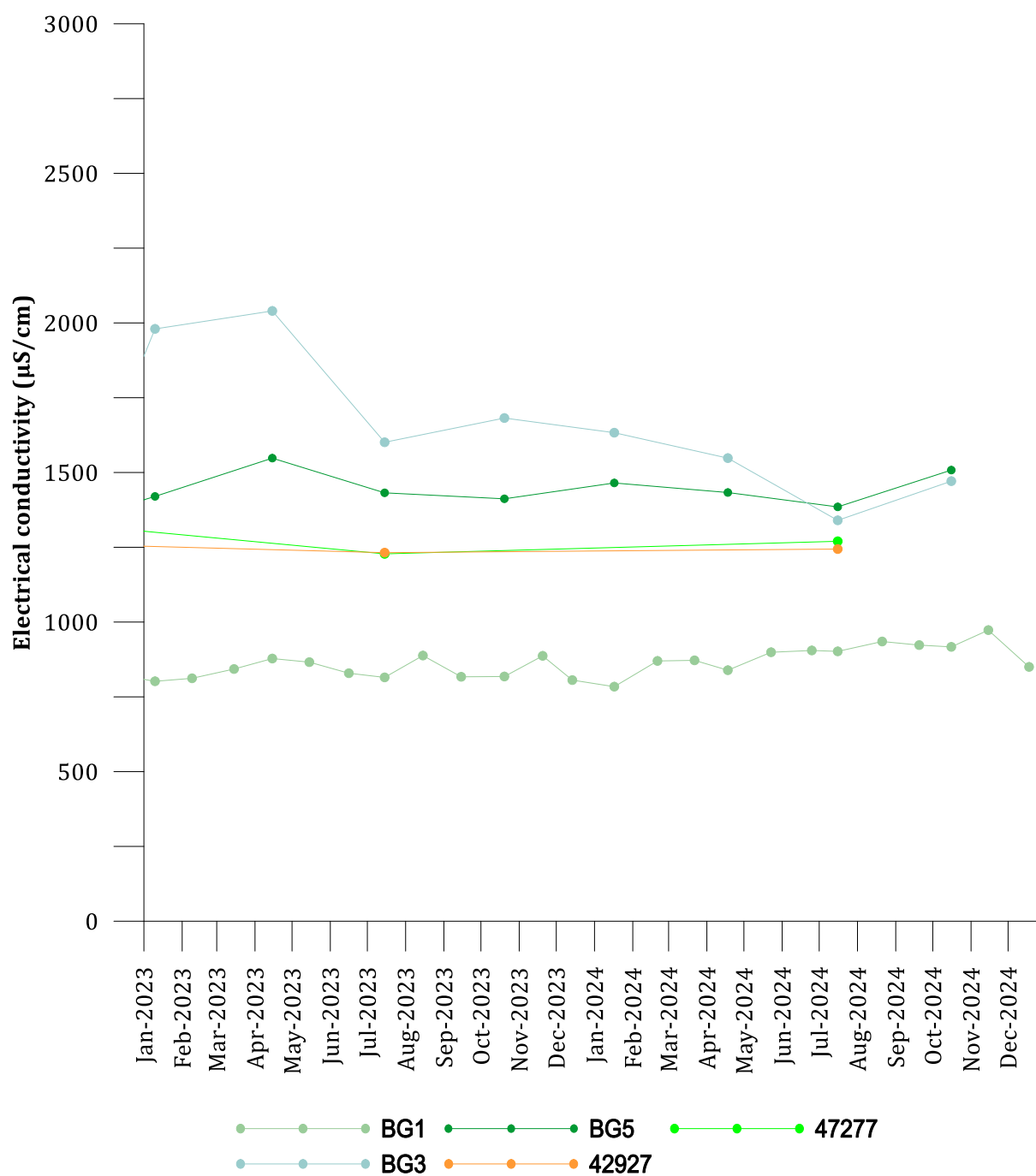


Figure 7.5 EC trends – Hunter River Alluvium (Regional)

7.3 Coal seam and interburden water quality

7.3.1 pH

Figure 7.6 and Figure 7.7 show pH trends for coal seam units and interburden bores in the Wantana area, respectively. Groundwater pH trends in coal seams and interburden have remained circumneutral and stable and generally share the same trends over 2024. No coal seam/interburden bores have exceeded pH trigger values throughout 2024.

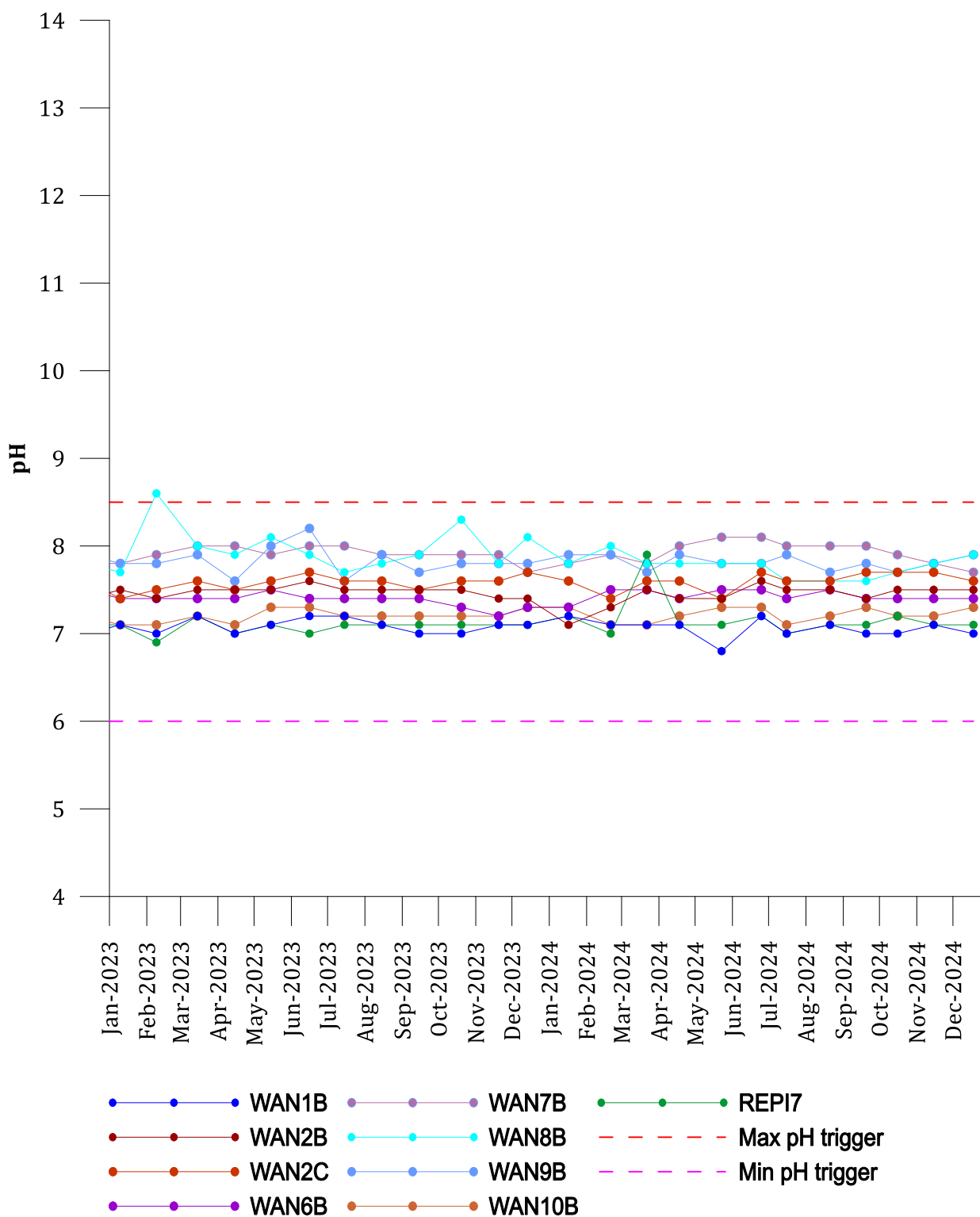


Figure 7.6 pH trends – coal seam aquifers

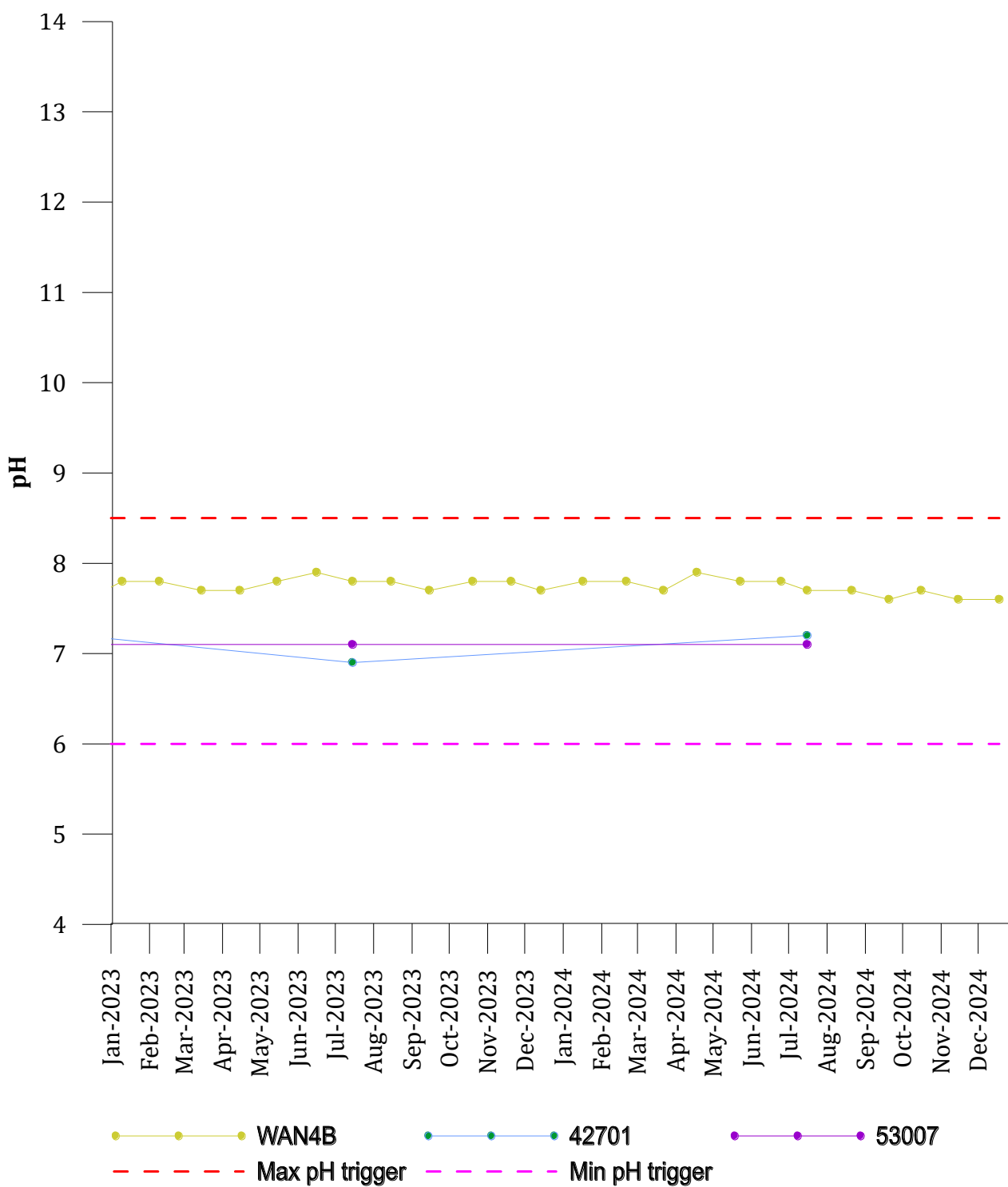


Figure 7.7 pH trends – coal seam aquifers (Wantana Area)

7.3.2 EC

Figure 7.8 and Figure 7.9 show EC trends for coal seam and interburden bores in the Wantana area and Regional monitoring bores, respectively. Water quality trigger events in 2024 are described in Section 7.5.

The coal seam and interburden bores can be separated into three distinct groups by groundwater EC:

- bores that have EC measurements generally less than 2,000 $\mu\text{S}/\text{cm}$, including WAN1A, WAN1B, WAN2A, WAN6B, and WAN9B (lower EC group; Figure 7.8);
- bores that have EC measurements between 2,000 $\mu\text{S}/\text{cm}$ and 3,000 $\mu\text{S}/\text{cm}$, including WAN2B, WAN2C, WAN4B, WAN7B and WAN8B (Figure 7.8); and
- bores that have EC measurements between 3,000 $\mu\text{S}/\text{cm}$ and 9,000 $\mu\text{S}/\text{cm}$, including WAN5A, and WAN10B that are within the expected range for coal seam bores (Figure 7.8 and Figure 7.9).

The lower EC group may reflect seepage from the alluvium.

Groundwater EC in the following nine coal seam monitoring bores exceeded their derived triggers at some point in 2024 (Table 7.1):

- REP17.
- WAN1B.
- WAN2A.
- WAN2C.
- WAN6A.
- WAN8A.
- WAN10A.
- WAN10B.

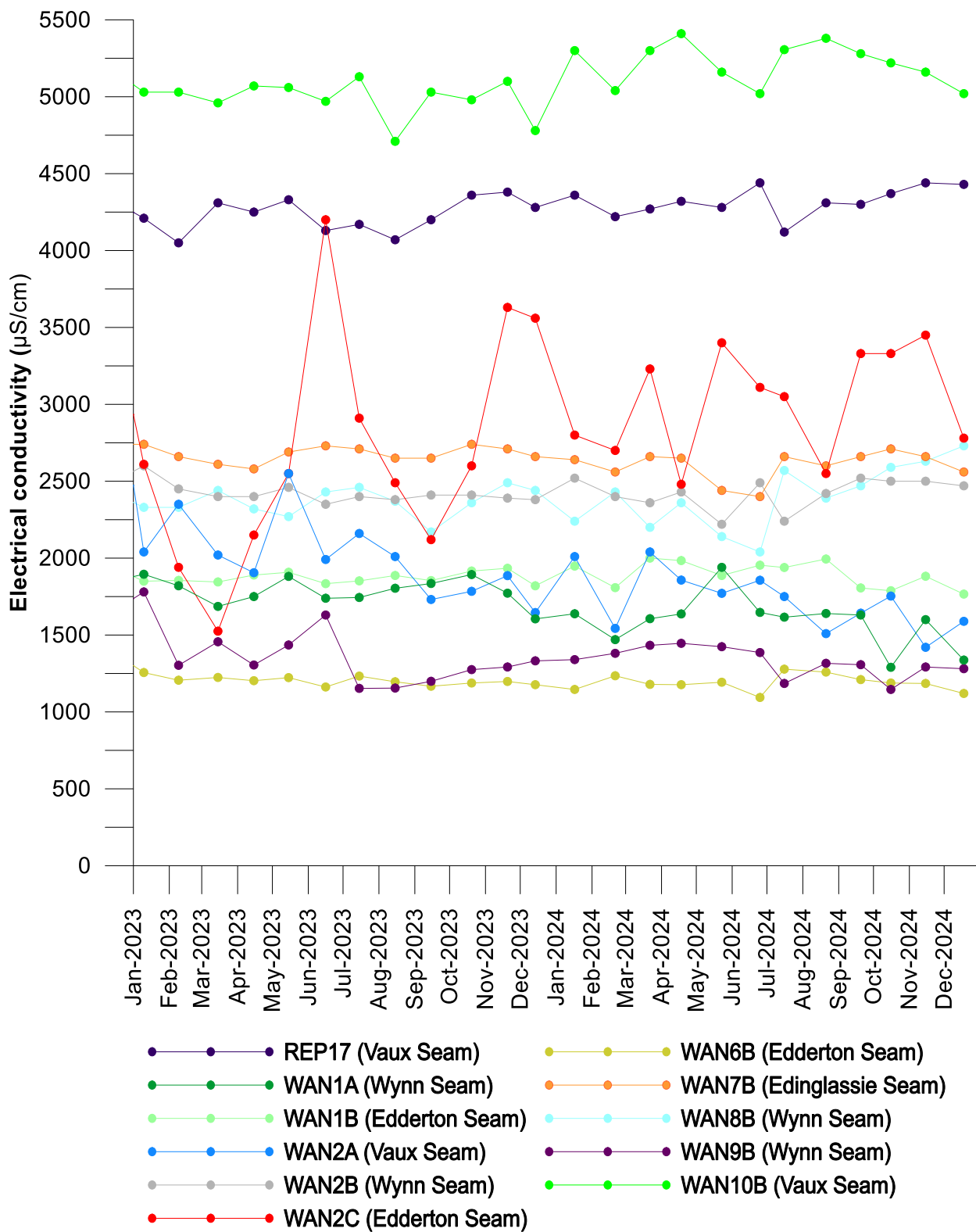


Figure 7.8 Electrical conductivity trends – Coal seam aquifers (Wantana Area)

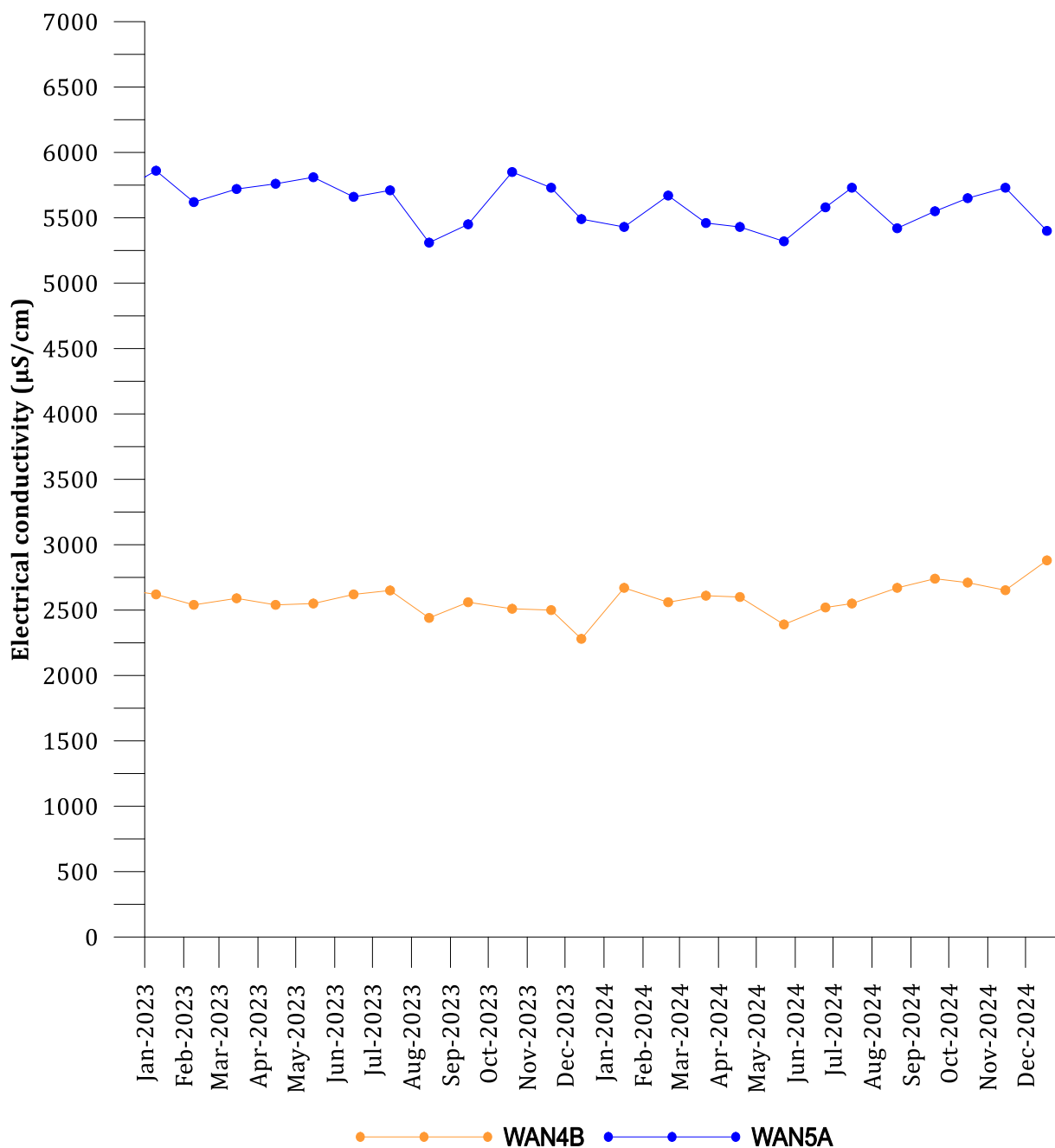


Figure 7.9 Electrical conductivity trends – Deep Permian bores

7.4 Permian groundwater quality – northwest of active mining

Figure 7.10 and Figure 7.11 show the EC and pH, respectively, for bores to the northwest of active mining. These bores include:

- BE1;
- BE2; and
- BE3.

Figure 7.10 shows differing trends for bores BE1 and BE2, wherein EC decreased between January 2023 and November 2024 in BE1, while bore BE2 showed an increasing trend over the same period. BE3 was decommissioned during November 2023 due to pit progression.

Figure 7.11 shows pH values have remained circumneutral and stable through 2024. Groundwater pH values for all monitoring bores are within historic ranges and within trigger bounds.

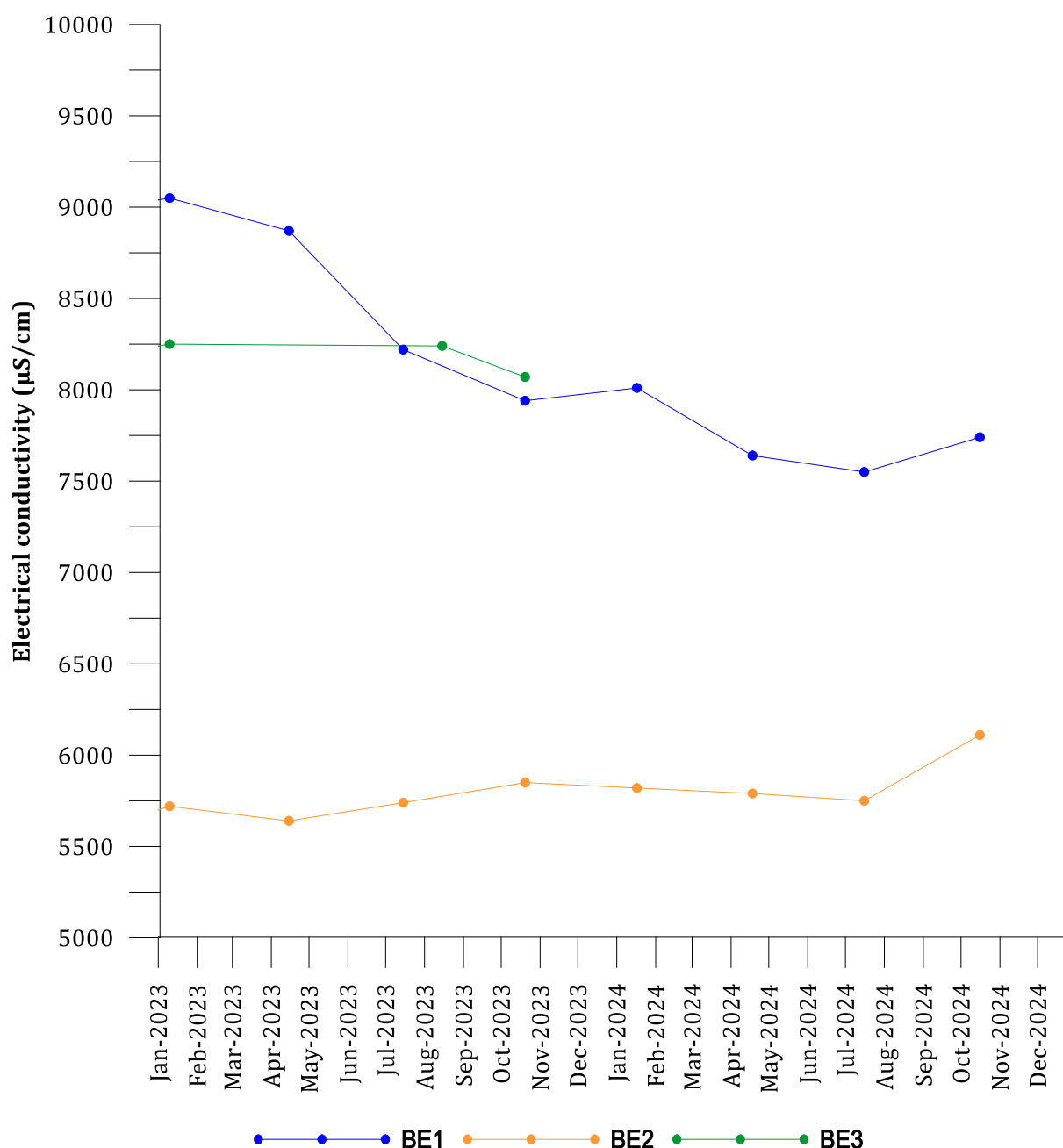


Figure 7.10 Electrical conductivity of Permian bores to the northwest of active mining

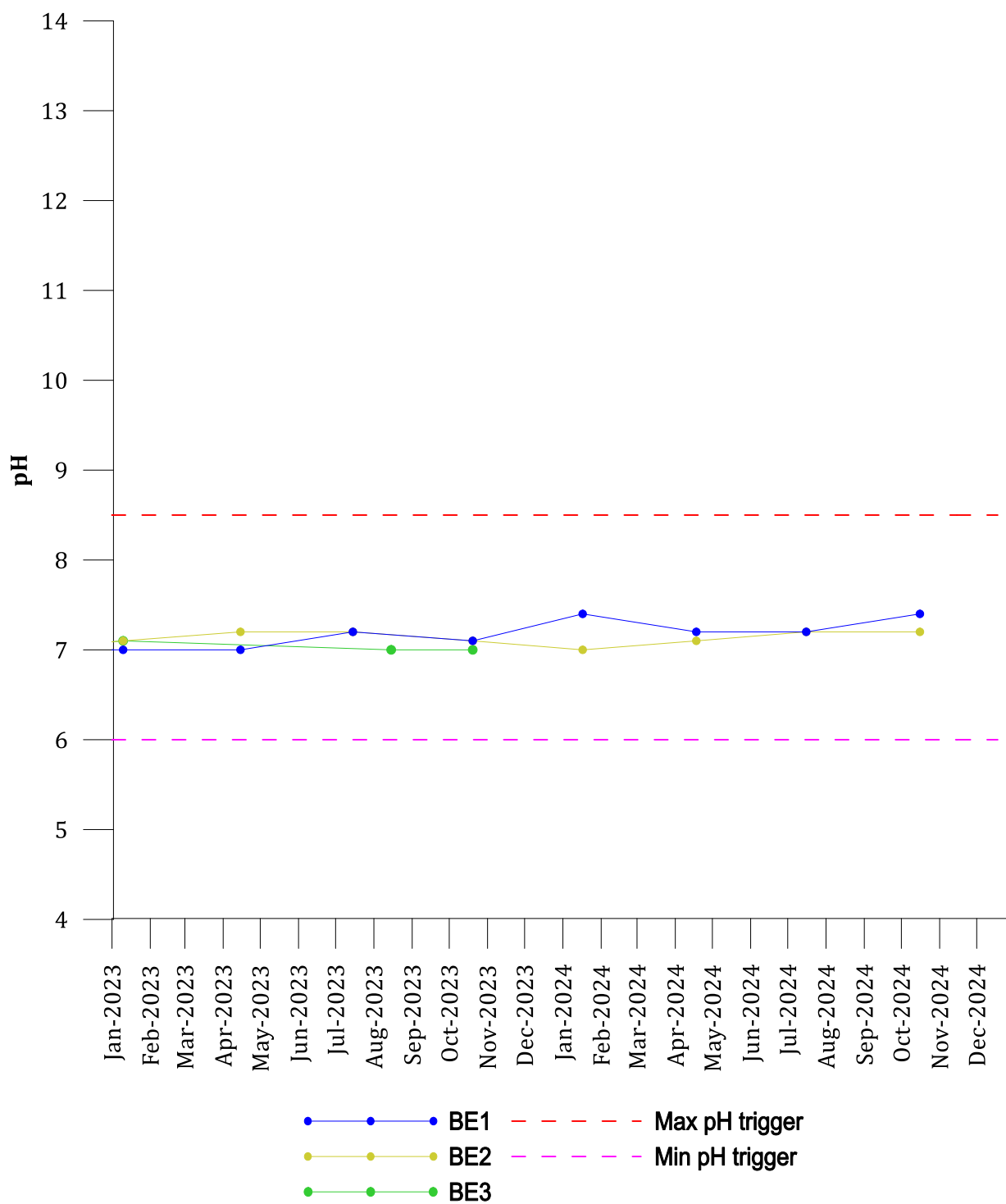


Figure 7.11 pH of Permian bores to the northwest of active mining

7.5 Water quality trigger events

Water quality monitoring data was compared to trigger values in the current WMP (Version 6, December 2023). Twelve sites had groundwater quality trigger events in 2024.

7.5.1 pH

With the exception of WAN8A, which recorded five consecutive exceedances for pH in 2024, all groundwater monitoring bores in the network have recorded values within the assigned trigger range. Elevated pH values for WAN8A were investigated in 2017 and were found to be unrelated to mining (refer Section 7.2.1) and further analysis identified that this bore is nearly dry and is recommended for replacement (AGE 2024). Results from this report further indicate that the water in this bore is stagnant, and not representative of the target formation in which the bore is screened.

7.5.2 EC

A comparison of monitoring results to EC triggers revealed that fourteen monitoring bores exceeded their respective EC triggers during the 2024 monitoring period (refer Table 5.1 for trigger levels). Eleven of these exceedances trigger the response protocol as outlined in the WMP, which was updated in December 2023 (WMP 2023 – BMC) to better incorporate historical data. The relevant monitoring data and trigger events are summarised in Table 7.1 and discussed further in the following paragraphs.

Stage 2 maximum EC trigger levels for Alluvial bore 47277 and Deep Permian boreholes 28510, 42701 and 53007 were markedly reduced in the updated 2023 WMP (Table 5.1). This decrease in the trigger level has placed current EC measurements for these bores significantly above the thresholds for notifiable trigger events. All four of the above sites are recorded on an annual basis and all exceeded the trigger criteria for groundwater EC during 2024 monitoring period. An investigation by AGE into these exceedances is currently underway.

Groundwater in Permian sandstone bore BE1 is monitored on a quarterly basis and exceeded the Stage 1 trigger threshold for EC for all monitoring periods during 2024. It should be noted that the trigger threshold criteria for BE1 was updated in the new WMP. From December 2023, trigger criteria for Stage 1 and Stage 2 triggers were updated from 7,186 and 7,190 $\mu\text{S}/\text{cm}$ to 7,420 and 8,280 $\mu\text{S}/\text{cm}$ respectively. During 2024, BE1 continued its trend of reducing EC values and recorded a slight overall reduction through 2024. The continued groundwater EC exceedances in BE1 during 2024 require investigation per the WMP which is already underway. Borehole BE2 lies approximately 1.5 Km to the south of BE1 and similarly monitors interburden Permian sandstone, but converse to BE1, groundwater EC readings in BE2 remain stable and beneath its Stage 1 trigger level (which is lower than the BE1 Stage 1 trigger level).

Groundwater in alluvial monitoring bores located to the east of the mine BG5, SMB2N, WAN2A and WAN6A exceeded their derived triggers for EC consistently throughout 2024.

Groundwater in BG5 exceeded its derived Stage 2 trigger threshold during all quarterly monitoring events. Historically, EC in BG5 has remained below the Stage 1 trigger threshold but recent trends show that EC has increased above the trigger from July 2022 to April 2023, decreasing afterward. The latest WMP assigned lower groundwater EC thresholds to BG5 (Table 5.1) and although readings from 2024 are within historical range and are relatively consistent with those collected during recent historical monitoring, the readings from 2024 all exceeded the most recent Stage 2 trigger threshold (1,341 $\mu\text{S}/\text{cm}$). An investigation by AGE into exceedances in BG5 is currently underway.

Groundwater EC in SMB2N recorded a single Stage 2 EC exceedance in December 2024. Prior to this exceedance, values have remained below their respective Stage 1 thresholds for the entirety of 2024. This exceedance was noted in the latest quarterly groundwater review and SMB2N has been included in the exceedance investigation currently underway by AGE.

Alluvial bore WAN10A recorded multiple readings above its derived Stage 1 trigger level during 2024, registering exceedances on two separate occasions (March and October). Since these do not constitute three consecutive exceedances, no further investigation is required.

Multiple Stage 1 exceedances were also observed in the shallow Permian bore WAN10B (monitoring the Vaux seam), which recorded exceedances in January, March, April, July, and August. As these intermittent exceedances do not constitute three consecutive Stage 1 exceedances, no further investigation is required per the WMP.

WAN2A, which screens both alluvium and the Vaux Seam, recorded an increase in groundwater EC at the beginning of the year, recording Stage 2 trigger exceedances during January and March 2024, with all other recordings during 2024 exceeding Stage 1 trigger thresholds. WAN2A's revised trigger thresholds (WMP 2023 – BMC) are higher than previous thresholds (Table 5.1) however readings are continuing to exceed the trigger. AGE recently reviewed data from WAN2A and attributed the elevated EC to the mobilisation of salts from the unsaturated zone brought on by high rainfall and associated high groundwater levels (WAN2A investigation 2024 - AGE) and are not due to impacts from mining. Therefore, no further investigation is recommended but WAN2A should continue to be monitored.

Readings at WAN6A were above Stage 1 trigger levels for 11 out of 12 recording periods during 2024, registering 10 reportable exceedances. An investigation by AGE into these exceedances is currently underway.

Groundwater EC readings in WAN1B recorded five Stage 1 exceedances during 2024 with readings through the year fluctuating around the Stage 1 trigger threshold. The new Stage 1 trigger threshold (WMP 2023 – BMC) is marginally lower than previous triggers and although readings from 2024 are relatively consistent with recent historical data, the exceedances in WAN1B are currently being investigated by AGE.

Vaux Seam monitoring bore REP17 recorded multiple EC exceedance events throughout the year. REP17 intermittently exceeded the Stage 1 thresholds and recorded two consecutive Stage 1 exceedances in November and December 2024. These exceedances are not part of three consecutive Stage 1 exceedances and so do not require further investigation.

WAN5B, recorded a single reading above the Stage 1 trigger threshold during 2024 and therefore does not meet the exceedance criteria and no further investigation is required.

Table 7.1 Summary of EC trigger exceedances for 2024

Site	28510*	42701*	47277*	53007*	BE1*	BG5*	REPI7	SMB2N*	WAN1B*	WAN2A*	WAN5B	WAN6A*	WAN10A	WAN10B
Lithology	Deep Permian	Deep Permian	Alluvium	Deep Permian	Permian Sandstone	Alluvium	Vaux Seam	Alluvium	Shallow Permian	Alluvium	Deep Permian	Alluvium	Alluvium	Vaux Seam
Stage 1 EC Trigger - 95th Percentile (µS/cm)	1041	991	1244	947	7420	1309	4370	2420	1880	1358	1290	1063	1367	5290
Stage 2 EC Trigger - Maximum EC (µS/cm)	1052	1035	1247	975	8280	1341	4470	2460	2000	1881	1900	1280	1647	5440
Jan-24	-	-	-	-	<u>8010</u>	<u>1465</u>	4360	2010	1948	<u>2010</u>	902	940	1185	5300
Feb-24	-	-	-	-	-	-	4220	1771	1808	<u>1543</u>	1115	1107	1442	5040
Mar-24	-	-	-	-	-	-	4270	1991	2000	<u>2040</u>	990	1107	1634	5300
Apr-24	-	-	-	-	<u>7640</u>	<u>1433</u>	4320	1973	<u>1984</u>	<u>1857</u>	911	<u>1065</u>	1211	5410
May-24	-	-	-	-	-	-	4280	1820	<u>1887</u>	<u>1771</u>	885	<u>1128</u>	1295	5160
Jun-24	-	-	-	-	-	-	4440	1879	<u>1954</u>	<u>1856</u>	1302	<u>1130</u>	1408	5020
Jul-24	<u>1320</u>	<u>1170</u>	<u>1270</u>	<u>1147</u>	<u>7550</u>	<u>1385</u>	4120	1826	<u>1939</u>	<u>1750</u>	830	<u>1099</u>	910	5306
Aug-24	-	-	-	-	-	-	4310	1950	<u>1994</u>	<u>1509</u>	832	<u>1176</u>	1193	5380
Sep-24	-	-	-	-	-	-	4300	1880	1806	<u>1642</u>	945	<u>1134</u>	1640	5280
Oct-24	-	-	-	-	<u>7740</u>	<u>1508</u>	4370	1910	1788	<u>1753</u>	852	<u>1262</u>	1583	5220
Nov-24	-	-	-	-	-	-	4440	2400	1882	<u>1420</u>	950	<u>1190</u>	1362	5160
Dec-24	-	-	-	-	-	-	<u>4430</u>	<u>2612</u>	1766	<u>1589</u>	965	<u>1190</u>	1250	5020

Notes: * indicates investigation is underway.
999 indicates Stage 1 exceedance.
999 indicates Stage 2 exceedance.
underscore signifies exceedance is a trigger investigation event (i.e. Stage 2 or third consecutive Stage 1 exceedance).

8 Comparison to ANZECC guidelines

Groundwater is used for livestock watering on properties in the region as well as for irrigation purposes. Guidelines exist for the protection of these environmental values and are outlined in the Australian and New Zealand Environment and Conservation Council (ANZECC, 2000) guidelines.

Annual speciation results as required by the WMP have been compared to the ANZECC guidelines and are shown in Table 8.1. WAN8A was found to contain insufficient water to sample, having been identified as dry and recommended for replacement. Exceedances of guideline values in 2024 were recorded for iron, fluoride, TDS, and Sodium (Table 8.1).

Table 8.1 July 2024 ANZECC Exceedances

Site	Long term irrigation	Stock water	Stock water - pigs and poultry	Stock water - sheep and dairy cows	Long term irrigation
Analyte in exceedance	Iron (mg/L)	Fluoride (mg/L)	TDS (mg/L)	TDS (mg/L)	Sodium (mg/L)
Exceedance value	0.20 mg/L	2.0 mg/L	3000 mg/L	4000 mg/L	115
28510	<0.05	0.2	857	-	66
37774	<0.05	0.2	1200	-	208
42701	<0.05	0.2	738	-	58
42927	<0.05	0.2	810	-	61
46737	<0.05	1.1	-	4090	956
47277	<0.05	0.2	852	-	74
53007	<0.05	0.2	730	-	57
BE1	2.06	4.1	-	4790	1740
BE2	0.29	2.0	-	3660	1190
BG1	<0.05	0.2	490	-	56
BG3	<0.05	0.3	782	-	124
BG5	<0.05	0.2	800	-	79
REP17	<0.05	0.9	2390	-	758
SMB1S	<0.05	0.2	1030	-	151
SMB2N	0.18	0.3	1040	-	190
WAN1A	2.46	0.7	940	-	226
WAN1B	0.15	0.6	1160	-	308
WAN2A	1.3	0.8	1020	-	183
WAN2B	0.64	3.5	1400	-	587
WAN2C	0.93	2.8	1560	-	534
WAN4A	<0.05	0.4	744	-	143
WAN4B	<0.05	1.1	1430	-	460
WAN5A	2.5	1.0	-	3390	1120
WAN5B	1.43	0.2	467	-	56
WAN6A	<0.05	0.2	702	-	53
WAN6B	0.07	1.0	704	-	206
WAN7A	<0.05	0.3	822	-	134
WAN7B	<0.05	1.5	1560	-	624
WAN8B	0.8	2.8	1510	-	516
WAN9A2	0.23	0.2	568	-	64
WAN9B	0.19	5.4	753	-	305
WAN10A	<0.05	0.4	534	-	87
WAN10B	0.12	1.1	-	3060	966

9 Summary

9.1 Groundwater levels

A review of groundwater level trends indicates the following:

- Alluvium groundwater levels have remained consistent with the CRD, increasing during heavy rainfall in early 2024 (April and May) and declining during the remainder of the year due to below average rainfall. Water level contours and flow directions are generally consistent with previous years.
- Regional alluvium bore BG3 exceeded Stage 1 triggers a multiple times throughout 2024 and previously in 2023. These exceedances, however, were interrupted by water levels above (sometimes very slightly above) the Stage 1 trigger level and so three consecutive exceedances were not reached. No further investigation is necessary at this time but diligent monitoring of this bore should continue.
- The Hunter River water level data indicates that, whilst periods of higher rainfall correlate with elevated river levels, the Hunter River generally displays relatively stable water levels due to being regulated by the Glenbawn Dam.
- On a regional scale, groundwater in the alluvium flows south-west, generally parallel to the flow of the Hunter River. However, close to the Wantana Extension, alluvial groundwater flows towards the pit, likely due to the depressurisation of coal seams subcropping beneath the alluvium. This is consistent with the 2013 EIS (AGE, 2013a) that states *“The groundwater model predicts that mining associated with the Project will induce flow from the alluvium to the Permian. This is a reversal of the flow direction under pre-mining conditions”*, and *“The model predicts mining will continue to depressurise and lower groundwater levels in the Permian sequence, but this will not result in drawdown extending a significant degree into the alluvial aquifer system, with model drawdown calculated to be less than 1 m.”*
- The coal seams and interburden in the Wantana Extension show evidence of depressurisation due to mining, and there is potential in this area for seepage from the alluvium to the coal seams. A pressure head differential of up to 18 m (WAN4, WAN9 and WAN10) is evident between the alluvium and the coal seams. In 2024, as compared to 2023, this differential remained stable due to below average rainfall. This depressurisation is in line with the EIS groundwater model predictions that state *“The water level in the deep aquifer is expected to fall reducing the availability of water in this aquifer”*. Bengalla’s target coal seams are included in the *“deep aquifer”* layer of the groundwater model.
- WAN1B (Edderton seam), has shown mining induced depressurisation from mid-2010 to late-2011 and subsequent water level recovery. The water level appears to have recovered to above the pre-mining level. This demonstrates that water levels in depressurised coal seams can recover post-mining.
- WAN2C declined approximately 6 m between September 2005 and December 2006 but has remained relatively unchanged thereafter. The bore was blocked with an obstruction in September 2016, which was cleared in October 2019, and has since recorded groundwater levels of approximately 100 mAHD.
- A steep hydraulic gradient exists near WAN8A and BG1. It appears likely that water is flowing from the edge of the alluvium, which is recharged via the regulated Hunter River, into the depressurised Wynn Seam. Bore WAN8A has been identified as nearly dry and recommended for replacement.
- Bores to the northwest of the active mining area (i.e. future mining area) showed very little change in groundwater level across the monitoring period. Groundwater elevation in 46737 is no longer increasing following a sharp increase from August 2022 to October 2022 and has remained stable throughout 2023 and 2024. This is consistent with the EIS groundwater model predictions. The eventual removal of those seams and overburden will completely depressurise the whole profile at that location and an area outside of the highwall location.
- The Edderton Seam at VWP installations BE1, BE2 and BE3 shows signs of seam depressurisation. The sensor at BE1 recorded a significant increase in pressure head in July/August 2023. Subsequently during 2024, pressure head at this sensor continued to steadily decline at a rate similar to that recorded prior to 2023.
- The Mt Arthur Seam at VWP installations BE1, BE2, BE3 and BE5 also shows signs of seam depressurisation. Overall, pressure head trends in BE1 and BE2 remained stable or slightly decreased in 2024. Pressure head at these locations will continue to decline as the pit progresses westward.
- Due to mining progress, the VWP installations at BE3 and BE5 were decommissioned in October 2023 and April 2024 respectively.

9.2 Groundwater quality

A review of pH monitoring data indicates the following:

- All monitoring bores recorded groundwater pH values within triggers and share similar pH trends, with the exception of WAN8A (see next paragraph).
- WAN8A has historically presented elevated pH measurements and exceeded the trigger value in August 2017. During the five out of twelve months of 2024, pH values in WAN8A were consistently high (around 12.5). For the remaining four months WAN8A did not contain sufficient water for sampling. WAN8A likely contains stagnant water and the elevated pH in this bore should not be considered representative of the screened formation. WAN8A is recommended for replacement.
- BE series bores show little change in pH (7.0 – 7.4) over the reporting period.

A review of EC monitoring data indicates the following:

- Alluvial bores BG5 and 47277 and Deep Permian boreholes 28510, 42701 and 53007 Stage 2 maximum EC trigger levels were reduced in the updated WMP. These bores are all located in the Hunter River alluvial plain northeast of Bengalla Mine. The decrease in the trigger level has placed readings for these bores significantly above the thresholds for reportable trigger events. All four of the above sites are recorded on an annual basis and all exceeded the trigger criteria for groundwater EC during this monitoring period. An investigation by AGE into these exceedances is currently underway.
- Wantana Extension area alluvial bores WAN2A and WAN6A have recorded groundwater EC trigger exceedances during 2024 and require investigation per the WMP. AGE recently reviewed data from WAN2A and attributed the elevated EC to the mobilisation of salts from the unsaturated zone brought on by high rainfall and associated high groundwater levels (WAN2A investigation 2024 - AGE). An investigation by AGE into the exceedances seen in WAN6A is currently underway.
- Wantana Extension area Permian bore WAN1B recorded eight of twelve readings above Stage 1 groundwater EC trigger levels during 2024, amounting to 6 reportable exceedances during 2024. An investigation by AGE into these exceedances is currently underway.
- Bores WAN10A and WAN10B recorded multiple readings above the Stage 1 trigger criteria but not three consecutive exceedances and so no further investigation is required.
- Monitoring bore REP17, screening the Vaux Seam, recorded two Stage 1 EC trigger exceedances during November and December 2024. EC values in 2024 remained consistent with values from the previous reporting periods, which were generally recorded at or above the previous Stage 2 EC trigger levels. These trigger levels were updated as part of the latest approved WMP. The exceedances were not part of three consecutive exceedances and so does not require further investigation.
- Groundwater quality within the bores to the northwest of the active mining area (BE1, BE2) showed differing groundwater EC trends despite the fact they both monitor Permian interburden units. Groundwater EC in BE1 was consistently above the Stage 1 trigger threshold in 2024 whereas BE2 remained relatively stable below trigger thresholds. Groundwater EC exceedances observed in bore BE1 during 2024 are currently being investigated by AGE.
- SMB1S and SMB2N present EC values that have generally remained consistent throughout 2024 and recent years, except in December 2024 where SMB2N recorded a single Stage 2 trigger exceedance in December 2024. This had been noted in the latest quarterly groundwater review and is currently being investigated by AGE.
- EC values in alluvium monitoring bores are less than 1,500 $\mu\text{S}/\text{cm}$, except for SMB1S, SMB2N, WAN7A and WAN9A2. This is likely to be a natural phenomenon associated with proximity to coal seam subcrop and their influence on the water quality locally.
- WAN4A EC values steadily declined during 2024, consistent with previous reporting periods, recording a measurement of 1,150 $\mu\text{S}/\text{cm}$ in December 2024. The bore is likely impacted by underlying coal seam depressurisation due to mining. The decrease in pressure may have allowed local infiltration of less-saline river water into the alluvium, causing a decrease in EC. The water level in this bore does not appear to be impacted. The water quality appears to be returning to a level in line with the pre-2008 water quality in this bore. The EC values in this bore should continue to be monitored.

- BG3 displayed an increase in EC to mid-2023 but has been generally decreasing throughout 2024. No triggers were exceeded. This bore is situated to the south of Bengalla (and north of Mt Arthur where the same geological profile is mined), along strike from actively mined coal seams which are known to be depressurising. The rise in EC in BG3 was most likely brought on by localised infiltration of mobilised salts in the unsaturated zone above the alluvium because of increased alluvial groundwater levels in 2022. Recent groundwater EC data in BG3 shows signs of recovery and a continued declining trend was observed during 2024.
- EC data within the coal measures and interburden is generally between 2,500 $\mu\text{S}/\text{cm}$ and 9,000 $\mu\text{S}/\text{cm}$, which is the expected EC for coal measures and interburden.
- Four bores in the coal seams (WAN1A, WAN1B, WAN6B, and WAN9B) show EC less than 2,000 $\mu\text{S}/\text{cm}$, suggesting leakage from the alluvium due to depressurisation of the coal seams. WAN9B has historically recorded EC at or above 2,000 $\mu\text{S}/\text{cm}$. EC values in WAN9B remained stable throughout 2024, with the latest recorded measurement in December being 1,281 $\mu\text{S}/\text{cm}$. It should be noted that WAN1A and WAN2A are screened nearby the contact of a coal seam and alluvial material and are not considered to be screened wholly within coal. This freshening of the alluvium, coal measures, and interburden was predicted in the EIS groundwater model, which states *“Water quality in the alluvial sediments will improve as a result of decreased discharge of water from hardrock aquifers to the alluvial aquifer due to aquifer depressurisation.”*
- Groundwater chemistry data collected in 2024 was compared to the ANZECC guidelines. Multiple locations exceed the ANZECC guidelines for iron (long term irrigation), fluoride (stock water), TDS (stock water), and sodium (long term irrigation).

10 Recommendations

Recommendations based on the information provided in this (and previous) annual reports include:

- Investigate groundwater EC exceedances in boreholes 28510, 42701, 47277, 53007, BE1, BG5, WAN1B, WAN2A, WAN6A, and SMB2N (all currently underway).
- Continue to monitor water levels in bores where access allows. The water levels should be investigated if the respective water levels drop below the trigger criteria.
- A replacement bore should be installed for WAN8A, WAN8B, and WAN3, with an awareness that very low water levels observed in these bores are likely not representative of the aquifer. Replacement of WAB3 and WAN8A has recently been recommended by AGE but WAN8B should be included in this consideration.
- At present the spatial coverage of monitoring installations to the west of the pit is limited.
 - install new monitoring bores/WMP installations to the west of the advancing pit to replace the decommissioned BE3, BE4, and BE5 monitoring installations and incorporate these into future versions of the WMP.
- Previous versions of the WMP, BE2 and BE3 site coordinates appear to have been incorrectly assigned. This issue has reoccurred in the newest version of the WMP (*WMP 2023 – BMC*) in table E3, where BE2 is assigned coordinates that conflict with previous maps, tables and figures. The location of these bores should be surveyed and compared to the approved WMP. This may have implications for derived trigger levels in these bores.
- Groundwater level trigger criteria for BE2 in the current WMP seem to have the values for the max drawdown and trigger level transposed. This should be rectified in future versions of the WMP.

11 References

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- Australasian Groundwater and Environmental Consultants Pty Ltd (2021), "Bengalla Mine Annual Groundwater Report", March 2021 (G1543Y).
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- BMC (2019), "Bengalla Mine. Water Management Plan. Version 7" Bengalla Mining Company. August 2017.
- BMC (2023), "Bengalla Mine. Water Management Plan. Version 6" Bengalla Mining Company. December 2023.

Appendix A

Monitoring bore summary data

Bore ID	Easting MGA94 z56	Northing MGA94 z56	Ground level (mAHD)	Top of casing (mAHD)	Stick- up (m)	Screen Interval/Sensor Depth (mbGL)	Total depth (mBGL)	Bore base elevation (mAHD)	Geology/ Target Seam	Standard WQ/SWL	Installation date	Full suite WQ	Data since	Baseline water level (mAHD)	Baseline measurement date	Max predicted drawdown (mAHD)	Maximum predicted drawdown (m)	WMP bore	Trigger levels (mAHD)	2024 GWL (mAHD)	Measured date	Difference baseline vs. 2024 GWL (m)	Max drawdown vs. 2024 GWL (m) [Available drawdown]	Trigger vs. 2024 GWL (m)
11953 _a	298192	6428693	147	147.97	0.97	-	-	-	Deep Permian	Quarterly	Jan-97	Annually	Oct-03	136.46	1-Feb-00	-	-	No	-	-	-	-	-	-
18298 _b	294375	6423521	132.86	133.47	0.61	-	-	-	Alluvium	Quarterly	Jan-97	Annually	Sep-09	123.53	1-Feb-11	123.19	0.34	Yes	123.2	123.31	Jul-24	-0.22	0.12	0.11
19116 _b	296078	6425589	135.6	136.43	0.82	-	-	-	Alluvium	Quarterly	Jan-97	Annually	Oct-03	127.46	1-May-97	123.24	4.22	Yes	123.2	126.16	Jul-24	-1.3	2.92	2.96
28510 _b	298649	6429105	142.7	144	1.3	-	-	-	Deep Permian	Quarterly	Jan-97	Annually	Aug-09	132.22	1-Feb-00	128.97	3.25	Yes	129	-	-	-	-	-
37774 _b	298488	6428998	145.6	146	0.4	-	-	-	Deep Permian	Quarterly	Jan-97	Annually	Aug-09	134.14	1-Feb-00	128.74	5.4	Yes	128.7	-	-	-	-	-
42701 _b	298586	6428632	144	144.91	0.97	-	-	-	Deep Permian	Quarterly	Jan-97	Annually	Oct-03	133.18	1-Feb-00	131.26	1.92	Yes	131.3	133.52	Jun-24	0.34	2.26	2.22
42927 _b	298843	6428570	144.26	145.36	1.1	-	-	-	Alluvium	Quarterly	Jan-97	Annually	Oct-03	132.29	1-Feb-00	131.11	1.18	Yes	131.1	133.58	Jun-24	1.29	2.47	2.48
46737 _b	291862	6427143	227.69	227.9	0.21	-	-	-	Shallow Permian	Quarterly	Jan-97	Annually	Sep-09	186.05	1-Feb-01	185.31	0.74	Yes	185.3	191.95	Jun-24	5.9	6.64	6.65
47277 _{b,c}	299145	6428643	143.54	144.59	1.06	-	-	-	Alluvium	Quarterly	Jan-97	Annually	Aug-09	133.65	1-Aug-02	132.81	0.84	Yes	132.8	133.64	Jun-24	-0.01	0.83	0.84
53007 _b	298720	6428857	143.97	144.01	0.04	-	-	-	Deep Permian	Quarterly	Jan-97	Annually	Aug-09	133.67	1-Feb-01	131.91	1.76	Yes	131.9	133.51	Jun-24	-0.16	1.6	1.61
64092 _a	297762	6428813	151.27	151.35	0.09	-	-	-	Shallow Permian	Quarterly	Jan-97	Annually	Oct-03	143.98	1-Feb-99	-	-	No	-	-	-	-	-	-
A10 _a	295445	6428834	199.33	199.33	0	-	-	-	Shallow Permian	Quarterly	Jan-97	Annually	Oct-03	184.45	1-Feb-99	-	-	No	-	-	-	-	-	-
BE1 (bore)	293469	6429033	241.48	242.67	1.19	69-75	75	166.48	Permian Sandstone	Quarterly	Jun-12	Annually	Jun-12	172.04	1-Sep-12	156.83	15.21	Yes	156.8	164.45	Jul-24	-7.59	7.62	7.65
BE2 (bore)	292977	6427587	175.2	176.4	1.18	48-54	54	156.22	Permian Sandstone	Quarterly	Jun-12	Annually	Jun-12	167.67	1-Sep-12	18.81	148.86	Yes	18.8	156.91	Jul-24	-10.76	138.1	138.11
BE3 (bore) _a	293374	6425866	175.21	176.39	1.18	48-54	54	121.21	Permian Sandstone	Quarterly	Jun-12	Annually	Jun-12	145.69	1-Sep-12	113.18	32.51	Yes	113.2	-	-	-	-	-
BG1 _b	296656	6426003	138.2	138.78	0.58	-	-	-	Alluvium	Quarterly SWL 8hr logger	Jan-97	Annually	Oct-03	128.24	1-Nov-00	126.84	1.4	Yes	126.8	128.46	Jul-24	0.22	1.62	1.66
BG3 _b	294731	6424413	133.6	133.76	0.16	-	-	-	Alluvium	Quarterly SWL 8hr logger	Jan-97	Annually	Oct-03	126.48	1-Feb-99	126.25	0.23	Yes	126.3	126.35	Jul-24	-0.13	0.1	0.05
BG4 _b	291570	6424648	166.04	166.36	0.32	-	-	-	Shallow Permian	Quarterly SWL 8hr logger	Jan-97	Annually	Sep-09	152.74	1-May-01	149.92	2.82	No	-	-	-	-	-	-
BG5 _b	298609	6427874	142.2	142.51	0.31	-	-	-	Alluvium	Quarterly	Jan-97	Annually	Oct-03	133.35	1-Feb-99	132.4	0.95	Yes	132.4	132.57	Jul-24	-0.78	0.17	0.17
E12 _b	294808	6427576	197.06	197.17	0.11	-	-	-	Shallow Permian	Quarterly	Jan-97	Annually	Oct-03	157.4	1-Feb-99	-	-	No	-	-	-	-	-	-
REP17	295575	6425832	135.47	136.38	0.91	49-52	52	83.47	Vaux Seam	Quarterly	Jan-97	Annually	Jan-97	102.09	1-Jun-10	63.07	39.02	Yes	63.1	90.77	Jul-24	-11.32	27.7	27.67
SMB1S	296955	6426391	141.2	142.47	1.27	13-19	19	122.2	Alluvium	Monthly	Jun-10	Biannually	Aug-10	128.66	1-Aug-11	127.17	1.49	Yes	127.2	128.33	Jul-24	-0.33	1.16	1.13
SMB2N	297124	6426549	141.69	142.61	0.92	15-21	21	120.69	Alluvium	Monthly	Jun-10	Biannually	Aug-10	128.83	1-Aug-11	127.28	1.55	Yes	117.5	128.52	Jul-24	-0.31	1.24	11.02
WAN10A	295828	6425571	135.07	136.13	1.06	Aug-13	13.83	121.24	Alluvium	Monthly	May-09	Biannually	Apr-09	126.74	1-May-09	122.16	4.58	Yes	122.2	126.78	Jul-24	0.04	4.62	4.58
WAN10B	295825	6425578	135.04	136.1	1.06	44-47	47	88.04	Vaux Seam	Monthly	May-09	Biannually	Apr-09	119.2	1-May-09	98.32	20.88	Yes	98.3	109.21	Jul-24	-9.99	10.89	10.91
WAN1A	296519	6426099	140.6	141.35	0.75	16-20	20	120.6	Alluvium/Wynn seam	Monthly	Sep-05	Annually	Aug-09	121.72	1-Sep-05	117.53	4.19	Yes	117.5	125.8	Jul-24	4.08	8.27	8.3
WAN1B	296519	6426099	140.6	141.35	0.75	29-33	33	107.6	Edderton Seam	Monthly	Sep-05	Annually	Aug-09	115.87	1-Sep-05	100.09	15.78	Yes	100.1	121.48	Jul-24	5.61	21.39	21.38
WAN2A	296217	6425824	137.7	138.4	0.7	13-16	16	121.7	Alluvium/Vaux seam	Monthly	Sep-05	Annually	Aug-09	125.23	1-Feb-07	118.47	6.76	Yes	118.5	125.79	Jul-24	0.56	7.32	7.29
WAN2B	296217	6425824	137.7	138.44	0.74	36-39	39	98.7	Wynn Seam	Monthly	Sep-05	Annually	Aug-09	111.8	1-Feb-07	86.38	25.42	Yes	86.4	105.24	Jul-24	-6.56	18.86	18.84
WAN2C	296217	6425824	137.7	138.43	0.73	51-54	55	83.7	Edderton Seam	Monthly	Sep-05	Annually	Aug-09	100.44	1-Feb-07	75.02	25.42	Yes	75	100.24	Jul-24	-0.2	25.22	25.24
WAN3 _{ae}	295772	6425713	136.4	136.7	0.3	2.5-87	87	49.4	Deep Permian	Monthly	Sep-05	Annually	Aug-09	126.64	1-Sep-05	-	-	Yes	-	-	Jul-24	-	-	-
WAN4A	295442	6425690	135.1	135.93	0.83	11.5-14.5	14.5	120.6	Alluvium	Monthly	Sep-05	Annually	Aug-09	126.64	1-Sep-05	121.16	5.48	Yes	121.2	126.34	Jul-24	-0.3	5.18	5.14
WAN4B	295442	6425690	135.1	135.89	0.79	21-24	24	111.1	Deep Permian	Monthly	Sep-05	Annually	Aug-09	124.51	1-Sep-05	98.19	26.32	Yes	98.2	115.43	Jul-24	-9.08	17.24	17.23
WAN5A	296019	6425360	135.9	136.74	0.84	10.5-13.5	15.57	121.17	Alluvium	Monthly	Sep-05	Annually	Aug-09	126.74	1-Sep-05	124.31	2.43	Yes	124.3	126.4	Jul-24	-0.34	2.09	2.1
WAN5B _e	296019	6425360	135.9	136.78	0.88	26-29	28.98	107.8	Deep Permian	Monthly	Sep-05	Annually	Aug-09	126.74	1-Sep-05	116.03	10.71	Yes	116	126.58	Jul-24	-0.16	10.55	10.58
WAN6A	296553	6425634	136.9	137.67	0.77	7.5-10.5	10.5	126.4	Alluvium	Monthly	Sep-05	Annually	Aug-09	128	1-Aug-07	126.9	1.1	Yes	126.9	127.91	Jul-24	-0.09	1.01	1.01
WAN6B	296553	6425634	136.9	137.66	0.76	30-33	33	103.9	Edderton Seam	Monthly	Sep-05	Annually	Aug-09	127.92	1-Aug-07	123.82	4.1	Yes	123.8	127.69	Jul-24	-0.23	3.87	3.89
WAN7A	296856	6426254	138.1	138.86	0.76	12.0-15.0	15	123.1	Alluvium	Monthly	Sep-05	Annually	Aug-09	126.8	1-Feb-09	125.4	1.4	Yes	125.4	126.91	Jul-24	0.11	1.51	1.51
WAN7B	296856	6426254	138.1	138.89	0.79	80-83	83	55.1	Edlinglassie Seam	Monthly	Sep-05	Annually	Aug-09	128.7	1-Feb-08	126.41	2.29	Yes	126.4	129.76	Jul-24	1.06	3.35	3.36
WAN8A	296457	6425854	136.41	137.47	1.07	10.7-11.9	12.94	124.53	Alluvium	Monthly	May-09	One off sample	Apr-09	125.64	1-Sep-09	123.29	2.35	Yes	123.3	125.18	Jul-24	-0.46	1.89	1.88
WAN8B	296450	6425855	136.33	137.42	1.09	15-18	19.6	117.82	Wynn Seam	Monthly	May-09	One off sample	Apr-09	118.03	1-Oct-09	108.51	9.52	Yes	108.5	118.21	Jul-24	0.18	9.7	9.71
WAN9A	296326	6425582	136.88	137.98	1.1	8.5-10.5	10.5	126.38	Alluvium	Monthly	May-09	One off sample	Apr-09	126.25	1-Sep-09	123.68	2.57	Yes	123.7	127.17	Jul-24	0.92	3.49	3.47
WAN9B	296328	6425576	136.93	137.88	0.95	21-24	24	112.93	Wynn Seam	Monthly	May-09	Biannually	Apr-09	119.44	1-Sep-09	111.39	8.05	Yes	111.4	114.63	Jul-24	-4.81	3.24	3.23
BE1 (VWP)	293475	6429036	241.48	-	-	120	120	121.48	Warkworth/Mt Arthur	Quarterly	Oct-11	NA	2011	-	-	-	-	-	-	128.83	Jun-24	-	-	-
BE1 (VWP)	293475	6429036	241.48	-	-	264.5	264.5	-23.02	Edderton Seam	Quarterly	Nov-11	NA	2011	-	-	-	-	-	-	143.93	Jun-24	-	-	-
BE2 (VWP)	292977	6427587	204.22	-	-	97.8	97.8	106.42	Warkworth/Mt Arthur	Quarterly	Dec-11	NA	2011	-	-	-	-	-	-	93.96	Jun-24	-	-	-
BE2 (VWP)	292977	6427587	204.22	-	-	212.5	212.5	-8.28	Edderton Seam	Quarterly	Jan-12	NA	2011	-	-	-	-	-	-	127.82	Jun-24	-	-	-
BE3 (VWP) _a	293374	6425866	175.21	-	-	80.6	80.6	94.61	Warkworth/Mt Arthur	Quarterly	Feb-12	NA	2011	-	-	-	-	-	-	-	-	-	-	-
BE3 (VWP) _a	293374	6425866	175.21	-	-	154.6	154.6	20.61	Edderton Seam	Quarterly	Mar-12	NA	2011	-	-	-	-	-	-	-	-	-	-	-
BE4 (VWP) _a	294313	6428784	191.4	-	-	82	228.2	-36.8	Mt Arthur	Quarterly	Mar-17	NA	2017	-	-	-	-	-	-	-	-	-	-	-
BE4 (VWP) _a	294313	6428784	191.4	-	-	213	228.2	-36.8	Edderton Seam	Quarterly	Mar-17	NA	2017	-	-	-	-	-	-	-	-	-	-	-
BE5 (VWP) _a	293696	6427245	181.3	-	-	74	210.15	-28.85	Mt Arthur	Quarterly	Apr-17	NA	2017	-	-	-	-	-	-	-	-	-	-	-
BE5 (VWP) _a	293696	6427245	181.3	-	-	197.5	210.15	-28.85	Edderton Seam	Quarterly	Apr-17	NA	2017	-	-	-	-	-	-	-	-	-	-	-
GW01A	298190	6428409	TBC	TBC	TBC	9-Dec	12	TBC	Alluvium	Monthly	Dec-18	Annually	2019	-	-	-	-	No	-	-	-	-	-	-
GW01B	298190	6428409	TBC	TBC	TBC	24-27	27	TBC	Shallow Permian	Monthly	Dec-18	Annually	2019											

Appendix B

Annual surface water review



Australasian
Groundwater
& Environmental
Consultants

Report on

Bengalla 2024 Annual Surface Water Review

Prepared for
Bengalla Mining Company Pty Ltd

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Bengalla 2024 Annual Surface Water Review

B1 Introduction and scope of work

The Bengalla Mining Company Pty Ltd (BMC) is a joint venture ownership between New Hope Group (80%) and Taipower (20%). BMC operate the Bengalla open cut coal mine (Bengalla), which was officially opened in 1999. Bengalla is located approximately 4 km west of Muswellbrook in the Upper Hunter Valley of New South Wales (NSW). Mining operations target coal from the Warkworth to Edderton seams of the Permian Wittingham Coal Measures.

The approved Bengalla Water Management Plan (WMP) (BMC 2023) sets out the procedures for management of water at Bengalla and includes surface water impact assessment criteria for investigating any potentially adverse impacts to surface water with an emphasis on water quality in the Hunter River (receiving waters).

This report provides a review of surface water quality data against prescribed exceedance triggers at Bengalla in response to recorded exceedances in 2024 for receiving water monitoring sites along the Hunter River. Specifically, this report investigates the source of exceedances by comparing water quality to other water quality monitoring in the Hunter River and identifies the causal pathways for the recent elevated water quality parameters.

As it relates to the WMP, this assessment includes:

- review of meteorological conditions over the relevant period;
- documentation of the timing and location of the exceedance(s);
- investigation into the potential cause of the exceedance, i.e. were there any changes to land use that may have affected surface water over time; and
- discussion on whether the exceedances are attributable to mining at Bengalla and if the results indicate actual or potential harm to the environment.

B2 Site water management

B2.1 Surface Water Monitoring Program

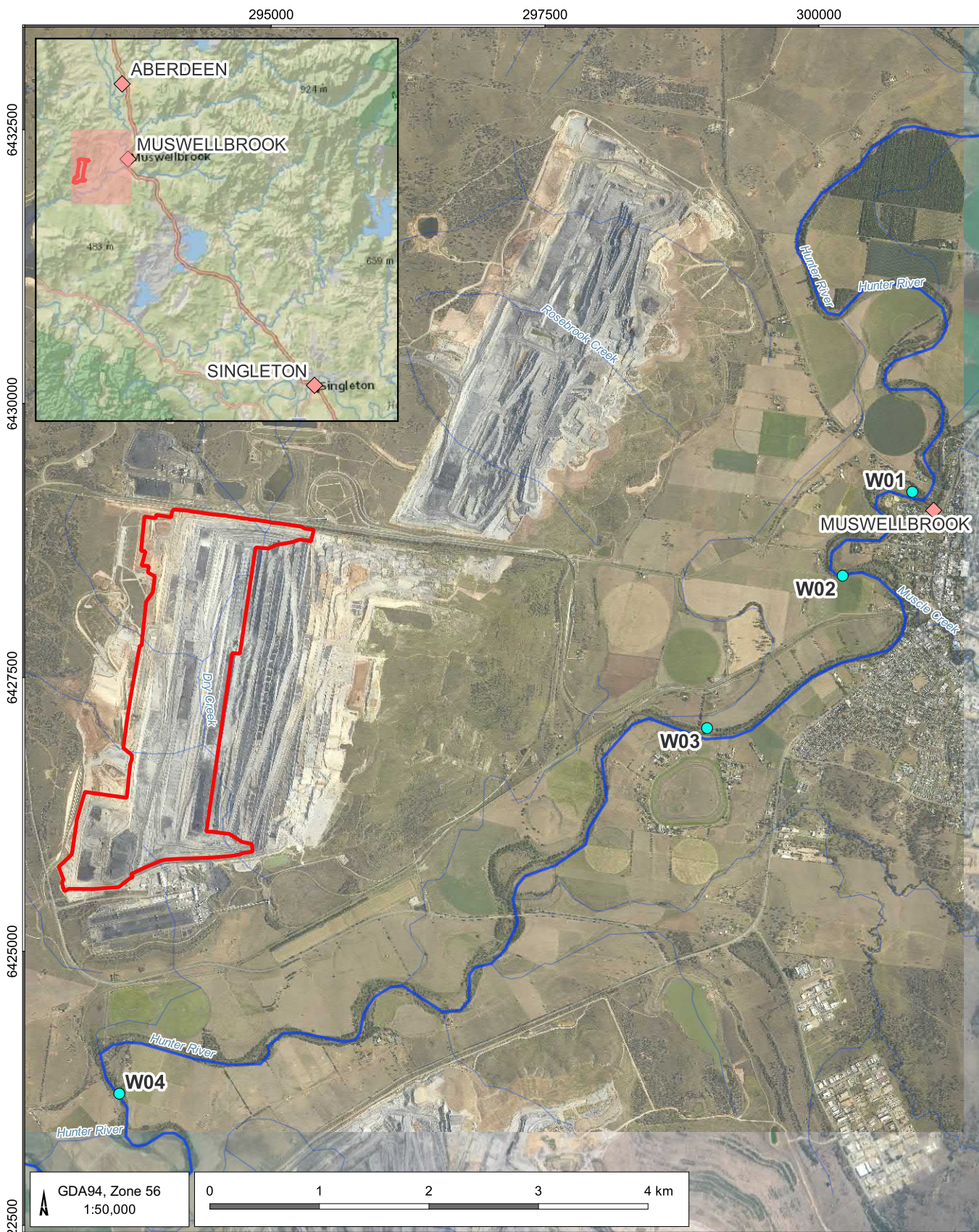
A surface water monitoring program is undertaken at Bengalla to monitor compliance with regulatory requirements and improve the understanding and efficiency of the Bengalla water management system and the effectiveness of surface water management. The monitoring program is in respect of:

- water quality;
- water quantity;
- water management system key infrastructure; and
- stream and riparian vegetation health.

Water quality monitoring is conducted in accordance with the requirements provided in Approved Methods for Sampling and Analysis of Water Pollutants in New South Wales (Department of Environment and Conservation, 2004) and AS 5667:1:1998 Parts 1, 4 and 6. Surface water quality monitoring is undertaken across the Bengalla site (see WMP) but sites relevant to this investigation are those along the Hunter River, which are provided in Table B 2.1 and shown in Figure B 2.1.

Table B 2.1 Surface water monitoring sites along the Hunter River

Site ID	Easting	Northing	Sampling point description	Type of Analysis	Monitoring frequency
W01	300853	6429192	Hunter River (upstream, near Kayuga Road Bridge)	Basic Surface Water Analysis	Monthly
				Surface Water Speciation	6 Monthly
W02	300217	6428426	Hunter River (upstream, Thornbro Dairy – North)	Basic Surface Water Analysis	Monthly
W03	298979	6427035	Hunter River (upstream, Thornbro Dairy – South)	Basic Surface Water Analysis	Monthly
W04	293612	6423698	Hunter River (downstream, Whites Creeks Vineyards)	Basic Surface Water Analysis	Monthly
				Surface Water Speciation	6 Monthly



LEGEND

- Surface Water Sites
- 2024 Void Boundary
- Major Drainage
- Major road
- ◆ Hunter River surface water monitoring sites

NOTE: Aerial Image Capture Date : January 2025
Source: BMC

Bengalla 2024 Annual Surface Water Review
(BEN5024.001)

**Bengalla surface water monitoring
network and (inset) Hunter River
stations**



AGE

DATE
21/03/2025

FIGURE No:

B 2.1

B2.2 Surface Water Triggers

The Bengalla Development Consent (SSD-5170) Schedule 3, Condition 25 stipulates that the surface water management plan must include performance criteria and trigger levels for investigating any potentially adverse impacts associated with activities at Bengalla. The surface water quality impact assessment criteria used as trigger values for assessing Bengalla's surface water impacts to the Hunter River are provided in the WMP and those relevant to this assessment are reproduced in Table B 2.2. The trigger levels are to be based on historic data but, where insufficient local reference data is available, Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) ecosystem trigger values have been adopted (AGI 2000). The Development Consent states that trigger values may be refined or rederived if required following monitoring.

Table B 2.2 Bengalla adopted water quality trigger levels for the Hunter River sites

Parameter	Unit of Measure	Concentration Limit (Trigger)	Comments
pH	pH	6.5 – 8.1	Lower bound based on ANZECC guideline for ecosystem protection, upper bound based on site baseline data
EC	µS/cm	650	Site baseline data adopted, rounded to nearest 10
TSS	mg/L	40	Site baseline data adopted, rounded to nearest 10

B2.3 Response Protocol

Should the monitoring program identify the occurrence of a trigger exceedance at Bengalla, BMC will initiate an investigation (where applicable) to:

- identify the cause of the event;
- determine if the event is an incident and/or non-compliance;
- identify any additional monitoring requirements, mitigation, or management strategies required; and
- review follow-up results, where required, to measure the effectiveness of the mitigation or management strategies.

A technical specialist may be engaged, where required, to undertake the investigation and prepare report.

Following exceedances in surface water quality data collected at the Bengalla Hunter River sites throughout 2024, BMC engaged AGE as the technical specialist to initiate a review of the data.

B3 Surface water exceedance summary 2024

Water quality data is collected by Bengalla and the four Hunter River monitoring sites and assessed for field parameters (pH, EC, TSS) quarterly. AGE have been engaged previously by BMC to undertake quarterly review of groundwater level and quality data collected across the Bengalla groundwater monitoring network. Because of the link between groundwater and surface water, as well as the number of Bengalla bores that target the alluvial aquifer adjacent to the Hunter River, surface water data (pH, EC, and TSS) is included in the quarterly review.

Beginning in mid-2024, EC data collected at all surface water sites began showing elevated levels (Table B 3.1). EC readings exceeded the prescribed trigger level of 650 $\mu\text{S}/\text{cm}$ in each month since June 2024 (except August). These exceedances triggered Bengalla's response plan which required further investigation. A preliminary investigation was undertaken in Q3 2024 (July - September) which compared EC at Bengalla's monitoring sites to EC recorded in the Hunter River at Aberdeen (station ID 210056). The main finding of that investigation was that the elevated EC recorded at Bengalla was due to elevated EC in the Hunter River prior to it passing by Bengalla (i.e. in situ conditions).

The exceedances in EC did not appear to coincide with exceedances in pH or TSS over the same time period (see Table B 3.1), but pH readings were high and exceeded the upper trigger level at several times throughout 2024. TSS was generally consistent with historical data with a few notable spikes (which do not appear to be part of any observed trends) and a few times when the readings exceeded the trigger levels. The patterns in pH and TSS do not appear to be part of an underlying trend but are discussed further in the following subsections.

Table B 3.1 Water quality data from 2024 collected at Bengalla

Parameter	pH				EC				TSS			
Trigger range	6.5 – 8.1				650 $\mu\text{S}/\text{cm}$				40 mg/L			
Date	W01	W02	W03	W04	W01	W02	W03	W04	W01	W02	W03	W04
30-Jan-24	8.1	8.2	8.1	8.0	466	542	486	594	18	21	15	32
27-Feb-24	8.2	8.3	8.1	8.2	461	511	609	495	17	234	22	20
27-Mar-24	8.1	8.1	8.1	8.1	466	453	460	478	15	14	12	19
30-Apr-24	8.0	8.0	8.0	8.0	503	499	523	588	11	7	12	11
29-May-24	8.0	8.0	8.0	8.2	490	477	490	401	5	22	30	45
27-Jun-24	8.3	8.3	8.3	8.3	740	718	788	816	11	11	16	9
25-Jul-24	8.2	8.4	-	8.0	739	717	-	758	8	13	-	14
20-Aug-24	8.0	8.2	8.1	8.2	485	468	473	476	14	28	26	23
27-Sep-24	8.2	8.2	8.1	8.2	883	872	922	911	15	9	6	13
18-Oct-24	8.1	8.1	8.1	-	777	759	817	-	13	16	13	-
26-Nov-24	8.0	8.0	8.1	-	803	810	895	-	20	12	46	-
19-Dec-24	8.0	8.0	7.9	-	662	675	750	-	27	31	27	-

Note: 999 indicates exceedance.

B3.1.1 Surface water pH

The pH-high trigger exceedances were recorded at all monitoring sites during 2024, with all stations remaining either very close to the upper exceedance threshold or exceeding it throughout 2024. Location W03 recorded a single exceedance during June 2024 but remained near the trigger level throughout, whereas all other locations recorded several exceedances and also remained near the trigger level. All pH data for 2024 monitoring and the associated trigger level can be seen in Figure B 3.1 which shows that pH is consistently near the trigger level of 8.1 with several exceedances but an overall stable trend.

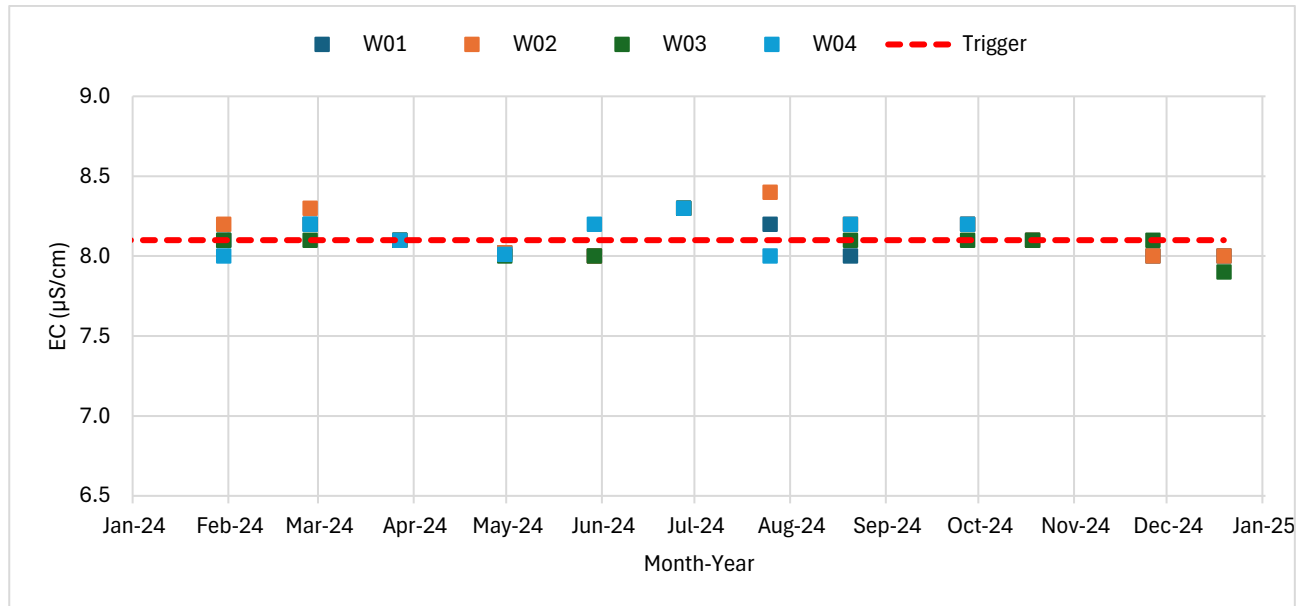


Figure B 3.1 Bengalla 2024 pH data and trigger level

B3.1.2 Surface water EC

EC exceedances were recorded at all surface water monitoring during 2024 (Figure B 3.2), with all exceedances occurring in the second half of the year (June – December). The exception was August when all sites recorded EC below the trigger level. During the early half of 2024 (January – May) all stations reported EC consistently below the trigger level. The exceedances were investigated briefly in the Q3-2024 report and interpreted to be largely driven by in situ water quality conditions of the Hunter River (see further discussion in Section B4.3).

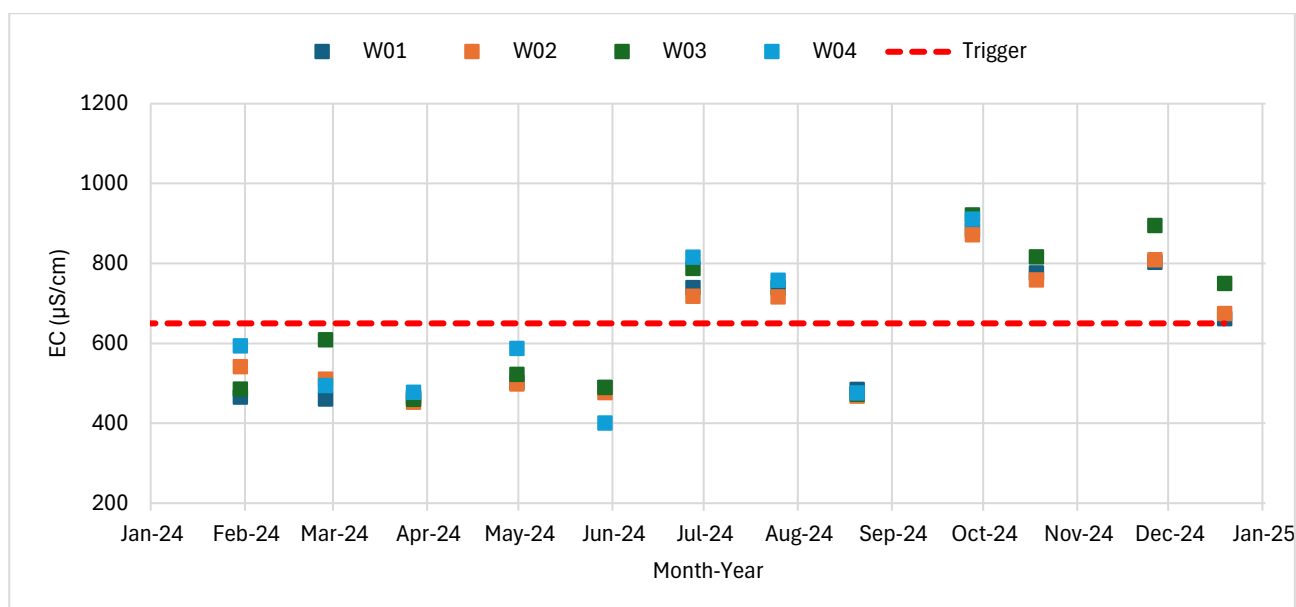


Figure B 3.2 Bengalla 2024 EC data and trigger level

B3.1.3 Surface water total suspended solids (TSS)

Three of the four surface water monitoring sites recorded a single trigger exceedance in 2024, in different months, with all sites staying below the trigger level for the remaining months (Figure B 3.3). The trigger exceedances were fairly minor (less than 10 mg/L over the trigger level), did not occur across all sites, and appeared as isolated events (i.e. TSS returned to background levels in the following month). The exceedance in May 2024 is the only one that was accompanied by elevated TSS in other monitoring sites (although other sites did not exceed the trigger level).

The reading taken at W02 during February 2024 was 234 mg/L, which is over almost 200 mg/L above any other reading in 2024 (see Table B 3.1). As the readings at other sites for that time were all consistently around 20 mg/L, the reading at W02 is likely erroneous and is likely a sampling or scrivener's error.

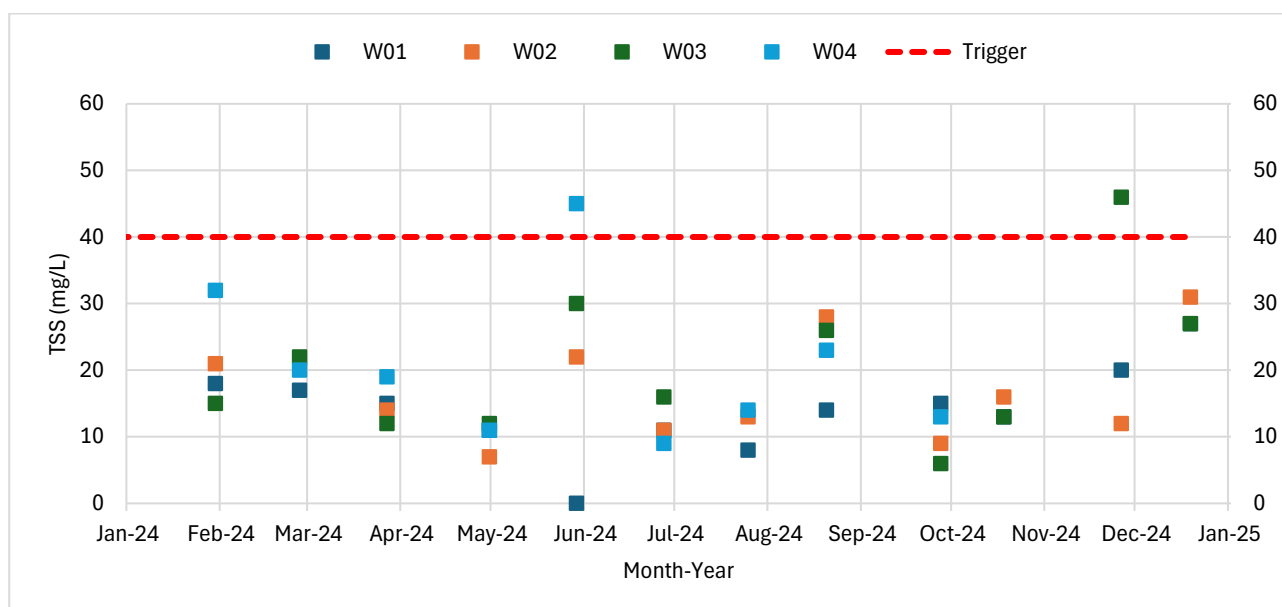


Figure B 3.3 Bengalla 2024 TSS data and trigger level

B4 Exceedance Investigation

The primary goal of this review is to address requirements of the Response Protocol for Bengalla's WMP, namely, to identify the cause of the event and determine if the event is an incident and/or noncompliance. This is achieved by assessing to what degree in situ surface water conditions in the Hunter River are responsible for the observed water quality readings at Bengalla. In this section, water quality data from the Bengalla monitoring sites are compared to climate and river conditions to determine if there is a link between conditions in the Hunter River upstream and readings made at Bengalla.

B4.1 Climate

The climate at Bengalla is described in the main body of the 2024 Annual Groundwater Review and specifically for 2024 but is generalised in this section as it relates to surface water conditions. The Bengalla area is considered temperate and characterised by hot, wetter summers and mild, dryer winters. Average temperatures range from an average daily low of approximately 17 °C in winter to an average daily high of approximately 32 °C in summer. Rainfall averages 597 mm per year (based on 1992-2024 period of record) and varies seasonally (Table B 4.1), with rainfall in the summer months being slightly higher (over 10% of the annual total) than during the winter (6-8% of average). Rainfall events are typically short-duration (1-2 days) but can be high-intensity (over 100 mm/day).

Table B 4.1 Monthly average rainfall and rainfall percent of annual (from Bengalla weather station)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Monthly average rainfall (mm)*	54.3	68.1	65.9	38.1	34.1	44.8	34.5	34.5	35.7	46.9	69.4	70.6	597
% of total annual rainfall*	9%	11%	11%	6%	6%	8%	6%	6%	6%	8%	12%	12%	-

Note: * from 1992-2024.

Historical rainfall is contextualised using the Cumulative Rainfall Departure (CRD) method (Figure B 4.1). This method is a summation of the monthly departure of rainfall from the long-term average monthly rainfall. A rising trend in the CRD plot indicates periods of above average rainfall, whilst a falling slope indicates periods when rainfall is below average.

The CRD for Bengalla since 1995 is shown in Figure B 4.1 and illustrates two significant drought periods (persistent below-average rainfall and a declining trend in CRD) from 2001-2007 and 2017-2019. These dips are followed by persistent above-average rainfall (rising trend) but there was another recent short-duration period of below average rainfall in 2023 and only a moderate recovery in 2024.

Persistent above-average or below-average rainfall contributes to storage in the Hunter River system by allowing reservoirs to fill up (e.g., Glenbawn Dam, Glennies Creek Dam) which then provides water for release down the Hunter River for irrigation, ecology, and recreation. Persistent drought conditions lead to low storage levels and low river levels (see Section B4.2) which then impacts water quality of the river (DCCEEW 2024).

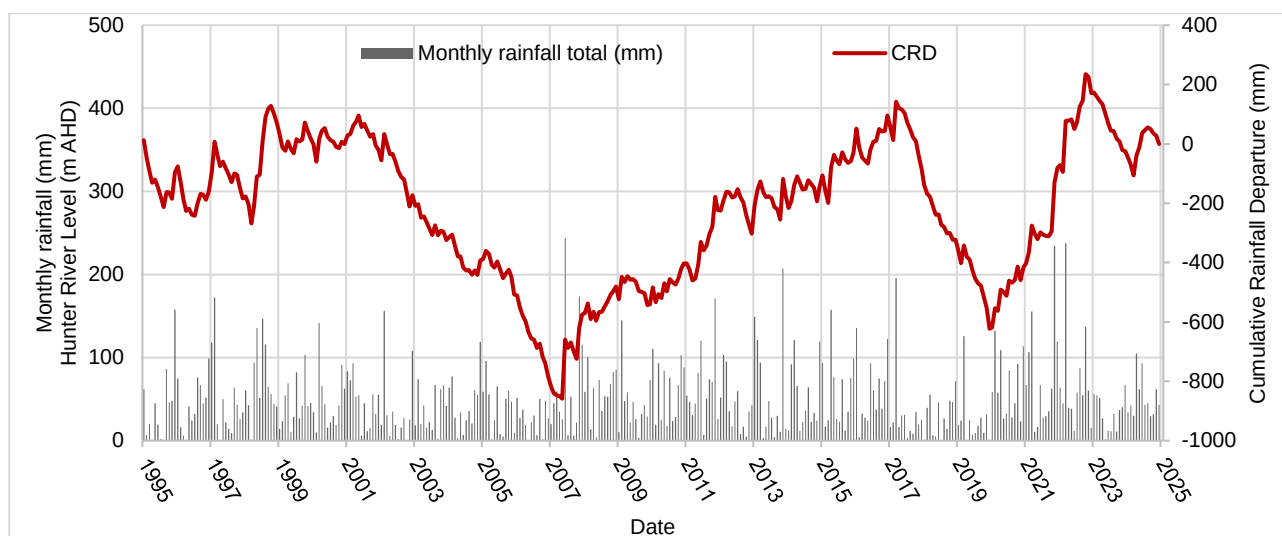


Figure B 4.1 Cumulative rainfall departure (1995 to 2024) for Bengalla weather monitoring station

B4.2 Hunter River

The Hunter River watershed drains water from east of the Great Dividing Range and flows eastward to its outlet at the Pacific Ocean at Newcastle NSW. The Hunter River near Bengalla is controlled by releases from Glenbawn Dam but also fluctuate in response to rainfall. The water quality of the river oscillates due to persistent low-flow periods and episodic high-flow periods (flooding), which impact water quality. The Hunter River region, and particularly the lower Hunter catchment, supports a high level of urban and industrial development which has affected water quality. In the upper catchment, land clearing has resulted in erosion and salinity issues (NSW 2025).

B4.2.1 Hunter River average values

The Hunter River is the receiving water for discharges from Bengalla (via Dry Creek). Hunter River water quality data has been collected by Department of Industry – Water (DOI-Water) since the 1970s. The results from monitoring by DOI-Water indicate that the Hunter River is alkaline (related to pH), fresh (related to EC), and has a median Total Suspended Solids (TSS) of 8 mg/L. Water quality reported by Bengalla since 2007 supports these results and average values from Bengalla's surface water monitoring sites are provided in Figure B 4.2.

Readings of pH are historically above 7.5 (alkaline) for the Bengalla monitoring sites and often approach (or exceed) the trigger level of 8.1 (median = 8.0; see Table B 2.1).

TSS is generally fairly low at the site (median = 21 mg/L) but occasional high-value readings have been recorded (over 1000 mg/L). These elevated readings are usually isolated and not part of persistent trends and may not even be consistent across the four monitoring sites.

River stage and electrical conductivity (EC) data is collected for the Hunter River at multiple sites within the watershed and data from the WaterNSW monitoring site at Aberdeen (station ID: 210056; approximately 22 km upstream from Bengalla) provide an average EC of 530 $\mu\text{S}/\text{cm}$ (i.e. 'fresh') over the period from 2007-2024 (also reported in Figure B 4.2). The Aberdeen station is used throughout this report for comparison because it is deemed sufficiently upstream from Bengalla to represent in situ Hunter River conditions (i.e. water quality conditions prior to any interaction with Bengalla). The NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) publishes annual surface water quality reports for the Hunter River which includes statistics at five sites along the river (Muswellbrook being the nearest to Bengalla). These reports include statistical summaries (box-and-whisker plots) for water quality parameters including: pH, EC, and TSS. Values from the 2022-2023 report (covering July 2022 through June 2023) are included in Table B 2.1 (the 2023-2024 report was not available).

The data provided in Table B 2.1, as well as the DCCEE report indicates that pH and TSS appear relatively consistent between the four sites with pH consistently around 8.0 and TSS generally below 40 mg/L. EC generally increases downstream, which is further discussed in the DCCEE report and attributed to both natural sources such as the marine origin of the Permian sediments that underly the basin, and anthropogenic sources such as mining, power generation, and agriculture.

Figure B 4.2 Statistical summary of water quality parameters for the Hunter River

Parameter		Aberdeen ¹	Bengalla ²	Muswellbrook ³	Singleton ³
pH	25 th %ile	NA	7.8	7.7	7.8
	Median		8.0	8.1	8.1
	75 th %ile		8.1	8.2	8.2
EC (µS/cm)	25 th %ile	396	384	490	600
	Median	502	477	600	800
	75 th %ile	640	652	850	1100
TSS (mg/L)	25 th %ile	NA	12	10	25
	Median		21	14	34
	75 th %ile		43	20	41

Source: ¹ WaterNSW realtime monitoring site.

² Bengalla.

³ Approximated from figures in DCCEE Hunter River Annual Surface Water Quality Report 2022-2023.

B4.2.2 River stage and climate

River stage and EC data was collected from the WaterNSW Water Information Hub (WaterNSW 2025) for the monitoring station and Aberdeen NSW (Station ID: 210056). This station is located approximately 22 km upstream from Bengalla's W01 site and is the nearest upstream site where EC data is collected and reported daily (daily river stage and temperature are recorded at the Muswellbrook station but not water quality parameters). River stage was compared to the CRD developed above and presented in Figure B 4.3 for the period 2007-2024 (corresponds to period of record for Bengalla surface water data).

Figure B 4.3 shows that, while river stage can be highly variable and fluctuate over several metres in response to high-intensity rainfall events, there is an observable relationship between drought conditions (e.g. 2017-2021; 2023-2024) and river stage. Conversely, periods of persistent above-average rainfall (e.g. 2020-2023) correspond to 1) higher peak stage (flooding), 2) repeated high-stage events, and 3) higher "baseline" stage (i.e. lowest stage over a given period).

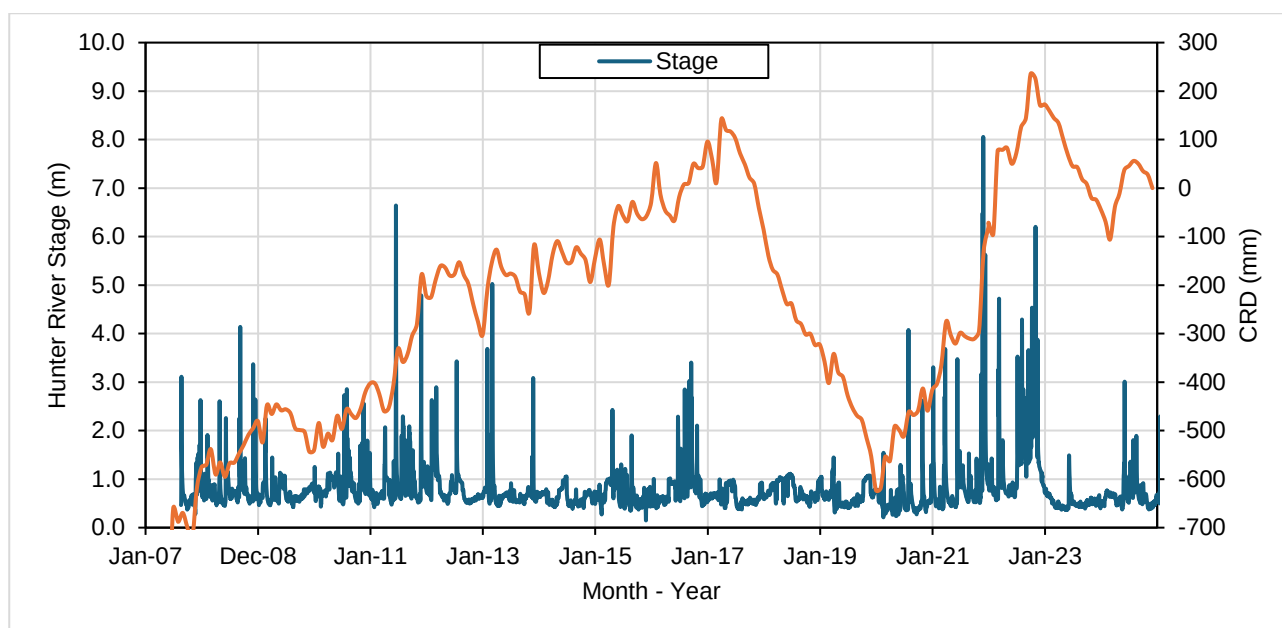


Figure B 4.3 Hunter River stage and CRD

B4.2.3 River stage and EC

As discussed above, the Hunter River is susceptible to persistent low-flow conditions and is impacted by salinity from natural and anthropogenic conditions (DCCEEW 2024). Low flow conditions tend to slow the river velocity down which allows for an increase in the evaporation over pools in the river. Evaporation concentrates dissolved minerals in the river water (including salts) which then can lead to a rise in EC. Salinity in the Hunter River is managed by the Hunter River Salinity Trading Scheme (HRSTS; see Section B4.2.3.1).

The Aberdeen station also records daily EC data for the Hunter River and this data is provided along with the river stage data in Figure B 4.4 for the period 2007-2024. Figure B 4.4 shows that there is higher variability in EC than in river stage but, when focussing on the period from 2017-2020 (drought), there is a clear correlation between long-term stage and EC. EC fluctuates between 300 $\mu\text{S}/\text{cm}$ and 900 $\mu\text{S}/\text{cm}$ over the full period of record in the figure but between 2017 and 2020, EC is around 400 $\mu\text{S}/\text{cm}$ and shows much less variability.

Figure B 4.5 shows the same data as Figure B 4.4 but on a much smaller time scale (3 years). At this scale it is clear that high stage events correspond to low EC, and EC rises over periods of persistent low river stage due to, as mentioned, concentration of salts in the water due to evaporation.

The relationship between river stage and EC is illustrated more succinctly in Figure B 4.6 which shows the minimum monthly river stage versus the maximum monthly EC for the Hunter River at Aberdeen over the period 2007-2024. River stage typically increases very rapidly and recedes at a slower rate, and EC increases even more slowly as the river stage recedes, so a direct comparison between daily stage and EC data was too noisy to provide a useful comparison. The fact that this relationship is not a strictly straight line is due to the fact that there is a minimum river stage (around 0.5 m), which is likely related to the stage where the river is nearly stagnant and exists as a series of connected pools, but evaporation will continue which further drives higher EC values. The lower EC limit (around 160 $\mu\text{S}/\text{cm}$) is likely related to the 'freshest' incoming water to the system and is associated with the highest stage values.

Further discussion around what is controlling EC in the Hunter River upstream of Bengalla is outside the scope of this assessment and likely much more complicated than what is presented here. Instead, it is sufficient for this assessment to establish that EC conditions in the Hunter River upstream of the Bengalla mine are similar in magnitude to what is recorded by Bengalla. The extent that these in situ conditions are driving water quality conditions recorded at the Bengalla surface water monitoring sites are discussed further in Section B4.3.

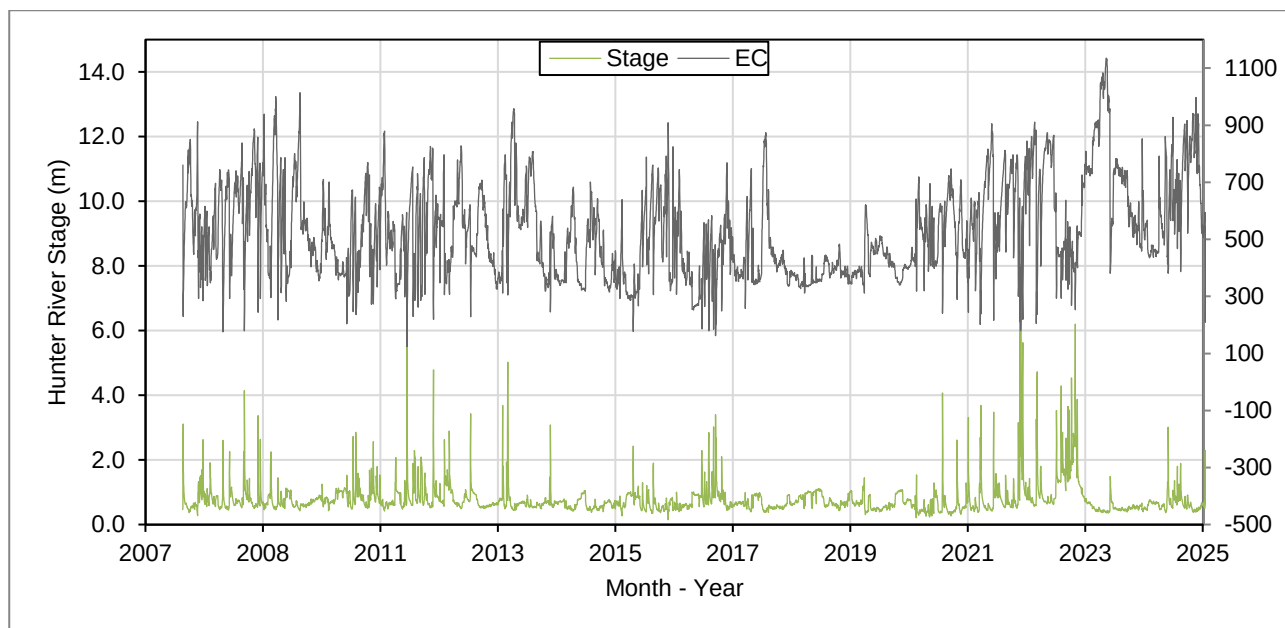


Figure B 4.4 Hunter River stage and EC from Aberdeen station (2007-2024)

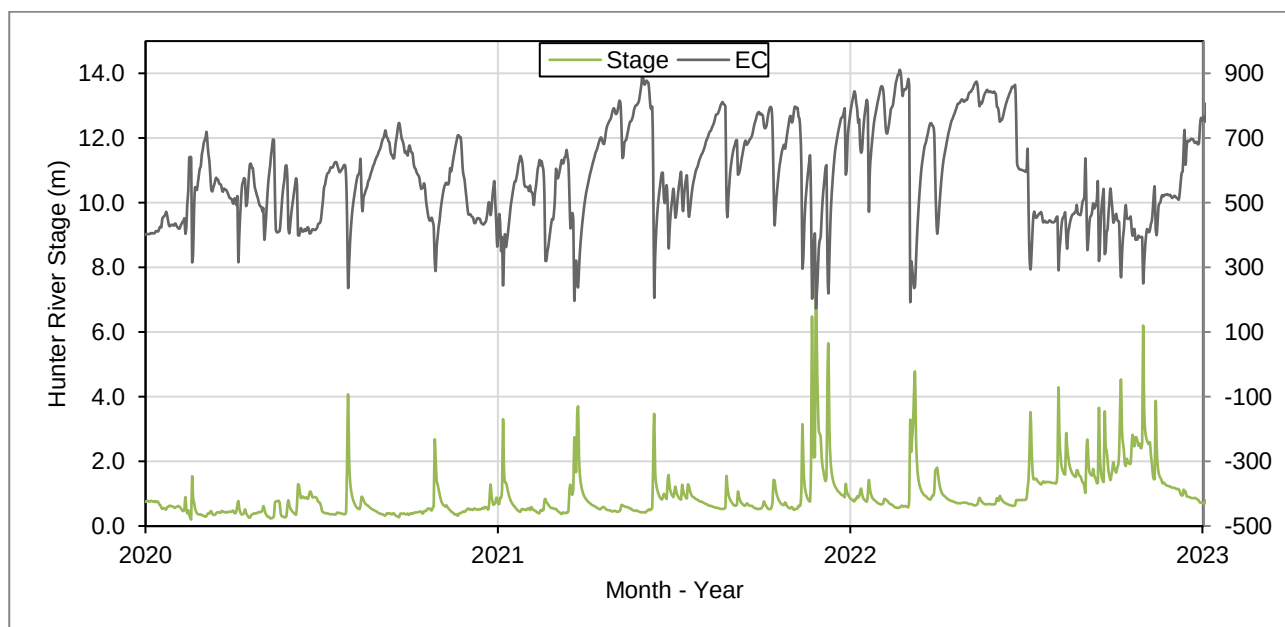


Figure B 4.5 Hunter River stage and EC from Aberdeen station (2020-2022)

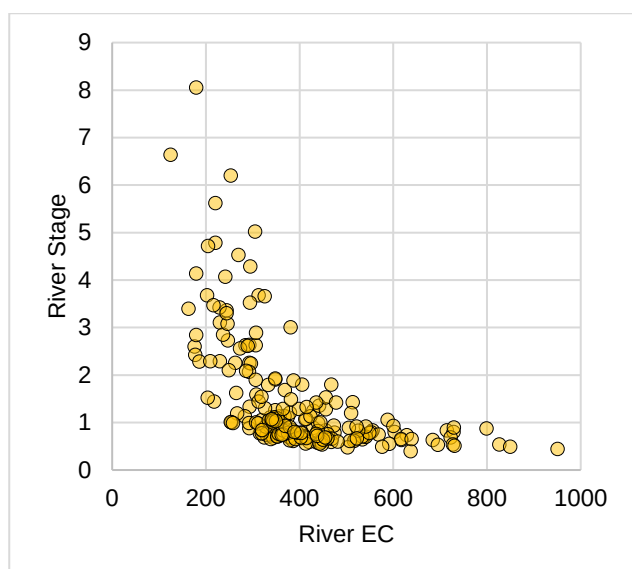


Figure B 4.6 Minimum river stage versus maximum EC for the Hunter River at Aberdeen by month

B4.2.3.1 Hunter River Salinity Trading Scheme

It is worth noting that salinity in the Hunter River is of such concern that the NSW Government developed the Hunter River Salinity Trading Scheme (HRSTS) to manage salinity in the river alongside the needs of river users. The HRSTS involves a finite system of salt credits that industries can buy and trade to discharge their salty water into the Hunter River. Discharges are only permitted when the river contains adequate fresh water to dilute the salt and maintain water quality. The scheme therefore balances the amount of salt that industry can directly discharge with the background level of salt in the river. Agriculture benefits from fresh irrigation waters while miners and electricity generators can make controlled discharges of excess waters.

Review of Bengalla's Monthly Water Quality Monitoring Reports for 2024 state "*No discharges under the HRSTS were undertaken...for the monitoring period*" for each month, indicating that no mine water was discharged to the Hunter River in 2024.

B4.3 Surface water exceedance discussion

The three field water quality parameters (pH, EC, and TSS) recorded at Bengalla's surface water monitoring sites are discussed in this section as they relate to in situ conditions in the Hunter River. The discussion covers the full period of record (2007-2024) with an emphasis on recent exceedances (2024). While pH, EC, and TSS are all considered in this assessment, we have chosen to emphasise EC as there is readily available data on EC from the Hunter River at the Aberdeen site. The comparison between EC measured at Aberdeen and measured at Bengalla is used to establish the relationship between in situ river water quality upstream of Bengalla and water quality measured at Bengalla, which is then applied to pH and TSS.

B4.3.1 Surface water EC

All four surface water sites recorded EC values above the prescribed triggers during 2024, with all the exceedances occurring during the period between June and December (see Table B 3.1). During the early half of 2024, between January and May, all stations were consistently below surface water EC trigger and only began to record exceedances from June onwards (Figure B 4.7).

A review of EC data over the full period of record (2007-2024) shows that the exceedances in 2024 are just the latest exceedance events and that several similar exceedance events occurred in the past 18 years (Figure B 4.7). We use the term "exceedance event" to define a period over multiple months were EC exceeded the trigger level but are separated by EC below the trigger level. A previous exceedance event occurred through 2023 where EC rose at all sites to over 1000 $\mu\text{S}/\text{cm}$ before returning to lower values. This event is highlighted in Figure B 4.8 and shown along with Hunter River stage and Hunter River EC. Comparison between river stage and EC shows that this exceedance event was coincident with a prolonged period of low river stage. Other exceedance events can be seen in Figure B 4.8 and each corresponds to a prolonged period of low stage.

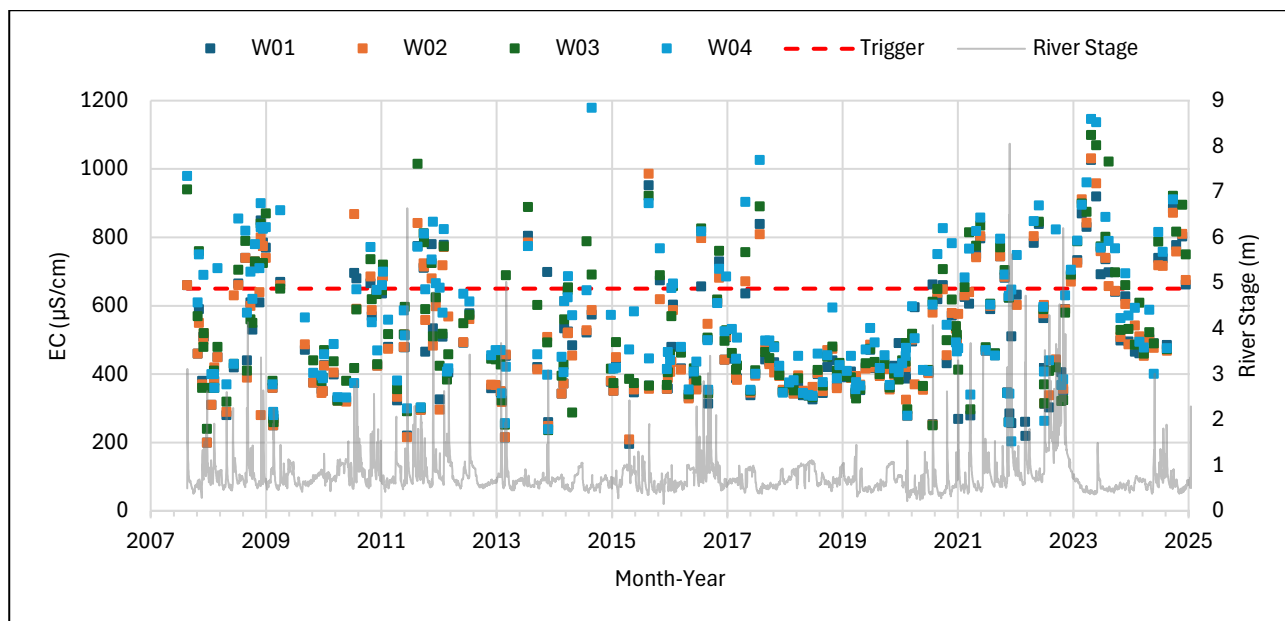


Figure B 4.7 EC readings at Bengalla (2007-2024)

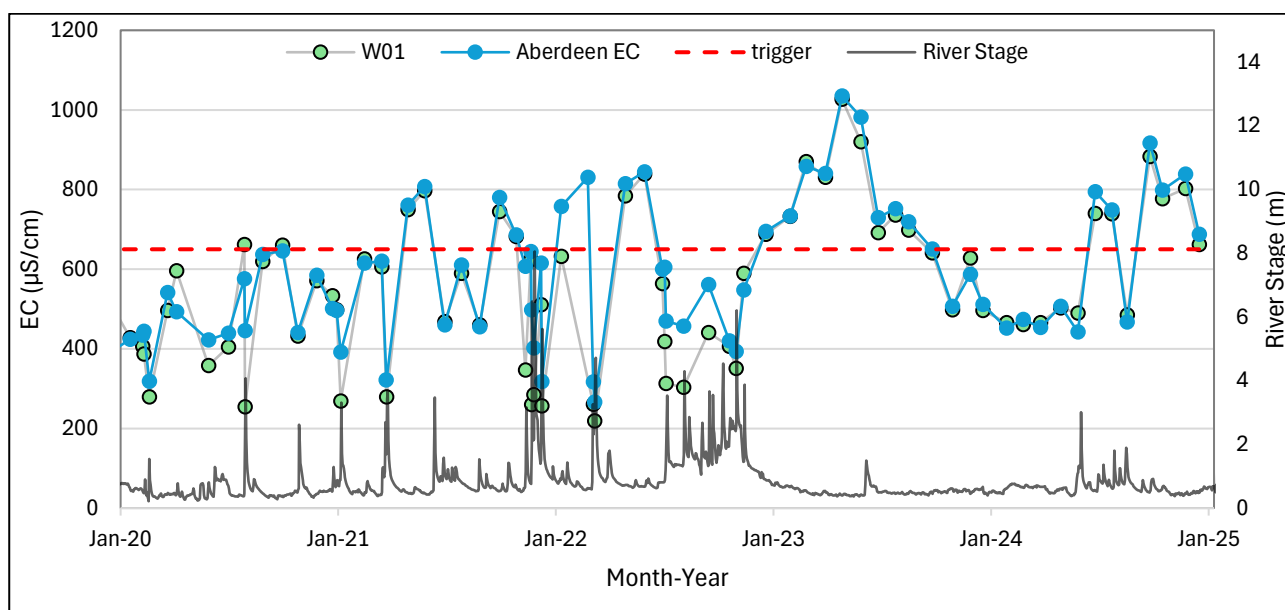


Figure B 4.8 Hunter River EC and W01 EC

Figure B 4.8 also shows the Hunter River EC and EC measured at Bengalla's W01 site (furthest upstream) which highlights the similarities between EC in the Hunter River at Aberdeen and at Bengalla and indicates that EC at Bengalla is very strongly correlated to in situ conditions of the Hunter River. This relationship is further illustrated in Figure B 4.9 which compares EC in the Hunter River directly to EC at site W01. The correlation coefficient (R^2) between these two datasets is 0.79, which indicates a moderately strong correlation and, more importantly, the slope of the best-fit line is nearly 1, which indicates that EC at W01 is generally equal (or slightly lower given the slope = 0.94) than EC measured at Aberdeen. The significance of this figure is that it shows that there is not generally any significant change in EC (and, by extension, change in water quality conditions) from Aberdeen to Bengalla.

Figure B 4.9 (left pane) establishes the relationship between EC in the Hunter River and EC measured at Bengalla's upstream monitoring site but would not account for discharge to the Hunter River by Bengalla, which may be direct discharge of surface water or indirect discharge via groundwater baseflow through the alluvial aquifer adjacent to the river. The effect of discharge from Bengalla would, instead, be evident by changes in water quality between monitoring sites along the river. This was investigated by comparison between EC at site W01 (most upstream site) and site W04 (most downstream site), which is shown in Figure B 4.9 (right pane). This comparison produces an R^2 value of 0.75 and a slope of 1.03. While the slope implies EC at W04 is generally higher than EC at W01 (on average, approximately 3% higher), the R^2 implies there is also some variability in the difference and that W04 is occasionally lower than W01. Furthermore, Figure B 4.9 covers from 2007 through 2024 and, under circumstances where Bengalla is authorised to release water into the Hunter River (i.e. under the HRSTS), it would be expected for EC to increase between W01 and W04.

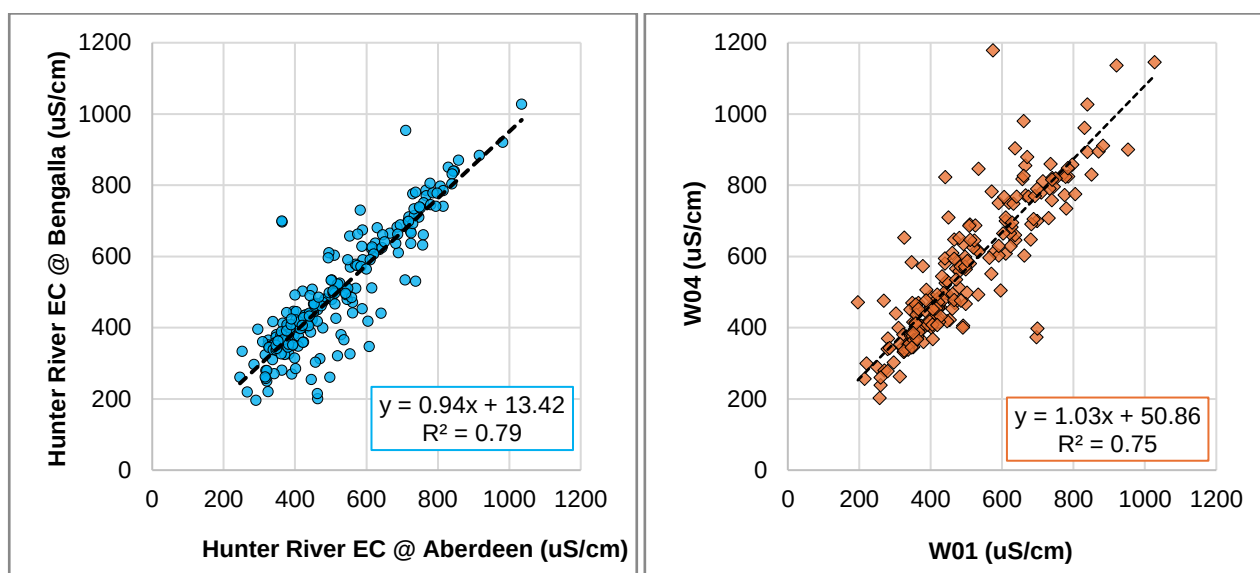


Figure B 4.9 Hunter River EC vs W01 (left pane) and W01 vs W04 (right pane)

B4.3.2 Surface water pH

Measured pH values have been generally near or above 8.0 for 2024 which is consistent with the entire period of record (see Figure B 4.10). With the exception of initial low pH values in 2007 (around 7.0), pH at all sites has been generally consistent between 7.5 and 8.2 with no clear change between sites W01 and W04 (average difference < 0.04). While there appear to be some subtle trends in the dataset (such as a slight dip in average pH below 8.0 between 2014 and 2016), the absence of large changes (notably between 2017 and 2020) produced a comparison to river stage with an $R^2 < 0.01$ (not shown) which suggests that pH measured at Bengalla is generally stable. The correlation between W01 and W04 data is provided in Figure B 4.11 and the best-fit line produced a slope of 0.82 (indicating pH in W04 is generally lower than at W01) and an R^2 of 0.56 (indicating only moderate correlation) and indicating, overall, that there is no discernible change in pH in the Hunter River as it flows past Bengalla.

Data on pH is collected by the NSW DCCEEW (2024) from the Hunter River at Muswellbrook and published in annual reports. The 2022-2023 annual report shows that the median pH recorded at Muswellbrook was approximately 8.1 and ranged from approximately 7.4 to 8.2 (see Section B4.2.1). These values are consistent with previous years' reports and also consistent with data collected at Bengalla and implies that pH is consistent with in situ conditions of the Hunter River and that there is no significant change in pH near Bengalla.

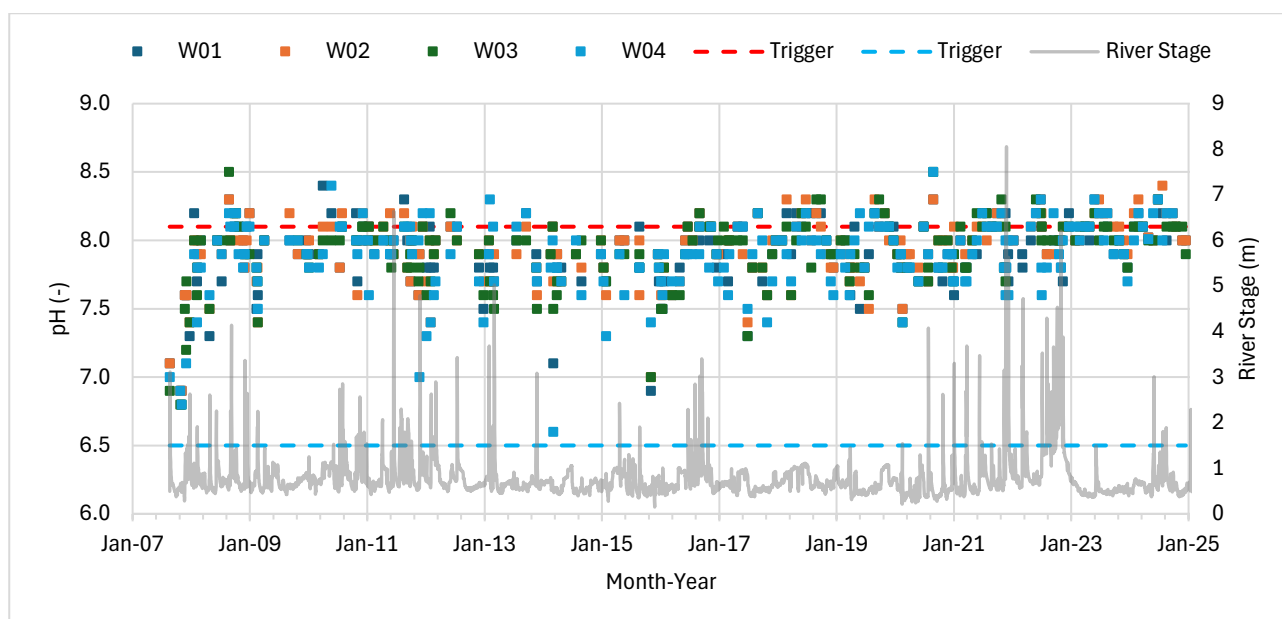


Figure B 4.10 pH readings at Bengalla (2007-2024)

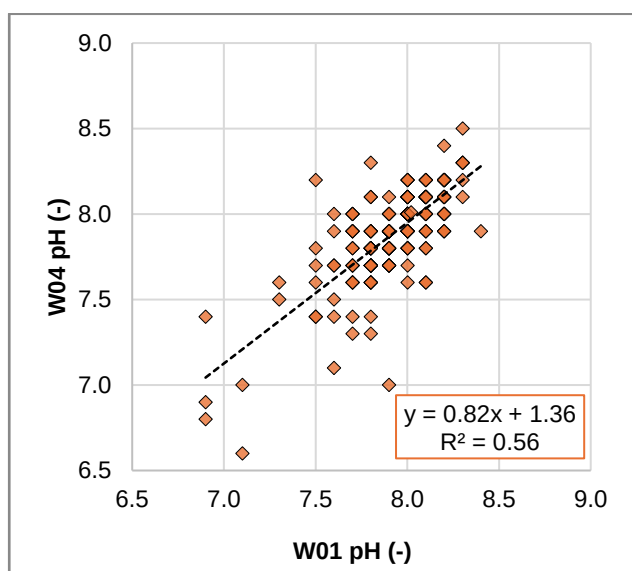


Figure B 4.11 W01 pH vs W04 pH and best-fit line

B4.3.3 Surface water TSS

Total suspended solids (TSS) remained mostly below trigger thresholds in 2024, with only a few sites marginally exceeding the prescribed trigger level of 40 mg/L. This pattern is consistent with historic data (Figure B 4.12) which also shows generally low TSS readings (less than 20 mg/L) with occasional spikes but no clear long-term trends. There is, however, an apparent relationship between low TSS and low river stage from 2017-2020 but no other clear correlation (R^2 between river stage and W01 TSS < 0.01; not shown). The average difference between W01 and W04 (W04 minus W01) for 2024 and for the full period of record is 8 mg/L and -8.7 mg/L, respectively. Figure B 4.13 shows W01 vs W04 which produces a best-fit line with a slope of 0.64 ($R^2 = 0.67$) indicating that W04 is generally less than W01 overall but also has only moderate correlation (suggesting there is some independence in TSS between W01 and W04). Overall, this provides evidence that TSS is not typically increasing in the Hunter River as it passes by Bengalla.

Data from DCCEEW's surface water quality report shows that TSS at Muswellbrook had a median value of approximately 13 mg/L and a range between 10 and 20 mg/L. This, as with pH, is consistent with data collected by Bengalla and indicates that the measured TSS is consistent with in situ conditions of the Hunter River upstream of Bengalla.

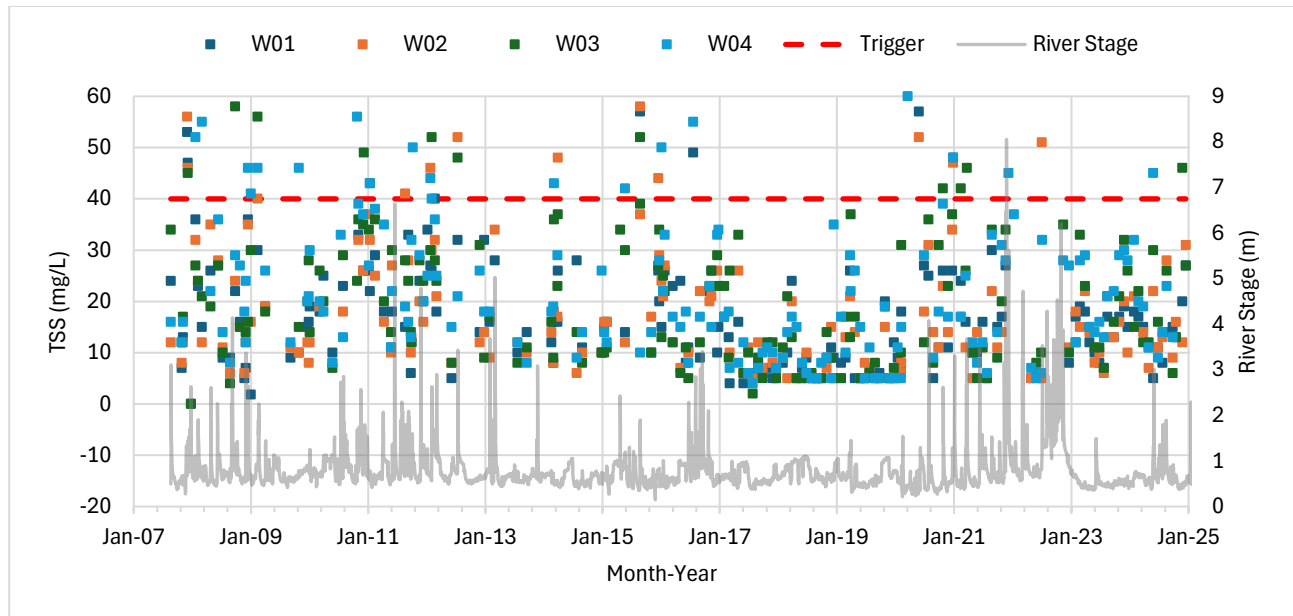


Figure B 4.12 TSS readings at Bengalla (2007-2024) with river stage at Aberdeen

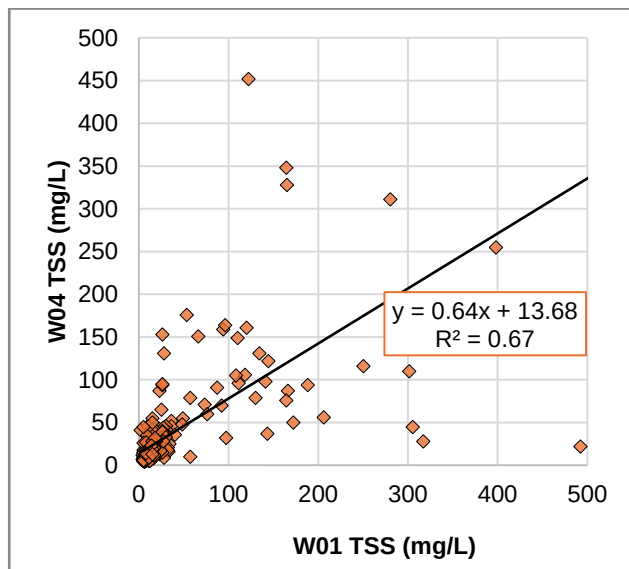


Figure B 4.13 W01 pH vs W04 pH and best-fit line

B5 Summary and Conclusions

Benalla operates under Development Consent (SSD-5170) and under their Water Management Plan (WMP), which lays out criteria for monitoring groundwater and surface water to ensure any adverse impacts from mining activities are quickly identified and addressed. Part of the WMP is the Surface Water Monitoring Program which includes monthly monitoring at four sites along the Hunter River, which is the receiving water source for discharge from Bengalla. The WMP also provides trigger values for water quality measured at the Hunter River sites. When measured values exceed trigger levels, the WMP requires investigation.

Average water quality conditions for the Hunter River were summarised in this report based on publicly available data from WaterNSW and from annual surface water quality reports from DCCEEW. These sources provide average conditions for pH, EC, and TSS (as well as others) in the Hunter River at various sites including Muswellbrook (near Bengalla) and Aberdeen (22 km upstream of Bengalla). Review of these data sources indicate that in situ surface water conditions in the Hunter River are fairly consistent to measured values at Bengalla. Comparison between EC and river stage from the Aberdeen site indicates a strong correlation between river stage and EC, with high EC being correlated to prolonged periods of low river stage and low EC correlated to high stage.

Surface water quality data (pH, EC, and TSS) collected at Bengalla's surface water monitoring sites in 2024 was reviewed for exceedances of the prescribed trigger levels and compared to in situ conditions as well as long-term trends in the data. Comparison was also made between the upstream Bengalla site (W01) and the downstream site (W04) to identify any significant changes in water quality in the Hunter River as it passes by Bengalla. Key findings for pH, EC, and TSS are provided below.

B5.1 EC summary

- EC measurements from all sites ranged from 401 $\mu\text{S}/\text{cm}$ to 922 $\mu\text{S}/\text{cm}$ in 2024 and all measured sites recorded exceedances in nearly every month since June (exception was August) with EC up to 270 $\mu\text{S}/\text{cm}$ above the trigger level of 650 $\mu\text{S}/\text{cm}$. These exceedances coincide with an extended period of low stage in the Hunter River as well as higher EC values measured in the Hunter River at Aberdeen.
- The EC behaviour in 2024 is consistent with the long-term behaviour of higher EC recorded at Bengalla following persistent low-stage periods, which existed from June through December 2024. Data from the Hunter River monitoring site at Aberdeen was used to establish this trend between EC and river stage for the full period of record (2007-2024) which confirmed that high EC corresponds to low stage and vice versa.
- A comparison of EC measured at Bengalla at W04 (downstream site) and W01 (upstream site) indicates that there is no clear trend of increasing or decreasing EC in 2024 (difference ranges from -89 to +128 $\mu\text{S}/\text{cm}$; average = 31 $\mu\text{S}/\text{cm}$). Comparison of the longer record (2007-2024) indicates a very slight bias toward higher EC in W04 than W01 (slope of best-fit line = 1.03, $R^2 = 0.75$), but when considering that release of water into the Hunter River is permitted at certain times under the HRSTS, this relationship indicates that, even though discharge is allowed, there is no major increase in EC in the Hunter River as it passes by Bengalla.
- Overall, the review of EC data indicates values measured by Bengalla for 2024 are representative of in situ river conditions, as illustrated by EC data from the Aberdeen site.

B5.2 pH summary

- pH measurements from all sites in 2024 ranged from 7.9 to 8.4 with most sites regularly exceeding the prescribed upper trigger level of 8.1 or recording values near it.
- The exceedances do not appear to be part of a trend in increasing pH but represent a continuation of average pH levels over the full period of record (2007-2024). These pH values are consistent with in situ water quality conditions in the Hunter River at Aberdeen, Muswellbrook, and Singleton.

- Comparison of pH readings between upstream and downstream sites (W04 minus W01) does not indicate a preferential bias towards changing pH between the sites in 2024 (average difference = 0.01), which is consistent with the long term data (average difference = -0.04) which produces a best-fit line with a slope = 0.82 ($R^2 = 0.56$) indicating a slight bias towards lower pH in W04 than W01.
- The pH data indicate that any discharge occurring from Bengalla (either direct or indirect) over the period of record is not causing a change in water quality in the Hunter River with respect to pH.

B5.3 TSS summary

- TSS measurements ranged from 7 mg/L to 234 mg/L throughout 2024 and remained below the prescribed trigger level with the exception of three sites in three separate months (W02 in February, W04 in May, and W03 in November). The exceedance in February (234 mg/L) is ten times higher than measurements in the other sites for that month and may be an erroneous measurement.
- The TSS readings show no clear trends throughout 2024 and no clear correlation to river stage, which is consistent across the full period of record (2007-2024). The only exception is a period from 2017-2020 where both low stage and low TSS were recorded, but this is not enough to indicate an overall correlation.
- There is also no clear relationship in TSS between W01 and W04 in 2024 (range from -2 to 40 mg/L; average = 8 mg/L) or for the full period of record (range from -963 to +430 mg/L; average = -9.7 mg/L), which has a slope of 0.64 ($R^2 = 0.67$), indicating a bias toward lower TSS in W04 than W01. This suggests that TSS is generally variable across the different monitoring sites and indicates no change in TSS in the Hunter River as it passes by Bengalla.

The overall findings of this report indicate:

- The reported EC, pH, and TSS exceedances in 2024 were related to in situ conditions and do not represent an incident.
- There was no reported direct (surface water) discharge to the Hunter River in 2024 under the HRSTS.
- Water quality at the upstream monitoring site (W01) is generally consistent with conditions measured upstream at Aberdeen (likely similar for pH and TSS) and EC is strongly correlated with river stage.
- There is no clear strong relationship between water quality measurements at upstream and downstream sites at Bengalla indicating no major change in water quality in the Hunter River as it passes by Bengalla, meaning no evidence of impact.
- There is no change in beneficial use category for the surface water sites (AGI 2024) although the elevated EC may make the water a risk for irrigation of salt sensitive crops. There is no risk of environmental harm.

B6 Recommendations

After review of the surface water data, AGE are providing the following recommendations:

- Update EC, TSS, and pH triggers based on 1) measurements made and Bengalla and 2) measurements made at other sites along the Hunter River (e.g. using data collected by government agencies).
- No changes to the surface water monitoring network are recommended at this time.

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Appendix H

Rehabilitation Monitoring Report

Rehabilitation Monitoring and Audit 2024

Bengalla Mine



Rehabilitation Monitoring and Audit 2024 – Bengalla Mine

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Executive Summary

This report presents the findings of the 2024 rehabilitation monitoring program conducted at Bengalla mine by Koru Environmental on behalf of Bengalla Mining Company Pty Limited (**BMC**).

Large-scale remediation, rehabilitation and revegetation works are currently underway at Bengalla to establish high density woody vegetation (**HDWV**) across the eastern overburden emplacement area (**OEA**) following the approved rehabilitation reforms. Rehabilitation works at the site are driven by the Rehabilitation Management Plan (**RMP**) and the Forward Work Plan (**FWP**) developed by BMC.

Monitoring approaches and methods strictly adhered to those defined in the RMP and included a combination of scientific transect-based data collection and a rehabilitation walkover audit. The intent of the audit is to complement the transect-based monitoring by collecting opportunistic observations of rehabilitation performance at the larger scale, particularly focussing on key deficiencies and issues impacting the rehabilitation that may require intervention.

In light of the progressively increasing areas of rehabilitation completed at the site (i.e. requiring more monitoring transects to be established), a decision was made in 2024 to change the monitoring frequency for each transect from annual to biennial for some of the older monitoring sites and establish a rotational monitoring schedule whereby half of the transects are monitored in odd years and the second half in even years. Following on this approach, a total of 23 transects were monitored during the current 2024 campaign.

Field surveys were completed in early October 2024 and followed approximately six months of optimal growing conditions in the locality with average to above average rainfall.

Based on collected monitoring results and observations, recommendations have been suggested to improve the condition of rehabilitation areas and ensure they are progressing towards the defined rehabilitation objectives and completion criteria.

Summary Findings – Pasture Rehabilitation

Only one small area of pasture rehabilitation (and one monitoring transect) was monitored in 2024. The rehabilitation was established in late 2023 (i.e. < 1 year old) and vegetation and pasture establishment remained very limited at the time of monitoring. This was mostly attributed to a severe infestation of Turnip Weed which rapidly colonised the area post-seeding and hindered the germination of pasture grasses. Moderate amounts of Galenia were also present which will require control.

Pasture establishment will need to be closely monitored in the area.

Laboratory analyses of soil collected at the transect highlighted no key deficiencies or limitations that could hinder pasture establishment.

Summary Findings – HDWV Rehabilitation

A total of 22 monitoring transects were assessed in areas of native ecosystem (HDWV) rehabilitation. Key findings were as follows:

- Vegetative ground cover protection was satisfactory (i.e. meeting the 70% cover benchmark) at 19 of the 22 transects, slightly below benchmark but on an improving trend at two transects and unsatisfactory at one transect established in 2023 where no germination had yet occurred.
- Tree densities (a key objective of HDWV rehabilitation) met the defined minimum target of 400 stems/ha at only eight transects and were insufficient at 14 transects; including four transects with moderate tree densities (200-400 stems/ha) and ten transects with low to very low tree densities (<200 stems/ha). Additional revegetation works and efforts will be required to meet objectives.
- Native tree richness per transect ranged from one to eight species (average ~3.4 species/transect), with 15 of the 22 transects showing a satisfactory performance against the target communities benchmark levels. Resemblance of the establishing tree layer to the target communities was generally adequate.

- Native shrub richness per transect ranged from zero to six species (average of ~2.3 species/transect, with only 6 of the 22 transects showing a satisfactory performance against the target communities benchmark levels. Resemblance of the establishing shrub layer to the target communities was variable.
- Native ground cover richness per transect ranged from zero to eight species (average of ~2.7 species/transect, with no transect showing a satisfactory performance against the target communities benchmark levels. Resemblance of the establishing ground layer to the target communities was consistently inadequate and will require improvement.
- Cumulative weed cover was high to very high at most transects, with invasive grasses, Galenia, Golden Wreath Wattle and African Boxthorn observed across the site.
- The 2024 soil testing program identified deficiencies in the growth medium at five of the 22 sampling locations (transects), highlighting issues of strong alkalinity and sodicity. All deficient samples came from areas where topsoil was not applied, and direct seeding was undertaken in a subsoil substrate or directly into overburden – i.e. highlighting the limitations of these substrates.

Summary Findings – Audit Inspection

Key findings stemming from the 2024 audit for the inspected areas included the following:

- Localised earthworks will be required to repair erosion gullies, breached contour banks and scour impacts in two rock-lined drainage channels.
- The light-vehicle track network should be maintained across the rehabilitation.
- Additional construction / incorporation (and greater diversity) of artificial habitat features will be needed to enhance the habitat value of the rehabilitation and improve its function as a native wildlife movement corridor.
- Regular population counts of feral pest species (particularly pigs and rabbits / hares) are suggested to gain a better understanding of population levels at the site and subsequently inform management requirements so that species are not left to prosper to such levels that could pose a threat to rehabilitation success.
- Some good management practices were noted including successful localised control of African Boxthorn, and salvage and translocation into the rehabilitation of Tiger Orchid specimens found in the pre-strip area.

1. Introduction

1.1 Background

Bengalla Mine (**Bengalla**) is located approximately 4 kilometres (**km**) west of the township of Muswellbrook in the Upper Hunter Valley of New South Wales (**NSW**). The mine is managed and operated by Bengalla Mining Company Pty Limited (**BMC**), a joint venture ownership with New Hope Group and Taipower. BMC is responsible for all facets of the operation including coal extraction, final landform development and rehabilitation works.

BMC presently operates under Development Consent for State Significant Development (**SSD**) 5170 (as modified) which was granted by the NSW Department of Planning and Environment on 3 March 2015 for the Continuation of Bengalla Project. The approval allows for the extraction of up to 15 million tonnes per annum of run of mine coal until 2039.

As required by SDD-5170, rehabilitation at Bengalla is carried out progressively and as soon as reasonably practicable following disturbance. BMC undertakes an annual rehabilitation monitoring program (this report) to evaluate the progress of rehabilitation towards fulfilling the Rehabilitation Objectives and Rehabilitation Completion Criteria.

The annual rehabilitation monitoring program at Bengalla commenced in 2009 and has been successively implemented by AECOM (2009-2017), Koru Environmental (2018-2022) and Moss Environmental (2023). Monitoring is implemented to satisfy the requirements of:

- Relevant conditions contained in SDD 5170; and
- The Rehabilitation Management Plan (**RMP**) current at the time of monitoring (BMC, 2024).

1.2 Report Scope and Structure

This report provides a brief overview of rehabilitation requirements and objectives at Bengalla, outlines the monitoring methods and presents the results of the 2024 rehabilitation monitoring program conducted in October 2024 by Koru Environmental Pty Ltd on behalf of BMC. It is structured as follows:

- **Section 2** – highlights rehabilitation requirements and objectives for Bengalla, and the monitoring approach adopted to assess and report on performance condition.
- **Section 3** – defines the monitoring approach used to assess and report on performance condition at Bengalla and presents the scope of works completed during the 2024 monitoring campaign.
- **Section 4** – outlines the field data collection and data interpretation methodologies, as defined in the current RMP.
- **Section 5** – presents and discusses the 2024 results from the transect-based monitoring, including monitoring of pasture and native ecosystem rehabilitation.
- **Section 6** – presents and discusses the key findings and observations from the 2024 rehabilitation audit inspection.
- **Section 7** – provides an assessment of current rehabilitation condition and progress against the defined RMP rehabilitation completion criteria.
- **Section 8** – provides high-level generic recommendations suggested to improve rehabilitation condition, based on the 2024 monitoring results and observations.
- **Section 9** – includes the bibliography of references cited throughout this report.

2. Land Rehabilitation at Bengalla

2.1 Post-Mining Landform and Land Use Goals

The overarching objective of the Bengalla rehabilitation program is to develop a safe, stable and non-polluting landscape that is consistent with rehabilitation requirements stated in relevant project approvals. This will be achieved by the development of an undulating, free draining post mining landform (excluding final void) that is consistent with the surrounding environment.

A mixture of native bushland and cattle grazing were identified to be the most suitable post-mining land uses for the majority of land at Bengalla with the exception of the overburden emplacement area (OEA). The eastern face of the OEA is required to be revegetated to contain high density natural woodland similar to that presently found within undisturbed areas of land within the SSD-5170 (as modified) project boundary. This combination of agricultural (cattle grazing) and conservation land use are the preferred land uses following mine closure.

2.2 Rehabilitation Objectives

Final land use domains are land management units characterised by a similar post mining land use objective. Mining domains are land management units within the mine site, usually with unique operational and functional purpose. Rehabilitation Objectives and Rehabilitation Completion Criteria have been developed for the final land use domains as described in the Bengalla RMP.

Of the final land use domains defined in the RMP for the site, two are currently relevant to the rehabilitation monitoring program; namely 'Domain A: 'Native Ecosystem (HDWV)' and 'Domain B: Agricultural – Grazing'. These are further described in **Table 1**, together with associated rehabilitation objectives.

Table 1 Bengalla final land use domains and rehabilitation objectives relevant to vegetation cover

Domain	Rehabilitation objectives
Domain A – Native Ecosystem (HDWV)	• Eastern and Southeastern Faces of the Overburden Emplacement Area (OEA) to have levels of ecosystem function which demonstrate that the rehabilitation is self-sustainable. • The vegetation composition of the rehabilitation contains species that are commensurate with native communities of high-density woody vegetation (HDWV). The HDWV species mix is based on the naturally occurring Grey Box – Ironbark Woodland and Ironbark – Spotted Gum – Grey Box Woodland vegetation communities. • Levels of Ecosystem Function have been established that demonstrate the rehabilitation is self-sustainable. • Incorporate open woodland across at least 10% of the rehabilitated landform.
Domain B – Agricultural: Grazing	• Rehabilitation to be Class III, IV or V Agricultural Land Capability. • Revegetation is sustainable for the long-term and only requires maintenance that is consistent with the intended final land use. • vegetation composition is recognisable as pasture land similar to other areas within the region.

2.3 Existing Rehabilitation

2.3.1 Background

To date, rehabilitation works have been undertaken on the northern, central and southern overburden dumps, which are collectively referred to as the eastern OEA. In accordance with BMC's previous development consent (DA 211/93), areas of pre-2016 rehabilitation across the eastern OEA were revegetated with a mosaic of pasture and woodland rehabilitation (with no specific species selection).

However, the new approval (SDD-5170) was granted under the condition that the entire southern and eastern face of the OEA is to be entirely revegetated using HDWV, i.e. requiring BMC to retrofit historic rehabilitation areas not achieving adequate tree densities (i.e. areas of pasture rehabilitation and areas of low-density woody vegetation) into HDWV.

To that effect, a revegetation program is underway which commenced in 2020. The strategy incorporates a combination of approaches including different revegetation techniques (direct seeding using a rear-mounted spreader, aerial seeding using a helicopter or drone, or tubestock plantings) in various substrates / growth medium types (topsoil, subsoil or overburden).

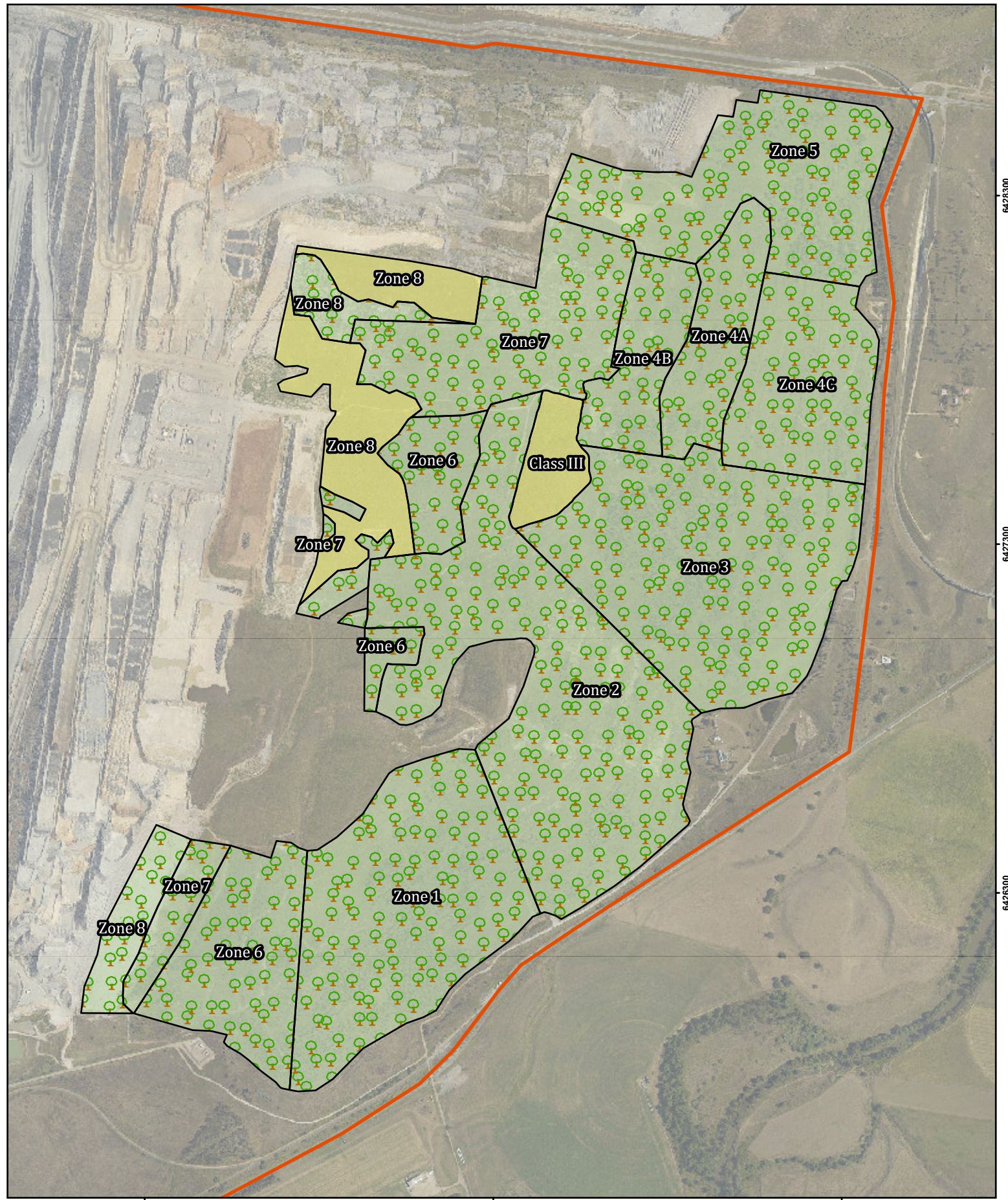
2.3.2 Rehabilitation Zones

Rehabilitation works at the site are undertaken in accordance with the RMP and the Forward Work Program (FWP) developed by Bengalla. The program defines management zones based on existing conditions, revegetation strategy and timing for implementation. Management zones include both historic rehabilitation areas requiring to be converted to HDWV as well as areas of new rehabilitation (i.e. not previously established).

At the time of the 2024 monitoring campaign, a total of approximately 325.7 hectares (**ha**) of post-mined rehabilitated lands existed at Bengalla, comprising:

- ~26.4 ha of pasture rehabilitation, comprising 5.7 ha on Class III land capability and ~20.7 ha on Class IV/V land capability.
- ~299.3 ha of native ecosystem (HDWV) rehabilitation on class IV and V land capability.

Current rehabilitation areas at the site and the rehabilitation management zones are shown in **Figure 1**.



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MAP SIZE: A4 Portrait
 DATUM: GDA 1994
 PROJECTION: MGA Zone 56

PROJECT REF: P2024-008
 CREATED BY: mcalteau
 DATE CREATED: 17-Mar-2025

Legend

Bengalla project boundary

FWP management zones

Final land use

Native ecosystem (HDWV)

Agricultural - Grazing (Pasture)

Bengalla Mine
Rehabilitation Monitoring 2024

FIGURE 1

**Final Land Use
and Rehabilitation
Management Zones**

3. Rehabilitation Monitoring

3.1 Approach

Rehabilitation monitoring at Bengalla is undertaken to satisfy the requirements of the RMP, with the monitoring results being reported in the Annual Rehabilitation Report as part of the Annual Review. The objective of the annual monitoring program is to assess rehabilitation progress against relevant objectives and commitments.

The monitoring approach includes a combination of transect-based monitoring and a rehabilitation audit:

- The transect-based monitoring relies on quantitative data that is collected in a consistent and repeatable manner to allow multi-year comparison of data and assessment of changes and trends occurring over time. The results of this monitoring indicate whether the rehabilitation meets the relevant objectives and completion criteria particularly pertaining to vegetation performance attributes (e.g. tree densities, floristic assemblages, vegetation structure, etc.), whilst highlighting potential deficiencies requiring improvement.
- The rehabilitation audit is intended as a complement to the transect-based monitoring and consists of a high-level walkthrough inspection of rehabilitation areas. Its primary objective is to identify potential issues / deficiencies occurring at the broader scale and requiring intervention (e.g. slope instabilities or drainage issues, weed infestations, vegetation dieback, etc.), that would otherwise not be captured at the scale of the transect-based monitoring.

3.2 Monitoring Schedule

The rehabilitation monitoring program is implemented annually at the site.

Historically, all monitoring transects established across the rehabilitation were monitored on an annual basis. However, as mining progresses and additional rehabilitation is completed at the site, the density of transects (which is correlated to the area of rehabilitation) increases whereby ongoing annual monitoring of transects becomes less informative as the rehabilitation becomes better established (i.e. more mature) mature and ecological successional processes start to slow down.

Consequently, a decision was made to change the monitoring frequency for each transect to biennial and establish a rotational schedule whereby half of the transects are monitored in Year A and the second half in Year B (and the alternance then repeated); with the exception of:

- Newly established rehabilitation areas;
- Drainage features; and
- Areas identified to have significant weed infestations in the previous monitoring report.

This will assist Bengalla in planning targeted remedial works on a risk-based approach.

Starting in 2024 (i.e. this current monitoring campaign), all transects coded with an even number will be monitored in even years and those coded with odd number in odd years. This approach will allow to maintain a relatively consistent and reasonable monitoring effort every year, without compromising on the quality or scientific validity of the collected datasets.

Accordingly, the geographical scope for the annual rehabilitation audit will generally be limited to the areas containing the transects for the given monitoring year, i.e. assessing the broader areas surrounding the transects and whilst travelling to and between monitoring transects. This way, comprehensive coverage of the rehabilitation will be achieved every two years.

3.3 2024 Scope of Works

3.3.1 Monitoring effort

The scope of works for the 2024 monitoring campaign included the assessment of 23 monitoring transects (comprising 22 in areas of HDWV and one in Class IV/V pasture rehabilitation) as well as walkover visual inspections (i.e. rehabilitation audit) of the associated surrounding areas.

One new monitoring transects (HDWV 12) was established during the 2024 program of works, located in an area recently improved with tubestock tree plantings as part of the ongoing revegetation program.

The transects monitored in 2024 are detailed in **Table 2** and their location shown in **Figure 2**.

Table 2 2024 rehabilitation monitoring scope – Monitoring sites

Transect code	Land use	Year rehab. est.	Year transect est.	Revegetation method	Coordinates	
					Easting	Northing
PAS 04	Pasture	2023	2023	Topsoil + direct seeded	296222	6428009
HDWV 02	Native ecosystem	2004	2011	Topsoil + direct seeded	297401	6428141
HDWV 04	Native ecosystem	2007	2017	Topsoil + direct seeded	297078	6427375
HDWV 06	Native ecosystem	2014	2017	Topsoil + direct seeded	296362	6426364
HDWV 08	Native ecosystem	2016	2017	Topsoil + direct seeded	296102	6426010
HDWV 10	Native ecosystem	2006	2018	Topsoil + direct seeded	296939	6427274
HDWV 12	Native ecosystem	2024	2024	Topsoil + tubestock	297013	6427653
HDWV 14	Native ecosystem	2020	2020	Topsoil + tubestock	297230	6428081
HDWV 16	Native ecosystem	2020	2020	Topsoil + tubestock	297015	6427977
HDWV 18	Native ecosystem	2020	2020	Subsoil + direct seeded	297462	6427928
HDWV 20	Native ecosystem	2023	2020	Topsoil + direct seeded	296380	6427604
HDWV 22	Native ecosystem	2020	2021	Topsoil + direct seeded	296244	6427006
HDWV 24	Native ecosystem	2020	2021	Topsoil + direct seeded	295886	6425949
HDWV 26	Native ecosystem	2020	2021	Topsoil + direct seeded	295619	6425988
HDWV 28	Native ecosystem	2020	2021	Overburden + direct seeded	296675	6427115
HDWV 30	Native ecosystem	2021	2022	Subsoil + direct seeded	296314	6427853
HDWV 32	Native ecosystem	2021	2022	Overburden + aerial seeded	296765	6428083
HDWV 34	Native ecosystem	2021	2022	Overburden + aerial seeded	296076	6426277
HDWV 36	Native ecosystem	2022	2022	Topsoil + tubestock	296988	6426789
HDWV 38	Native ecosystem	2021	2022	Subsoil + direct seeded	296902	6426453
HDWV 40	Native ecosystem	2022	2022	Topsoil + tubestock	295637	6426310
HDWV 42	Native ecosystem	2021	2022	Overburden + aerial seeded	295586	6426438
HDWV 44	Native ecosystem	2023	2023	Overburden + aerial seeded	296222	6428009

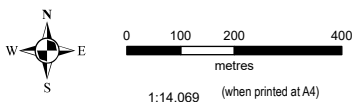
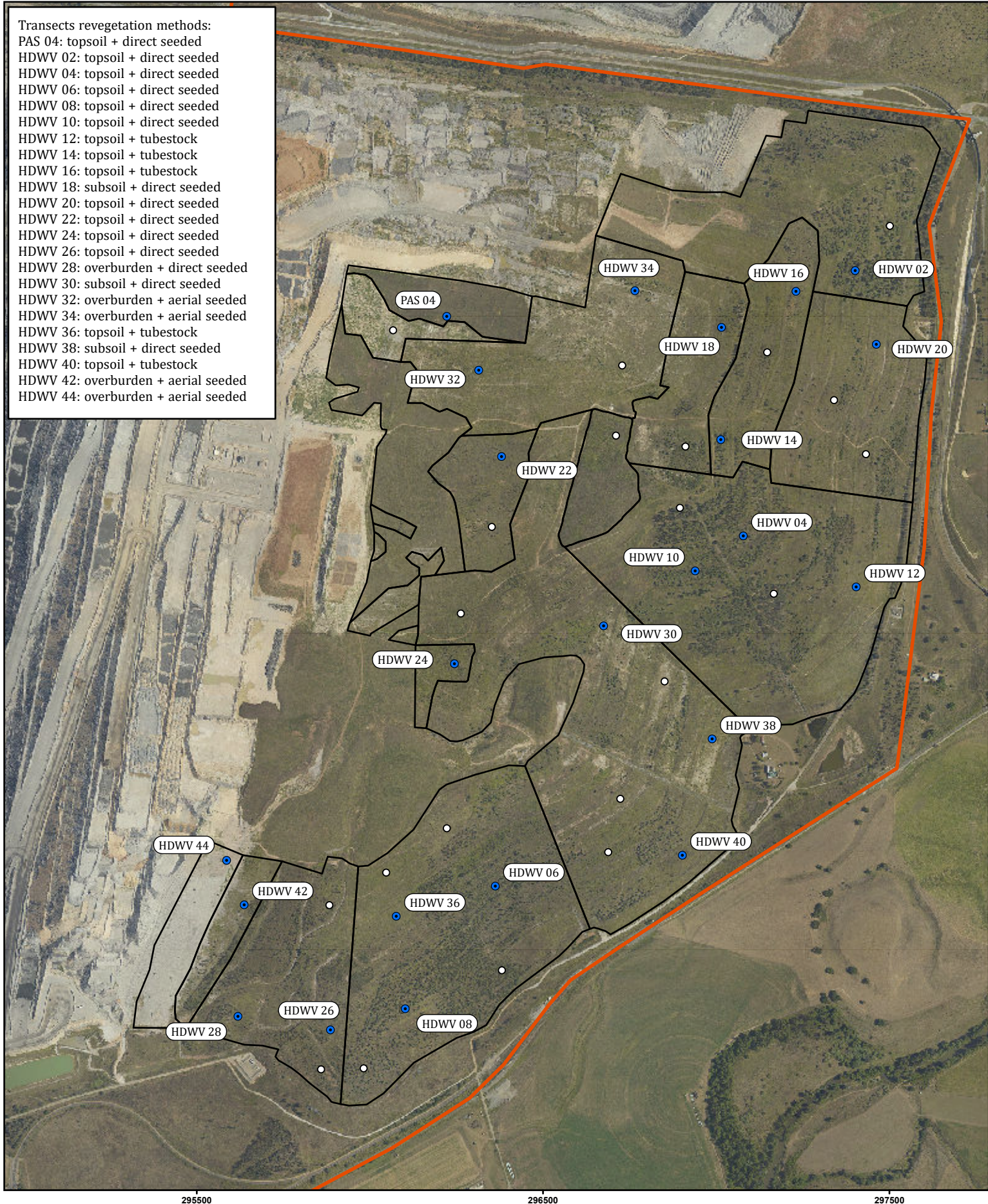
3.3.2 Reporting

The field data collection program was followed by processing, analysis and interpretation of monitoring data and results.

The annual rehabilitation monitoring report (this report) was prepared presenting the 2024 findings and covering all aspects of the field work and site assessments. The report presents trends and trajectories in rehabilitation condition (where relevant for transects with multiple years of data acquisition), includes an assessment of rehabilitation progress against relevant completion criteria defined in the RMP, and provides management recommendations suggested to improve rehabilitation performance for currently deficient areas (where required).

Transects revegetation methods:

- PAS 04: topsoil + direct seeded
- HDWV 02: topsoil + direct seeded
- HDWV 04: topsoil + direct seeded
- HDWV 06: topsoil + direct seeded
- HDWV 08: topsoil + direct seeded
- HDWV 10: topsoil + direct seeded
- HDWV 12: topsoil + tubestock
- HDWV 14: topsoil + tubestock
- HDWV 16: topsoil + tubestock
- HDWV 18: subsoil + direct seeded
- HDWV 20: topsoil + direct seeded
- HDWV 22: topsoil + direct seeded
- HDWV 24: topsoil + direct seeded
- HDWV 26: topsoil + direct seeded
- HDWV 28: overburden + direct seeded
- HDWV 30: subsoil + direct seeded
- HDWV 32: overburden + aerial seeded
- HDWV 34: overburden + aerial seeded
- HDWV 36: topsoil + tubestock
- HDWV 38: subsoil + direct seeded
- HDWV 40: topsoil + tubestock
- HDWV 42: overburden + aerial seeded
- HDWV 44: overburden + aerial seeded



MAP SIZE: A4 Portrait
 DATUM: GDA 1994
 PROJECTION: MGA Zone 56

PROJECT REF: P2024-008
 CREATED BY: mcalteau
 DATE CREATED: 17-Mar-2025

Legend

-  Bengalla project boundary
-  FWP management zones
-  Transects monitored in 2024
-  Transects not monitored in 2024

Bengalla Mine
 Rehabilitation Monitoring 2024

FIGURE 2

**Monitoring
 Transects Locations**

4. Methodology

4.1 Transect-based Monitoring

4.1.1 Transect Densities and Layout

Although not specifically stipulated, monitoring transect densities are established to provide adequate geographical coverage of the rehabilitation areas, and on average one monitoring transect is established per approximately 10 ha. As far as possible, specific transect placement in the field is selected to be best representative of the rehabilitation / vegetation condition in the surrounding area.

Each monitoring site consists of a standardised 50 m long linear transect, with associated 50 m 10 m plot and nested 1 m² and 4 m² quadrats, in the configuration depicted in **Figure 3**.

Transect lines are generally established across the contour or at a slight angle down the slope, but not directly down the slopes to ensure that the transect does not intersect a contour bank structure (where relevant). Transects are permanently established using metal star pickets at the start and end points to facilitate repeated measurements over time, and their geographical coordinates recorded using a handheld GPS.

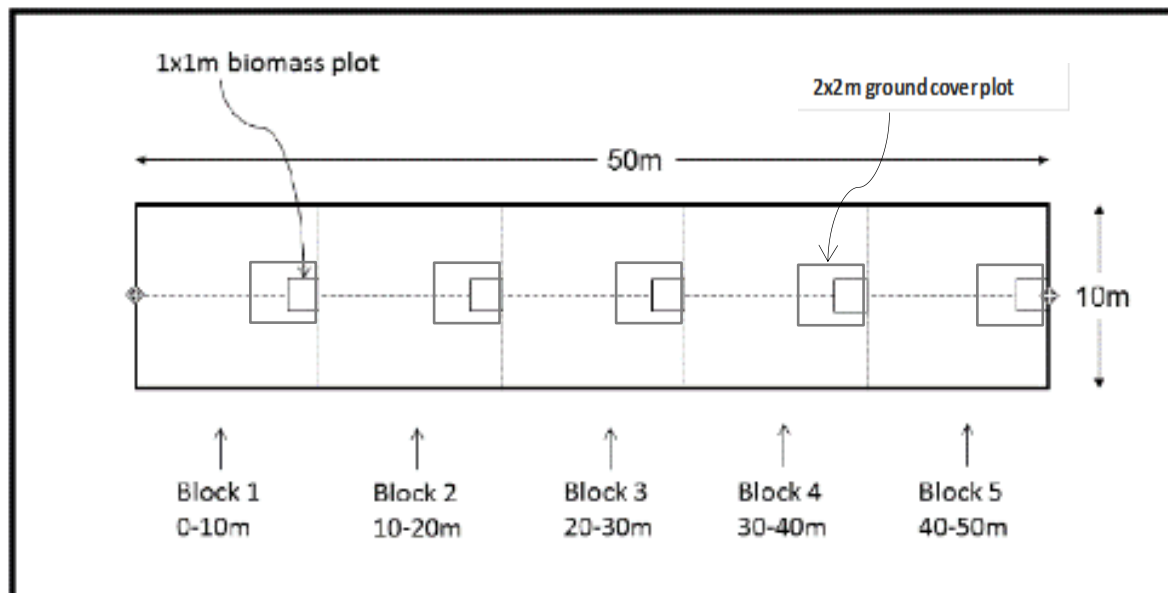


Figure 3 Monitoring sites layout

4.1.2 Monitoring Metrics and Data Collection Methods

At each of the monitoring transects, the metrics in **Table 3** are assessed and recorded (differing based on the target final land use).

Table 3 Monitoring metrics and assessment methods

Metric	Sampling area	Methods
All land use types		
Slope	50m transect line	The slope gradient at the transect line is measured using a digital clinometer for accurate results.
Erosion	10 m x 50 m plot area	- Erosion is assessed in accordance with the guidelines in the Australian Soil and Land Survey Field Handbook (National Committee on Soil and Terrain, 2009) for sheet, rill, gully and tunnel erosion. - Where rills or gully features were present, their location, depth and width are recorded as they intercept the transect line.
Bare ground	2 m x 2 m quadrats	The proportion (%) of exposed bare ground is visually estimated and recorded (i.e. the proportion of the ground area where vegetation, litter, logs and rocks >10 cm are absent).
Ground cover composition	2 m x 2 m quadrats	All ground cover species (grasses, herbs and sub-shrubs) are identified and recorded, and assigned a foliage projected cover (FPC) score in percent (%).
Soil properties	10 m x 50 m plot area	A composite soil sample (made up of 5-6 x sub-samples) is collected and sent to a NATA-accredited laboratory for analysis of soil chemistry.
Pasture rehabilitation		
Pasture biomass	1 m x 1 m quadrats	All standing herbage is cut to ground level using hand shears and the clipped material weighed on site using a digital scale to determine the standing herbage biomass.
Feed quality	10 m x 50 m plot area	A sample of available forage material is collected (in accordance with the guidelines provided by NSW DPI (2017) and sent to a NATA-accredited laboratory for feed quality testing.
HDWV rehabilitation		
Vegetation community composition and structure	10 m x 50 m plot area	- All trees and shrub species are identified and recorded. - A count is undertaken of all shrubs and trees to determine the overall stem densities. - Each recorded individual is categorised within a height category using the following classes: <1m, 1-3m, 3-5m, 5-8m, 8-12m, >12m.
	50m transect line	FPC provided by shrub species and by tree species is measured using a line intercept method, with native species and exotic species assessed separately.
Habitat potential	10 m x 50 m plot area	The presence and abundance of a litter layer, ground logs/woody debris, large rocks or other artificial habitat features are quantified and recorded.
Ecosystem resilience ⁽¹⁾	10 m x 50 m plot area	- Results of the woody species height stratification are used to determine the occurrence of second-generation seedlings. - The presence of reproductive material (buds/flowers/fruits) on established native shrubs and trees is recorded.

Note: (1) assessment implemented starting at Year 5 post-rehabilitation establishment.

4.1.3 Notes on Current Monitoring Methods

It is noted that the current monitoring methods pre-date the latest version(s) of the RMP. They were developed in 2016 to address the specific requirements of the Mining Operations Plan (**MOP**) at the time.

Significant changes have occurred between 2016 and 2024 in rehabilitation completion criteria approaches and expectations set by the NSW Resources Regulator authority, as have industry standards for monitoring rehabilitation (or vegetation) condition (for example with the introduction of the NSW Biodiversity Assessment Method (**BAM**) in 2017).

Therefore, and in some respects, the current monitoring methodology only allows for an indicative assessment of current rehabilitation condition against the latest performance indicators and completion criteria defined in the RMP (while also requesting to collect data with little relevance to inform the RMP completion criteria).

Monitoring methods and approaches are intended to be revised prior to the next round of rehabilitation monitoring in 2025.

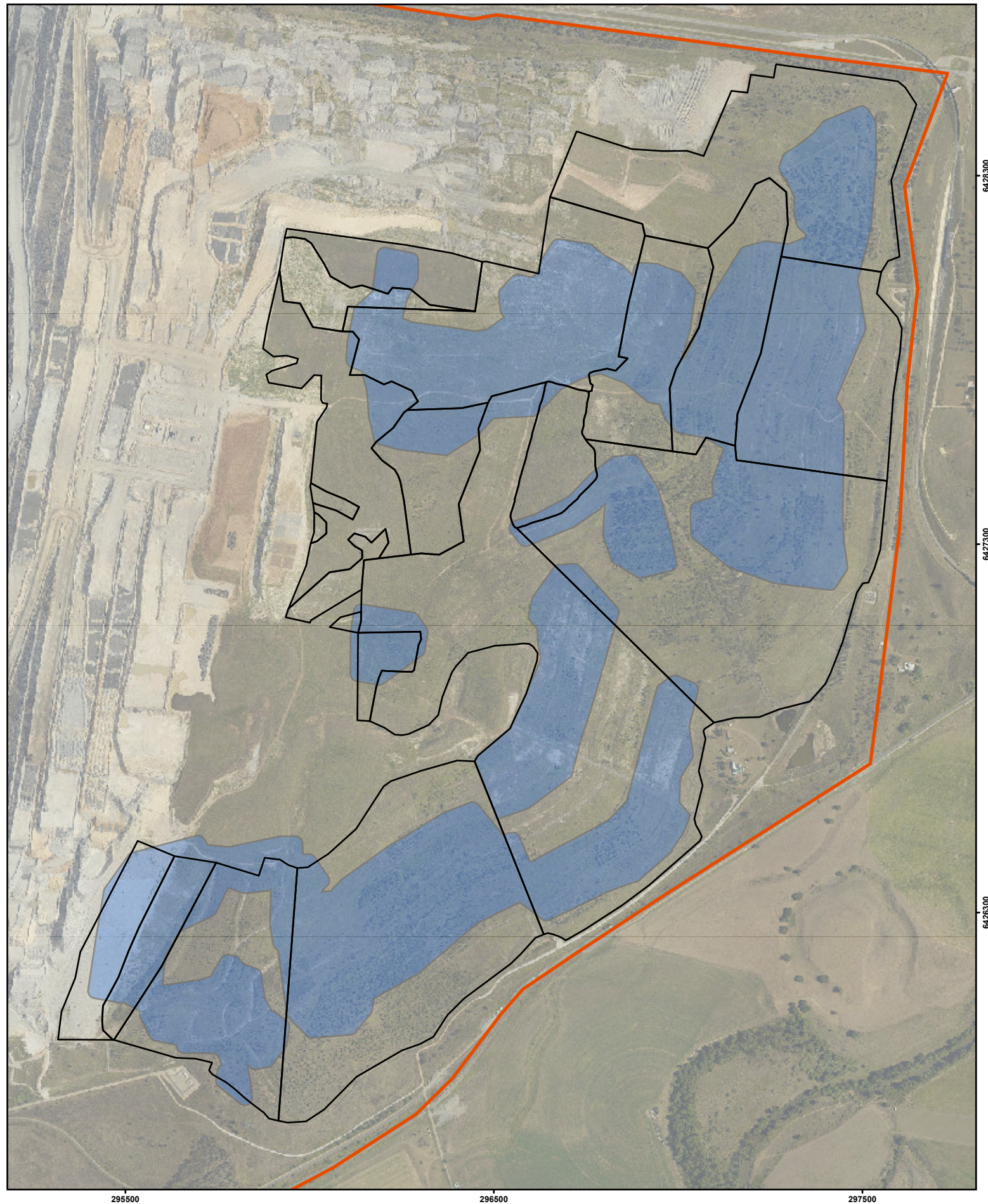
4.2 Audit Inspection

The audit consisted of a rapid-style assessment of rehabilitation areas surrounding the 2024 transects; traversing the areas in cross-sections and covering an area as comprehensive as possible within the available time allocation. Areas inspected in 2024 are shown in **Figure 4**.

Opportunistic sightings and assessments were made identifying the following where relevant:

- Stability of slopes and landforms – including presence and severity of active erosion areas (e.g. rill, gully and tunnel erosion);
- Function and condition of existing erosion and sediment control structures and landform features, including water management structures (e.g. spine drains, contour banks), water ponding areas, etc. (where applicable);
- Visual assessment of ground protection and vegetation cover, vegetation health and growth rates;
- Presence of artificial habitat structures incorporated into the rehabilitation (e.g. nest boxes, logs, rock piles or large boulders, erect habitat trees, etc)
- Areas of significant weed incursion (with a particular focus on high threat exotics and priority weed species);
- Evidence of presence/impact of vertebrate pests; and
- Any other disturbance factors or features, such as presence of mine waste, track disturbance, damaged fences, etc.

GPS points and geo-located photographs were taken of all observations made during the assessment. By collecting geo-located photos, areas can be re-visited in the future and photo-monitoring continued to demonstrate the evolution of the site condition over time.







0

90

180

360

metres

1:13,011 (when printed at A4)

MAP SIZE: A4 Portrait

DATUM: GDA 1994

PROJECTION: MGA Zone 56

PROJECT REF: P2024-008

CREATED BY: mcalteau

DATE CREATED: 17-Mar-2025

Legend  FWP management zones  Bengalla project boundary  2024 audit inspection area	Bengalla Mine Rehabilitation Monitoring 2024
	FIGURE 4 Rehabilitation Audit Inspection Area

4.3 Works Implementation

4.3.1 Monitoring Dates

Field data collection took place over two weeks during the first fortnight of October 2024 and was conducted by Matthieu Catteau (Principal Rehabilitation Scientist / Ecologist) from Koru Environmental.

Monitoring activities were supervised by BMC's environment and community team representatives.

4.3.2 Weather Conditions

Interrogating local rainfall data in the context of an ongoing monitoring program is important as the amount of rain received during the months or even weeks preceding floristic surveys can strongly influence the species diversity observed in the ground layer (especially shorter-lived species of grass, forb, fern, twiner, etc.). Wet conditions tend to favour the emergence and flowering of many species (including weeds), whereas drier periods will often lead to lower recorded species diversity (often compounded by desiccated plants making positive species identification difficult). Consequently, cross-year comparisons of total species richness and abundance of vegetation typically requires careful interpretation.

For rehabilitated lands on unconsolidated soil profiles, the amount and intensity of rainfall can also have repercussions on landform stability and surface erosion processes, especially in areas of steeper slope gradients and/or where a vegetative cover has not yet fully established (e.g. recent rehabilitation). In particular, heavy rainfall events (i.e. ≥ 25 mm in 24-hour) generate high surface-flow velocities associated with greater erosive forces.

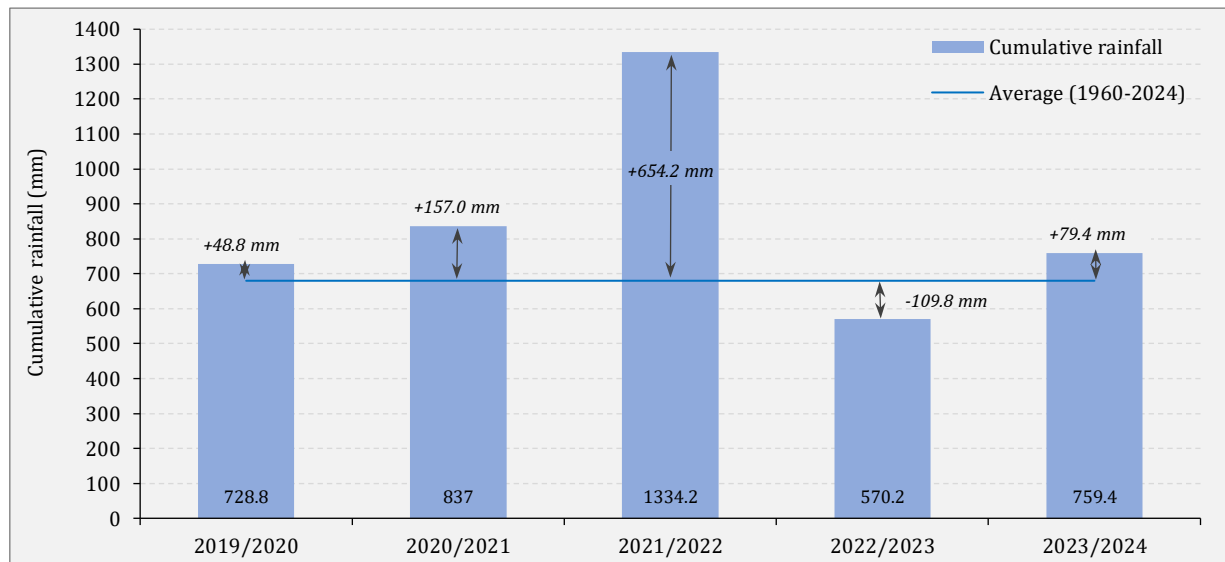
Rainfall data received in the locality over the past 5 years are illustrated in **Graph 1** (cumulative 12-month rainfall calculated over the October-to-September period) and **Graph 2** (monthly rainfall) (data from Muswellbrook (Spring Creek (Castle Vale)) BoM Station No. 61192).

As shown in **Graph 1**, the locality experienced slightly above-average annual rainfall during the year preceding the 2024 monitoring event, with a cumulative ~760 mm of rainfall received or ~112% of the long-term annual average. This followed a year of below average rainfall during 2022-23 (~570 mm received, or ~84% of annual average), highlighting improved conditions between the last two rehabilitation monitoring events.

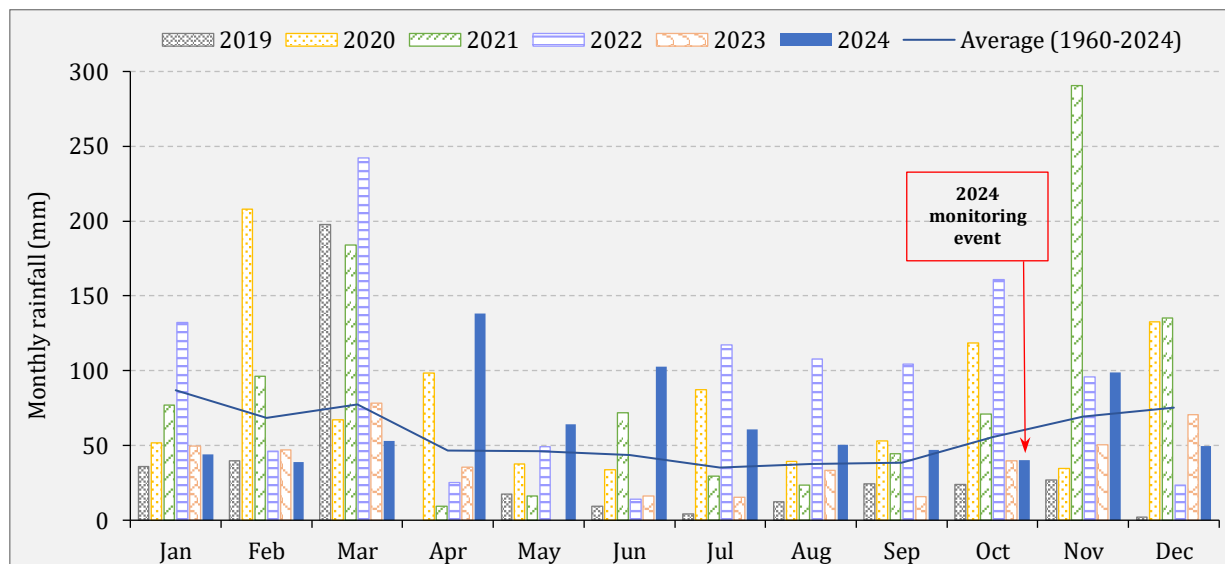
Compared to long-term seasonal averages, the six-month period leading into the 2024 field surveys (i.e. April to September 2024) was particularly wet, with all months receiving rainfall totals above (to well-above) their long-term monthly averages. The months of April and June were particularly wet and experienced rainfall approximately triple and double their respective long-term seasonal average (**Graph 2**). In contrast, the six-month period prior (i.e. September 2023 to February 2024) was dry compared to long-term monthly seasonal average standards.

The locality experienced a total of six heavy rainfall events during the 12 months preceding the 2024 survey, including four occurring during the six months leading up to the field surveys.

Finally, approximately 46 mm of rainfall occurred during the four weeks directly preceding the field surveys.



Graph 1 Local annual rainfall 2019-2024 (cumulative October to September)



Graph 2 Local monthly rainfall data 2019-2024

4.4 Results Interpretation

4.4.1 Transect-collected Data

Results from the transect-based monitoring were analysed, tabulated and presented graphically to provide a summary of key monitoring results for each transect monitored. Where relevant, data from previous monitoring events were also included for comparison purposes and trend analyses. The following data analyses and interpretation were undertaken:

- **Soil properties:** soil chemical properties of pH, salinity, sodicity and fertility were assessed against values documented in relevant literature (particularly Hazelton and Murphy, 2007) and as pertaining to value ranges known to be suitable and conducive to vegetation growth.
- **Ground cover:** protective ground cover was defined as including live vegetative cover, litter cover and other perennial and immovable ground features (such as logs or rocks >10 cm in size or diameter).
- **Weeds:** data were interrogated for the presence and abundance of weed species. Weeds were categorised as either 'non-invasive exotics' (i.e. low risk and generally requiring no active control except in severe cases)

or 'priority weeds' (i.e. problematic species requiring active and ongoing control), noting that the classification of exotic species as priority weeds differed based on the final land use type:

- **Pastural land use:** in areas of agricultural / pasture rehabilitation, priority weeds only comprised species listed as priority weeds under the NSW Biosecurity Act 2015 for the Hunter region (NSW WeedWise).
- **HDWV land use:** in areas of native ecosystem (ecological) rehabilitation, priority weeds were defined to include species listed as priority weeds under the NSW Biosecurity Act 2015 for the Hunter region **and** species listed as High Threat Exotics (HTE) under the NSW BAM.
- Other exotic species not legislatively listed but known to be problematic and pose a threat to rehabilitation success were also classified as priority weeds. These included for example *Acacia saligna*, *Setaria sphacelata* or *Panicum coloratum* in ecological rehabilitation or species with known toxicities to stock in pasture rehabilitation, e.g. *Urochloa panicoides*.
- **Pasture composition:** data were interrogated for the presence and proportion of suitable pasture species making up the pasture composition, i.e. palatable and productive species appropriate to the district. These were classified as either: C3 or C4 grasses¹ or legumes². All native species occurring in pasture areas were also considered as acceptable.
- **Pasture biomass:** the herbage biomass measured at all five 1 m² quadrats was averaged and converted into kilogram per hectare (kg/ha) equivalent. Using the dry matter (DM) content of the sampled herbage (returned by the laboratory as part of the feed quality testing results), the pasture biomass was then calculated in the standard unit of kg DM/ha.
- **Pasture productivity:** potential carrying capacities and stocking rates of the rehabilitated pastures were calculated in accordance with the 'Beef stocking rates and farm size – Hunter Region' (NSW DPI, 2006b).
- **HDWV composition:** species recorded in the rehabilitation were compared against native species assemblages characteristic of the local GBIW and SGIGBF communities to determine levels of resemblance; based on data available in the NSW BioNet Vegetation Information System (BioNet VIS) and other published community profiles.
- **HDWV structure:** stem counts and densities were considered and reported for tree species only (tree species as defined in the BAM), which is believed to be the intent of the relevant RMP completion criteria.
- **HDWV function:** natural regeneration potential was assessed via the presence of reproductive material on native shrub and tree species (i.e. demonstrating the potential for the community to self-regenerate) and the presence of second-generation tree seedlings (i.e. evidence of active regeneration processes occurring).

4.4.2 Walkover Audit Observations

All observations made during the walkover audit inspection were assigned a priority ranking based on the guideline defined in Table 4. This approach was adopted with the view to provide BMC a record of what issues should be prioritised for maintenance / remedial actions (while also highlighting those areas of acceptable performance / practice).

¹ Grasses can be classified as either C3 or C4 plants, depending on the different pathways that plants use to capture carbon dioxide during photosynthesis. C3 plants are adapted to cool season establishment and growth (and have a greater tolerance to frost), whilst C4 plants are better adapted to warm or hot seasonal conditions (i.e. tropical species). Generally, C4 species have a greater water use efficiency and generate greater biomass, but C3 species tend to have a higher feed quality (NSW DPI, non-dated).

² Legumes are a critical component to achieve productive pastures, being the major source of nitrogen for pasture grasses and improving their overall palatability and feed quality.

Table 4 Rehabilitation performance criteria guidelines

Priority	Type	Description
1	Urgent immediate action required	- Issues threatening the fundamental objectives of safe, stable and vegetated landforms (e.g. severe erosion issues compromising land capability, large bare areas, spontaneous combustion impacts, etc). - Unattended issues will prevent successful lease relinquishment. - Repair/remediation costs likely to increase rapidly if issue is left unattended.
2	Major maintenance works required	- Rehabilitation success compromised and does not meet completion criteria. - Issue processes and impacts may deteriorate if left unattended for a long period of time. - Significant management inputs required to address the issue and progress the rehabilitation towards defined objectives and criteria (e.g. repairs of minor/localised erosion, severe widespread weed infestations, large-scale revegetation or tree plantings, etc.)
3	Regular inspections, localised maintenance works or improvement interventions required	- Does not meet completion criteria but future rehabilitation success unlikely to be compromised. - Localised or routine land management actions required to improve rehabilitation condition (e.g. localised weed control, supplementary infill tree plantings, fertiliser applications, incorporation of artificial habitat features, etc.) - Careful monitoring or regular inspections of area/issue required to confirm area/issue is not degrading further.
4	Observations of good practices or rehabilitation performance.	- Satisfactory rehabilitation performance (relative to the age of the rehabilitation) or example of good practice. - Meets or on trajectory to meet completion criteria (e.g. ecologically young areas). - Routine land management and monitoring should be continued to maintain status until relinquishment process is sought.

4.4.3 Compliance Assessment

Using the analysed field monitoring data together with the observations made during the walkover audit, an assessment was undertaken of current rehabilitation condition or progress against associated completion criteria defined in the RMP (2024 version); noting that the validity of the assessment was compounded by the limitation in the current monitoring methodology as discussed in **Section 4.1.3**, i.e. the assessment is indicative only.

For reference, these criteria have been reproduced in **Table 5**. (note that some criteria have been reworded, re-organised or grouped to remove duplicates or improve legibility), which also highlights how each criterion is being assessed under the scope of this monitoring program.

As the suitably qualified expert, appropriate quantitative measures have been developed to measure rehabilitation performance against the Completion Criteria. These are based on review of published literature and studies, historical monitoring results, benchmarks in previous MOPs, and other relevant industry standards and guidelines.

Table 5 Bengalla rehabilitation objectives and completion criteria

Category	RMP completion criteria	Qualitative measure
All final land use domains		
Access	Land is safely accessible to humans and/or grazing stock	As per criteria.
	No uncontrolled access and demarcations present.	As per criteria.
Landform stability	No visible signs of instability (slumping / cracks) requiring ongoing management and maintenance works.	Significant ponding or slumping observed, or severe tension cracking.
	No evidence of erosion within the water/sediment management structures requiring ongoing management and maintenance works.	As per criteria.
	No erosion rills, gullies or tunnel erosion requiring ongoing management and maintenance works.	Erosion rills (i.e. <30 cm deep) are acceptable. No active gully channels >30 cm in depth. No active tunnel erosion.
	Constructed landform compliant with approved final landform design.	Not assessed – outside the scope of the annual monitoring program.
Land contamination	No evidence of contamination from hazardous or problematic materials.	No contaminated materials observed on the surface (e.g. carbonaceous material, hydrocarbons, etc). No evidence of severe or widespread vegetation dieback that could indicate a contamination issue.
Feral pests	No increasing trends in feral pest populations and species diversity.	Indicative criteria assessment undertaken based on sightings of feral pest species (primary or secondary evidence) and observed impacts on soils and vegetation.
Bushfire	Bushfire controls are implemented including firebreaks, management of fuel loads and access maintained for firefighting.	Criteria generally outside the scope of this monitoring program. Assessment limited to the suitability of access across the rehabilitation (i.e. sufficient light vehicle track network and tracks condition).
Removal of infrastructure	All infrastructure not used as part of the final land use is removed.	As per criteria.
Surface water	Surface water quality meets parameters suitable for land use.	Not assessed – outside the scope of the annual monitoring program.
	Surface runoff is diverted to neighbouring drainage lines.	Not assessed – outside the scope of the annual monitoring program.
Groundwater	Landform compliant with the approved hydrological modelling landform design.	Not assessed – outside the scope of the annual monitoring program.

Category	RMP completion criteria	Qualitative measure
Waste and process materials	Waste storage areas have been constructed as designed. Verification and/or testing confirms integrity of structures and does not pose threat of environmental harm	Not assessed – outside the scope of the annual monitoring program.
Domain A4 – Native Ecosystem / Overburden Emplacement Area		
Vegetation composition	Native species diversity is comparable to native woodland areas in the region (based on GBIW / SGIGBF communities).	Native species diversity assessed for all three main growth form groups (i.e. trees, shrubs, ground covers). Performance deemed satisfactory where: - Native species richness is $\geq 50\%$ of the published community benchmarks, and $\geq 75\%$ of species established in the rehabilitation are representative of the target communities.
Vegetation structure	Tree stems densities are maintained at ≥ 400 stems/ha.	As per criteria.
Ecosystem function	Soil / growth medium maintains chemical and physical qualities appropriate to achieve native vegetation growth.	Performance assessed as satisfactory where key soil parameters (i.e. those most influencing and regulating plant growth) are within documented suitable range (generally based on Hazelton and Murphy, 2007).
	Surface organic litter is present	As per criteria.
	Presence of habitat features on rehabilitated areas.	As per criteria.
	Presence of native animal activity.	Incidental and opportunistic observations only (i.e. fauna monitoring outside the scope of this monitoring program).
	Evidence of reproductive material on mature long-lived vegetation and/or presence of second-generation seedlings from mature long-lived species.	As per criteria.
	Recruitment rates are equal to or exceed mortality rates.	Criteria difficult to assess. Assumed as met where tree densities are maintained at 400 stems/ha over time.
	Priority weed species coverage is comparable to native woodland areas in the region (based on GBIW / SGIGBF communities).	In the absence of relevant reference sites, priority weed cover is deemed acceptable where $\leq 10\%$ (cumulative FPC).
Domain B4 – Agricultural: Grazing / Overburden Emplacement Area		
Rehabilitation to be Class III, IV or	Pasture cover is comparable to similar pasture areas within the region.	Assessed against the previous MOP target of 70% total protective cover (i.e. $<30\%$ bare ground).

Category	RMP completion criteria	Qualitative measure
V Agricultural Land Capability	Pasture composition (i.e. presence of grasses and legumes) is comparable to similar pasture areas within the region.	Assessed as satisfactory where $\geq 75\%$ of the live herbage cover is comprised of suitable pasture species.
	Pasture productivity is comparable to similar pasture areas within the region.	Assessed as satisfactory where $\geq 1,500$ kg DM/ha, which has been reported as the minimum herbage mass required to maintain satisfactory production in a dry cow cattle enterprise in the region (NSW DPI, 2006a).
	Priority weed species coverage is comparable to similar pasture areas within the region.	Priority weed cover deemed acceptable where $\leq 10\%$ (cumulative FPC).
	No species with known toxicity to grazing stock.	As per criteria.
	Surface organic litter present.	As per criteria.
	No surface rocks present that impede the post-mining land use.	Surface rocks with the potential to impede the post-mining land use defined as rocks larger than 50 cm in size, as these could prevent the safe usage of farming equipment.

5. Results – Transect-based Monitoring

5.1 Pasture Rehabilitation

Only one monitoring transect in pasture rehabilitation was assessed in 2024 (PAS 04), located in Class IV/V rehabilitation established in 2023 (i.e. ~ 1 year old).

It is noted that the transect was established during the 2023 monitoring campaign and its placement was questionable, with the starting point of the transect located extremely close to the rehabilitation zone boundary.

5.1.1 Photographic Monitoring

Photographic monitoring results, depicting the condition of the monitoring transects at the time of the 2024 monitoring event, are provided in **Appendix A**. These can be compared with previous monitoring years (supplied in previous annual monitoring reports) to determine evolution and changes in vegetation establishment and condition over time.

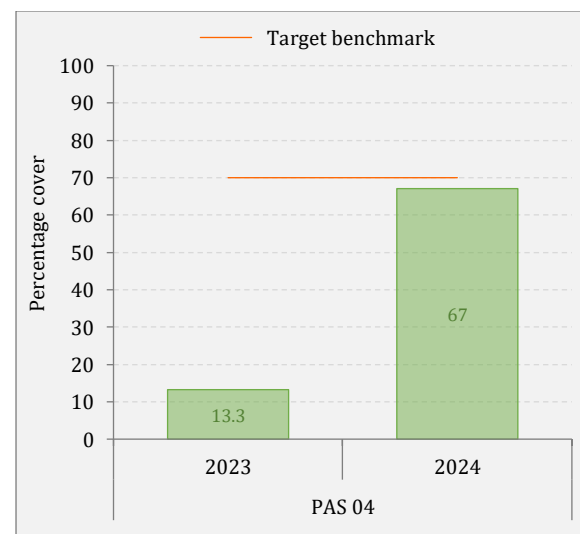
5.1.2 Erosion

Despite limited protective and vegetative ground cover present, no active erosion processes were detected at the PAS 04 transect site, the site being located on top of the emplacement in an area of relatively flat topography.

5.1.3 Ground Cover Protection

This transect was first monitored last year shortly after the rehabilitation was established and at a time where vegetation establishment was in its infancy (13.3% cover recorded in 2023). A significant increase in ground cover protection to ~67.0% was recorded in 2024, which however remained slightly below the 70% benchmark (**Graph 3**).

However, and despite the reported cover, pasture establishment was extremely poor at the site at the time of monitoring. The presence of perennial pasture grasses was negligible (<1.0% cover) and the protective cover consisted mainly of weeds and litter (from desiccated annual weeds). In particular, the area was dominated by an extremely thick stand of *Rapistrum rugosum** (Turnip Weed, largely desiccated and dead standing at the time), which likely colonised rapidly and vigorously post-seeding and hindered the germination of pasture species.



Graph 3 Pasture monitoring results – Ground cover protection

5.1.4 Pasture Composition

Monitoring results for pasture composition are summarised in **Graph 4** (detailed 2024 floristics monitoring results are provided in **Appendix B** for further reference).

A total of 19 species were recorded at the transect in 2024 comprising seven desirable pasture species, nine non-invasive exotics and three priority weeds. This compared to eleven species recorded in 2023 comprising four desirable (pasture species and seven non-invasive exotics).

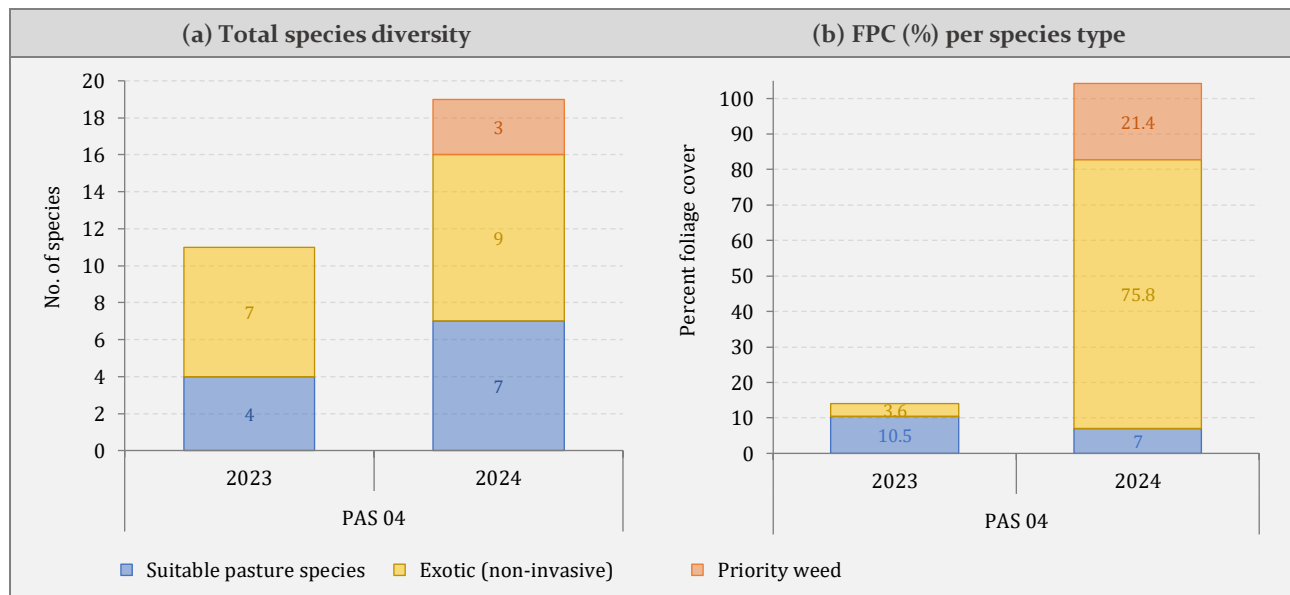
Desirable pasture species included three grasses (one annual and two perennials) and four legumes (two medics and two clovers). This in the absolute does not represent a poor composition performance, however the cumulative abundance of these species was very low and provided only ~7.0% of the vegetative cover (with grasses accounting for <1.0% of the cover).

Rather, the vegetative cover at the site was very largely dominated by weeds, including ~75.8% cover of non-invasive exotics (mainly Turnip Weed) and ~21.4% cover of priority weeds.

Recorded priority weeds included *Galenia pubescens** (Galenia), *Senecio madagascariensis** (Fireweed) and *Urochloa panicoides** (Liverseed Grass).

- Galenia was by far the most prevalent (~21% average cover) and may require targeted control in the area unless pasture grasses establish vigorously to naturally outcompete the species.
- Fireweed was very scarce (~0.2% average cover) and not problematic at the time. The species has known toxicities to livestock (NSW DPI, 2024).
- Liverseed Grass is considered a priority weed species for the purpose of this monitoring program due to its reported potential toxicity to stock from nitrate poisoning (Chauhan, 2022). Although it occurred at negligible levels (~0.2% average cover) a dormant seedbank may be present in the soil.

Overall, pasture establishment performance at PAS 04 was very poor more than a year after seeding and will need to be closely monitored. Pasture grasses may still germinate and establish and progressively outcompete annual weeds (to be determined the next time this site is monitored). Failing this, the area will need to be re-seeded.



Graph 4 Pasture monitoring results - Species composition

5.1.5 Pasture Productivity

Considering the negligible grass cover at the time of monitoring, pasture productivity assessments (i.e. biomass levels and feed quality testing) could not be undertaken for the PAS 04 monitoring transect in 2024.

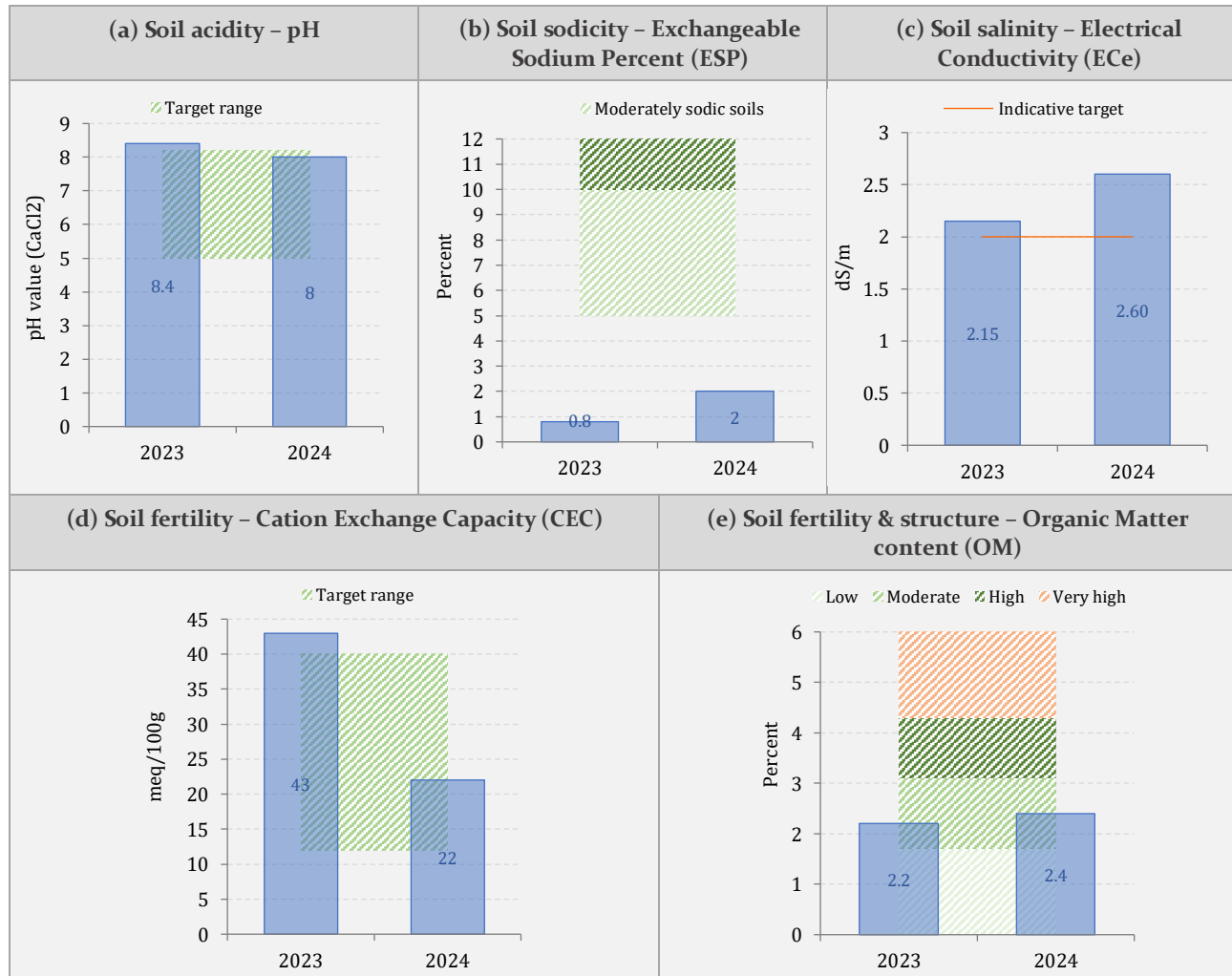
5.1.6 Soil Properties

Testing results for key soil chemical properties are presented in **Graph 5**; including pH, salinity, sodicity, cation exchange capacity (CEC) and organic matter content (OM). For further reference, the detailed laboratory analysis report is provided in **Appendix C**.

Most soil chemical attributes have remained relatively stable at PAS 04 since the last monitoring event, generally showing only minimal seasonal variations. One exception was for CEC levels which nearly halved between 2023 and 2024; however the 2024 reading of 22.0 meq/100g remained well within desirable target range therefore the reported drop is not a matter for concern.

In relation to other soil properties, the tested sample remained slightly alkaline (but within target range), slightly saline, non-sodic and with moderate levels of organic matter. The slight levels of salinity are not expected to be problematic and should settle as the rehabilitation further establishes.

Overall, the material placed in the area appeared adequate and should be conducive to the establishment and growth of pasture species in the long-term.



Graph 5 Pasture monitoring results – Soil properties

5.1.6.1 Performance Summary

Based on the transect-collected data as discussed in the previous sections, a visual summary of the 2024 vegetation and soil performance condition against key attribute metrics is presented in **Table 10** for the pasture transect monitored.

To provide an overview of transect trajectories towards objectives and completion criteria, the following colour coding has been used:

- Green** indicates that target level or completion criterion is met.
- Yellow** indicates that current performance is slightly below or trending towards target/criterion, and may naturally self-improve over time (or only require minor intervention).
- Red** indicates that current performance is significantly short or target / criteria levels and will likely require major intervention.

Table 6 Pasture monitoring results – 2024 summary of vegetation and soil performance

Target / criteria	PAS 04
Vegetation metrics	
Ground cover protection	
Pasture species diversity	
Pasture species cover	
Pasture productivity	
Weed cover	
Species present with known toxicity to stock	
Soil metrics	
Soil acidity / alkalinity	
Soil salinity	
Soil sodicity	
Soil fertility (CEC)	
Soil organic matter	
No. of metrics assessed	11
Metrics meeting target	5

5.2 Native Ecosystem Rehabilitation (HDWV)

A total of 22 monitoring transects in areas of HDWV were assessed in 2024. It is noted that one monitoring transect established during the 2023 monitoring campaign (HDWV 44) was not ideally placed and had its starting point located very close to the rehabilitation zone boundary.

For practicality in reporting and legibility purposes, monitoring results from the past three monitoring events only have been included in the presented results and data. Where older monitoring data exist for a particular monitoring site, previous years reports can be referred to for longer-term trends in rehabilitation condition.

5.2.1 Photographic Monitoring

Photographic monitoring results, depicting the condition of the monitoring transects at the time of the 2024 monitoring event, are provided in **Appendix A**. These can be compared with previous monitoring years (supplied in previous annual monitoring reports and electronically) to determine evolution and changes in vegetation establishment and condition over time.

5.2.2 Erosion

Soil and slope stability were excellent at all monitoring transects with limited to no active erosion processes recorded likely to require ongoing management.

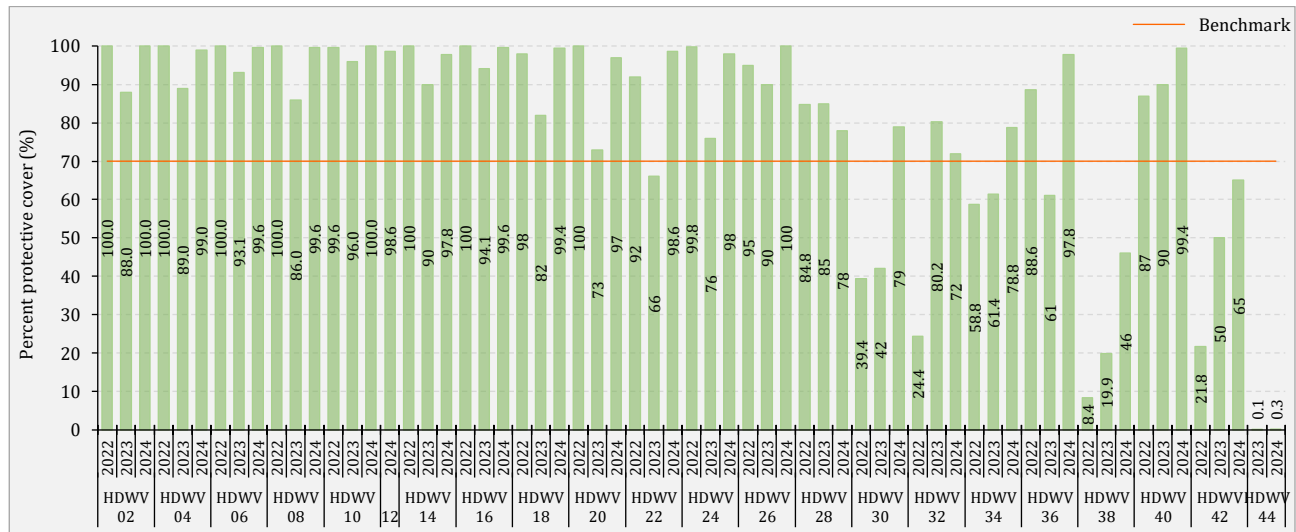
Consistent with records from previous monitoring years, four transects displayed past evidence of rill erosion including HDWV 32, HDWV 34, HDWV 38 and HDWV 42, with residual channels to 10-20cm deep. However, in all cases the erosion was assessed as either fully stabilised (HDWV 32 and HDWV 34) or stabilising (HDWV 38 and HDWV 42) as a function of progressive vegetation establishment. The fact that the identified rill channels at these transects have not deteriorated over the past 2 years (i.e. developed into gully channels) indicates a relatively low erosion risk in these areas, and remediation works are not warranted.

No tunnel or gully erosion was recorded at any of the 22 monitoring site locations in 2024. Low severity tunnelling was reported at HDWV 22 during the 2023 monitoring campaign; however impacts were not detected in 2024.

5.2.3 Vegetation Structure

5.2.3.1 Ground Cover Protection

Trends in ground cover protection over the past three years are depicted in **Graph 6**.



Graph 6 HDWV monitoring results – Ground cover protection

Protective ground cover levels measured in 2024 were satisfactory at 19 of the 22 transects monitored; ranging between 72.0-100.0%. The ground layer vegetation in these areas is generally well established with low to negligible amounts of bare ground present. The following are further noted about these transects:

- In many instances cover levels showed an increase from last year and were back to levels generally commensurate with those recorded in 2022. This included two transects where cover levels temporarily dropped to below minimum benchmark in 2023 (HDWV 22 and HDWV 36). These fluctuations reflect the less favourable climatic conditions (i.e. drier) in the months leading up to the 2023 monitoring compared to the wetter condition of 2022 and 2024.
- Two transects located in rehabilitation established (or re-done) in 2021 achieved the minimum 70% target benchmark for the first time in 2024 (HDWV 30 and HDWV 34); i.e. displaying a positive trajectory.

Cover levels remained below minimum benchmark at three transects in 2024:

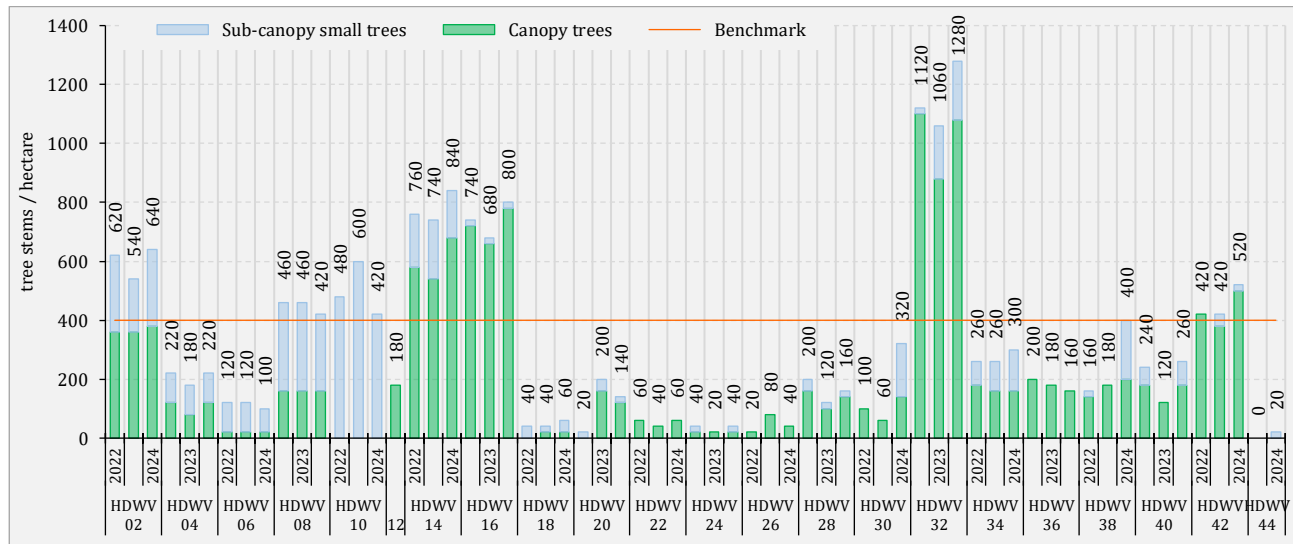
- Two were in rehabilitation established in 2021 and have displayed a progressively improving trend over the past three monitoring events, including HDWV 38 (direct seeded in a subsoil substrate) and HDWV 42 (direct seeded in overburden). Despite the sub-optimal substrate / growth medium established in these locations (especially for the growth of understorey species), cover levels are expected to continue increasing and likely achieve benchmark levels during the next monitoring event in 2025.
- In contrast, ground vegetation was near-fully lacking at HDWV 44 (0.3% cover). Although the rehabilitation remained young in this area (established in late 2022), the absence of germination approximately one year after seeding is concerning. The substrate used in this rehabilitation block (overburden) could be poorly conducive to the establishment of vegetation, and/or the seed batch used in revegetation works could have been of poor quality. This will need to be closely monitored.

5.2.3.2 Tree Densities

Monitoring results for tree densities are displayed in **Graph 7**. Reported stem counts have shown minimal changes over the past three years (as can usually be expected once the first germination flush has occurred), and

minor cross-year variations in stem counts can generally be attributed to operators estimates and/or conditions at the time of monitoring.

For example, a thick and tall ground weed layer (as was the case in several sites in 2024) and hinder the visibility of young seedlings / tubestocks in areas recently seeded / planted and thus affect reported stem counts. In this regard tree count data become more accurate and reliable once the rehabilitation is older (i.e. a few years after seeding / planting).



Graph 7 HDWV monitoring results – Tree stem densities

Overall, tree density performance for the 22 transects monitored in 2024 was as follows:

- Tree densities were excellent at five transects, i.e. above minimum benchmark and dominated by preferable long-lived canopy eucalypt species (HDWV 02, HDWV 14, HDWV 16, HDWV 32 and HDWV 42).
- Three transects (HDWV 08, HDWV 10 and HDWV 38) met the minimum stem density benchmark but the established tree layer was dominated (to exclusively comprised of) less preferable small sub-canopy tree species (mainly *Acacia salicina* Cooba), which represents a sub-optimal outcome. Recorded Coobas are often small and not forming a well-developed canopy layer, i.e. an adequate community structure is unlikely to develop in these locations.
- Tree densities were unsatisfactory and below benchmark at the other 14 transects, including four transects with moderate tree densities (200-400 stems/ha) and ten transects with low to very low tree densities (<200 stems/ha). Of these, all but two transects (HDWV 04 and HDWV 06) are in areas of rehabilitation recently established (or re-done), which is particularly concerning and reflects of inefficient revegetation techniques.

When considering the average as an indicator of performance at the larger scale to incorporate acceptable levels of variability within the zone, tree densities for the transects assessed in 2024 (excluding HDWV 44 where germination had not yet occurred) averaged ~350 stems/ha, which comprised ~245 canopy eucalypt stems and ~105 sub-canopy small tree stems. This remained below minimum target benchmark indicating that further vegetation improvements will be required to increase tree densities.

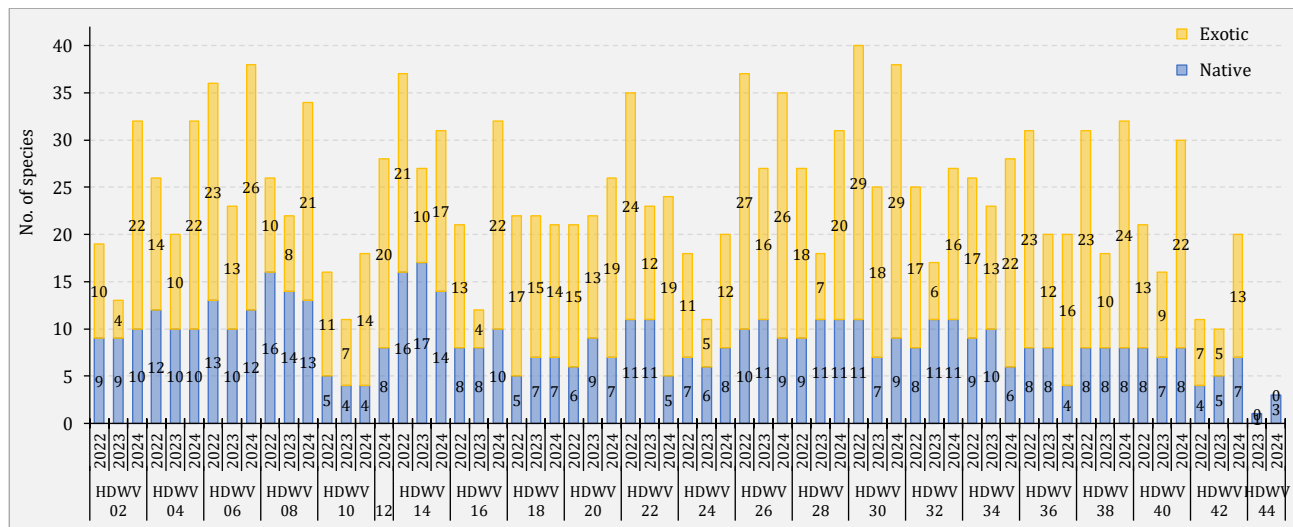
However, and finally, it is noted that the query zone used for tree counts in the current methodology (i.e. a narrow 5 m x 50m band) is inauspicious to gathering accurate tree density data. Results could change slightly if a more conventional approach and query zone were adopted (i.e. 20m x 50m plot area), which would be better representative of true rehabilitation performance condition.

5.2.4 Vegetation Composition

A summary of results is presented in the sub-sections below. For further reference, detailed floristic monitoring results are provided in **Appendix B**.

5.2.4.1 Floristics Composition

Floristics trends for the 2022-2024 period (i.e. total species richness inclusive of natives + exotics) are depicted in **Graph 8**.



Graph 8 HDWV monitoring results – Total species richness

Excluding the HDWV 44 transect where negligible vegetation was present at the time of monitoring, total species richness in 2024 was highly variable and ranged between 18-38 species for an average of ~28.4 species/transect. For the same suite of transects, this compared against an average of ~19.0 species/transect last year (range 10-27 species) and ~26.3 species/transect two years ago (range 11-40 species).

These results clearly highlighted the seasonal variations in species dynamics that occur as influenced by climatic conditions, the 2022 and 2024 monitoring events being conducted at the back of wetter conditions compared to the drier conditions of 2023.

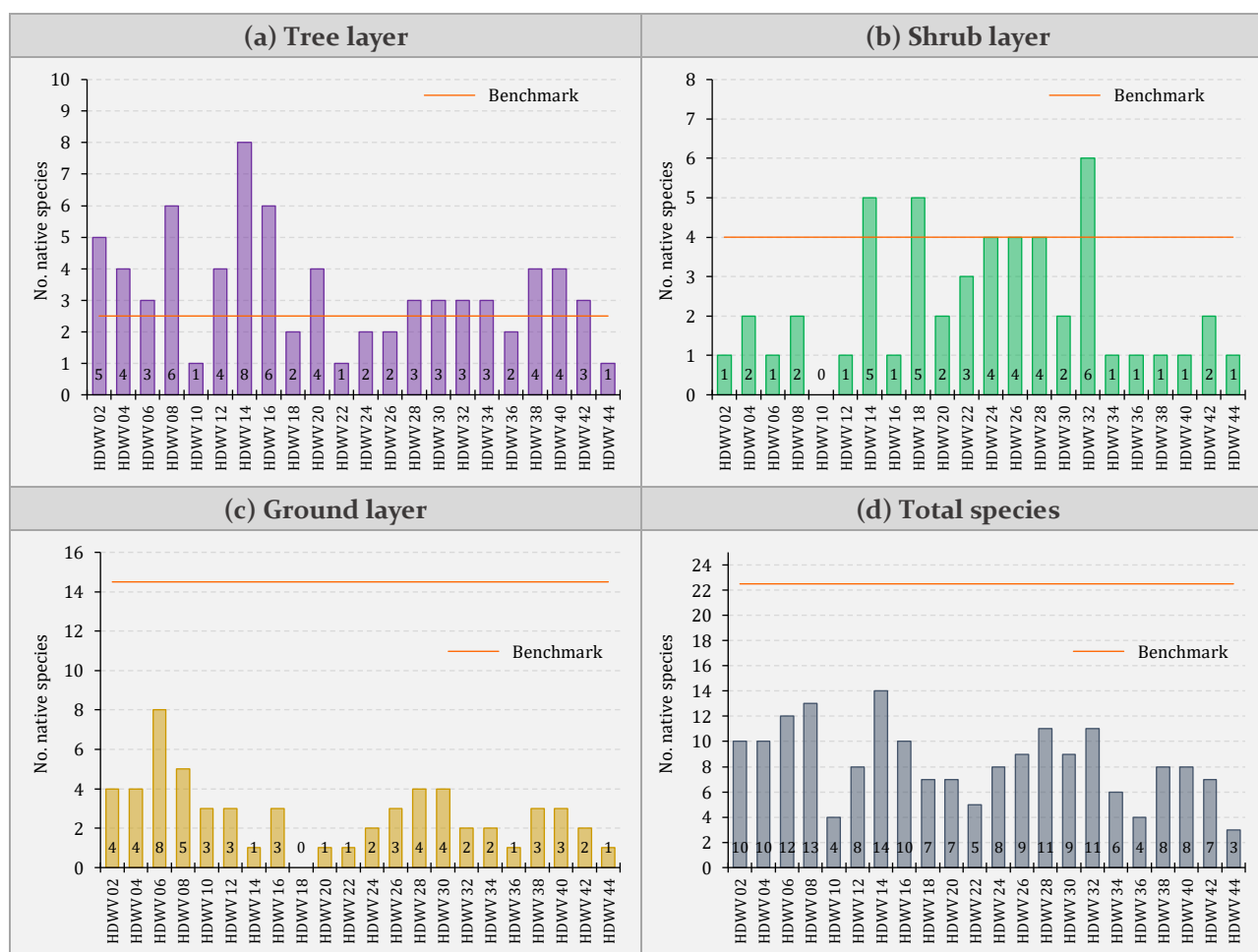
The proportion of native species (to the total species richness) ranged between 20.0-45.2% with an average of ~30.4% for all transects in 2024 (compared to an average of ~49.2% in 2023 and ~35.3% in 2022), highlighting that establishing vegetation communities continued to be predominantly exotic across the site. Particularly, the ground layer remained largely dominated by exotic species in most locations across the OEA, and highly diverse and abundant populations of weeds occur at the site.

Overall, these results represent a poor floristics performance for areas where ecological rehabilitation is targeted as the final land use.

5.2.4.2 Native Species Richness

For each of the main three growth form groups or vegetation layers, comparisons of native species richness levels recorded at the monitoring transects in 2024 against the relevant BioNet VIS community condition benchmarks are shown in **Graph 9**. As discussed in **Section 4.4.3**, target levels for the rehabilitation have set at 50% of the published benchmarks.

Note that the condition benchmarks for both GBIW and SGIGBF communities were interrogated and considered, and for each growth form group the lowest benchmark value of the two communities was used for the purpose of defining completion criteria target levels. This resulted in indicative benchmark targets for native species richness of 2.5 tree species, 4.0 shrub species, 14.5 ground cover species and 22.5 total species – i.e. richness levels at which rehabilitation performance can be considered satisfactory.



Graph 9 HDWV monitoring results – Native species richness per main growth form groups

A total of 14 native tree species were recorded across all areas monitored in 2024, including three small sub-canopy species and eleven canopy eucalypts. Native tree richness per transect ranged from one to eight species (average ~3.4 species/transect), with 15 of the 22 transects showing a satisfactory performance against the indicative benchmark levels.

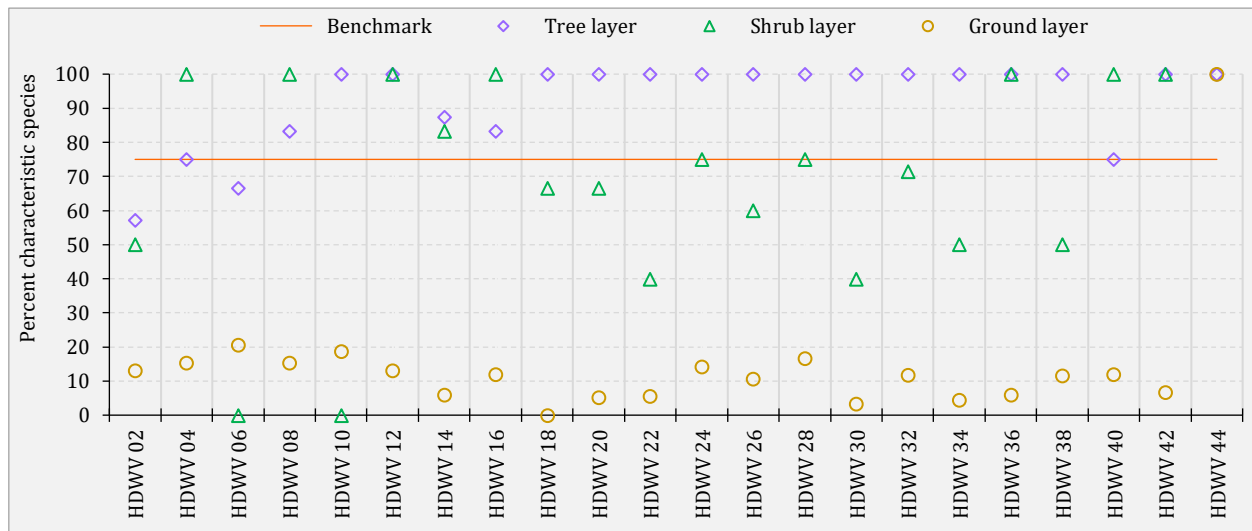
A total of 14 native shrub/sub-shrub species were recorded across all areas monitored in 2024. Native shrub richness per transect ranged from zero to six species (average of ~2.3 species/transect, with only 6 of the 22 transects showing a satisfactory performance against the indicative benchmark levels).

A total of 21 native ground cover species were recorded across all areas monitored in 2024, comprising 7 grasses, 11 forbs, 1 fern, 1 sedge and 1 twiner. Native ground covers richness per transect ranged from zero to eight species (average of ~2.7 species/transect, with no transect showing a satisfactory performance against the indicative benchmark levels).

Overall, total native species richness ranged between 3-14 species, and was consistently well below the indicative benchmark levels for all transects. Only three of the 22 transects returned satisfactory levels of both tree and shrub native richness (HDWV 14, HDWV 28 and HDWV 32), whilst four transects had richness levels below targets in all three main growth form groups.

5.2.4.3 Community Assemblages

The 2024 native species assemblages' performance against target communities is shown in **Graph 10**. As discussed in **Section 4.4.3**, target levels for the rehabilitation have set at 75% of the published benchmarks.



Graph 10 HDWV monitoring results – Representativeness of native species against target communities

Results showed that with only localised exceptions (i.e. HDWV 02 and HDWV 06) the established (or establishing) tree layer was adequately representative of the target GBIW/SGIGBF local communities, for an overall satisfactory performance.

The representativeness of the mid-storey shrub layer was more variable with only 10 of the 22 transects meeting the 75% resemblance benchmark.

In sharp contrast, the ground layer composition was far removed from target assemblages with only between 0.0 and 20.6% of established species being representative of GBIW/SGIGBF, for a very poor performance. This is due to the very high diversity and abundance of the weed populations established at the site.

Overall, the 2024 monitoring results highlighted a poor performance in terms of native species richness and composition (especially in the ground layer), and the establishing vegetation poorly resembles the target native communities.. Significant improvements works and management inputs will be required (likely necessitating long management timeframes) to improve the rehabilitation condition and meet final land use objectives pertaining to ecological rehabilitation at the site.

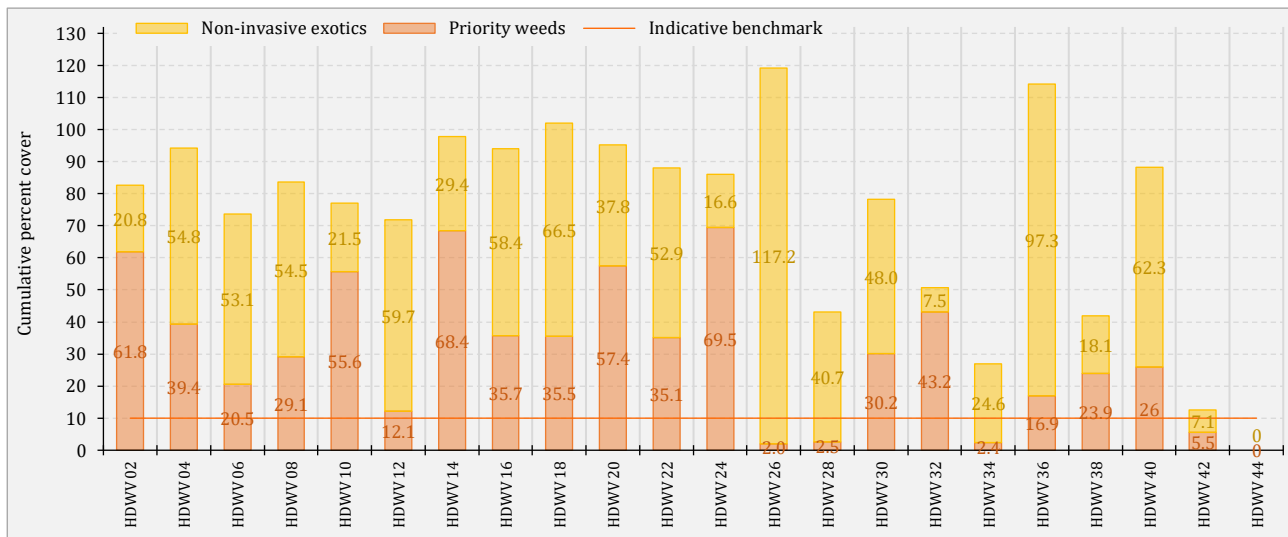
5.2.5 Ecosystem Function

5.2.5.1 Weeds

The 2024 results for cumulative weed cover (i.e. ground + mid + upper storey³) are presented in **Graph 11**.

Note that to align with the current RMP, results and data interpretation for weed cover in 2024 (i.e. this report) differed from previous years. In this report, all non-native species have been considered as weeds in areas of native ecosystem (ecological) rehabilitation; whereas in previous years (i.e. in previous versions of the RMP and MOPs) the final land use for the eastern OEA incorporated a component of cattle grazing which meant that introduced suitable pasture species (e.g. pasture grasses and legumes) could be considered as an acceptable ground cover. For this reason, cross-year comparison of results has not been undertaken in **Graph 11**.

³ Ground layer weeds FPC = average weed cover in the 2 m x 2 m quadrats. Mid and upper storey weeds FPC = assessed through the 50 m line intercept method (refer to monitoring methods in **Section 4.1.2**).



Graph I HDWV monitoring results – Weed cover levels

A total of 69 exotic species were recorded across all transects in 2024, comprising 58 non-invasive weeds (2 trees, 1 shrubs, 1 sub-shrubs, 6 grasses, 1 vine and 47 forbs) and eleven priority weeds (2 shrubs, 5 grasses and 4 forbs). The latter included *Acacia saligna** (Golden Wreath Wattle), *Bidens Pilosa** (Cobblers Peg), *Carthamus lanatus** (Saffron Thistle), *Cenchrus clandestinus** (Kikuyu), *Chloris Gayana** (Rhodes Grass), *Galenia pubescens* (Galenia), *Megathyrsus maximus** (Guinea Grass), *Lycium ferocissimum** (African Boxthorn), *Panicum coloratum** (Coolah Grass), *Senecio madagascariensis* (Fireweed) and *Setaria sphacelata** (South-African Pigeon Grass).

Consistent with previous years, weed population levels remained high to very high (i.e. problematic) across most of the site. Excluding HDWV 44 where no vegetation was established, total exotic cover ranged between 12.6-119.2% for an average of 73.7% for all transects, comprising 2.0-65.9% (average ~32.0%) priority weeds and 7.1-117.2% (average ~45.2%) non-invasive exotics.

Cumulative priority weed cover was within 'allowable' levels (i.e. <10.0%) at only five of the 22 monitoring transects and ranged between 12.1-69.5% at the other 17 transects for an overall very poor performance. Areas with lower abundance of priority weeds included all transects established in areas seeded directly in overburden substrate, which is nutrient poor and less conducive to weed establishment.

For each transect where priority weed cover exceeded the allowable 10.0% weed criterion, cover levels per main growth form groups are further detailed in **Table 7**. The latter shows that populations of priority weeds at most locations were overwhelmingly dominated by invasive grasses.

Consistent with previous years findings, the ground layer throughout most of the eastern OEA remained dominated by priority weed grasses with Guinea Grass, Rhodes Grass and Kikuyu (respectively) being the most prevalent. This is a legacy of both the previous final land use definition for the eastern OEA (under the old development consent DA 211/93) and the long farming/agriculture history of the land on which Bengalla mine was constructed.

These grasses are vigorous and highly aggressive and can rapidly outcompete and fully displace native ground cover species. They by far represent the biggest problem and greatest threat to the success of ecological rehabilitation on the eastern OEA, and are notoriously difficult to suppress and manage. Regardless, their populations will need to be significantly reduced to achieve the defined objectives in the RMP (and the ground layer transitioned to native-dominated assemblages), which will require the development of a long-term integrated strategy to address the issue at the site-level.

Table 7 HDWV monitoring results – Priority weed cover levels (%) per growth forms

Growth form	HDWV 02	HDWV 04	HDWV 06	HDWV 08	HDWV 10	HDWV 12	HDWV 14	HDWV 16	HDWV 18	HDWV 20	HDWV 22	HDWV 24	HDWV 30	HDWV 32	HDWV 36	HDWV 38	HDWV 40
Grasses	61.0	39.0	19.0	29.0	55.0	10.6	66.0	13.6	30.0	56.6	33.4	69.0	29.2	41.6	15.4	19.4	25.4
Forbs	0.2	0.4	1.5	0.1	0.6	1.5	2.4	22.1	0.5	0.8	1.7	0.5	1.0	1.6	1.5	4.5	0.6
Shrubs	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total cover	61.8	39.4	20.5	29.1	55.6	12.1	68.4	35.7	35.5	57.4	35.1	69.5	30.2	43.2	16.9	23.9	26.0

Finally, it is noted that exotic species classified as ‘non-invasive’ were also prevalent across the site, with ten transects containing very high cumulative levels (>50.0% cover) and another seven transects moderate to high cumulative levels (20.0-50.0% cover); i.e. only five of 22 transects showed cover levels <20.0%. Most common and abundant species included *Lysimachia arvensis** (Scarlet Pimpernel), *Rapistrum rugosum** (Turnip Weed), *Conyza spp.** (Fleabanes) and a range of *Medicago spp.** (Medics).

Current levels of these species are locally problematic, yet their management is impractical and no approach likely to generate successful outcome. However, these species all have a poor competitive edge and should naturally and progressively recede under a developing tree canopy. Therefore, management efforts and resources should in priority focus on achieving an adequately dense tree layer.

5.2.5.2 Natural Regeneration

As per the monitoring methodology, regeneration assessments were only undertaken for transects located within rehabilitation areas >5 years old, or five of the 22 transects assessed in 2024. Results are presented in **Table 8**.

Active natural tree regeneration (i.e. recruitment of second-generation tree seedlings) was evidenced at only one of the five older monitoring transects. However, this consisted of *Acacia salicina* (Cooba) seedlings and could be from suckering of a parent plant rather than from deposited seeds.

At each monitoring transect, between 0.0-100.0% of native shrub species and between 33.3-100.0% of tree species were recorded with evidence of flowering/fruitlet structures in 2024. However, it is noted that this metric should be taken as indicative only and not representative, as shrubs and trees may be flowering/fruitlet at different times of the year, while some individual of a specific species may only produce flower/fruits in response to conditions and not necessarily on a seasonal or annual basis.

Overall and irrespective of their performance in terms of species composition and tree densities, the results highlighted an adequate potential for the established communities to be self-sustainable.

Table 8 HDWV monitoring results – Natural regeneration potential

Attribute	HDWV 02	HDWV 04	HDWV 06	HDWV 08	HDWV 10
% of native shrubs with flower/fruit	0.0	50.0	100.0	50.0	n/a ⁽¹⁾
% of native trees species with flower/fruit	40.0	50.0	66.6	33.3	100.0
2 nd generation native tree seedlings present	Yes	No	No	No	No

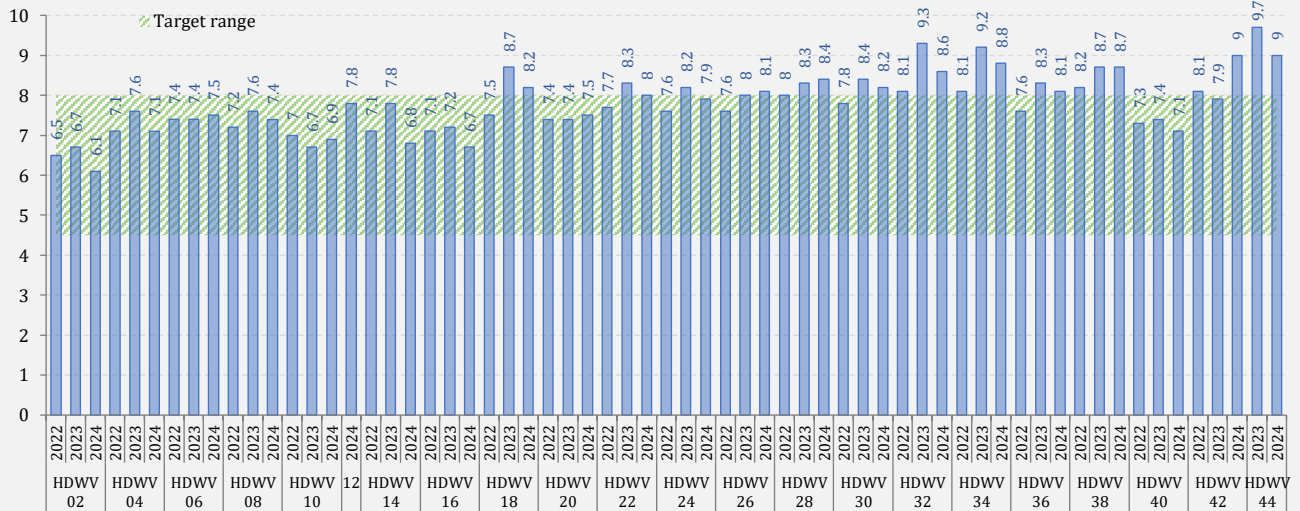
Note: (1) No native shrub species present at this location.

5.2.5.3 Soil Properties

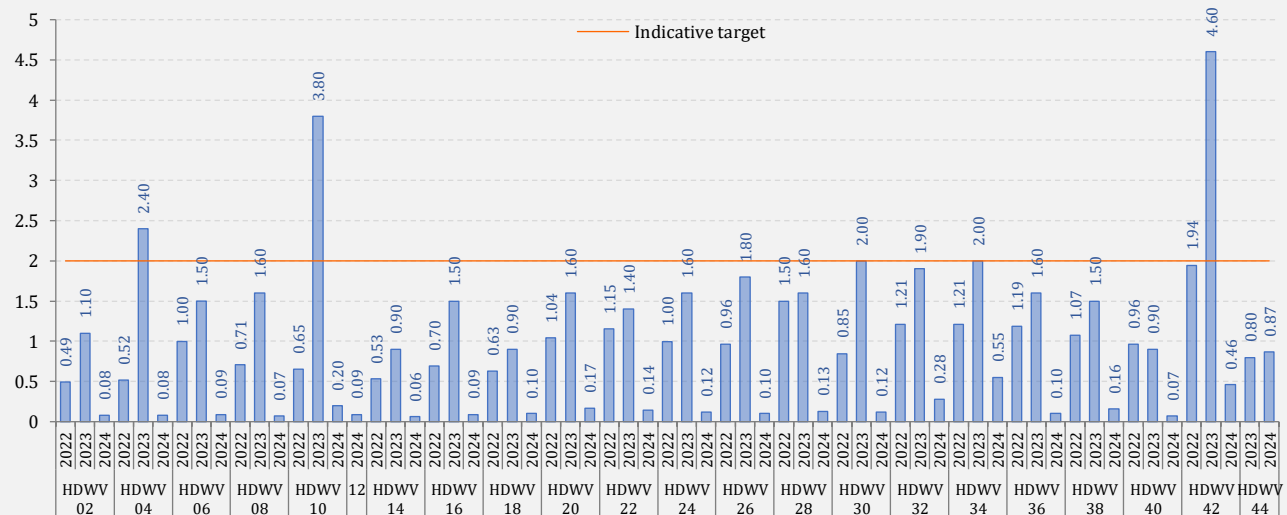
Testing results for key soil chemical properties are presented in **Graph 12**; including pH, salinity, sodicity, cation exchange capacity (CEC) and organic matter content (OM). Key findings are discussed in **Table 9**.

For further reference, the detailed laboratory analysis report is provided in **Appendix C**.

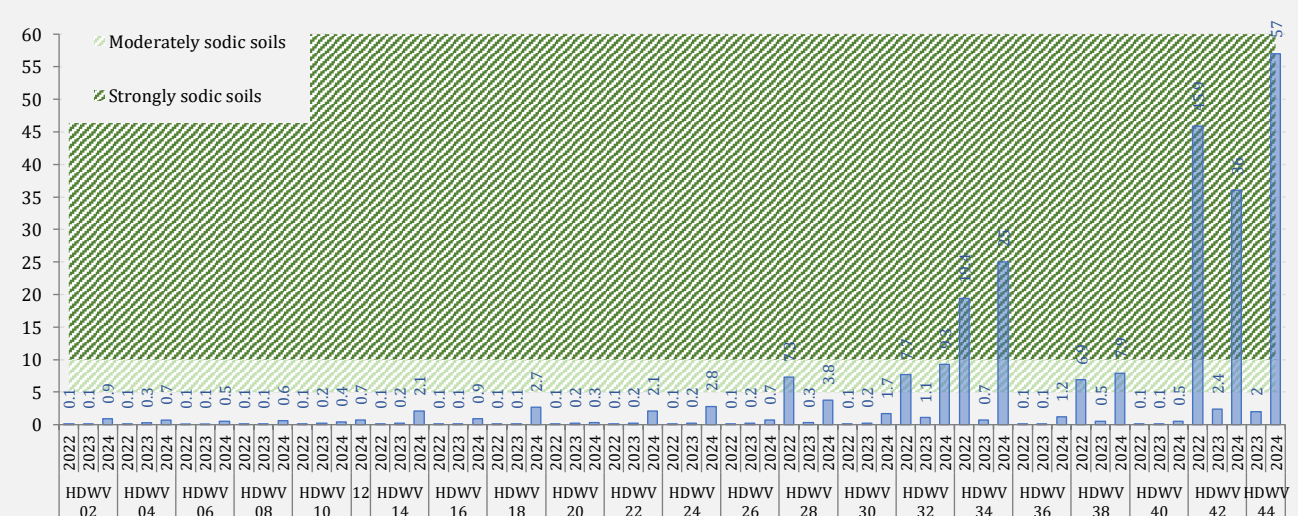
(a) Soil acidity – pH

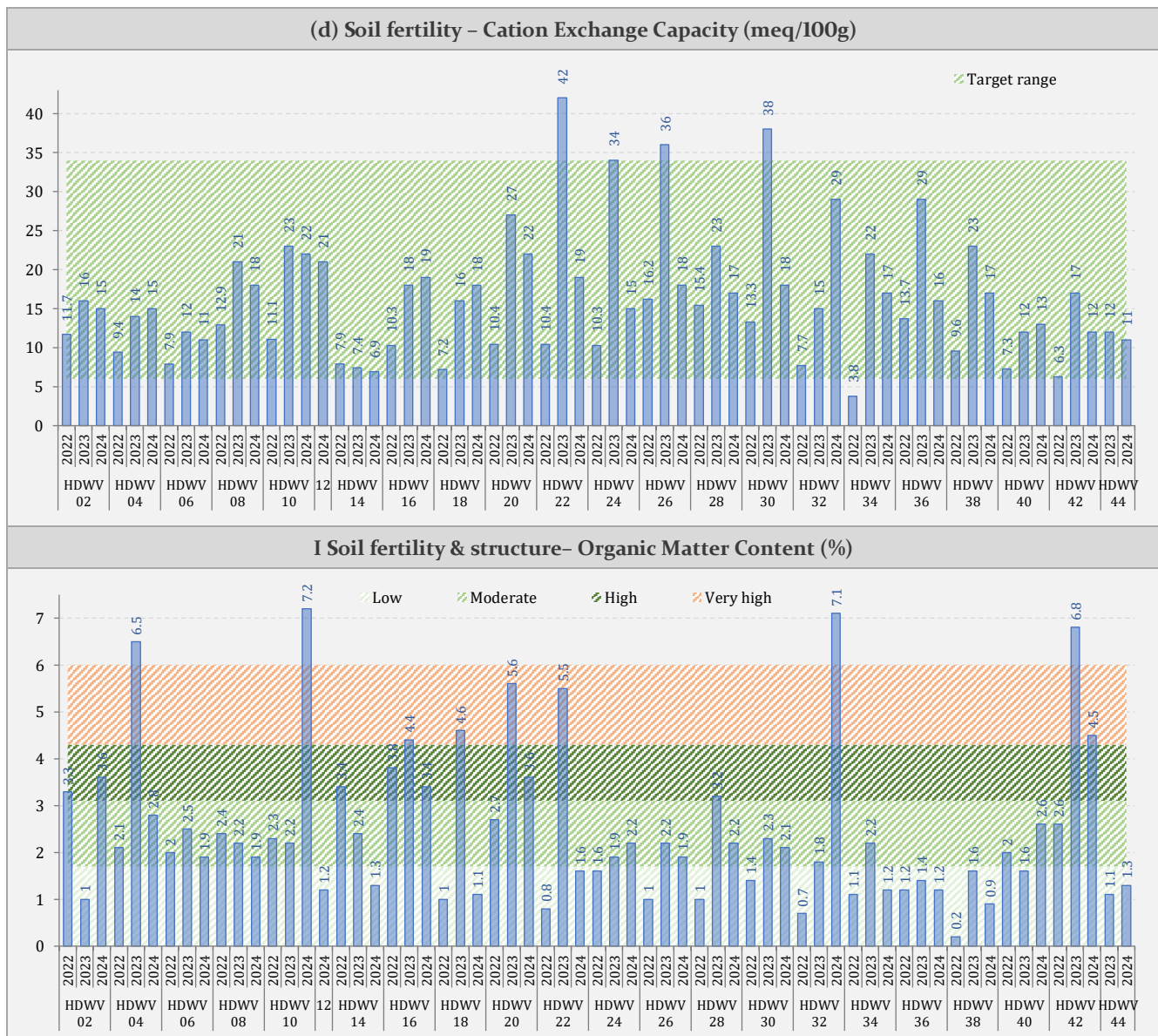


(b) Soil salinity – Electrical conductivity (dS/m)



I Soil sodicity – Exchangeable Sodium Percent (%)





Graph 12 HDWV monitoring results – Soil properties

Table 9 HDWV monitoring results – Soil monitoring key findings

Soil acidity – pH	Soil pH levels recorded in 2024 ranged between 6.1-9.0 (i.e. slightly acidic to strongly alkaline), with 12 of the 22 transects being within acceptable range for native vegetation growth (i.e. 4.5-8.0). All (except one) of the ten samples falling marginally outside the upper target range came from areas seeded in subsoil or overburden substrates (i.e. no topsoil applied), reflecting the alkalinity of these substrates. Of these, five were only moderately alkaline (i.e. pH levels 8.1-8.4) and five strongly alkaline (i.e. pH levels 8.5-9.0). In strongly alkaline soils, the soil pH is no longer the principal factor that affects plant growth and growth is more likely to be affected by various deficiencies (e.g. sodicity) or mineral / nutrient toxicities. Most sampling locations showed only small variations since last year that are within the bound of what can be considered natural seasonal changes in soil processes (i.e. ± 0.1 to 0.7 pH units), the exceptions being at HDWV 14 and HDWV 42: HDWV 14 showed a sudden increase in acidity in 2024 (from 7.8 in 2023 to 6.8 in 2024), with levels however remaining well within desirable target range. This can in fact be seen as a positive trend as slightly acidic pH levels are better representative of
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	the natural soil profiles of the region, and well conducive to the growth of native species. • HDWV 42 showed a sudden increase in alkalinity in 2024 (from 7.9 in 2023 to 9.0 in 2024). Rehabilitation in this location remains relatively young and soil are likely still settling. Overall, locations where soil alkalinity could be of concern and affect the rehabilitation include HDWV 32, HDWV 34, HDWV 38, HDWV 42 and HDWV 44. Vegetation growth and health will need to be closely monitored in the future.
Soil salinity – electrical conductivity (EC)	Soil salinity levels were low at all locations in 2024 and comprised between 0.06-0.87 dS/m, i.e. within values considered as non-saline and unlikely to restrict vegetation establishment and growth. Three transect locations which flagged issues of salinity last year (HDWV 04, HDWV 10 and HDWV 42) have settle back down to within non-saline levels in 2024. The reasons behind the sudden and episodic increase in salinity detected in 2023 are unknown, however locations displaying volatile soil testing results should be closely monitored.
Soil sodicity – exchangeable sodium percentage (ESP)	Soil sodicity levels in 2024 remained low and non-problematic at 17 of the 22 transect sampling locations – for a satisfactory performance. However, sodicity issues were recorded at five locations with two samples displaying moderately sodic levels (HDWV 32 and HDWV 38 at respectively 7.9% and 9.3%), one site strongly sodic levels (HDWV 34 at 25.0%) and two sites extremely sodic levels (HDWV 42 and HDWV 44 at respectively 36.0% and 57.0%). Consistently for these five locations, sodicity issues were not detected in 2023 (where all returned ESP levels <2.5%), but were already present in 2022. This was clearly influenced by the conditions at the time of sampling with 2023 being significantly drier (and monitoring completely later in the season) than conditions during 2022 and 2024. Indeed, soil sodicity readings increase in wetter conditions because of the clay particles separating and being more active when soil moisture or water is present. Overall, soil sodicity is an issue at these locations (and to a lesser degree also at HDWV 28), which all correspond to areas dressed with overburden or subsoil material only (i.e. highlighting the limitations of this substrates). In particular, the lack of vegetation germination and establishment at HDWV 44 is likely to be linked to the recorded sodicity levels (combined with the strongly alkaline pH), with soil swelling and surface crusting (and associated poor water infiltration and drainage) restricting seed germination. More generally, higher soil sodicity levels in areas of overburden or subsoil substrates correlate well with poorer vegetative performance. Even at transects where adequate tree densities have germinated (e.g. HDWV 32 and HDWV 42), tree growth appeared visibly restricted and stunted.
Soil fertility – cation exchange capacity (CEC)	Soils CEC readings in 2024 were consistently within the indicative target range in all samples and ranged between 6.9-29.0 meq/100g, for a satisfactory performance. Soil fertility levels are likely adequate in all locations to sustain the growth and persistence of native species (which are naturally adapted to the nutrient-poor environment of the region). All sampling locations displayed annual variations (locally very pronounced) in CEC levels from last year, however none that could be flagged as out of the ordinary and outside natural seasonal variations (wide fluctuations can be common in CEC levels). Of note, five locations (HDWV 22, HDWV 24, HDWV 26, HDWV 30 and HDWV 36) showed a clear drop compared to their 2023 levels (often more than halved) however all remained within acceptable levels in 2024 and thus not concerning.
Soil fertility and structure	Consistent with previous years, soil OM levels were highly variable between all samples and ranged from a low 0.9% to a very high 7.2%. As for CEC levels, OM readings can display significant seasonal fluctuations driven by temperature, moisture levels and

organic matter content (OM)	vegetative condition a specific site; which was the case for most monitoring locations between the 2023 and 2024 sampling events. 15 of the 22 samples showed a slight to moderate decrease in OM content in 2024, likely attributable to the sampling being conducted later in the season in 2023 (i.e. January), when hotter temperatures accelerate soil microbial activity and breakdown of organic matter (i.e. resulting in lower readings). In total, of the 22 transects tested in 2024, eight returned OM content considered as low (<1.7%), eight as moderate (1.7-3.0%), three as high (3.1-4.3%) and three as very high (>4.3%). Soil structure can be deemed as currently unsatisfactory at the eight locations with low OM readings; however this should progressively increase as vegetation further establishes and organic plant litter is returned to the ground over time from plant life-cycling. No location is expected to have or develop key limitations or deficiencies in terms of OM content (except perhaps at HDWV 44 if vegetation fails to establish).
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5.2.5.4 Performance Summary

Based on the transect-collected data as discussed in the previous sections, a visual summary of the 2024 vegetation and soil performance condition against key attribute metrics is presented in **Table 10** for each transect monitored.

To provide an overview of transect trajectories towards objectives and completion criteria, the following colour coding has been used:

- Green** indicates that target level or completion criterion is met.
- Yellow** indicates that current performance is slightly below or trending towards target/criterion, and may naturally self-improve over time (or only require minor intervention).
- Red** indicates that current performance is significantly short of target / criteria levels and will likely require major intervention.

Table 10 HDWV monitoring results – 2024 summary of vegetation and soil performance

Target / criteria	HDWV 02	HDWV 04	HDWV 06	HDWV 08	HDWV 10	HDWV 12	HDWV 14	HDWV 16	HDWV 18	HDWV 20	HDWV 22	HDWV 24	HDWV 26	HDWV 28	HDWV 30	HDWV 32	HDWV 34	HDWV 36	HDWV 38	HDWV 40	HDWV 42	HDWV 44	Proportion transects meeting target
Vegetation metrics																							
Ground cover protection																							86.4%
Tree densities																							27.3%
Native richness – Trees																							68.2%
Native richness – Shrubs																							27.3%
Native richness – Ground covers																							0.0%
Tree layer composition																							95.5%
Shrub layer composition																							45.5%
Ground layer composition																							0.0%
Weed cover																							13.6%
Regeneration						n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20.0%
Soil metrics																							
Soil acidity / alkalinity																							54.6%
Soil salinity																							100.0%
Soil sodicity																							77.3%
Soil fertility (CEC)																							100.0%
Soil organic matter																							63.6%
No. of metrics assessed	15	15	15	15	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
Metrics meeting target	9	9	7	9	7	8	9	10	6	8	6	9	7	9	7	8	6	6	4	10	8	4	

6. Walkover Audit Inspection

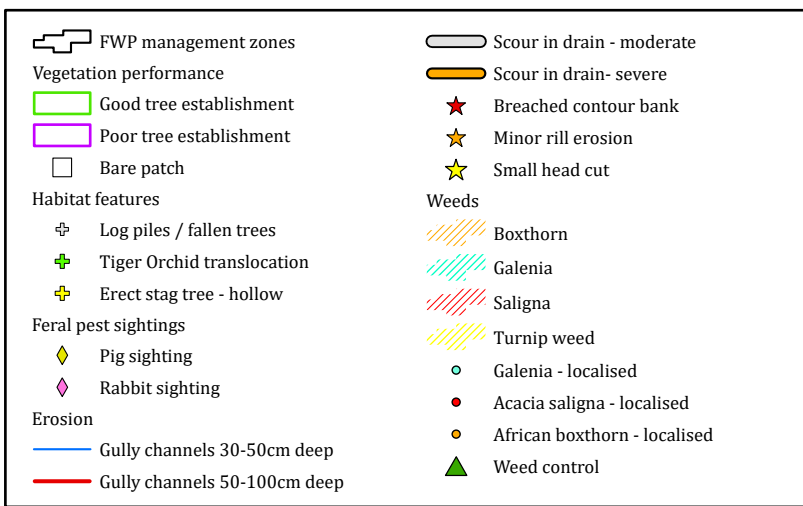
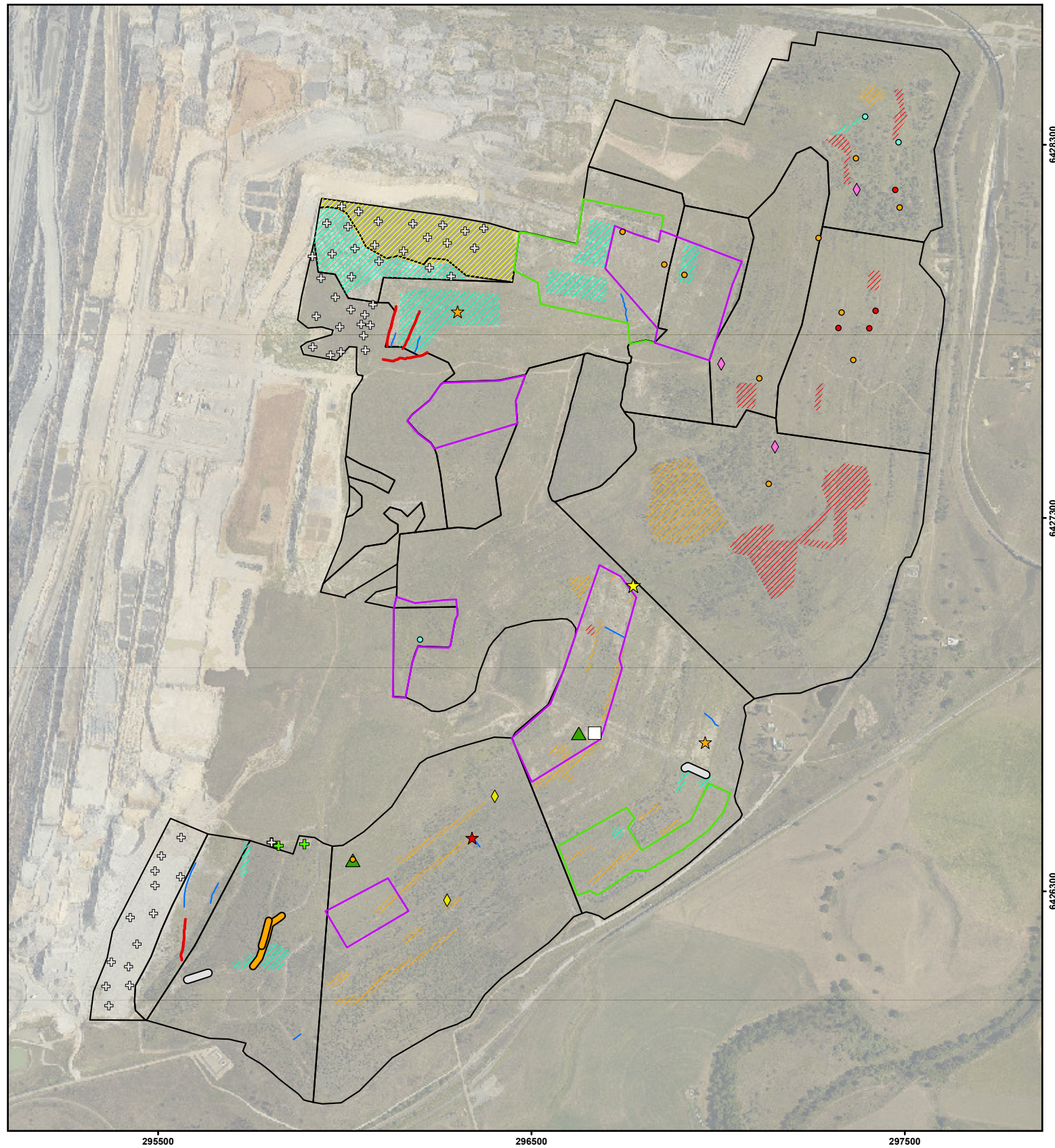
Key observations made during the 2024 walkover inspection are summarised in **Table II** (which includes reference links to example photographs provided in **Appendix D**), with their locations shown in **Figure 5**.

Table II Walkover audit key findings 2024

Category	Details	Photo ref.	Priority
Pasture Rehabilitation			
Habitat augmentation	Large fallen trees / stumps have been scattered across the Class IV/V pasture area to provide artificial habitat.	N/A	4
Ground cover	Pasture cover and perennial vegetation remained poorly established across the inspected Class IV/V pasture area at the time of monitoring (i.e. ~1 year after seeding).	Photo 1	3
Weeds – Turnip Weed	The monitored class IV/V pasture area was severely infested by a near monotypic stand of Turnip Weed, hindering the germination and establishment of preferable pasture species. The successful establishment of pasture grass will need to be closely monitored once the weed has completed its annual lifecycle and before it re-establishes in winter 2025. More generally, the species is prevalent and problematic across the entire site.	Photo 2	3
Native Ecosystem Rehabilitation (HDWV)			
Good tree establishment	Localised areas of recently established or re-worked rehabilitation under the FWP were noted as showing excellent outcomes (in terms of tree densities and growth rates), including both direct-seeded areas and areas planted with tubestock.	Photo 3	4
Poor tree establishment	Many areas recently established or re-worked under the FWP showed unsuccessful or insufficient tree establishment at the time of inspection, highlighting potentially ineffective revegetation efforts. Additional revegetation works may be needed if the areas are confirmed as insufficient in the next 1-2 monitoring events.	Photo 4	3
Bare ground	A localised patch of bare ground (~1,200 m ²) was noted in Zone 2 on the upper contour near the rock-lined drain.	Photo 5	2
Scour in drainage structure – severe	Very severe scour erosion (to 2.5m deep in places) is impacting the sides of the main rock-lined drainage channel in the area of natural undulating landform in the southern OEA. The drain structure is considered as failed and will require significant repairs.	Photo 6	1
Scour in drainage structure – moderate	Two other locations of scour erosion impacts to rock drains of similar nature but milder severity were recorded including: - In Zone 6 (southern OEA) with scouring to ~75cm deep; and - In Zone 2 (central OEA) with scouring to ~1.2m deep.	Photo 7	2
Breached contour bank	One location with a breached / failed contour bank remained in Zone 1 (first reported in 2020), which led to moderate gully erosion downslope. The area (i.e. breach + gully channel) appeared overall	Photo 8	3

	stabilised and seemingly not further deteriorated compared to the last time it was assessed in 2022; however it should be repaired to ensure proper surface drainage.		
Drainage structures – good performance	All other inspected drainage structures (contour banks and rock-lined drains) were assessed as stable and well-functioning.	Photo 9	4
Contour bank repairs – good practice	The location in Zone 5 (northeast of the OEA) which had been reported for several years with a severely breached/failed contour bank has been repaired and the drainage structure re-instated to a stable and functional condition. The repaired area was however dominated by weeds (especially Galenia) at the time of inspection and follow-up weed control should be implemented.	Photo 10	4
Topsoil management	The scouring observed in the rock drains also highlighted that excessive amounts of topsoil were applied across Zone 6 (>2m in depth), for what is considered poor management practice. For example, this topsoil would have better been used in areas of pasture rehabilitation or to dress areas seeded in overburden (e.g. Zone 7 and Zone 8). Although recovering this topsoil is impractical or unrealistic, all future new rehabilitation should ensure that topsoil application rates are adequate. This will also minimise the risk of topsoil shortage during the later stages of the life-of-mine.	Photo 11	3
Gully erosion on slope	Several gully channels were recorded during the inspection, including: • 9 x channels of moderate severity 30-50 cm deep; and • 4 x channels of high severity 50-100cm deep. All gullies of high severity should be repaired. Gullies of moderate severity should be closely monitored and remediation requirements considered on a case-by-case basis, i.e. repairs are unlikely to be justified in the channels fully stabilise in their current condition and are located in areas of good vegetation performance.	Photo 12	2
Rill erosion on slope	Two localised sections of slope in Zone 2 and Zone 7 showed residual impacts from rill erosion processes with several channels defined to ~15-30cm deep. Both areas should be monitored but appeared largely stabilised, i.e. remediation works are unlikely to be needed.	Photo 13	3
Headcut erosion	One small (localised) erosion headcut was noted on the eastern slope in Zone 2. The feature is not very severe and currently of minimal concern but should be monitored to ensure it does not expand and develop into a gully.	Photo 14	3
Weeds – Invasive grasses	Invasive grasses (listed as high-threat exotics under the BAM) largely dominate the ground layer vegetation across most of the site, preventing the establishment of a native understorey.	Photo 15	2
Weeds – Golden Wreath Wattle	The species remains common across the site and locally problematic. The severe infestations mapped in previous years in Zone 3 remains, and many small patches / scattered individuals occur throughout the slopes.	Photo 16	2
Weeds – African Boxthorn	The species remains common across the site and keeps establishing from soil-borne seedbank. Localised infestations (particularly on contour banks) and scattered individuals occur throughout.	Photo 17	2

	The species is known to be problematic at the site and will require ongoing management as part of the routine weed control program.		
Weeds – Galenia	Galenia remains prevalent and widely distributed across the entire site, including localised infestations and small patches scattered throughout. The species is known to be problematic at the site and will require ongoing management as part of the routine weed control program.	Photo 18	2
Weed control – good practice	Some areas were noted with evidence of African Boxthorn control being undertaken. However, control activities appeared relatively haphazard and the treated areas very localised.	Photo 19	4
Animal pests	Rabbits and Feral Pigs were again sighted in the rehabilitation during the 2024 field works. Pig impacts were limited to scattered surface diggings / light soil churning. Although impacts are currently limited in extent and severity, their presence represents a risk to both ecological and pasture rehabilitation and ongoing control should continue. No rabbit warrens or significant soil disturbance from rabbits were detected, however localised impacts on establishing young seedlings were observed (ringbarking / browsing). Rabbits represent a significant threat especially in young rehabilitation or regenerating areas. Population levels at the site are unknown and regular population counts should be considered to understand and track rabbit abundance over time, which in turn would inform the need for management.	Photo 20	3
Habitat augmentation	Good incorporation of habitat features has been undertaken across the recently established areas of HDWV rehabilitation in Zone 8, mainly comprising log piles / large fallen trees.	Photo 21	4
Poor use of habitat resources	In the recently established HDWV rehabilitation in Zone 8 (southern OEA), rock-racking was not undertaken and large to very large rocks are scattered across the surface. These would be better used to create rock piles and further enhance habitat resources.	Photo 22	3
Threatened species translocation	Several specimens of Tiger Orchid (<i>Cymbidium canaliculatum</i>) found in the pre-strip were successfully salvaged and relocated into the rehabilitation on their host stag trees – for an excellent practice. Their survival will need to be monitored to determine the success of the translocation / transfer.	Photo 23	4
Access tracks	As noted in previous years, light vehicle access remains insufficient across the OEA rehabilitation, with many areas difficult of access. In addition, limited to no maintenance of the existing track network has been undertaken in recent years, and several of the previously constructed tracks are no longer practicable / accessible due to overgrown vegetation and/or erosion impacts. The Internal track network should be improved (i.e. additional tracks established) and maintenance of existing tracks implemented on a regular basis to ensure all tracks remain visible and in a serviceable condition.	N/A	3



Bengalla Mine
 Rehabilitation Monitoring 2024

FIGURE 5

Walkover Audit Findings 2024

7. Compliance Assessment

Based on the 2024 monitoring results and audit observations, an assessment of current rehabilitation condition and progress against relevant RMP completion criteria is undertaken in following tables, as relevant to the scope of this monitoring program (refer to **Section 4.4.3**).

- **Table 12** addresses criteria pertaining to general land condition and processes occurring at the broader scale, generally based on the observations and findings from the walkover audit inspection.
- **Table 13** addresses criteria pertaining to vegetation performance and soil properties, based on data collected at the monitoring transects.

Note that the assessment of compliance is only applicable to the areas monitored in 2024, as per the rationale discussed in **Section 3.2**.

Table 12 Progress against RMP completion criteria – General criteria

Category	Completion criteria	Condition / progress	2024 status
Access	Land is safely accessible to humans and/or grazing stock	Access if insufficient for maintenance and monitoring purposes, but is safe	Compliant
	No uncontrolled access and demarcations present.	No uncontrolled access evidenced, and rehabilitation areas at the site are typically well-demarcated.	Compliant
Removal of infrastructure	All infrastructure not used as part of the final land use is removed.	No infrastructure required to be removed observed as remaining in the rehabilitation.	Compliant
Landform stability	No visible signs of instability (slumping / cracks) requiring ongoing management and maintenance works.	No slumping / cracking or major signs of instabilities noted in the areas inspected during the 2024 monitoring	Compliant
	No evidence of erosion within the water/sediment management structures requiring ongoing management and maintenance works.	Severe scouring recorded in several rock-lined drains requiring to be remediated.	Not compliant
	No erosion rills, gullies or tunnel erosion requiring ongoing management and maintenance works.	Several locations detected with gully erosion channels requiring to be remediated.	Not compliant
Land contamination	No evidence of contamination from hazardous or problematic materials.	None detected	Compliant
Feral pests	No increasing trends in feral pest populations and species diversity.	Population counts outside the scope of this monitoring program. Some impacts from feral pigs and rabbits detected across the rehabilitation with potential to threatened long-term rehabilitation success if population levels increase. Bengalla has an animal pest management program in place for feral pigs (i.e. ongoing culling program); however populations of rabbits are not managed.	Partially compliant
Bushfire	Bushfire controls are implemented including firebreaks, management of fuel loads and access maintained for firefighting.	Construction of firebreaks or fuel load reductions currently not required.	Partially compliant

Category	Completion criteria	Condition / progress	2024 status
		Access to some areas of the emplacement is currently limited which could restrict firefighting activities. Tracks have been established across the OEA but need to be maintained.	
Habitat value	Presence of habitat features on rehabilitated areas	Most historic and older rehabilitation areas of the OEA lack habitat features. As reported in previous years, some localised sections within Zone 1, 3 and 4 were enhanced with logs/fallen trees spread or scattered onto the surface. Log piles / fallen trees were also incorporated across the most recently established Zone 7 and Zone 8 rehabilitation. However, habitat features density overall remains limited. For example, no rock piles / rocky areas or nest boxes have yet been incorporated which present an opportunity to further improve wildlife habitat value and connectivity across the site.	Partially compliant
	Presence of native animal activity.	As in 2024, macropods and several species of reptiles, woodland birds and birds of prey were observed as utilising the rehabilitation areas.	Compliant

Table 13 Progress against RMP completion criteria – Vegetation and soils

Category	Completion criteria	Condition / progress as of 2024	2024 status
Pasture Rehabilitation			
Rehabilitation to be Class III, IV or V Agricultural Land Capability	Pasture cover is comparable to similar pasture areas within the region.	No. Pasture cover was minimal in the small area assessed; however rehabilitation was very young and pasture likely to soon establish.	Trending
	Pasture composition (i.e. presence of grasses and legumes) is comparable to similar pasture areas within the region.	A sufficient diversity of pasture species was recorded in the small area assessed; however all occurred at very low abundance at the time.	Trending
	Pasture productivity is comparable to similar pasture areas within the region.	No. Pasture productivity was minimal in small the area assessed in 2024 due to the lack of pasture cover; however	Trending

Category	Completion criteria	Condition / progress as of 2024	2024 status
		rehabilitation was very young and productivity likely to improve as pasture cover establishes.	
	Priority weed species coverage is comparable to similar pasture areas within the region.	No. Priority weed cover high in the small area assessed at approximately 21.4%.	Not compliant
	No species with known toxicity to grazing stock.	Two species recorded with known toxicity to stock (Fireweed and Liverseed Grass)	Not compliant
	Surface organic litter present.	Developing. Expected to increase as pasture further establishes.	Trending
	No surface rocks present that impede the post-mining land use.	Adequate rock-racking undertaken in the small area assessed, with no surface rocks present that could impeded a grazing land use.	Compliant
Native Ecosystem Rehabilitation (HDWV)			
Vegetation composition	Tree species richness is $\geq 50\%$ of target communities benchmarks	68.2% of transects compliant.	Partially compliant
	Shrub species richness is $\geq 50\%$ of target communities benchmarks	27.3% of transects compliant.	Mostly non-compliant
	Ground covers species richness is $\geq 50\%$ of target communities benchmarks	0.0% of transects compliant.	Not compliant
	$\geq 75\%$ of established tree species are representative of the target communities	95.5% of transects compliant.	Mostly compliant
	$\geq 75\%$ of established shrub species are representative of the target communities	45.5% of transects compliant.	Mostly non-compliant
	$\geq 75\%$ of established ground cover species are representative of the target communities	0.0% of transects compliant.	Not compliant

Category	Completion criteria	Condition / progress as of 2024	2024 status
Vegetation structure	Tree stems densities are maintained at ≥ 400 stems/ha.	27.3% of transects compliant.	Mostly uncompliant
Ecosystem function	Priority weed species coverage is comparable to native woodland areas in the region (based on GBIW / SGIGBF communities).	13.6% of transects compliant. Invasive grasses, Galenia, Golden Wreath Wattle and African Boxthorn are highly problematic across the site.	Not compliant
	Surface organic litter is present	Surface litter is either present or developing in all locations	Trending
	Evidence of reproductive material on mature long-lived vegetation and/or presence of second-generation seedlings from mature long-lived species.	Most of the HDWV rehabilitation of the site remained in the early successional stages as of 2024 (i.e. generally too young to adequately assess the potential for regeneration). Some older areas were assessed in 2024 (5 of 22 transects), which generally all show an adequate potential to self-regenerate.	Trending
	Soil / growth medium maintains chemical and physical qualities appropriate to achieve native vegetation growth.	17 of 22 transects (77.3%) showed adequate soil qualities in 2024. Limitations / deficiencies with the potential to restrict native vegetation growth were detected at five monitoring transects, particularly with issues of strong alkalinity and sodicity. Most deficient soil profiles corresponded to areas established in overburden, highlighting the limitation of this substrate as a growth medium for native ecosystem rehabilitation.	Partially compliant

8. Recommendations

8.1 Erosion Repairs

Erosion issues identified during this 2024 round of monitoring included:

- Four gully channels of high severity (50-100 cm deep) all located in Zone 7. These exceed recommended erosion criteria and should be repaired.
- Nine gully channels of moderate severity (30-50cm deep), two areas of superficial rill erosion (<30cm deep) and one small localised headcut. These features / impacts are of lower severity and generally of lesser concern, and the necessity of repairs should be assessed in context of the status of erosion processes (i.e. active vs stabilised) as well as vegetative performance in the surrounding area.
- One location with a breached/failed contour banks in Zone 1;
- The scour erosion in the main drainage channel in the southern Zone 6. The scour is very severe (>2.5 m deep in places) and widespread, and the drain is overall deemed as failed.
- The scour erosion in the rock drop structure in Zone 2. The impacted area is relatively localised (i.e. spans the length of only one contour) but the scour is moderately severe (>1 m deep).

8.2 Weeds

Weed incursion remains one of the main issues inhibiting rehabilitation progress across the site and will require significant, systematic and ongoing management inputs.

Introduced pasture grasses (particularly Guinea Grass, Kikuyu and Rhodes Grass) overwhelmingly dominate the ground layer vegetation across most of the OEA (i.e. all areas except those seeded in overburden substrate). These are longer deemed as an acceptable outcome in areas of native woodland vegetation (HDWV) of the site based on the recent committed changes in final land use definition in the latest version of the RMP. These species highly invasive in native ecosystems where they outcompete and displaced native ground cover species.

An integrated long-term strategy will need to be developed to control and manage these grasses and progressively transition the ground layer towards native-dominated assemblages more commensurate with the target GBIW / SGIGBF communities. Short of stripping and reworking the rehabilitation, any strategy with a chance of success will be contingent on the presence of a sufficient tree layer to increase competition for resources and shade the ground layer. In the present state of the rehabilitation, managing exotic grasses is therefore deemed impractical and likely to be vain, and efforts and resources in the next few years should continue to be placed into ensuring that a dense tree layer is successfully established across all areas.

Consistent with previous years, other priority weeds of concern at the site continue to include Galenia, Golden Wreath Wattle and African Boxthorn, which keep establishing from soil-borne seed loads. However, these typically respond well to conventional treatments (i.e. herbicide applications, mulching, etc) and are manageable provided sufficient resources and commitment (and diligent follow-ups). Particularly, the severe and well-established infestation of Golden Wreath Wattle in Zone 3 (which has been reported for several years) should be removed. Successful removal will likely involve several years of diligent follow-up control of re-establishing individuals until the seed loads are exhausted.

Other recorded priority weeds (e.g. Cobblers Peg, Saffron Thistle, Fireweed, etc.) occur more sparsely and generally do not represent an immediate threat to the successful establishment of the targeted land use, thus pose little concern at present.

Finally, several areas continue to sustain very high population levels of broadleaf (non-listed) environmental weeds at the time of the 2024 monitoring. These are generally not recommended for treatment as they tend to naturally reduce once canopy foliage establishes (assuming that adequate tree densities are achieved). This will however need to be demonstrated through the long-term monitoring program, and active management considered otherwise (Turnip Weed in particular appears particularly prevalent and problematic across the site).

8.3 HDWV Establishment

Revegetation works completed under the FWP over the past four years have achieved very variable results and success.

Of the 22 transects monitored in 2024 and located in rehabilitation areas recently established or re-worked under the FWP, only five met the minimum tree density benchmark of 400 stems/ha – highlighting unsuccessful or ineffective revegetation works / techniques. Additional revegetation works or infill planting campaigns will be required in most of these areas.

8.4 Soils

Findings from the 2024 soil testing program highlighted limitations and deficiencies in the growth medium at five of the 22 sampling locations, particularly with issues of strong alkalinity and sodicity. All deficient samples came from areas where topsoil was not applied and direct seeding undertaken in a subsoil substrate or directly into overburden.

Soil alkalinity and sodicity parameters in these areas will need to be closely monitored to determine whether levels settle to within acceptable criteria as the rehabilitation further establishes and stabilises over time. Likewise, trends in vegetation health and growth will help determine whether these soil deficiencies are transient or if they have the potential to undermine long-term rehabilitation success (and need to be managed).

More generally and moving forward, the suitability of these substrates as a growth medium to support the establishment and growth of native ecosystem vegetation may need to be re-considered.

8.5 Feral Pests

Feral pigs continued to be present and utilising the rehabilitation in 2024 (several individuals sighted). Although observed impacts are currently limited in extent and severity, their presence represents a risk to both ecological and pasture rehabilitation and the existing culling program should continue.

Rabbits/Hares have historically not been controlled at the site, and population levels are unknown. However, impacts to young seedlings were observed in 2024 and these species will pose a significant threat to the rehabilitation if population levels increase. As suggested in the 2023 monitoring report, active nocturnal monitoring using the Transect Spotlight method should be considered to establish a baseline count. Seasonal monitoring would then allow future fluctuations of these pests to be detected and managed accordingly before severe impacts on vegetation rehabilitation occur.

8.6 Habitat Augmentation

With localised exceptions in areas more recently established, habitat construction remains limited at the broader scale across the rehabilitation, and often limited to log piles / fallen trees.

To further enhance the habitat value of the rehabilitation and improve its function as a native wildlife corridor, consideration should be given to diversifying the use of artificial features and include for example rock piles, large boulders, nest boxes, erect stag trees or frog ponds.

- Rock piles/boulders, erect stag trees and frog ponds are difficult to retrofit into existing rehabilitation without causing damage to establishing vegetation; but should be considered in all new and future rehabilitation works.
- Nest boxes can be incorporated in established rehabilitation, either on existing mature trees or on posts.

Finally, it is recommended that habitat resources would be more beneficial and better used in areas of native ecosystem, less so in areas of pasture rehabilitation.

8.7 Access

It is recommended that the light vehicle track network within the rehabilitation is improved to provide better access to all areas and facilitate monitoring and maintenance activities.

Importantly, access tracks should be well demarcated, visible and regularly maintained to ensure they remain in a practicable and serviceable condition.

8.8 Monitoring Program

Consideration should be given to re-locating the two monitoring sites established in 2023 further away from the rehabilitation zone perimeter boundary and in a more central location within the patch with a view to minimise potential impacts from edge effects and ensure the transects are representative of the zone (suggested recommendation only).

In light of recent changes in final land use definition and associated completion criteria in the latest version of the RMP, consideration should also be given to re-visiting and improving Bengalla's rehabilitation monitoring program to improve the quality and validity of the collected datasets.

9. References

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Appendix A

2024 Photographic Monitoring Record



Monitoring Site: PAS 04



Monitoring Site: HDWV 02



Monitoring Site: HDWV 04



Monitoring Site: HDWV 06



Monitoring Site: HDWV 08



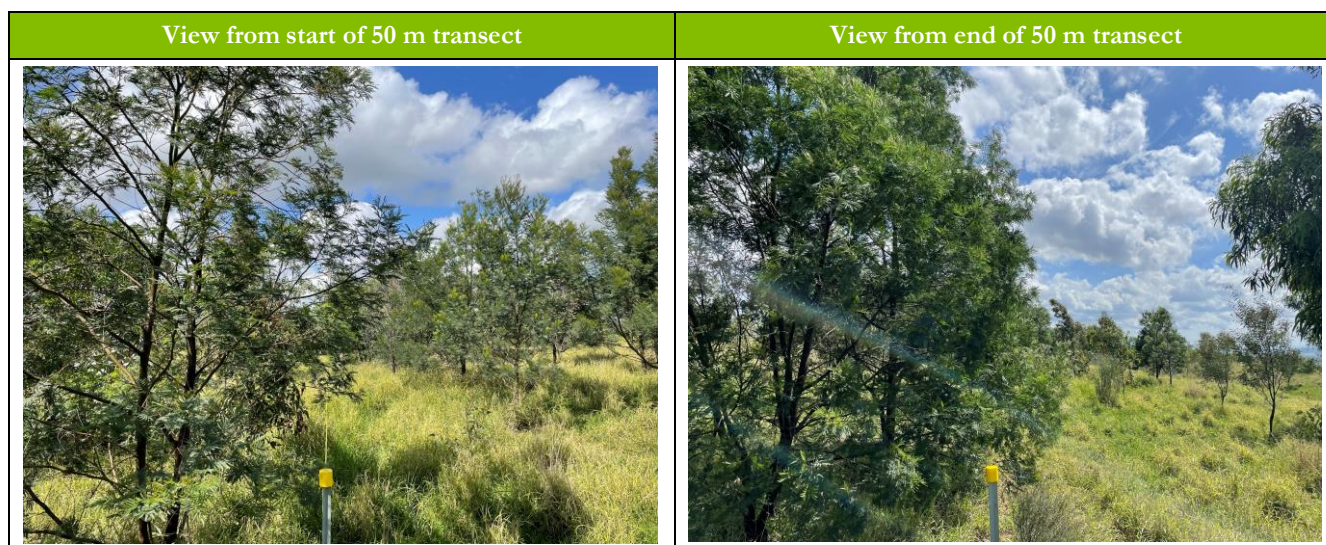
Monitoring Site: HDWV 10



Monitoring Site: HDWV 12



Monitoring Site: HDWV 14



Monitoring Site: HDWV 16



Monitoring Site: HDWV 18



Monitoring Site: HDWV 20



Monitoring Site: HDWV 22



Monitoring Site: HDWV 24



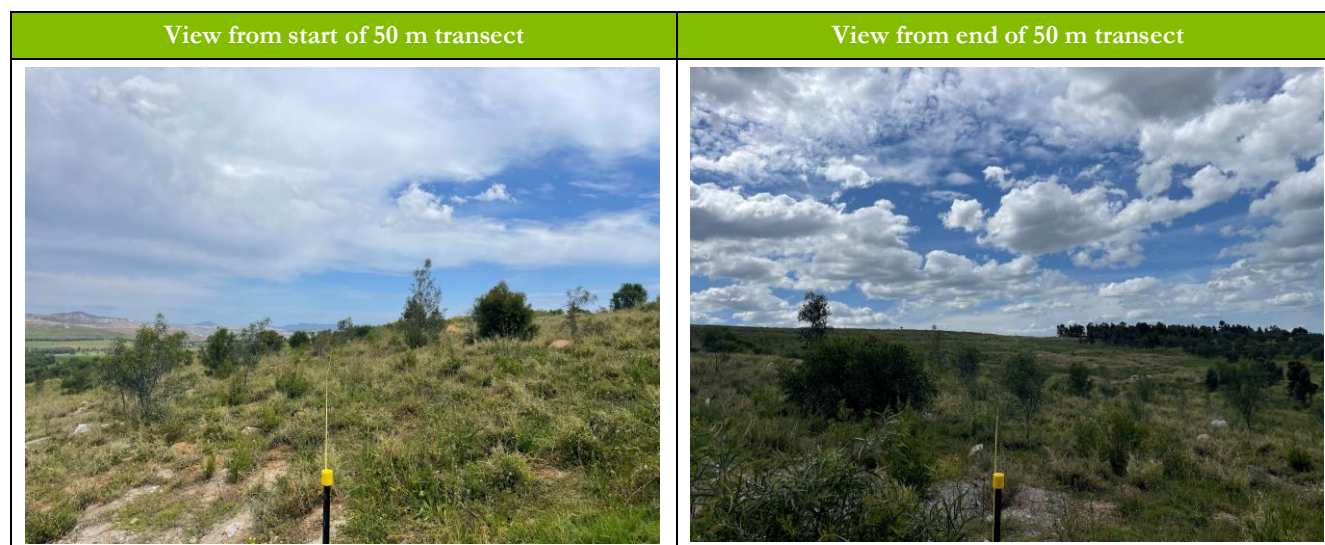
Monitoring Site: HDWV 26



Monitoring Site: HDWV 28



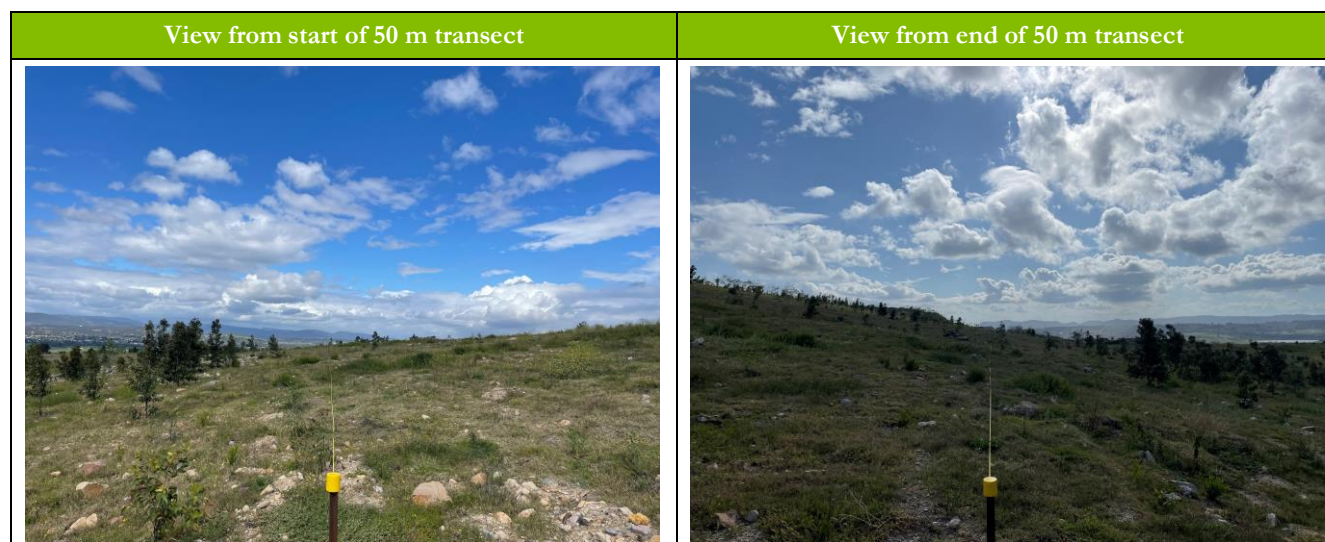
Monitoring Site: HDWV 30



Monitoring Site: HDWV 32



Monitoring Site: HDWV 34



Monitoring Site: HDWV 36



Monitoring Site: HDWV 38



Monitoring Site: HDWV 40



Monitoring Site: HDWV 42



Monitoring Site: HDWV 44



Appendix B

2024 Floristics Monitoring Results



Ground Cover Floristics

					HDWV02	HDWV04	HDWV06	HDWV08	HDWV10	HDWV12	HDWV14	HDWV16	HDWV18	HDWV20	HDWV22	HDWV24	HDWV26	HDWV28	HDWV30	HDWV32	HDWV34	HDWV36	HDWV38	HDWV40	HDWV42	HDWV44
Species	Common name	Life form	Type	GBIW / SGIGBF																						
Arctotheca calendula	Capeweed	Forb	Exotic (non-invasive)	No																	0.1					
Asphodelus fistulosus	Onion Weed	Forb	Exotic (non-invasive)	No				0.1									0.4								0.1	
Aster subulatus	Wild Aster	Forb	Exotic (non-invasive)	No						0.1													0.2		0.1	
Atriplex semibaccata	Creeping Saltbush	Sub-shrub	Native	Yes																15.5					0.2	
Avena barbata	Bearded Oats	Grass	Exotic (non-invasive)	No			0.2																			
Bidens pilosa	Cobblers Peg	Forb	Priority weed	No	0.1							5.1							0.1							
Bromus catharticus	Prairie Grass	Grass	Exotic (non-invasive)	No		0.4		1			0.2															
Bromus hordeaceus	Soft Brome	Grass	Exotic (non-invasive)	No																				7.2		
Calotis lappulacea	Yellow Burr-daisy	Forb	Native	No	0.1														0.1							
Capillipedium spicigerum	Scented-top Grass	Grass	Native	No				0.2																		
Carthamus lanatus	Saffron Thistle	Forb	Priority weed	No										0.2					0.1		0.5	0.1				
Cenchrus clandestinus	Kikuyu	Grass	Priority weed	No							9	3.8		20						18.2						
Centaurea melitensis	Maltese Cockspur	Forb	Exotic (non-invasive)	No													0.1	0.2	0.4			0.1				
Centaureum tenuiflorum	Slender Centaury	Forb	Exotic (non-invasive)	No						0.1								0.1			0.1					
Cheilanthes sieberi	Poison Rock Fern	Fern	Native	No			0.1																			
Chloris gayana	Rhodes Grass	Grass	Priority weed	No		1			1	6.2		1.4	30		16.4					41.6	0.6		19.2	25.2	3.3	
Cirsium vulgare	Spear Thistle	Forb	Exotic (non-invasive)	No	0.2	1.4		0.2	0.2			5.2					0.2	0.1	0.2	0.1	0.1		0.1	0.9	0.9	
Convolvulus erubescens	Blushing Bindweed	Vine	Native	Yes																			0.1			
Conyza bonariensis	Flaxleaf Fleabane	Forb	Exotic (non-invasive)	No			0.5	0.2								0.5	0.1	0.2				0.1			0.3	
Conyza sumatrensis	Tall Fleabane	Forb	Exotic (non-invasive)	No	0.1	1.6	3.1		1.4	0.9		0.1	10.2	0.1	0.1	0.2				0.4	0.4		0.1	0.2	1.4	
Cullen tenax	Emu-foot	Forb	Native	No															0.1							
Cyclospermum leptophyllum	Slender Celery	Forb	Exotic (non-invasive)	No	0.1		10.4	0.1			0.1	1.8		0.1		0.2	0.3	0.2	0.2		0.1		0.4			
Cynodon dactylon	Common Couch	Grass	Native	Yes				5	0.1								2.4	22.8		3.2	51		1.1		52	0.2
Cyperus gracilis	Slender Flat-sedge	Sedge	Native	Yes		0.1			4																	
Datura stramonium	Common Thornapple	Forb	Exotic (non-invasive)	No							0.1						0.1									
Dichanthium sericeum	Queensland Bluegrass	Grass	Native	Yes				0.8																		
Dichondra repens	Kidney Weed	Forb	Native	Yes	0.2					0.1									0.1							
Einadia trigonos	Fishweed	Forb	Native	Yes				0.6																		
Enchylaena tomentosa	Ruby Saltbush	Sub-shrub	Native	Yes																0.4						
Eriochloa pseudoacrotricha	Early Spring Grass	Grass	Native	No															0.1		1					
Erodium crinitum	Blue Storksbill	Forb	Native	Yes		0.8	0.5					0.1		0.3	1.1	0.2	5.1	0.1				0.1		2.6		
Euchiton sphaericus	Star Cudweed	Forb	Native	Yes			0.1																			
Euphorbia dallachyana	Mat Spurge	Forb	Native	Yes																			0.2			
Facelis retusa	Annual Trampweed	Forb	Exotic (non-invasive)	No			0.4			0.1							0.1		0.1							
Galenia pubescens	Galenia	Forb	Priority weed	No		0.2	0.1		0.6		1.7	7		0.4	0.8	0.5	0.2		0.4	0.2	0.8	1.3	4.4			
Galium aparine	Cleavers	Vine	Exotic (non-invasive)	No		7.6	0.2	6.6	5.4															1		
Gamochaeta calviceps	Cudweed	Forb	Exotic (non-invasive)	No	0.1		0.6																	0.1		
Geranium solanderi	Native Geranium	Forb	Native	Yes			0.2									0.1										
Gomphocarpus fruticosus	Narrow-leaved Cotton Bush	Forb	Exotic (non-invasive)	No								0.1						0.1			0.1		1		0.1	
Hirschfeldia incana	Buchan Weed	Forb	Exotic (non-invasive)	No																					2	
Lachnagrostis filiformis	Blown Grass	Grass	Native	No																					0.1	
Lactuca saligna	Willow-leaved Lettuce	Forb	Exotic (non-invasive)	No			0.2	0.4		0.4				0.2	0.1	0.1				0.5			0.4	1.4	0.8	
Lactuca seriola	Prickly Lettuce	Forb	Exotic (non-invasive)	No	0.1		1.1	1.3	0.1	6.4		0.8					1	0.4	0.1		0.2			6.1	0.3	
Linaria pelisseriana	Pelisser's Toadflax	Forb	Exotic (non-invasive)	No																				0.1		
Linum trigynum	French Flax	Forb	Exotic (non-invasive)	No	0.1		0.2																0.1			
Lolium perenne	Perennial Ryegrass	Grass	Exotic (non-invasive)	No		0.4		2										1				3		1		
Lolium rigidum	Wimmera Ryegrass	Grass	Exotic (non-invasive)	No		2.2				8.4	13	5			1.4											
Lysimachia arvensis	Scarlet Pimpernel	Forb	Exotic (non-invasive)	No	6.2	4.2	0.6	2.6	0.2	2.6	5.2	32	1.6	5.6	1.6	13.6	22	20.2	1	0.9	1.3	8.4	1	21		
Malva parviflora	Small-flowered Mallow	Forb	Exotic (non-invasive)	No		0.6			0.2													0.1		0.1		

Medicago minima	Woolly Burr Medic	Forb	Exotic (non-invasive)	No															1							
Medicago orbicularis	Button Medic	Forb	Exotic (non-invasive)	No															0.1	1						
Medicago polymorpha	Burr Medic	Forb	Exotic (non-invasive)	No	0.1	23	0.3	0.6	0.8	7	0.6	8.2		9	1		28		2.2	1	9.6	0.2	0.2			
Medicago truncatula	Barrel Medic	Forb	Exotic (non-invasive)	No	0.1		7.6			13	9.2		30	20	43	0.2	25	2	14			26	6.2	10.7		
Megathyrus maximus	Guinea Grass	Grass	Priority weed	No	61	38	19	29	54		57	8.4		36.6	17	69	1		11			15.4	0.2	0.2		
Mellilotus indicus	Hexham Scent	Forb	Exotic (non-invasive)	No		0.2	17			17	0.1		6.4	0.2	1.7		0.4	12.4	1.4	0.6	10.4	37	6.2	5.2		
Modiola caroliniana	Red-flowered Mallow	Forb	Exotic (non-invasive)	No									0.1		0.8		0.6	0.4	0.4		0.6		0.1			
Oxalis perennans	Grassland Wood-sorrel	Forb	Native	Yes	0.1	0.1	0.1	0.3	0.2	0.4		0.2					0.1	0.1						0.5		
Panicum coloratum	Coolah Grass	Grass	Priority weed	No						4.4																
Panicum queenslandicum	Coolibah Grass	Grass	Native	Yes														0.2								
Petrorhagia dubia	Hairy Pink	Forb	Exotic (non-invasive)	No						0.1																
Plantago lanceolata	Ribwort Plantain	Forb	Exotic (non-invasive)	No		2	0.4	17		0.8	0.1	1	14.4	0.2			1	0.4	8.1	1.1	0.7	6.1		0.6		
Rapistrum rugosum	Turnip Weed	Forb	Exotic (non-invasive)	No	0.1	9.2	0.4	10.4	11	0.3	0.1	1.2		0.6	1.3	0.1	32	0.4	0.2	0.2	0.1	14.5		4.3		
Rumex crispus	Curled Dock	Forb	Exotic (non-invasive)	No																	0.4					
Rumex spinosus	Devil's Thorn	Forb	Exotic (non-invasive)	No		0.2																				
Salsola australis	Rolypoly	Sub-shrub	Native	No																					0.1	
Senecio madagascariensis	Fireweed	Forb	Priority weed	No	0.1	0.2	1.4	0.1		1.5	0.7	10	0.5	0.2	0.9		0.8	2.5	0.4	1.4	0.5	0.1	0.1	0.6	0.6	
Senecio quadridentatus	Cotton Fireweed	Forb	Native	Yes		0.4	0.5			4.9		0.2							0.1				1.5			
Setaria parviflora	Slender Pigeon Grass	Grass	Exotic (non-invasive)	No													0.2	0.1				0.1				
Setaria sphacelata	South-African Pigeon Grass	Grass	Priority weed	No																				1.6		
Sida rhombifolia	Paddy's Lucerne	Sub-shrub	Exotic (non-invasive)	No											0.2		0.2					0.1				
Silybum marianum	Variegated Thistle	Forb	Exotic (non-invasive)	No		0.2						0.2		0.4					0.1							
Solanum americanum	Glossy Nightshade	Forb	Exotic (non-invasive)	No				0.1																		
Solanum nigrum	Black-berry Nightshade	Forb	Exotic (non-invasive)	No	0.1	0.1	1.3								0.1		0.1						0.1			
Sonchus asper	Prickly Sowthistle	Forb	Exotic (non-invasive)	No	0.2	0.2	0.4	0.1		0.1		0.8		0.1		0.3		0.1						0.5	1.1	
Sonchus oleraceus	Common Sowthistle	Forb	Exotic (non-invasive)	No	0.4	0.1	4.4	0.9	0.2	0.2	0.2	1.6	0.1	1.2	0.3	1.2	2.8	1.3	0.2	0.5	0.1	1.6	0.2	1.2	0.1	
Sporobolus creber	Slender Rat's Tail Grass	Grass	Native	Yes	0.6		0.2			0.2																
Stachys arvensis	Stagger Weed	Forb	Exotic (non-invasive)	No	0.1			9.8				0.2			0.1		0.9		0.2		0.1					
Tolpis barbata	Yellow Hawkweed	Forb	Exotic (non-invasive)	No																			0.2			
Trifolium arvense	Haresfoot Clover	Forb	Exotic (non-invasive)	No							0.4		0.4													
Trifolium campestre	Hop Clover	Forb	Exotic (non-invasive)	No	0.1		2.6				0.2		1.5			0.2	1.2					0.1				
Trifolium glomeratum	Clustered Clover	Forb	Exotic (non-invasive)	No			0.8	0.6					1.4		1.2		0.2	0.2	17.6				0.2	0.5		
Trifolium repens	White Clover	Forb	Exotic (non-invasive)	No								0.4								1.1						
Trifolium vesiculosum	Arrowleaf Clover	Forb	Exotic (non-invasive)	No															0.1							
Urospermum picroides	False Hawkbit	Forb	Exotic (non-invasive)	No	0.1	1.2			2	2.2		0.1		0.1					0.3				0.1			
Verbena bonariensis	Purpltop	Forb	Exotic (non-invasive)	No			0.3	0.5								0.3	0.9	0.2				0.2	1.2			
Verbena quadrangularis	A Verbena	Forb	Exotic (non-invasive)	No																0.2						
Veronica hederifolia	Ivy-leaved Speedwell	Forb	Exotic (non-invasive)	No		0.1																				
Wahlenbergia gracilis	Australian Bluebell	Forb	Native	Yes			0.1																			

Mid and Upper Storey Floristics

Site Code	Species	Type	Growth form	GBIW / SGIGBF	Height Class (m)						Reproductive material present	Average repro. score
					< 1	1-3	3-5	5-8	8-12	>12		
HDWV 02	Acacia saligna	Priority weed	Shrub	No	1	3					n/a	n/a
HDWV 02	Eucalyptus cladocalyx	Exotic (non-invasive)	Tree	No				1	1	1	Yes	3
HDWV 02	Corymbia citriodora	Exotic (non-invasive)	Tree	No				1	1		Yes	3.5
HDWV 02	Acacia implexa	Native (local)	Shrub	Yes	1	3	3				No	0
HDWV 02	Acacia salicina	Native (local)	Small tree	Yes	1	3	9	1			Yes	0.75
HDWV 02	Eucalyptus moluccana	Native (local)	Tree	Yes						1	No	0
HDWV 02	Eucalyptus camaldulensis	Native (local)	Tree	No					1		No	0
HDWV 02	Eucalyptus crebra	Native (local)	Tree	Yes				2			No	0
HDWV 02	Corymbia maculata	Native (local)	Tree	Yes				5	4		Yes	0.75
HDWV 04	Acacia salicina	Native (local)	Small tree	Yes		2	2	1			Yes	1.67
HDWV 04	Eucalyptus microcarpa	Native (local)	Tree	Yes	1	1			1		No	0
HDWV 04	Acacia implexa	Native (local)	Shrub	Yes			1				No	0
HDWV 04	Corymbia maculata	Native (local)	Tree	Yes			1		1		Yes	3
HDWV 04	Acacia decora	Native (local)	Shrub	Yes		1					Yes	1
HDWV 04	Eucalyptus camaldulensis	Native (local)	Tree	No				1			No	0
HDWV 06	Acacia ligulata	Native (out-of-range)	Shrub	No		30	4				Yes	2
HDWV 06	Acacia concurrens	Native (out-of-range)	Small tree	No			1	1			Yes	4
HDWV 06	Acacia salicina	Native (local)	Small tree	Yes			2				Yes	4
HDWV 06	Eucalyptus melliodora	Native (local)	Tree	Yes				1			No	0
HDWV 08	Acacia decora	Native (local)	Shrub	Yes		6					Yes	3.5
HDWV 08	Acacia salicina	Native (local)	Small tree	Yes	1	4	6	2			Yes	1.1
HDWV 08	Eucalyptus moluccana	Native (local)	Tree	Yes			2	3			No	0
HDWV 08	Corymbia maculata	Native (local)	Tree	Yes				1			No	0
HDWV 08	Eucalyptus tereticornis	Native (local)	Tree	Yes			1				No	0
HDWV 08	Eucalyptus crebra	Native (local)	Tree	Yes			1				No	0
HDWV 08	Acacia implexa	Native (local)	Shrub	Yes		1					No	0
HDWV 08	Acacia decurrens	Native (local)	Small tree	No				1			Yes	2
HDWV 10	Acacia salicina	Native (local)	Small tree	Yes		1	17	3			Yes	2.5
HDWV 10	Lycium ferocissimum	Priority weed	Shrub	No	3	3					n/a	n/a
HDWV 12	Acacia implexa	Native (local)	Shrub	Yes	2	1					n/a	n/a
HDWV 12	Eucalyptus moluccana	Native (local)	Tree	Yes	2						n/a	n/a
HDWV 12	Eucalyptus blakelyi	Native (local)	Tree	Yes	3	1					n/a	n/a
HDWV 12	Corymbia maculata	Native (local)	Tree	Yes	2						n/a	n/a
HDWV 12	Eucalyptus spp.	Native (local)	Tree	Yes	1						n/a	n/a
HDWV 14	Daviesia genistifolia	Native (local)	Shrub	Yes	1						n/a	n/a
HDWV 14	Acacia deanei	Native (local)	Shrub	Yes	1		3				n/a	n/a
HDWV 14	Acacia implexa	Native (local)	Shrub	Yes			2				n/a	n/a
HDWV 14	Acacia falcata	Native (local)	Shrub	Yes		4					n/a	n/a
HDWV 14	Dodonaea viscosa subsp. cuneata	Native (local)	Shrub	Yes	1	2					n/a	n/a
HDWV 14	Acacia saligna	Priority weed	Shrub	No		2					n/a	n/a
HDWV 14	Acacia salicina	Native (local)	Small tree	Yes	1						n/a	n/a
HDWV 14	Acacia decurrens	Native (local)	Small tree	No		1	5	2			n/a	n/a
HDWV 14	Eucalyptus blakelyi	Native (local)	Tree	Yes	1						n/a	n/a
HDWV 14	Eucalyptus fibrosa	Native (local)	Tree	Yes	1						n/a	n/a
HDWV 14	Eucalyptus crebra	Native (local)	Tree	Yes	1	1					n/a	n/a
HDWV 14	Corymbia maculata	Native (local)	Tree	Yes		5	4				n/a	n/a
HDWV 14	Eucalyptus albens	Native (local)	Tree	Yes	2	7					n/a	n/a
HDWV 14	Eucalyptus moluccana	Native (local)	Tree	Yes	2	5					n/a	n/a
HDWV 16	Acacia falcata	Native (local)	Shrub	Yes		4					n/a	n/a
HDWV 16	Acacia decurrens	Native (local)	Small tree	No			1				n/a	n/a
HDWV 16	Eucalyptus fibrosa	Native (local)	Tree	Yes		1					n/a	n/a
HDWV 16	Eucalyptus moluccana	Native (local)	Tree	Yes	1	7	1				n/a	n/a
HDWV 16	Eucalyptus blakelyi	Native (local)	Tree	Yes	2	5					n/a	n/a
HDWV 16	Corymbia maculata	Native (local)	Tree	Yes	3	5					n/a	n/a
HDWV 16	Eucalyptus crebra	Native (local)	Tree	Yes	8	6					n/a	n/a
HDWV 18	Dodonaea viscosa subsp. spatulata	Native (local)	Shrub	Yes	70	3					n/a	n/a
HDWV 18	Acacia falcata	Native (local)	Shrub	Yes		1					n/a	n/a
HDWV 18	Acacia implexa	Native (local)	Shrub	Yes		2					n/a	n/a

HDWV 18	Acacia linifolia	Native (local)	Shrub	No	1	1					n/a	n/a
HDWV 18	Acacia saligna	Priority weed	Shrub	No		1					n/a	n/a
HDWV 18	Acacia decora	Native (local)	Shrub	Yes	1						n/a	n/a
HDWV 18	Acacia salicina	Native (local)	Small tree	Yes	1	1					n/a	n/a
HDWV 18	Eucalyptus blakelyi	Native (local)	Tree	Yes	1						n/a	n/a
HDWV 20	Dodonaea viscosa subsp. spatulata	Native (local)	Shrub	Yes	35						n/a	n/a
HDWV 20	Acacia implexa	Native (local)	Shrub	Yes		2	1				n/a	n/a
HDWV 20	Lycium ferocissimum	Priority weed	Shrub	No	2						n/a	n/a
HDWV 20	Acacia salicina	Native (local)	Small tree	Yes		1					n/a	n/a
HDWV 20	Eucalyptus tereticornis	Native (local)	Tree	Yes	2						n/a	n/a
HDWV 20	Eucalyptus crebra	Native (local)	Tree	Yes	3						n/a	n/a
HDWV 20	Corymbia maculata	Native (local)	Tree	Yes	1						n/a	n/a
HDWV 22	Dodonaea viscosa subsp. spatulata	Native (local)	Shrub	Yes	4						n/a	n/a
HDWV 22	Pavonia hastata	Exotic (non-invasive)	Shrub	No	2						n/a	n/a
HDWV 22	Acacia linifolia	Native (local)	Shrub	No	1	2					n/a	n/a
HDWV 22	Acacia implexa	Native (local)	Shrub	Yes		1					n/a	n/a
HDWV 22	Corymbia maculata	Native (local)	Tree	Yes		1	2				n/a	n/a
HDWV 24	Dodonaea viscosa subsp. spatulata	Native (local)	Shrub	Yes	6						n/a	n/a
HDWV 24	Acacia linifolia	Native (local)	Shrub	No		13					n/a	n/a
HDWV 24	Acacia parvipinnula	Native (local)	Shrub	Yes		3	1				n/a	n/a
HDWV 24	Acacia salicina	Native (local)	Small tree	Yes		1					n/a	n/a
HDWV 24	Corymbia maculata	Native (local)	Tree	Yes	1						n/a	n/a
HDWV 24	Acacia implexa	Native (local)	Shrub	Yes		1					n/a	n/a
HDWV 26	Dodonaea viscosa subsp. spatulata	Native (local)	Shrub	Yes	2						n/a	n/a
HDWV 26	Acacia linifolia	Native (local)	Shrub	No		4					n/a	n/a
HDWV 26	Acacia implexa	Native (local)	Shrub	Yes		1					n/a	n/a
HDWV 26	Eucalyptus moluccana	Native (local)	Tree	Yes	1						n/a	n/a
HDWV 26	Corymbia maculata	Native (local)	Tree	Yes		1					n/a	n/a
HDWV 26	Acacia decora	Native (local)	Shrub	Yes		1					n/a	n/a
HDWV 28	Dodonaea viscosa subsp. spatulata	Native (local)	Shrub	Yes	4	1					n/a	n/a
HDWV 28	Acacia implexa	Native (local)	Shrub	Yes		2					n/a	n/a
HDWV 28	Acacia linifolia	Native (local)	Shrub	No	1	1					n/a	n/a
HDWV 28	Acacia salicina	Native (local)	Small tree	Yes		1					n/a	n/a
HDWV 28	Eucalyptus tereticornis	Native (local)	Tree	Yes		1					n/a	n/a
HDWV 28	Corymbia maculata	Native (local)	Tree	Yes		3	2	1			n/a	n/a
HDWV 28	Cassinia sifton	Native (local)	Shrub	Yes	1	1					n/a	n/a
HDWV 30	Pavonia hastata	Exotic (non-invasive)	Shrub	No	5						n/a	n/a
HDWV 30	Acacia decora	Native (local)	Shrub	Yes	1						n/a	n/a
HDWV 30	Dodonaea viscosa subsp. spatulata	Native (local)	Shrub	Yes	50	3					n/a	n/a
HDWV 30	Acacia salicina	Native (local)	Small tree	Yes	3	5	1				n/a	n/a
HDWV 30	Eucalyptus crebra	Native (local)	Tree	Yes	1	1					n/a	n/a
HDWV 30	Corymbia maculata	Native (local)	Tree	Yes	4	1					n/a	n/a
HDWV 30	Lycium ferocissimum	Priority weed	Shrub	No		1					n/a	n/a
HDWV 30	Acacia saligna	Priority weed	Shrub	No		1					n/a	n/a
HDWV 32	Dodonaea viscosa subsp. spatulata	Native (local)	Shrub	Yes	55						n/a	n/a
HDWV 32	Corymbia maculata	Native (local)	Tree	Yes	31	21					n/a	n/a
HDWV 32	Acacia salicina	Native (local)	Small tree	Yes	7	3					n/a	n/a
HDWV 32	Acacia linifolia	Native (local)	Shrub	No		2					n/a	n/a
HDWV 32	Lycium ferocissimum	Priority weed	Shrub	No	2						n/a	n/a
HDWV 32	Acacia parvipinnula	Native (local)	Shrub	Yes	1						n/a	n/a
HDWV 32	Eucalyptus tereticornis	Native (local)	Tree	Yes	1	1					n/a	n/a
HDWV 32	Acacia implexa	Native (local)	Shrub	Yes	2						n/a	n/a
HDWV 34	Lycium ferocissimum	Priority weed	Shrub	No	5						n/a	n/a
HDWV 34	Dodonaea viscosa subsp. spatulata	Native (local)	Shrub	Yes	17						n/a	n/a
HDWV 34	Acacia salicina	Native (local)	Small tree	Yes	6	1					n/a	n/a
HDWV 34	Corymbia maculata	Native (local)	Tree	Yes	5	2					n/a	n/a
HDWV 34	Eucalyptus crebra	Native (local)	Tree	Yes	1						n/a	n/a
HDWV 36	Dodonaea viscosa subsp. spatulata	Native (local)	Shrub	Yes	2						n/a	n/a
HDWV 36	Eucalyptus moluccana x albens	Native (local)	Tree	Yes	2						n/a	n/a
HDWV 36	Corymbia maculata	Native (local)	Tree	Yes	5	1					n/a	n/a
HDWV 38	Dodonaea viscosa subsp. spatulata	Native (local)	Shrub	Yes	10						n/a	n/a
HDWV 38	Corymbia maculata	Native (local)	Tree	Yes	5	2					n/a	n/a

HDWV 38	Acacia salicina	Native (local)	Small tree	Yes	2	8					n/a	n/a
HDWV 38	Eucalyptus moluccana x albens	Native (local)	Tree	Yes	1						n/a	n/a
HDWV 38	Eucalyptus crebra	Native (local)	Tree	Yes	2						n/a	n/a
HDWV 40	Dodonaea viscosa subsp. spatulata	Native (local)	Shrub	Yes	8	2					n/a	n/a
HDWV 40	Eucalyptus albens	Native (local)	Tree	Yes	2	3					n/a	n/a
HDWV 40	Acacia decurrens	Native (local)	Small tree	No	1	3					n/a	n/a
HDWV 40	Eucalyptus moluccana	Native (local)	Tree	Yes	1						n/a	n/a
HDWV 40	Corymbia maculata	Native (local)	Tree	Yes		3					n/a	n/a
HDWV 42	Acacia salicina	Native (local)	Small tree	Yes		1					n/a	n/a
HDWV 42	Corymbia maculata	Native (local)	Tree	Yes	21	3					n/a	n/a
HDWV 42	Dodonaea viscosa subsp. spatulata	Native (local)	Shrub	Yes	6						n/a	n/a
HDWV 42	Eucalyptus moluccana x albens	Native (local)	Tree	Yes		1					n/a	n/a
HDWV 44	Acacia salicina	Native (local)	Small tree	Yes	1						n/a	n/a

Appendix C

2024 Soil Laboratory Analyses Report



DATE OF ISSUE: 6/12/24

REPORT NO: WN241915

Soil Analysis Report

REPORT NO:	WN241915	ISSUE DATE:	6/12/24
DATE SAMPLES RECEIVED:	8/11/24	PURCHASE ORDER:	
SAMPLES RECEIVED:	23	COMMENT:	Results relate only to items tested.

SUBMITTER:	Matthieu Catteau
COMPANY:	Koru Enviromental - Matthieu Cattteau
ADDRESS:	76 Grey Street CLARENCE TOWN NSW 2321,

METHOD ID	ANALYSIS METHOD
S201	Soil pH in 1:5 water or 1:5 CaCl ₂ suspension
S202	Soil Electrical Conductivity (1:5 soil/water extract)
S266	Available Sulfur by KCl ₄₀ extraction
SP901	Soil colour and texture **
S262	Colwell, Bicarbonate Extractable Phosphorus in soil by FIA
S236	Organic Carbon by Walkley & Black
M630	Total Carbon and/or Total Nitrogen by Dumas Combustion
S273	Gillman & Sumpter Exchangeable Cations
S224	Chloride in soil by FIA
S241	Ammonium Nitrogen in 2M KCl extracts of soil
S250	Nitrate Nitrogen in 2M KCl extracts of soil

REPORT AUTHORISATION

Approved for Release by:



Sarah Morison
Coordinator Analytical Services

DATE OF ISSUE: 6/12/24

REPORT NO: WN241915

ANALYSIS RESULTS								
			1	2	3	4	5	6
Test Description	LOR	UNITS	P4	HDWV 02	HDWV 04	HDWV 06	HDWV 08	HDWV 10
pH (Water)	0.04	pH units	8.8	6.9	7.9	8.3	8.3	7.5
pH (CaCl ₂)	0.04	pH units	8.0	6.1	7.1	7.5	7.4	6.9
Electrical Conductivity	0.001	dS/m	0.31	0.077	0.082	0.094	0.067	0.20
Sulfur (KCl ₄₀)	2	mg/kg	38	10	8.2	3.1	2.4	18
Texture**			Light clay	Medium clay	Medium clay	Light clay	Heavy clay	Clay loam
ECe Calculation Result**	0.001	dS/m	2.6	0.58	0.61	0.80	0.39	1.7
Colwell Phosphorus	2	mg/kg	21	9.8	21	4.7	8.2	28
Organic Carbon	0.05	%	1.4	2.1	1.6	1.1	1.1	4.2
Total Nitrogen	0.02	%	0.096	0.14	0.11	0.080	0.089	0.34
Exchangeable Aluminium	0.1	cmol(+)/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Calcium	0.03	cmol(+)/kg	12	10	9.7	7.5	12	17
Exchangeable Potassium	0.01	cmol(+)/kg	0.44	1.2	0.81	0.49	0.87	1.1
Exchangeable Magnesium	0.007	cmol(+)/kg	7.4	4.0	4.7	2.8	4.7	4.2
Exchangeable Sodium	0.03	cmol(+)/kg	1.8	0.14	0.10	0.059	0.11	0.077
CEC (effective)	0.20	cmol(+)/kg	22	15	15	11	18	22
Calcium/ Magnesium			1.7	2.5	2.1	2.7	2.6	4.0
Percent Aluminium Saturation		% of ECEC	N/A	N/A	N/A	N/A	N/A	N/A
Exchangeable Calcium Percent		% of ECEC	56	65	63	69	68	76
Exchangeable Potassium Percent		% of ECEC	2.0	7.8	5.3	4.5	4.9	4.8
Exchangeable Magnesium Percent		% of ECEC	33	26	31	26	26	19
Exchangeable Sodium Percent		% of ECEC	8.3	0.88	0.66	0.54	0.63	0.35
Chloride	2.0	mg/kg	62	15	13	2.6	3.4	15
KCl Extractable Ammonium-N	0.3	mg/kg	0.86	2.0	0.69	1.1	0.61	7.5
KCl Extractable Nitrate-N	0.2	mg/kg	35	6.3	10	4.9	3.1	44

ANALYSIS RESULTS								
			7	8	9	10	11	12
Test Description	LOR	UNITS	HDWV 12	HDWV 14	HDWV 16	HDWV 18	HDWV 20	HDWV 22
pH (Water)	0.04	pH units	8.6	7.8	7.3	9.1	8.2	8.7
pH (CaCl ₂)	0.04	pH units	7.8	6.8	6.7	8.2	7.5	8.0
Electrical Conductivity	0.001	dS/m	0.087	0.057	0.092	0.10	0.17	0.14
Sulfur (KCl ₄₀)	2	mg/kg	<2	3.0	8.0	2.6	4.3	4.5
Texture**			Medium clay	Sandy loam	Clay loam	Heavy clay	Medium clay	Medium clay
ECe Calculation Result**	0.001	dS/m	0.65	0.80	0.79	0.61	1.3	1.1
Colwell Phosphorus	2	mg/kg	15	8.5	22	4.0	30	7.0
Organic Carbon	0.05	%	0.67	0.74	2.0	0.66	2.1	0.95
Total Nitrogen	0.02	%	0.034	0.054	0.16	0.042	0.17	0.10
Exchangeable Aluminium	0.1	cmol(+)/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Calcium	0.03	cmol(+)/kg	14	4.2	11	6.5	16	12
Exchangeable Potassium	0.01	cmol(+)/kg	0.43	0.71	1.4	0.25	1.4	0.59
Exchangeable Magnesium	0.007	cmol(+)/kg	7.3	1.9	6.3	7.5	4.8	5.5
Exchangeable Sodium	0.03	cmol(+)/kg	0.14	0.14	0.17	0.39	0.071	0.39
CEC (effective)	0.20	cmol(+)/kg	21	6.9	19	15	22	19
Calcium/ Magnesium			1.9	2.2	1.8	0.87	3.3	2.2
Percent Aluminium Saturation		% of ECEC	N/A	N/A	N/A	N/A	N/A	N/A
Exchangeable Calcium Percent		% of ECEC	63	60	59	44	72	65

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ANALYSIS RESULTS								
			7	8	9	10	11	12
Test Description	LOR	UNITS	HDWV 12	HDWV 14	HDWV 16	HDWV 18	HDWV 20	HDWV 22
Exchangeable Potassium Percent		% of ECEC	2.0	10	7.1	1.7	6.3	3.1
Exchangeable Magnesium Percent		% of ECEC	34	28	33	51	22	30
Exchangeable Sodium Percent		% of ECEC	0.65	2.1	0.87	2.7	0.32	2.1
Chloride	2.0	mg/kg	2.7	7.0	9.7	4.8	12	15
KCl Extractable Ammonium-N	0.3	mg/kg	0.93	0.86	2.3	0.47	3.4	0.63
KCl Extractable Nitrate-N	0.2	mg/kg	2.4	8.9	6.2	1.0	10	12

ANALYSIS RESULTS								
			13	14	15	16	17	18
Test Description	LOR	UNITS	HDWV 24	HDWV 26	HDWV 28	HDWV 30	HDWV 32	HDWV 34
pH (Water)	0.04	pH units	8.6	8.7	9.1	8.9	9.6	9.8
pH (CaCl ₂)	0.04	pH units	7.9	8.1	8.4	8.2	8.6	8.8
Electrical Conductivity	0.001	dS/m	0.12	0.10	0.13	0.12	0.28	0.55
Sulfur (KCl ₄₀)	2	mg/kg	2.4	5.0	2.4	3.3	41	110
Texture**			Medium clay	Medium clay	Medium clay	Clay loam	Medium clay	Heavy clay
ECe Calculation Result**	0.001	dS/m	0.93	0.78	0.97	1.0	2.1	3.2
Colwell Phosphorus	2	mg/kg	7.8	11	7.3	5.5	4.0	6.1
Organic Carbon	0.05	%	1.3	1.1	1.3	1.2	4.1	0.72
Total Nitrogen	0.02	%	0.12	0.10	0.093	0.10	0.20	0.077
Exchangeable Aluminium	0.1	cmol(+)/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Calcium	0.03	cmol(+)/kg	10	10	8.0	10	12	4.7
Exchangeable Potassium	0.01	cmol(+)/kg	0.59	0.77	0.51	0.49	0.31	0.47
Exchangeable Magnesium	0.007	cmol(+)/kg	4.1	6.4	8.3	6.4	14	7.3
Exchangeable Sodium	0.03	cmol(+)/kg	0.43	0.13	0.67	0.30	2.7	4.3
CEC (effective)	0.20	cmol(+)/kg	15	18	17	18	29	17
Calcium/ Magnesium			2.5	1.6	0.97	1.6	0.85	0.64
Percent Aluminium Saturation		% of ECEC	N/A	N/A	N/A	N/A	N/A	N/A
Exchangeable Calcium Percent		% of ECEC	67	59	46	59	41	28
Exchangeable Potassium Percent		% of ECEC	3.9	4.3	2.9	2.8	1.1	2.8
Exchangeable Magnesium Percent		% of ECEC	27	36	47	36	48	44
Exchangeable Sodium Percent		% of ECEC	2.8	0.72	3.8	1.7	9.3	25
Chloride	2.0	mg/kg	6.7	3.8	3.9	5.5	85	330
KCl Extractable Ammonium-N	0.3	mg/kg	0.64	0.47	0.68	0.91	<0.3	0.50
KCl Extractable Nitrate-N	0.2	mg/kg	5.1	2.7	0.63	5.1	0.26	10

ANALYSIS RESULTS								
			19	20	21	22	23	
Test Description	LOR	UNITS	HDWV 36	HDWV 38	HDWV 40	HDWV 42	HDWV 44	
pH (Water)	0.04	pH units	8.8	9.8	7.7	10.7	10.1	
pH (CaCl ₂)	0.04	pH units	8.1	8.7	7.1	9.0	9.0	
Electrical Conductivity	0.001	dS/m	0.10	0.16	0.066	0.46	0.87	
Sulfur (KCl ₄₀)	2	mg/kg	3.6	4.8	2.6	140	190	
Texture**			Clay loam	Heavy clay	Medium clay	Clay loam	Medium clay	
ECe Calculation Result**	0.001	dS/m	0.89	0.90	0.50	4.0	6.5	
Colwell Phosphorus	2	mg/kg	8.5	4.2	9.3	3.6	2.9	

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ANALYSIS RESULTS							
			19	20	21	22	23
Test Description	LOR	UNITS	HDWV 36	HDWV 38	HDWV 40	HDWV 42	HDWV 44
Organic Carbon	0.05	%	0.67	0.53	1.5	2.6	0.75
Total Nitrogen	0.02	%	0.076	0.070	0.14	0.14	0.067
Exchangeable Aluminium	0.1	cmol(+)/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Calcium	0.03	cmol(+)/kg	11	7.0	9.4	2.6	1.7
Exchangeable Potassium	0.01	cmol(+)/kg	0.52	0.22	0.73	0.44	0.31
Exchangeable Magnesium	0.007	cmol(+)/kg	4.2	8.9	3.1	4.5	2.6
Exchangeable Sodium	0.03	cmol(+)/kg	0.20	1.4	0.061	4.2	6.1
CEC (effective)	0.20	cmol(+)/kg	16	17	13	12	11
Calcium/ Magnesium			2.7	0.79	3.0	0.58	0.63
Percent Aluminium Saturation		% of ECEC	N/A	N/A	N/A	N/A	N/A
Exchangeable Calcium Percent		% of ECEC	70	40	71	22	15
Exchangeable Potassium Percent		% of ECEC	3.2	1.2	5.5	3.8	2.9
Exchangeable Magnesium Percent		% of ECEC	26	51	23	38	24
Exchangeable Sodium Percent		% of ECEC	1.2	7.9	0.46	36	57
Chloride	2.0	mg/kg	2.3	7.6	4.4	63	570
KCl Extractable Ammonium-N	0.3	mg/kg	0.64	0.58	0.70	<0.3	<0.3
KCl Extractable Nitrate-N	0.2	mg/kg	4.6	0.80	5.4	14	51

LABORATORY NOTES

****NATA Accreditation does not cover the performances of this service.**

Analysis is conducted within the date received and the date the report is finalised.

As requested, testing for PSA will be performed by EAL. Results will be forwarded when received by AgEnviro Laboratory.

When required, samples air dried at 40°C as per Soil Chemical Methods - Australasia (Rayment and Lyons 2011).

- Results are expressed on an air-dry weight basis unless otherwise stated.
- Physical soil testing results calculated on 105°C dry weight
- This report should not be reproduced except in full.
- Samples will be retained for one calendar month from the date of the final report. Samples will then be discarded.
- Clients wishing to recover their samples must contact the laboratory within this period.
- This laboratory will return residual samples at client expense.

Certificate of Analysis E24-00-1237

Client:	NSW Department of Primary Industries	Laboratory:	Environmental Analysis Laboratory
Contact:	Jana Crooks	Contact:	EAL Customer Service Team
Address:	Accounts Payable, 1243 Bruxner Highway, Wollongbar, NSW 2477, Australia	Address:	PO Box 157, East Lismore NSW 2480 Australia
Telephone:		Telephone:	(02) 6620 3678
Email:	wollongbar.labs@dpi.nsw.gov.au	Email:	eal@scu.edu.au

Customer reference:	WN241915	Request ID:	EAL/E24-00-1237
Number of samples:	23	Report ID:	E24-00-1237_RCOAP1_1
Date samples received:	22 November 2024	Issue date:	28 November 2024

Authorised by:	Nick Ward
Position:	Technical Team Leader



Comments: EAL is a NATA accredited laboratory (14960), accredited for compliance with ISO/IEC 17025 - Testing.

Certificate of Analysis

Request ID: EAL/E24-00-1237 Report ID: E24-00-1237_RCOAP1_1 Issue date: 28 November 2024

Client Sample ID:				WN241915-1	WN241915-2	WN241915-3	WN241915-4	WN241915-5
Your Client:				NSW DPIRD	NSW DPIRD	NSW DPIRD	NSW DPIRD	NSW DPIRD
EAL Sample ID:				E24-00-1237-0001	E24-00-1237-0002	E24-00-1237-0003	E24-00-1237-0004	E24-00-1237-0005
Parameter	Unit	Method Reference	LOR	---	---	---	---	---
Moisture Content	%	Inhouse S2 (105°C)	<0.1	10.7	11.9	12.6	9.0	13.3
Texture (ISSS Classification)	---	** Inhouse S30	---	Clay	Clay Loam	Clay Loam	Clay Loam	Clay
Gravel > 2 mm fraction	% of whole sample	** Inhouse S30	<0.1	2.3	4.7	9.6	1.2	3.0
Sand > 20 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	38.0	46.9	53.5	61.5	40.2
Silt 2–20 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	16.1	17.1	16.8	15.5	18.5
Clay < 2 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	45.9	36.0	29.7	23.1	41.3

Client Sample ID:				WN241915-6	WN241915-7	WN241915-8	WN241915-9	WN241915-10
Your Client:				NSW DPIRD	NSW DPIRD	NSW DPIRD	NSW DPIRD	NSW DPIRD
EAL Sample ID:				E24-00-1237-0006	E24-00-1237-0007	E24-00-1237-0008	E24-00-1237-0009	E24-00-1237-0010
Parameter	Unit	Method Reference	LOR	---	---	---	---	---
Moisture Content	%	Inhouse S2 (105°C)	<0.1	18.9	15.8	11.1	16.4	10.3
Texture (ISSS Classification)	---	** Inhouse S30	---	Clay	Clay Loam	Sandy Loam	Clay	Silty Clay Loam
Gravel > 2 mm fraction	% of whole sample	** Inhouse S30	<0.1	11.5	7.1	0.7	2.7	1.4
Sand > 20 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	52.0	65.2	75.8	43.6	45.3
Silt 2–20 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	13.0	9.3	8.5	18.0	27.1
Clay < 2 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	35.0	25.5	15.7	38.5	27.6

Client Sample ID:				WN241915-11	WN241915-12	WN241915-13	WN241915-14	WN241915-15
Your Client:				NSW DPIRD	NSW DPIRD	NSW DPIRD	NSW DPIRD	NSW DPIRD
EAL Sample ID:				E24-00-1237-0011	E24-00-1237-0012	E24-00-1237-0013	E24-00-1237-0014	E24-00-1237-0015
Parameter	Unit	Method Reference	LOR	---	---	---	---	---
Moisture Content	%	Inhouse S2 (105°C)	<0.1	17.0	15.7	13.1	13.0	9.3
Texture (ISSS Classification)	---	** Inhouse S30	---	Clay	Clay	Clay Loam	Clay Loam	Clay Loam
Gravel > 2 mm fraction	% of whole sample	** Inhouse S30	<0.1	4.2	1.4	1.2	5.1	10.2
Sand > 20 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	38.4	42.3	48.1	47.8	40.6
Silt 2–20 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	15.0	18.0	18.2	17.4	24.9
Clay < 2 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	46.6	39.8	33.7	34.9	34.4

Client Sample ID:				WN241915-16	WN241915-17	WN241915-18	WN241915-19	WN241915-20
Your Client:				NSW DPIRD	NSW DPIRD	NSW DPIRD	NSW DPIRD	NSW DPIRD
EAL Sample ID:				E24-00-1237-0016	E24-00-1237-0017	E24-00-1237-0018	E24-00-1237-0019	E24-00-1237-0020
Parameter	Unit	Method Reference	LOR	---	---	---	---	---
Moisture Content	%	Inhouse S2 (105°C)	<0.1	12.0	15.7	8.8	11.2	10.2
Texture (ISSS Classification)	---	** Inhouse S30	---	Clay	Silty Clay Loam	Silty Clay Loam	Clay	Silty Clay Loam
Gravel > 2 mm fraction	% of whole sample	** Inhouse S30	<0.1	2.4	3.5	11.1	1.5	6.4
Sand > 20 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	39.7	31.0	27.3	50.8	37.2
Silt 2–20 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	21.4	32.9	34.4	14.0	33.0
Clay < 2 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	38.9	36.1	38.3	35.2	29.8

Certificate of Analysis

Request ID: EAL/E24-00-1237 Report ID: E24-00-1237_RCOAP1_1 Issue date: 28 November 2024

Client Sample ID:				WN241915-21	WN241915-22	WN241915-23
Your Client:				NSW DPIRD	NSW DPIRD	NSW DPIRD
EAL Sample ID:				E24-00-1237-0021	E24-00-1237-0022	E24-00-1237-0023
Parameter	Unit	Method Reference	LOR	---	---	---
Moisture Content	%	Inhouse S2 (105°C)	<0.1	12.0	8.5	7.1
Texture (ISSS Classification)	---	** Inhouse S30	---	Clay Loam	Silty Loam	Silty Loam
Gravel > 2 mm fraction	% of whole sample	** Inhouse S30	<0.1	3.5	6.7	7.9
Sand > 20 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	58.9	52.5	48.9
Silt 2–20 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	12.6	28.8	31.0
Clay < 2 µm fraction	% < 2 mm fraction	** Inhouse S30	<0.1	28.5	18.7	20.2

Notes:

- All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (available on request or at scu.edu.au/eal).
- Analysis conducted between sample arrival date and reporting date.
- This report is not to be reproduced except in full.
- Results only relate to the item tested.

Appendix D

2024 Walkover Audit Photographs



Photo 1 – Poor ground cover establishment in Zone 8 Class IV/V pasture area



Photo 2 – Severe Turnip Weed infestations in Zone 8 Class IV/V pasture area



Photo 3a – Example of good tree establishment in seeded area in Zone 7



Photo 3b – Example of good tubestock survival and growth rates in Zone 2



Photo 4 – Example of unsuccessful tree revegetation in Zone 2



Photo 5 – Localised bare patch in Zone 2



Photo 6 – Severe scour erosion in drain in Zone 6



Photo 7 – Moderate scour erosion in drain in Zone 2



Photo 8 – Breached contour bank in Zone 1



Photo 9 – Example of stable and vegetated drop structure



Photo 10 – Repaired contour bank in Zone 5



Photo 11 – Excessive topsoil application rates in Zone 6



Photo 12 – example of gully erosion on slope in Zone 6



Photo 13 – Example of superficial rill erosion in Zone 2



Photo 14 – Slight head cut erosion in Zone 2 (visibility hindered by thick vegetation)



Photo 15 – Typical ground cover condition dominated by invasive grasses



Photo 16 – Severe Golden Wreath Wattle infestation in Zone 3



Photo 17 – High densities of African Boxthorns on contour bank in Zone 2



Photo 18 – Example of Galenia infestation in Zone 5



Photo 19 – Localised control of African Boxthorns in Zone X



Photo 20 – Examples of impacts from hares on young seedling



Photo 2la – Good incorporation of log piles in Zone 7



Photo 2lb – Good incorporation of log piles in Zone 8



Photo 22 – Poor use of large surface rocks in Zone 8



Photo 23 – Translocation of Tiger Orchid specimens





END OF REPORT



Appendix I

Summary of Cumulative Elevated PM_{10} Monitoring Results and Bengalla Increment

APPENDIX I

Summary of Cumulative Elevated Dust Monitoring Results and Bengalla Increment

Date of elevated result	Result ($\mu\text{g}/\text{m}^3$)	Monitor	Description
24 HOUR EXCEEDANCES			
05 February 2024	51.2	PM ₁₀ -1	BMC engaged Todoroski Air Sciences (TAS) to investigate the elevated PM ₁₀ levels recorded at PM ₁₀ -1. Based on the prevailing wind directions it was estimated that Bengalla's operations contributed 7.8 $\mu\text{g}/\text{m}^3$ to the elevated reading at PM ₁₀ -1. BMC provided DPIE with the investigation report and a summary of operations undertaken at Bengalla on the day.
12 March 2024	53.5	PM ₁₀ -3	BMC engaged TAS to investigate the elevated PM ₁₀ levels recorded at PM ₁₀ -3. Based on the prevailing wind directions it is estimated that Bengalla's operations contributed 20.3 $\mu\text{g}/\text{m}^3$ to the elevated reading at PM ₁₀ -3. BMC provided DPE with the investigation report and a summary of operations undertaken at Bengalla on the day.
12 December 2024	61.2	PM ₁₀ -3	BMC engaged TAS to investigate the elevated PM ₁₀ levels recorded at PM ₁₀ -3. Based on the prevailing wind directions it is estimated that Bengalla's operations contributed 15.6 $\mu\text{g}/\text{m}^3$ to the elevated reading at PM ₁₀ -3. BMC provided DPIE with the investigation report and a summary of operations undertaken at Bengalla on the day.

Appendix J

Non- Aboriginal Heritage Sites

Bengalla Mining Company Non Aboriginal Heritage Sites

Keys Family Cemetery



Stockyards



Old Bengalla



House Site 1



House Site 2



Blunts Butter Factory



Bengalla Homestead



External Views



Main homestead, northern aspect



Internal views of fire places



Example of brick and mortar repairs needed



Garden Shed



Out building



Book Keeper's Cottage



Images of internal repairs of book keeper's cottage

Overdene Homestead



External view



External view of exposed verandah area





Internal views of Overdene Cottage

Appendix K

2024 Independent Environmental Audit Actions

INDEPENDENT ENVIRONMENTAL AUDIT FINDINGS - BENGALLA MINING COMPANY PTY LIMITED (BMC) RESPONSE

Date: 25 August 2023

Identified Non-Compliances and Recommendations

Non-Compliances identified against SSD-5170 have been summarised in **Table 1** below including the independent audit finding, recommendation, and BMC response.

Table 1 Non-compliances SSD-5170

Condition Ref	Date	Requirement	Independent Audit Finding	Recommendation
S2 C1	2022	In addition to meeting the specific performance measures and criteria established under this consent, the Applicant must implement all reasonable and feasible measures to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment that may result from the construction and operation of the development and any rehabilitation required under this consent.	BMC implemented some reasonable and feasible measures to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment that may result from the construction and operation of the development and any rehabilitation required under this consent during the audit period. However, there were some identified non-compliances and opportunities for improvement regarding management of air quality/dust impacts, rehabilitation, and surface water. See non-compliances listed on this checklist and throughout the audit report.	Follow recommendations provided throughout this checklist and the audit report to remediate non-compliances as soon as possible.
Response this reporting period: BMC will continue to implement management plans approved under SSD-5170.				
Date: Ongoing.				
S2 C2	2022	The Applicant must: a. carry out the development generally in accordance with the EIS, SEE (Mod 1), SEE (Mod 2), SEE (Mod 3) and SEE (Mod 4); and b. comply with the conditions of this consent and the Development Layout. Note: The Development Layout is shown in Appendix 2.	BMC was observed to be carrying out the development in general accordance with the EIS and Mods during the audit period. However, the auditor's report a number of non-compliances against SSD5170 including: - S2C1 - S3C12 - S3C19 - S3C23 - S3C28 - S3C45	Follow recommendations provided throughout this checklist and the audit report to remediate non-compliances as soon as possible.

Condition Ref	Date	Requirement	Independent Audit Finding	Recommendation
			- S3C46 -S5C7A -S5C10 And therefore, this condition.	
Response this reporting period: BMC will continue to implement management plans approved under SSD-5170.				
Date: Ongoing.				
S3 C12	2020	Property Investigations If the owner of any privately-owned land claims that buildings and/or structures on his/her land have been damaged as a result of blasting on the site, then within 2 months of receiving this claim the Applicant must: - commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to investigate the claim; and - give the landowner a copy of the property investigation report. If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Applicant must repair the damage to the satisfaction of the Secretary. If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Secretary for resolution.	Warning Letter dated 22 October 2020 issued by DPIE regarding an alleged breach of section 4.2 of the EPA Act involving failure to comply with Schedule 3, Condition 12 of SSD-5170. This condition relevantly requires a property investigation to be commissioned within 2 months of receiving a claim by the owner of privately-owned land that buildings and/or structures have been damaged as a result of blasting on site. On 3 June 2020, an owner of privately-owned land in the vicinity of Bengalla Mine requested a property investigation. DPIE determined that the required response was provided after the 2-month timeframe (on 14 August 2020). A suitably qualified, experienced and independent expert was commissioned to complete the property investigation. The report concluded that damage to buildings and/or structures was not attributable to blasting at Bengalla Mine. No other property investigations were required during the audit period.	In future, make further effort to respond to any requests for property investigations within the required 2-month timeframe.
Response this reporting period: BMC will respond within SSD-5170 time requirement or seek an extension of time from the Department of Planning and Environment (DPE). No requests received during 2023.				
Date: Ongoing.				
S3 C23	2022	Water Pollution Unless an EPL or the EPA authorises otherwise, the Applicant must comply with section 120 of the POEO Act and the Protection	Incident on 16 August 2022, where elevated TSS discharged during authorised HRSTS event, and an incident on the 6-7 July 2022 when the hourly volume discharge limit was exceeded.	Ensure evidence of EPA notification and official Caution letter to close out the non-compliance are included in the Independent Environmental Audit Report.

Condition Ref	Date	Requirement	Independent Audit Finding	Recommendation
		of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002.	During the Reporting Period BMC notified the EPA of a potential breach of Conditions L1 and E1.3 of EPL 6538 regarding hourly volume discharge limits under the Hunter River Salinity Trading Scheme (HRSTS) on 6-7 July 2022.	Ensure desilting of DW1 is undertaken. BMC has taken steps to monitor the river registers for the entirety of Block periods. EPA has closed out investigation.

Response this reporting period: DW1 dam desilting completed.

Date: Completed.

S3 C28	2022	Long Term Security of Offsets Within 2 years of the commencement of development under this consent, unless otherwise agreed with the Secretary, the Applicant must make suitable arrangements to provide appropriate long-term security for the land within the Biodiversity Offset Strategy identified in Table 13 through a Biobanking Agreement under the Threatened Species Conservation Act 1995 (or an alternative mechanism agreed with OEH), to the satisfaction of the Secretary.	Taken from 2022 Annual Review: DPE granted an extension to 30 June 2022. BMC corresponded with relevant NSW government departments during 2022 about this matter. Following that correspondence, BMC is taking steps to progress Biodiversity Stewardship Agreements. In the meantime, offset areas remain owned by BJV and managed by BMC in accordance with the approved BOMP. BMC provided evidence of correspondence with BCT regarding requests for extension on this condition. A letter dated 23 December 2022 showed BMC had still not received a response from the BCT from their previous letter dated 26 September 2022. The letter requested an extension until 30 June 2023. BMC also supplied a number of Progress Reports they have sent to DPIE within the audit period, noting a number of complex issues had been identified, including dedication of the properties to the National Estate, Biodiversity Stewardship Agreement or alternate mechanism and environmental targets and measures.	It is noted that the arrangement of a solution for long term security of offsets is complex and Bengalla is making efforts to determine an appropriate long-term mechanism for security. At the time of inspection BMC was still exploring options and corresponding with BCT about the issue.
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Response this reporting period: BMC is continuing to consult with the DPE and to progress the establishment of the long term security.

Date: Ongoing

S3 C43	2022	The Applicant must: a. implement all reasonable and feasible measures to minimise the waste (including coal reject) generated by the development;	Of all non-mineral waste generated by the development in the audit period, an average of 77% per year was recycled according to the annual reviews for the audit period.	Implement further staff training to raise awareness around waste management, specifically waste sorting and storage on site.
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Condition Ref	Date	Requirement	Independent Audit Finding	Recommendation
		b. ensure that the waste generated by the development is appropriately stored, handled and disposed of; c. manage on-site sewage treatment and disposal in accordance with the requirements of Council; and d. monitor and report on effectiveness of the waste minimisation and management measures each calendar year, to the satisfaction of the Secretary.	Auditors sighted BMC's 'PRO-0069 Tipping and Dumping Materials' as well as 'PORO-0459 ARD and Mineral Waste Management' which were deemed to lay adequate framework for waste management procedures. Auditors also sighted Bengalla WWTP certification 2022 dated 28 October 2022 by SLR. The document confirmed on-site sewage management was adequate and infrastructure was well maintained. BMC also reuses some waste streams such as intermediate bulk containers, according to the yearly Annual Reviews. Onsite sewage treatment was observed to be effective. BMC reports on the effectiveness of waste minimisation yearly in the Annual Reviews which are available on the New Hope Group website. The effectiveness of waste minimisation is monitored throughout the year and reported in Annual Reviews. However, it was noted during site inspection that some waste was not being appropriately stored, with lids missing from a number of waste storage bins and contamination present in some bins, such as the oily rags only bin.	
Response this reporting period: BMC reviewed the PORO-0459 ARD and Mineral Waste Management plan in March 2024. BMC also conducted targeted training across all staff members as part of planned staff engagement sessions. In these sessions waste observations as detailed in the audit and waste allocation expectations across BMC were communicated. The training occurred in February 2024 to align with already scheduled whole of site engagement sessions.				
S3 C45	2022	Progressive Rehabilitation The Applicant must carry out rehabilitation progressively, that is, as soon as reasonably practicable following disturbance (particularly on the face of emplacements that are visible off-site). Interim stabilisation measures must be implemented where reasonable and feasible to control dust emissions in disturbed areas that are not active, and which are not ready for final rehabilitation.	While the majority of the site fulfills this condition and is considered either active mining area or undergoing the stages of rehabilitation. There is an area on the northern face of the overburden emplacement area which has not been part of active mining for approximately 10 years and has not undergone any form of temporary or permanent rehabilitation. The site is visible from Wybong Road. There is no evidence that this area was included in the forward work plan. This site was raised as an observation in the previous	Ensure plans are progressed for rehabilitation of the northern face and appropriate rehabilitation commences as soon as reasonably possible.

Condition Ref	Date	Requirement	Independent Audit Finding	Recommendation
		Note: It is accepted that parts of the site that are progressively rehabilitated may be subject to further disturbance in future.	audit. It is understood that over the years the site has developed a surface armouring and currently may not contribute significantly to dust generation from the site. It is also noted that across Wybong Road is current active mining from Mt Pleasant mine and therefore may not be considered a high visual impact area relative to the surrounds. In discussions with Bengalla representatives it was noted that there is a plan for the Northern Area to be designed as a geomorphic landform which will require approval as a change to the final landform.	
Response this reporting period: BMC has completed rehabilitation according to the Forward Program and Rehabilitation Management Plan. BMC are preparing an application to modify SSD-5170 that modify the final landform which will meet the rehabilitation objectives on the area identified in the audit adjacent to Wybong Road. Date: BMC anticipate lodging a modification application in the 2024 reporting period In the 2024 reporting period, BMC were completing the Modification Report for lodgement in 2025.				
S3 C46	2021	Rehabilitation Management Plan The Applicant must prepare a Rehabilitation Management Plan for the development to the satisfaction of the DRG. This plan must: e. be submitted to the DRG for approval within 6 months of the date of this consent; f. be prepared in consultation with the Department, DoI, OEH, Council and the CCC; g. be prepared in accordance with relevant DRG guidelines; h. describe how the rehabilitation of the site would be integrated with the implementation of the biodiversity offset strategy; i. include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the site, including over the long-term following completion of mining operations, and triggering remedial action (if necessary); j. describe the design specifications and measures that would be implemented to	Topsoil Management and Rehabilitation under MOP Official Caution dated 15 May 2020 issued by the Resources Regulator regarding an alleged failure to comply with mining lease conditions requiring compliance with an approved MOP (topsoil management procedure and progressive rehabilitation schedule for 2017 and 2018). Following a site inspection on 29 August 2019, the Resources Regulator determined that BMC did not comply with the MOP as follows: 1. Failure to fulfil commitments with respect to topsoil management procedure as referenced in Section 2.3.3.6 (Topsoil Stockpiles) of the approved MOP (including topsoil stockpile size, inactive stockpile management, prevention of sediment water runoff leaving site, weed control management for topsoil stockpiles, topsoil storage processes and maintaining an inventory of available topsoil). 2. Failure to comply with the progressive rehabilitation schedule for 2017 and 2018 in line with commitments made in Table 27 of the approved MOP.	Corrective actions have been taken by BMC. No further action required.

Condition Ref	Date	Requirement	Independent Audit Finding	Recommendation
		ensure compliance with the relevant conditions of this consent, and address all aspects of rehabilitation including mine closure, final landform including final voids, and final land use; k. include interim rehabilitation where necessary to minimise the area exposed for dust generation; l. include a research program that seeks to improve the understanding and application of rehabilitation techniques and methods in the Hunter Valley; m. include a schedule for establishment of native vegetation corridors and habitat linkages across the site; n. include a landscape management plan for the proposed Bengalla Link Road realignment; o. include a plan for the reinstatement of Dry Creek including: • detailed design specifications for the reinstatement of the creek; • a schedule of works describing how the reinstatement work would be staged and integrated with mining operations and the final landform; • a revegetation program; • hydrological, ecological and geomorphic performance and completion criteria for the reinstated creek based on the assessment of baseline conditions; and • a program to monitor, maintain and/or improve the hydrological and ecological function, quality and geomorphic stability of the reinstated creek; p. include a program to monitor, independently audit and report on the effectiveness of the measures, and progress against the detailed	BMC has taken corrective action regarding the identified matters in accordance with the requirements of notices issued by the Resources Regulator under section 240 of the Mining Act (NTCE0003914, NTCE0003917 and NTCE0003919). In December 2021, BMC notified the NSW Resources Regulator (RR) that proposed installation of High-Density Woody Vegetation over previously rehabilitated lands would not be fully completed during 2021 due to difficult meteorological and ground conditions.	

Condition Ref	Date	Requirement	Independent Audit Finding	Recommendation
		performance and completion criteria; and q. build to the maximum extent practicable on other management plans required under this consent. The Applicant must implement the management plan as approved by the Secretary.		
Response this reporting period: BMC will continue to implement the Rehabilitation Management Plan.				
Date: Completed				

1.1 Summary of Audit Recommendations

Table 2 below outlines the general recommendations identified during the audit. The recommendations detailed below are based around continuous improvement opportunities identified during the audit and do not all represent immediate non-compliance issues. BMC has provided a response to the recommendations.

Table 2 Summary of Recommendations

Condition Ref	Requirement	Independent Audit Finding	Recommendation	BMC Response
S2C1	In addition to meeting the specific performance measures and criteria established under this consent, the Applicant must implement all reasonable and feasible measures to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment that may result from the construction and operation of the development and any rehabilitation required under this consent.	BMC implemented some reasonable and feasible measures to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment that may result from the construction and operation of the development and any rehabilitation required under this consent during the audit period. However, there were some identified non-compliances and opportunities for improvement regarding management of air quality/dust impacts, rehabilitation and surface water. See non-compliances listed on this checklist and throughout the audit report.	Follow recommendations provided throughout this checklist and the audit report to remediate non-compliances as soon as possible.	BMC will continue to implement management plans approved under SSD-5170. Date: Ongoing.
S2C2	The Applicant must: a. carry out the development generally in accordance with the EIS, SEE (Mod 1), SEE (Mod 2), SEE (Mod 3) and SEE (Mod 4); and b. comply with the conditions of this consent and the Development Layout. Note: The Development Layout is shown in Appendix 2.	BMC was observed to be carrying out the development in general accordance with the EIS and Mods during the audit period. Auditors report a number of non-compliances against SSD5170 including: - S2C1 - S3C12 - S3C19 - S3C20* - S3C23 - S3C28* - S3C45 - S3C46* - S5C7A - S5C10 And therefore, this condition.	Follow recommendations provided throughout this checklist and the audit report to remediate non-compliances as soon as possible.	BMC will continue to implement management plans approved under SSD-5170. Date: Ongoing.
S3C12	Property Investigations If the owner of any privately-owned land claims that buildings and/or structures on his/her land have been	Warning Letter dated 22 October 2020 issued by DPIE regarding an alleged breach of section 4.2 of the EPA Act involving failure to comply with Schedule 3, Condition 12 of SSD-5170.	Ensure that future requests for property investigations occur within the required 2-month timeframe.	BMC will respond within SSD-5170 time requirement or seek an extension of time from

Condition Ref	Requirement	Independent Audit Finding	Recommendation	BMC Response
	damaged as a result of blasting on the site, then within 2 months of receiving this claim the Applicant must: - commission a suitably qualified, experienced and independent person, whose appointment is acceptable to both parties to investigate the claim; and - give the landowner a copy of the property investigation report. If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Applicant must repair the damage to the satisfaction of the Secretary. If there is a dispute over the selection of the suitably qualified, experienced and independent person, or the Applicant or the landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Secretary for resolution.	This condition requires a property investigation to be commissioned within 2 months of receiving a claim by the owner of privately-owned land that buildings and/or structures have been damaged as a result of blasting on site. On 3 June 2020, an owner of privately-owned land in the vicinity of Bengalla Mine requested a property investigation. DPIE determined that the required response was provided after the 2-month timeframe (on 14 August 2020). A suitably qualified, experienced and independent expert was commissioned to complete the property investigation. The report concluded that damage to buildings and/or structures was not attributable to blasting at Bengalla Mine. No other property investigations were required during the audit period.		the Department of Planning and Environment (DPE). Date: Ongoing
S3C19	Operating Conditions The Applicant must: - implement all reasonable and feasible measures to minimise the: - odour, fume and dust emissions of the development; and - release of greenhouse gas emissions from the site; minimise any visible air pollution generated by the development; minimise the surface disturbance of the site; operate a comprehensive air quality management system that uses a combination of predictive meteorological forecasting, predictive air dispersion modelling and real-time air quality monitoring data to guide the day-to-day planning of mining operations and implementation of both proactive and reactive air quality mitigation measures to ensure compliance with the relevant conditions of this consent;	BMC was observed to be employing some dust mitigation measures during the site inspection, such as water truck spraying of tracks in the pit. BMC's air quality monitoring system was observed to be comprehensive and adequate, using a combination of eight real time air quality monitors, nine high volume air samplers, 27 dust deposition gauges, as well as a meteorological station and inversion tower. The air quality monitoring system feeds into managerial decision and risk assessments, such as blasting risk assessments, to minimise visible air pollution and surface disturbance on site. Blasting events, etc would not be undertaken during adverse meteorological conditions according to interview with Environment employee Ben Simpson. However, during site inspection it was observed that dust mitigation measures were not in place on BMC's ROM hopper, contradictory to part a) of S3C19, as the applicant was not implementing all feasible measures to minimise dust emissions.	Review the ROM hopper dust suppression system and ensure it is operating effectively to mitigate dust emissions.	BMC will review the ROM hopper dust suppression system and ensure it is operating effectively to mitigate dust emissions. Upon completion of the review if works are required those works will be commissioned. Date Review by 31 December 2023. Any works as soon as reasonable and feasible after the review.

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	minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note d to Tables 6-8 above); implement all reasonable and feasible measures to co-ordinate the air quality management at the Bengalla mine with the air quality management at the Mt Arthur and Mount Pleasant mines to minimise any cumulative air quality impacts; and monitor and report on compliance with the relevant air quality conditions in this consent, to the satisfaction of the Secretary.			
S3C23	Water Pollution Unless an EPL or the EPA authorises otherwise, the Applicant must comply with section 120 of the POEO Act and the Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002.	Incident on 16 August 2022, where elevated TSS discharged during authorised HRSTS event, and an incident on the 6-7 July 2022 when the hourly volume discharge limit was exceeded. During the Reporting Period BMC notified the EPA of a potential breach of Conditions L1 and E1.3 of EPL 6538 regarding hourly volume discharge limits under the Hunter River Salinity Trading Scheme (HRSTS) on 6-7 July 2022.	The recommendations from the surface water specialist are as follows: - Ensure evidence of EPA notification and official Caution letter to close out the noncompliance are included in the Independent Environmental Audit Report. - Ensure desilting of DW1 is undertaken. BMC has taken steps to monitor the river registers for the entirety of Block periods. EPA has closed out investigation. BMC provided the EPA notification and official caution letter to auditors	BMC has commenced desilting of certain dams at Bengalla Mine that will include DW1. Date: As required.
S3C28	Long Term Security of Offsets Within 2 years of the commencement of development under this consent, unless otherwise agreed with the Secretary, the Applicant must make suitable arrangements to provide appropriate long-term security for the land within the Biodiversity Offset Strategy identified in Table 13 through a Biobanking Agreement under the Threatened Species Conservation Act 1995 (or an alternative mechanism agreed with OEH), to the satisfaction of the Secretary.	Taken from 2022 Annual Review: DPE granted an extension to 30 June 2022. BMC corresponded with relevant NSW government departments during 2022 about this matter. Following that correspondence, BMC is taking steps to progress Biodiversity Stewardship Agreements. In the meantime, offset areas remain owned by BJV and managed by BMC in accordance with the approved BOMP .	It is noted that the arrangement of a solution for long term security of offsets is complex and Bengalla is making efforts to determine an appropriate long-term mechanism for security. At the time of inspection BMC was still exploring options and	BMC is continuing to consult with the DPE and to progress the establishment of the long term security. Date: Ongoing.

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		BMC provided evidence of correspondence with BCT regarding requests for extension on this condition. A letter dated 23 December 2022 showed BMC had still not received a response from the BCT from their previous letter dated 26 September 2022. The letter requested an extension until 30 June 2023 .BMC also supplied a number of Progress Reports they have sent to the Department within the audit period, noting a number of complex issues had been identified, including dedication of the properties to the National Estate, Biodiversity Stewardship Agreement or alternate mechanism and environmental targets and measures.	corresponding with BCT about the issue.	
S3C43	The Applicant must: - implement all reasonable and feasible measures to minimise the waste (including coal reject) generated by the development; - ensure that the waste generated by the development is appropriately stored, handled and disposed of; - manage on-site sewage treatment and disposal in accordance with the requirements of Council; and - monitor and report on effectiveness of the waste minimisation and management measures each calendar year, to the satisfaction of the Secretary.	Of all non-mineral waste generated by the development in the audit period, an average of 77% per year was recycled according to the annual reviews for the audit period. Auditors sighted BMC's 'PRO-0069 Tipping and Dumping Materials' as well as 'PORO-0459 ARD and Mineral Waste Management' which were deemed to lay adequate framework for waste management procedures. Auditors also sighted Bengalla WWTP certification 2022 dated 28 October 2022 by SLR. The document confirmed on-site sewage management was adequate and infrastructure was well maintained. BMC also reuses some waste streams such as intermediate bulk containers, according to the yearly Annual Reviews. Onsite sewage treatment was observed to be effective. BMC reports on the effectiveness of waste minimisation yearly in the Annual Reviews which are available on the New Hope Group website. The effectiveness of waste minimisation is monitored throughout the year and reported in Annual Reviews. However, it was noted during site inspection that some waste was not being appropriately stored, with lids missing from a number of waste	Ensure that regular inspections consider maintenance of waste segregation, and that staff training is undertaken to ensure awareness of waste management, specifically waste segregation and storage on site.	BMC will review relevant waste procedures and conduct training with relevant staff. Date: Review of procedures and training to be completed by 31 December 2023.

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S3C45	Progressive Rehabilitation The Applicant must carry out rehabilitation progressively, that is, as soon as reasonably practicable following disturbance (particularly on the face of emplacements that are visible off-site). Interim stabilisation measures must be implemented where reasonable and feasible to control dust emissions in disturbed areas that are not active, and which are not ready for final rehabilitation. Note: It is accepted that parts of the site that are progressively rehabilitated may be subject to further disturbance in future.	storage bins and contamination present in some bins, such as the oily rags only bin. While the majority of the site fulfills this condition and is considered either active mining area or undergoing the stages of rehabilitation. There is an area on the northern face of the overburden emplacement area which has not been part of active mining for approximately 10 years and has not undergone any form of temporary or permanent rehabilitation. The site is visible from Wybong Road. There is no evidence that this area was included in the forward work plan. This site was raised as an observation in the previous audit. It is understood that over the years the site has developed a surface armouring and currently may not contribute significantly to dust generation from the site. It is also noted that across Wybong Road is current active mining from Mt Pleasant mine and therefore may not be considered a high visual impact area relative to the surrounds. In discussions with Bengalla representatives it was noted that there is a plan for the Northern Area to be designed as a geomorphic landform which will require approval as a change to the final landform.	Ensure plans are progressed for rehabilitation of the northern face and appropriate rehabilitation commences as soon as reasonably possible.	BMC has completed rehabilitation according to the Mining Operations Plan and now the Forward Program and Rehabilitation Management Plan. BMC are preparing an application to modify SSD-5170 that will likely include installation of geomorphic features on the northern face adjacent to Wybong Road. Date: BMC anticipate lodging a modification application around end of first quarter 2024.
S3C46	Rehabilitation Management Plan The Applicant must prepare a Rehabilitation Management Plan for the development to the satisfaction of the DRG. This plan must: - be submitted to the DRG for approval within 6 months of the date of this consent; - be prepared in consultation with the Department, DoI, OEH, Council and the CCC; - be prepared in accordance with relevant DRG guidelines; - describe how the rehabilitation of the site would be integrated with the implementation of the biodiversity offset strategy; - include detailed performance and completion criteria for evaluating the performance of the	Topsoil Management and Rehabilitation under MOP Official Caution dated 15 May 2020 issued by the Resources Regulator regarding an alleged failure to comply with mining lease conditions requiring compliance with an approved MOP (topsoil management procedure and progressive rehabilitation schedule for 2017 and 2018). Following a site inspection on 29 August 2019, the Resources Regulator determined that BMC did not comply with the MOP as follows: Failure to fulfil commitments with respect to topsoil management procedure as referenced in Section 2.3.3.6 (Topsoil Stockpiles) of the approved MOP (including topsoil stockpile size,	Corrective actions have been taken by BMC. No further action required.	BMC will continue to implement the Rehabilitation Management Plan. Date: Ongoing.

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	rehabilitation of the site, including over the long-term following completion of mining operations, and triggering remedial action (if necessary); f. describe the design specifications and measures that would be implemented to ensure compliance with the relevant conditions of this consent, and address all aspects of rehabilitation including mine closure, final landform including final voids, and final land use; g. include interim rehabilitation where necessary to minimise the area exposed for dust generation; h. include a research program that seeks to improve the understanding and application of rehabilitation techniques and methods in the Hunter Valley; i. include a schedule for establishment of native vegetation corridors and habitat linkages across the site; j. include a landscape management plan for the proposed Bengalla Link Road realignment; k. include a plan for the reinstatement of Dry Creek including: • detailed design specifications for the reinstatement of the creek; • a schedule of works describing how the reinstatement work would be staged and integrated with mining operations and the final landform; • a revegetation program; • hydrological, ecological and geomorphic performance and completion criteria for the reinstated creek based on the assessment of baseline conditions; and • a program to monitor, maintain and/or improve the hydrological and ecological function, quality and geomorphic stability of the reinstated creek; l. include a program to monitor, independently audit and report on the effectiveness of the measures, and progress against the detailed performance and completion criteria; and	inactive stockpile management, prevention of sediment water runoff leaving site, weed control management for topsoil stockpiles, topsoil storage processes and maintaining an inventory of available topsoil). 2. Failure to comply with the progressive rehabilitation schedule for 2017 and 2018 in line with commitments made in Table 27 of the approved MOP. BMC has taken corrective action regarding the identified matters in accordance with the requirements of notices issued by the Resources Regulator under section 240 of the Mining Act (NTCE0003914, NTCE0003917 and NTCE0003919). In December 2021, BMC notified the NSW Resources Regulator (RR) that proposed installation of High-Density Woody Vegetation over previously rehabilitated lands would not be fully completed during 2021 due to difficult meteorological and ground conditions.		

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	m. build to the maximum extent practicable on other management plans required under this consent. The Applicant must implement the management plan as approved by the Secretary.			