



BENGALLA MINE ANNUAL REVIEW 2022

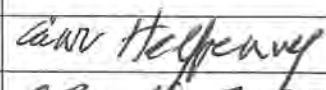


Prepared by:

BENGALLA MINING COMPANY PTY LIMITED
LOCKED BAG 5
MUSWELLBROOK NSW 2333

April 2023

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)
MOP start date	8 November 2017 (Approval date)
MOP end date ¹	2 July 2022
Annual Review start date	1 January 2022
Annual Review end date	31 December 2022
<p>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 2022 to 31 December 2022 (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.</p> <p>Note:</p> <p>a) <i>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.</i></p> <p>b) <i>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).</i></p>	
Name of authorised reporting officer	Cam Halfpenny
Title of authorised reporting officer	General Manager
Signature of authorised reporting officer	
Date	28-4-2023

¹ MOP not required from 2 July 2022 – replaced by requirement for Rehabilitation Management Plan (RMP) under statutory mining lease conditions in Part 2 of Schedule 8 of Mining Regulation 2016 NSW (the Mining Regulation). A new RMP was prepared by 1 August 2022 as required under the Regulation.

TABLE OF CONTENTS

1	STATEMENT OF COMPLIANCE	11
1.1	INTRODUCTION.....	11
2	INTRODUCTION	16
2.1	BACKGROUND	16
2.2	DOCUMENT PURPOSE.....	17
2.3	BMC CONTACTS	19
3	APPROVALS	25
3.1	OVERVIEW.....	25
3.2	PENDING APPLICATIONS AT END OF REPORTING PERIOD.....	26
3.3	VARIATIONS	27
3.4	STATUS OF MANAGEMENT PLANS	27
4	OPERATIONS SUMMARY	29
4.1	MINING OPERATIONS.....	29
4.2	OTHER OPERATIONS.....	29
4.3	EMPLOYMENT AND OTHER DETAILS.....	30
4.4	NEXT REPORTING PERIOD	30
5	ACTION REQUIRED FROM PREVIOUS ANNUAL REVIEW	31
6	ENVIRONMENTAL MANAGEMENT AND PERFORMANCE	34
6.1	METEOROLOGY	34
6.2	NOISE	35
6.3	BLASTING	38
6.4	AIR QUALITY.....	43
6.5	SPONTANEOUS COMBUSTION	50
6.6	GREENHOUSE GAS	51
6.7	NON-MINERAL WASTE	54
6.8	MINERAL WASTE	55
6.9	ABORIGINAL ARCHAEOLOGY AND CULTURAL HERITAGE	56
6.10	NON-ABORIGINAL HERITAGE	57
6.11	BIODIVERSITY	68
6.12	WEEDS AND PEST MANAGEMENT	78
6.13	VISUAL AMENITY AND LIGHTING.....	91
6.14	EMERGENCY RESPONSE PREPAREDNESS	92
7	WATER MANAGEMENT	93

7.1	WATER BALANCE	93
7.2	SURFACE WATER	96
7.3	GROUNDWATER	99
8	REHABILITATION.....	102
8.1	REHABILITATION OBJECTIVES AND FINAL LAND USE	102
8.2	REHABILITATION MANAGEMENT.....	103
8.3	REHABILITATION MONITORING PROGRAM	106
9	COMMUNITY RELATIONS	109
9.1	COMMUNITY ENGAGEMENT	109
9.2	COMMUNITY CONTRIBUTIONS	109
9.3	COMMUNITY COMPLAINTS.....	111
10	INDEPENDENT ENVIRONMENTAL AUDIT	112
10.1	SSD-5170.....	112
10.2	DAMS SAFETY REGULATION 2019 AND MINING APPROVALS 1-3	112
11	INCIDENTS AND NON-COMPLIANCES	113
11.1	FURTHER INFORMATION ABOUT NON-COMPLIANCES.....	113
11.2	REPORTABLE INCIDENTS OR EXCEEDANCES.....	114
11.3	ACTIONS TO BE TAKEN TO PREVENT ENVIRONMENTAL INCIDENTS	116
12	ACTIVITIES PROPOSED IN THE NEXT REPORTING PERIOD	117

LIST OF TABLES

Table 1: Statement of Compliance	11
Table 2: Non-Compliance Risk Matrix.....	12
Table 3: Non- Compliances in the Reporting Period	12
Table 4: Development Consent and Mining Lease Requirements for Annual Review	17
Table 5: BMC Contacts	19
Table 6: Bengalla Approvals Summary	25
Table 7: Status of BMC Management Plans	27
Table 8: Production and Waste Summary.....	29
Table 9: Actions Required from 2021 Annual Review.....	31
Table 10: 2020-2022 Noise Trends.....	36
Table 11: Blast Monitoring Locations and Criteria.....	39
Table 12: Blast Performance Summary 2020-2022	40
Table 13: Summary of Deposited Dust Annual Average Monitoring Results	46
Table 14: Summary of Annual Average TSP Monitoring Results.....	47
Table 15: Summary of Annual Average PM ₁₀ Monitoring Results.....	47
Table 16: Greenhouse Gas Emission Reduction Research and Development Initiatives.....	51
Table 17: Energy Consumed and Produced FY 2020 to 2022.....	51
Table 18: GHG Emissions FY 2020 to 2022	52
Table 19: Summary of Scope 1 and Scope 2 GHG Emissions (CO ₂ -e t/yr)	52
Table 20: Non-mineral Waste Management.....	54
Table 21: Short Term Maintenance of the Bengalla and Overdene Homesteads 2022	59
Table 22: Assessment Against Performance Criteria.....	71
Table 23: Site Water Take 2022.....	93
Table 24: Site Water Balance 2022.....	93
Table 25: Discharge Events 2022	94
Table 26: Summary of Surface Water Monitoring Results (2020 – 2022).....	98
Table 27: Bengalla Rehabilitation Objectives (from SSD-5170 (as modified))	102
Table 28: Bengalla Rehabilitation Status Summary	104
Table 29: Bengalla Rehabilitation Monitoring Program Transects (2022).....	106
Table 30: Reportable Matters or Exceedances 2022.....	115
Table 31: Environmental Management Activities Proposed for 2023.....	117

LIST OF FIGURES

Figure 1: Regional Locality.....	20
Figure 2: Muswellbrook Locality	21
Figure 3: Approved Site Layout.....	22
Figure 4: Mining Leases	23
Figure 5: Environmental Monitoring Network	24
Figure 6: Noise Monitoring Network	37
Figure 7: Blast Monitoring Network	42
Figure 8: Air Quality Monitoring Locations	45
Figure 9: Biodiversity Offset Areas.....	70
Figure 10: Bengalla Weed Management Locations 2022	79
Figure 11: Black Mountain Weed Management Locations 2022.....	81
Figure 12: Kenalea (Echo) Weed Management Locations 2022.....	82
Figure 13: Kenalea Weed Management Locations 2022	83
Figure 14: Kenalea (Kenelput) Weed Management Locations 2022.....	84
Figure 15: 1080 Wild Dog Baiting Locations at Bengalla Mine	87
Figure 16: 1080 Wild Dog Bait Locations at Black Mountain Offset.....	88
Figure 17: 1080 Wild Dog Bait Locations at Kenalea Properties Offset.....	89
Figure 18: 1080 Wild Dog Bait Locations at Merriwa River Offset	90
Figure 19: Surface Water Monitoring Locations	97
Figure 20: Groundwater Monitoring Locations	101
Figure 21: Mining and Rehabilitation Status 2022.....	105
Figure 22: Environmental Complaints Received 2022	111

LIST OF APPENDICES

- Appendix A Meteorological Monitoring Summary
- Appendix B Noise Monitoring Summary
- Appendix C Blast Monitoring Summary
- Appendix D Air Quality Monitoring Summary
- Appendix E Annual Compliance Report for EPBC Approval 2012/6378
- Appendix F Surface Water Monitoring Summary
- Appendix G Annual Groundwater Monitoring Report 2022
- Appendix H Rehabilitation Monitoring Findings
- Appendix I Summary of Cumulative Elevated PM10 Monitoring Results and Bengalla Increment
- Appendix J Non-Aboriginal Heritage Sites
- Appendix K 2019 Independent Environmental Audit Actions

ACRONYMS

ACARP	Australian Coal Association Research Programme
ACHMP	Aboriginal Cultural Heritage Management Plan
AEISG	Australasian Explosive Industry Safety Group
AGE	Australasian Groundwater and Environmental Consultants Pty Limited
ANZECC	Australian and New Zealand Environment Conservation Council
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
BOMP	Biodiversity Offset Management Plan
BTOC	Below Top of Casing
CCC	Bengalla Community Consultative Committee
CDF	Community Development Fund
CER	Clean Energy Regulator
CHPP	Coal Handling Preparation Plant
CO2-e	Carbon Dioxide Equivalent
CST	Community Support Team
CW1	Clean Water Dam 1
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DoEE	Department of Environment and Energy
DoI - Water	NSW Department of Primary Industries – Lands and Water
DPE	NSW Department of Planning and Environment
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
GIS	Geographical Information System

GJ	Gigajoule
Ha	Hectare
HDWV	High Density Woody Vegetation
HHMP	Historic Heritage Management Plan
HRSTS	Hunter River Salinity Trading Scheme
HVAS	High Volume Air Sampler
IBC	Intermediate Bulk Container
IEA	Independent Environmental Audit
INP	Industrial Noise Policy (EPA,2000)
IR	Infrared
LETA	Low Emissions Technology Australia
LLS	NSW Local Land Services
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)
MOD4	SSD-5170 Modification 4
MOP	Bengalla Mine Mining Operations Plan 2017 - 2022
MSC	Muswellbrook Shire Council
Mt	Mega Tonnes
Mtpa	Mega Tonnes per annum
NGER	National Greenhouse and Energy Reporting
NMP	Noise Management Plan
NPfi	Noise Policy for Industry (EPA, 2017)
NPI	National Pollutant Inventory
NPWS	National Parks and Wildlife Services
NSW	New South Wales
OEA	Overburden Emplacement Area
Orica	Orica Australia Pty Limited
PIN	Penalty Infringement Notice
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
PPV	Peak Particle Velocity
RAP	Registered Aboriginal Party
Reporting Period	1 January 2021 - 31 December 2021
RFS	Rural Fire Service
RL	Relative Level
RMP	Rehabilitation Management Plan

RMS	NSW Roads and Maritime Services
ROM	Run of Mine
RR	NSW Resources Regulator
RTEMS	Real Time Environment Management System
Safeguard Mechanism	National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015 Cth
SDD	Stage Discharge Dam (Decommissioned)
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
SSD-5170 (as modified)	State Significant Development 5170
SWL	Standing Water Level
t	Tonnes
TDS	Total Dissolved Solids
TEOM	Tapered Element Oscillating Microbalance
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
VIMP	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 2022 – 31 December 2022 (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
Mining Lease (ML) 1397	Yes
ML 1450	Yes
ML 1469	Yes
ML 1711	Yes
ML 1728	Yes
ML 1729	Yes
ML 1796	Yes
MOP 2017-2022 (Amendment D)* Approved 6 December 2021**	See Note below
Rehabilitation Management Plan and Forward Program*** Prepared by 1 August 2022	See Note below
Environment Protection Biodiversity Conservation (EPBC) Approval 2012/6378	No

* Compliance with an approved MOP was a condition of BMC's mining leases until 2 July 2022.

** MOP not required from 2 July 2022 - replaced by requirement for Rehabilitation Management Plan (RMP) under statutory mining lease conditions in Part 2 of Schedule 8 of the Mining Regulation. A new RMP was prepared by 1 August 2022 as required under the Mining Regulation.

*** Statutory mining lease conditions in Part 2 of Schedule 8 of the Mining Regulation require the mining lease holder to implement the RMP and if the Forward Program specifies implementation timeframes, comply with those timeframes.

NOTE – During the Reporting Period, BMC transitioned from the MOP to the new RMP and Forward Program in accordance with the new regulatory requirements. The first version of the Forward Program was submitted to the RR on 1 August 2022. The reporting periods for BMC's mining leases were subsequently changed with approval of the RR and the second version of the Forward Program was submitted to the RR on 31 March 2023. Rehabilitation at Bengalla is undertaken in accordance with the current RMP and Forward Program.

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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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	Condition #	Condition Description (Summary)	Non-compliance Status*	Comment	Section described in this Annual Review
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	<p>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.</p> <p>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.</p> <p>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 is taking steps to progress Biodiversity Stewardship Agreements for the offset areas. In the meantime, the offset areas continued to be owned by the BJV and managed by BMC in accordance with the BOMP.</p>	See Section 11 for further comments

Approval	Condition #	Condition Description (Summary)	Non-compliance Status*	Comment	Section described in this Annual Review
				<p>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>.</p>	
	<p>Condition 6</p>	<p>Approval holder must undertake management and monitoring of water resources in accordance with NSW approval conditions 23 to 25</p>	<p>Non-compliant (Low Risk)</p>	<p>Condition 23 Requirement</p> <p>Schedule 3 Condition 23 of SSD-5170 (Condition 23) requires BMC to comply with section 120 of the <i>Protection of the Environment Operations Act 1990</i> NSW (POEO Act) and the <i>Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002</i> NSW (unless an EPL or the EPA authorises otherwise).</p> <p><u>Discharge 16 August 2022</u></p> <p>During the Reporting Period BMC notified DCCEEW, DPE and the NSW Environment Protection Authority (EPA) of a potential non-compliance relating to Condition 23. This involved an elevated Total Suspended Solids (TSS) concentration recorded for a discharge event on 16 August 2022.</p> <p>The matter was investigated, and a report provided to DCCEEW, DPE and EPA. The DPE and EPA subsequently issued further correspondence to BMC, to which BMC responded as requested.</p> <p>By letter dated 10 March 2023, the EPA advised BMC that it <i>“has reasonable grounds to believe that [BMC] committed an offence under section 64(1) of the [POEO Act] by the alleged non-compliance with EPL condition L2.1, by exceeding the concentration limits specified in condition L2.4, which occurred on 16 August 2022 ... the EPA has given consideration to this matter and in these circumstances ... considers it appropriate to issue [BMC] with this Official Caution for the alleged offence”</i>.</p> <p><u>Hourly Volume Discharge Limit 6-7 July 2022</u></p>	<p>See Section 11 for further comments</p>

Approval	Condition #	Condition Description (Summary)	Non-compliance Status*	Comment	Section described in this Annual Review
				<p>During the Reporting Period BMC notified 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.</p> <p>This arose from a revised HRSTS River Register that was issued by Water NSW at 23:41 on 6 July 2022 during a HRSTS discharge being performed at Bengalla. The HRSTS register provided for an unexpected change to the maximum permitted hourly discharge rate under the HRSTS. It resulted in a period of 3-4 hours where the discharge from Bengalla's licensed discharge point exceeded the maximum discharge rate calculated under Condition E1.3 of the EPL.</p> <p>The matter was investigated, and an expert report provided to the EPA. The report concluded the exceedance of the allowable discharge limit was negligible and unlikely to have any significant environmental consequence. BMC did not receive a response from the EPA to the report.</p>	
	Condition 13	Non-compliance with conditions of approval must be reported to DCCEEW within 2 business days	Administrative Non-Compliance	<p>On 23 August 2022 (following receipt of water monitoring results on 19 August 2022 with those results not being viewed by BMC staff until 22 August 2022 due to a Mine Infrastructure Area evacuation associated with blasting that occurred nearby on 19 August 2022), BMC notified DCCEEW of a potential non-compliance relating to Schedule 3 Condition 23 of SSD-5170 in respect of a discharge event that occurred on 16 August 2022 (see further comments above).</p> <p>On 7 September 2022, BMC notified DCCEEW of a non-compliance relating to Schedule 3 Condition 28 of SSD-5170 which requires provision of appropriate long-term security for the offset areas (see further comments above). This followed correspondence from DPE on 17 August 2022 advising that an extension of time to comply with Condition 28 would not be granted. As described above, BMC corresponded with the relevant NSW government departments during 2022 to determine the appropriate long-term mechanism for securing</p>	

Approval	Condition #	Condition Description (Summary)	Non-compliance Status*	Comment	Section described in this Annual Review
				<p>the offsets and Biodiversity Stewardship Agreements are being progressed.</p> <p>BMC will separately notify DCCEEW of the non-compliance with Condition 6 of the EPBC Approval which relates to hourly volume discharge limits under the HRSTS (relevant to Schedule 3 Condition 23 of SSD-5170) on 6-7 July 2022, which was identified in preparing this Annual Review.</p>	
SSD-5170	Schedule 3 Condition 23	Comply with s120 of the <i>Protection of the Environment Operations Act 1990 NSW</i> and the <i>Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002 NSW</i> (unless an EPL or the EPA authorises otherwise).	Non-compliance Low Risk	<p><u>Discharge 16 August 2022</u></p> <p>During the Reporting Period BMC notified DCCEEW, DPE and EPA of a potential non-compliance relating to Condition 23. This involved an elevated Total Suspended Solids (TSS) concentration recorded for a discharge event on 16 August 2022.</p> <p>The matter was investigated, and a report provided to DCCEEW, DPE and EPA. The DPE and EPA subsequently issued further correspondence to BMC, to which BMC responded as requested.</p> <p>By letter dated 10 March 2023, the EPA advised BMC that it <i>"has reasonable grounds to believe that [BMC] committed an offence under section 64(1) of the [POEO Act] by the alleged non-compliance with EPL condition L2.1, by exceeding the concentration limits specified in condition L2.4, which occurred on 16 August 2022 ... the EPA has given consideration to this matter and in these circumstances ... considers it appropriate to issue [BMC] with this Official Caution for the alleged offence"</i>.</p> <p><u>Hourly Volume Discharge Limit 6-7 July 2022</u></p> <p>During the Reporting Period BMC notified 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.</p> <p>This arose from a revised HRSTS River Register that was issued by Water NSW at 23:41 on 6 July 2022 during a HRSTS discharge being performed at Bengalla. The HRSTS register provided for an unexpected change to the maximum permitted hourly discharge rate under the HRSTS. It resulted</p>	See Section 11 for further comments

Approval	Condition #	Condition Description (Summary)	Non-compliance Status*	Comment	Section described in this Annual Review
				<p>in a period of 3-4 hours where the discharge from Bengalla's licensed discharge point exceeded the maximum discharge rate calculated under Condition E1.3 of the EPL.</p> <p>The matter was investigated, and an expert report provided to the EPA. The report concluded the exceedance of the allowable discharge limit was negligible and unlikely to have any significant environmental consequence. BMC did not receive a response from the EPA to the report.</p>	
	Schedule 3 Condition 28	Implementation for long term security for biodiversity offsets	Administrative non-compliance	<p>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.</p> <p>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.</p> <p>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 is taking steps to progress Biodiversity Stewardship Agreements for the offset areas. In the meantime, the offset areas continued to be owned by the BJV and managed by BMC in accordance with the BOMP.</p>	See Section 11 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) in December 2016 following the grant of SSD-5170.

On 3 March 2015, the Secretary of what is now the DPE, 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 (Mod 5 was approved in February 2023, after the end of the Reporting Period).

The approved Bengalla layout is shown on **Figure 3**, mining leases held by BMC are shown on **Figure 4** and an overview of the Bengalla environmental monitoring network is shown on **Figure 5**. The location of the approved Biodiversity Offset Areas in relation to Bengalla is shown on **Figure 9**.

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).

This Annual Review no longer functions as the Annual Environmental Management Report/Rehabilitation Report (AEMR) under conditions of BMC's mining leases. From 2 July 2022, the requirement for an AEMR was replaced by the requirement for an Annual Rehabilitation Report (ARR) under the statutory mining lease conditions in Part 2 of Schedule 8 of the Mining Regulation. On 31 March 2023, BMC submitted an ARR to the RR covering the period 27 June 2022 to 31 December 2022 as required by the RR. For completeness and consistency with the Guidelines, this Annual Review for the Reporting Period addresses the reporting requirements under mining lease conditions in **Table 4** that applied until 2 July 2022.

On 20 March 2023, the DPIE granted an extension of time in which to submit this Annual Review until 28 April 2023.

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

Document	Where Addressed
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 2, 4, 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: <ul style="list-style-type: none"> • 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
ML1450 and ML1469 (Condition 3) – until 2 July 2022	
1. Within 12 months of the commencement of mining operations and thereafter annually or at such other times as may be allowed by the Director-General, the lease holder must lodge an Annual Environmental Management Report (AEMR) (now referred to as the Annual Review) with the Director-General.	This document
2. The AEMR must be prepared in accordance with the Director-General's guidelines current at the time of reporting and contain a review and forecast of performance for the preceding and ensuing twelve months in terms of: <ol style="list-style-type: none"> a) the accepted Mining Operations Plan; b) development consent requirements and conditions; c) Environmental Protection Authority and Department of Land and Water Conservation licences and approvals; d) any other statutory environmental requirements; e) details of any variations to environmental approvals applicable to the lease area; and f) where relevant, progress towards final rehabilitation objectives. 	This document Sections 3, 4 and 8
3. After considering an AEMR the Director-General may, by notice in writing, direct the leaseholder to undertake operations, remedial actions or supplementary studies in the manner and within the period specified in the notice to ensure that operations on the lease area are conducted in accordance with sound mining and environmental practice.	-
4. The leaseholder shall, as and when directed by the Minister, cooperate with the Director-General to conduct and facilitate review of the AEMR involving other government agencies.	-
ML 1450 (Condition 7) – until 2 July 2022	
a) The lease holder shall each year once operations have commenced, submit for the Minister's approval an "Annual Environmental Management Report" relating to the operations of the leaseholder on the subject area.	This document
b) The date by which the Report must be submitted will be determined by the Minister after consulting with the lease holder.	
c) The Report shall comprise:	
i. a plan showing short, medium and long term mining plans;	Section 4

Document	Where Addressed
ii. a rehabilitation report (in respect of open cut operations) and/or a surface environmental management report (in respect of underground operations);	Section 8
iii. a review of performance in terms of Environment Protection Authority and Department of Water Resources licence and approval conditions (related to the Clean Air Act 1961, the Clean Waters Act 1970, the Noise Control Act 1975, the Environmentally Hazardous Chemical Act 1985, the Pollution Control Act 1970 and the Water Act 1912) applicable to the subject area;	Sections 6 to 8
iv. a review of performance in terms of Development Consent conditions for the subject area;	Sections 1 and 11 and Sections 6 to 8
v. a listing of any variations obtained to approvals applicable to the subject area during the previous year.	Section 3.3
MLs 1397, 1711, 1728, 1729 and 1796 (Condition 3(f)) – until 2 July 2022	
<p>The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must:</p> <ul style="list-style-type: none"> i. provide a detailed review of the progress of rehabilitation against the performance measures and criteria established in the approved MOP; ii. be submitted annually on the grant anniversary date (or at such other times as agreed by the Minister); and iii. be prepared in accordance with any relevant annual reporting guidelines published on the Department’s website [...] <p><i>Note: The Rehabilitation Report replaces the Annual Environmental Management Report.</i></p>	Section 8

2.3 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
Craig White Environment Superintendent	Phone: 02 6542 9500 Email: craig.white@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
Phone	Bengalla General Enquiries 02 6542 9500; or Community Complaints Hotline 1800 178 984.



Figure 1: Regional Locality

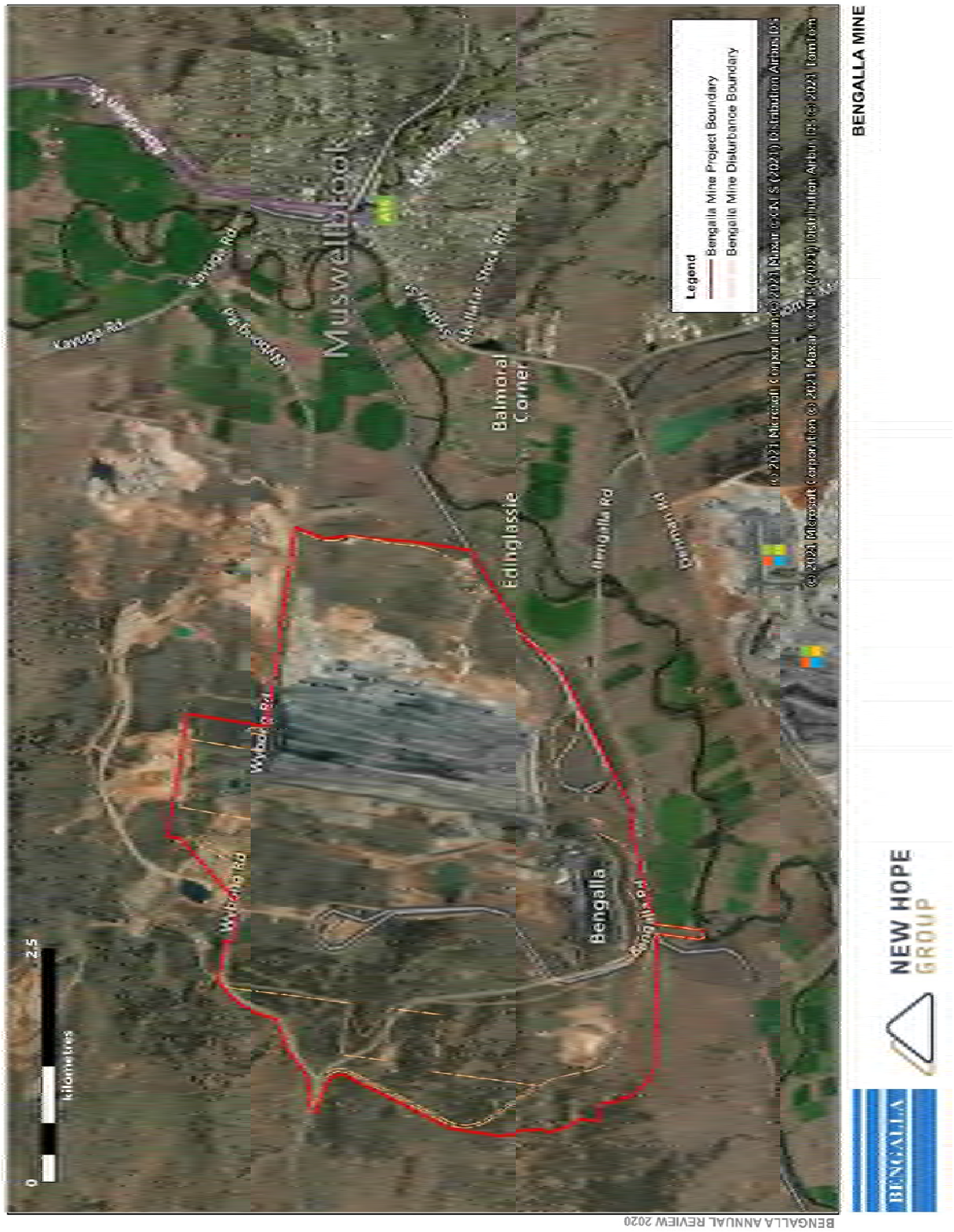


Figure 2: Muswellbrook Locality



Figure 3: Approved Site Layout

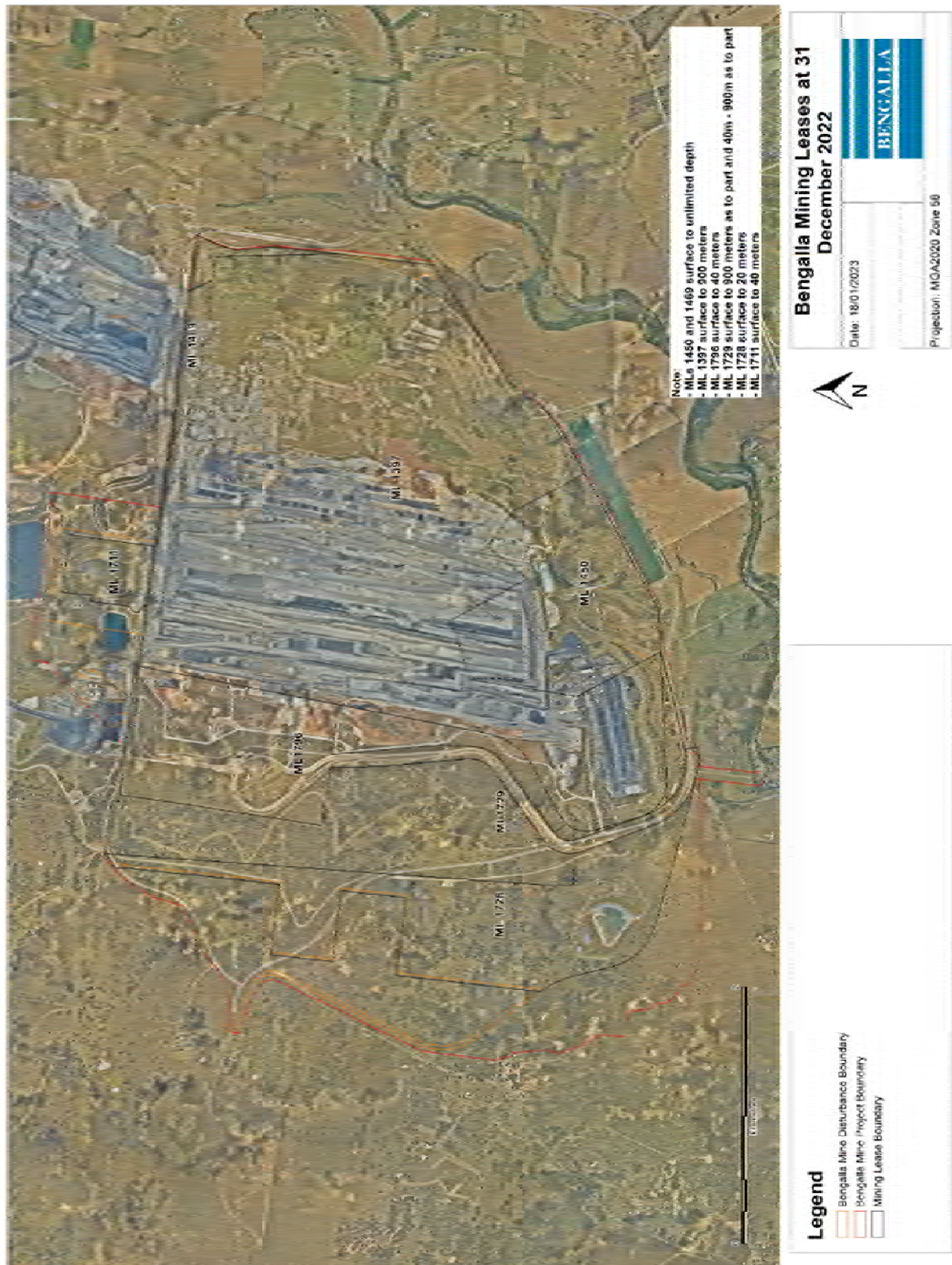


Figure 4: Mining Leases

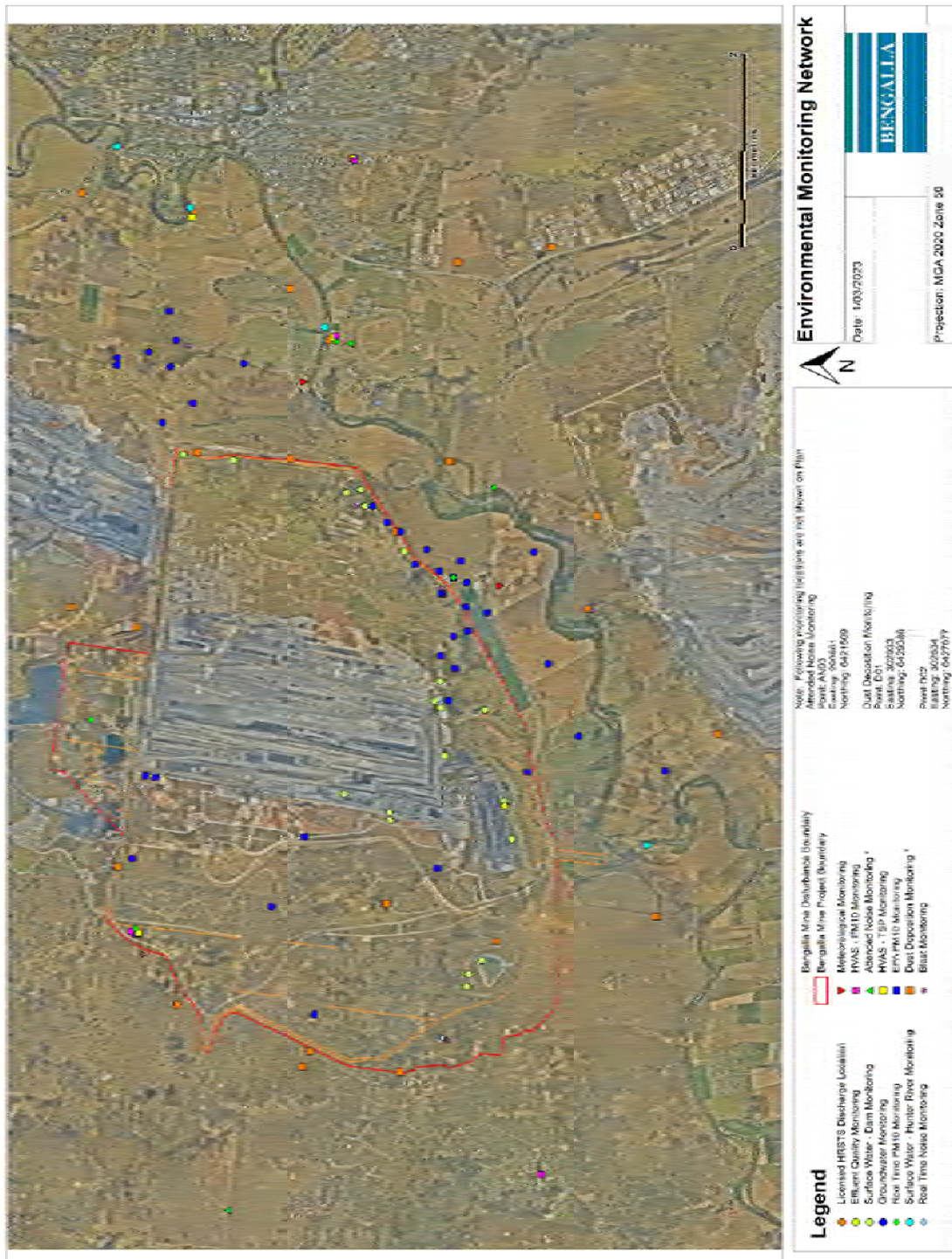


Figure 5: Environmental Monitoring Network¹

¹ Figure 5 shows HVAS – PM10, HVAS – TSP and Dust Deposition Monitoring locations as shown in AQMP 2017. A new air quality monitoring network is in the process of being installed in accordance with AQMP 2022 (approved on 14 December 2022).

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*	DPE
Development Consent SSD-5170 MOD 1 – approved 16 December 2015	03/03/2015 – 28/02/2039	DPE
Development Consent SSD-5170 MOD 2 – approved 1 July 2016	03/03/2015 – 28/02/2039	DPE
Development Consent SSD-5170 MOD 3 – approved 23 December 2016	03/03/2015 – 28/02/2039	DPE
Development Consent SSD-5170 MOD 4 – approved 19 December 2018 (Note: MOD 5 application lodged on 28 November 2021 and approved after end of Reporting Period on 24 February 2023)	03/03/2015 – 28/02/2039	DPE
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 – 09/06/2020*** (renewal application lodged 6 June 2019)	MEG
ML 1469	05/06/2000 – 04/06/2021*** (renewal application lodged 30 May 2020)	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

Document	Approval Period(s)	Authority
EPL 6538	Anniversary Date 11 September	NSW Environment Protection Authority (EPA)
MOP 2017 – 2021	08/11/2017 – 11/04/2019	NSW Resources Regulator (RR)
MOP 2017 – 2021 Amendment A	11/04/2019 – 28/10/2020	RR
MOP 2017 – 2021 Amendment B	28/10/2020 – 26/07/2021 (MOP Amendment B addendum approved 22/12/2020)	RR
MOP 2017 – 2021 Amendment C	26/07/2021 – 06/12/2021	RR
MOP 2017 – 2022 Amendment D****	06/12/2021 – 02/07/2022	RR
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
XSTR100151 (Licence to Store Explosives)	Expiry date: 10/01/2023	SafeWork NSW
XSTR200130 (Licence to Store Explosives)	10/08/2022 – 07/08/2027	SafeWork NSW
5061036 (Radiation Management Licence)	Expiry date: 08/08/2023	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.

** Application for ancillary mining activities condition to attach to ML 1397 lodged 15 November 2017.

*** Renewal sought – authority continues to have effect over area to which renewal application relates until finally determined (section 117 of Mining Act).

**** MOP not required from 2 July 2022 - replaced by requirement for Rehabilitation Management Plan (RMP) under statutory mining lease conditions in Part 2 of Schedule 8 of the Mining Regulation. A new RMP was prepared by 1 August 2022 as required under the Mining Regulation.

***** 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 2022:

- (a) application for part transfer of ML 1728 from BMC to MACH Energy Australia Pty Ltd (MACH) and J.C.D. Australia Pty Ltd (JCDA) – lodged with MEG on 4 April 2022;
- (b) application for Minister’s approval for sublease of ML 1711 from BMC to MACH and JCDA – lodged with MEG on 16 December 2022; and
- (c) application to vary the Bengalla Colliery Holding following expiry of subleases of ML 1796 and ML 1729 (see **Section 3.3** below) and to adjust the colliery holding boundary around the proposed ML 1711 sublease area – lodged with MEG on 25 November 2022.

Other applications were made before the Reporting Period and were still pending at the end of the Reporting Period (refer to **Table 6** above). Please also refer to **Table 7** below for comments on the RMP and Forward Program lodged with the RR during the Reporting Period.

3.3 VARIATIONS

The following new or varied approvals were issued during the Reporting Period:

- (a) EL 9431 granted to BMC by the Minister administering the Mining Act on 4 July 2022; and
- (b) subleases of parts of ML 1796 and 1729 from BMC to MACH/JCDA expired on 31 October 2022; and
- (c) conditions of all BMC's mining leases varied by the delegate of the Minister administering the Mining Act on 17 October 2022 following commencement of new statutory mining lease conditions under Part 2 of Schedule 8A of the Mining Regulation from 2 July 2022.

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)	18 August 2017
Environmental Management Strategy (EMS)	3 April 2020
Historic Heritage Management Plan (HHMP)	18 August 2017
MOP 2017-2021 Amendment D*	6 December 2021
Rehabilitation Management Plan (RMP)	2 August 2022**
Forward Program	Lodged with RR on 1 August 2022***
Noise Management Plan (NMP)	27 May 2019
Visual Impact Mitigation Plan (VMP)	14 June 2016
Water Management Plan (WMP)	1 February 2019

* MOP ceased on 2 July 2022.

** RMP not subject to approval of the Secretary except for certain elements of it (Rehabilitation Objectives, Rehabilitation Completion Criteria and Final Landform and Rehabilitation Plan) which were pending approval at the end of the Reporting Period.

BMC proposed in a letter to the RR and DPE dated 10 February 2023 to take the following steps to address the requirements of the Mining Regulation and SSD-5170 regarding preparation and implementation of an RMP:

- (a) update its RMP having regard for the comments received from the RR so far and the applicable guidelines and then place the updated RMP on the BMC website;

- (b) further revise the RMP after the RR approves the RO, RCC and FLRP (to incorporate and reflect those approved documents);
- (c) provide the RMP (incorporating the approved RO, RCC and FLRP) to relevant stakeholders for comment;
- (d) if necessary, revise the RMP in response to any feedback from stakeholders;
- (e) submit the RMP to the RR for approval; and
- (f) if necessary, revise the RMP following determination of MOD 5 (to reflect any updated Consent conditions relating to the RMP).

The above approach is subject to the requirements of the Mining Regulation and SSD-5170 (as modified) as they apply at the time that each step would occur.

**** Forward Program is not subject to approval of the Secretary.*

During the Reporting Period, the plans delineated by ^ were submitted for review by DPE.

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 2023.

4.1 MINING OPERATIONS

During 2022, 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 2021 and 2022 and forecast volumes for 2023.

Table 8: Production and Waste Summary

Material	Unit	Approved Limit	Previous Reporting Period (2021 Actual)	This Reporting Period (2022 Actual)	Next Reporting Period (2023 Plan)
Waste Rock / Overburden	Mbcm	-	50.7	48.2	56.8
ROM Coal	Mt	15	12.87	10.72	12.59
Reject Material	Mt	-	3.36	2.79	2.83
Saleable Product	Mt	-	10.26	8.30	9.91

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.

Other operations at Bengalla during the Reporting Period included:

- **Exploration (in ML areas):** During the calendar year of 2022 in ML 1729 and ML 1796 a total of 35 boreholes were drilled for structure and coal quality analysis.
- **Coal Transport:** During the Reporting Period, 8,304,920 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 1,055 with a maximum of 7 train movements per day.

- **Infrastructure, Construction and Management:** The following projects were commenced, progressed or completed during the Reporting Period:
 - Construction of the new reload facility was completed in 2022.
 - The subleases of ML 1729 and ML 1796 from BMC to MACH/JCDA (for the Mount Pleasant rail and associated infrastructure south of Wybong Road) expired during the Reporting Period. The infrastructure was removed by MACH other than items

the parties agreed would remain in situ and the area will be used for BMC's mining operations.

4.3 EMPLOYMENT AND OTHER DETAILS

At 31 December 2022, BMC employed 570 permanent employees and 128 contractors on a full-time equivalent basis. Approximately 89 per cent of BMC employees resided in the local government areas of Muswellbrook, Upper Hunter and Singleton.

4.4 NEXT REPORTING PERIOD

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

- Continue mining westward.
- Relocation and construction of various infrastructure (that is anticipated to include the tyre bay, crib huts, north water fill point, clean water diversion infrastructure and maintenance pad) to facilitate the progression of mining.
- Pre-production drilling.
- Rehabilitation according to the RMP and Forward Program.
- Decommissioning of the old reload facility.
- CHPP upgrades.

A summary of key environmental approval and management activities proposed for 2023 is provided in **Section 12**.

5 ACTION REQUIRED FROM PREVIOUS ANNUAL REVIEW

BMC received a request for additional information in connection with the 2021 Annual Review from the DPE dated 25 August 2022. BMC responded to that information request on 30 September 2022. DPE accepted the 2021 Annual Review in a letter to BMC dated 15 November 2022.

The 2021 Annual Review (Table 29) identified various actions for 2022. Information about those actions and current status is provided in **Table 9** below.

Table 9: Actions Required from 2021 Annual Review

Type of Action	Action Required from 2021 Annual Review	Requested By	Action Taken by BMC	Where discussed in Annual Review
Air Quality	Implementation of updated Air Quality monitoring network (subject to approval of submitted AQMP)	Operator	AQMP approved 14 December 2022. Updated air quality monitoring network will be implemented throughout 2023 in accordance with AQMP.	Sections 3.1 and 6.4.3
Regulatory	Development of new Rehabilitation Management Plan and associated documents to comply with rehabilitation reforms to the Mining Act/Regulation (current term of MOP expires 2 July 2022)	Operator/RR	A new Rehabilitation Management Plan and associated documents including a Forward Program were developed by 2 August 2022 as required under Part 2 of Schedule 8A of Mining Regulation.	Sections 3.1, 3.4 and 8.2
Regulatory	Lodgement of SSD-5170 Modification Application (Mod 6)	Operator	Mod 6 being prepared. BMC focused on finalising Mod 5 during the Reporting Period (approved on 24 February 2023).	Sections 8.3.2 and 12
Audit	Commission and undertake Independent Environmental Audit	Operator/DPE	BMC submitted auditor details to DPE on 28 September 2022, 14 October 2022, 16 January 2023 and 27 January 2023. The DPE approved the audit team on 31 January	Section 10

Type of Action	Action Required from 2021 Annual Review	Requested By	Action Taken by BMC	Where discussed in Annual Review
			2023. An audit team member has resigned from RPS, so BMC is seeking approval of a new audit team member.	
Audit	Review and update Operating and Management Manuals, Emergency Plans and Dam Safety Management System in accordance with Dams Safety audit	Operator	Manuals, Plans and System documents revised.	Section 10
Management Plans	Undertake reviews of management plans in accordance with SSD-5170	Operator	BMC will review management plans likely following approval of SSD-5170 Mod 5.	Sections 3.4 and 12
Tree Screening	Progress Denman Road tree screening (Schedule 3, Condition 40 of SSD-5170)	Operator/DPE	DPE granted an extension to 31 December 2022. Tree screen planting has been undertaken on sections of Wybong Road (September 2019) and Roxburgh Road (March 2019 and July 2020).	Sections 6.13.2 and 12
Offsets	Progress long-term security of biodiversity offset areas (Schedule 3, Condition 28 of SSD-5170)	Operator/DPE	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.	Sections 1.1, 11 and 12

Type of Action	Action Required from 2021 Annual Review	Requested By	Action Taken by BMC	Where discussed in Annual Review
Rehabilitation	Undertake new rehabilitation and installation of HDWV into existing rehabilitation according to the MOP (now RMP)	Operator/RR	No new rehabilitation and 25 Ha of HDWV has been installed over existing rehabilitation as of 31 December 2022.	Section 8
Groundwater Bores	Installation of groundwater bores	Operator	Groundwater bore installation finalised in April 2022. Sampling commenced September 2022 after safety concerns of gas emitting from groundwater bore were allayed.	Section 7.3

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 2023 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 **Figure 5**).

Maintenance and calibration activities were completed on the meteorological station on 22/03/2022, 19/05/2022, 14/09/2022 and 29/11/2022.

6.1.2 Environmental Performance

Wind speed, wind direction, air temperature, relative humidity, solar radiation, rainfall and evapotranspiration are recorded at the meteorological station. A summary of monthly rainfall, temperatures and wind roses being part of the 2022 meteorological data is included as **Appendix A**.

6.1.3 Further Actions

There are no additional actions planned for 2023 regarding meteorological monitoring.

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 6**).

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 the same locations as for compliance attended monitoring.

Results from the supplementary attended monitoring are not used to determine compliance.

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 6**.

The noise levels recorded at the real-time monitors are not used to determine compliance.

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 2022 is provided in **Appendix B**.

Trend over Life of Project

Average noise levels at AN01, AN03 and AN04 during the Reporting Period had generally increased from the previous two years, however, the noise levels remained within the noise compliance criteria (see **Table 10**).

Table 10: 2020-2022 Noise Trends

Location	Noise Criteria dBA	BMC Only LAeq dBA		
		2022	2021	2020
AN01	35	30.4 ¹	28.6 ⁴	27
AN03	40	IA ²	36.0 ⁵	30
AN04	35	32.0 ³	32.7 ⁶	34

1 Seven readings within meteorological range averaged.

2 Seven readings within meteorological range with seven inaudible.

3 Seven readings within meteorological range averaged with five readings inaudible.

4 Five readings within meteorological range averaged.

5 One reading within meteorological range with four readings inaudible.

6 Three readings within meteorological range averaged with three readings inaudible.

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 review 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 DPE for approval.

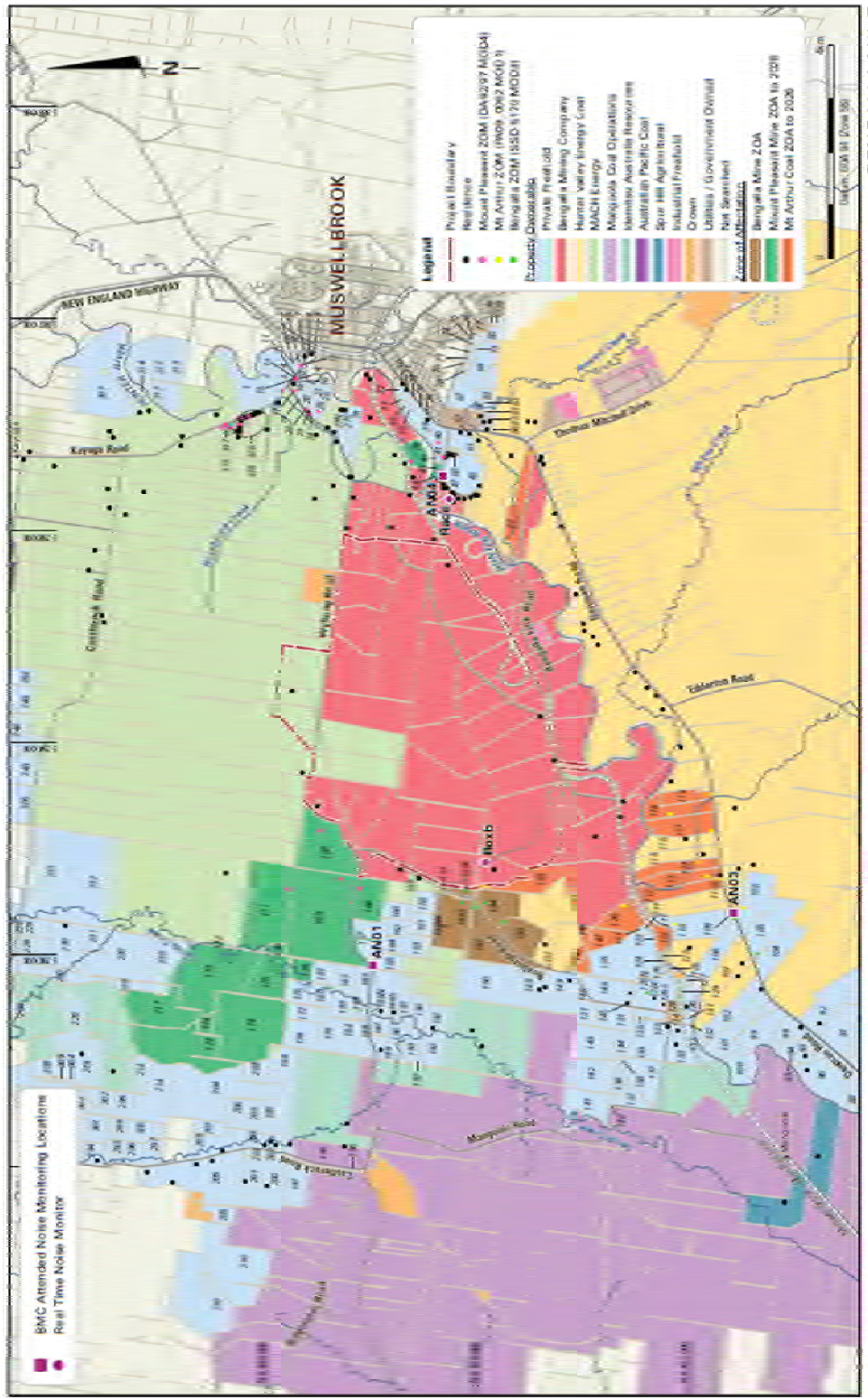


Figure 6: Noise Monitoring Network

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 Blast Fume Management and Post Blast Assessment.

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 165 blast events comprising 172 individual blasts 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 7**.

In accordance with the BMP, blast monitoring is undertaken at 11 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); and
- Waveform trace, where applicable.

Assessment of compliance with blast criteria for privately owned residences and public infrastructure is undertaken at three blast monitors located on non-mine owned land being MRE, SCH and BLK in EPL 6538 (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 monitors in EPL 6538 on non-mine owned land (MRE, SCH and BLK) did not exceed relevant criteria for overpressure or ground vibration.

Eight fume events occurred at Bengalla during the Reporting Period, all categorised as Level 3 events (i.e. no fume events rated over Level 3C against the Australasian Explosive Industry Safety Group (AEISG) fume rating system).

Trend and Comparison to Assessment Predictions

Table 12 details the 2022 blast performance as compared to 2021 and 2020. A review of blast monitoring measurements over the period 2020 – 2022 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)
St James School	SCH		
Blake	BLK		
Mine Owned Historic Heritage Site Monitoring Locations			
Edinglassie Homestead	EGL	10 mm/s	120 dB (linear Peak) and 5% ≥ 115 dB (linear Peak)
Bengalla Homestead	BHS		
ARTC Infrastructure			
Wantana	WAN	100 mm/s	-

Table 12: Blast Performance Summary 2020-2022

Blast Summary	2022		2021		2020	
	Number of Blasts	% of Blasts	Number of Blasts	% of Blasts	Number of Blasts	% of Blasts
Total blasts	172		198		195	
Average number of blasts per week	3.2		3.8		3.75	
Days with 2 blast events	25	15	21	10.6	4	2
Days with 3 blast events	0	0	Not reported			
Number of road closures – Wybong Road	40	23	37	18.7	30	15
Number of road closures – Bengalla Road	0	0	0	0	0	0
Number of rail loop closures	0	0	1	0.5	7	3
Number of blast events within Stage Discharge Dam (SDD) Notification Area ⁽¹⁾	0	0	0	0	49	25
Number of blast events within Clean Water Dam 1 (CW1) Notification Area	60	35	55	27.8	66	34
Number of blast events within Mt Pleasant Environmental Dam 3 (ED3) Notification Area ⁽²⁾	60	35	55	27.8	55	35
Exceedances of applicable vibration and overpressure criteria						
• Private Receivers Monitoring Locations Vibration (10 mm/sec)	0	0	0	0	0	0
• Private Receivers Monitoring Locations Vibration (5 % ≥ 5 mm/sec) ⁽³⁾	0	0	1	0.5	1	<0.01
• Private Receivers Monitoring Locations Overpressure (120dB)	0	0	0	0	0	0
• Private Receivers Monitoring Locations Overpressure (5% ≥ 115 dB) ⁽³⁾	5	3	4	2	3	2
• Historic Heritage Site Monitoring Locations Vibration (10 mm/sec)	0	0	0	0	0	0
• Historic Heritage Site Monitoring Locations Vibration (5% ≥ 5 mm/sec)	0	0	0	0	0	0
• Historic Heritage Site Monitoring Locations	0	0	0	0	0	0

Blast Summary	2022		2021		2020	
	Number of Blasts	% of Blasts	Number of Blasts	% of Blasts	Number of Blasts	% of Blasts
Overpressure (120 dB)						
• Historic Heritage Site Monitoring Locations Overpressure (5% ≥ 115 dB) ⁽³⁾	1	1	1	0.5	2	0.1
• ARTC Infrastructure (100 mm/sec)	0	0	0	0	0	0
Blast result capture rate, all non-mine owned monitors	172	100	198	100	195	100
Fume events (\geq Rating 3)	8	5	5	2.5	2	0.01

(1) SDD was decommissioned in June 2020.

(2) Monitoring of ED3 commenced on 11 March 2020.

(3) The blasting criteria in Schedule 3, Condition 8 of SSD-5170 are 0% allowable exceedance for 120 dB (Lin Peak) overpressure and 10 mm/s ground vibration and 5% allowable exceedance (of the total number of blasts over a period of 12 months) for 115 dB (Lin Peak) overpressure and 5 mm/s ground vibration at any residence on privately owned land.

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 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 2022.

6.3.3 Further Actions

Any additional blasting actions planned for implementation in 2023 will be in accordance with the BMP and interactions with other mines.

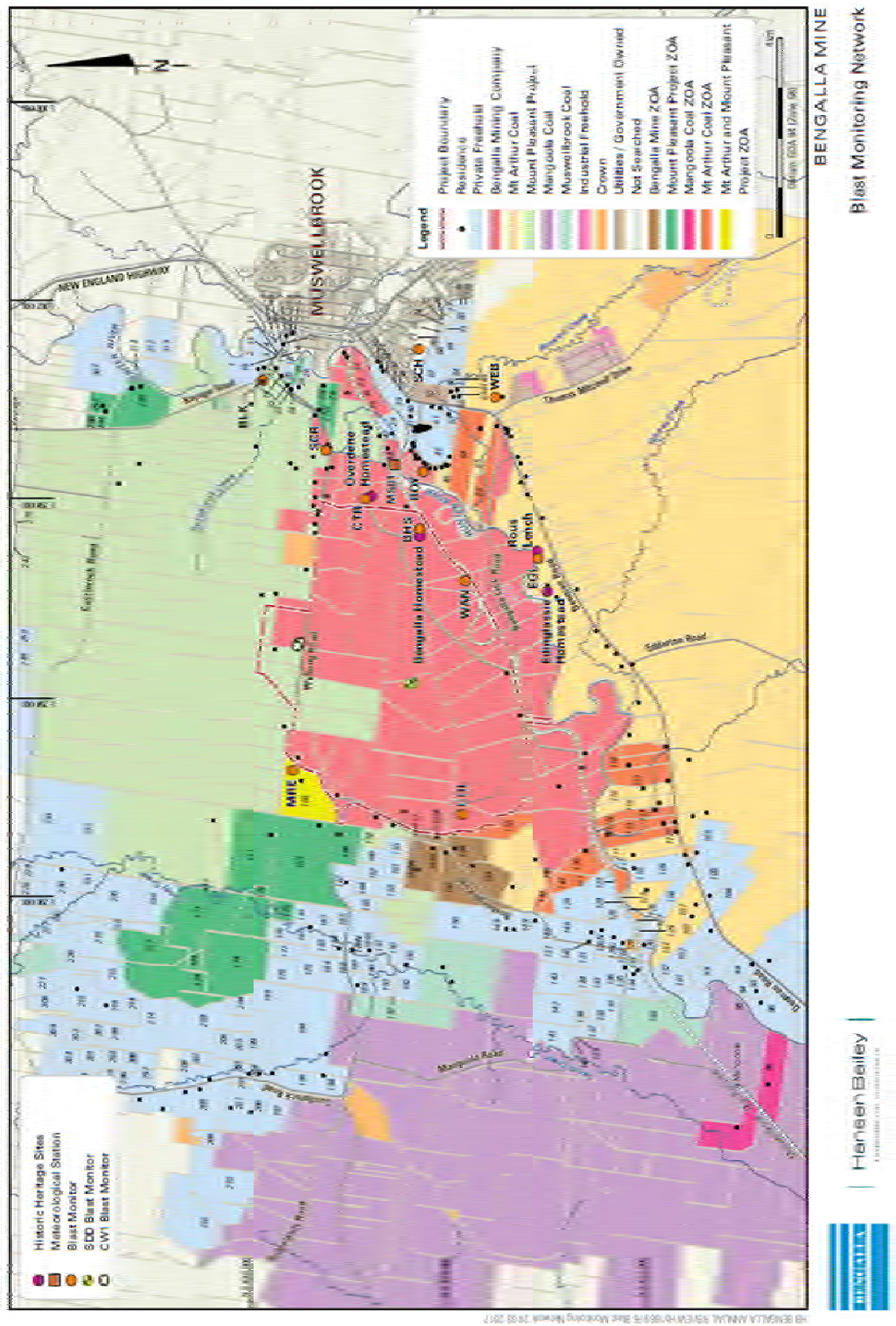


Figure 7: Blast Monitoring Network

6.4 AIR QUALITY

6.4.1 Environmental Management

BMC manages air quality according to the approved AQMP, which sets out procedures for the 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.

The Secretary of DPE approved a new AQMP near the end of the Reporting Period (on 14 December 2022). Upon approval of the new AQMP, redundant monitors in the existing air quality monitoring network were decommissioned or changed status from compliance monitors to real-time monitors (i.e. used as a management tool) in accordance with section 6.2.2 of the AQMP. The remaining monitors will continue to operate until the new air quality network has been installed and is operational. The description of air quality management during the Reporting Period in **Section 6.4** of this Annual Review relates to the air quality network as it was before 14 December 2022.

During the Reporting Period, Bengalla's air quality monitoring network is shown in **Figure 8** and comprises:

- One meteorological station and an inversion tower.
- Six real-time air quality monitors (four E-Bam monitors and two DustTrak monitors), linked to the Real Time Environment Management System (RTEMS). These monitors are used as a management tool.
- Nine High Volume Air Samplers (HVAS) with five measuring TSP and four measuring PM₁₀. One HVAS (PM3) is located on land owned by Hunter Valley Energy Coal Pty Limited, the operator of Mt Arthur Coal (MAC). The HVAS monitors are used to measure compliance against the relevant criteria in SSD-5170 (as modified). Measurements are sampled every six days for a continuous 24-hour period.
- 27 Deposition Dust Gauges of which 14 are used to measure compliance against the relevant criteria in SSD-5170.

PM_{2.5} is 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 near the primary wind axis relative to Bengalla. The EPA allowed for removal of monitoring point EPA23 from EPL

6538 by email to BMC dated 1 November 2021 (the formal licence variation was subsequently issued on 28 February 2023).

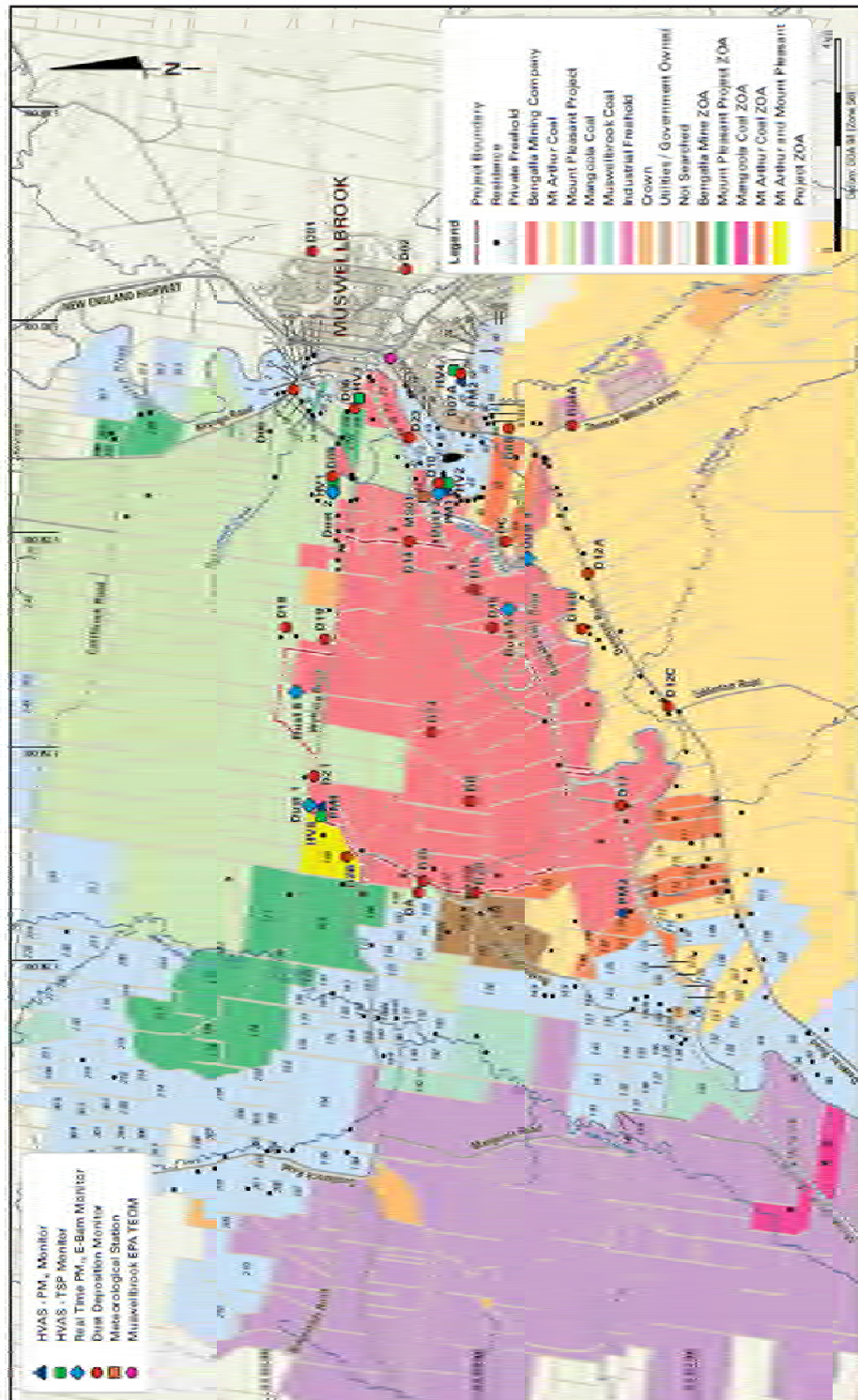


Figure 8: Air Quality Monitoring Locations
Figure source: AQMP (2017)

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 calendar year 2022.

Elevated PM₁₀ 24 hour all source measurements were recorded at PM-4 on various dates during the Reporting Period. DPE 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 2022 are included in **Appendix D**.

- 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 2022 that are compliant with the applicable criteria for annual average total deposited dust (4g/m²/month) and 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)	2021 Annual Average Deposited Dust (g/m ² /month)	2020 Annual Average Deposited Dust (g/m ² /month)
D01	4.0	1.0	0.9	1.2
D02	4.0	1.1	1.2	2.4
D04A	4.0	1.5	2.1	3.0
D05	4.0	1.9	2.1	2.5
D06	4.0	1.4	2.8	2.7
D07A	4.0	1.2	1.3	2.6
D08	4.0	1.4	1.5	1.8
D09	4.0	2.4	2.9	3.0
D10	4.0	1.6	2.8	3.5
D20	4.0	3.5	3.0	4.5 ⁽¹⁾
D23B	4.0	1.6	1.5	2.0
D25	4.0	2.1	2.2	3.2
D26	4.0	1.5	1.4	3.2
DA	4.0	2.6	1.8	3.7

(1) As notified to DPE by BMC on 14/1/2021 after receipt of air quality monitoring results for the 2020 calendar year.
NOTE – All dust deposition gauges in **Table 13** other than D06, D10 and D26 were decommissioned at 14/12/2022. D06, D10 and D26 will be used as compliance monitors for deposited dust until the new air quality network is fully commissioned and operational in accordance with the new AQMP. Results for 2022 are calendar year.

- 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 2022 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 (µg/m ³)	Period	2022 Annual Average TSP (µg/m ³)	2021 Annual Average TSP (µg/m ³)	2020 Annual Average TSP (µg/m ³)
HV1 ⁽²⁾	90	All run days	50.4 ⁽³⁾	64.1	74.0
		Excluding extraordinary events	-	-	69.1
HV2	90	All run days	48.2	55.3	70.2
		Excluding extraordinary events	-	-	62.6
HV3	90	All run days	34.5	41.7	50.9
		Excluding extraordinary events	-	-	45.1
HV4 ⁽²⁾	90	All run days	37.8 ⁽³⁾	44.7	58.8
		Excluding extraordinary events	-	-	53.2
HV6 ⁽²⁾	90	All run days	80.4 ⁽³⁾	76.0	96.5 ⁽¹⁾
		Excluding extraordinary events	-	-	87.7

(1) As notified to DPE by BMC on 14/1/2021 after receipt of air quality monitoring results for the 2020 calendar year. As noted in the expert's report, an invalid reading on 3 January 2020 was excluded and the measured annual average data for HV6 was 91.7 µg/m³.

(2) At 14/12/2022, HV1 and HV4 were decommissioned. HV6 changed status from compliance monitor to real-time monitor.

(3) Annual Average TSP readings at 12/12/2022.

- 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 µg/m³) at all compliance monitoring sites.

The annual average criteria for PM₁₀ excludes extraordinary events, however the occurrence of extraordinary events was not examined for the Reporting Period as the monitoring results were already below 25 µg/m³.

Table 15: Summary of Annual Average PM₁₀ Monitoring Results

Site	Annual Average PM10 Criteria (µg/m ³)	Period	2022 Annual Average PM ₁₀ (µg/m ³)	2021 Annual Average PM ₁₀ (µg/m ³)	2020 Annual Average PM ₁₀ (µg/m ³)
PM-1		All Run days	16.5	20.1	25.7

Site	Annual Average PM10 Criteria ($\mu\text{g}/\text{m}^3$)	Period	2022 Annual Average PM10 ($\mu\text{g}/\text{m}^3$)	2021 Annual Average PM10 ($\mu\text{g}/\text{m}^3$)	2020 Annual Average PM10 ($\mu\text{g}/\text{m}^3$)
	25	Excluding extraordinary events	-	-	21.9
PM-2 ⁽²⁾	25	All Run days	15.6 ⁽³⁾	17.0	22.7
		Excluding extraordinary events	-	-	20.0
PM-3	25	All Run days	16.0	15.6	26.5
		Excluding extraordinary events	-	-	23.8
PM-4 ⁽²⁾	25	All Run days	22.6 ⁽³⁾	24.1	32.0 ⁽¹⁾
		Excluding extraordinary events	-	-	27.3

(1) As notified to DPE by BMC on 14/1/2021 after receipt of air quality monitoring results for the 2020 calendar year. As noted in the expert's report, an invalid reading on 3 January 2020 was excluded and the measured annual average data for monitor PM10-4 was 29.3 $\mu\text{g}/\text{m}^3$.

(2) At 14/12/2022, PM10-2 decommissioned. PM10-4 changed status from compliance monitor to real-time monitor.

(3) Annual Average PM10 readings at 12/12/2022.

- PM_{2.5}

As detailed in the approved AQMP (2017), 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 6.2 $\mu\text{g}/\text{m}^3$, below the criterion of 8 $\mu\text{g}/\text{m}^3$.

The annual average criteria for PM_{2.5} excludes extraordinary events, however the occurrence of extraordinary events was not examined for the Reporting Period as the monitoring results were already below 8 $\mu\text{g}/\text{m}^3$.

The trend for PM_{2.5} is decreasing over 2021 and the Reporting Period.

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 respectively against the criteria over the 2020 – 2022 period. The cumulative measurements have generally decreased over the three-year period. The decrease may be attributed to increased rainfall in 2020, 2021 and 2022 compared to drought conditions which were experienced previously.

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 2022.

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 DPE.

There were no requests made for an independent review of impacts from Bengalla (for air quality or otherwise) during 2022.

6.4.3 Further Actions

The new AQMP was approved by the Secretary of DPE on 14 December 2022. As described above, some monitors in the existing air quality monitoring network were decommissioned or changed status on approval of the new AQMP. BMC will continue the implementation of the new air quality monitoring network during 2023 and until it is fully commissioned and operational will operate under the interim monitoring network described in the new 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

No spontaneous combustion incidents were recorded at Bengalla during the Reporting Period.

6.5.3 Further Actions

There are no additional actions planned for 2023 regarding the management of 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 Cth* (Safeguard Mechanism) also applies to emissions at Bengalla.

National Pollutant Inventory

For the 2021 – 2022 FY reporting period BMC reported on 27 of the 31 reportable substances.

National Greenhouse and Energy Reporting

During the 2021 – 2022 FY reporting period Bengalla reported total emissions of 787,295 t Carbon Dioxide Equivalent (CO₂e) (Scope 1 and Scope 2).

The results for FYs 2020 – 2022 are presented in **Table 17** and **Table 18**.

Table 17: Energy Consumed and Produced FY 2020 to 2022

Energy	FY 2021-2022	FY 2020-2021	FY 2019-2020
Consumed Gigajoule (GJ)	2,636,980	2,808,053	2,819,739
Produced (GJ)	259,316,316	260,612,775	279,633,222

Table 18: GHG Emissions FY 2020 to 2022

Greenhouse Gas Emissions	FY 2021-2022	FY 2020-2021	FY 2019-2020
Scope 1 (t CO ₂ -e)	725,774	449,399	538,857
Scope 2 (t CO ₂ -e)	61,521	53,694	61,929
Total (t CO₂-e)	787,295	503,093	600,786

GHG Emissions for Calendar Years 2022-2022 and Comparison to Predictions

Annual GHG emissions (Scope 1 and Scope 2) for calendar years 2020, 2021 and 2022 (the latter being the Reporting Period) are presented in **Table 19**, with a comparison 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 2020, 2021 and 2022 calendar years are lower than the AQIA predictions for Years 4 to 13 primarily due to reduced materials movement compared to the EIS.

Table 19: Summary of Scope 1 and Scope 2 GHG Emissions (CO₂-e t/yr)

Year	Fugitive Emissions	Diesel Fuel	Electricity	Explosives	Total
	Scope 1	Scope 1	Scope 2	Scope 1	Scope 1 + 2
AQIA Years 4 to 13	486,000	212,291	82,885	4,317	785,493
2020	390,657	172,620	59,916	6,204	629,396
2021	416,909	163,903	69,515	5,375	655,703
2022	347,409	161,082	64,662	5,201	578,354

NOTES

1. AQIA Years 4 to 13 means for each of Years 4 to 13 of the Project (Bengalla).
2. As required, Table 19 calculates actual greenhouse gas emissions using the same methodology for calculating estimated emissions in the AQIA. This methodology is different to that required for reporting under the NGER Scheme and Safeguard Mechanism.

Reasonable and feasible steps 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.

- Efficient fuel use by optimising mine design, for example, haul road distances and optimisation of resource extraction.
- Commissioning of a study to:
 - identify high level emission reduction opportunities, leveraging existing work, and prioritise them based on emission reduction potential; and
 - develop a high level implementation road map with net present value positive components.

6.6.3 Further Actions

BMC will review its emissions against its Production Adjusted Baseline under the Safeguard Mechanism and determine next steps as required.

6.7 NON-MINERAL WASTE

6.7.1 Environmental Management

Non-mineral waste generated at Bengalla during 2022 was 1,916 t. A total of 1,474 t was recycled, representing 77% of the total waste. These figures remained generally consistent with 2020 and 2021. **Table 20** details non-mineral waste tonnes for the period 2020 to 2022.

Table 20: Non-mineral Waste Management

	2022	2021	2020
Total (t)	1,916	1,827	1,834
Recycled (t)	1,474	1,422	1,408

6.7.2 Environmental Performance

A total of 1,916 t of non-mineral waste was disposed of in 2022 being predominantly general waste, oily rags and hydraulic hoses.

The major waste streams recycled at Bengalla in 2022 were 541 t waste oil, 20 t grease, 20 t batteries, 28 t oil filters, 20 t coolant, 743 t scrap metal and 62 t timber.

Several waste streams are re-used where practicable such as intermediate bulk containers. Some filters and batteries are also recycled where possible, however are not returned to Bengalla.

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 541t is slightly above the EIS prediction of 526t; and
- the scrap metal volume of 743t is well below the EIS prediction of 1902t.

6.7.3 Further Actions

There are no additional actions planned for 2023 regarding the management of non-mineral waste. Normal waste management practice will continue.

6.8 MINERAL WASTE

6.8.1 Environmental Management

Management of mineral waste at Bengalla in 2022 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 2022 (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 2023 relative to 2022.

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

The waste rock/overburden volume referenced in **Table 8** for 2022 is below the EIS prediction.

6.8.3 Further Actions

There are no additional actions other than normal practices planned for 2023 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 Aboriginal Cultural Heritage Management Plan (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 2022 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.

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 DPE.

6.10 NON-ABORIGINAL HERITAGE

6.10.1 Environmental Management

BMC has developed and implements the approved Historic Heritage Management Plan (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 12 September 2022. The results of the inspections and surveys are summarised below.

Bengalla Homestead

The 2022 dilapidation survey of Bengalla Homestead and associated buildings concluded that there appeared to be no further major degradation since the 2021 survey.

Externally the condition of the homestead and service wing remained stable, and the building was 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 bookkeepers' cottage has been undertaken and externally the building is generally in a good state of repair.

The renovated cottage service building and garden shed were in a good state of repair and have not deteriorated since the 2021 inspection.

The condition of the other remaining structures is consistent with the previous inspection including the tool shed, steel water tower and stable.

All buildings and 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 2022 dilapidation survey of Overdene Homestead concluded that there appeared to be no further major degradation since the 2021 inspection.

Works carried out in 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 appears stable. Installation of a new floor system, restoration of windows, doors and internal walls is still outstanding. The external downpipe next to the entry door needs to be fixed to ensure no further degradation of this wall occurs.

Access to Overdene Homestead was restricted during 2022 due to the construction and testing of the Mount Pleasant Mine rail project.

A summary of the 2022 maintenance and preservation works completed by BMC at the Bengalla and Overdene Homesteads is presented in **Table 21**.

Appendix J contains photos from the 2022 inspections at Bengalla and Overdene Homesteads.

Keys Family Private Cemetery

An annual inspection was undertaken on the Keys Family Private cemetery in February and May 2022. The cemetery was in good condition with headstones remaining in good condition with no evidence of vandalism or deterioration. New fencing is being undertaken in 2023 at the cemetery.

Stockyards

An annual inspection was undertaken of the Stockyards in May 2022. 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 May 2022. The existing sandstone wall remains in good condition. The area was fenced and signage still present.

House Site 1

An annual inspection was undertaken of House Site 1 in May 2022. The site was fenced and signage erected.

House Site 2

An annual inspection was undertaken of House Site 2 in May 2022. The site was fenced and signage erected. No further work was required.

Blunts Butter Factory

An annual inspection was undertaken of Blunts Butter Factory in May 2022. Fencing around the site remained in good condition. Signage was erected. No further works were required.

Table 21: Short Term Maintenance of the Bengalla and Overdene Homesteads 2022

Reference	Maintenance	Response	Status
OVERDENE HOMESTEAD			
HHMP Appendix D, Section 6.5	Repair internal render all rooms	Being quoted to repair in 2023 -2024	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 is being quoted to repair in 2023 -2024	Ongoing
HHMP Appendix D, Section 6.5	Reinstate verandah.	Restoration is being designed and planned 2023-2024	Upcoming
HHMP Appendix D, Section 6.5	Reinstate veranda flooring, including repair of sandstone dwarf wall supporting veranda joists and eastern veranda slab.	Restoration is being designed and planned 2023-2024	Upcoming
HHMP Appendix D, Section 6.5	Restore or replace woodwork around external openings and paint.	Restoration is being designed and planned 2023-2024	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 is being designed and planned 2023-2024	Upcoming
HHMP Appendix D, Section 6.5	Replace ceiling boards with like for like.	Restoration is being designed and planned 2023-2024	Upcoming
HHMP Appendix D, Section 6.5	Repair remaining cracks in brick and stonework (D7).	This was carried out in 2018 repair works	Completed
HHMP Appendix D, Section 6.5	External	This was carried out in 2018 repair works	Completed

Reference	Maintenance	Response	Status
<p>HHMP Appendix D, Section 6.5</p>	<ul style="list-style-type: none"> - 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 		
<p>HHMP Appendix D, Section 6.5</p>	<p>Internal</p> <ul style="list-style-type: none"> - 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 	<p>Restoration is being designed and planned 2023-2024</p>	<p>Upcoming</p>
BENGALLA HOMESTEAD			
<p>HHMP Appendix C, Section 6.5</p>	<p>Building 1 – Homestead and Service Wing</p>		
<p>HHMP Appendix C, Section 6.5</p>	<p>Maintain Homestead to ensure stability and prevent further damage to all features *</p>	<p>All works carried out in 2019</p>	<p>Completed</p>

Reference	Maintenance	Response	Status
HHMP Appendix C, Section 6.5	<p>Remediate external faults to service wing including, but not limited to the following *:</p> <ul style="list-style-type: none"> - 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 6.5	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 6.5	<p>Remediate external damage caused by footing defects, including, but not limited to the following *:</p> <ul style="list-style-type: none"> - 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 6.5	<p>Remediate internal damage to Room 1, including, but not limited to the following:</p> <ul style="list-style-type: none"> - Repair cracking in brickwork where exposed by missing plaster; - Repair plaster missing or removed; 	All works carried out in 2019	Completed

Reference	Maintenance	Response	Status
HHMP Appendix C, Section 6.5	<ul style="list-style-type: none"> - Reinststate/replace tiles in fireplace; and - Repair crack in metal plinth*. 		
HHMP Appendix C, Section 6.5	<p>Remediate internal damage to Room 2, including, but not limited to the following:</p> <ul style="list-style-type: none"> - 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 6.5	<p>Remediate internal damage to Room 3, including, but not limited to the following:</p> <ul style="list-style-type: none"> - 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 6.5	<p>Remediate internal damage to Room 4, including, but not limited to the following:</p> <ul style="list-style-type: none"> - 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 6.5	<p>Remediate internal damage to Room 5, including, but not limited to the following:</p> <ul style="list-style-type: none"> - 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
HHMP Appendix C, Section 6.5	<p>Remediate internal damage to Room 7, including, but not limited to the following:</p>	All works carried out in 2019	Completed

Reference	Maintenance	Response	Status
	<ul style="list-style-type: none"> - Cracking below Window 12; and - Cracking above and adjacent to Door 10. 		
HHMP Appendix C, Section 6.5	<p>Remediate internal damage to Room 9, including, but not limited to the following:</p> <ul style="list-style-type: none"> - Cracking above Door 9 	All works carried out in 2019	Completed
HHMP Appendix C, Section 6.5	<p>Remediate internal damage to Room 25, including, but not limited to the following:</p> <ul style="list-style-type: none"> - 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 6.5	<p>Remediate internal damage to Room 26, including, but not limited to the following:</p> <ul style="list-style-type: none"> - 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 6.5	<p>Remediate internal damage to Room 27, including, but not limited to the following:</p> <ul style="list-style-type: none"> - 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 floor boards, if not already remediated as part of rising damp assessment. 	All works carried out in 2019	Completed
HHMP Appendix C, Section 6.5	<p>Remediate internal damage to Room 28, including, but not limited to the following:</p> <ul style="list-style-type: none"> - Thinning mortar on western wall; - Missing brickwork adjacent to Door 33; - Cracking in brickwork above Doors 32 and 33; 	All works carried out in 2019	Completed

Reference	Maintenance	Response	Status
	<ul style="list-style-type: none"> - Investigate cause and remediate of concrete floor crack; - Cracking above Window 15. 		
HHMP Appendix C, Section 6.5	<p>Remediate internal damage to Room 29, including, but not limited to the following:</p> <ul style="list-style-type: none"> - 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 6.5	<p>Remediate internal damage to Room 30, including, but not limited to the following:</p> <ul style="list-style-type: none"> - Cracking above Door 31 and extending to western wall; - Cracking above Window 17 and 18; - Replace removed skirting boards; - Termitte damage in northern wall and Door 31 woodwork, if not already remediated. 	All works carried out in 2019	Completed
HHMP Appendix C, Section 6.5	<p>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*</p>	Garage maintained and refurbished for storage and toilet amenities	Completed
HHMP Appendix C, Section 6.5	<p>Building 3 – Underground cistern Maintain as required to ensure cistern does not deteriorate</p>	Maintained as per maintenance schedule	Ongoing
HHMP Appendix C, Section 6.5	<p>Building 4 – Garden Lodge The Garden Lodge has been assessed as being unsafe and is recommended for removal (Archaeology Australia, 2009)</p>	Restored to original condition 2019	Completed
HHMP Appendix C, Section 6.5	<p>Building 5 – Toilet/Shower Undertake required maintenance to ensure long-term stability of building*</p>	Repointed and roofed to maintain building integrity	Completed

Reference	Maintenance	Response	Status
HHMP Appendix C, Section 6.5	Building 6 - Gazebo Undertake on-going maintenance*	Repointed and roofed to maintain building integrity	Completed
HHMP Appendix C, Section 6.5	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 6.5	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 6.5	Remediate internal damage to Room 6, including, but not limited to the following: <ul style="list-style-type: none"> - 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 6.5	Remediate internal damage to Room 7, including, but not limited to the following: <ul style="list-style-type: none"> - buckling of ceiling lining. 	Restored and improved to liveable condition 2022	Completed
HHMP Appendix C, Section 6.5	Building 9 – Tennis Court Maintain in current condition	Maintained as per maintenance schedule	Ongoing
HHMP Appendix C, Section 6.5	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
HHMP Appendix C, Section 6.5	Building 11 – Machinery shed Undertake on-going maintenance.	Maintained as per maintenance schedule	Ongoing

Reference	Maintenance	Response	Status
HHMP Appendix C, Section 6.5	Building 12 – Modern Water-Tower Undertake on-going maintenance.	Maintained as per maintenance schedule	Ongoing
HHMP Appendix C, Section 6.5	Building 13 – Stockyards Maintain in current condition	Maintained as per maintenance schedule	Ongoing
HHMP Appendix C, Section 6.5	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 6.5	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 6.5	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 DPE 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

6.11.1 Environmental Management

SSD-5170 and EPBC Approval 2012/6378 (the EPBC Approval) require BMC to manage biodiversity at Bengalla and its Biodiversity Offset Areas (BOAs).

Appendix E includes an annual compliance report for 2022 against the conditions of EPBC Approval 2012/6378 (EPBC Compliance Report).

During the Reporting Period, there were two non-compliances with EPBC Approval conditions reported to DCCEEW. These related to Condition 6 (discharge event on 16 August 2022) and Condition 4 (provision of long-term security for offset properties). Refer to **Appendix E** for details. Please also refer to **Section 1.1** and **Section 11** for further details about compliance matters.

6.11.2 Environmental Performance

Onsite Biodiversity Management and Mitigation

Biodiversity management at Bengalla is undertaken in accordance with the approved Biodiversity Management Plan (BDMP).

The EPBC Compliance Report 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. This individual was translocated to a donor tree prior to Stage 2 tree clearing activities in December 2022.

Offsite Biodiversity Management and Mitigation

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.

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 9**.

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;

- feral pig management;
- preparation works for hazard reduction burns across all BOAs;
- fire trail maintenance at Kenalea; and
- summer and winter ecological surveys.

BMC attended various meetings with stakeholders including adjoining private neighbours, NSW Local Land Services and various Wild Dog Associations.

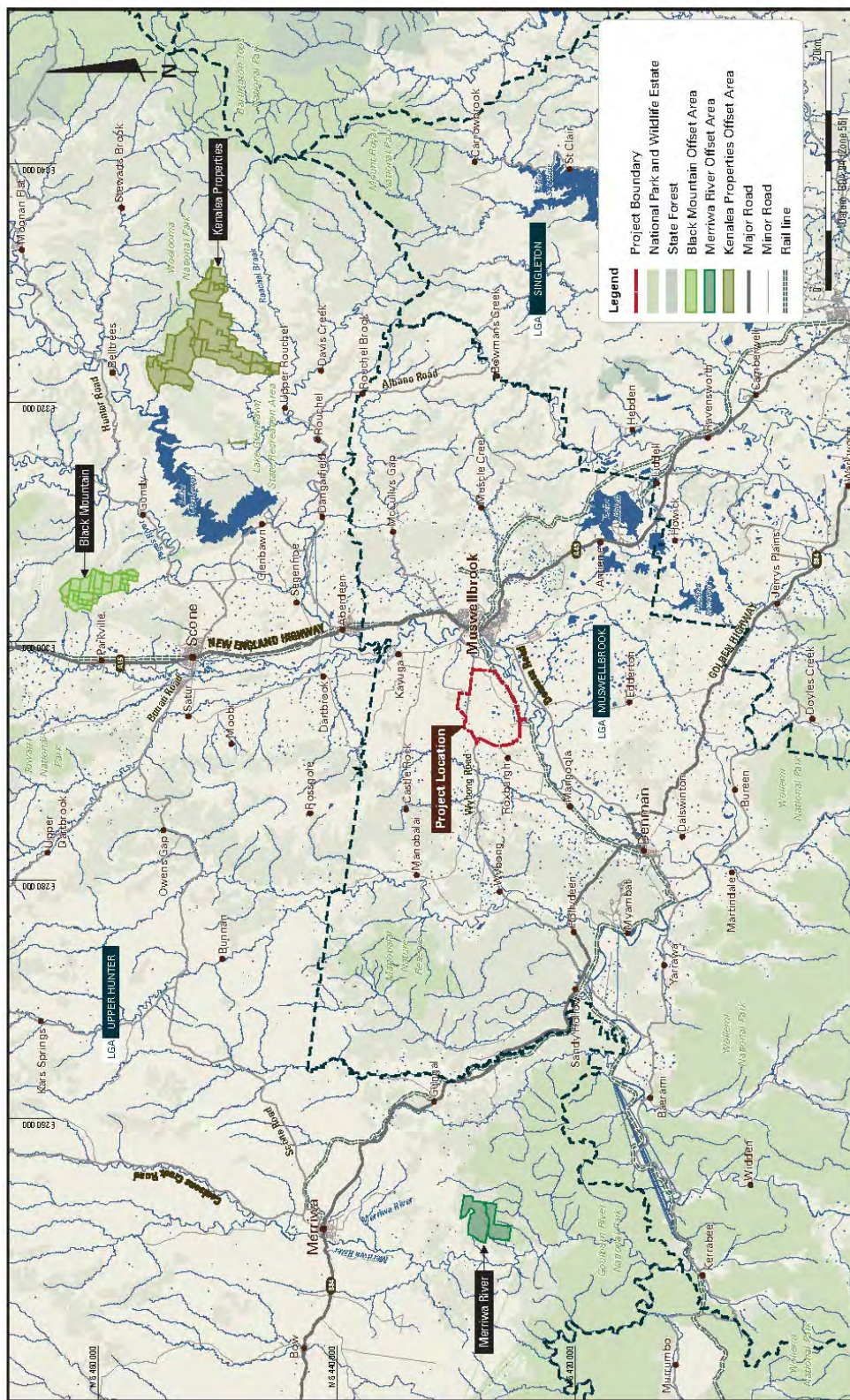


Figure 9: Biodiversity Offset Areas

Biodiversity Offset Area Ecological Surveys

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 BOMP contains measurable indicators and completion criteria for Years 5, 10 and 20 of the Project. **Table 22** compares the measurable indicators and performance criteria for Year 10 against the results of Year 6 (2022) annual monitoring.

Table 22: Assessment Against Performance Criteria

KPI / Measurable Indicators	Year 10 Performance Criteria	Results of Year 6 (2022) Monitoring
Vegetation Management Zones		
Zone 1 - Existing Forest and Woodland (Maintain condition of vegetation within benchmark)		
Total native species richness (NPS)	Maintenance or increase in native species richness	Thirteen (13) of 19 monitoring sites recorded an equal or greater native plant species richness compared to baseline. Of the six sites where native species richness was below baseline numbers, none are below benchmark values.
% Native over-store cover (NOS)	Increase to at least 20% of lower benchmark	Two (2) of 19 monitoring sites recorded an equal or greater native over storey cover compared to baseline. Of the 17 sites where native over storey was below baseline numbers, only two were below benchmark values. Of the two monitoring sites below benchmark values, both were above 20% of the lower benchmark value.
% Native mid-storey cover (NMS)	Increase to at least 20% of lower benchmark	Fourteen (14) of 19 monitoring sites recorded an equal or greater native mid-storey cover compared to baseline. Nine (9) of the 19 monitoring sites were also below benchmark values. Of the nine monitoring sites below benchmark values, six were above 20% of the lower benchmark value.
% Native ground cover (grasses) (NGCG)	Maintenance of cover above lower benchmark	Four (4) of 19 monitoring sites recorded an equal or greater native ground cover (grasses) compared to baseline. Of the 15 sites where native ground cover (grasses) was below baseline, none were below benchmark values.
% Native ground cover (shrubs) (NGCS)	Increase to at least lower benchmark	Six (6) of 19 monitoring sites recorded an equal or greater native ground cover (shrubs) compared to baseline. Of the thirteen sites where native ground cover (shrubs) was below baseline numbers, five are also below benchmark values.
% Native ground cover (other natives) (NGCO)	Maintenance of current cover above lower benchmark	Five (5) of 19 monitoring sites recorded an equal or greater native ground cover (other natives) compared to baseline. All 19 monitoring sites are above lower benchmark for native ground cover (other natives).
% Exotic plant cover	Weed cover not increased above baseline	Nine (9) of 19 monitoring sites recorded an equal or lower exotic plant cover compared to baseline.

KPI / Measurable Indicators	Year 10 Performance Criteria	Results of Year 6 (2022) Monitoring
% overstorey regeneration (OR)	100%	Twelve (12) of 19 monitoring sites have 100% regeneration of all canopy species present, and 15 of 19 monitoring sites have the same or higher levels of regeneration compared to baseline.
Number of trees with hollows (NTH)	Maintenance of number of trees with hollows	Nine (9) of 19 monitoring sites recorded an equal or greater number of trees with hollows compared to baseline.
Total length (m) of fallen logs (FL)	Maintenance of length (m) of fallen logs	Fifteen (15) of 19 monitoring sites recorded an equal or greater length of fallen logs compared to baseline.
Zone 2 - Derived Native Grasslands (Maintain and improve through assisted natural regeneration. Aim to increase to benchmark condition)		
Total native species richness (NPS)	Increase to at least 80% of lower benchmark.	Two (2) of six monitoring sites recorded native species richness at least 80% of lower benchmark.
% Native over-storey cover (NOS)	Increase to at least 20% of lower benchmark	Native over-storey cover absent from monitoring sites.
% Native mid-storey cover (NMS)	Increase to at least 80% of lower benchmark.	Native mid-storey cover absent from monitoring sites.
% Native ground cover (grasses) (NGCG)	Maintenance of cover within benchmark range.	All six monitoring sites are within benchmark range for native ground cover (grasses), and five of the six also exceed the upper benchmark.
% Native ground cover (shrubs) (NGCS)	Increase to at least 80% of lower benchmark.	One (1) of six monitoring sites with native ground cover (shrubs) at least 80% of lower benchmark.
% Native ground cover (other natives) (NGCO)	Increase to at least 80% of lower benchmark.	Four (4) of six monitoring sites with native ground cover (other natives) at least 80% of lower benchmark.
% Exotic plant cover	50% reduction in baseline EPC value	Four (4) of six monitoring sites recorded an equal or decreased weed cover compared to baseline, while only one of the six monitoring sites recorded a 50% reduction in EPC compared to baseline.
% overstorey regeneration (OR)	Increase to 50%	Overstorey regeneration absent from monitoring sites.
Number of trees with hollows (NTH)	No change expected in 10 years. Maintenance of trees with hollows and increase in trees that can eventually produce hollows	No significant change observed. No trees with hollows recorded during baseline or in year six (2022) monitoring.
Total length (m) of fallen logs (FL)	Maintenance or increase in length (m) of fallen logs	Four (4) of six monitoring sites recorded a greater or equal length of fallen logs compared to baseline.
Zone 3 – Riparian (Rebuild/improve riparian corridors; protect waterways. Aim to increase to benchmark condition)		
Total native species richness (NPS)	Increase to at least 80% of lower benchmark	All three monitoring sites at least 80% of lower benchmark for native species richness.

KPI / Measurable Indicators	Year 10 Performance Criteria	Results of Year 6 (2022) Monitoring
% Native over-storey cover (NOS)	Increase to at least 20% of lower benchmark	All three monitoring sites at least 20% of lower benchmark range for native overstorey cover.
% Native mid-storey cover (NMS)	Increase to at least 80% of lower benchmark	One (1) of three monitoring sites at least 80% of lower benchmark for native mid-storey cover. All three monitoring sites maintained or increased native mid-storey cover compared to baseline.
% Native ground cover (grasses) (NGCG)	Increase to at least 80% of lower benchmark	All monitoring sites at least 80% of lower benchmark for native ground cover (grasses).
% Native ground cover (shrubs) (NGCS)	Increase to at least 80% of lower benchmark	Two (2) of three monitoring sites at least 80% of lower benchmark for native ground cover (shrubs).
% Native ground cover (other natives) (NGCO)	Increase to at least 80% of lower benchmark	All monitoring sites at least 80% of lower benchmark for native ground cover (other natives).
% Exotic plant cover	50% reduction in baseline EPC value	Zero (0) of three monitoring sites recorded a 50% reduction in EPC compared to baseline. Two (2) of three monitoring sites decreased weed cover compared to baseline.
% overstorey regeneration (OR)	Increase to 50%	All monitoring sites recorded at least 50% overstorey regeneration.
Number of trees with hollows (NTH)	No change expected in 10 years. Maintenance of trees with hollows, and increase in trees that can eventually produce hollows	Two (2) of three monitoring sites maintained or increased number of trees with hollows.
Total length (m) of fallen logs (FL)	Maintenance or increase in length (m) of fallen logs	All three monitoring sites recorded an equal or increased total length of fallen logs compared to baseline.
Box Gum Woodland and Derived Native Grassland		
Box Gum Woodland		
Increase in site condition value	Native over-storey cover to increase to at least 20% of lower benchmark	All monitoring sites recorded native over-storey cover of at least 20% of lower benchmark.
	Native mid-storey cover to increase to at least 20% of lower benchmark	Eleven (11) of 14 monitoring sites recorded native mid-storey cover of at least 20% of lower benchmark.
	Native ground cover (shrubs) to increase to at least lower benchmark	Ten (10) of 14 monitoring sites recorded native ground cover (shrubs) meeting lower benchmark.
Increase in site context value	Connectivity within biodiversity offset areas increased as a result of management activities	No significant change observed. Changes expected over a longer timeframe.

KPI / Measurable Indicators	Year 10 Performance Criteria	Results of Year 6 (2022) Monitoring
	Increased security of biodiversity offset areas through formal conservation arrangement	Refer to comments at Section 1.1 and Section 11 .
Derived Native Grassland		
Increase in site condition value	Native species richness to increase to at least 80% of lower benchmark.	Two (2) of six monitoring sites with native species richness at least 80% of lower benchmark.
	Native over-storey cover to increase to at least 20% of lower benchmark	Native over-storey cover absent from monitoring sites.
	Native mid-storey cover to increase to at least 50% of lower benchmark	Native over-storey cover absent from monitoring sites.
	Native ground cover (shrubs) to increase to at least 80% of lower benchmark.	One of six monitoring sites with native ground cover (shrubs) at least 80% of lower benchmark.
	Native ground cover (other natives) to increase to at least 80% of lower benchmark.	Four (4) of six monitoring sites with native ground cover (other natives) at least 80% of lower benchmark.
	Reduction in exotic plant cover by 50%	One (1) of six monitoring sites recorded a 50% reduction in EPC compared to baseline.
	Over-storey regeneration increased to 50%	Over-storey regeneration absent from monitoring sites.
	Potential increase in total length of fallen logs	Four (4) of six monitoring sites maintained length of fallen logs compared to baseline, while one of six monitoring sites increased the length of fallen logs.
Increase in site context value	Connectivity within biodiversity offset areas increased as a result of management actions	No significant change observed. Changes expected over a longer timeframe.
	Increased security of biodiversity offset areas through formal conservation arrangement	Refer to comments at Section 1.1 and Section 11 .
Threatened Species		
Tiger Orchid: - Maintenance of resident species populations and existing habitat for species.	Increase in the extent and condition of habitat	Species not detected during surveys. No obvious increase in area and condition. Changes expected over a longer timeframe.

KPI / Measurable Indicators	Year 10 Performance Criteria	Results of Year 6 (2022) Monitoring
<ul style="list-style-type: none"> - Increase in suitable habitat and increase in species populations and area of occupancy. 		
<p>Squirrel Glider:</p> <ul style="list-style-type: none"> - Maintenance of resident species populations and existing habitat for species. - Increase in suitable habitat and increase in species populations and area of occupancy. 	<ul style="list-style-type: none"> - Increase in the extent and condition of habitat - Continued detection of the species 	<p>No obvious increase in area and condition. Changes expected over a longer timeframe.</p>
<p>Spotted-tailed Quoll:</p> <ul style="list-style-type: none"> - Maintenance of resident species populations and existing habitat for species. - Increase in suitable habitat and increase in species populations and area of occupancy. 	<ul style="list-style-type: none"> - Increase in the extent and condition of habitat - Continued detection of the species 	<p>Species recorded at three locations within the Kenalea Properties on numerous occasions.</p> <p>No obvious increase in area and condition. Changes expected over a longer timeframe.</p>
<p>Threatened Microbats:</p> <ul style="list-style-type: none"> - Maintenance of resident species populations and existing habitat for species. - Increase in suitable habitat and increase in species populations and area of occupancy. 	<ul style="list-style-type: none"> - Increase in the extent and condition of habitat - Continued detection of the species 	<p>Threatened microbat species were recorded within Kenalea, Black Mountain and Merriwa, with further threatened species possibly occurring.</p> <p>No obvious increase in area and condition. Changes expected over a longer timeframe.</p>
<p>Woodland Birds:</p> <ul style="list-style-type: none"> - Maintenance of resident species populations and existing habitat for species. - Increase in suitable habitat and increase in species populations and area of occupancy. 	<ul style="list-style-type: none"> - Increase in the extent and condition of habitat - Continued detection of the species 	<p>Three (3) threatened woodland birds recorded within Kenalea and Merriwa River.</p> <p>No obvious increase in area and condition, although the occurrences of the Speckled Warbler and the Dusky Woodswallow do appear to have consistently increased in recent years. Changes expected over a longer timeframe.</p>
<p>Regent Honeyeater and Swift Parrot:</p> <ul style="list-style-type: none"> - Maintenance of resident species populations and existing habitat for species. - Increase in suitable habitat and increase in species populations and area of occupancy. 	<p>Increase in the extent and condition of habitat</p>	<p>Species not detected during surveys.</p> <p>No obvious increase in area and condition. Changes expected over a longer timeframe.</p>

KPI / Measurable Indicators	Year 10 Performance Criteria	Results of Year 6 (2022) Monitoring
Weeds		
Weed density and distribution	50% reduction in baseline EPC value	Changes to exotic species richness variable across the Biodiversity Offset Areas. Primarily an increase in weed density was observed compared to baseline.
Weed diversity	Downward trend in weed diversity	No significant changes to weed species diversity observed.
Significant target weed infestations	Downward trend in abundance and distribution of significant target weed infestations	Significant weed infestations not mapped as part of annual monitoring. Some changes in occurrences of target species at monitoring sites observed.
Feral Animals		
Feral animal abundance	Downward trend in feral animal abundance	Changes in species occurrences observed, including detections of some previously recorded species and absence of previously recorded species at specific sites. Changes expected over a longer timeframe. However, impacts likely to persist as animals move from adjoining areas into the Biodiversity Offset Areas. No significant increase in abundance of all feral species as a whole observed.
Habitat disturbance by feral animals	Downward trend in habitat disturbance by feral animals	No significant disturbance observed at the monitoring sites.

The data collected in 2022 represented the sixth year of annual monitoring. This assessment is intended to continue the annual monitoring program of the BOAs. Given that the monitoring program is still in its early stages, few measurable changes in survey results were detected in Year six annual monitoring surveys. Nevertheless, it is notable 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. 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 results of monitoring undertaken in Year 6 has been assessed based on the Year 10 performance criteria outlined in the BOMP. Currently no canopy species regeneration is occurring within the derived native grasslands sites that comprise Zone 2. A plan will be developed and implemented to address increasing the presence of canopy species.

Additionally, an increase in the abundance of weed species compared to baseline has been recorded. It is noted that this increase in weed species abundance is likely the result of the previous several years of above average rainfall and favourable growth conditions that has resulted in the proliferation of all ground layer species, both native and exotic, throughout the BOAs. Additional weed management will be undertaken where practicable to prevent further infestation.

Bushfire Hazard Reduction Burns

No hazard reduction burns occurred in the Reporting Period.

During April 2022, an assessment of fuel loads and fuel characteristics for each of the BOAs was undertaken following extensive rainfall experienced in recent years to determine BMC's exposure to bushfire hazards. As a result of this assessment, plans for hazard reduction burns were developed and were scheduled to occur at Black Mountain, Kenalea properties (Echo and Kenalea) and Merriwa River during Spring 2022. Ongoing rainfall again prevented these burns from occurring in 2022, however they are now re-scheduled to occur if optimal conditions prevail in 2023. Results of these burns will be reported in the 2023 Annual Review.

6.11.3 Further Actions

Should any amendments to the BDMP or BOMP be required, BMC will review and submit a revised version of the BDMP or BOMP to the relevant regulatory agencies and stakeholders for comment and then approval to DPE and DCCEEW. A study will be commenced on assessing actions required to meet the Year 10 Performance Criteria.

6.12 WEEDS AND PEST MANAGEMENT

6.12.1 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, as required. Weed and pest control at Bengalla and on the BOA's is undertaken through targeted chemical, baiting and shooting applications.

6.12.2 Environmental Performance

Weed Management

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

- **Bengalla**

During 2022, approximately 255 ha was treated for the management of weeds. Target weed species primarily included African boxthorn, galenia, St John's wort and other environmental weeds. Priority areas for treatment included the pre-clearing areas, rehabilitation areas and topsoil stockpiles. Chemicals used during 2022 include Glyphosate with metsulfuron, Grazon Extra and Garlon 600.

Observations during the weed treatment program and follow up inspections indicate that treatment methods used during the Reporting Period have generally been effective in reducing the presence of weeds in target areas.

Weed management areas at Bengalla are shown on **Figure 10**.

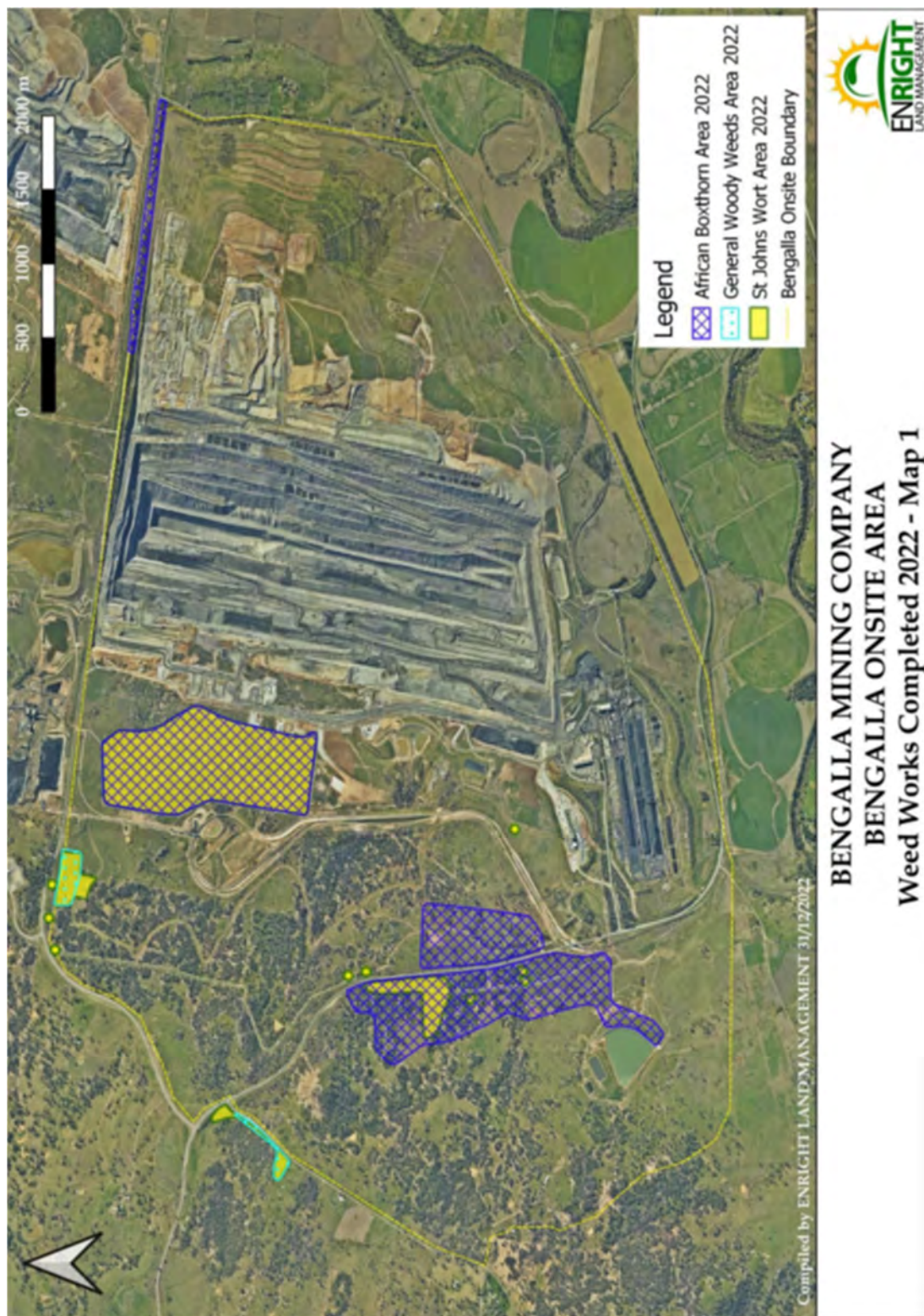


Figure 10: Bengalla Weed Management Locations 2022

- **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 BOAs. Following identification, weed control commences.

The chemicals to be utilised are based on their effectiveness depending on the type of weeds present. Chemicals used during 2022 include Glyphosate with metsulfuron, Grazon Extra and Garlon 600.

The weeds controlled during the Reporting Period included prickly pear, Paterson's curse, blue heliotrope, African boxthorn, lantana and several environmental weeds across each BOA.

St John's Wort was also addressed on Black Mountain utilising ground controls whilst on Kenalea a combination of ground control and aerial spraying was undertaken.

Regional rainfall was above the long-term average for 2022 which contributed to the increase of several weed populations and the ensuing level of control required. Access to some areas proved difficult in 2022 due to flooding of creeks and access crossings.

Figure 11 - Figure 14 show locations of weed control in 2022 at the Black Mountain and Kenalea BOA's. The Merriwa River BOA had minimal weed control undertaken due to ongoing wet conditions impacting on safe access.

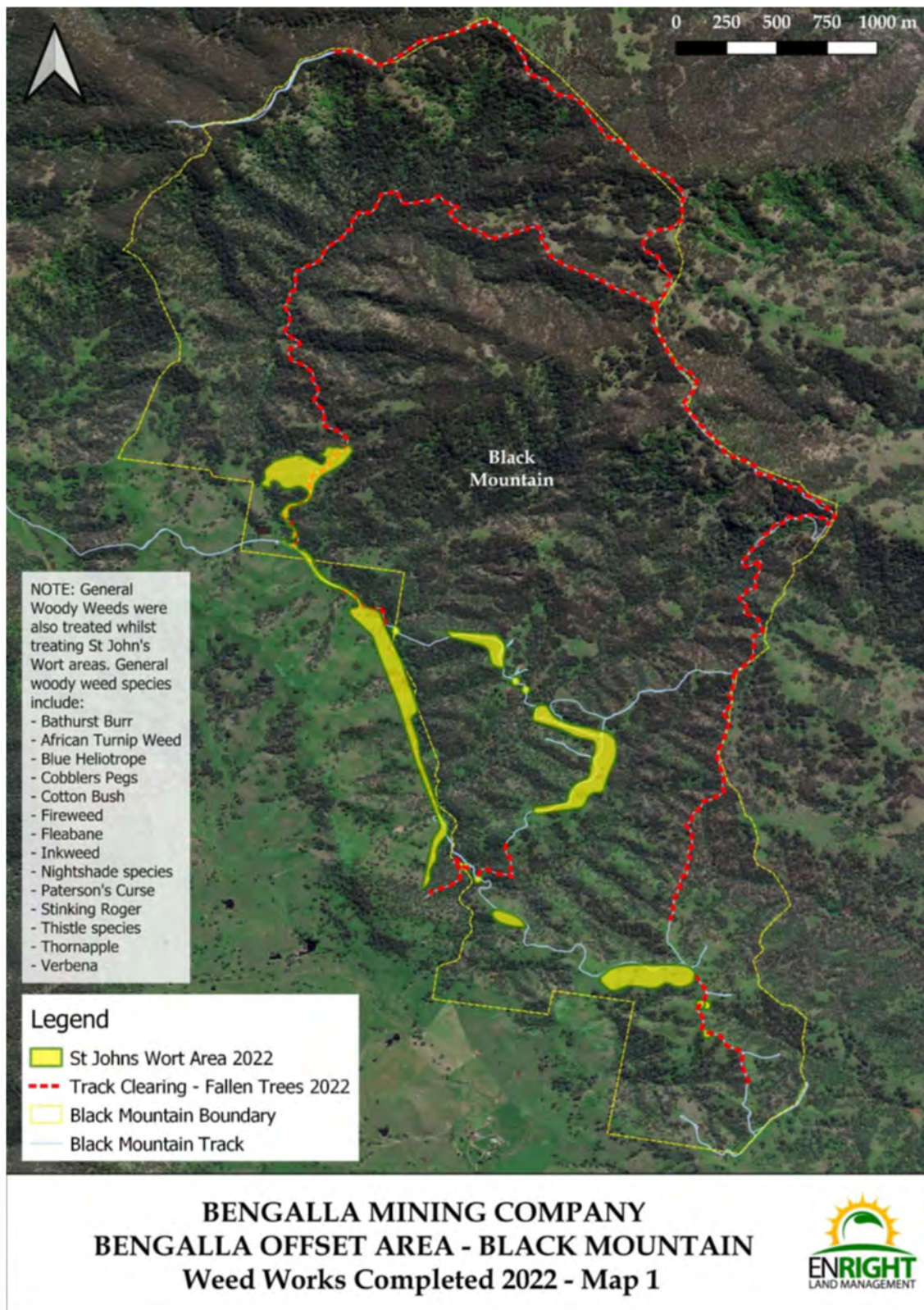


Figure 11: Black Mountain Weed Management Locations 2022

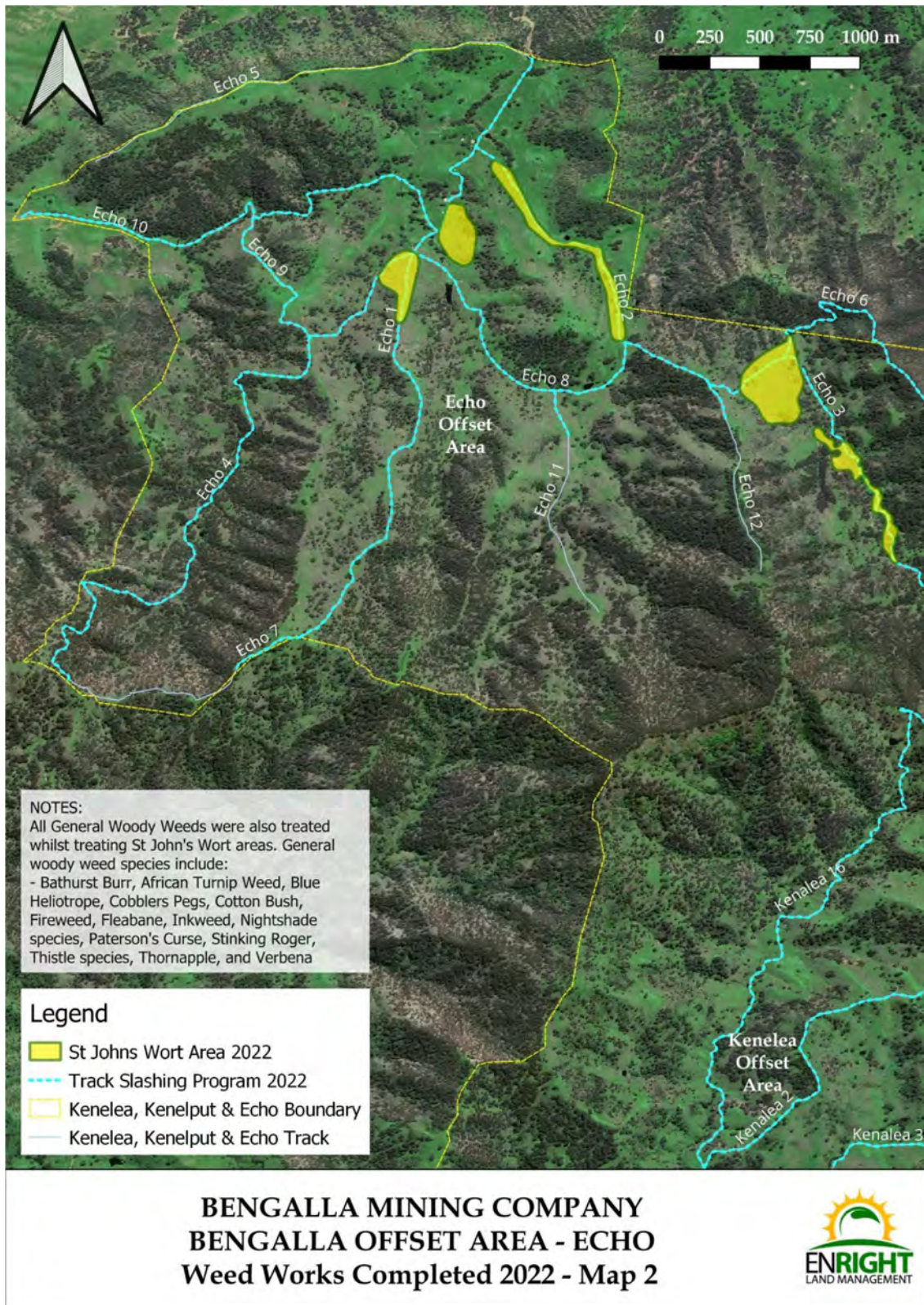


Figure 12: Kenalea (Echo) Weed Management Locations 2022

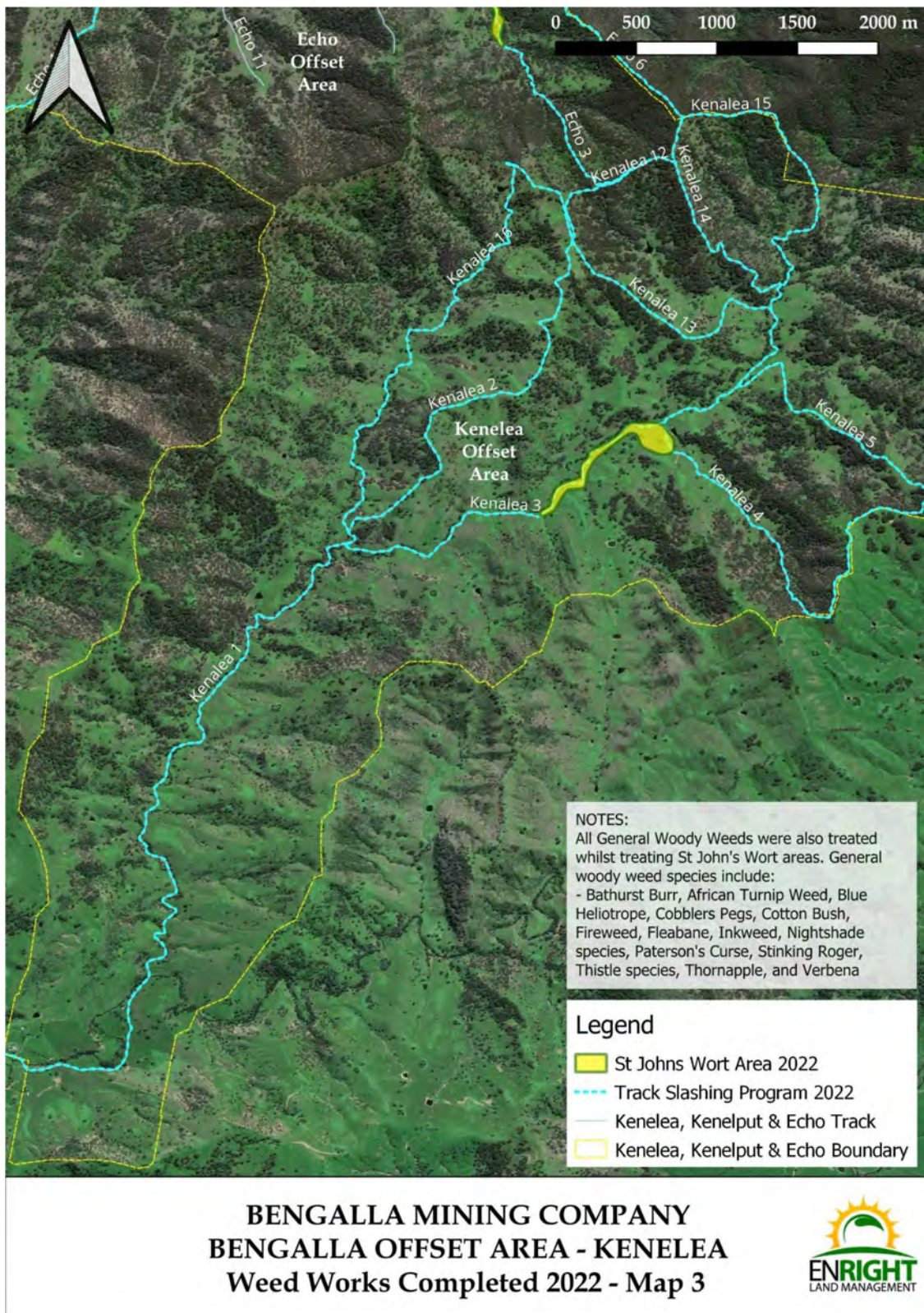


Figure 13: Kenalea Weed Management Locations 2022

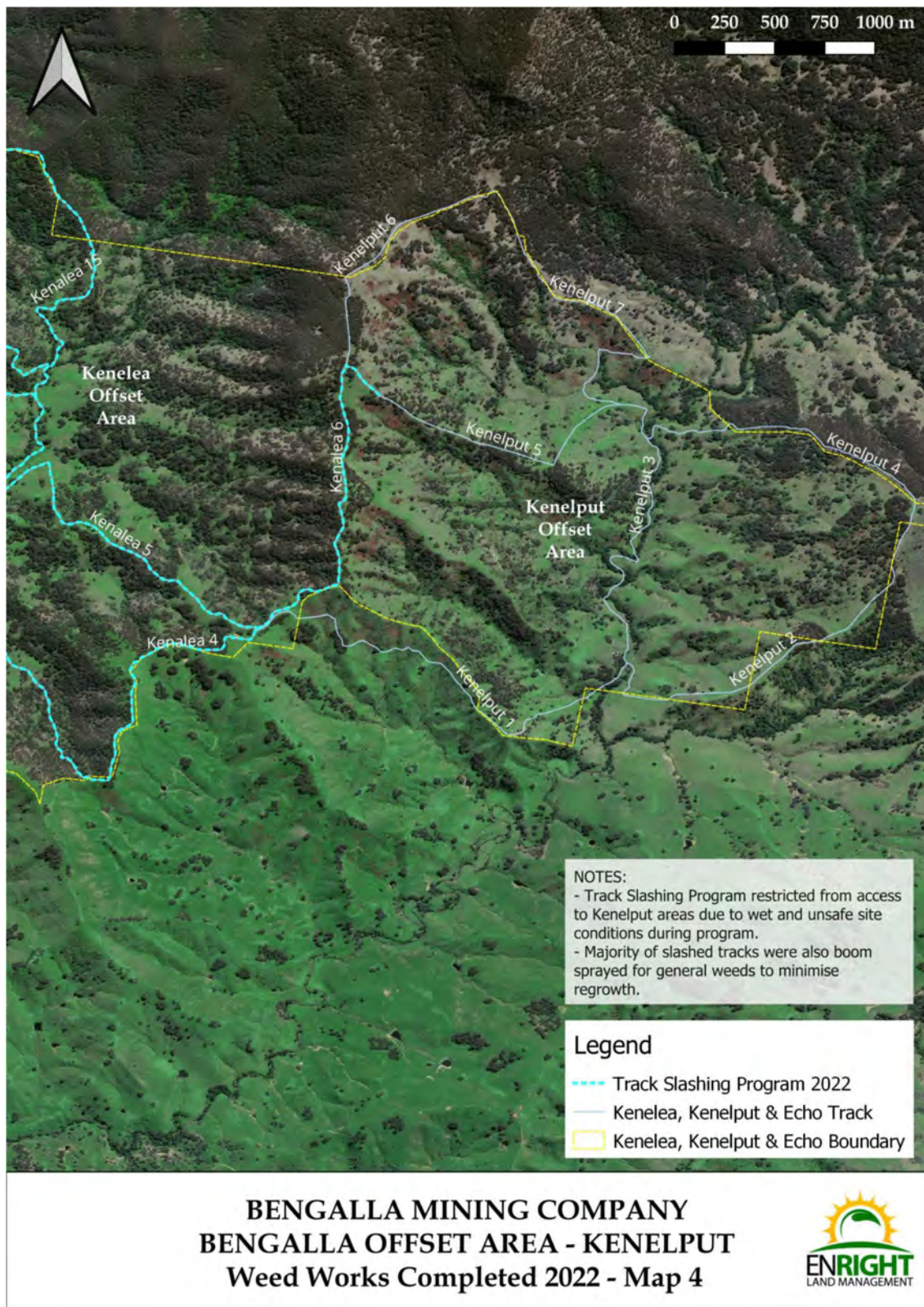


Figure 14: Kenalea (Kenelput) Weed Management Locations 2022

Pest Management

- **Bengalla**

A pig control program was conducted throughout 2022 at various locations across Bengalla, however this was impacted by continued access issues due to continued rainfall. This utilised both trapping and baiting using sodium nitrate. A total of 10 pigs were trapped and culled in 2022.

Feral pigs were trapped utilising a penning system using grain and molasses as the main attractant. Once trapped, all pigs were disposed of humanely.

The culling program will continue into 2023 across Bengalla.

Dog baiting programs at Bengalla occurred in the Autumn and Spring 2022. Each program was undertaken in conjunction with LLS and local wild dog associations and additionally forms part of a broader scale baiting program targeting foxes and wild dogs in the Hunter Valley. Baiting included utilising 1080 poison baits in addition to ejector capsule baits and each baiting program extended for three weeks during each period.

Figure 15 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, 25 bait stations were laid over a three week period with a total of 87 baits. Results indicate 42 takes of which 17 takes were by target species being foxes. No wild dog takes were recorded. Bait shyness was detected at some locations.

During the spring baiting program, 25 stations were laid over a three week period with a total of 65 baits. Results indicate 27 takes of which 18 takes were by target species being foxes. 2 wild dog takes were recorded. No evidence of bait shyness was 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, including aerial dog baiting in Autumn and Spring in consultation with Local Land Services. **Figure 16**, **Figure 17** and **Figure 18** show locations of wild dog baiting locations on each BOA in 2022.

A total of 614 baits were placed during the 2022 ground baiting program targeting foxes and wild dogs. A total of 104 baits were taken during the program. Results indicated that 38% of baits were taken by wild dogs and 62% by foxes. Trends over 5 years indicate that wild dog takes have varied from 67 in 2016, 29 takes in 2017, 33 takes in 2018. 88 takes in 2019, 29 in 2020, 28 in 2021 and 39 in 2022. This suggests that dog numbers have risen during 2022, possibly due to an increase in food supply or migration from other areas where food supply was lower.

Opportunistic feral animal control was also undertaken during weed control works targeting 17 pigs and 2 deer.

Further Actions

Ongoing management of weeds and feral animals at Bengalla and BOA's will continue during 2023.

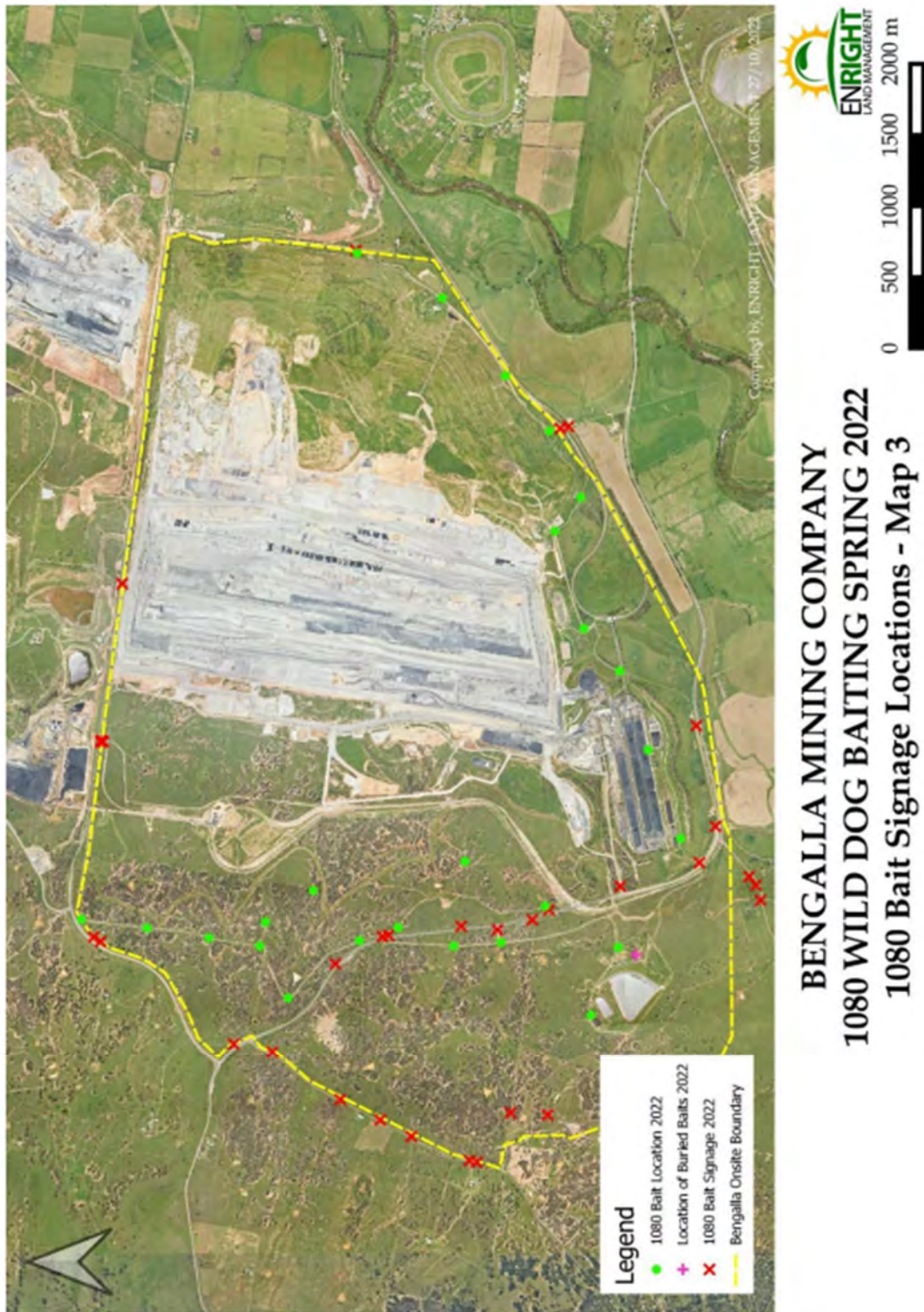
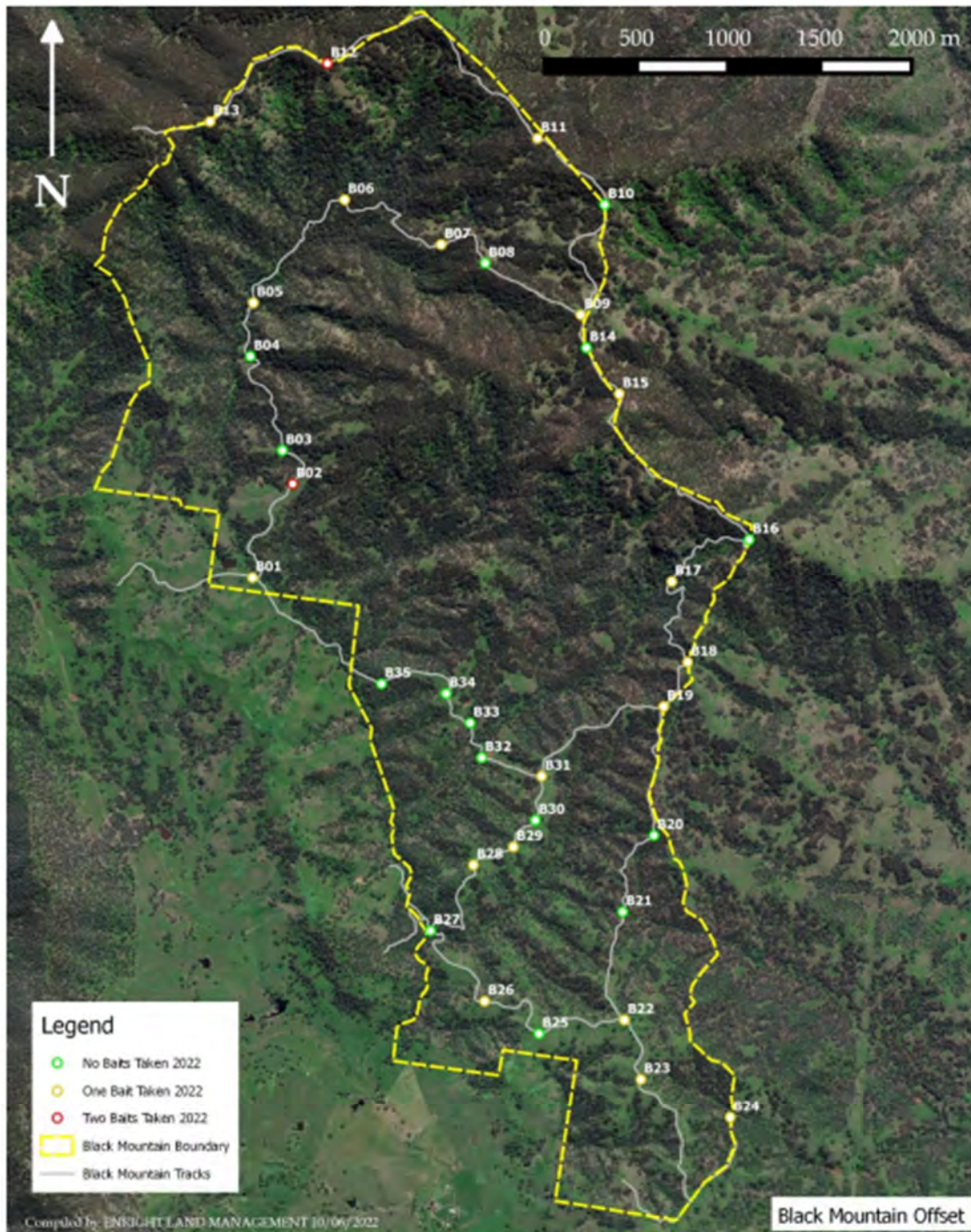


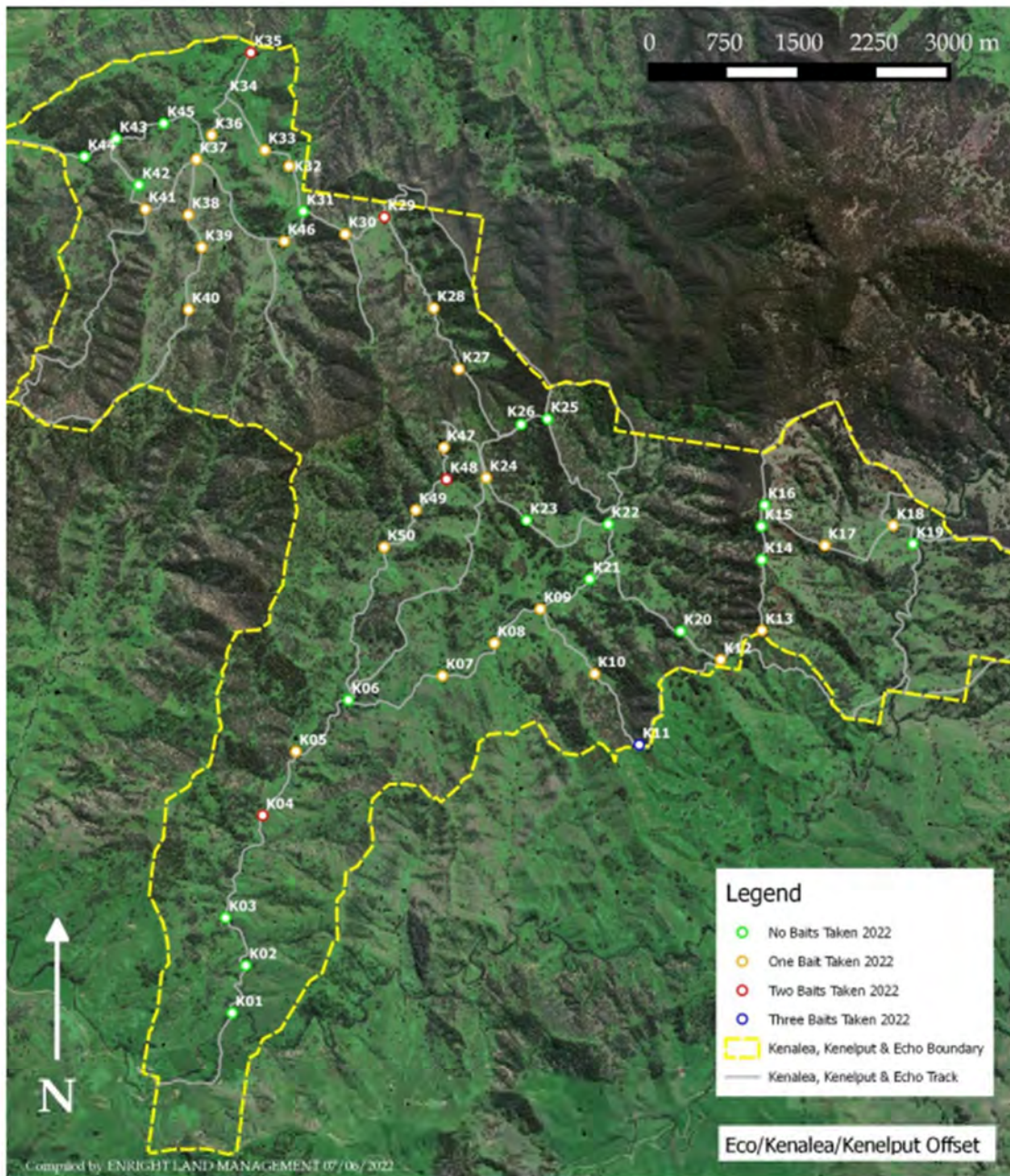
Figure 15: 1080 Wild Dog Baiting Locations at Bengalla Mine



BENGALLA MINING COMPANY
1080 BAITING PROGRAM AUTUMN 2022
Wild Dog & Fox Bait Location Success Rate - Map 2



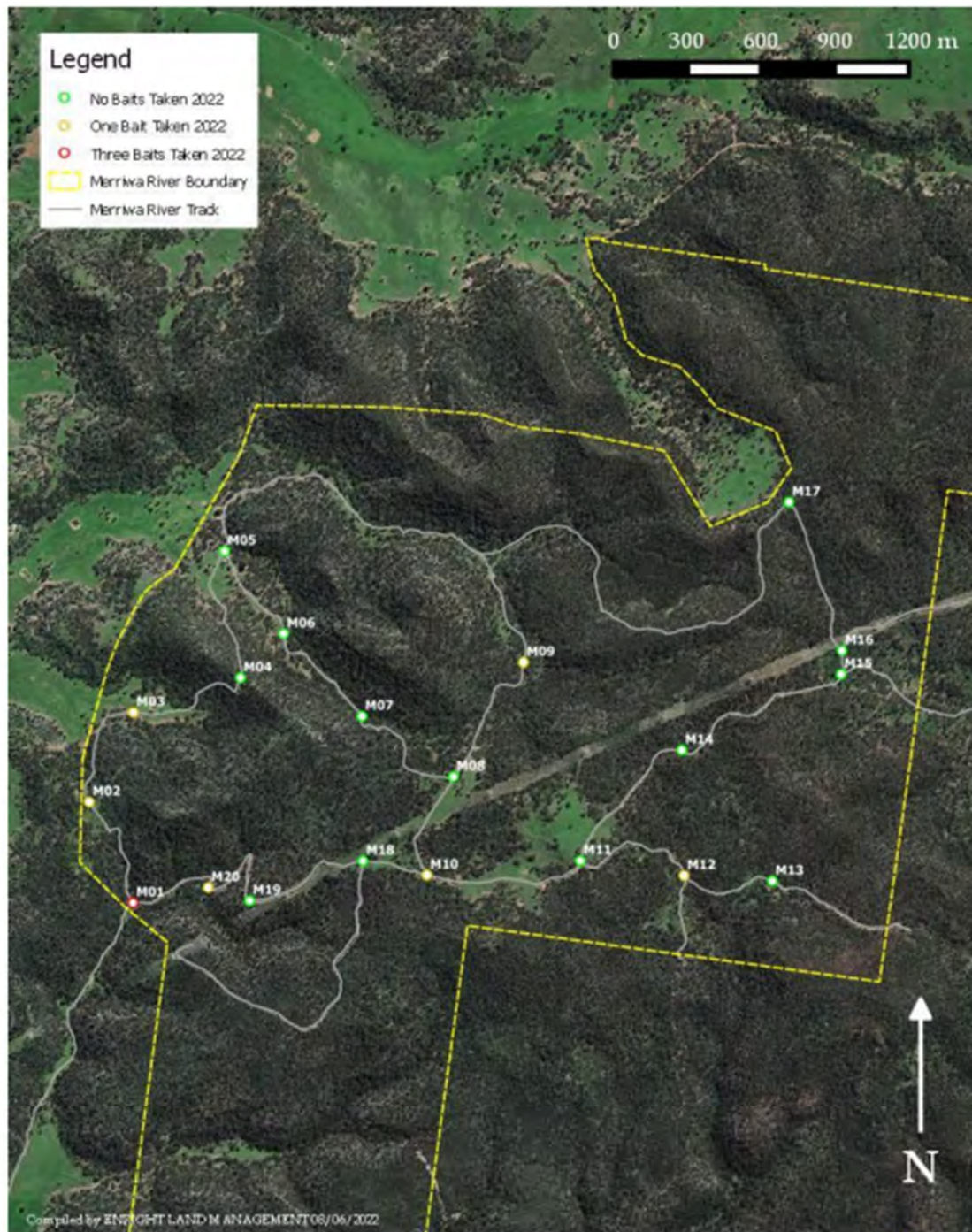
Figure 16: 1080 Wild Dog Bait Locations at Black Mountain Offset



**BENGALLA MINING COMPANY
1080 BAITING PROGRAM AUTUMN 2022
Wild Dog & Fox Bait Success Rate - Map 2**



Figure 17: 1080 Wild Dog Bait Locations at Kenalea Properties Offset



BENGALLA MINING COMPANY
1080 BAITING PROGRAM AUTUMN 2022
Wild Dog & Fox Bait Location Success Rate - Map 2



Figure 18: 1080 Wild Dog Bait Locations at Merriwa River Offset

6.13 VISUAL AMENITY AND LIGHTING

6.13.1 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.

6.13.2 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 RMS (now 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 has 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.

BMC is progressing an application for the required consent under section 138 of the *Roads Act 1993* NSW to complete tree screen planting along Denman Road. Some sections of Wybong Road can now be accessed after the Mount Pleasant Mine rail and associated infrastructure was removed (that occurred 31 October 2022). The Secretary of DPE has granted an extension to complete tree screen planting until 31 December 2022. BMC requested an extension of time to meet its obligations by letter to DPE dated 30 December 2022. Mod 5 contained amended and new conditions regarding tree screening along public roads.

6.13.3 Further Actions

Plantings in road reserves or adjacent areas that have views of Bengalla will be progressed as required following further consideration of the Mod 5 conditions.

6.14 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 7 December 2022. The simulated scenario was an uncontrolled discharge from Bengalla Discharge Dam (DW1) impacting the Muswellbrook / Ulan rail line and Bengalla Link Road.

The exercise confirmed that the response procedure included in the PIRMP is appropriate and that the required response from BMC was effective.

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 23**. An overview of the site water balance is presented in **Table 24**.

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 23: Site Water Take 2022

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>	1449 units ¹	-	555	555
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	150 ³	-	150
Harvestable Rights	Muswellbrook Water Source <i>Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009 NSW</i>	109 ML ²	0	-	0
Total					705

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 (EIS).

³ Groundwater inflow to open cut pit estimated by WSP Report dated 1 February 2023.

Table 24: Site Water Balance 2022

Aspect	Volume (ML)
Water Inputs	
Raw water sourced from Hunter River (ML/yr)	555
Rainfall and catchment runoff (ML/yr)	2,421
Groundwater inflow to open cut pits (ML/yr)	150
Water entrained in ROM coal processed (ML/yr)	958
Total Inputs	4,084
Outputs	
Water entrained in product coal	1,749

Aspect	Volume (ML)
Other CHPP plant losses	36
Dust suppression (stockpiles and haul roads)	696
Vehicle wash-down losses	133
Hunter River Salinity Trading Scheme (HRSTS) discharge	1904
Other offsite discharges from mine water management system	0
Evaporation from dams	199
Total outputs	4,717
Water Balance for 2022	+633 ML

During the Reporting Period, BMC discharged a total of 1,904 ML of saline water from DW1 to the Hunter River (from 62 discharge events) under the Hunter River Salinity Trading Scheme (HRSTS). An overview of the discharge events is presented in **Table 25**.

Table 25: Discharge Events 2022

Block Number	Start Date	Start Time	End Date	End Time	Total Volume (ML)
2022-066	5/03/2022	5:46	6/03/2022	3:32	38.25
2022-067 (1 and 2)	6/03/2022	5:01	7/03/2022	3:33	43.62
2022-068 (1 and 2)	7/03/2022	4:37	8/03/2022	3:29	97.64
2022-069(1)	8/03/2022	5:03	9/03/2022	3:45	147.01
2022-070(1)	9/03/2022	4:29	10/03/2022	1:12	155.63
2022-071(1)	10/03/2022	7:40	10/03/2022	12:14	30.25
2022-072(1)	11/03/2022	12:00	12/03/2022	3:32	27.10
2022-073(1)	12/03/2022	8:08	13/03/2022	3:33	51.10
2022-074(1)	13/03/2022	8:00	14/03/2022	3:33	27.67
2022-075(1)	14/03/2022	7:54	14/03/2022	10:34	2.20
2022-092(1)	31/03/2022	16:19	31/03/2022	23:25	2.96
2022-093(1)	1/04/2022	7:37	2/04/2022	2:30	32.54
2022-094(1)	2/04/2022	9:41	3/04/2022	2:05	18.59
2022-095(1)	3/04/2022	7:23	4/04/2022	3:22	18.07
2022-096(1)	4/04/2022	7:43	5/04/2022	3:29	11.17
2022-097(1)	5/04/2022	7:28	6/04/2022	3:30	4.11
2022-187(1)	4/07/2022	11:24	5/07/2022	3:31	13.12
2022-188(1)	5/07/2022	5:32	5/07/2022	16:58	5.68
2022-188(2)	5/07/2022	16:59	6/07/2022	3:23	23.17
2022-189(1)	6/07/2022	4:45	6/07/2022	9:26	17.57
2022-189(2)	6/07/2022	9:27	7/07/2022	3:25	135.58
2022-190(1)	7/07/2022	4:49	7/07/2022	10:07	5.36
2022-190(2)	7/07/2022	10:08	8/07/2022	3:29	51.73
2022-191(1)	8/07/2022	4:40	9/07/2022	3:32	81.01
2022-192(1)	9/07/2022	5:49	10/07/2022	3:32	95.95
2022-193(1)	10/07/2022	4:49	11/07/2022	3:31	33.84
2022-194(1)	11/07/2022	5:06	12/07/2022	3:30	29.21

2022-195(1)	12/07/2022	4:33	13/07/2022	3:30	22.85
2022-203(2)	20/07/2022	12:30	20/07/2022	22:56	3.51
2022-208(1)	25/07/2022	8:25	25/07/2022	23:17	8.86
2022-209(1)	26/07/2022	4:48	27/07/2022	3:22	27.38
2022-210(1)	27/07/2022	5:13	28/07/2022	3:25	28.00
2022-211(1)	28/07/2022	4:47	29/07/2022	3:11	10.67
2022-212(1)	29/07/2022	4:25	29/07/2022	23:22	5.73
2022-213(1)	30/07/2022	4:41	31/07/2022	3:29	14.71
2022-214(1)	31/07/2022	4:59	1/08/2022	3:24	14.32
2022-215(1)	1/08/2022	4:42	2/08/2022	3:11	21.98
2022-216(1)	2/08/2022	4:27	3/08/2022	3:14	24.69
2022-217(1)	3/08/2022	4:29	4/08/2022	3:15	12.35
2022-218 (1)	4/08/2022	4:42	4/08/2022	20:32	5.92
2022-224 (1)	10/08/2022	9:20	11/08/2022	3:29	34.92
2022-225 (1)	11/08/2022	5:45	12/08/2022	3:30	31.68
2022-226 (1)	12/08/2022	5:24	12/08/2022	19:00	9.66
2022-230 (1)	16/08/2022	8:10	16/08/2022	8:31	0.48
2022-263(1)	18/09/2022	7:22	18/09/2022	23:15	16.10
2022-264(1)	19/09/2022	6:04	19/09/2022	23:24	24.10
2022-265(1)	20/09/2022	7:04	20/09/2022	23:23	9.80
2022-268(2)	23/09/2022	14:13	23/09/2022	15:02	1.04
2022-268(3)	23/09/2022	15:03	24/09/2022	3:26	49.80
2022-269(1)	24/09/2022	8:00	24/09/2022	11:16	7.60
2022-268(3)	24/09/2022	11:17	24/09/2022	23:32	57.90
2022-270(1)	25/09/2022	7:24	25/09/2022	23:31	10.40
2022-271(1)	26/09/2022	6:59	26/09/2022	23:28	12.20
2022-272(1)	27/09/2022	6:40	27/09/2022	23:28	21.30
2022-273(1)	28/09/2022	6:39	28/09/2022	15:09	3.00
2022-300(1)	25/10/2022	12:13	25/10/2022	23:26	26.90
2022-301(1)	26/10/2022	6:22	26/10/2022	23:23	98.70
2022-302(1)	27/10/2022	6:32	27/10/2022	10:37	17.40
2022-302(2)	27/10/2022	10:38	27/10/2022	14:56	29.30
2022-322(1)	16/11/2022	7:17	16/11/2022	8:29	1.20
2022-322(2)	16/11/2022	8:30	16/11/2022	15:03	39.20

7.2 SURFACE WATER

7.2.1 Environmental Management

BMC has an approved Water Management Plan (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 555 ML from the Hunter River. The Bengalla site water balance for 2022 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 19**.

Surface Water Monitoring Results

A comparison of the 2022 surface water monitoring results with the results for previous years for the Hunter River is presented in **Table 26**.



Figure 19: Surface Water Monitoring Locations

Table 26: Summary of Surface Water Monitoring Results (2020 – 2022)

Year	Site W01 Average ¹			Site W02 Average ²			Site W03 Average ³			Site W04 Average ⁴		
	pH	TSS	EC	pH	TSS	EC	pH	TSS	EC	pH	TSS	EC
2020	7.9	178	474	7.9	193	454	7.9	203	490	7.9	168	536
2021	7.9	110	503	8.1	60	635	8.0	76	574	7.9	47	552
2022*	8.0	177	487	8.1	180	530	8.1	104	487	8.0	97	592

* 15 sampling events

1. One sampling event not sampled due to no safe access.
2. Five sampling events not sampled due to no safe access.
3. Five sampling events not sampled due to no safe access.
4. Three sampling events not sampled due to no safe access.

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 µS/cm.

Bengalla recorded several rain events¹ during 2022 (January, March, July, August, September, October and November) which resulted in elevated TSS levels in the Hunter River which significantly impacted the annual average at all Hunter River sites (see **Appendix F**). No exceedances of the trigger values were recorded in pH or EC for the Reporting Period at the four Hunter River water monitoring sites.

Comparison to Assessment Predictions

The EIS predicted that downstream impacts on surface water quality would be negligible provided discharge from Bengalla is conducted according to the HRSTS.

Surface water monitoring of pH, TSS and EC at the four Hunter River water monitoring sites in 2022 confirmed that water quality remains generally within the relevant WMP impact criteria for pH and EC however there were elevated results for TSS which created an overall average in excess of the trigger values.

An overview of the Bengalla site water balance for 2022 is provided in **Section 7.1**. In comparing the 2022 water balance results to the EIS, Year 8 average results were selected as 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 8² however a surplus of approximately 632 ML occurred in 2022. The discrepancy between the EIS prediction and the

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

² Bengalla EIS Volume 1 Table 51.

measured and modelled 2022 water balance is likely due to above average rainfall for the Reporting Period.

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 DPE for approval.

7.3 GROUNDWATER

7.3.1 Environmental Management

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

Groundwater Monitoring

The groundwater monitoring network (shown on **Figure 20**) targets two aquifers being an alluvial aquifer associated with the Hunter River floodplain and a Permian aquifer system.

The alluvium, shallow bedrock and deep bedrock bores are all sampled for Standing Water Level, pH, EC, and Total Dissolved Solids at various frequencies. A chemical analysis including sulphate and metals is also undertaken on several bores annually according to the WMP.

The final development of the new nested bore (located north of BG3) was completed in April 2022. However, sampling of the nested bore was delayed due to safety concerns related to methane gas emissions from the bore. Following several tests of methane levels emitting from the bore, BMC were able to determine the risk is low and sampling commenced in September 2022.

Monitoring Results for Groundwater Levels, Quality and Baseline Data

During 2022, BMC undertook investigations into groundwater triggers as per Appendix E of WMP, of which all investigations concluded no environmental harm had occurred. BMC 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 2022 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 2023 actions.

The WMP will be reviewed and updated as required in 2023 according to SSD-5170, including the new trigger levels recommended from the Groundwater Validation Review (AGE, 2022).

BMC will lodge the revised plan with relevant regulatory agencies for comment and then with DPE for approval.



Figure 20: Groundwater Monitoring Locations

8 REHABILITATION

This section describes the Bengalla rehabilitation objectives and performance during 2022. Rehabilitation activities planned for the next Reporting Period are also discussed.

8.1 REHABILITATION OBJECTIVES AND FINAL LAND USE

The rehabilitation objectives for Bengalla as described in Schedule 3 Condition 44 of SSD-5170 and the status of each is provided in **Table 27**.

Table 27: Bengalla Rehabilitation Objectives (from SSD-5170 (as modified))

Feature	Objective	Status
Mine site (as a whole)	<ul style="list-style-type: none"> Safe, stable and non-polluting 	<ul style="list-style-type: none"> Ongoing. See Section 6.8.1 for a description of Bengalla mineral waste management during 2022.
	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Rehabilitate the entire face with high density woody vegetation as soon as practicable following the completion of mining operations¹ 	<ul style="list-style-type: none"> Ongoing. Rehabilitation Management Plan describes implementation of HDWV.
Final void	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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) Maximise to the greatest extent practicable the final void landform to be in keeping with the natural terrain features of the surrounding landscape 	<ul style="list-style-type: none"> Final void designs approved under SSD-5170 to be reviewed at least five years from closure of Bengalla.
Agricultural land	<ul style="list-style-type: none"> Restore or maintain land capability generally as described in the EIS and 	<ul style="list-style-type: none"> Ongoing. Rehabilitation activities are undertaken with the objective of

¹ This part of Schedule 3 Condition 44 was modified in February 2023 by Mod 5 to state “Rehabilitate the entire face with high density woody vegetation comprising of species commensurate with the surrounding native vegetation communities as soon as practicable following the completion of mining operations”.

Feature	Objective	Status
	shown conceptually in Appendix 9 of SSD-5170.	achieving the land capability approved under SSD-5170 and the Rehabilitation Management Plan.
Revegetation areas	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Dry Creek reinstatement planned to commence from around 2030 subject to operational progress.
Surface infrastructure	<ul style="list-style-type: none"> To be decommissioned and removed, unless RR agrees otherwise 	<ul style="list-style-type: none"> During 2022 Bengalla decommissioned the ORICA Reload Facility and the BMC Magazine.
Community	<ul style="list-style-type: none"> Ensure public safety; Minimise the adverse socio-economic effects associated with mine closure 	<ul style="list-style-type: none"> 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 and MOP Amendment D (up until 1 July 2022), the Bengalla Mine Forward Program (post 2 July 2022) and the Rehabilitation Management Plan (RMP) (post 2 July 2022).

The proposed area for new rehabilitation in 2022 was approximately 20ha consisting of Class IV pasture rehabilitation (8.7ha) and High Density Woody Vegetation (HDWV) 11.3ha, focussing on the southern face and crest of the Overburden Emplacement Area (OEA). Additionally, approximately 42ha of retrofitted HDWV tubestock was proposed on the eastern face of the OEA.

During the Reporting Period, no areas of new rehabilitation were completed due to ongoing meteorological conditions impacting the delivery of bulk material for reshaping and final rehabilitation. This is scheduled to be finalised in the current Forward Program period.

During the Reporting Period, BMC continued retrofitting of HDWV tubestock over previously rehabilitated lands. During May 2022, 25ha of tubestock were planted on the eastern face of the OEA. This area was different from what was planned as 27ha of a treed area was previously planted when the original rehabilitation was installed.

The rehabilitation completed for 2021 (previous reporting period), 2022 (this Reporting Period) and the predicted rehabilitation activities for 2023 is summarised in **Table 28**.

Table 28: Bengalla Rehabilitation Status Summary

Mine Area Type	Previous Reporting Period 2021 (ha)	This Reporting Period 2022 (ha)	Next Reporting Period 2023 (ha) ⁶
A. Total mine footprint¹	1,252	1,355	1,556
B. Total Active Disturbance²	946	1,047	1,229
C. Land being prepared for rehabilitation³	0	0	0
D. Land Under Active Rehabilitation⁴	306 ⁷	307	327
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 2023" is consistent with Bengalla Mine Forward Program and RMP.

7 Area miscalculated in Annual Review 2021. Correct area of land under active rehabilitation is 307ha. Note, no rehabilitation has been undertaken in 2022 Reporting Period.

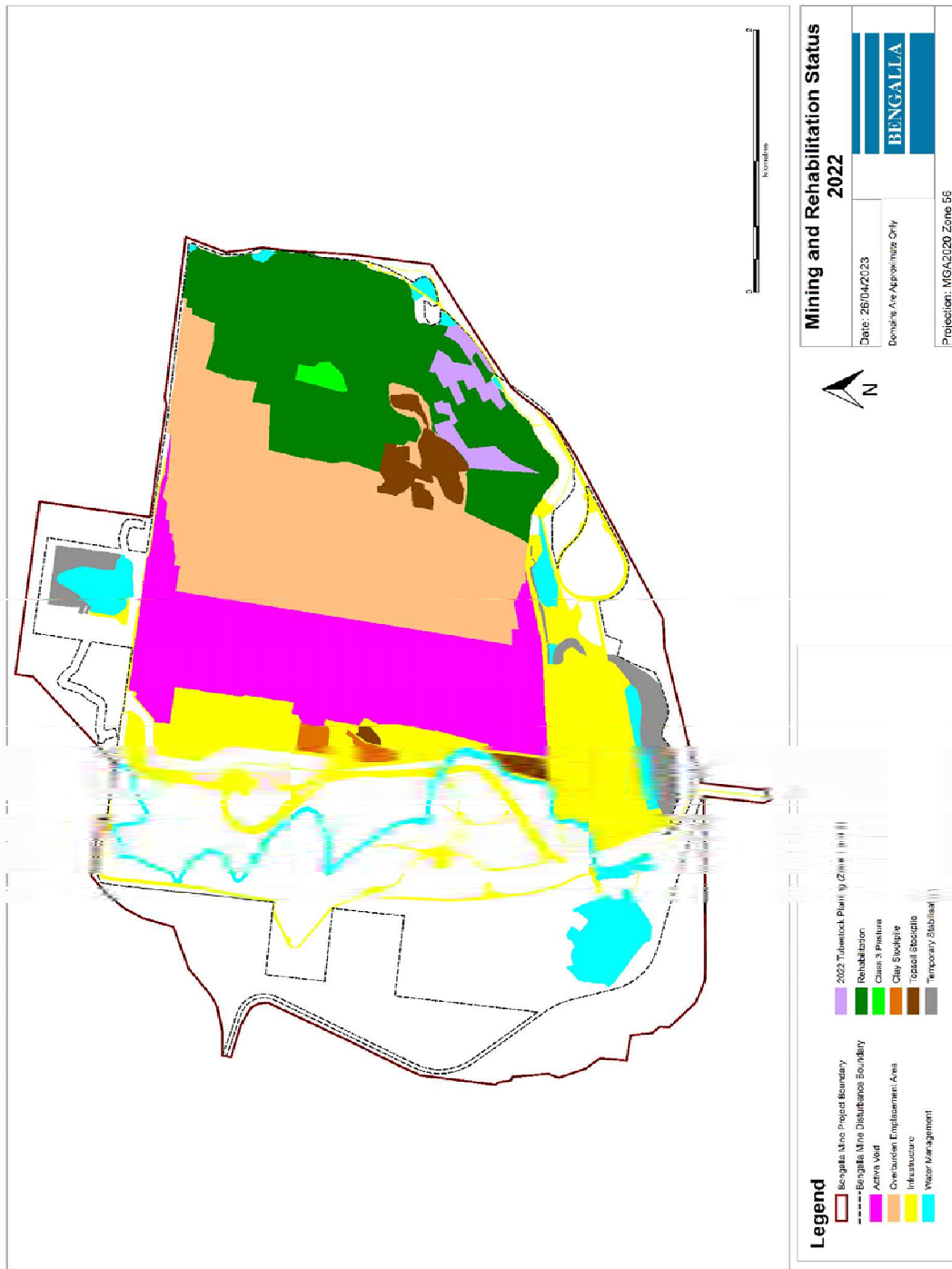


Figure 21: Mining and Rehabilitation Status 2022

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.

During the Reporting Period, rehabilitation monitoring was undertaken during December 2022 and assessed 40 existing rehabilitation sites.

The transect based monitoring conducted during 2022 is presented in **Table 29**, with the locations of each transect shown on Figure 2 of Appendix H. HDWV 35 - 42 were established and monitored following progressive installation of HDWV during the Reporting Period.

Table 29: Bengalla Rehabilitation Monitoring Program Transects (2022)

Transect Name	Description	Rehabilitation Established	Transect Established
Class III	Grazing Pasture	2012	2014
NW1 (HDWV 1)	High density woodland on Class IV or V land	2005	2009
NW2 (HDWV 2)	High density woodland on Class IV or V land	2004	2009
NW3 (HDWV 3)	High density woodland on Class IV or V land	2008	2012
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
NW7 (HDWV 7)	High density woodland on Class IV or V land	2015	2017
NW8 (HDWV 8)	High density woodland on Class IV or V land	2016	2018
NW9 (HDWV 9)	High density woodland on Class IV or V land	2016	2018
NW10 (HDWV 10)	High density woodland on Class IV or V land	2006	2018
NW11 (HDWV 11)	High density woodland on Class IV or V land	2004	2018
NW14 (HDWV 14)	High density woodland on Class IV or V land	2020	2020
NW15 (HDWV 15)	High density woodland on Class IV or V land	2020	2020
HDWV16	High density woodland on Class IV or V land	2020	2020
HDWV17	High density woodland on Class IV or V land	2020	2020
HDWV18	High density woodland on Class IV or V land	2020	2020
HDWV19	High density woodland on Class IV or V land	2020	2020
HDWV20	High density woodland on Class IV or V land	2020	2020
HDWV21	High density woodland on Class IV or V land	2020	2020
HDWV22	High density woodland on Class IV or V land	2020	2020
HDWV23	High density woodland on Class IV or V land	2020	2020
HDWV24	High density woodland on Class IV or V land	2020	2020
HDWV25	High density woodland on Class IV or V land	2020	2020
HDWV26	High density woodland on Class IV or V land	2020	2020
HDWV27	High density woodland on Class IV or V land	2020	2020
HDWV28	High density woodland on Class IV or V land	2020	2020
HDWV29	High density woodland on Class IV or V land	2021	2021

Transect Name	Description	Rehabilitation Established	Transect Established
HDWV30	High density woodland on Class IV or V land	2021	2021
HDWV31	High density woodland on Class IV or V land	2021	2021
HDWV32	High density woodland on Class IV or V land	2021	2021
HDWV33	High density woodland on Class IV or V land	2021	2021
HDWV34	High density woodland on Class IV or V land	2021	2021
HDWV35	High density woodland on Class IV or V land (tubestock)	2022	2022
HDWV36	High density woodland on Class IV or V land (tubestock)	2022	2022
HDWV37	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
HDWV39	High density woodland on Class IV or V land (tubestock)	2022	2022
HDWV40	High density woodland on Class IV or V land (tubestock)	2022	2022
HDWV41	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

Source: Koru Environmental Pty Limited, 2022

8.3.1 Rehabilitation Monitoring Results

Following three years of severe drought between 2016-2019, above average rainfall was received during 2020, 2021 and 2022.

During 2022 rehabilitation monitoring continued to focus on rehabilitated areas of the OEA.

The Class III pasture rehabilitation overall showed a satisfactory performance condition in 2022, with high vegetative cover dominated by productive and palatable tropical pasture grasses, high biomass and feed quality, and minimal weed incidence.

Areas of historic HDWV rehabilitation are well established and showed minimal change from the last few years.

Ground layer throughout historic areas remained largely dominated by exotic pasture species – with *Megathyrus maximus* (Guinea grass) being particularly widespread and abundant; and consistently with previous years the incidence of native ground cover species was overall limited. This however still conforms with the final land use defined for areas of HDWV which are intended to include a component of grazing and therefore needs to include productive and palatable species.

Areas of recent HDWV rehabilitation (established since 2020) were variable in condition.

Soil sampling and analysis was undertaken with testing results generally indicating no key deficiencies in the various growth media.

Weed incursion remained a key issue in 2022, with most problematic species including *Galenia*, Golden Wreath Wattle and African boxthorn. *Galenia* has responded rapidly to the

increased rainfall with an increased abundance recorded at many locations. Additionally African boxthorn has also increased. 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. Erosion repairs will be undertaken in some key areas in 2023 on 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 2023 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.

Remediation works identified in geofluid structures will occur during 2023.

BMC will undertake the recommended actions detailed in **Appendix H** for 2023 where reasonable and feasible that have been identified as part of the 2022 rehabilitation monitoring program.

BMC is considering a modification application of SSD-5170 partly related to the landform. If that modification application is progressed long term stability of the landform will be examined.

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 2022:

- Bengalla Community Consultative Committee (CCC) meetings. The meetings were held in February, May, August, and November 2022. 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 2022, two Upper Hunter Mining Dialogue School Mines Tours were held with a total of 39 students from Muswellbrook High School and St Joseph's Primary School Denman participating.

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 the CST include:

- Denman Pony Club
- Muswellbrook Cats AFL Club
- Upper Hunter Community Services
- Muswellbrook High School
- Upper Hunter Youth Services
- Upper Hunter Stock Dog Challenge
- Westpac Charity Golf Day
- Muswellbrook and District Camera Club

During 2022, BMC contributed to the education and career development of students from Muswellbrook, Aberdeen, and Scone High Schools with the provision of undergraduate scholarships. BMC awarded eight (8) scholarships to local students pursuing an

undergraduate degree in 2023, and four full scholarships for students pursuing a career in engineering which includes vacation work at Bengalla. BMC will continue to support local students with scholarship programs again being made available in 2023. In addition, each year in partnership with MIGAS, BMC takes on local apprentices so that at any one time there are 16 apprentices employed by BMC. In 2022, five apprentices were employed, and they will be undertaking their mechanical and electrical studies whilst also working onsite.

The work experience/placement program with local High Schools and TAFE continued in 2022, offering 23 placements to local students and the opportunity to experience the various careers in the mining industry.

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 2022 included:

- The Polly Farmer Foundation - Muswellbrook Follow the Dream Program.
- Scone Charity Rodeo
- Wanaruah Local Aboriginal Lands Council Elders Group
- The Great Cattle Dog Muster
- Merriwa Volunteer Rescue Association
- Upper Hunter Country Tourism Association
- PCYC Muswellbrook Mini Movers Program
- Muswellbrook Shire Council's Rock'n the Brook Music Event

BMC will continue to focus on ensuring the long-term sustainability of the community and target issues, needs and opportunities which are a priority to the local community through the CDF.

In 2022, BMC sponsored and partnered with local community groups including:

- Muswellbrook Shire Council (MSC) Blue Heeler Film Festival and the Easter Family Fun Day
- the Upper Hunter Show
- Muswellbrook Race Club Bengalla Race Day
- Muswellbrook PCYC 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 2022 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 \$867,594 was provided 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:

- CDF: \$264,575
- Scholarships: \$74,000
- CST and Sponsorships: \$391,525

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 33 complaints during the Reporting Period, a decrease compared to the 68 complaints received in 2021 and 51 complaints in 2020.

During the Reporting Period, the most common environmental complaints raised by complainants related to blasting - 22, noise - 7 and air quality - 2. A summary of complaints received during the Reporting Period is provided in **Figure 22**.

The environmental complaints for 2022 were less than complaints received during 2021 which comprised of blasting - 41, noise - 16 and air quality – 7. During 2020 complaints comprised of blasting - 24, noise - 9 and air quality – 5 due to drought conditions.

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.

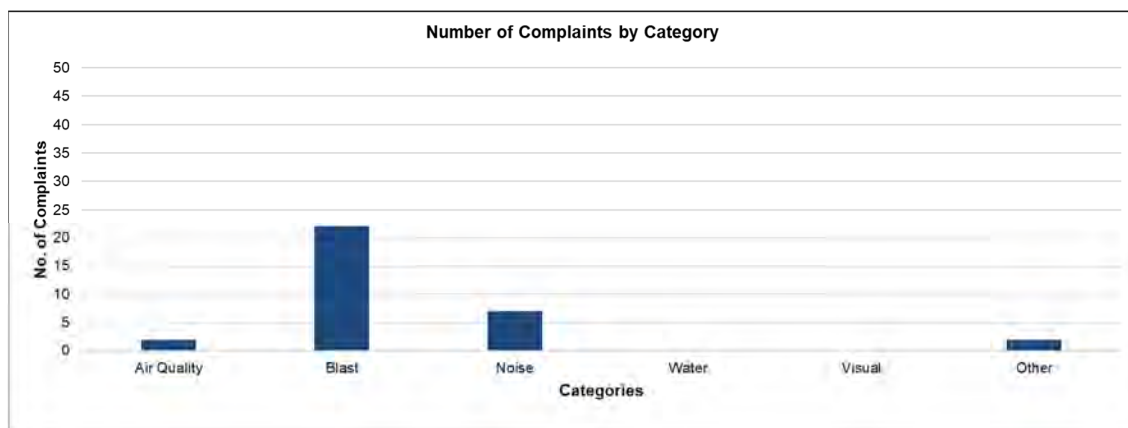


Figure 22: Environmental Complaints Received 2022

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 December 2019. Actions arising from this audit are being addressed and are detailed in **Appendix K**.

The next IEA was scheduled to be commissioned by 1 October 2022. BMC submitted auditor details to DPE on 28 September 2022, 14 October 2022, 16 January 2023 and 27 January 2023. The DPE approved the audit team on 31 January 2023. An audit team member has resigned from RPS, so BMC is seeking approval of a new audit team member.

The IEA is scheduled to be completed during second quarter 2023 and audit actions will be reported in the 2023 Annual Review.

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.

The purpose of the audit was to determine implantation and if applicable, identify high level compliance gaps with nominated elements of the Dam Safety Regulation 2019 (NSW). The audit reviewed the management practices in relation to Bengalla declared dams, particularly the Operation and Maintenance Plans, the Emergency Plans, and the Dam Safety Management System (together the Dams Safety NSW Plans).

The issue date of the Dams Safety NSW audit report was 9 March 2022. BMC reviewed the Dams Safety NSW Plans and adopted revised versions.

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 Elevated TSS Concentrations during Discharge Event 16 August 2022

- Summary

BMC recorded an elevated TSS reading (9,510 mg/L) at EPL 6538 monitoring point 26 during an authorised HRSTS water discharge event on 16 August 2022 (Discharge Event). The Discharge Event was notified to the DPE, EPA and DCCEEW.

- Details

The risk of actual or potential harm to the environment was investigated, and an expert report provided by BMC to the EPA, DPE and DCCEEW in September 2022 concluded that based on the assessment in the report the increase in sediment load at the Hunter River as a result of the discharge was negligible, well within allowable limits and is very unlikely to have resulted in any perceptible effect on the environment.

The EPA issued an Official Caution in respect of the Discharge Event on 10 March 2023.

- Actions taken to ensure compliance

BMC has reviewed the operation of the discharge dam and sampling procedures. BMC is also undertaking a program to desilt DW1.

11.1.2 Exceedance of Hourly Volume Discharge Limit 6-7 July 2022

- Summary

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.

- Details

At 23:41 on 6 July 2022, during the discharge that was occurring pursuant to Block 2022 – 189(2), BMC received notice that site discharge period Block 2022 – 189(3) had been determined although, as a consequence of the time of day, the determination went undetected by BMC's staff. Block 2022 – 189(3) applied to the same site discharge period as Block 2022 – 189(1) and Block 2022 – 189(2) but had the effect of decreasing the discharge rate. This resulted in changing the criteria that applied for the last 4 hours and 19 minutes of the relevant Block and as a consequence the discharge exceeded the requirement of Condition E1.3 of the EPL.

BMC did not expect any reduction in the amount of discharge that would be authorised due to the flow within the Hunter River over the relevant Block during that day. Any reduction in the

allowable discharge has the effect of putting BMC into technical non-compliance with Condition E1.3, as even when the notice is issued during the day there will always be a lag involved in calculating the revised parameters and physically implementing the changes required.

The matter was investigated, and an expert report provided to the EPA. The report analysed the salt mass discharged from Bengalla and the state of the Hunter River during the discharge that occurred between Water NSW issuing Block 189(3) under the HRSTS and BMC completing the discharge. In summary, the report concluded the exceedance of the allowable discharge limit was negligible and unlikely to have any significant environmental consequence.

BMC did not receive a response from the EPA to the report.

- Actions taken to ensure compliance

BMC has taken steps to monitor the river registers for the entirety of Block periods.

11.1.3 Long-term Security for Biodiversity Offsets

- Summary

BMC is taking steps to comply with Schedule 3 Condition 28 of SSD-5170 which requires BMC to make suitable arrangements to provide appropriate long term security for the Biodiversity Offset Areas through a Biobanking Agreement under the *Threatened Species Conservation Act 1995* (or an alternative mechanism agreed with BCD) to the satisfaction of the Secretary.

- Details

All Biodiversity Offset Areas identified in the relevant approvals are owned by the 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. At this stage, the DPE has not granted a further extension in which to comply with the condition.

- Actions taken to ensure compliance

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 is taking steps to progress Biodiversity Stewardship Agreements for the offset areas. In the meantime, the offset areas continued to be owned by the BJV and managed by BMC in accordance with the BOMP.

11.2 REPORTABLE INCIDENTS OR EXCEEDANCES

There were no “*incidents*” (as that term is defined in SSD-5170) during the Reporting Period.

Table 30 provides details of matters or exceedances during the Reporting Period that were reported by BMC to regulatory authorities. Matters addressed at **Section 11.1** are not reproduced in **Table 30**.

Table 30: Reportable Matters or Exceedances 2022

No	Date	Reported To	Nature	Details	Action Taken	Matter Status
1.	28 Jan 2022	DPE	Air Quality	Potential exceedance of 24-hour air quality criteria at PM10-4	Expert report (concluding BMC did not exceed criteria) supplied to DPE. BMC also supplied operations summary for relevant date to DPE.	No further action required. Completed and closed.
2.	15 Feb 2022	DPE	Air Quality	Potential exceedance of 24-hour air quality criteria at PM10-4	Expert report (concluding BMC did not exceed criteria) supplied to DPE. BMC also supplied operations summary for relevant date to DPE.	No further action required. Completed and closed.
3.	13 Sep 2022	DPE	Air Quality	Potential exceedance of 24-hour air quality criteria at PM10-4	Expert report (concluding BMC did not exceed criteria) supplied to DPE. BMC also supplied operations summary for relevant date to DPE.	No further action required. Completed and closed.
4.	30 Nov 2022	DPE	Air Quality	Potential exceedance of 24-hour air quality criteria at PM10-4	Expert report (concluding BMC did not exceed criteria) supplied to DPE.	No further action required. Completed and closed.

No	Date	Reported To	Nature	Details	Action Taken	Matter Status
					BMC also supplied operations summary for relevant date to DPE.	

11.3 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 2023.

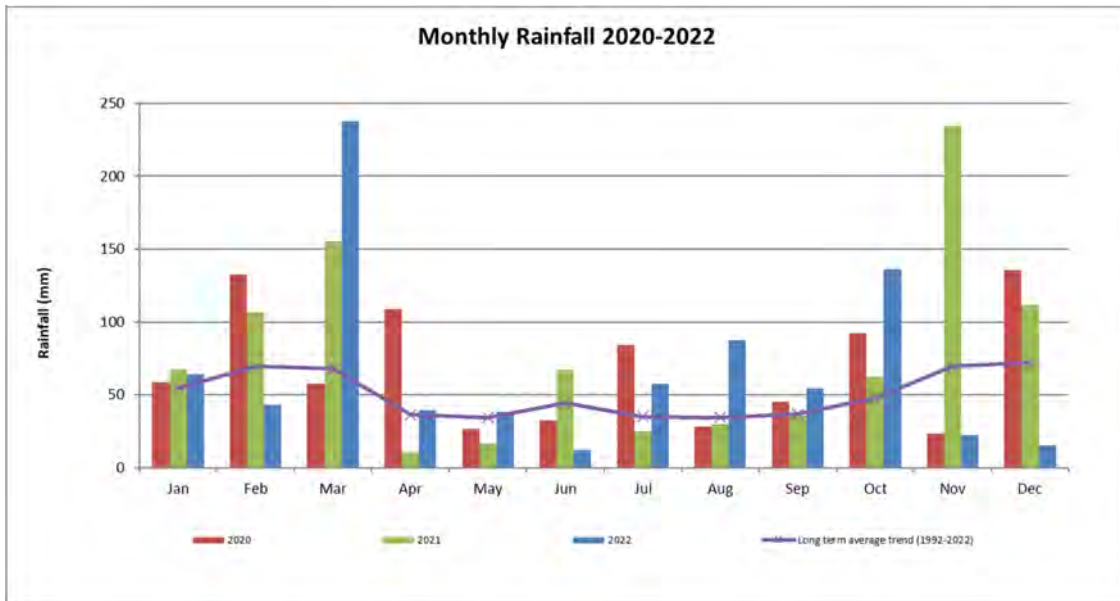
A summary of key environmental management activities proposed for 2023 is presented in **Table 31**. Progress against these activities will be reported in the 2023 Annual Review.

Table 31: Environmental Management Activities Proposed for 2023

Area / Issue	Actions Proposed	Timeline for Implementation
Air quality	Implementation of updated Air Quality monitoring network.	December 2023 (subject to change due to delivery time of monitors and mains power supply to monitor site).
Regulatory	Continued assessment and preparation of SSD-5170 Modification Application 6.	To be confirmed.
Audit	Undertake Independent Environmental Audit.	To be progressed during 2023.
Management Plans	Undertake reviews of management plans in accordance with SSD-5170.	Following approval of Mod 5.
Tree Screening	Progress Denman Road tree screening (Schedule 3, Condition 40 and 41A of SSD-5170).	To be progressed during 2023.
Offsets	Progress long-term security of biodiversity offset areas (Schedule 3, Condition 28 of SSD-5170).	To be progressed during 2023.
Rehabilitation	Undertake new rehabilitation and installation of HDWV into existing rehabilitation according to the Rehabilitation Management Plan and Forward Program. Commence Rehabilitation Strategy (Schedule 3, Condition 47 of SSD-5170).	To be progressed during 2023.
Noise	Upgrade Roxburgh real time noise monitor	Around May 2023.

Appendix A

Meteorological Monitoring Summary



Graph A1
Bengalla Monthly Rainfall 2020 to 2022

Table A1
Monthly Temperatures 2022

Month	Minimum Daily Temperature (°C)	Maximum Daily Temperature (°C)
January	13.8	34.3
February	10.7	35.3
March	10.5	31.6
April	5.7	29.1
May	1.0	26.2
June	-2.5	20.5
July	-2.7	19.0
August	-0.1	22.7
September	2.3	23.8
October	3.1	28.0
November	3.1	32.9
December	5.0	34.5

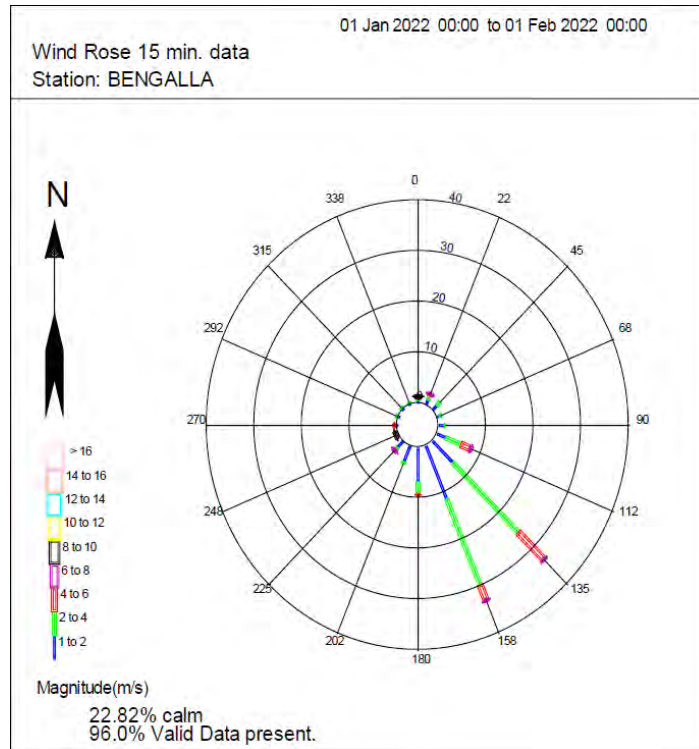


Figure A1
Bengalla January 2022 Windrose

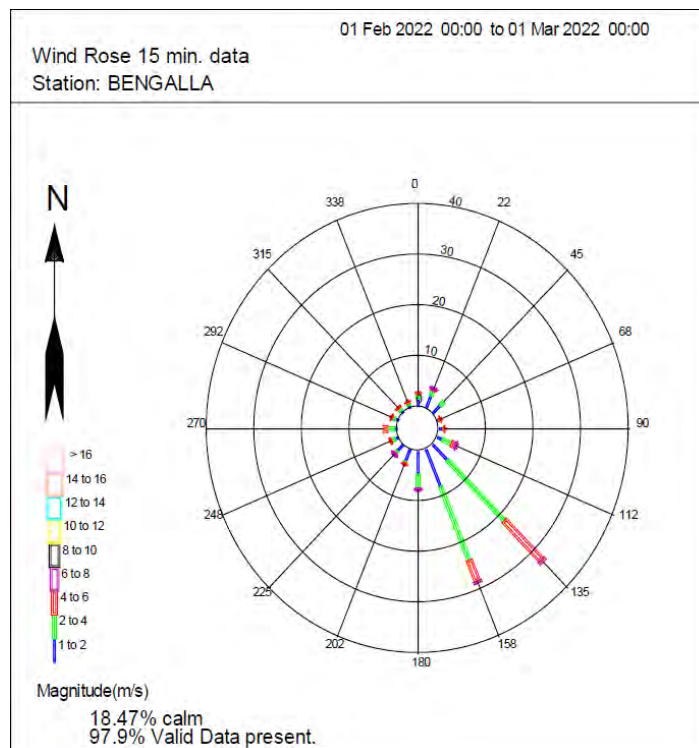


Figure A2
Bengalla February 2022 Windrose

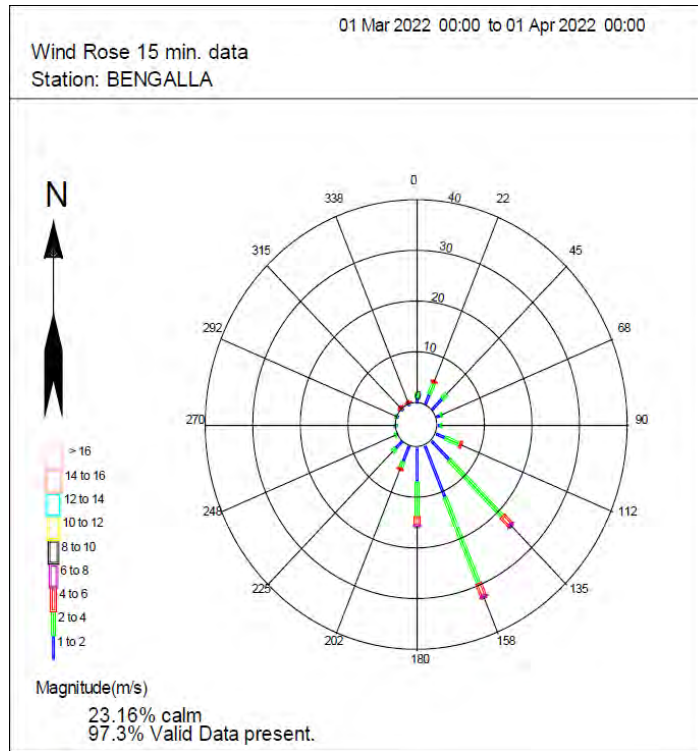


Figure A3
Bengalla March 2022 Windrose

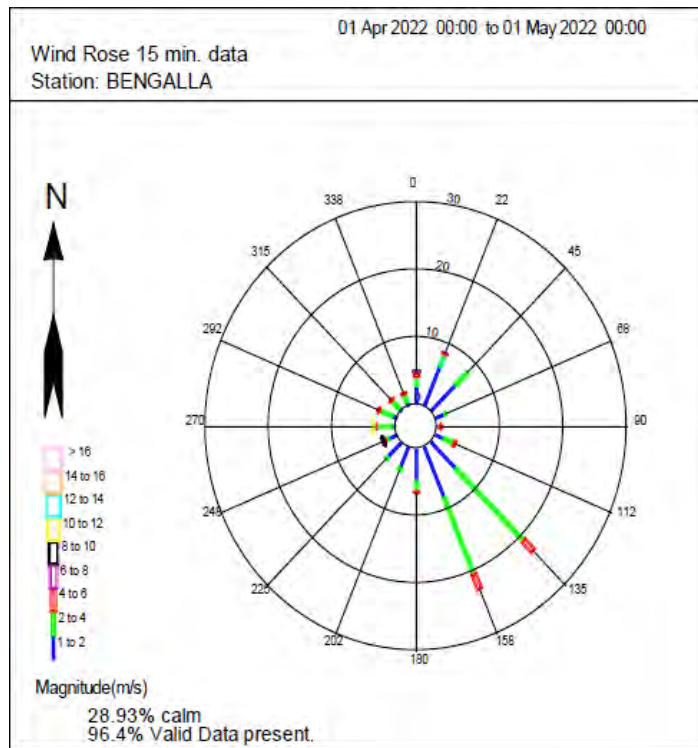


Figure A4
Bengalla April 2022 Windrose

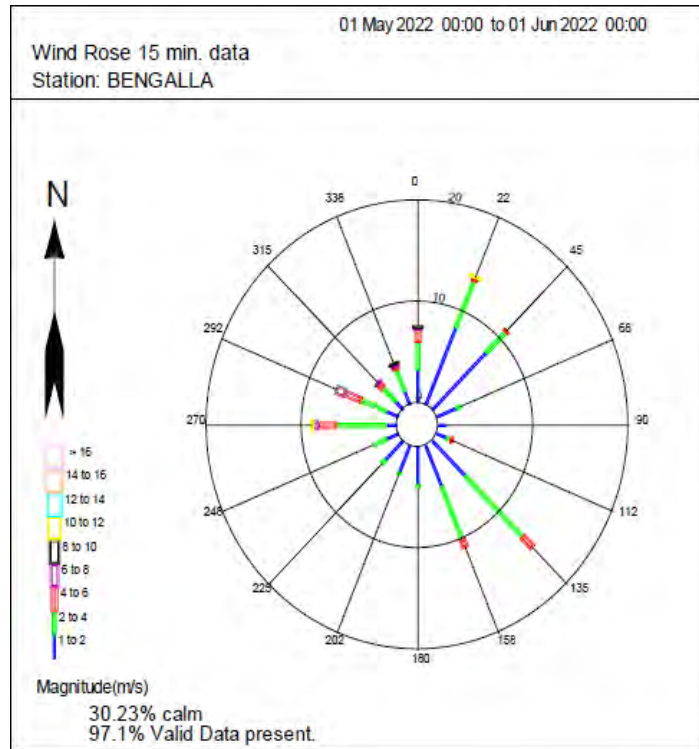


Figure A5
Bengalla May 2022 Windrose

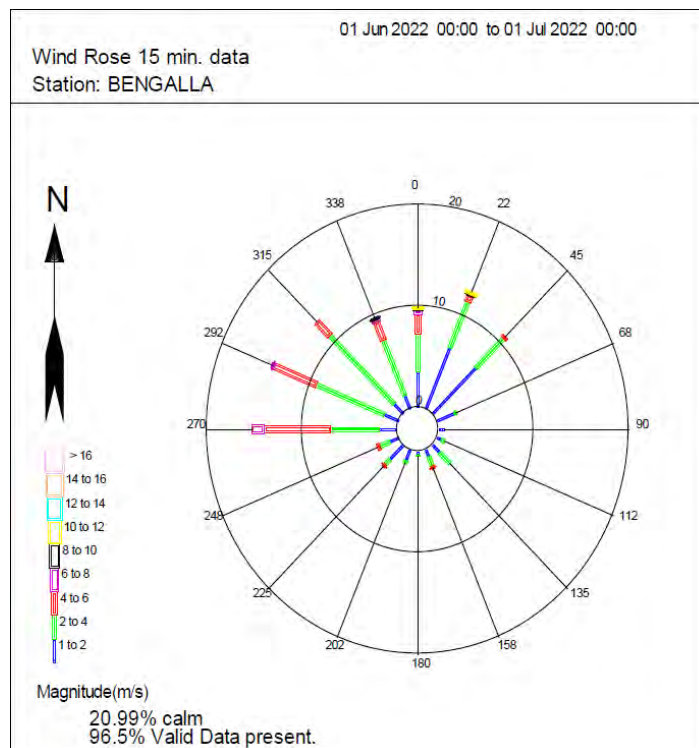


Figure A6
Bengalla June 2022 Windrose

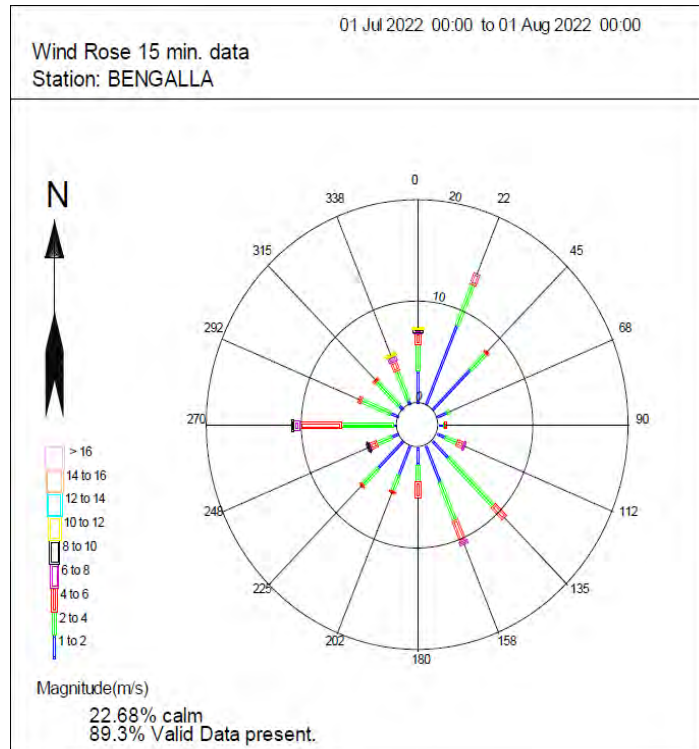


Figure A7
Bengalla July 2022 Windrose

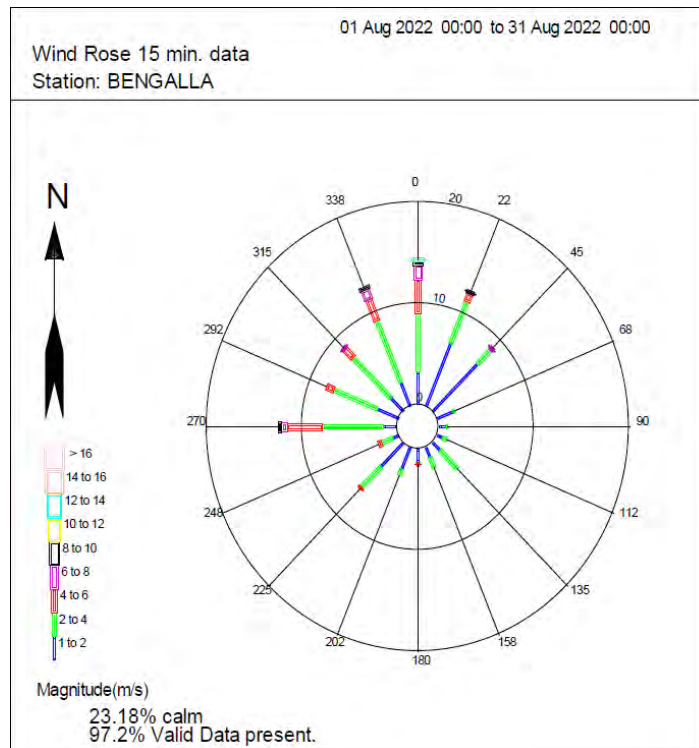


Figure A8
Bengalla August 2022 Windrose

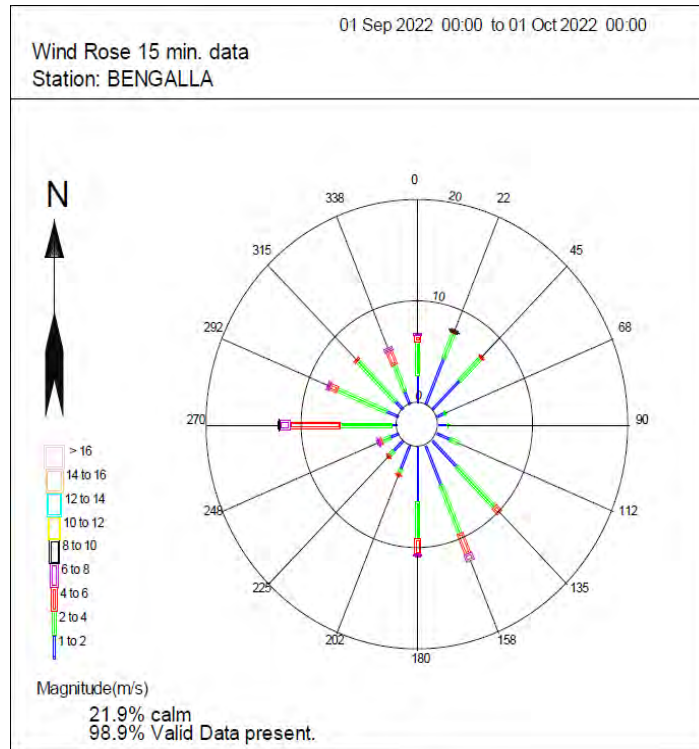


Figure A9
Bengalla September 2022 Windrose

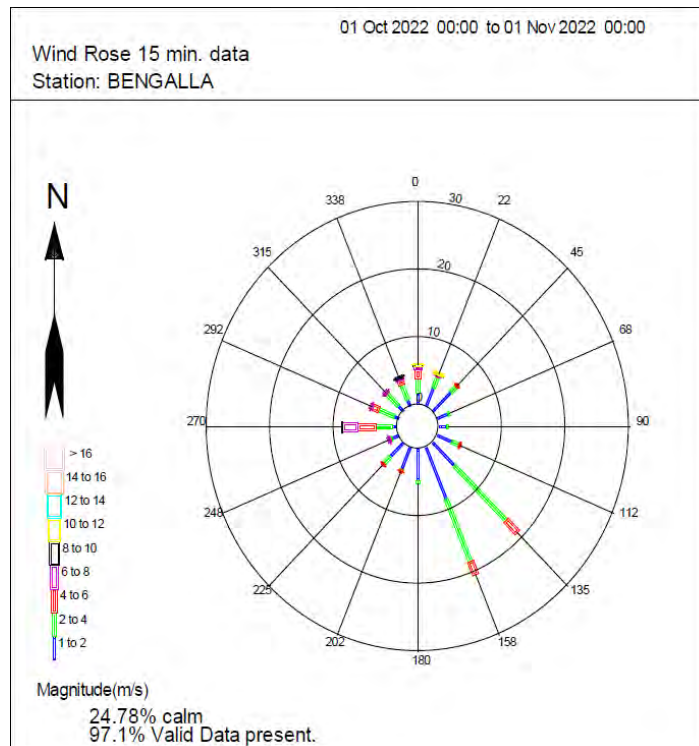


Figure A10
Bengalla October 2022 Windrose

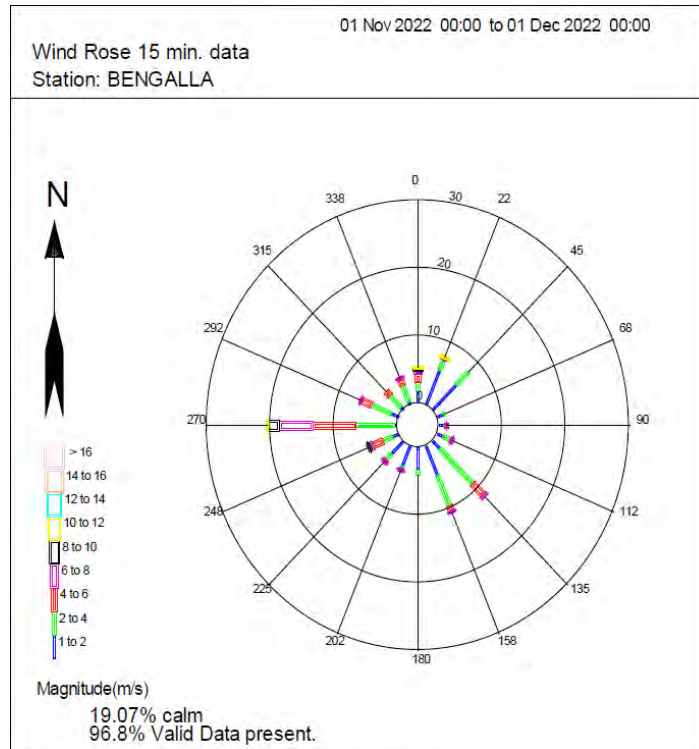


Figure A11
Bengalla November 2022 Windrose

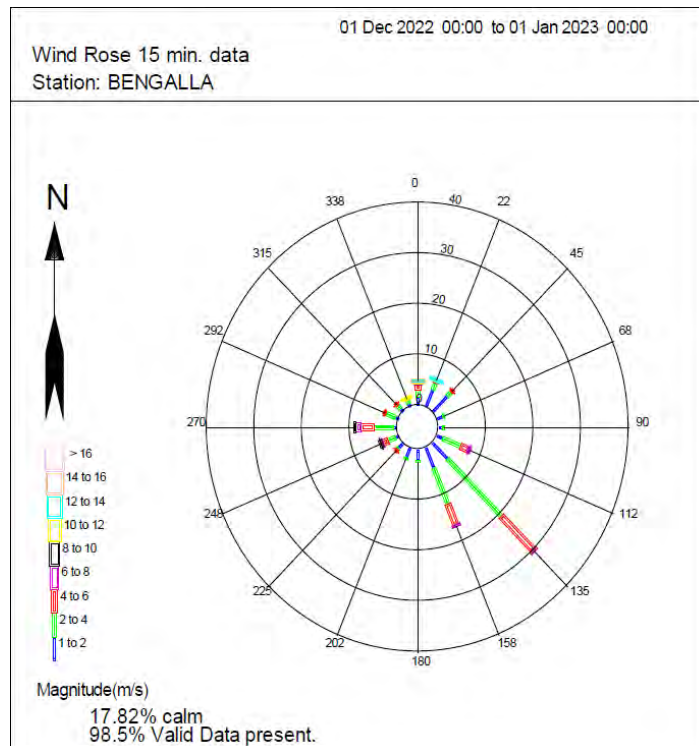


Figure A12
Bengalla December 2022 Windrose

Notes:
Sourced from Benchmark Monitoring.

Appendix B

Noise Monitoring Summary

Table B1
Summary of Compliance Attended Noise Monitoring Results 2022

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-22	Yes	31	35	53	60	37	45	No
	Feb-22	Yes	26	35	48	60	32 ⁶	45	No
	Mar-22	Yes	33	35	55	60	41 ⁶	45	No
	Apr-22	Yes	27	35	52	60	30	45	No
	May-22	Yes	35	35	56	60	46 ⁶	45	No (within 2 dBA)
	Jun-22	No	24	35	49	60	28	45	No
	Jul-22	No	30	35	55	60	31	45	No
	Aug-22	Yes	30	35	52	60	36	45	No
	Sep-22	No	29	35	48	60	34	45	No
	Oct-22	No	IA	35	IA	60	IA	45	No
	Nov-22	No	27	35	50	60	35	45	No
	Dec-22	Yes	31	35	50	60	36	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-22	Yes	IA	40	IA	60	IA	45	No
	Feb-22	Yes	IA	40	IA	60	IA	45	No
	Mar-22	Yes	IA	40	IA	60	IA	45	No
	Apr-22	Yes	IA	40	IA	60	IA	45	No
	May-22	Yes	IA	40	IA	60	IA	45	No
	Jun-22	No	<30	40	<58	60	<35	45	No
	Jul-22	No	est 30	40	est 52	60	<35	45	No
	Aug-22	Yes	IA	40	IA	60	IA	45	No
	Sep-22	No	IA	40	IA	60	IA	45	No
	Oct-22	No	IA	40	IA	60	IA	45	No
	Nov-22	No	36	40	58	60	39	45	No
	Dec-22	Yes	IA	40	IA	60	IA	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-22	Yes	IA	35	IA	60	IA	45	No
	Feb-22	Yes	IA	35	IA	60	IA	45	No
	Mar-22	Yes	IA	35	IA	60	IA	45	No
	Apr-22	Yes	IA	35	IA	60	IA	45	No
	May-22	No	IA	35	IA	60	IA	45	No
	Jun-22	Yes	36 ⁷	35	54	60	43 ⁸	45	No
	Jul-22	No	35	35	57	60	47 ^{8,9}	45	No
	Aug-22	Yes	IA	35	IA	60	IA	45	No
	Sep-22	No	est 32	35	IA	60	IA	45	No
	Oct-22	No	est 34	35	approx. 54	60	est 36	45	No
	Nov-22	No	est 28	35	est 50	60	est 32	45	No
	Dec-22	Yes	28	35	50	60	31	45	No

Source: Bridges Acoustics (2022)

- Notes (modified from Bridges Acoustics, 2022)**
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 NIMP;
 5. LA_{1,1min} operational noise levels for BMC in the absence of all other noise source;
 6. The reported LA_{1,1min} level includes a +5 dBA correction to periods of total noise
 7. The estimated noise level of LA_{eq}, 15min is within 2 dBA of the criterion and is therefore considered compliant with the relevant conditions of SSD-5170.
 8. The reported LA_{1,1min} level includes a +5 dBA correction to periods of total noise.
 9. The tonal-corrected noise level of LA_{1,1min} is within 2 dBA above the criterion and occurred under invalid weather conditions and therefore compliant with relevant conditions of SSD-5170.
- IA = inaudible

Appendix C

Blast Monitoring Summary

Table C1
Blast Monitoring Summary – 2022

Event No.	BLAST DETAILS			GROUND VIBRATION (mm/s)			OVERPRESSURE (dB)		
	Date	Time of Blast	Blast Code	Blake	Moore	School	Blake	Moore	School
1	04/01/22	11:38:45 AM	S39-26-IB-VARL	0.15	1.79	0.16	109.1	106.7	86.8
2	04/01/22	11:40:21 AM	S39-17-IB-PF2	0.03	0.27	0.02	102.6	103.6	99.4
3	07/01/22	4:19:32 PM	S38-20-PS-BYWN	0.38	1.06	0.16	103.0	103.2	92.5
4	07/01/22	4:49:03 PM	S39-24-IB-VARL	0.25	0.08	0.19	99.3	96.1	87.0
5	08/01/22	3:59:32 PM	S37-11-IB-WN	0.03	0.17	0.01	88.9	94.2	91.8
6	11/01/22	2:54:33 PM	S38-22-IB-BR2C	0.05	0.21	0.05	99.5	108.0	93.8
7	14/01/22	3:03:27 PM	S38-16-IB-BR1	0.03	0.36	0.03	88.1	91.2	86.3
8	15/01/22	1:00:06 PM	S39-29-CI-MAPF & S39-30-PS-PF2	0.05	0.31	0.04	86.5	97.3	88.6
9	18/01/22	3:27:20 PM	S39-22-IB-VARL	0.23	2.00	0.07	97.6	98.9	94.2
10	24/01/22	11:31:27 AM	S38-11-IB-BR1	0.23	2.00	0.07	97.6	98.9	94.2
11	25/01/22	2:58:02 PM	S39-13-CI-MAPF	0.11	1.09	0.04	90.0	100.1	87.7
12	28/01/22	12:22:37 PM	S39-20-IB-VARL	0.28	1.52	0.13	86.0	99.5	87.8
13	01/02/22	12:46:55 PM	S41-00-IB-RL181	0.06	0.35	0.02	84.3	101.8	93.5
14	02/02/22	11:11:07 AM	S43-02-IB-RL180	0.30	3.09	0.09	94.3	105.3	92.3
15	02/02/22	2:57:14 PM	S38-18-IB-BR2A & S38-15-IB-BR1	0.10	0.87	0.06	98.6	101.1	89.4
16	04/02/22	3:00:51 PM	S39-10-IB-MA1	0.09	0.57	0.03	97.7	115.0	101.0
17	07/02/22	10:35:51 AM	S39-05-IB-MA1	0.19	2.40	0.05	100.1	106.1	96.9
18	09/02/22	4:39:18 PM	S38-19-IB-BR2C	0.10	0.60	0.10	97.5	100.2	98.4
19	09/02/22	4:39:59 PM	S37-20-IB-WN	0.03	0.06	0.01	88.9	96.2	84.3
20	10/02/22	4:30:11 PM	S38-19-IB-BR2A	0.05	0.41	0.04	89.4	94.3	90.3
21	14/02/22	3:53:22 PM	S39-29-IB-PF2	0.14	0.63	0.10	87.0	99.6	87.6
22	16/02/22	12:07:25 PM	S37-03-IB-WN	0.07	0.55	0.04	95.5	100.1	97.6
23	17/02/22	3:06:55 PM	S39-10-CI-MAPF	0.19	1.28	0.06	94.2	98.2	91.6
24	19/02/22	4:12:40 PM	S39-14-IB-PF2	0.07	0.59	0.03	107.6	114.4	95.0
25	22/02/22	2:37:42 PM	S39-19-IB-VARL	0.22	1.59	0.08	114.7	106.6	102.2
26	25/02/22	12:00:51 PM	S39-02-IB-MA1	0.19	1.35	0.05	95.8	109.0	94.7
27	26/02/22	3:28:34 PM	S38-12-PS-BYWN & S38-15-IB-BR2C	0.25	2.25	0.16	99.1	104.6	91.8

28	28/02/22	2:56:17 PM	S39-07-CI-MAPF	0.14	0.80	0.04	107.4	101.0	93.5
29	01/03/22	12:05:54 PM	S39-03-IB-MA1	0.10	0.72	0.03	95.3	106.4	83.7
30	03/03/22	11:57:33 AM	S37-07-IB-WN	0.07	0.54	0.03	102.1	105.1	96.9
31	07/03/22	12:20:00 PM	S38-04-IB-BR1	0.22	2.04	0.08	90.0	97.6	94.3
32	12/03/22	2:21:39 PM	S38-06-IB-BR1	0.20	1.00	0.06	102.5	105.8	98.2
33	15/03/22	3:04:28 PM	S39-27-IB-VA1	0.10	0.51	0.08	111.0	104.8	93.3
34	15/03/22	3:06:00 PM	S39-13-IB-VA1	0.48	3.26	0.09	100.9	107.1	88.3
35	18/03/22	11:01:05 AM	S39-02-PS-PF2	0.16	0.53	0.04	82.0	85.3	96.4
36	18/03/22	11:01:49 AM	S39-03-CI-MAPF	0.12	0.56	0.03	87.4	99.4	88.2
37	21/03/22	11:06:54 AM	S38-02-IB-BR1	0.21	1.33	0.03	87.8	96.4	87.0
38	21/03/22	11:07:57 AM	S39-02-CI-MAPF	0.12	0.63	0.04	91.0	99.4	86.6
39	22/03/22	11:56:42 AM	S39-10-IB-PF2	0.11	0.90	0.05	88.7	101.4	89.3
40	23/03/22	11:08:03 AM	S38-02-IB-BR1	0.19	0.86	0.12	92.4	97.7	94.0
41	25/03/22	2:32:43 PM	S38-09-IB-BR1	0.17	1.38	0.07	106.2	108.4	97.6
42	31/03/22	3:57:06 PM	S38-17-IB-BR2A	0.02	0.15	0.01	101.6	95.3	85.9
43	31/03/22	3:57:57 PM	S39-22-IB-VA1	0.14	1.08	0.13	102.7	103.2	93.8
44	02/04/22	3:51:50 PM	S39-17-IB-VARL	0.17	1.54	0.08	89.0	92.7	90.2
45	05/04/22	4:05:41 PM	S37-09-IB-WN	0.07	0.30	0.03	94.6	92.8	90.9
46	05/04/22	4:06:49 PM	S38-08-IB-BR1	0.20	1.56	0.05	93.7	93.1	88.8
47	07/04/22	3:34:43 PM	S39-29-IB-VA1	0.07	0.35	0.08	85.8	107.8	85.9
48	07/04/22	3:36:36 PM	S39-15-IB-VA1	0.18	2.28	0.10	87.7	107.7	85.0
49	11/04/22	11:39:47 AM	S38-12-IB-BY1	0.16	1.52	1.09	97.9	101.9	100.1
50	12/04/22	3:31:27 PM	S40-24-IB-WW4	0.19	2.83	0.16	87.4	104.7	90.5
51	14/04/22	3:35:22 PM	S38-15-IB-BY1	0.15	1.13	0.08	89.5	107.6	90.4
52	19/04/22	3:04:36 PM	S38-03-PS-BYWN	0.19	2.04	0.11	87.7	93.6	98.7
53	19/04/22	3:06:49 PM	S37-23-IB-BY1	0.10	0.66	0.11	88.1	94.9	91.6
54	19/04/22	3:07:45 PM	S39-16-IB-VARL	0.13	1.86	0.07	85.2	90.6	92.2
55	21/04/22	1:39:23 PM	S38-17-IB-BY1	0.18	1.56	0.13	100.3	99.0	94.0
56	23/04/22	3:29:55 PM	S40-20-IB-WW4	0.09	1.72	0.05	94.8	103.7	91.2
57	26/04/22	3:40:42 PM	S40-26-IB-WW4	0.07	0.68	0.07	90.7	105.3	90.5
58	28/04/22	9:57:17 AM	S38-20-IB-BY1	0.10	0.85	0.09	93.6	97.7	95.5
59	29/04/22	4:02:43 PM	S38-07-PS-BYWN	0.20	1.68	0.09	82.1	88.9	86.2
60	29/04/22	4:03:42 PM	S39-06-IB-PF2	0.22	1.35	0.06	93.9	99.0	89.1
61	30/04/22	2:28:36 PM	S38-22-RA-BY1	0.05	0.25	0.03	95.9	95.3	96.2
62	02/05/22	4:21:24 PM	S39-03-IB-PF2	0.23	2.12	0.07	95.3	106.2	93.0

63	05/05/22	2:56:50 PM	S40-18-IB-WW4	0.17	2.90	0.11	86.4	96.4	91.5
64	06/05/22	3:52:10 PM	S39-11-IB-VA1	0.20	2.30	0.08	92.4	97.7	94.4
65	11/05/22	3:55:41 PM	S39-17-IB-VA1	0.18	0.91	0.11	90.1	102.6	85.1
66	12/05/22	11:22:33 AM	S38-11-IB-BY1	0.26	1.61	0.07	90.9	100.0	87.0
67	16/05/22	3:54:55 PM	S40-16-IB-WW4	0.13	3.65	0.12	88.5	101.9	94.1
68	19/05/22	11:58:11 AM	S38-09-IB-BY1	0.24	2.82	0.08	93.9	98.0	88.1
69	21/05/22	2:57:24 PM	S38-06-IB-BY1	0.36	2.38	0.08	102.8	101.9	93.9
70	24/05/22	2:56:19 PM	S38-23-IB-BY1	0.17	0.95	0.12	105.3	98.2	86.2
71	27/05/22	3:00:22 AM	S38-03-IB-BY1	0.43	2.28	0.10	92.8	93.1	86.9
72	28/05/22	2:59:31 PM	S39-24-PS-BYWN	0.20	1.42	0.19	89.8	88.9	95.3
73	30/05/22	12:06:37 PM	S39-02-IB-PF2	0.19	1.05	0.05	97.6	102.2	94.8
74	02/06/22	3:09:45 PM	S39-24-IB-BR2C	0.03	0.15	0.02	85.4	95.8	90.3
75	03/06/22	2:58:01 PM	S40-22-CI-MAPF	0.09	0.78	0.07	97.4	99.9	93.7
76	04/06/22	3:26:23 PM	S39-14-IB-VA1	0.05	0.41	0.03	101.3	113.0	101.1
77	07/06/22	2:28:07 PM	S39-07-IB-VA1	0.49	3.95	0.13	98.8	108.2	93.8
78	11/06/22	2:30:46 PM	S39-09-IB-VA1	0.40	3.16	0.13	102.2	101.1	97.2
79	15/06/22	4:05:51 PM	S39-03-IB-VA1	0.58	4.24	0.18	98.1	101.7	95.2
80	15/06/22	4:06:56 PM	S40-01-IB-WW2	0.18	1.17	0.04	96.8	102.4	96.7
81	18/06/22	10:56:49 AM	S39-05-IB-VA1	0.30	2.34	0.09	93.3	104.1	91.9
82	21/06/22	3:58:13 PM	S40-29-IB-WW2 & S40-26-CI-MAPF	0.08	0.40	0.05	93.1	96.9	93.9
83	21/06/22	3:59:27 PM	S40-20-CI-MAPF	0.05	0.44	0.04	90.7	88.0	92.4
84	23/06/22	2:29:09 PM	S38-18-IB-WN	0.09	0.38	0.06	99.8	103.1	97.7
85	24/06/22	12:27:08 PM	S39-22-PS-BYWN	0.21	1.01	0.16	106.7	102.2	100.3
86	25/06/22	3:22:56 PM	S39-17-PS-BYWN	0.44	2.51	0.34	90.0	97.8	93.9
87	28/06/22	3:22:14 PM	S39-19-IB-BR2C	0.04	0.23	0.03	92.5	101.0	82.7
88	30/06/22	12:00:39 PM	S39-17-IB-BR1	0.06	0.55	0.03	91.2	92.9	90.5
89	02/07/22	1:53:14 PM	S38-25-IB-WN	0.11	0.55	0.09	94.9	104.4	98.7
90	11/07/22	3:09:31 PM	S39-02-IB-VA1	0.66	2.02	0.08	90.8	101.0	94.2
91	12/07/22	2:53:50 PM	S38-12-IB-WN	0.08	0.26	0.02	91.9	101.7	97.9
92	15/07/22	4:02:33 PM	S38-21-IB-WN	0.08	0.69	0.08	95.1	103.9	97.2
93	18/07/22	3:00:05 PM	S40-27-CI-MAPF	0.04	0.31	0.03	96.8	107.6	100.4
94	21/07/22	3:25:01 PM	S40-29-IB-WW3	0.07	0.65	0.07	103.0	112.6	107.9
95	23/07/22	3:27:01 PM	S40-16-CI-MAPF	0.11	0.95	0.08	95.4	107.4	88.5
96	25/07/22	3:30:23 PM	S38-14-IB-WN	0.06	0.46	0.03	92.4	100.8	95.7
97	28/07/22	3:53:36 PM	S38-15-IB-WN	0.06	0.44	0.03	95.3	100.5	93.6

BENGALLA MINING COMPANY PTY LIMITED

98	30/07/22	4:08:32 PM	S38-08-IB-WN	0.11	0.54	0.05	95.7	103.9	94.8
99	02/08/22	3:01:46 PM	S38-03-IB-WN	0.09	0.46	0.03	98.5	104.3	98.3
100	04/08/22	12:24:30 PM	S38-06-IB-WN	0.05	0.29	0.02	91.9	95.0	98.3
101	08/08/22	3:58:13 PM	S39-12-IB-BR1	0.26	2.65	0.08	93.9	99.7	89.5
102	11/08/22	3:56:38 PM	S39-09-IB-BR1	0.18	1.41	0.08	92.3	96.0	87.7
103	15/08/22	2:32:10 PM	S40-07-IB-WW3	0.07	0.72	0.03	100.4	103.8	99.0
104	17/08/22	3:58:46 PM	S39-06-IB-BR1	0.26	1.22	0.11	90.2	93.8	85.4
105	19/08/22	4:16:47 PM	S40-29-IB-WWRL	0.09	0.75	0.06	98.3	102.2	98.5
106	23/08/22	3:28:55 PM	S40-11-IB-WW4	0.16	2.11	0.09	108.8	95.3	108.6
107	27/08/22	3:00:07 PM	S40-26-IB-PF2	0.16	1.84	0.12	92.1	103.3	89.5
108	30/08/22	12:03:42 PM	S39-03-IB-BR1	0.45	2.99	0.14	113.6	106.5	107.0
109	31/08/22	3:29:57 PM	S40-18-IB-PF2	0.06	0.67	0.05	102.0	101.9	87.2
110	02/09/22	3:06:36 PM	S40-03-IB-WW3 & S40-01-PS-MA2	0.17	1.14	0.06	98.4	108.3	97.7
111	07/09/22	11:29:11 AM	S39-18-IB-BR2A	0.23	0.60	0.07	98.9	108.3	100.0
112	08/09/22	1:33:52 PM	S39-02-IB-BR1	0.29	1.32	0.06	97.7	100.6	88.4
113	08/09/22	1:35:05 PM	S40-01-IB-WW3	0.13	1.03	0.04	94.1	104.3	95.2
114	10/09/22	3:02:59 PM	S40-23-IB-PF2	0.10	1.25	0.07	110.6	111.6	99.5
115	12/09/22	2:56:51 PM	S39-11-PS-BYWN & S39-16-IB-BR2C	0.31	2.29	0.14	97.9	104.0	94.8
116	15/09/22	3:54:49 PM	S40-29-IB-WW4	0.08	0.44	0.05	89.4	101.0	90.1
117	17/09/22	3:23:46 PM	S40-19-IB-VARL	0.24	2.61	0.15	95.2	109.4	106.2
118	20/09/22	10:28:55 AM	S40-08-IB-WW4	0.09	1.44	0.05	93.4	101.6	89.2
119	26/09/22	10:36:39 AM	S39-11-IB-BY1	0.19	1.81	0.08	94.9	99.8	91.7
120	28/09/22	10:40:38 AM	S39-15-IB-BY1	0.19	1.56	0.09	106.5	102.9	100.0
121	30/09/22	2:40:24 PM	S39-17-IB-BY1	0.13	1.35	0.17	118.6	105.4	110.7
122	01/10/22	3:54:31 PM	S39-22-IB-BY1	0.11	0.72	0.07	116.3	108.4	88.6
123	04/10/22	10:57:22 AM	S39-19-IB-BY1 & S39-22-RA-BY1	0.10	0.70	0.08	94.9	99.7	94.5
124	08/10/22	4:25:46 PM	S40-29-IB-VARL	0.40	1.91	0.26	91.4	96.3	90.0
125	08/10/22	4:25:06 PM	S39-23-IB-BY1	0.18	0.93	0.14	81.8	93.1	83.4
126	12/10/22	3:52:18 PM	S40-22-IB-VARL	0.17	1.92	0.12	103.9	113.1	90.1
127	15/10/22	12:34:44 PM	S40-04-IB-WW4	0.12	0.81	0.05	102.3	111.3	91.6
128	18/10/22	1:22:43 PM	S39-03-PS-BYWN	0.15	0.95	0.05	95.5	96.7	101.9
129	18/10/22	1:24:34 PM	S41-01-IB-WW1	0.18	3.45	0.06	103.8	106.6	87.8
130	20/10/22	1:54:06 PM	S39-07-PS-BYWN	0.27	0.75	0.05	90.0	90.7	84.5
131	21/10/22	3:57:10 PM	S40-11-CI-MAPF	0.13	0.98	0.05	87.5	94.9	86.7
132	27/10/22	1:22:25 PM	S40-24-IB-VARL	0.20	1.51	0.16	90.7	94.8	97.6

133	28/10/22	12:08:05 PM	S40-02-IB-WW2	0.16	0.88	0.03	110.0	109.2	102.6
134	28/10/22	4:04:52 PM	S40-29-CI-MAPF	0.06	0.34	0.04	104.4	115.7	105.6
135	31/10/22	4:21:59 PM	S41-18-IB-WW4	0.12	0.44	0.12	111.2	109.8	97.1
136	04/11/22	3:55:23 PM	S41-16-IB-WW4	0.19	2.80	0.12	97.6	108.0	86.3
137	08/11/22	11:23:59 AM	S39-08-IB-BY1	0.28	2.31	0.11	91.8	98.2	86.3
138	09/11/22	2:56:30 PM	S41-26-IB-WW3	0.05	0.37	0.04	94.8	103.9	95.5
139	11/11/22	12:24:51 PM	S40-09-IB-MA1	0.05	0.72	0.03	98.9	104.3	93.6
140	14/11/22	10:54:18 AM	S41-20-IB-WW4	0.12	1.54	0.10	110.6	114.6	94.4
141	16/11/22	10:58:45 AM	S41-02-IB-RL181-DAM	0.17	1.55	0.06	104.5	107.5	107.6
142	17/11/22	12:02:20 PM	S40-05-IB-MA1	0.19	1.62	0.07	94.1	100.9	93.1
143	19/11/22	4:10:53 PM	S41-23-IB-WW4	0.12	2.00	0.11	102.8	95.6	99.2
144	22/11/22	3:30:22 PM	S41-27-IB-WW3	0.10	1.40	0.09	107.2	110.0	104.3
145	23/11/22	3:59:53 PM	S41-21-IB-PF2	0.07	0.76	0.06	108.6	101.0	100.3
146	25/11/22	3:28:54 PM	S40-09-CI-MAPF	0.05	0.30	0.02	101.9	98.6	97.0
147	25/11/22	3:30:53 PM	S40-16-IB-PF2	0.12	2.00	0.11	102.8	95.6	99.2
148	29/11/22	11:06:48 AM	S40-26-IB-VARL	0.28	1.77	0.26	88.9	98.1	94.0
149	01/12/22	10:56:46 AM	S40-01-IB-WW4	0.14	0.49	0.03	99.9	108.0	95.9
150	03/12/22	3:02:32 PM	S39-05-IB-BY1	0.41	2.32	0.11	94.2	102.4	85.1
151	05/12/22	10:52:57 AM	S40-07-CI-MAPF	0.10	0.66	0.03	95.8	104.1	91.7
152	06/12/22	10:56:15 AM	S41-13-IB-WW4	0.19	2.73	0.07	93.5	102.7	89.7
153	08/12/22	2:58:34 PM	S39-03-IB-BY1	0.38	2.55	0.09	105.6	103.8	98.2
154	10/12/22	11:38:45 AM	S41-10-IB-WW4	0.15	1.25	0.08	96.1	109.3	83.4
155	12/12/22	10:29:33 AM	S40-17-IB-VARL	0.85	3.09	0.28	108.3	100.3	106.5
156	12/12/22	10:30:49 AM	S40-03-IB-MA1	0.13	1.06	0.05	116.4	109.2	105.7
157	14/12/22	10:28:25 AM	S41-08-IB-WW3	0.08	0.76	0.03	96.2	112.9	105.8
158	16/12/22	12:28:32 PM	S41-26-IB-WW4	0.11	3.29	0.10	109.0	106.5	86.9
159	19/12/22	11:34:12 AM	S41-27-IB-WW4	0.19	2.57	0.19	103.4	104.9	86.0
160	21/12/22	11:14:59 AM	S39-21-IB-WN	0.52	0.38	0.13	103.0	96.0	101.5
161	24/12/22	11:25:27 AM	S41-19-CI-MAPF	0.09	1.12	0.08	84.3	101.9	102.7
162	30/12/22	10:00:25 AM	S40-01-IB-MA1	0.26	1.69	0.07	92.6	104.6	89.4
163	30/12/22	10:02:02 AM	S41-03-IB-RL181	0.18	2.50	0.04	106.4	107.9	89.8
164	31/12/22	3:26:00 PM	S40-30-IB-PF2	0.04	0.18	0.03	105.1	106.5	83.1
165	31/12/22	3:27:00 PM	S40-13-IB-PF2	0.04	0.32	0.02	98.2	108.1	94.9

Appendix D

Air Quality Monitoring Summary

**Table D1
Particulate Matter <10µm (PM₁₀) Summary**

Run Date	PM ₁₀ -1		PM ₁₀ -2		PM ₁₀ -3		PM ₁₀ -4		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)	Run Date Reading (µg/m ³)	Annual Rolling Average (µg/m ³)	Run Date Reading (µg/m ³)	Annual Rolling Average (µg/m ³)		
04/01/2022	25.0	20.3	22.7	17.1	31.4	15.9	49.0	24.6	50	25
10/01/2022	23.8	20.5	25.8	17.4	22.5	15.9	30.4	24.8	50	25
16/01/2022	27.1	20.3	25.6	17.4	30.8	15.9	35.3	24.8	50	25
22/01/2022	15.6	20.1	17.2	17.2	23.5	15.7	33.1	24.3	50	25
28/01/2022	25.6	19.8	23.0	17.4	36.6	16.2	52.6	23.6	50	25
03/02/2022	18.0	19.9	19.1	17.5	14.3	16.1	30.3	24.1	50	25
09/02/2022	20.1	19.8	21.7	17.5	22.3	16.1	23.2	24.4	50	25
15/02/2022	25.1	20.0	29.6	17.6	40.5	16.4	55.0	24.7	50	25
21/02/2022	34.5	20.4	25.5	17.9	12.8	16.3	14.9	25.2	50	25
27/02/2022	20.0	20.5	16.8	17.8	19.3	16.4	29.3	25.8	50	25
05/03/2022	15.8	20.4	14.5	17.8	22.8	16.4	29.0	24.0	50	25
11/03/2022	18.9	20.3	21.3	17.7	22.3	16.2	35.4	24.0	50	25
17/03/2022	21.2	20.5	19.2	17.7	25.5	16.2	37.5	24.1	50	25
23/03/2022	33.8	20.9	27.3	18.1	28.6	16.4	28.5	24.4	50	25
29/03/2022	9.5	20.9	9.3	18.0	7.3	16.4	8.0	24.2	50	25
04/04/2022	19.5	21.0	21.2	18.2	15.1	16.3	13.2	23.9	50	25
10/04/2022	21.2	20.9	17.0	18.1	14.6	16.3	33.9	24.2	50	25
16/04/2022	15.8	20.2	14.3	17.6	20.7	16.3	28.1	24.1	50	25
22/04/2022	13.1	20.1	11.1	17.4	6.2	16.2	13.8	24.1	50	25
28/04/2022	11.4	20.0	12.2	17.3	7.4	15.8	11.1	23.3	50	25
04/05/2022	13.8	20.0	17.5	17.3	18.2	15.9	23.5	23.3	50	25
10/05/2022	17.9	20.1	15.1	17.3	27.1	16.2	18.4	23.2	50	25
16/05/2022	13.4	19.8	10.9	17.2	6.2	16.2	5.5	23.1	50	25

Run Date	PM ₁₀₋₁		PM ₁₀₋₂		PM ₁₀₋₃		PM ₁₀₋₄		24-hour Assessment Criteria (µg/m ³)	Annual Assessment Criteria (µg/m ³)
	Run Date Reading (µg/m ³)	Annual Rolling Average (µg/m ⁵)	Run Date Reading (µg/m ³)	Annual Rolling Average (µg/m ⁵)	Run Date Reading (µg/m ³)	Annual Rolling Average (µg/m ⁵)	Run Date Reading (µg/m ³)	Annual Rolling Average (µg/m ⁵)		
22/05/2022	10.5	19.8	5.1	17.0	5.6	15.9	13.6	23.1	50	25
28/05/2022	9.4	19.6	10.4	16.9	4.3	15.9	3.4	23.1	50	25
03/06/2022	7.8	19.4	11.2	16.8	2.1	15.7	4.6	22.8	50	25
09/06/2022	10.1	19.3	7.2	16.7	1.7	15.6	2.2	22.6	50	25
15/06/2022	17.7	19.5	18.7	16.8	3.9	15.6	7.2	22.7	50	25
21/06/2022	14.1	19.6	16.7	17.0	1.4	15.5	7.6	22.7	50	25
27/06/2022	14.4	19.7	14.7	17.1	7.2	15.6	18.8	22.9	50	25
03/07/2022	4.2	19.6	5.1	17.0	3.2	15.6	1.8	22.9	50	25
09/07/2022	5.6	19.4	9.3	16.7	2.9	15.4	2.7	22.2	50	25
15/07/2022	6.0	19.1	8.6	16.7	5.2	15.4	12.7	22.2	50	25
21/07/2022	8.2	19.0	8.5	16.7	16.2	15.6	14.4	22.3	50	25
27/07/2022	14.1	19.0	11.7	16.7	18.5	15.9	4.0	22.3	50	25
02/08/2022	4.1	18.6	8.8	16.5	4.0	15.8	10.0	22.4	50	25
08/08/2022	8.0	18.5	10.0	16.5	5.1	15.8	17.9	22.6	50	25
14/08/2022	3.1	18.3	1.5	16.2	0.8	15.6	<0.1	21.5	50	25
20/08/2022	6.7	17.9	10.3	15.8	18.3	15.6	4.1	20.8	50	25
26/08/2022	12.9	18.0	10.7	15.9	12.1	15.7	28.1	21.2	50	25
01/09/2022	22.3	18.0	16.0	15.9	29.5	16.0	28.0	21.0	50	25
07/09/2022	13.6	18.0	14.1	15.9	20.2	16.1	35.0	21.4	50	25
13/09/2022	12.7	17.4	11.3	15.7	9.8	16.0	56.1	22.1	50	25
19/09/2022	19.2	17.2	15.6	15.7	3.6	15.7	3.6	21.8	50	25
25/09/2022	8.5	16.8	3.1	15.5	4.4	15.6	6.6	21.7	50	25
01/10/2022	16.4	16.8	15.7	15.6	16.0	15.8	31.6	22.1	50	25
07/10/2022	7.1	16.2	6.7	15.4	6.2	15.6	6.7	22.0	50	25
13/10/2022	18.8	16.3	17.1	15.5	21.0	15.9	36.5	22.4	50	25
19/10/2022	12.2	16.2	9.2	15.4	13.4	15.8	10.6	22.0	50	25

Run Date	PM ₁₀₋₁		PM ₁₀₋₂		PM ₁₀₋₃		PM ₁₀₋₄		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)	Run Date Reading (µg/m ³)	Annual Rolling Average (µg/m ³)	Run Date Reading (µg/m ³)	Annual Rolling Average (µg/m ³)		
25/10/2022	14.3	16.1	10.0	15.3	7.9	15.7	7.4	21.8	50	25
31/10/2022	27.1	15.9	17.3	15.1	15.6	15.4	23.0	21.4	50	25
06/11/2022	18.0	16.0	13.9	15.1	22.2	15.6	36.9	21.7	50	25
12/11/2022	13.3	16.0	14.3	15.2	7.6	15.5	22.6	21.9	50	25
18/11/2022	24.8	16.0	21.4	15.2	27.4	15.5	46.9	22.1	50	25
24/11/2022	22.8	16.2	21.2	15.3	19.3	15.6	29.6	22.2	50	25
30/11/2022	26.1	16.2	20.3	15.3	33.7	15.8	58.5	22.7	50	25
06/12/2022	38.0	16.5	27.8	15.4	35.8	15.9	31.1	22.5	50	25
12/12/2022	32.4	16.8	24.2	15.6	13.6	16.0	21.1 ¹	22.6 ¹	50	25
18/12/2022	17.6	16.7			20.7	15.8	29.3	22.5	50	25
24/12/2022	17.0	16.6			20.2	15.7	14.8	22.2	50	25
30/12/2022	9.1	16.5			36.7	16.0	51.0	22.6	50	25

Source: AECOM (2022)
AQMP approved 14/12/2022, PM₁₀₋₂ decommissioned.
1. AQMP approved 14/12/2022, PM₁₀₋₄ changed status from compliance monitor to real-time monitor.

Table D2
Total Suspended Particulates (TSP) Summary

Run Date	HV1		HV2		HV3		HV4		HV6		Annual Assessment Criteria (<90 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)	Run Date Reading (µg/m ³)	Annual Rolling Average (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)	
04/01/2022	62.4	64.5	65.6	55.9	54.8	42.2	51.1	45.5	146.0	77.0	90
10/01/2022	74.1	65.3	53.2	56.3	49.0	42.7	46.8	44.7	98.6	77.6	90
16/01/2022	59.8	64.1	56.3	55.3	44.8	42.2	18.2	43.8	93.6	77.1	90
22/01/2022	42.1	63.1	41.2	54.7	28.3	41.6	31.6	43.8	101.0	75.0	90
28/01/2022	60.3	63.4	72.4	54.4	43.4	41.9	62.7	44.2	209.0	72.4	90
03/02/2022	43.2	63.4	44.7	54.5	37.7	42.0	42.6	44.1	114.0	73.0	90
09/02/2022	64.5	63.8	65.1	54.7	38.0	42.1	56.0	44.4	108.0	73.2	90
15/02/2022	58.3	64.0	63.8	55.2	46.1	42.3	63.5	44.8	199.0	74.7	90
21/02/2022	103.0	65.3	110.0	56.5	56.7	42.9	53.8	44.8	66.2	74.2	90
27/02/2022	36.9	64.5	38.8	56.1	24.2	42.6	44.2	44.6	120.0	75.1	90
05/03/2022	30.2	63.9	30.6	55.6	23.1	42.4	24.0	44.1	94.4	75.1	90
11/03/2022	31.4	63.4	36.3	55.2	29.2	41.9	40.9	44.2	105.0	75.1	90
17/03/2022	46.8	63.6	50.5	55.4	37.3	42.0	42.4	44.8	131.0	75.9	90
23/03/2022	101.0	65.1	89.2	56.7	58.2	42.1	68.0	45.4	91.3	77.2	90
29/03/2022	12.8	64.1	17.3	56.1	14.3	41.8	13.8	45.1	23.6	76.6	90
04/04/2022	106.0	65.0	66.4	56.5	41.5	41.9	50.3	44.9	32.6	75.1	90
10/04/2022	47.8	64.1	49.4	55.7	28.3	41.7	40.3	43.3	149.0	76.8	90
16/04/2022	36.9	64.4	40.8	53.8	17.0	37.6	37.8	43.0	107.0	77.4	90
22/04/2022	30.6	63.8	30.1	53.4	17.1	37.3	26.0	42.8	78.4	78.0	90
28/04/2022	25.0	63.5	22.1	52.9	20.1	36.9	21.2	42.3	31.2	76.2	90
04/05/2022	48.4	62.7	38.9	52.6	26.8	36.7	41.4	42.4	63.2	75.9	90
10/05/2022	48.4	62.4	42.4	52.6	31.0	36.7	39.6	41.8	75.0	76.1	90
16/05/2022	37.7	62.3	45.6	51.8	0.0	36.2	35.7	41.7	16.9	76.0	90

Run Date	HV1		HV2		HV3		HV4		HV6		Annual Assessment Criteria (<90 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)	Run Date Reading (µg/m ³)	Annual Rolling Average (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)	
22/05/2022	32.6	62.1	24.9	51.6	19.4	36.0	24.0	41.0	63.6	76.1	90
28/05/2022	32.9	61.2	25.0	50.8	2.5	35.3	21.4	40.6	28.0	76.3	90
03/06/2022	41.9	60.6	30.4	50.1	23.7	35.1	26.1	40.5	14.6	75.1	90
09/06/2022	63.0	60.3	35.8	50.0	29.0	35.0	31.5	40.7	7.3	74.7	90
15/06/2022	71.4	60.4	51.7	50.3	34.2	35.3	47.5	41.1	24.1	74.9	90
21/06/2022	66.0	60.7	50.9	50.7	33.1	35.5	44.3	41.3	29.4	75.0	90
27/06/2022	59.1	60.6	47.3	50.8	35.9	35.5	42.5	41.6	75.5	75.9	90
03/07/2022	15.7	60.1	11.7	50.6	10.6	35.3	11.8	41.0	12.9	75.8	90
09/07/2022	12.4	59.7	16.7	50.3	6.7	35.0	16.0	40.7	8.5	73.7	90
15/07/2022	32.8	58.6	21.9	49.3	15.4	34.8	19.3	40.5	29.0	73.3	90
21/07/2022	23.1	58.0	24.2	49.1	21.7	34.7	24.5	40.2	62.7	74.0	90
27/07/2022	61.8	57.9	51.1	49.0	33.8	34.7	43.7	40.0	14.3	73.9	90
02/08/2022	21.7	56.4	20.1	48.2	13.1	33.9	16.2	39.6	32.1	74.1	90
08/08/2022	26.0	55.1	24.2	48.0	19.5	33.6	23.1	39.1	52.0	74.7	90
14/08/2022	20.0	54.2	17.6	47.4	6.2	33.1	6.2	38.1	3.0	71.8	90
20/08/2022	47.6	53.4	25.1	46.6	41.5	32.9	24.0	38.1	9.4	70.1	90
26/08/2022	35.6	53.4	30.0	46.6	21.2	32.8	27.6	37.9	114.0	71.7	90
01/09/2022	37.9	53.0	48.7	46.3	28.8	32.8	32.4	37.8	96.0	70.4	90
07/09/2022	23.6	52.6	110.0	47.6	24.0	32.7	29.4	37.0	136.0	72.0	90
13/09/2022	48.9	51.0	52.4	46.4	35.5	31.9	38.2	36.8	166.0	74.0	90
19/09/2022	97.1	51.4	86.1	46.5	52.9	32.1	66.5	37.0	21.2	73.4	90
25/09/2022	41.0	49.2	56.8	46.0	24.1	31.6	34.1	37.1	27.2	73.1	90
01/10/2022	40.5	48.7	35.6	45.6	38.4	31.7	34.1	36.8	139.0	74.8	90
07/10/2022	29.8	47.1	15.6	44.6	21.8	31.4	19.0	36.8	26.6	74.7	90
13/10/2022	39.0	47.3	47.9	45.0	41.3	31.8	41.4	36.7	163.0	77.0	90
19/10/2022	31.7	46.6	33.1	44.7	53.7	32.0	25.4	36.4	50.3	76.2	90

Run Date	HV1		HV2		HV3		HV4		HV6		Annual Assessment Criteria (<90 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)	Run Date Reading (µg/m ³)	Annual Rolling Average (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)	
25/10/2022	62.8	46.8	38.0	44.5	35.8	32.0	25.1	35.5	26.7	75.5	90
31/10/2022	107.0	46.9	81.6	44.3	63.3	31.9	55.6	35.9	108.0	75.1	90
06/11/2022	34.1	46.8	46.6	44.5	34.2	32.0	33.4	36.1	149.0	76.5	90
12/11/2022	38.6	46.9	53.0	44.9	43.2	32.3	38.8	36.0	93.0	77.6	90
18/11/2022	65.6	46.9	54.6	45.0	43.4	32.4	53.4	36.4	168.0	78.6	90
24/11/2022	75.4	47.7	80.0	45.9	85.2	33.3	70.7	36.9	102.0	79.4	90
30/11/2022	42.3	47.7	65.9	46.3	47.3	33.5	50.6	37.0	184.0	81.0	90
06/12/2022	127.0	49.1	96.0	47.1	81.8	34.1	81.7	37.8	89.7	80.5	90
12/12/2022	111.0	50.4	81.5	47.9	79.1	34.9	64.7	37.8	56.8 ¹	80.4 ¹	90
18/12/2022			52.9	47.6	31.3	34.5			124.0	80.8	90
24/12/2022			40.1	47.3	28.1	34.2			59.4	80.2	90
30/12/2022			86.6	48.2	44.0	34.5			168.0	81.8	90

Source: AECOM (2022)
AQMP approved 14/12/2022, HV1 and HV4 decommissioned.
1. AQMP approved 14/12/2022, HV6 changed status from compliance monitor to real-time monitor.

**Table D3
Total Deposited Dust Summary**

Total Deposited Dust (g/m ² /month)														
Month	D01	D02	D04A	D05	D06	D07A	D08	D09	D10	D20	D23B	D25	D26	DA
January	0.9	0.7	1.0	2.8	1.9	1.2	3.5	2.3	1.3	4.7	1.3	2.2	1.0	3.7
February	2.7	1.0	2.9	1.2	0.7	1.0	1.2	5.4	1.3	4.7	1.6	1.0	2.5	4.0
March	1.2	0.9	1.5	1.2	1.2	1.2	1.9	1.7	1.4	3.0	0.9	3.6	2.1	4.0
April	1.3	1.1	0.8	1.4	1.8	2.4	1.7	1.9	0.5	4.6	2.4	4.6	2.7	3.5
May	1.0	1.2	2.4	2.1	1.2	1.2	1.5	1.5	1.2	3.2	3.2	1.8	0.4	2.0
June	0.6	0.6	0.8	1.1	0.8	0.5	0.7	1.3	2.1	1.9	3.2	0.7	1.0	1.0
July	0.8	0.7	1.0	1.6	1.0	0.8	0.8	2.3	1.3	1.8	1.2	1.1	0.9	1.1
August	0.4	0.5	1.0	1.8	0.8	0.7	0.5	1.6	0.8	1.8	0.5	0.8	0.7	0.9
September	0.5	0.8	1.6	2.2	1.4	1.0	0.9	2.2	1.4	3.1	1.2	2.4	1.4	2.2
October	0.8	1.5	1.4	1.5	1.0	1.8	1.1	2.0	1.5	3.2	1.3	2.0	1.8	2.2
November	0.8	1.2	1.7	2.6	1.6	1.0	1.4	2.4	1.7	5.5	1.4	2.7	2.0	3.6
December	1.2	2.8	1.4	2.8	3.3	1.5	1.5	3.6	5.1	4.2	1.4	2.5	2.0	3.4
Annual Average	1.0	1.1	1.5	1.9	1.4	1.2	1.4	2.4	1.6	3.5	1.6	2.1	1.5	2.6
Criteria (g/m²/month)	4	4	4	4	4	4	4	4	4	4	4	4	4	4

c = contaminated sample

Table D4
Increase in Deposited Dust

Month	Increase in Deposited Dust (g/m ² /month)													
	D01	D02	D04A	D05	D06	D07A	D08	D09	D10	D20	D23B	D25	D26	DA
January	-0.3	-1.2	-0.7	0.0	0.7	-1.0	0.0	0.0	-0.1	-1.1	-0.3	-0.7	-1.4	-1.8
February	0.0	-0.7	-0.3	0.3	0.9	-0.6	0.0	0.3	0.2	-0.7	0.1	-0.9	-1.0	-1.3
March	0.1	-0.7	-0.4	0.2	1.0	-0.1	0.0	0.4	0.2	-1.1	0.1	-0.7	-0.5	-1.4
April	0.1	-0.6	-0.3	0.4	0.8	0.1	0.2	0.3	0.0	-0.7	0.1	-0.3	-0.3	-1.2
May	0.1	-0.6	-0.2	0.4	0.9	0.1	0.3	0.1	-0.3	-0.7	0.1	-0.4	-0.6	-1.3
June	0.1	-0.6	-0.4	0.3	0.9	0.0	0.2	-0.1	-0.5	-0.7	0.1	-0.5	-0.6	-1.2
July	0.1	-0.5	-0.5	-0.3	1.0	-0.1	0.1	-0.3	-0.5	-0.6	0.2	-0.1	-0.4	-0.6
August	0.1	-0.6	-0.6	-0.3	0.8	-0.1	0.1	-0.5	-0.7	-0.4	0.0	-0.4	-0.3	-0.3
September	0.0	-0.6	-0.7	-0.3	0.2	-0.2	0.0	-0.8	-1.3	-0.5	0.0	-0.3	-0.2	-0.2
October	0.0	-0.6	-0.8	-0.4	0.2	-0.1	-0.2	-1.0	-1.6	-0.4	0.1	-0.2	0.0	0.1
November	0.0	-0.5	-0.9	-0.3	-0.1	-0.1	-0.2	-0.9	-1.6	-0.2	0.0	-0.4	0.1	0.5
December	0.1	-0.1	-0.6	-0.2	-1.4	-0.1	-0.1	-0.5	-1.2	0.5	0.1	-0.1	0.1	0.8
Annual Increase	0	-0.6	-0.5	0	0.5	-0.2	0	-0.3	-0.6	-0.6	0.1	-0.4	-0.4	-0.7
Criteria (g/m ² /month)	2	2	2	2	2	2	2	2	2	2	2	2	2	2

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

PM_{2.5} (µg/m³)		
Monitor	Annual Assessment Criteria	Result
DPIE Upper hunter Air Quality Monitoring Network "Muswellbrook" Monitor	8.0	6.2

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)
1/01/2022	5.8	7.5
2/01/2022	6.3	12.0
3/01/2022	6.0	7.6
4/01/2022	7.7	8.7
5/01/2022	5.0	6.0
6/01/2022	5.4	6.3
7/01/2022	4.4	5.5
8/01/2022	3.7	3.1
9/01/2022	14.2	14.1
10/01/2022	20.8	19.1
11/01/2022	17.0	15.4
12/01/2022	12.7	14.0
13/01/2022	7.5	7.7
14/01/2022	14.6	15.7
15/01/2022	10.0	5.8
16/01/2022	16.9	14.5
17/01/2022	31.6	26.5
18/01/2022	21.1	18.1
19/01/2022	5.6	6.2
20/01/2022	7.3	8.2
21/01/2022	7.6	8.5
22/01/2022	6.5	6.8
23/01/2022	5.6	7.9
24/01/2022	5.8	7.6
25/01/2022	9.7	10.4
26/01/2022	9.0	10.0
27/01/2022	5.5	7.1
28/01/2022	5.9	9.1
29/01/2022	7.8	9.7
30/01/2022	9.7	9.3
31/01/2022	13.2	13.9
1/02/2022	15.8	11.0
2/02/2022	5.3	3.8
3/02/2022	4.8	5.8
4/02/2022	4.8	5.9
5/02/2022	3.5	4.6
6/02/2022	4.5	5.1
7/02/2022	4.6	5.9
8/02/2022	5.3	6.6
9/02/2022	11.9	8.6

10/02/2022	8.8	8.0
11/02/2022	9.0	9.1
12/02/2022	6.6	8.0
13/02/2022	5.9	9.2
14/02/2022	7.0	10.6
15/02/2022	7.7	10.0
16/02/2022	9.7	12.7
17/02/2022	9.6	8.3
18/02/2022	10.9	7.9
19/02/2022	9.8	11.0
20/02/2022	9.1	11.0
21/02/2022	9.9	4.8
22/02/2022	9.2	12.1
23/02/2022	5.6	7.8
24/02/2022	3.1	4.7
25/02/2022	6.4	8.2
26/02/2022	5.7	7.9
27/02/2022	7.0	9.4
28/02/2022	3.7	6.3
1/03/2022	2.7	5.0
2/03/2022	3.4	5.6
3/03/2022	2.4	2.9
4/03/2022	2.5	3.0
5/03/2022	10.7	14.0
6/03/2022	4.1	3.9
7/03/2022	4.6	5.0
8/03/2022	2.3	1.6
9/03/2022	1.6	1.7
10/03/2022	4.7	6.7
11/03/2022	6.2	11.7
12/03/2022	4.4	8.1
13/03/2022	4.6	9.3
14/03/2022	7.4	9.1
15/03/2022	4.5	7.9
16/03/2022	5.6	10.8
17/03/2022	11.4	13.6
18/03/2022	10.4	13.0
19/03/2022	7.1	12.1
20/03/2022	8.0	12.4
21/03/2022	7.7	10.8
22/03/2022	16.3	16.3
23/03/2022	15.0	14.4
24/03/2022	3.3	5.4
25/03/2022	5.8	9.3
26/03/2022	2.7	5.2
27/03/2022	3.4	6.3
28/03/2022	9.6	15.2

29/03/2022	4.9	7.2
30/03/2022	5.2	6.4
31/03/2022	5.4	5.9
1/04/2022	2.9	4.5
2/04/2022	4.3	6.4
3/04/2022	6.0	3.2
4/04/2022	7.6	5.3
5/04/2022	11.1	19.8
6/04/2022	18.6	23.2
7/04/2022	5.6	8.7
8/04/2022	2.9	5.1
9/04/2022	3.1	5.9
10/04/2022	5.6	9.9
11/04/2022	6.8	7.9
12/04/2022	7.9	14.7
13/04/2022	4.6	8.0
14/04/2022	4.0	8.6
15/04/2022	7.2	11.1
16/04/2022	4.9	8.3
17/04/2022	6.4	10.0
18/04/2022	9.5	11.0
19/04/2022	5.8	8.2
20/04/2022	2.5	1.2
21/04/2022	4.9	7.4
22/04/2022	3.2	5.8
23/04/2022	3.6	8.0
24/04/2022	4.2	9.7
25/04/2022	5.3	10.8
26/04/2022	3.5	7.0
27/04/2022	7.1	10.7
28/04/2022	19.6	21.5
29/04/2022	11.3	9.6
30/04/2022	7.3	4.9
1/05/2022	7.7	9.9
2/05/2022	11.9	13.2
3/05/2022	10.6	14.2
4/05/2022	8.2	10.3
5/05/2022	6.9	3.5
6/05/2022	6.1	2.4
7/05/2022	5.6	5.0
8/05/2022	6.5	9.5
9/05/2022	9.6	20.0
10/05/2022	6.4	9.5
11/05/2022	2.7	5.6
12/05/2022	6.2	9.6
13/05/2022	8.1	12.2
14/05/2022	13.8	11.3

15/05/2022	9.2	4.9
16/05/2022	10.4	2.4
17/05/2022	7.0	5.9
18/05/2022	4.2	1.8
19/05/2022	6.1	6.9
20/05/2022	6.3	12.9
21/05/2022	5.5	11.3
22/05/2022	4.5	7.6
23/05/2022	3.4	7.8
24/05/2022	4.4	9.6
25/05/2022	12.5	16.7
26/05/2022	17.8	22.8
27/05/2022	12.3	14.5
28/05/2022	12.9	6.7
29/05/2022	5.8	1.7
30/05/2022	4.6	3.4
31/05/2022	1.8	1.1
1/06/2022	3.8	2.0
2/06/2022	4.3	3.1
3/06/2022	6.4	4.1
4/06/2022	2.1	0.8
5/06/2022	4.0	0.5
6/06/2022	1.9	0.7
7/06/2022	4.7	2.0
8/06/2022	4.0	1.1
9/06/2022	3.4	0.9
10/06/2022	2.6	0.5
11/06/2022	3.1	0.9
12/06/2022	4.6	3.3
13/06/2022	7.1	5.9
14/06/2022	12.6	15.9
15/06/2022	11.1	3.3
16/06/2022	9.2	7.8
17/06/2022	6.2	1.2
18/06/2022	7.5	10.6
19/06/2022	8.2	9.1
20/06/2022	13.5	15.8
21/06/2022	12.3	6.2
22/06/2022	8.9	2.9
23/06/2022	7.1	2.0
24/06/2022	5.2	1.4
25/06/2022	7.7	1.9
26/06/2022	9.7	3.6
27/06/2022	5.5	3.5
28/06/2022	8.1	7.5
29/06/2022	13.3	12.7
30/06/2022	9.2	9.4

1/07/2022	9.2	14.2
2/07/2022	13.5	14.4
3/07/2022	7.1	3.7
4/07/2022	4.1	1.2
5/07/2022	-	2.7
6/07/2022	0.2	0.2
7/07/2022	2.0	0.8
8/07/2022	3.5	2.7
9/07/2022	5.6	2.4
10/07/2022	6.2	6.4
11/07/2022	8.2	8.7
12/07/2022	6.6	9.0
13/07/2022	2.4	1.7
14/07/2022	3.9	3.5
15/07/2022	8.7	9.5
16/07/2022	6.1	4.5
17/07/2022	4.8	2.2
18/07/2022	4.2	1.2
19/07/2022	4.8	12.8
20/07/2022	4.1	8.6
21/07/2022	3.3	5.4
22/07/2022	3.0	6.0
23/07/2022	5.6	10.1
24/07/2022	14.0	21.9
25/07/2022	13.5	8.8
26/07/2022	8.4	4.2
27/07/2022	4.0	2.5
28/07/2022	3.7	1.2
29/07/2022	5.2	3.4
30/07/2022	8.3	13.8
31/07/2022	14.5	17.3
1/08/2022	9.1	2.3
2/08/2022	7.8	6.3
3/08/2022	8.8	9.4
4/08/2022	11.6	7.0
5/08/2022	5.4	2.9
6/08/2022	5.8	1.2
7/08/2022	6.4	1.0
8/08/2022	6.2	9.8
9/08/2022	5.9	8.2
10/08/2022	8.5	5.6
11/08/2022	15.0	16.4
12/08/2022	19.5	8.9
13/08/2022	2.5	1.3
14/08/2022	3.2	0.2
15/08/2022	2.8	0.7
16/08/2022	5.8	1.4

17/08/2022	7.0	1.9
18/08/2022	4.6	1.9
19/08/2022	4.2	1.1
20/08/2022	4.2	1.9
21/08/2022	11.6	8.2
22/08/2022	15.5	9.9
23/08/2022	10.0	7.4
24/08/2022	3.4	1.2
25/08/2022	2.8	2.1
26/08/2022	4.8	9.3
27/08/2022	7.7	10.4
28/08/2022	19.3	19.7
29/08/2022	23.1	17.6
30/08/2022	15.0	10.7
31/08/2022	6.3	6.4
1/09/2022	24.7	19.6
2/09/2022	10.2	7.8
3/09/2022	3.1	3.1
4/09/2022	3.4	2.9
5/09/2022	4.6	4.1
6/09/2022	5.4	8.9
7/09/2022	12.2	13.2
8/09/2022	9.9	10.9
9/09/2022	7.8	4.8
10/09/2022	2.8	0.6
11/09/2022	6.3	2.7
12/09/2022	5.2	2.4
13/09/2022	4.3	13.5
14/09/2022	6.9	9.1
15/09/2022	12.2	13.8
16/09/2022	5.4	1.9
17/09/2022	5.9	2.6
18/09/2022	4.9	1.6
19/09/2022	6.7	2.5
20/09/2022	5.9	14.5
21/09/2022	9.3	11.5
22/09/2022	4.8	6.7
23/09/2022	5.9	8.4
24/09/2022	8.2	7.0
25/09/2022	7.0	5.3
26/09/2022	7.5	8.3
27/09/2022	8.0	9.7
28/09/2022	5.2	2.6
29/09/2022	2.4	1.2
30/09/2022	3.7	4.8
1/10/2022	5.7	9.8
2/10/2022	6.5	9.5

3/10/2022	10.1	10.3
4/10/2022	9.2	12.1
5/10/2022	4.8	8.0
6/10/2022	6.4	9.8
7/10/2022	12.8	12.7
8/10/2022	12.1	6.6
9/10/2022	2.1	1.6
10/10/2022	5.8	7.1
11/10/2022	4.4	7.7
12/10/2022	5.1	7.7
13/10/2022	4.7	8.1
14/10/2022	6.2	2.8
15/10/2022	4.5	3.9
16/10/2022	6.5	13.6
17/10/2022	6.6	7.7
18/10/2022	9.1	10.3
19/10/2022	9.5	9.5
20/10/2022	10.2	13.2
21/10/2022	6.9	8.5
22/10/2022	6.4	4.4
23/10/2022	5.4	6.1
24/10/2022	6.7	8.9
25/10/2022	15.4	9.1
26/10/2022	6.6	1.6
27/10/2022	7.3	1.7
28/10/2022	8.2	2.9
29/10/2022	5.5	1.5
30/10/2022	5.3	4.7
31/10/2022	5.6	7.6
1/11/2022	2.1	0.9
2/11/2022	3.1	0.9
3/11/2022	2.3	2.5
4/11/2022	4.7	8.2
5/11/2022	5.4	0.2
6/11/2022	7.0	0.1
7/11/2022	7.9	0.1
8/11/2022	5.1	0.1
9/11/2022	3.9	0.1
10/11/2022	4.3	0.1
11/11/2022	8.0	0.1
12/11/2022	9.3	0.1
13/11/2022	17.5	0.1
14/11/2022	5.2	1.6
15/11/2022	4.2	0.3
16/11/2022	3.0	0.2
17/11/2022	2.8	0.1
18/11/2022	4.1	0.1

19/11/2022	5.3	0.3
20/11/2022	6.5	1.8
21/11/2022	4.5	0.4
22/11/2022	4.9	0.1
23/11/2022	5.0	0.2
24/11/2022	3.6	0.1
25/11/2022	9.2	0.1
26/11/2022	12.7	0.1
27/11/2022	9.5	0.8
28/11/2022	12.7	0.2
29/11/2022	10.0	4.8
30/11/2022	7.9	10.4
1/12/2022	6.8	9.4
2/12/2022	6.0	8.6
3/12/2022	5.9	8.3
4/12/2022	3.8	7.4
5/12/2022	8.6	6.5
6/12/2022	10.5	9.4
7/12/2022	7.3	5.8
8/12/2022	5.0	4.0
9/12/2022	6.4	8.5
10/12/2022	5.3	7.1
11/12/2022	8.6	9.1
12/12/2022	9.1	5.3
13/12/2022	5.6	2.6
14/12/2022	3.3	2.4
15/12/2022	2.8	2.5
16/12/2022	4.2	6.2
17/12/2022	4.6	7.5
18/12/2022	2.4	4.3
19/12/2022	6.8	9.9
20/12/2022	6.2	9.6
21/12/2022	5.1	7.9
22/12/2022	6.0	9.1
23/12/2022	12.2	10.4
24/12/2022	10.4	8.7
25/12/2022	14.1	11.2
26/12/2022	10.0	10.7
27/12/2022	8.9	14.2
28/12/2022	16.2	17.5
29/12/2022	17.3	20.2
30/12/2022	9.8	12.3
31/12/2022	7.7	9.9

Source: AECOM (2022)
EPA23 was removed due to blasting and mining operations on 27 October 2021. BMC advised NSW EPA that EPA-23 will be removed from EPL6538 at the next Variation Application

Appendix E
Annual Compliance Report for EPBC Approval 2012/6378

BENGALLA MINING COMPANY



Bengalla Mine (EPBC APPROVAL 2012/6378)

2022 ANNUAL COMPLIANCE REPORT



Prepared by:
BENGALLA MINING COMPANY PTY LIMITED
Locked Bag 5
MUSWELLBROOK NSW 2333
March 2022





TABLE OF CONTENTS

1	INTRODUCTION	2
1.1	Background	2
1.2	Purpose and Scope.....	2
1.3	Clearing Activities in 2022.....	3
1.4	Weed and Pest Management in 2022.....	4
1.5	Compliance Report	6
1.6	Conclusion	14
Appendix A	Biodiversity Management Plan Commitments.....	15
Appendix B	Biodiversity Offset Management Plan Commitments	18
Appendix C	Annual Clearing Report 2022.....	22
Appendix D	Weed and Pest Management	23

LIST OF TABLES

Table 1 Staged Clearing Approach	3
Table 2 BMC Compliance Status against Conditions of EPBC Approval for 2022	6

LIST OF FIGURES

Figure 1 - Vegetation Communities.....	5
Figure 2 – Bengalla Mine Weed Management Areas 2022.....	25
Figure 3 – Black Mountain Weed Management Locations 2022.....	26
Figure 4 – Kenalea (Echo) Weed Management Locations 2022	27
Figure 5 – Kenalea Weed Management Locations 2022	28
Figure 6 – Kenalea (Kenalput) Weed Management Locations 2022	29
Figure 7 – Black Mountain Wild Dog Bait Locations Autumn 2022	30
Figure 8 – Black Mountain Wild Dog Bait Locations Spring 2022	31
Figure 9 – Kenalea Wild Dog Bait Locations Autumn 2022	32
Figure 10 – Kenalea Wild Dog Bait Locations Spring 2022	33
Figure 11 – Merriwa River Wild Dog Bait Locations Autumn 2022	34
Figure 12 – Merriwa River Wild Dog Bait Locations Spring 2022	35



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 2022 to 31 December 2022 (Reporting Period).

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

This report is published as a stand-alone report and will also form an Appendix to the 2022 Annual Review for Bengalla required under SSD-5170 Schedule 5 Condition 4.

1.3 Clearing Activities in 2022

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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Removal of all vegetation other than habitat trees Habitat features left standing overnight
Clearing – Stage 2	<ul style="list-style-type: none"> 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 2022 (Clearing Report) is presented in **Appendix C** 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 2022 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 2022 pre-clearance and clearance surveys, which included:

- Identification of 232 hollow-bearing / habitat trees, of which 207 were felled;
- 100 animals were relocated or captured during pre-clearance and clearance surveys;
- Observation of 21 animals that evaded capture during clearing;
- Nine animals were killed as a result of tree felling;
- Six animals required euthanasia due to injuries obtained when clearing;



- 15 animals required assistance from wildlife rehabilitation agencies; and
- One *Cymbidium canaliculatum* (listed as endangered under the EPBC Act) was identified during Stage 1 pre-clearance surveys in 2022. This individual was successfully translocated to a donor tree prior to Stage 2 tree clearing activities in December 2022.

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 2022](#)

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

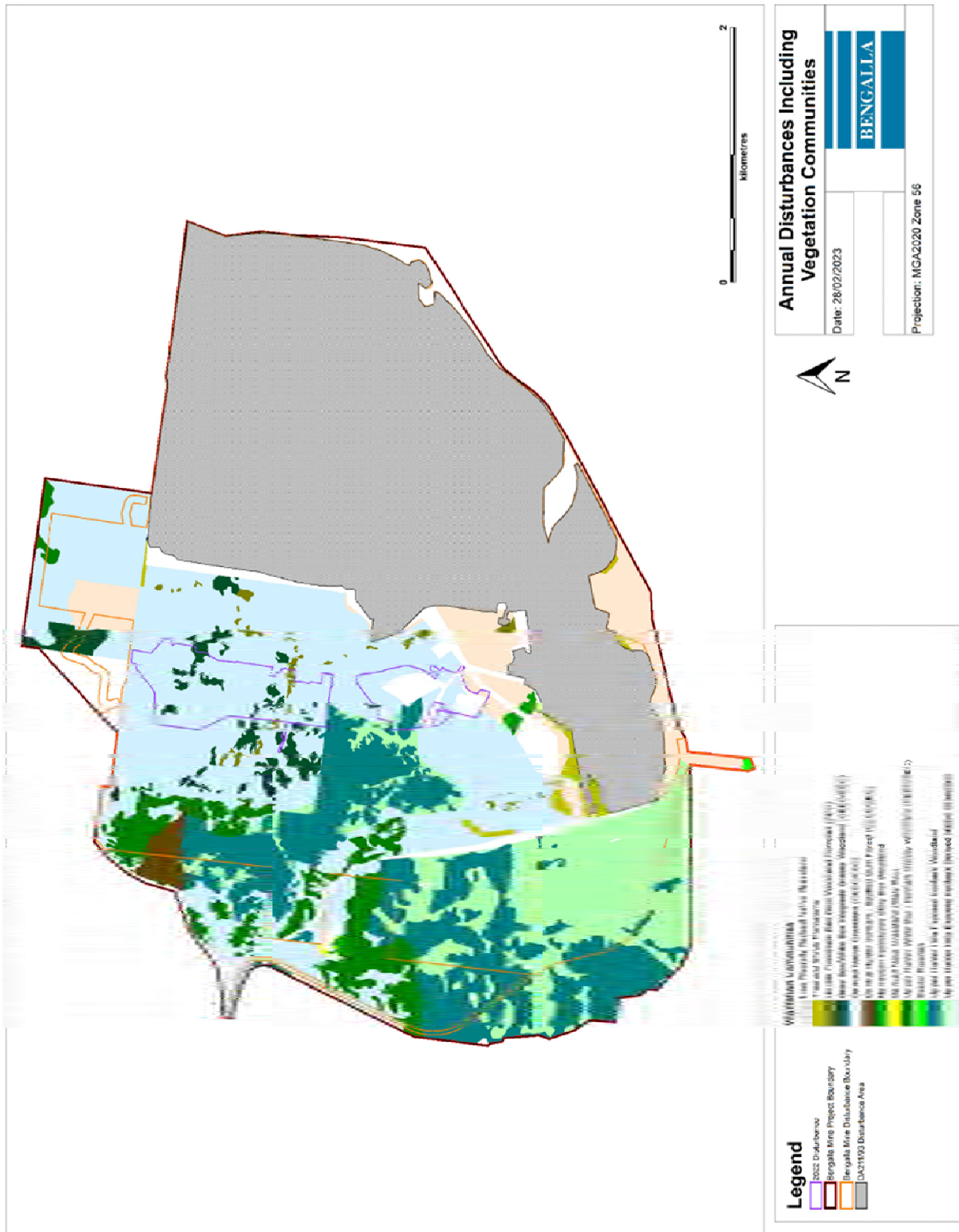


Figure 1 - Vegetation Communities

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 2022

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 2022 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	<p>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:</p> <ol style="list-style-type: none"> Delineate areas to be cleared, describe pre-clearance survey methods, specify actions to minimise fauna impacts and detail vegetation clearance procedures Require collection and stockpiling of habitat features important to threatened fauna species for reinstatement in rehabilitation areas Require use of native, locally sourced seed for propagation for rehabilitation activities Include measures to avoid, suppress and control the spread of plant pathogens (such as <i>Phytophthora cinnamomi</i>) 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. <p>The approval holder must not commence the action until the VCPLMP is approved by the</p>	Compliant	<p>A BDMP was developed to meet this requirement and is implemented at Bengalla. Appendix A sets out the commitments from the BDMP and the compliance status of each for the Reporting Period.</p> <p>The original BDMP was approved by each of (then) DPE and DoEE on 14 August 2015. BMC commenced implementation of the BDMP from that date (before operations commenced under SSD-5170).</p> <p>The current (revised) version of the BDMP was approved by DPE on 18 August 2017 and DoEE on 20 September 2017.</p> <p>The BDMP addresses each of the requirements in Condition 2(a)-(e) of the EPBC Approval (refer to Table 1 of the BDMP).</p>

Ref	Condition	Status	Comment
	<p>Minister. The approved VCPLMP must be implemented.</p> <p>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.</p>		
3	<p>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.</p> <p>The BOMP must:</p> <ol style="list-style-type: none"> a. 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) b. Provide a survey and description of the current condition (prior to any management activities) of the offset areas identified in Condition 3a c. Detail management actions and regeneration and revegetation strategies to be undertaken on the offset areas to improve the ecological quality of these areas, including: <ol style="list-style-type: none"> (i) 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; (ii) performance and completion criteria for evaluating the management of the offset areas, and criteria for triggering remedial action; (iii) a program to monitor and report on the effectiveness of these measures, and progress 	Compliant	<p>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.</p> <p>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.</p> <p>The BOMP addresses each of the requirements in Condition 3(a)-(c) of the EPBC Approval (refer to Table 1 of the BOMP).</p> <p>The approved BOMP was published on Bengalla's website within 1 month after being approved and continues to be available on the website.</p> <p>As noted in last year's report, BMC has taken preliminary steps towards separating the BOMP into three separate BOMPs (one for each offset property). At this stage, this process is on hold as BMC proposes to enter 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.</p>

Ref	Condition	Status	Comment
	<p>against the performance and completion criteria;</p> <p>(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</p> <p>(v) details of who would be responsible for monitoring, reviewing, and implementing the plan.</p> <p>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.</p> <p>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.</p>		
4	<p>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.</p>	<p>DCCEEW concluded not compliant with Condition 4 – no further action taken</p>	<p>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.</p> <p>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.</p> <p>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 is taking steps to progress Biodiversity Stewardship Agreements for the offset areas. In the meantime, the offset areas continued to be owned by the BJV and managed by BMC in accordance with the BOMP.</p> <p>BMC notified the non-compliance with Condition 28 to DCCEEW on 7 September 2022. By letter dated 12 October 2022, DCCEEW advised that it</p>

Ref	Condition	Status	Comment
			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”.
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	<p>Condition 44</p> <ul style="list-style-type: none"> Requirement <p>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.</p> <ul style="list-style-type: none"> Status <p>Rehabilitation at Bengalla is ongoing. It is undertaken in accordance with SSD-5170 (as modified) and the current Forward Program and Rehabilitation Management Plan (which replaced the former Mining Operations Plan from 1 July 2022).</p> <p>The current Forward Program covers a period from 27 June 2022 to 26 June 2025. The proposed rehabilitation activities for Year 1 (July 2022 to July 2023) include development of approx. 47.7 ha of retrofitted High Density Woody Vegetation (HDWV) on the eastern face of the Overburden Emplacement Area (OEA) and reshaping of approximately 20 ha of land of overburden for rehabilitation to Class IV pasture 8.7 ha and HDWV 11.3 ha on the landform of the OEA.</p> <p>During the Reporting Period, no areas of new rehabilitation were undertaken.</p> <p>BMC installed 20,000 HDWV tubestock into previously rehabilitated land according to the current Forward Plan.</p> <p>Further detail about the rehabilitation carried out at Bengalla during the Reporting Period will be available in Section 8 of the Annual Review for 2022.</p> <p>Condition 45</p> <ul style="list-style-type: none"> Requirement <p>Schedule 3 Condition 45 of SSD-5170 requires BMC to carry out progressive rehabilitation. Interim stabilisation measures are to be used where reasonable and feasible to control dust</p>

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
			<p>emissions in disturbed areas that are not active but not ready for final rehabilitation.</p> <ul style="list-style-type: none"> <u>Status</u> <p>Rehabilitation is carried out progressively at Bengalla, as soon as reasonably practicable following disturbance. Interim stabilisation measures are used where required.</p> <p>Condition 46</p> <ul style="list-style-type: none"> <u>Requirement</u> <p>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</p> <ul style="list-style-type: none"> <u>Status</u> <p>BMC was required to develop and implement a new Rehabilitation Management Plan and Forward Program (among other actions) from 1 July 2022 due to reforms to the Mining Act 1992.</p> <p>These new documents effectively replaced the previous approved Mining Operations Plan (which was implemented during the first half of the Reporting Period) and function as the Rehabilitation Management Plan for the purposes of Schedule 3 Condition 46 of SSD-5170. The new Rehabilitation Management Plan and Forward Program were implemented at Bengalla as part of mining operations during the second half of the Reporting Period.</p>
6	The approval holder must undertake management and monitoring of water resources in accordance with NSW approval conditions 23 to 25.	EPA concluded not compliant with EPL conditions relating to TSS concentration limits in respect of discharge event on 16 August 2022	<p>Condition 23</p> <ul style="list-style-type: none"> <u>Requirement</u> <p>Schedule 3 Condition 23 of SSD-5170 (Condition 23) requires BMC to comply with section 120 of the <i>Protection of the Environment Operations Act 1990</i> NSW (POEO Act) and the <i>Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002</i> NSW (unless an EPL or the EPA authorises otherwise).</p> <ul style="list-style-type: none"> <u>Status</u> <p>During the Reporting Period BMC notified DCCEEW, DPE and the NSW Environment Protection Authority (EPA) of a potential non-</p>

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
		<p>– caution issued</p>	<p>compliance relating to Condition 23. This involved an elevated Total Suspended Solids (TSS) concentration recorded for a discharge event on 16 August 2022.</p> <p>The matter was investigated and a report provided to DCCEE, DPE and EPA. The DPE and EPA subsequently issued further correspondence to BMC, to which BMC responded as requested.</p> <p>By letter dated 10 March 2023, the EPA advised BMC that it <i>“has reasonable grounds to believe that [BMC] committed an offence under section 64(1) of the [POEO Act] by the alleged non-compliance with EPL condition L2.1, by exceeding the concentration limits specified in condition L2.4, which occurred on 16 August 2022 ... the EPA has given consideration to this matter and in these circumstances ... considers it appropriate to issue [BMC] with this Official Caution for the alleged offence”</i>.</p> <p>During the Reporting Period, BMC discharged a total of 1,904 ML of saline water to the Hunter River under the <i>Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002 NSW</i>.</p> <p>Condition 24</p> <ul style="list-style-type: none"> Requirement <p>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.</p> <ul style="list-style-type: none"> Status <p>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).</p> <p>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 2022.</p> <p>Condition 25</p> <ul style="list-style-type: none"> Requirement <p>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.</p>

Ref	Condition	Status	Comment
			<ul style="list-style-type: none"> <u>Status</u> <p>The WMP was developed to meet this requirement and is implemented at Bengalla.</p> <p>The current WMP was approved by the Secretary on 1 February 2019. 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).</p>
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 and 6 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	<p>No request was made during the Reporting Period.</p> <p>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.</p>
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 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.	Not Triggered	<p>No request was made during the Reporting Period.</p> <p>Approved Bengalla management plans are available on Bengalla's website.</p> <p>BMC's approved Water Management Plan includes a Site Water Balance, Surface Water Management Plan and Groundwater Management Plan.</p>
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	<p>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.</p> <p>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.</p>	Not Triggered	<p>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).</p> <p>No request was made during the Reporting Period to make any records available to DCCEEW.</p> <p>Appendix A describes the commitments made in the approved BDMP and how each has been addressed in the Reporting Period.</p> <p>Appendix B describes the commitments made in the approved BOMP and how each has been addressed in the Reporting Period.</p>

Ref	Condition	Status	Comment
			Appendix C describes pre-clearing and clearing activities implemented in accordance with the BDMP during the Reporting Period.
12	<p>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.</p> <p>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.</p>	Compliant	<p>This report addresses compliance with each of the conditions of the EPBC Approval for the Reporting Period.</p> <p>Appendix A describes the commitments made in the approved BDMP and how each has been addressed in the Reporting Period.</p> <p>Appendix B describes the commitments made in the approved BOMP and how each has been addressed in the Reporting Period.</p> <p>Appendix C describes pre-clearing and clearing activities implemented in accordance with the BDMP during the Reporting Period.</p> <p>This report will be uploaded to Bengalla’s website by the end of March 2023 and documentary evidence of publication will be provided to DCCEEW at the same time.</p>
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.	Non-compliances with Conditions 4 and 6 reported to DCCEEW during the Reporting Period	<p>On 23 August 2022 (following receipt of water monitoring results on 19 August 2022 with those results not being viewed by BMC staff until 22 August 2022 due to a Mine Infrastructure Area evacuation due to blasting that occurred nearby on 19 August 2022), BMC notified DCCEEW of a potential non-compliance relating to Schedule 3 Condition 23 of SSD-5170 in respect of a discharge event that occurred on 16 August 2022 (see further comments above).</p> <p>On 7 September 2022, BMC notified DCCEEW of a non-compliance relating to Schedule 3 Condition 28 of SSD-5170 which requires provision of appropriate long-term security for the offset areas (see further comments above). This followed correspondence from DPE on 17 August 2022 advising that an extension of time to comply with Condition 28 would not be granted. As described above, BMC corresponded with the relevant NSW government departments during 2022 to determine the appropriate long-term mechanism for securing the offsets and Biodiversity Stewardship Agreements are being progressed.</p>
14	Upon the direction of the Minister, the approval holder must ensure that an independent audit of compliance with the 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	Not Triggered	No direction was made during the Reporting Period.

Ref	Condition	Status	Comment
	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 BDMP 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 were two non-compliances with EPBC Approval conditions reported to DCCEEW. These related to Condition 6 (discharge event on 16 August 2022 in respect of which the EPA has issued a caution) and Condition 4 (provision of long-term security for offset properties in respect of which DCCEEW has advised that no further action will be taken).

BMC will continue to review and document all relevant activities at Bengalla during the 2023 reporting period to assist in maintaining compliance with the EPBC Approval conditions.

Appendix A and **Appendix B** provide comments about the implementation of the BDMP and BOMP commitments respectively during the Reporting Period. In summary, BMC has generally complied with the BDMP 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 C .
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 C .
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 to be reported in Annual Review. OEH notified if new threatened species identified.	Compliant	Refer Section 3.1 of Appendix C .
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 to be reported in Annual Review. OEH notified if new threatened species identified.	Compliant	Refer Section 3.2 of Appendix C .
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 to be reported in Annual Review.	Compliant	Refer Section 3.1.7 of Appendix C .

BDMP Section	Control / Action	Timing / Trigger	Responsibility	Monitoring	Reporting	Status	Comment
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 to be reported in Annual Review.	Compliant	Refer Section 3.1.8 and Section 3.2 of Appendix C.
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 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 (WSP) during 2022. 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 C.
4.3	Weed control	Ongoing over life of mine	Environment Superintendent	Routine field observations 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 including rehabilitation areas.	Results to be reported in Annual Review.	Compliant	Refer Appendix D.
5.0	Ecological Monitoring	Ongoing over life of mine	Ecologist	N/A	Results to be reported in	Compliant	The purpose of the ecological monitoring program is primarily to



Bengalla Mine
2022 Annual Compliance Report

BDMP Section	Control / Action	Timing / Trigger	Responsibility	Monitoring	Reporting	Status	Comment
	and Inspections				Annual Review.		<p>monitor the risks posed by plant pathogens, exotic weeds and feral animals in biodiversity offsets, residual vegetation and rehabilitation areas and to indicate where management actions are required.</p> <p>For weed and feral animal monitoring programs for Bengalla and the biodiversity offset areas refer to Appendix D.</p> <p>Rehabilitation monitoring was completed during November 2022. Details of results will be presented in Section 8 of the 2022 Annual Review.</p> <p>As stated at section 5.4 of the BDMP, 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.</p>

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 area that may require maintenance.	Compliant	An annual inspection of certain boundary fencing for all biodiversity offset areas (BOS Areas) was undertaken in 2022. Fencing maintenance work and the replacement of two gates were undertaken at Kenalea during 2022.
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 2022 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 2022. Two gates were replaced at Kenalea.
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 2022.
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
2022 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 2022.
8.3	Best practice for control grazing will be implemented wherever control grazing is employed, including: <ul style="list-style-type: none"> • 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 dray 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 2022.
8.3	Control grazing will be monitored against Trigger and Performance Criteria.	Not Triggered	No control grazing was undertaken during 2022.
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 2022.
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 2022.
Bushfire management			
8.4	BMC will take practicable steps to prevent the occurrence of bushfires on the land and minimise the spread of bushfire.	Compliant	Fire trail maintenance was completed on Kenalea and Black Mountain in 2022. An assessment of fuel loads and fuel characteristics was completed on each offset area. Subsequent to this assessment, bushfire hazard reduction burns are planned for 2023 for each offset.



Bengalla Mine
2022 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. Locations of water fill points were provided to the RFS in 2018 following the ground truthing of these locations.
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 (excluding Merriwa River) due to access constraints) during the Reporting Period. Records of the location 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 was 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 2022. 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 2022 feral animal control program.



Bengalla Mine
2022 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 2022 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 2022.
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 Kenalea and Black Mountain were assessed and regraded where required in 2022. Merriwa River was not completed due to access being compromised by continued wet conditions.
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 (e.g. tracks, fence lines, gates)	Compliant	Inspections and maintenance of tracks was undertaken in 2022. Certain fence lines and gates were also inspected. Fencing maintenance work and the replacement of two gates were undertaken at Kenalea during 2022.
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 2022

Bengalla Mining Company Pty Ltd

February 2023

Bengalla Coal Mine 2022 Annual Clearing Report

wsp



Question today Imagine tomorrow Create for the future

Bengalla Coal Mine 2022 Annual Clearing Report

Bengalla Mining Company Pty Ltd

WSP

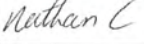
Level 3, 51-55 Bolton St
Newcastle NSW 2300
PO Box 1162
Newcastle NSW 2300

Tel: +61 2 4929 8300

Fax: +61 2 4929 8382

wsp.com

Rev	Date	Details
A	31/01/2023	Draft
B	06/02/2023	Draft – address client comments
C	21/02/2023	Final

	Name	Date	Signature
Prepared by:	Gavin Shelley	31/01/2023	
Reviewed by:	Nathan Cooper	06/02/2023	
Approved by:	Nathan Cooper	06/02/2023	

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

This document may contain confidential and legally privileged information, neither of which are intended to be waived, and must be used only for its intended purpose. Any unauthorised copying, dissemination or use in any form or by any means other than by the addressee, is strictly prohibited. If you have received this document in error or by any means other than as authorised addressee, please notify us immediately and we will arrange for its return to us.



Table of contents

Abbreviations	iv
Executive summary	v
1 Project background.....	1
1.1 Existing operation.....	1
1.2 Aims and objectives	1
2 Methods.....	2
2.1 Personnel	2
2.2 Pre-clearing survey procedure.....	2
2.3 Clearing procedure	4
3 Results	5
3.1 Stage 1 pre-clearance surveys	5
3.2 Stage 2 tree clearing	10
4 Conclusions	20
5 Limitations	21
5.1 Permitted purpose	21
5.2 Qualifications and assumptions	21
5.3 Use and reliance	21
5.4 Disclaimer	22
Bibliography	23

List of tables

Table 2.1	Contributors and their role	2
Table 3.1	Pre-clearing surveys completed in 2022.....	5
Table 3.2	Noxious weeds recorded during pre-clearance surveys	9
Table 3.3	Stage 2 clearing completed in 2022	10
Table 3.4	Species of animal recorded during Stage 2 tree clearing operations in 2022.....	12
Table 3.5	Fauna guilds recorded during Stage 2 clearing operations in 2022.....	13

List of figures

Figure 3.1	Ground disturbance permit areas subject to clearing activities in 2022	6
------------	------------------------------------------------------------------------------	---

List of photographs

Photo 3.1	<i>Cymbidium canaliculatum</i> requiring translocation in 2022	8
Photo 3.2	<i>Cymbidium canaliculatum</i> requiring translocation in 2022	8
Photo 3.3	An example of salvageable material identified during Stage 1 pre-clearing surveys in 2022	9
Photo 3.4	An example of salvageable material identified during Stage 1 pre-clearing surveys in 2022	9
Photo 3.5	Stage 2 – clearing – GDP 2201	11
Photo 3.6	Stage 2 – clearing – post felling	11
Photo 3.7	Active Noisy Friarbird nest, December 2022.....	14
Photo 3.8	Vegetation strip reserved to assist Noisy Friarbird breeding attempt, December 2022.....	14
Photo 3.9	An example of salvageable material identified during Stage 2 tree clearing	14
Photo 3.10	An example of salvageable material identified during Stage 2 tree clearing	14
Photo 3.11	Stage 1 pre-clearing survey of the proposed electricity easement widening showing two of the three habitat trees	15
Photo 3.12	Stage 2 tree clearing operations associated with the electricity easement.....	15
Photo 3.13	Isolated <i>Brachychiton populneus</i> felled in June 2022.....	16
Photo 3.14	Isolated <i>Allocasuarina luehmannii</i> stump felled in June 2022	16
Photo 3.15	An example of a hollow-bearing tree with small knot holes & fissures.....	17
Photo 3.16	A dead <i>Eucalyptus crebra</i> that contained hollows of varying size-classes	17
Photo 3.17	Inspection of microhabitat features from a bucket truck.....	17
Photo 3.18	Inspection of a large Ironbark hollow at elevation from a bucket truck	17
Photo 3.19	Location of dead trees felled in August 2022	18
Photo 3.20	Limb containing <i>Cymbidium canaliculatum</i> being sectioned from <i>Eucalyptus crebra</i> host tree.....	18
Photo 3.21	<i>Cymbidium canaliculatum</i> being lowered from host tree.....	18
Photo 3.22	<i>Eucalyptus crebra</i> donor tree	19
Photo 3.23	Translocated <i>Cymbidium canaliculatum</i>	19



List of appendices

- Appendix A Recorded flora
- Appendix B Recorded fauna
- Appendix C Scientific licence

Abbreviations

BMC	Bengalla Mining Company Pty Ltd
Bengalla	Bengalla Mine
BMP	Biodiversity Management Plan
EEC	Endangered Ecological Community
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
GDP	Ground Disturbance Permit
BC Act	<i>Biodiversity Conservation Act 2016</i>

Executive summary

The Bengalla Mine (Bengalla) Biodiversity Management Plan (BMP) (Bengalla Mining Company Pty Ltd, 2017) provides a framework for biodiversity management, reporting and auditing of ecological issues across Bengalla. As part of the Ground Disturbance Permit (GDP) process, the BMP requires that ecological pre-clearing and clearing surveys be carried out by a suitably qualified person to minimise harm to native flora and fauna.

This report summarises the pre-clearing and clearing surveys completed at Bengalla between January and December of 2022 (reporting period). These works were in relation to:

- general pit progression and relocation of infrastructure
- construction of new infrastructure
- maintenance work.

During the reporting period, pre-clearing and clearing surveys were undertaken by appropriately qualified WSP ecologists in accordance with the BMP.

During pre-clearing surveys, habitat features such as hollow trees were recorded, marked with the letter “H” (for habitat), and flagged with fluorescent tape. A total of 232 hollow-bearing/habitat trees were identified within the GDP area, 207 of which were felled in 2022. Salvaged habitat items were stockpiled, with the intention to relocate them to rehabilitation areas as areas become available.

One large *Cymbidium canaliculatum* was identified during Stage 1 pre-clearing surveys in 2022. This individual was successfully translocated to a donor tree prior to Stage 2 tree clearing activities in December 2022.

Immediately prior to the habitat trees being felled, the ecologist generally conducted a final pre-clearance survey and recorded the results as part of the clearance documentation. Following the felling of the tree, the ecologist investigated hollows for the presence of animals. During the 2022 clearing activities, 100 animals were relocated, 21 were observed but evaded capture, nine animals died during clearing and six animals required immediate euthanasia due to injuries obtained. Fifteen advanced nestling birds were also captured and passed on to appropriate wildlife rehabilitation agencies.

Clearing activities undertaken throughout 2023 will continue to follow the methodology outlined within the BMP.

1 Project background

1.1 Existing operation

The Bengalla Mining Company (BMC) operates Bengalla Mine (Bengalla), an open cut coal mine located approximately four kilometres (km) west of Muswellbrook in the Upper Hunter Valley, NSW.

Activities associated with clearing operations during the reporting period relate to the construction of new infrastructure, the relocation and maintenance of infrastructure and service roads, in addition to an extension of the open cut mining pit towards the west.

1.2 Aims and objectives

The aims of this annual clearing report are to detail the procedures and results for all pre-clearing and clearing operations completed at Bengalla in 2022, inclusive of:

- ecology pre-clearing surveys
- Stage 1 and Stage 2 clearing operations
- fauna handling and relocation
- habitat salvage and procedures.

2 Methods

2.1 Personnel

The contributors to the delivery of clearing operations and reporting, their qualifications and roles are listed in Table 2.1.

Table 2.1 Contributors and their role

Name	Qualification	Role
Gavin Shelley	B.Env Sc. Mgmt	Ecologist – pre-clearing surveys, spotter catcher and reporting
Sebastian Miller	B.Sc.	Ecologist – pre-clearing surveys, spotter catcher and reporting
Allan Richardson	B Env Sc (Hons)	Associate Ecologist – pre-clearing surveys, spotter catcher and reporting
Nathan Cooper	B.Env.Sc. Grad Dip Ornithology	Principal Ecologist – pre-clearing surveys, spotter catcher and technical review, project manager

All work was carried out under the appropriate licenses, including a scientific licence as required under Part 2 of the NSW *Biodiversity Conservation Act 2016* (BC Act) (License Number: SL100630), and an Animal Research Authority issued by the Department of Primary Industries (Agriculture).

2.2 Pre-clearing survey procedure

The ecology pre-clearance surveys were conducted throughout 2022 and were completed in accordance with Section 4.2.1 of the BMP, which outlines management actions for vegetation pre-clearance procedures. The aims and objectives of the ecology pre-clearing survey include:

- detecting the presence/absence of threatened species and their habitat, including *Cymbidium canaliculatum* (Tiger Orchid)
- recording the presence of any fauna or flora species
- identification and demarcation of habitat trees, large logs, and boulders
- identification and demarcation of salvageable material including hollow bearing trees, debris, and boulders
- searching for evidence of plant pathogen *Phytophthora cinnamomi*
- identification of appropriate fauna relocation sites for captured fauna species
- identification of plants suitable for seed collection
- identification of weed and pest species infestations.

Clearing boundaries were initially marked by a surveyor with survey pegs, generally incorporating spacing commensurate with visible line of sight. A hard copy map of the GDP area was also used as a reference when in the field.

It should be noted that throughout the year some GDP areas were assessed more than once due to only part of the GDP area being disturbed or an extended time frame between the initial pre-clearance inspection and commencement of works (Section 3.1).

2.2.1 *Fauna habitat identification*

Each clearing area was traversed by a field ecologist to identify important fauna habitat values, including:

- habitat trees – identified as any substantial non hollow-bearing tree that either provided significant canopy cover and thus significant potential foraging resources, or was observed to contain nesting material
- hollow-bearing trees – which include any tree that was observed to contain a visible hollow or fissure that may support microhabitat values for native fauna.

All identified habitat, hollow-bearing or significant trees were marked with “H” (habitat tree) in high visibility paint as well as pink flagging tape to ensure dark trees, such as *Eucalyptus crebra* (Narrow-leaved Ironbark), were clearly marked prior to the commencement of clearing activities. The number of habitat, hollow-bearing or significant trees were recorded on field proformas.

2.2.2 *Species inventory*

All flora and fauna species identified during the ecology pre-clearance surveys and clearing surveys were recorded and are presented in Appendix A and Appendix B.

2.2.3 *Surveys for *Cymbidium canaliculatum**

Trees within the clearing area were visually examined for the presence of *Cymbidium canaliculatum*, which is listed as an Endangered Population in the Hunter Catchment under the NSW BC Act.

2.2.4 *Salvageable habitat material*

In accordance with the BMP, selected salvageable hollow logs and rocks were identified for later reuse in rehabilitation areas. Since materials vary in abundance and quality throughout Bengalla, ecologists are guided by the selection criteria for salvageable materials (as outlined in Table 5 of the BMP) when identifying logs and rocks for re-use.

2.2.5 *Surveys for *Phytophthora cinnamomi**

Vegetation health assessments were undertaken to detect the presence of the plant pathogen *Phytophthora cinnamomi*. This involved assessing vegetation for any visible signs of disease.

2.2.6 *Fauna relocation sites*

Sites suitable for the relocation of displaced native fauna were assessed prior to the commencement of the ecology pre-clearance survey. Relocation sites were assessed for habitat attributes which represent similar or commensurate habitat attributes as those within the clearing areas. All relocation sites are located outside of the clearing area and consist of the same vegetation community. Fauna relocation sites are illustrated on Figure 3.1.

2.2.7 *Collection of seeds for rehabilitation purposes*

In accordance with the BMP, native trees and shrubs suitable for the harvesting and propagation of native seed for use in rehabilitation activities are required to be identified. Any areas of particularly high seed yield were marked on maps for future reference. During pre-clearing surveys throughout 2022, there was a lack of seed availability and as such, no seed was collected for use in rehabilitation areas.

2.2.8 *Identification of weed and pest species infestations*

Significant infestations of Weeds of National Significance (WONS) and noxious weeds identified during the field surveys were recorded and notified to BMC Environmental Department.

2.3 Clearing procedure

In accordance with Section 4.2.2 of the BMP, clearing activities in 2022 were undertaken as a two-stage process as follows:

- **Stage 1 clearing** – removal of understory vegetation other than marked/flagged habitat features. Habitat trees, marked with an 'H', were left to stand overnight to enable any resident fauna to self-relocate into adjacent habitat.
- **Stage 2 clearing** – commenced no less than 24 hours following the completion of Stage 1 clearing. Felled habitat trees were left undisturbed over night to allow any undetected fauna further opportunity to relocate.

2.3.1 *Fauna handling and relocation*

The following information is recorded in relation to fauna species observed during the clearing activities:

- details of animals sighted, captured, relocated, injured, or killed as a result of vegetation clearing activities
- the relocation of fauna within designated relocation areas
- tree species used for breeding or roosting by fauna
- micro-habitat features of where the species was found on the tree.

Uninjured adult fauna will be relocated into suitable habitat within designated relocation sites. Juvenile and injured fauna will be passed on to the Muswellbrook Satur Vets, local Wildlife Aid carers or euthanised in accordance with the Animal Research Authority Code of Practice (National Health and Medical Research Council, 2013).

3 Results

3.1 Stage 1 pre-clearance surveys

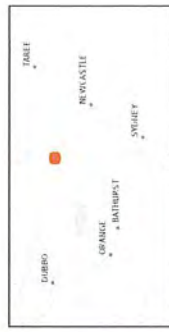
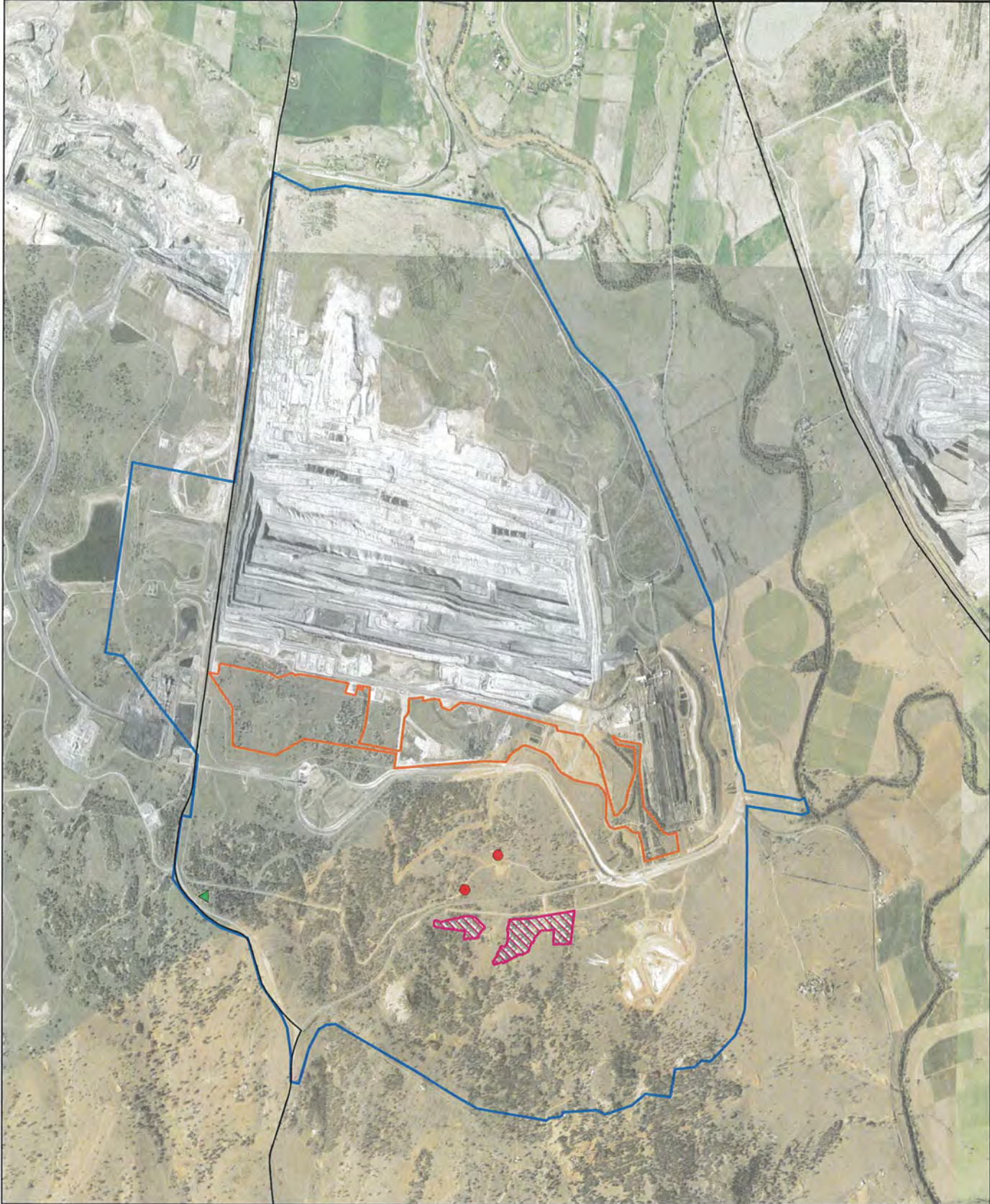
Pre-clearing surveys completed by or on behalf of BMC in 2022 are summarised in Table 3.1 and illustrated in Figure 3.1. It should be noted that throughout 2022, the GDP area was assessed on more than one occasion due to only part of the GDP area being disturbed, or an extended time frame between the initial pre-clearance inspection and commencement of works.

Table 3.1 Pre-clearing surveys completed in 2022

Ground disturbance permit area (GDP)	Date pre-clearance undertaken	Vegetation community
GDP 2201	11/01/2022	Derived native grassland in between <i>Eucalyptus crebra</i> , <i>Eucalyptus moluccana</i> and <i>Allocasuarina luehmannii</i> shrub open forest.
GDP 2201	16/02/2022	Derived native grassland in between <i>Eucalyptus crebra</i> , <i>Eucalyptus moluccana</i> and <i>Allocasuarina luehmannii</i> shrub open forest.
GDP 2201	8/06/2022	Derived native and exotic grassland with planted 10 year old <i>Eucalyptus crebra</i> and <i>Eucalyptus moluccana</i> canopy.
GDP 2201	8/06/2022	Central Hunter <i>Eucalyptus crebra</i> and <i>Eucalyptus moluccana</i> grassy woodland
GDP 2201	15/07/2022	Derived native and exotic grassland with planted 10 year old <i>Eucalyptus crebra</i> and <i>Eucalyptus moluccana</i> canopy.
GDP 2201	15/07/2022	Derived native and exotic grassland with patches of <i>Eucalyptus crebra</i> , <i>Eucalyptus moluccana</i> and <i>Allocasuarina luehmannii</i> shrub open forest.
GDP 2201	29/07/2022 & 3/08/2022	Derived native and exotic grassland with patches of <i>Eucalyptus crebra</i> , <i>Eucalyptus moluccana</i> and <i>Allocasuarina luehmannii</i> shrub open forest.
GDP 2201	9/08/2022	Derived native and exotic grassland with patches of <i>Eucalyptus crebra</i> , <i>Eucalyptus moluccana</i> and <i>Allocasuarina luehmannii</i> shrub open forest
GDP 2201	16/11/2022	Derived native grassland in between <i>Eucalyptus crebra</i> , <i>Eucalyptus moluccana</i> and <i>Allocasuarina luehmannii</i> shrub open forest.
GDP 2201	28/11/2022 & 29/11/2022	Derived native and exotic grassland with patches of <i>Eucalyptus crebra</i> , <i>Eucalyptus moluccana</i> and <i>Allocasuarina luehmannii</i> shrub open forest
GDP 2201	16/12/2022	Derived native and exotic grassland with planted 10-year-old <i>Eucalyptus crebra</i> and <i>Eucalyptus moluccana</i> canopy.

Figure 3.1
Ground disturbance permit areas subject
to clearing activities in 2022

- Legend**
- Cymbidium Translocation Site
 - Relocation Points
 - Road
 - Fauna Relocation Site
 - Project Development Boundary
 - GDP2201



Coordinate system: GDA2020
Scale ratio correct when printed at A3
1:30,000 Date: 21/02/2023



Data source: DELWP, Geoscience Australia, Metrismap
© WSP Australia Pty Ltd (WSP). Copyright in this drawing, information and data created (the "Work") is owned by WSP. All rights are reserved. No part of this Work may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of WSP. This Work is provided for the personal and confidential use of the recipient only. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC, MECHANICAL, PHOTOCOPYING, RECORDING, OR OTHERWISE, WITHOUT THE PRIOR WRITTEN PERMISSION OF WSP.

3.1.1 *Vegetation community structure*

The following vegetation communities were identified in the areas pre-cleared in 2022:

- derived native and exotic grassland
- derived native and exotic grassland with isolated pockets of *Eucalyptus crebra*
- derived native and exotic grassland with *Eucalyptus crebra*, *Eucalyptus moluccana*, and *Allocasuarina luehmannii* open forest
- derived native and exotic grassland with planted *Eucalyptus crebra* and *Eucalyptus moluccana*
- miscellaneous exotic and native planted vegetation.

3.1.2 *Habitat, hollow-bearing and significant trees*

A total of 232 hollow-bearing/habitat trees were identified within the GDP area subject to pre-clearing surveys in 2022.

3.1.3 *Species inventory*

3.1.3.1 Flora

A total of 43 flora species were recorded during pre-clearing surveys completed in 2022. Of these, 23 were introduced species (Appendix A).

3.1.3.2 Fauna

A total of 46 fauna species were recorded during pre-clearing surveys completed in 2022. Of these, four were introduced species (Appendix B).

3.1.4 *Cymbidium canaliculatum surveys*

One *Cymbidium canaliculatum* was identified during pre-clearing surveys in 2022, in association with Strip 41 (Latitude: -32.259929 Longitude: 150.815367) (Photo 3.1 and Photo 3.2). The orchid was observed growing in a large *Eucalyptus crebra*, approximately 11 m above the ground. The orchid was positioned with a north east aspect, occurring under the host trees canopy, and was observed in shade late in the morning. The orchid would be subject to morning sun but shaded from the afternoon sun.

In accordance with the BMP, Stage 2 clearing of the orchid's host tree was undertaken following the implementation of a translocation procedure, which was derived based on:

- site inspections and liaison between BMC staff, qualified arborists, bucket truck operators, crane operators, qualified ecologists
- determining suitable translocation site(s) and donor tree(s)
- safety and risk assessment documentation.

The *Cymbidium canaliculatum* translocation is detailed in Section 3.2.4.



Photo 3.1 *Cymbidium canaliculatum* requiring translocation in 2022



Photo 3.2 *Cymbidium canaliculatum* requiring translocation in 2022

3.1.5 *Phytophthora cinnamomi* surveys

No evidence of disease or plant dieback was identified within the GDP area subject to pre-clearing surveys in 2022.

3.1.6 *Collection of seeds for rehabilitation purposes*

During pre-clearing surveys throughout 2022, no seed was identified within survey areas deemed suitable to be collected for use in rehabilitation. Some species were identified to have seed including *Acacia salicina*, *Acacia parvipinnula*, *Eucalyptus crebra* and *Eucalyptus moluccana*; however, survey times were conducted when these species were mainly flowering, or seeds were too immature to be considered suitable for propagation purposes. Overall, due to clearing times and large areas of derived native and exotic grasslands limiting the number of canopy species, no suitable native flora seeding opportunities were present and no seed collection was conducted.

3.1.7 Weed species

Table 3.2 Noxious weeds recorded during pre-clearance surveys

Species	Class	Legal requirements
<i>Lycium ferocissimum</i> (African Boxthorn)	3	This plant must be continually suppressed and destroyed, and the plant must not be sold propagated or knowingly distributed.
<i>Opuntia stricta</i> (Prickly Pear)	4	The growth of the plant must be managed that reduces its numbers, spread and incidence and continuously inhibits its reproduction and the plant must not be sold propagated or knowingly distributed.
<i>Senecio madagascariensis</i> (Fireweed)	4	The growth of the plant must be managed that reduces its numbers, spread and incidence and continuously inhibits its reproduction and the plant must not be sold propagated or knowingly distributed.

3.1.8 Salvageable material

A total of 308 lineal metres of hollow ground timber was identified during Stage 1 pre-clearance surveys in 2022, examples of which are provided in Photo 3.3 and Photo 3.4.



Photo 3.3 An example of salvageable material identified during Stage 1 pre-clearing surveys in 2022



Photo 3.4 An example of salvageable material identified during Stage 1 pre-clearing surveys in 2022

3.2 Stage 2 tree clearing

The GDP area cleared in part in 2022 is summarised in Table 3.3 and illustrated on Figure 3.1. The removal of understory vegetation surrounding habitat trees was undertaken a minimum of 24 hours prior to habitat tree removal. Stage 2 clearing of habitat trees was undertaken over eight discrete periods in 2022, with a total of 207 habitat trees felled.

Table 3.3 Stage 2 clearing completed in 2022

Ground disturbance permit area	Stage 2 clearing completed (date)	Vegetation community
GDP 2201	12/01/2022	Derived native grassland in between <i>Eucalyptus crebra</i> , <i>Eucalyptus moluccana</i> and <i>Allocasuarina luehmannii</i> shrub open forest.
GDP 2201	17/02/2022	Derived native grassland in between <i>Eucalyptus crebra</i> , <i>Eucalyptus moluccana</i> and <i>Allocasuarina luehmannii</i> shrub open forest.
GDP 2201	27/06/2022	Central Hunter <i>Eucalyptus crebra</i> and <i>Eucalyptus moluccana</i> grassy woodland.
GDP 2201	27/06/2022	Central Hunter <i>Eucalyptus crebra</i> and <i>Eucalyptus moluccana</i> grassy woodland.
GDP 2201	19/07/2022	Derived native and exotic grassland with planted 10 year old <i>Eucalyptus crebra</i> and <i>Eucalyptus moluccana</i> canopy.
GDP 2201	9/08/2022	Low diversity native grassland/exotic understorey, canopy trees <i>Allocasuarina luehmannii</i> dead from historical inundation from dam.
GDP2201	12/12/2022	Derived native grassland in between <i>Eucalyptus crebra</i> , <i>Eucalyptus moluccana</i> and <i>Allocasuarina luehmannii</i> shrub open forest.
GDP 2201	13-16/12/2022	Derived native and exotic grassland with patches of <i>Eucalyptus crebra</i> , <i>Eucalyptus moluccana</i> and <i>Allocasuarina luehmannii</i> shrub open forest.

Prior to the habitat trees being felled, the trees were visually inspected to identify signs of fauna utilisation. Habitat trees were gently shaken prior to felling to encourage any resident fauna to vacate any fissure and/ or hollow. Habitat trees were then felled sequentially when directed by the supervising ecologist.

Immediately following the felling of each habitat tree, the supervising ecologist inspected the trees for remaining fauna. Tree hollows were inspected using a hand-held torch. Felled habitat trees were left undisturbed over night to allow any undetected fauna further opportunity to relocate. The habitat trees were then stockpiled for mulching or utilisation in rehabilitation areas.



Photo 3.5 Stage 2 – clearing – GDP 2201



Photo 3.6 Stage 2 – clearing – post felling

3.2.1 *Fauna recorded and relocated*

A total of 46 species of animal were observed whilst on site at Bengalla during Stage 1 and Stage 2 clearing activities (Appendix B). No animals were captured or relocated during Stage 1 pre-clearing inspections completed in 2022. Of the 46 species observed on site, a minimum of 151 individual animals were recorded using habitat trees impacted within the GDP area subject to Stage 2 tree clearing activities (Table 3.4, Table 3.5). This comprised of seven species of bird, five mammals, four reptiles and two species of frog. Animals handled for purpose of relocation or euthanasia were handled in accordance with the Animal Research Authority Code of Practice (National Health and Medical Research Council, 2013). During the 2022 Stage 2 tree clearing operations:

- 100 animals were successfully relocated
- 21 animals were displaced but evaded capture
- nine animals were killed as a result of tree felling
- six animals were euthanised following tree felling
- 15 animals required assistance from wildlife rehabilitation agencies.

Table 3.4 Species of animal recorded during Stage 2 tree clearing operations in 2022

Common name	Scientific name	Notes	Number of individuals
Animals relocated during Stage 2 tree clearing operations			
Robust Velvet Gecko	<i>Nebulifera robusta</i>	–	17
Tree Skink	<i>Egernia striolata</i>	–	26
Common Brushtail Possum	<i>Trichosurus vulpecula</i>	–	1
South-eastern Free-tailed Bat	<i>Ozimops planiceps</i>	–	3
Eastern Broad-nosed Bat	<i>Scotorepens orion</i>	–	1
Ride's Free-tailed Bat	<i>Ozimops ridei</i>	–	4
Free-tailed Bat	<i>Ozimops</i> spp.	Roost limb relocated	8 (minimum)
Unidentified microbat	–	Roost limb relocated	6 (minimum)
Gould's Wattled Bat	<i>Chalinolbus gouldii</i>	–	27
Striated Pardalote	<i>Pardalotus striatus</i>	–	1
Eastern Rosella	<i>Platycerus eximius</i>	–	3
Green Tree Frog	<i>Litoria caerulea</i>	–	2
Peron's Tree Frog	<i>Litoria peroni</i>	–	1
Total			100
Animals displaced but evaded capture			
Elegant Snake-eyed Skink	<i>Cryptoblepharus pulcher</i>	–	3
Tree Skink	<i>Egernia striolata</i>	–	3
Robust Velvet Gecko	<i>Nebulifera robusta</i>	–	1
Gould's Wattled Bat	<i>Chalinolbus gouldii</i>	Self-relocated	8
Unidentified microbat	–	Roost limb. Hollow entrance observed but bats were not accessible. Trunk could not be sectioned and relocated, and individuals remained in hollow to self-relocate at nightfall.	1 (minimum)
Common Myna	<i>Acridotheres tristis</i>	Self-relocated	4
Striated Pardalote	<i>Pardalotus striatus</i>	Hollow limb with fledgling relocated immediately adjacent nest tree where parents were calling from. Individual self-relocated within one hour.	1
Total			21

Common name	Scientific name	Notes	Number of individuals
Animal killed during Stage 2 tree clearing operations			
Tree Skink	<i>Egernia striolata</i>	–	4
Common Myna	<i>Acridotheres tristis</i>	3 x recent hatchlings	3
Gould's Wattle Bat	<i>Chalinolbus gouldii</i>	–	1
Eastern Broad-nosed Bat	<i>Scotorepens orion</i>	–	1
Total			9
Animals euthanised following Stage 2 tree clearing operations			
Robust Velvet Gecko	<i>Nebulifera robusta</i>	–	1
Lace monitor	<i>Varanus varius</i>	–	1
Common Myna	<i>Acridotheres tristis</i>	1 x advanced nestling	1
Common Starling	<i>Sturnus vulgaris</i>	1 x advanced nestling	1
Eastern Rosella	<i>Platyercus eximius</i>	3 x eggs, 2 x recent hatchlings	2
Total			6
Animals requiring assistance from wildlife rehabilitation agencies			
Eastern Rosella	<i>Platyercus eximius</i>	Delivered to Muswellbrook Satur Vets for collection by wildlife rehabilitation agencies	7
Galah	<i>Eolophus roseicapilla</i>		1
Striated Pardalote	<i>Pardalotus striatus</i>		3
Black-faced Cuckoo-shrike	<i>Coaracina novaehollandiae</i>		2
Noisy Miner	<i>Manorina melanocephala</i>		2
Total			15

Table 3.5 Fauna guilds recorded during Stage 2 clearing operations in 2022

Guild	Number of individuals recorded				
	Relocated	Observed	Injured	Dead/ Euthanised	Taken to Wildlife carer
Reptiles	43	7	0	6	0
Microchiropteran bats/mammals	50	9	0	2	0
Amphibians	3	0	0	0	0
Birds	4	5	0	7	15
Total	100	21	0	15	15

Whilst reptiles, frogs and microbats were released at designated relocation areas, a Noisy Friarbird nest was observed in an *Allocasuarina luehmanii* (Buloke) during clearing works completed in mid-December 2022, with adults attending and sitting on the nest (Photo 3.7). A strip of trees associated with the nest tree was left for the purpose of allowing the adults to raise and fledge their young (Photo 3.8). It was envisaged that nest might be vacated in a 5–6-week window, after which the nest would be inspected by an ecologist to gauge activity and guide clearing of the remaining trees in accordance with the BMP.



Photo 3.7 Active Noisy Friarbird nest, December 2022



Photo 3.8 Vegetation strip reserved to assist Noisy Friarbird breeding attempt, December 2022

3.2.2 Salvage of habitat resources

Stage 1 clearing operations identified approximately 308 lineal metres of new salvageable material potentially suitable for reuse in rehabilitation works in 2022. An additional 90 lineal metres of suitable salvageable material was identified from hollow-bearing trees felled during Stage 2 tree clearing activities (Photo 3.9 and Photo 3.10). Salvaged habitat items were to be stockpiled with the intention to relocate within rehabilitation areas as work progresses.



Photo 3.9 An example of salvageable material identified during Stage 2 tree clearing



Photo 3.10 An example of salvageable material identified during Stage 2 tree clearing

3.2.3 Stage 2 clearing works completed outside approved clearing time

In accordance with Bengalla's BMP, clearing of woodland areas will be avoided during May to November, in order to avoid impacting hibernating bats and important growth and flowering periods for *Cymbidium canaliculatum* (Bengalla Mining Company Pty Ltd, 2017). If clearing is to occur during this period, an assessment by a suitably qualified ecologist justifying clearing activities must be recorded.

Electrical easement widening (June 2022)

A Stage 1 pre-clearing survey was completed 15 June 2022 (and again on 15 July 2022) to assess the potential for impacts upon ecological values during proposed works requiring the removal of native vegetation for small widening to an electrical easement immediately north of the main mine access road. This area was confirmed as representing habitat of a planted nature, the plantings being restricted to native trees forming the canopy layer of the proposed clearing area. The area also contained two existing trees, two mature *Allocasuarina luehmannii*, one of which was deceased. One planted native tree was deceased but remained standing and was still holding decorticated bark (Photo 3.11 and Photo 3.12). The area did not contain any individuals of threatened flora species or habitat for such species.

In total, there were three trees which contained habitat features that may be used by microchiropteran bats. However, the three trees retained habitat features that were predominantly open in nature and while they may be used as bivouacs for bats hunting in the area during warmer months, the open nature of the habitat features, being limited to open fissures on two trees and decorticated bark on the third tree, are considered unlikely to offer sufficient protection for microchiropteran bats as to represent long-term hibernation sites for such species, due to the exposed nature of these features. Therefore, clearing of this area in the May to September period was considered unlikely to impact upon hibernating bats.

While some minor habitat existed within this area, there was not sufficient resources to justify waiting until summer to clear the vegetation. Appropriate ecologist supervision still occurred to ensure that any arising ecological matters were appropriately addressed and handled to ensure protection of important biodiversity. The three habitat trees were felled successfully on 19 July 2022, with no animals injured or requiring veterinary assistance. One Green Tree Frog (*Litoria caerulea*) was captured and relocated during these works.



Photo 3.11 Stage 1 pre-clearing survey of the proposed electricity easement widening showing two of the three habitat trees



Photo 3.12 Stage 2 tree clearing operations associated with the electricity easement

Clay stockpile

A proposed clay stockpile was also inspected on 15 June 2022. The area encompassed some 318 trees sparsely distributed as single trees and clumps, being a mixture of regrowth eucalyptus species, predominantly *Eucalyptus crebra* and *Eucalyptus moluccana* (Grey Box) and scattered mature *Brachychiton populneus* (Kurrajong). There were no trees within this area of a sufficient age class to develop hollows, and therefore, was not considered to provide potential hibernation habitat for microchiropteran bats. There were three pile of logs within the area from previous clearing operations, each of which had logs containing hollows. However, the proximity of the logs to the ground and their lack of sufficient depth, precludes their potential to represent safe and insulated suitable roosting locations for long term hibernation through the coldest periods of the year. Therefore, clearing of this area through the May to September period was not considered likely to impact threatened microchiropteran bats.

Isolated trees

On the 27 June 2022, one isolated *Brachychiton populneus* positioned on the edge of a mine high wall and a separate *Allocasuarina luehmannii* stump surrounded by mine infrastructure were inspected to determine their potential suitability for felling during the May to November avoidance period. The *Brachychiton populneus* contained one medium-sized trunk hollow approximately 3 m above the ground. The *Allocasuarina luehmannii* stump was approximately 3.5 m high with broken branches, fissures and some decorticated bark. Both trees were considered to contain minimal microchiropteran bat habitat, were positioned near active mine operations and were isolated from other trees or stands of native vegetation (Photo 3.13 and Photo 3.14). Both trees were felled without incidence on 27 June 2022 with no animals observed.



Photo 3.13 Isolated *Brachychiton populneus* felled in June 2022



Photo 3.14 Isolated *Allocasuarina luehmannii* stump felled in June 2022

Mine pit advancement (July – August 2022)

A Stage 1 pre-clearing survey was completed 15 July 2022 to assess the potential for impacts upon ecological values associated with a proposed mine advancement that required the removal of native vegetation and fauna habitat. The proposed mine advancement to the west of active mine operations incorporated Strip 41 and Strip 43. Due to the presence of many hollow-bearing trees (including stags with knot holes, fissures and some larger hollows), mine advancement plans were revised.

The revised mine plan reduced the area of impact, and thus, the number of hollow-bearing trees potentially affected. However, hollow-bearing trees were observed to contain features that could offer shelter for native fauna, particularly small mammals, reptiles and amphibians. Habitat features recorded ranged from small to medium sized fissures within the trunks of trees, small to large-sized hollows (including knot holes) and decorticated bark, which had lifted sufficiently to provide spaces for fauna to shelter. Examples of habitat features are provided in Photo 3.15 and Photo 3.16.

Due to the presence of potentially suitable microhabitats, follow-up inspections and additional methodologies were employed to ascertain whether habitat features were in use by over-wintering fauna; particularly microchiropteran bats. For this scenario, a bucket truck was used to visually inspect potential habitat features (fissures, knot holes, hollows, broken branches) at elevation with a hand-held light source and a Signet 9 mm Inspection Camera (QC-8710) with a 2 m gooseneck extension. Additional targeted inspections were completed on 29 July 2022 and 3 August 2022. A total of 16 dead trees associated with an historic mine discharge dam were inspected over the two separate targeted inspection dates and comprised of *Allocasuarina luehmannii* and *Eucalyptus crebra* trees (Photo 3.19).



Photo 3.15 An example of a hollow-bearing tree with small knot holes & fissures



Photo 3.16 A dead *Eucalyptus crebra* that contained hollows of varying size-classes



Photo 3.17 Inspection of microhabitat features from a bucket truck



Photo 3.18 Inspection of a large Ironbark hollow at elevation from a bucket truck



Photo 3.19 Location of dead trees felled in August 2022

In total, 12 of 16 trees were safely inspected from the bucket (Photo 3.17 and Photo 3.18) with no microchiropteran bats or any sign of animal activity or habitation observed, inclusive of H6 and H16 – H26. The inspection of trees at height confirmed that most potential microchiropteran bat roost habitat observed from the ground was minimal in nature and unlikely to provide suitable thermal characteristics or protection during torpor. Four trees (H12 – H15) were not inspected at height during the targeted inspection program. Soft ground conditions in their immediacy dictated that working at height from a bucket truck could not be undertaken safely.

Due to the minimal nature of observed microhabitat features, the trees proximity to active mine operations and distance from patches of native vegetation, it was considered that the trees could be safely felled during the microchiropteran bat avoidance period with appropriate ecological supervision to ensure that any arising ecological matters were appropriately addressed and handled to ensure protection of important biodiversity.

The 16 dead trees were felled on 9 August 2022 without injury to any fauna. A total of nine individual animals (one *Litoria caerulea* (Green Tree Frog), seven *Egernia striolata* (Tree Skink) and one *Chalinolobus gouldii* (Gould's Wattled Bat) were successfully relocated west of Bengalla Road.

3.2.4 *Cymbidium canaliculatum* translocation

The *Cymbidium canaliculatum* was translocated on 12 December 2022. The orchid was sectioned from the *Eucalyptus crebra* host tree by an experienced arborist from a bucket truck (Photo 3.20). The limb containing the orchid was secured by a crane prior to the arborist sectioning the limb approximately 1.5 m above the orchid and approximately 1 m below, back to the tree trunk (Photo 3.21).



Photo 3.20 Limb containing *Cymbidium canaliculatum* being sectioned from *Eucalyptus crebra* host tree



Photo 3.21 *Cymbidium canaliculatum* being lowered from host tree

The sectioned limb was positioned and secured on a flatbed truck and transported to the proposed translocation site (Photo 3.22). The sectioned limb containing the orchid was positioned on the ground and leant against the donor *Eucalyptus crebra* and secured using metal strips (Photo 3.23).



Bengalla Mining Company
Cymbidium Translocation
12.12.2022 14:23
32.25601, 150.79958 (t4m)
Wybong Rd, Castle Rock NSW

Photo 3.22 *Eucalyptus crebra* donor tree



Bengalla Mining Company
Cymbidium Translocation
12.12.2022 14:24
32.25615, 150.79956 (t4m)
Wybong Rd, Castle Rock NSW

Photo 3.23 Translocated *Cymbidium canaliculatum*

4 Conclusions

This report documents the pre-clearing and clearing activities completed at Bengalla Mine in 2022. Pre-clearing and clearing surveys were undertaken by appropriately qualified WSP ecologists to allow for the safe removal and relocation of native flora and fauna, where practicable.

A total of 232 hollow-bearing/ habitat trees were identified within GDP areas, 207 of which were felled in 2022. In total, approximately 398 lineal metres of salvageable material potentially suitable for reuse in rehabilitation programs was identified, with the intention to relocate within rehabilitation areas as work progresses.

During Stage 2 clearing operations, 100 animals required relocation, nine were killed and six were euthanised. Fifteen advanced nestling birds were also captured and passed on to appropriate wildlife rehabilitation agencies. In addition, 21 animals were observed using habitat trees but evaded capture once the tree was felled, and one microchiropteran bat roost was observed, but the trunk could not be sectioned and relocated. Uncaptured microchiropteran bats remaining in the roost were left to self-relocate at nightfall.

One large *Cymbidium canaliculatum* was identified during Stage 1 pre-clearing surveys in 2022. This individual was successfully translocated to a donor tree prior to Stage 2 tree clearing activities in December 2022.

Several clearing events occurred during the May to November avoidance period in 2022. Due to the minimal nature of observed microhabitat features, or the targeted inspection of microhabitats at elevation from a bucket truck, it was considered that the trees could be safely felled with appropriate ecological supervision to ensure that any arising ecological matters were appropriately addressed and handled to ensure protection of important biodiversity. All trees were felled successfully, with no animals injured or requiring veterinary assistance. Several animals were captured and relocated during these works.

Clearing activities undertaken in 2023 will continue to follow the methodology outlined within the BMP.

5 Limitations

This Report is provided by WSP Australia Pty Limited (*WSP*) for Bengalla Mining Company (*Client*) in response to specific instructions from the Client and in accordance with WSP's proposal dated 20 December 2022 (*Agreement*).

5.1 Permitted purpose

This Report is provided by WSP for the purpose described in the Agreement and no responsibility is accepted by WSP for the use of the Report in whole or in part, for any other purpose (*Permitted Purpose*).

5.2 Qualifications and assumptions

The services undertaken by WSP in preparing this Report were limited to those specifically detailed in the Report and are subject to the scope, qualifications, assumptions and limitations set out in the Report or otherwise communicated to the Client.

Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and / or recommendations in the Report (*Conclusions*) are based in whole or in part on information provided by the Client and other parties identified in the report (*Information*), those Conclusions are based on assumptions by WSP of the reliability, adequacy, accuracy and completeness of the Information and have not been verified. WSP accepts no responsibility for the Information.

WSP has prepared the Report without regard to any special interest of any person other than the Client when undertaking the services described in the Agreement or in preparing the Report.

5.3 Use and reliance

This Report should be read in its entirety and must not be copied, distributed or referred to in part only. The Report must not be reproduced without the written approval of WSP. WSP will not be responsible for interpretations or conclusions drawn by the reader. This Report (or sections of the Report) should not be used as part of a specification for a project or for incorporation into any other document without the prior agreement of WSP.

WSP is not (and will not be) obliged to provide an update of this Report to include any event, circumstance, revised Information or any matter coming to WSP's attention after the date of this Report. Data reported and Conclusions drawn are based solely on information made available to WSP at the time of preparing the Report. The passage of time; unexpected variations in ground conditions; manifestations of latent conditions; or the impact of future events (including (without limitation) changes in policy, legislation, guidelines, scientific knowledge; and changes in interpretation of policy by statutory authorities); may require further investigation or subsequent re-evaluation of the Conclusions.

This Report can only be relied upon for the Permitted Purpose and may not be relied upon for any other purpose. The Report does not purport to recommend or induce a decision to make (or not make) any purchase, disposal, investment, divestment, financial commitment or otherwise. It is the responsibility of the Client to accept (if the Client so chooses) any Conclusions contained within the Report and implement them in an appropriate, suitable and timely manner.

In the absence of express written consent of WSP, no responsibility is accepted by WSP for the use of the Report in whole or in part by any party other than the Client for any purpose whatsoever. Without the express written consent of WSP, any use which a third party makes of this Report or any reliance on (or decisions to be made) based on this Report is at the sole risk of those third parties without recourse to WSP. Third parties should make their own enquiries and obtain independent advice in relation to any matter dealt with or Conclusions expressed in the Report.

5.4 Disclaimer

No warranty, undertaking or guarantee whether expressed or implied, is made with respect to the data reported or the Conclusions drawn. To the fullest extent permitted at law, WSP, its related bodies corporate and its officers, employees and agents assumes no responsibility and will not be liable to any third party for, or in relation to any losses, damages or expenses (including any indirect, consequential or punitive losses or damages or any amounts for loss of profit, loss of revenue, loss of opportunity to earn profit, loss of production, loss of contract, increased operational costs, loss of business opportunity, site deprecation costs, business interruption or economic loss) of any kind whatsoever, suffered on incurred by a third party.

Bibliography

- BENGALLA MINING COMPANY PTY LTD 2017. Bengalla Mine - Biodiversity Management Plan. *In*: HANSEN BAILEY ON BEHALF OF BENGALLA MINING COMPANY PTY LTD (ed.).
- NATIONAL HEALTH AND MEDICAL RESEARCH COUNCIL 2013. Australian code for the care and use of animals for scientific purposes, 8th edition. Canberra: National Health and Medical Research Council.

Appendix A

Recorded flora



Table A.1 Recorded flora

Scientific name	Common name	Introduced	EPBC Act ¹	BC Act ²
<i>Acacia sp.</i>	Wattle			
<i>Acacia parvipinnula</i>	Silver-stemmed Wattle			
<i>Acacia salicina</i>	Willow Wattle			
<i>Allocasuarina luehmannii</i>	Buloke			
<i>Angophora floribunda</i>	Rough-barked Apple			
<i>Austrostipa verticillata</i>	Bamboo Grass			
<i>Bidens pilosa</i>	Cobblers Pegs	*		
<i>Brachychiton populneus</i>	Kurrajong			
<i>Bursaria spinosa</i>	Blackthorn			
<i>Callistemon viminalis</i>	Weeping Bottlebrush			
<i>Cirsium vulgare</i>	Spear Thistle	*		
<i>Chloris gayana</i>	Rhodes Grass	*		
<i>Chrysocephalum apiculatum</i>	Golden Buttons			
<i>Conyza sp.</i>	Fleabane	*		
<i>Cymbidium canaliculatum</i>	Tiger Orchid			EP
<i>Cynodon sp.</i>	Couch	*		
<i>Dichondra repens</i>	Kidney Weed			
<i>Digitaria sp.</i>	–			
<i>Eragrostis curvula</i>	African Lovegrass	*		
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark			
<i>Eucalyptus moluccana</i>	Grey Box			
<i>Geijera parviflora</i>	Wilga			
<i>Glycine tabacina</i>	–			
<i>Gomphocarpus fruticosus</i>	Balloon Cotton	*		
<i>Hypericum perforatum</i>	St Johns Wort	*		
<i>Hypochaeris radicata</i>	Catsear	*		
<i>Lomandra sp.</i>	–			
<i>Lycium ferocissimum</i>	African Boxthorn	*		
<i>Medicago sp.</i>	–	*		
<i>Melia azedarach</i>	White Cedar	*		
<i>Melinis repens</i>	Red-natal Grass	*		
<i>Onopordum acanthium</i>	Scotch Thistle	*		

Scientific name	Common name	Introduced	EPBC Act ¹	BC Act ²
<i>Opuntia stricta</i>	Prickly Pear	*		
<i>Paspalum sp.</i>	Paspalum	*		
<i>Plantago lanceolata</i>	Plantain	*		
<i>Rumex crispus</i>	Curled Dock	*		
<i>Rytidosperma caespitosum</i>	Wallaby Grass			
<i>Senecio madagascariensis</i>	Fireweed	*		
<i>Sida rhombifolia</i>	Paddys Lucerne	*		
<i>Solanum sp.</i>	–	*		
<i>Taraxacum officinale</i>	Common Dandelion	*		
<i>Verbena bonariensis</i>	Purpletop	*		
<i>Wahlenbergia communis</i>	Blue Bells			

(1) *Environment Protection and Biodiversity Conservation Act 1999*

(2) *Biodiversity Conservation Act 2016* – EP = Endangered Population.

Appendix B

Recorded fauna



Table B.1 Recorded fauna

Scientific name	Common name	Introduced	EPBC Act ¹	BC Act ²
Amphibians (2)				
<i>Litoria caerulea</i>	Green Tree Frog			
<i>Litoria peroni</i>	Peron's Tree Frog			
Birds (30)				
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill			
<i>Acanthiza lineata</i>	Striated Thornbill			
<i>Acridotheres tristis</i>	Common Myna	*		
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar			
<i>Anas superciliosa</i>	Pacific Black Duck			
<i>Anthochaera carunculata</i>	Red Wattlebird			
<i>Aquila audax</i>	Wedge-tailed Eagle			
<i>Chenonetta jubata</i>	Australian Wood Duck			
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike			
<i>Corvus coronoides</i>	Australian Raven			
<i>Coturnix ypsilophora</i>	Brown Quail			
<i>Cracticus tibicen</i>	Australian Magpie			
<i>Cracticus torquatus</i>	Grey Butcherbird			
<i>Dacelo noveguineae</i>	Laughing Kookaburra			
<i>Eolophus roseicapilla</i>	Galah			
<i>Falco cenchroides</i>	Nankeen Kestrel			
<i>Falco berigora</i>	Brown Falcon			
<i>Grallina cyanoleuca</i>	Magpie Lark			
<i>Hirundo neoxena</i>	Welcome Swallow			
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater			
<i>Malurus cyaneus</i>	Superb Fairywren			
<i>Manorina melanocephala</i>	Noisy Miner			
<i>Ocyphaps lophotes</i>	Crested Pigeon			
<i>Pardalotus striatus</i>	Striated Pardalote			
<i>Petrochelidon ariel</i>	Fairy Martin			
<i>Petrochelidon nigricans</i>	Tree Martin			
<i>Philemon corniculatus</i>	Noisy Friarbird			
<i>Platycercus eximius</i>	Eastern Rosella			

Scientific name	Common name	Introduced	EPBC Act ¹	BC Act ²
<i>Rhipidura leucophrys</i>	Willie Wagtail			
<i>Sturnus vulgaris</i>	Common Starling	*		
Mammals (9)				
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat			
<i>Macropus giganteus</i>	Eastern Grey Kangaroo			
<i>Oryctolagus cuniculus</i>	Rabbit	*		
<i>Ozimops planiceps</i>	South-eastern Free-tailed Bat			
<i>Ozimops ridei</i>	Ride's Free-tailed Bat			
<i>Scotorepens orion</i>	Eastern Broad-nosed Bat			
<i>Trichosurus vulpecula</i>	Common Brushtail Possum			
<i>Vulpes vulpes</i>	Fox	*		
<i>Wallabia bicolor</i>	Swamp Wallaby			
Reptiles (5)				
<i>Cryptoblepharus pulcher</i>	Elegant Snake-eyed Skink			
<i>Egernia striolata</i>	Tree Skink			
<i>Nebulifera robusta</i>	Robust Velvet Gecko			
<i>Pogona barbata</i>	Eastern Bearded Dragon			
<i>Varanus varius</i>	Lace Monitor			

(1) Environment Protection and Biodiversity Conservation Act 1999

(2) Biodiversity Conservation Act 2016.

Appendix C

Scientific licence





Department of Planning, Industry and Environment
Scientific Licence
Biodiversity Conservation Act 2016

Name and postal address of principal licensee

Nominated premises (where appropriate)

Mr Alex Cockerill
 WSP
 Se 1 L 3 51-55 Bolton St
 NEWCASTLE NSW 2300

[Empty box for nominated premises]

Your licence number is: SL100630

This licence is valid from: 01 June 2021

This licence will expire on: 31 August 2022

Additional authorisations:

Project Title: General flora and fauna surveys for environmental impact assessments

This class of biodiversity conservation licence granted under Part 2 of the *Biodiversity Conservation Act 2016* authorises the following activities: Harm by means of capture, deal in (possess), and liberate protected and threatened animals for survey purposes; Pick and deal in (possess) protected and threatened plants for identification purposes.

This licence authorises the principal licensee and any associates named in **Attachment A** to conduct those activities authorised above, to those species, communities or materials listed in **Attachment B**, at the locations specified in **Attachment C** of this licence.

This licence also authorises the principal licensee to conduct research on National Park estate under clause 26 of the National Parks and Wildlife Regulation 2019 (NPW Reg), where this forms part of a project approved by a delegated officer of the *Biodiversity Conservation Act 2016*.

This licence is granted subject to the provisions of *Biodiversity Conservation Act 2016*, Biodiversity Conservation Regulation 2017, the general conditions listed below, any special conditions as may be notified in writing to the licensee by the Environment Agency Head of the Department of Planning, Industry and Environment (the Department) or a 'delegated officer' of the *Biodiversity Conservation Act 2016* and the Department's "Scientific Licensing Policy".

[Signature of Delegated Officer]

Signature of Delegated Officer

Date: 02 December 2021

[Signature of Principal Licensee]

Signature of Principal Licensee*

Date: 8/12/21

* This licence is not valid unless it is signed by the principal licensee. By signing this licence, the licensee agrees that they have read, understood and agree to comply with all of the conditions listed on the licence.

About Us

WSP is one of the world's leading professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, planners, surveyors and environmental specialists, as well as other design, program and construction management professionals. We design lasting solutions in the Transport & Water, Property & Buildings, Earth & Environment, and Mining & Power sector as well as offering strategic Advisory, Engagement & Digital services. With approximately 6,100 talented people in more than 50 offices in Australia and New Zealand, we engineer future ready projects that will help societies grow for lifetimes to come. www.wsp.com/en-au/.





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 BDMP 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 weed and the terrain.

- Bengalla

During 2022, approximately 255 ha was treated for the management of weeds. Target weed species included African boxthorn, galenia, St John's wort and other environmental weeds. Priority areas for treatment included the pre-clearance areas, rehabilitation areas and topsoil stockpiles. Chemicals used during 2022 included Glyphosate with metsulfuron, Grazon Extra and Garlon 600.

Observations during the weed treatment program and follow up inspections indicate that treatment methods used during the Reporting Period have generally been effective in reducing the presence of weeds in target areas.

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

- Biodiversity Offset Areas

Weed management across the biodiversity offset areas 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. Chemicals used during 2022 include Glyphosate with metsulfuron, Grazon Extra and Garlon 600.

The weeds controlled during the Reporting Period included prickly pear, Paterson's curse, African boxthorn, lantana and several environmental weeds across each offset area. St John's Wort was also addressed at Kenalea properties and Black Mountain.

Application of chemicals was primarily via vehicle mounted spray rigs however backpacks were also used in some areas inaccessible by vehicle.

Regional rainfall was well above the long-term average for 2022 which contributed to the increase of several weed populations and the ensuing level of control required. Access to some areas also proved difficult in 2022 due to flooding of creeks and access crossings.

A significant area of St John's Wort was also addressed using aerial spraying on Kenalea during December 2022. Aerial spraying increased BMC's ability to access areas impacted that were

inaccessible to conventional control measures. The image below shows the aerial spraying. The chemical used aurally was Grazon.

Figures 3 to 6 below show locations of weed control in 2022 at the Black Mountain and Kenalea offset properties. The Merriwa River offset property was inaccessible during 2022 due to ongoing weather conditions impacting road access.



Photo: Aerial weed control being undertaken on Kenalea.

Pest Management

- ***Bengalla***

A pig control program was conducted throughout 2022 at various locations across Bengalla, however this was impacted by continued access issues due to continued rainfall. This utilised both trapping and baiting using sodium nitrite. A total of 19 pigs were trapped and culled in 2022.

Feral pigs were trapped utilising a penning system using grain and molasses as the main attractant. Once trapped, all pigs were disposed of humanely.

This culling program will continue into 2023 across Bengalla.

Dog baiting programs at Bengalla occurred in the Autumn and Spring. 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. Baiting included utilising 1080 poison baits in addition to ejector capsule baits and each baiting program extended for three weeks during each period.

Both buffer lands and rehabilitation areas were utilised in the programs.

During the autumn baiting program, 25 bait stations were laid over a three week period with a total of 87 baits. Results indicate 42 takes of which 17 takes were by target species being foxes. No wild dog takes were recorded.

During the spring baiting program, 25 bait stations were laid over a three week period with a total of 65 baits. Results indicate 27 takes of which 18 takes were by target species being foxes. 2 wild dog takes were recorded.

- Offset Properties

During the Reporting Period, BMC undertook two 4-week dog ground baiting programs across all offset properties, including aerial dog baiting in Autumn and Spring in consultation with Local Land Services.

Figures 7 to 12 below show locations of wild dog baiting locations in 2022 at the offset properties.

A total of 614 baits were placed during the 2022 ground baiting program targeting foxes and wild dogs. A total of 104 baits were taken during the program. Results indicated that 38% of baits were taken by wild dogs and 62% by foxes. Trends over 5 years indicate that wild dog takes have varied from 67 in 2016, 49 takes in 2017, 33 takes in 2018, 88 takes in 2019, 29 in 2020, 28 in 2021 and 39 in 2022. This suggests that dog numbers have risen during 2022, possibly due to an increase in food supply or migration from other areas where food supply was lower.

Opportunistic feral animal control was also undertaken during weed control works targeting 17 pigs and 2 deer.

Further Actions

Ongoing management of weeds and feral animals at Bengalla and the offset properties will continue during 2023.

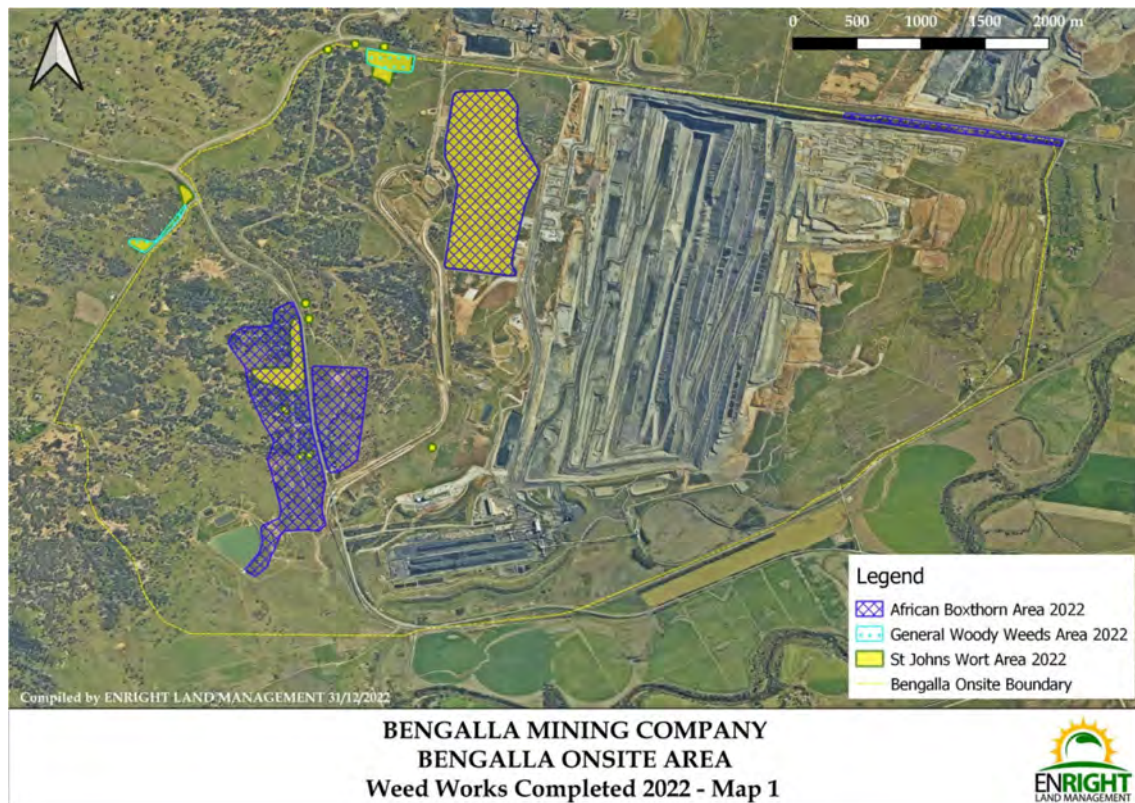


Figure 2 – Bengalla Mine Weed Management Areas 2022

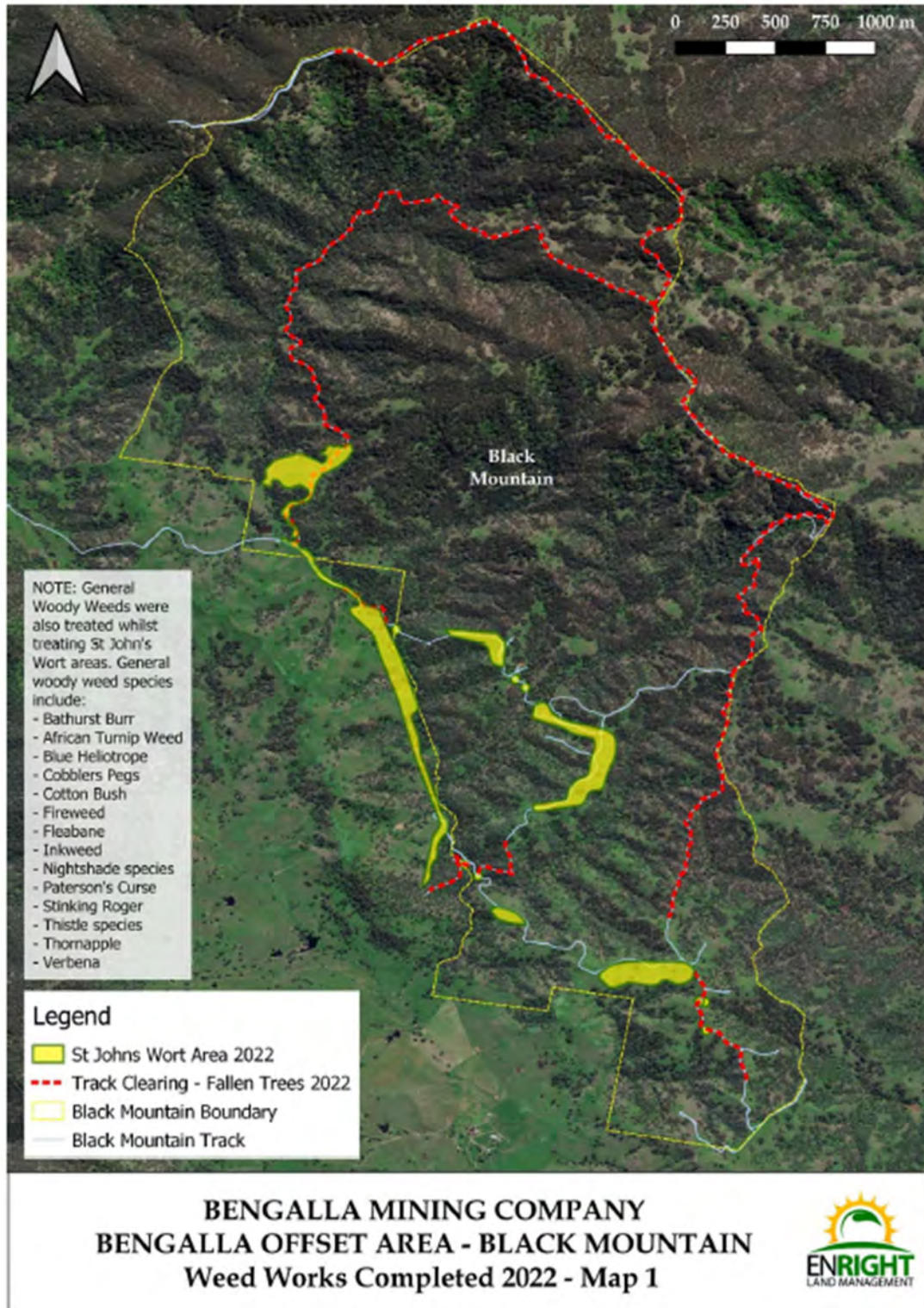


Figure 3 – Black Mountain Weed Management Locations 2022

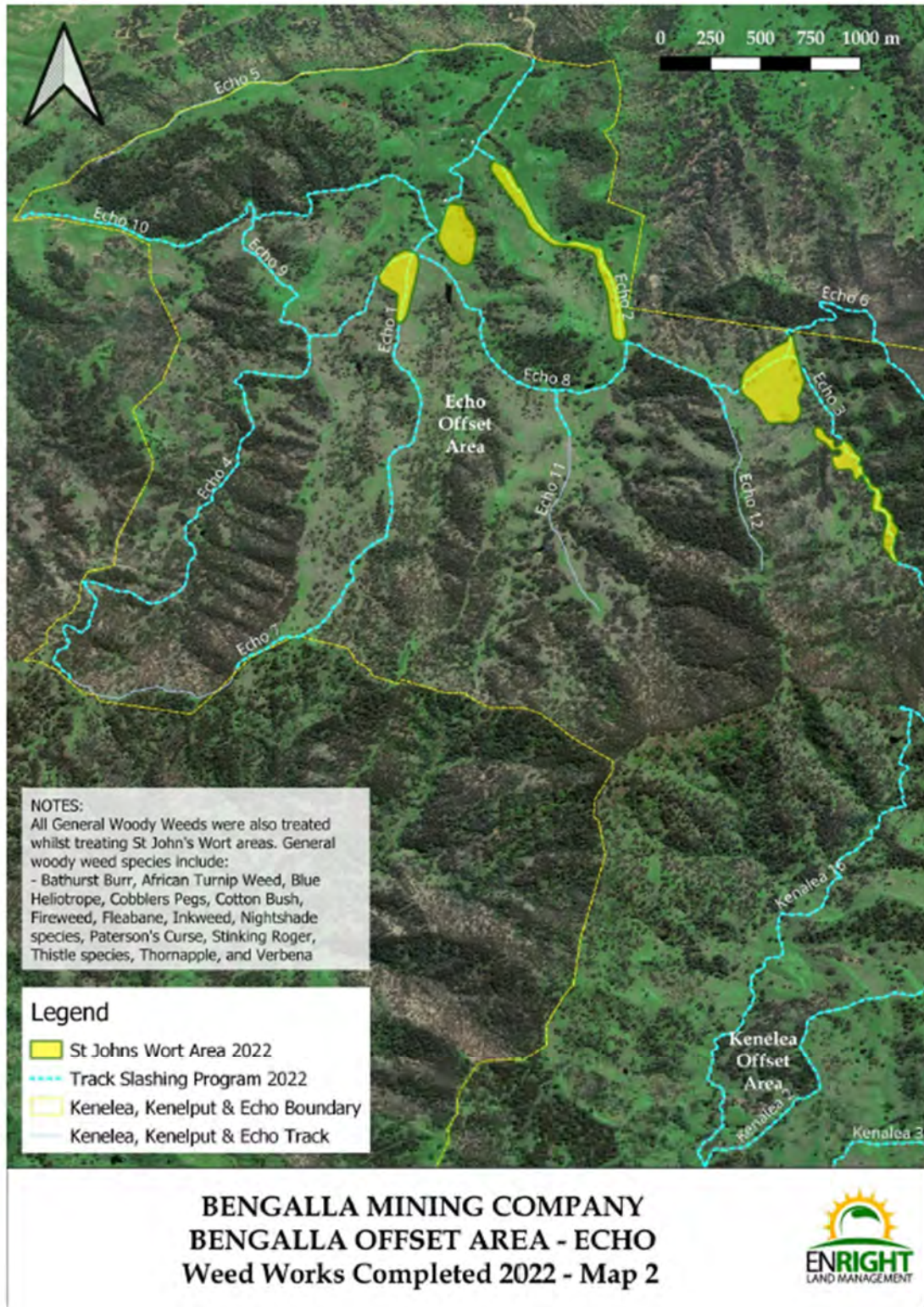
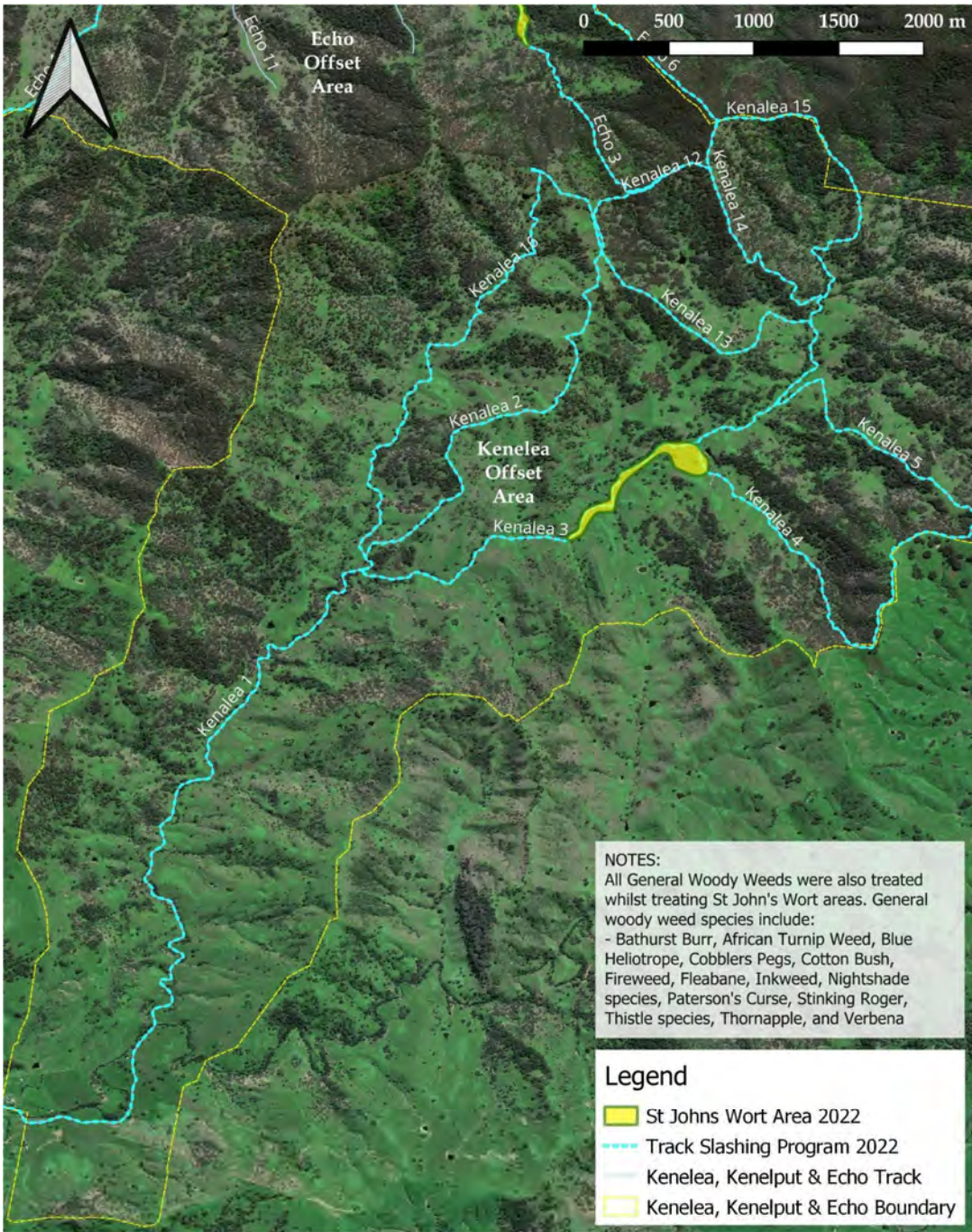


Figure 4 – Kenalea (Echo) Weed Management Locations 2022



**BENGALLA MINING COMPANY
BENGALLA OFFSET AREA - KENELEA
Weed Works Completed 2022 - Map 3**



Figure 5 – Kenalea Weed Management Locations 2022

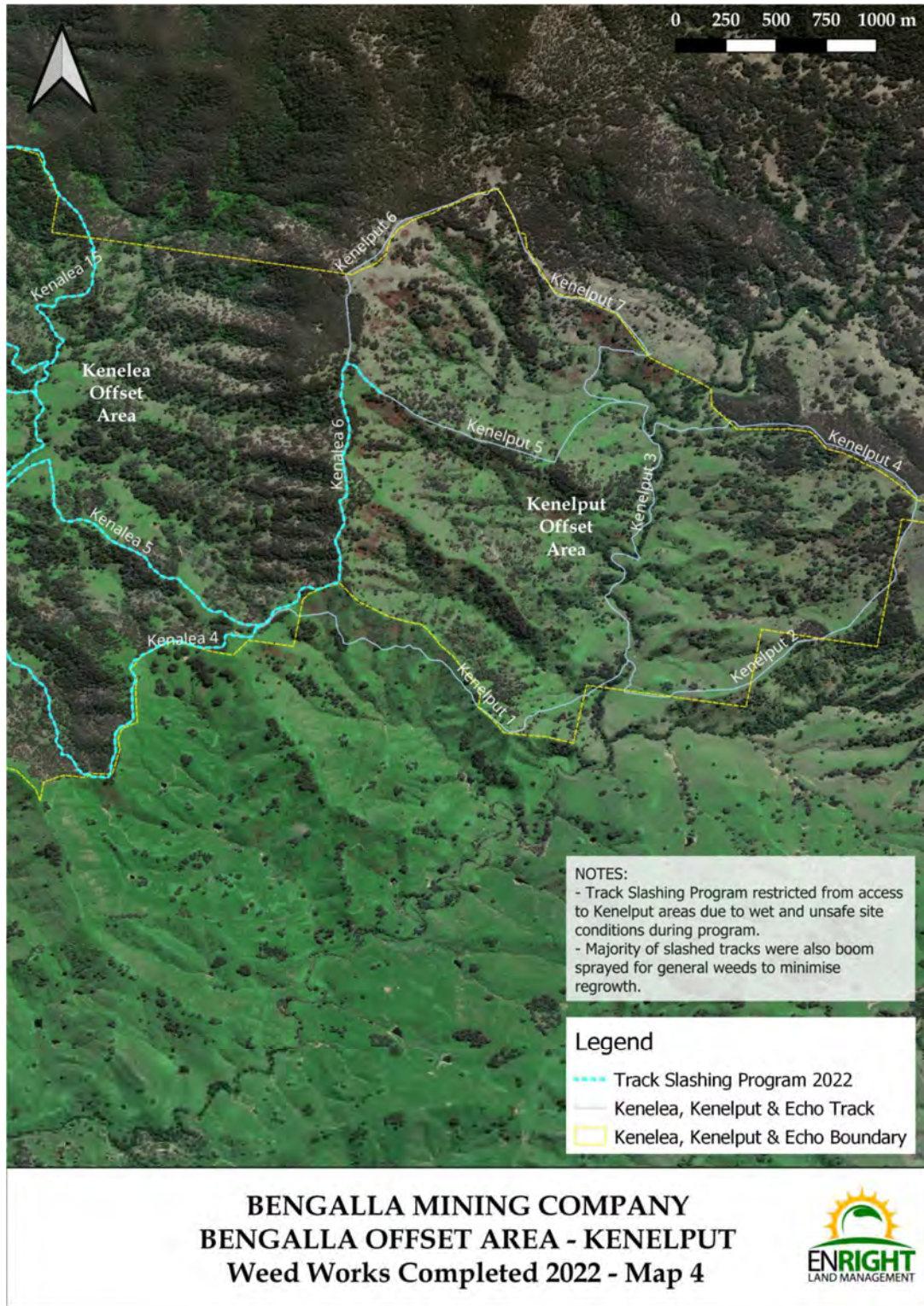
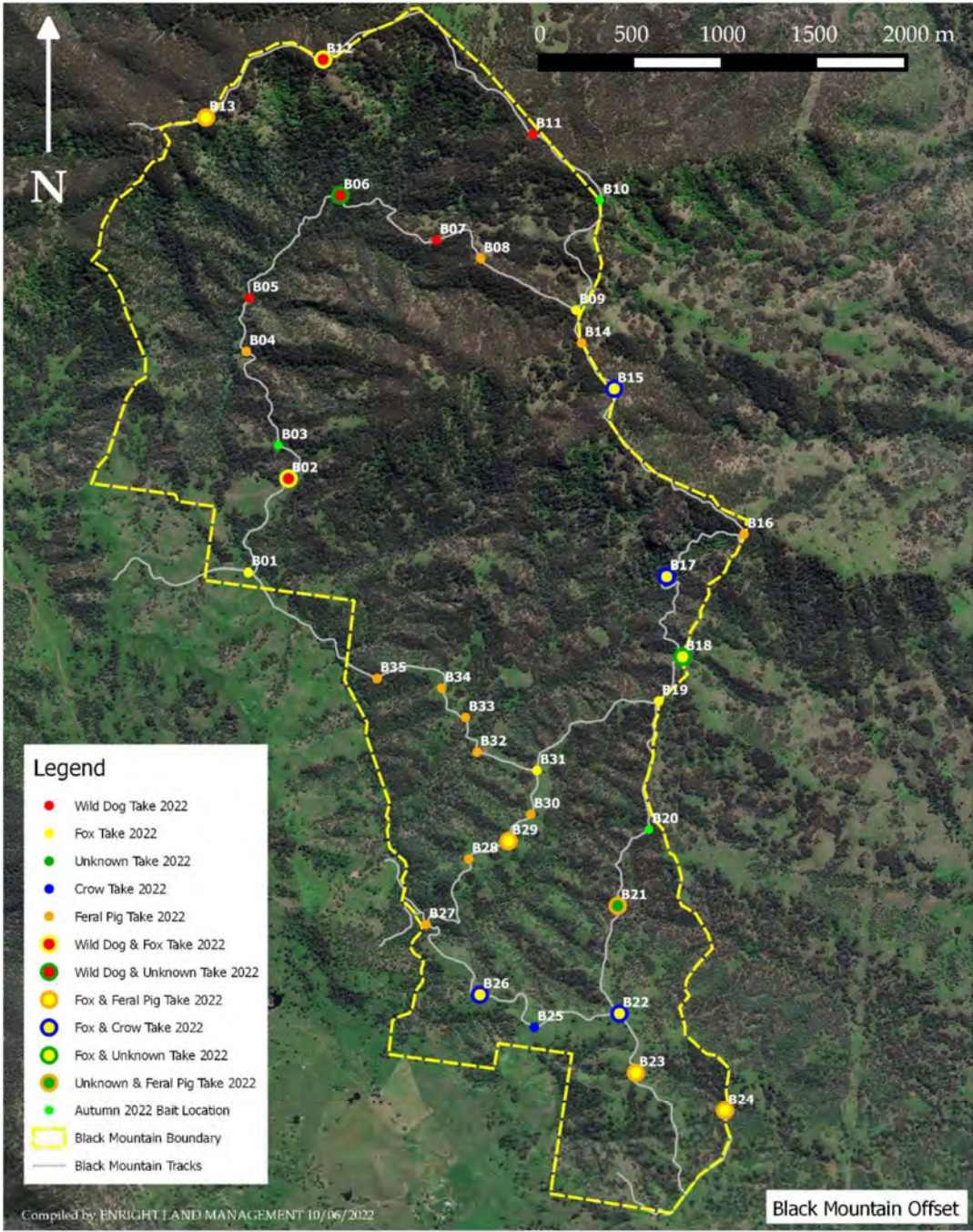


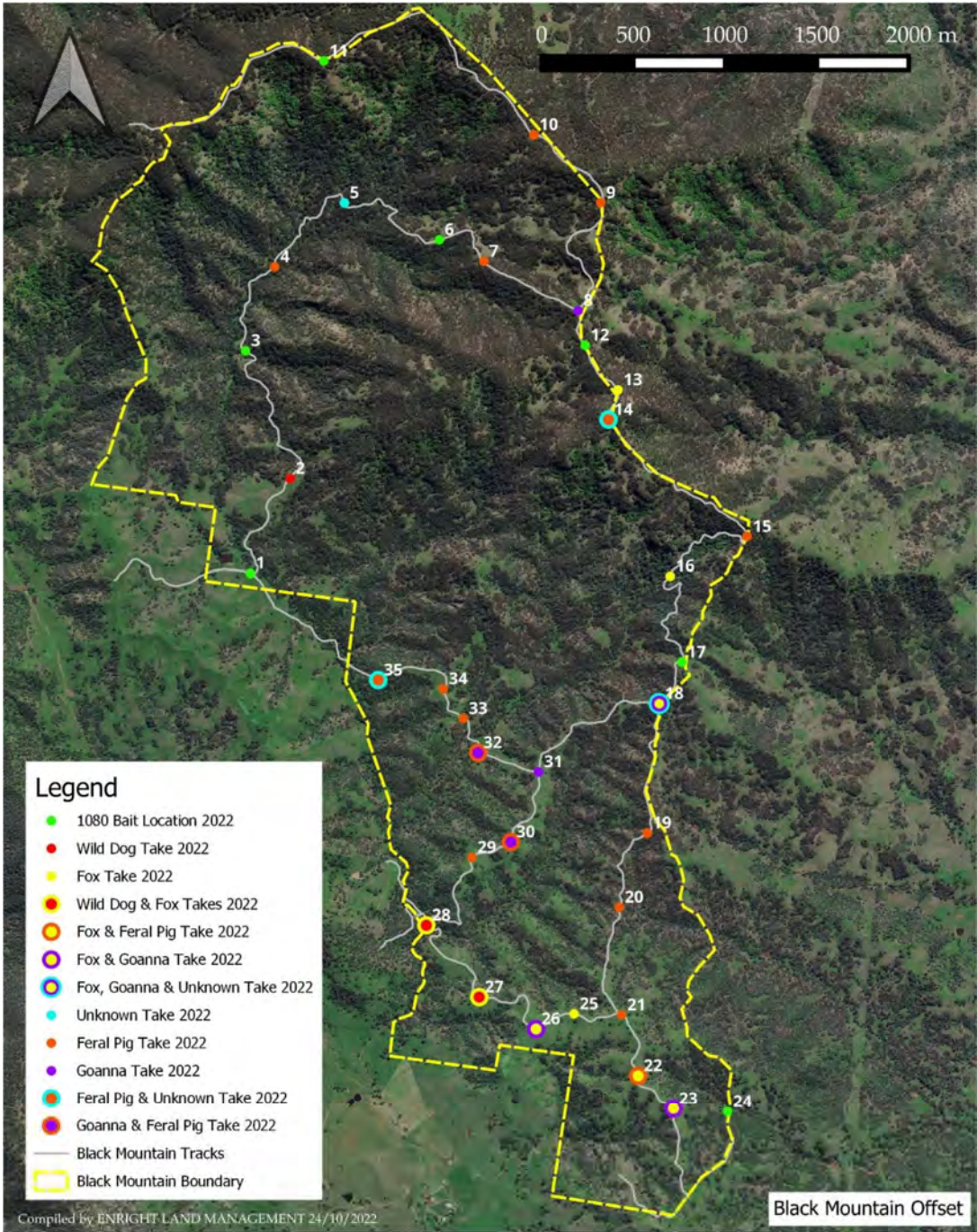
Figure 6 – Kenalea (Kenalput) Weed Management Locations 2022



BENGALLA MINING COMPANY
1080 BAITING PROGRAM AUTUMN 2022
Wild Dog & Fox Bait Taken - Map 1



Figure 7 – Black Mountain Wild Dog Bait Locations Autumn 2022



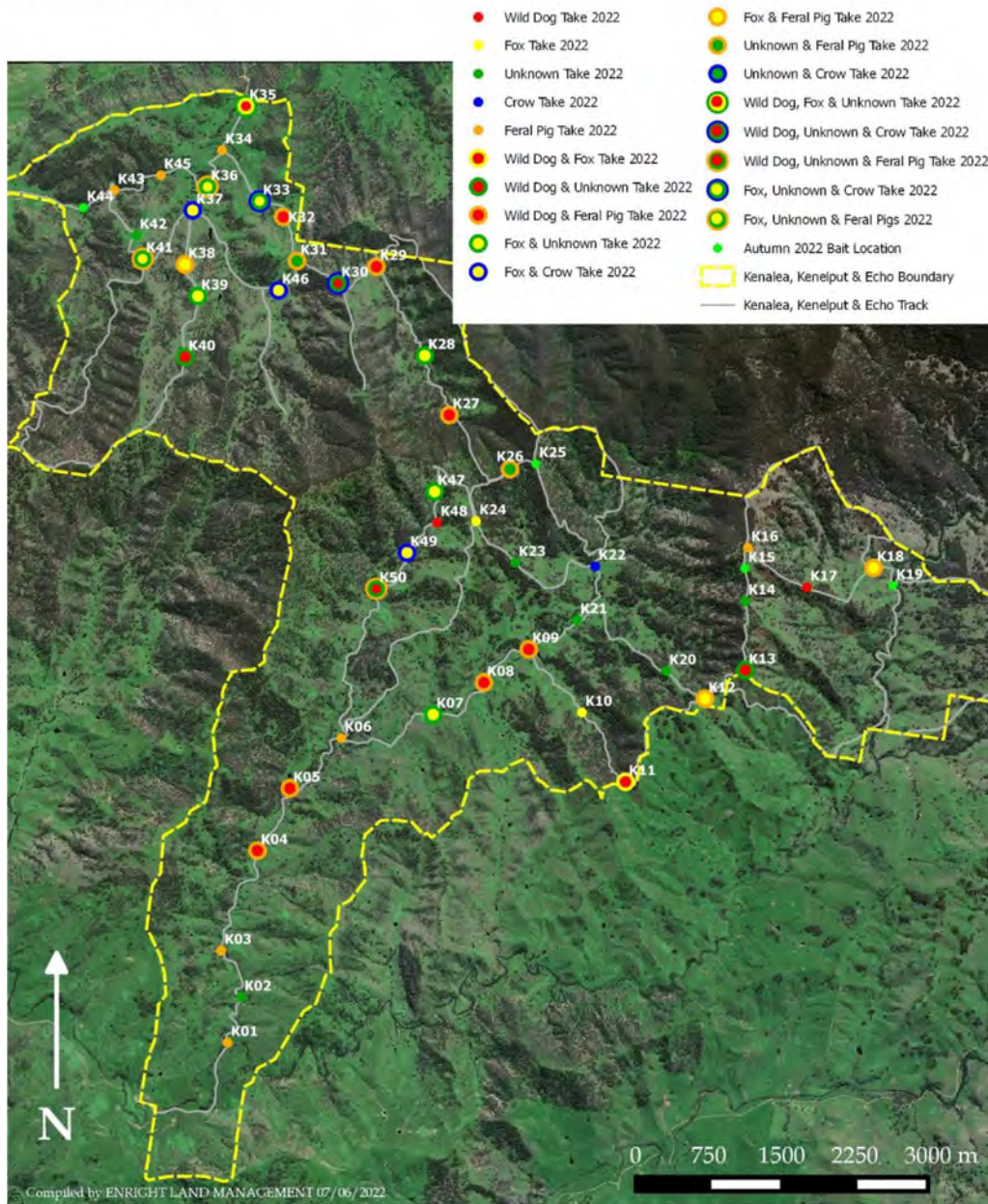
**BENGALLA MINING COMPANY
1080 BAITING PROGRAM SPRING 2022
Wild Dog & Fox Baits Taken - Map 1**



Figure 8 – Black Mountain Wild Dog Bait Locations Spring 2022

Eco/Kenalea/Kenelput Offset

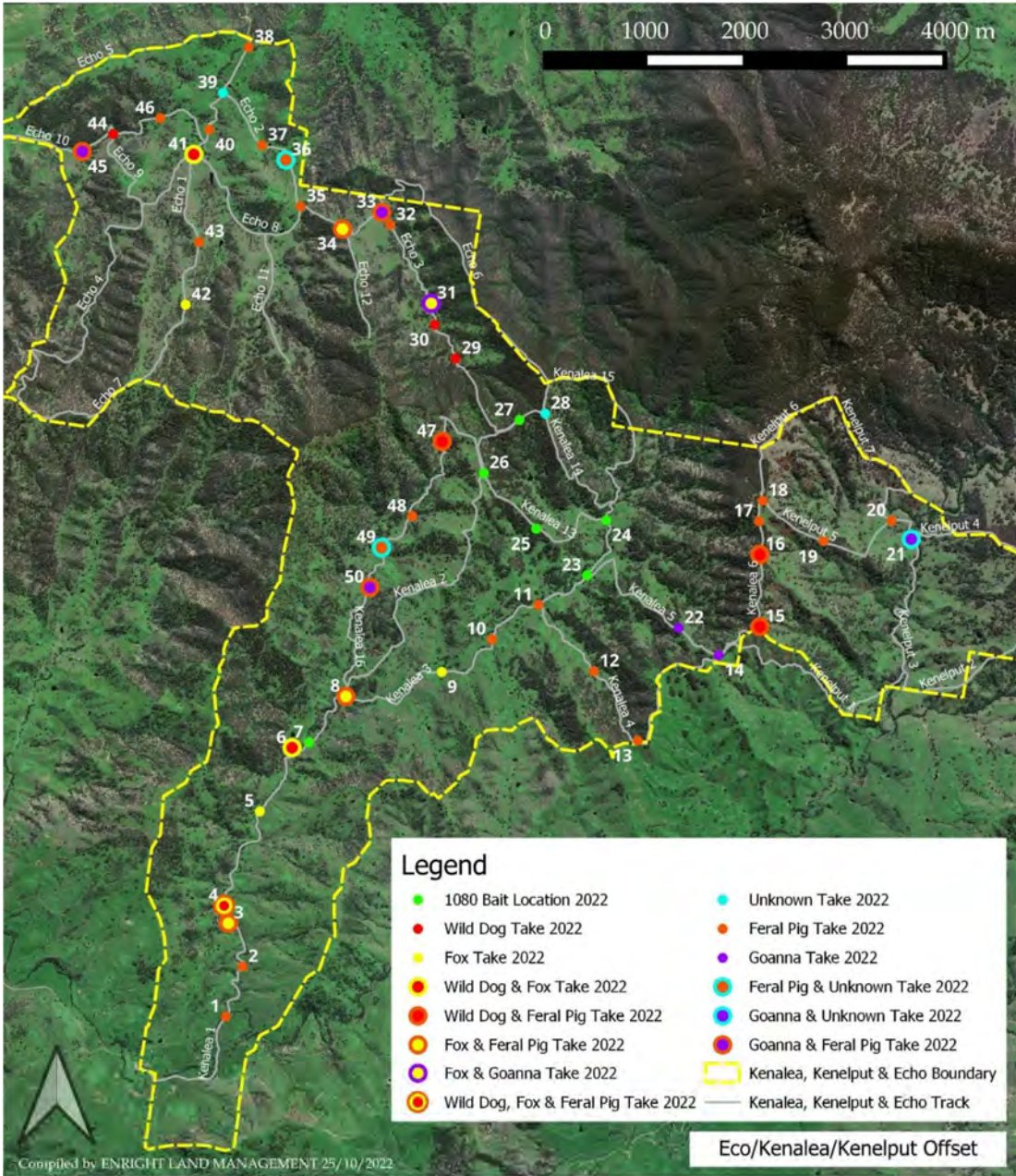
Legend



BENGALLA MINING COMPANY
1080 BAITING PROGRAM AUTUMN 2022
Wild Dog & Fox Baits Taken - Map 1



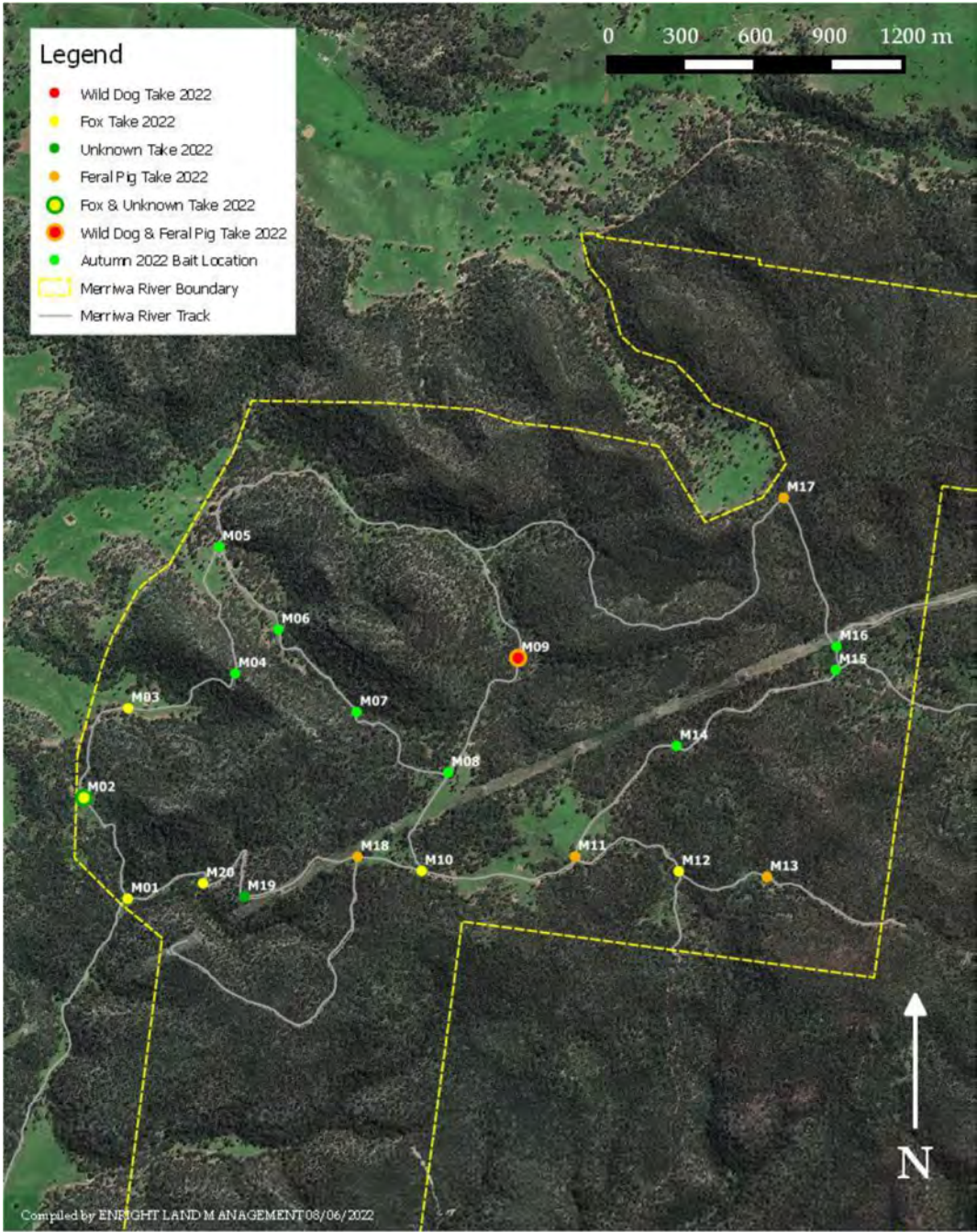
Figure 9 – Kenalea Wild Dog Bait Locations Autumn 2022



BENGALLA MINING COMPANY
1080 BAITING PROGRAM SPRING 2022
Wild Dog & Fox Baits Taken - Map 1



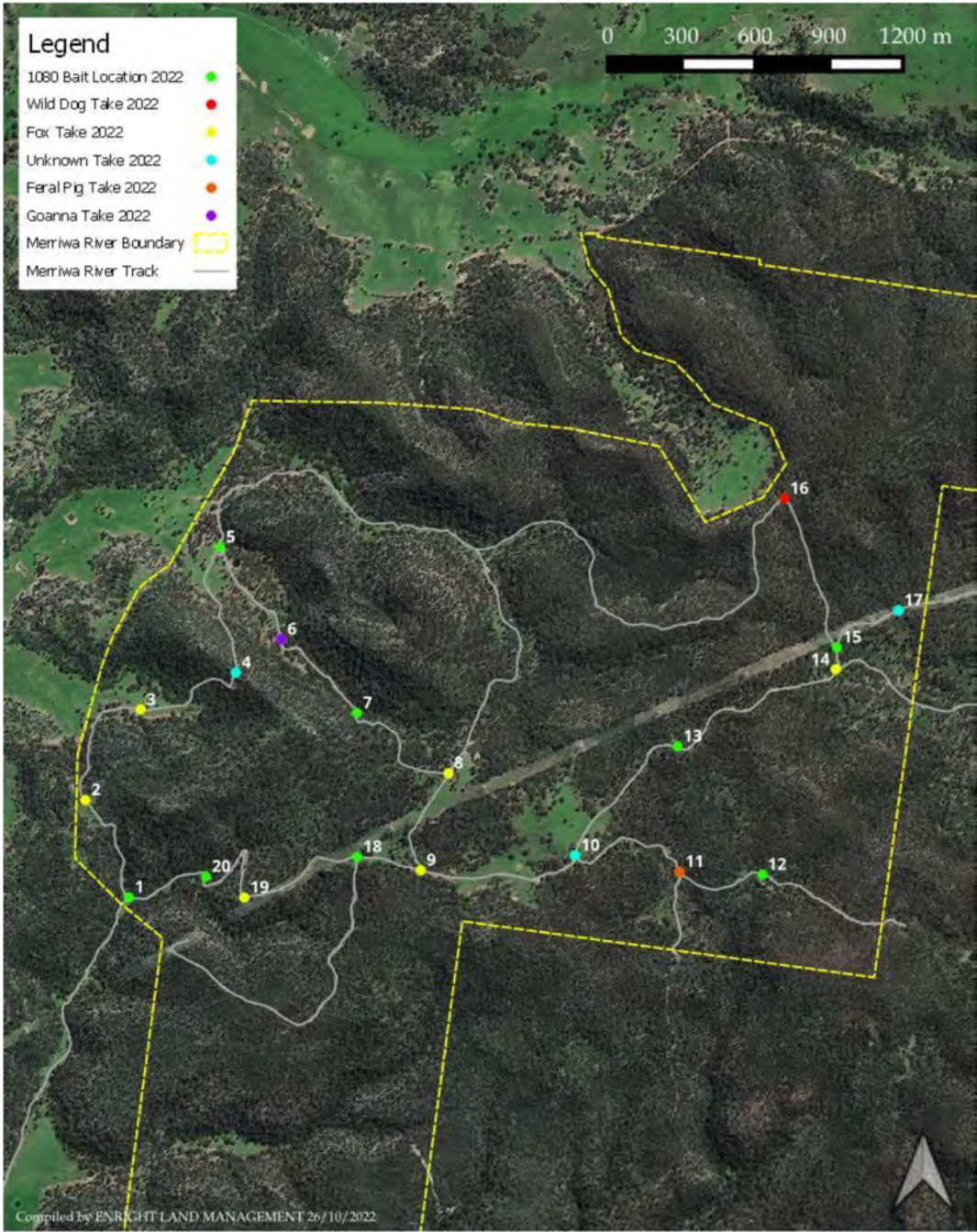
Figure 10 – Kenalea Wild Dog Bait Locations Spring 2022



**BENGALLA MINING COMPANY
1080 BAITING PROGRAM AUTUMN 2022
Wild Dog & Fox Baits Taken - Map 1**



Figure 11 – Merriwa River Wild Dog Bait Locations Autumn 2022



**BENGALLA MINING COMPANY
1080 BAITING PROGRAM SPRING 2022
Wild Dog & Fox Baits Taken - Map 1**



Figure 12 – Merriwa River Wild Dog Bait Locations Spring 2022

Appendix F

Surface Water Monitoring Summary

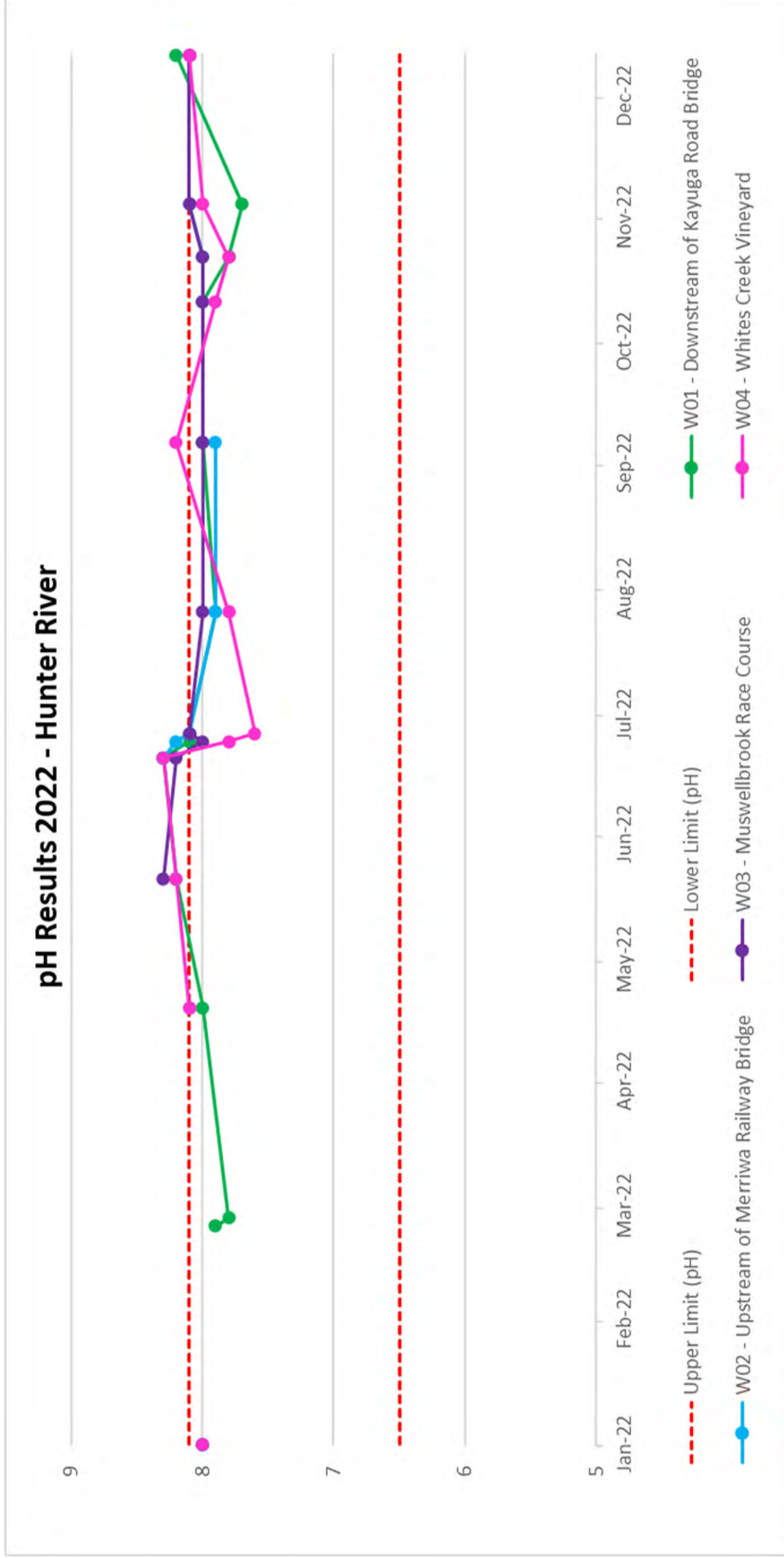
**Table F1
Hunter River (W01 – W04) Surface Water Monitoring Results 2022**

Criteria	11-Jan-22	25-Feb-22	06-Mar-22	08-Mar-22	29-Apr-22	31-May-22	30-Jun-22	04-Jul-22 ¹	06-Jul-22	05-Aug-22	16-Sep-22	21-Oct-22	01-Nov-22 ¹	14-Nov-22 ¹	21-Dec-22
W01															
pH	8.0	Not Sampled ²	7.9	7.8	8.0	8.2	8.3	8.1	8.1	7.9	8.0	8.0	7.8	7.7	8.2
TSS (mg/L)	143	Not Sampled ²	215	251	<5	6	<5	134	97	398	130	122	301	317	8
EC (µS/cm)	632	261	219	219	784	839	564	418	313	303	441	406	351	590	688
W02															
pH	8.0	Not Sampled ²	Not Sampled ²	Not Sampled ²	8.1	Not Sampled ²	8.3	8.2	8.1	7.9	7.9	Not Sampled ²	8.0	8.1	8.1
TSS (mg/L)	99	Not Sampled ²	Not Sampled ²	Not Sampled ²	<5	804	<5	51	164	601	116	Not Sampled ²	288	106	11
EC (µS/cm)	602	804	804	804	804	804	578	602	315	338	443	443	357	589	671
W03															
pH	Not Sampled ²	Not Sampled ²	Not Sampled ²	Not Sampled ²	Not Sampled ²	8.3	8.2	8.0	8.1	8.0	8.0	8.0	8.0	8.1	8.1
TSS (mg/L)	Not Sampled ²	Not Sampled ²	Not Sampled ²	Not Sampled ²	Not Sampled ²	8	10	170	81	200	124	197	206	35	10
EC (µS/cm)	Not Sampled ²	Not Sampled ²	Not Sampled ²	Not Sampled ²	Not Sampled ²	846	590	370	315	409	420	321	324	580	691
W04															
pH	8.0	Not Sampled ²	Not Sampled ²	Not Sampled ²	8.1	8.2	8.3	7.8	7.6	7.8	8.2	7.9	7.8	8.0	8.1
TSS (mg/L)	37	Not Sampled ²	Not Sampled ²	Not Sampled ²	7	848	6	131	32	255	79	452	110	28	27
EC (µS/cm)	748	748	748	748	848	894	597	408	263	440	823	368	385	630	705

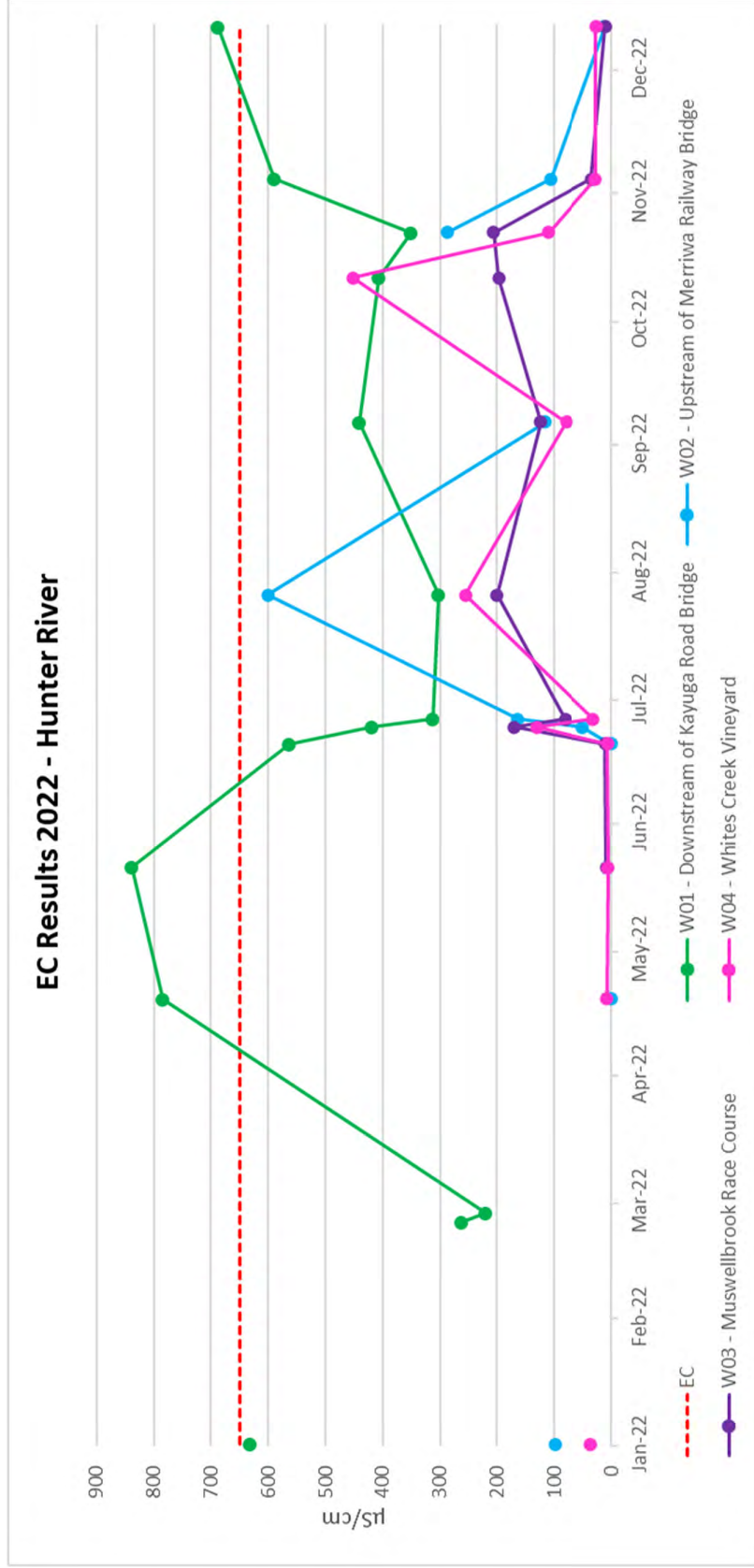
Data sourced from AECOM.

¹Rain event occurred.

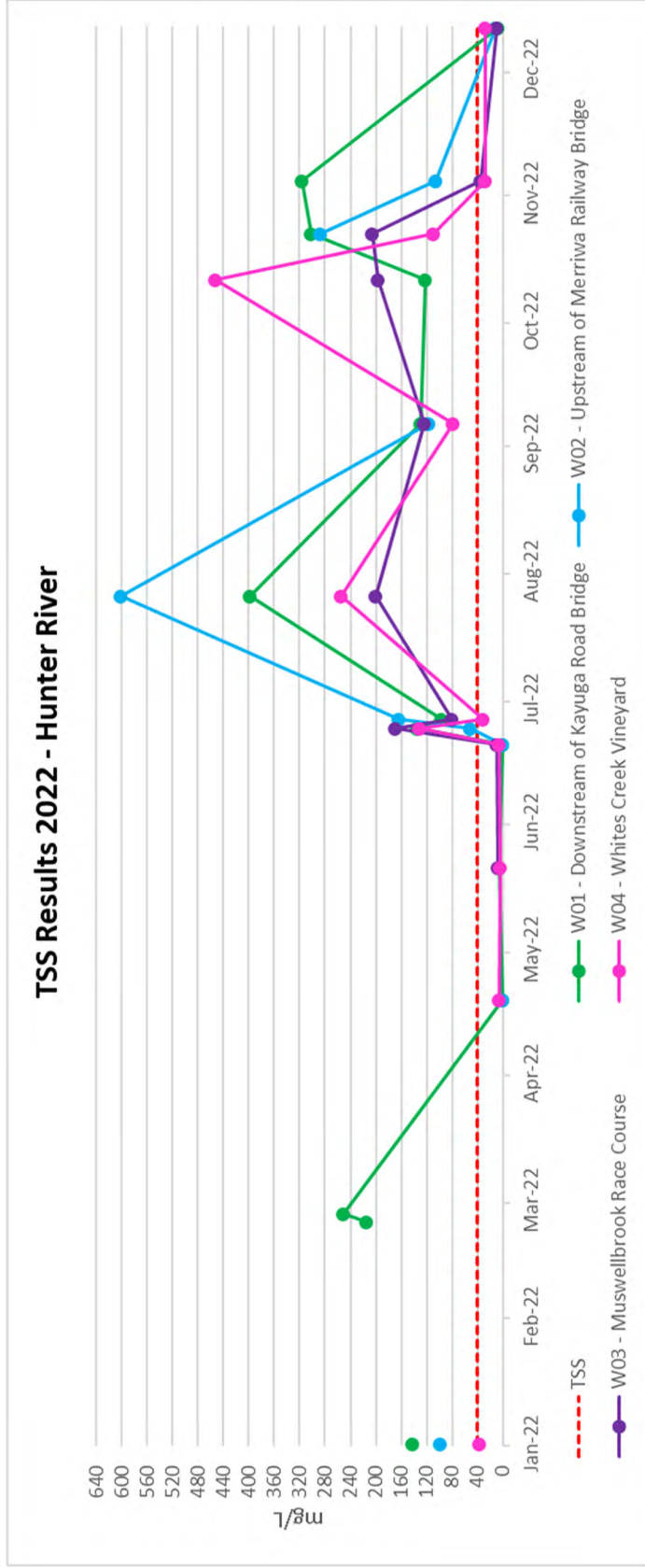
² No safe access to sampling point



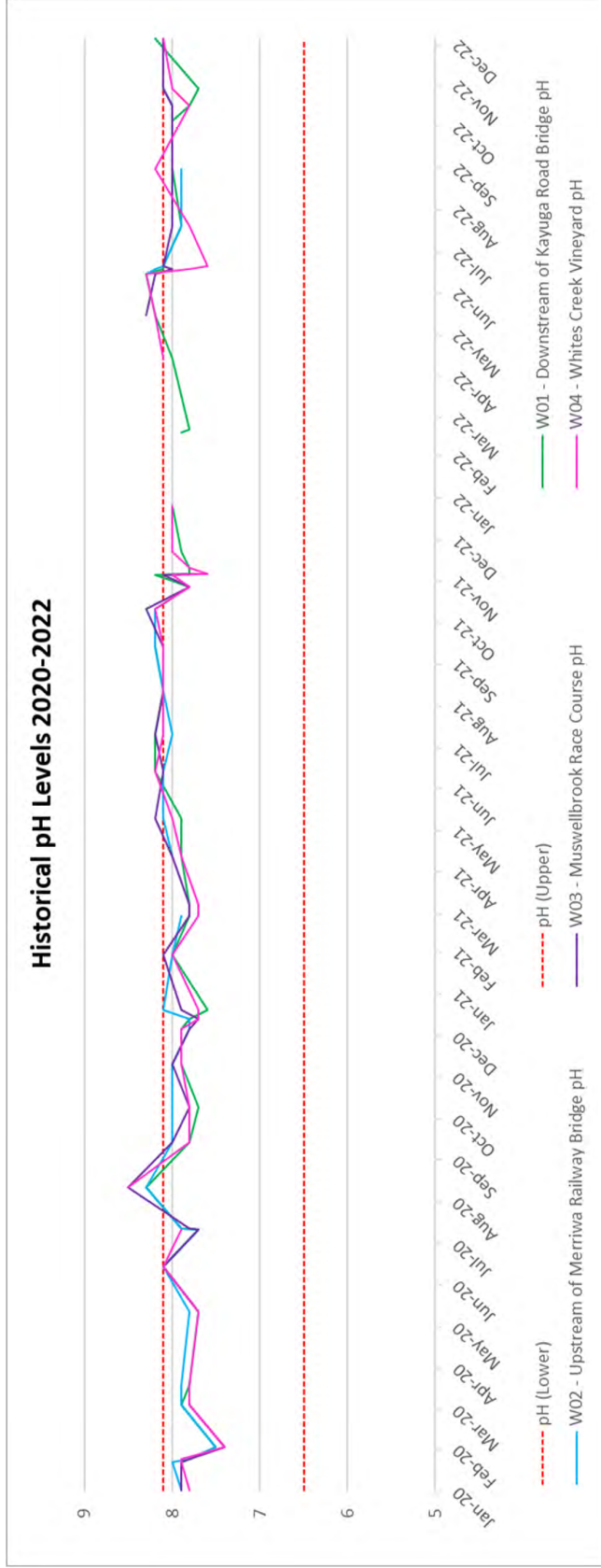
Graph F1
Hunter River pH Results 2022



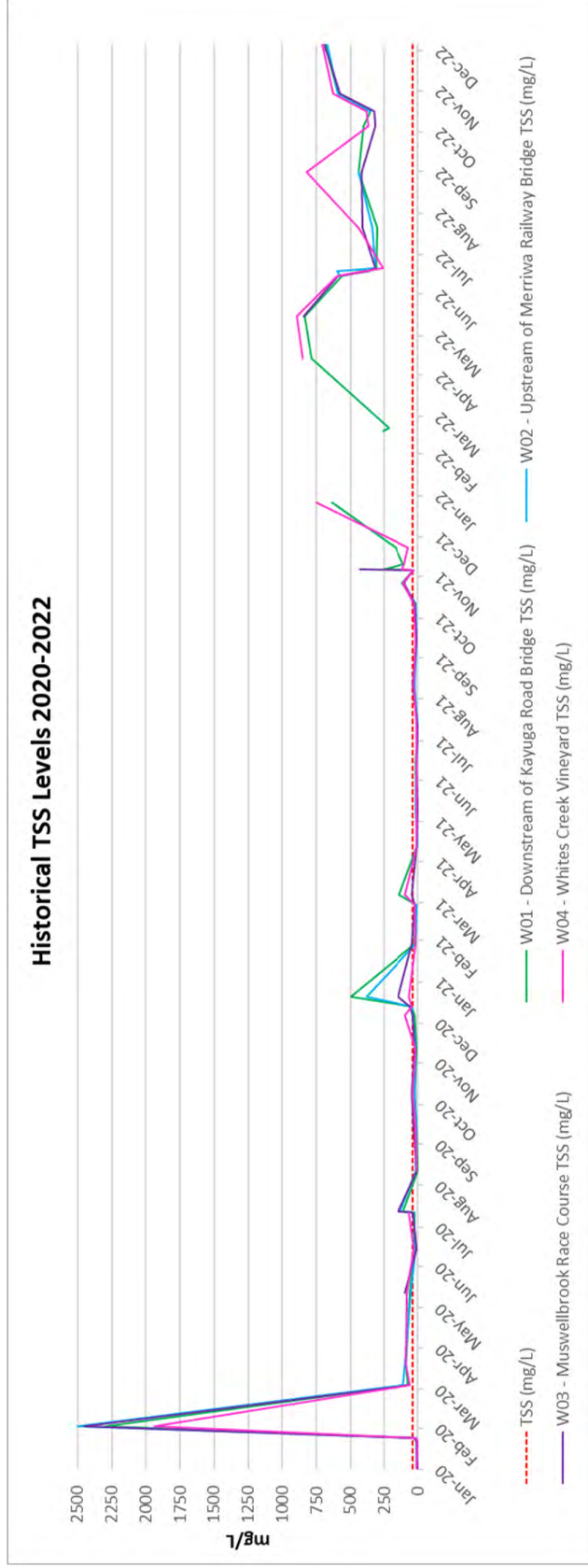
Graph F2
Hunter River EC Results 2022



Graph F3
Hunter River TSS Results 2022

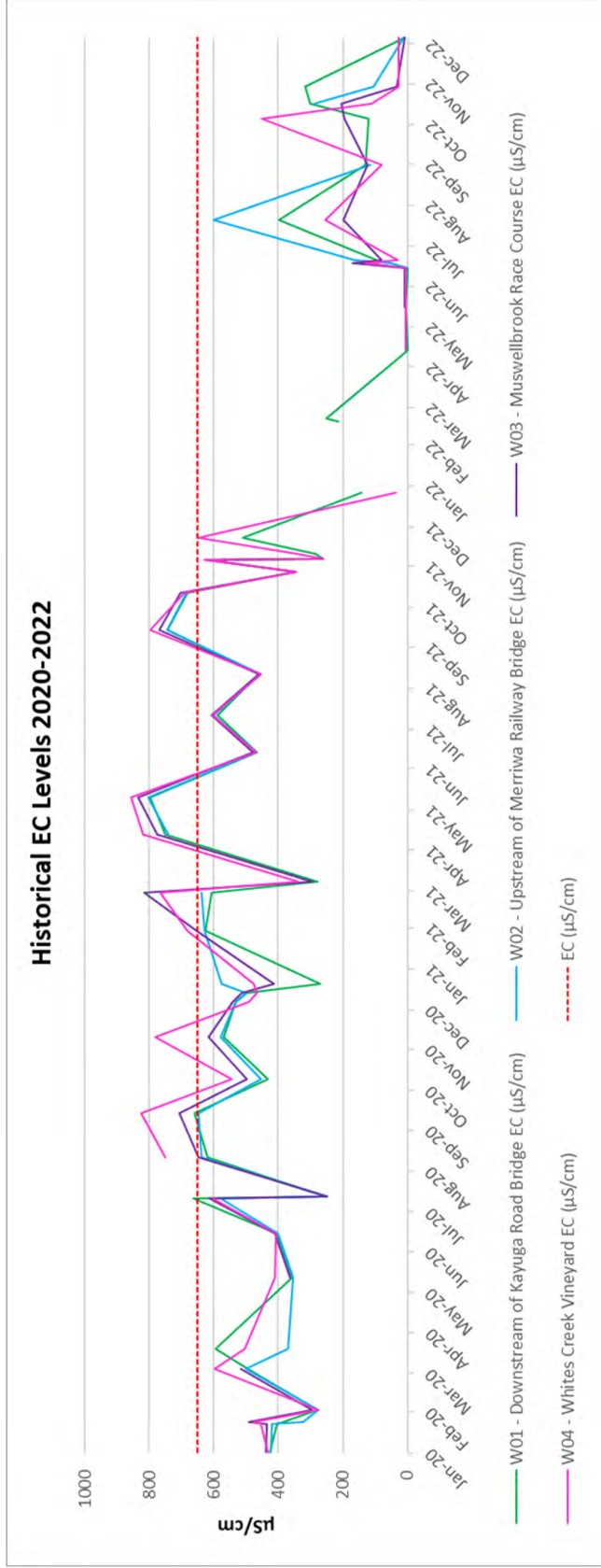


Graph F4
Hunter River pH Results 2020 - 2022



Graph F5
Hunter River TSS Results 2020 – 2022

(Note Elevated TSS levels have been recorded due to Hunter River flooding and La Nina conditions increasing ongoing flows into the Hunter River during 2020, 2021 and 2022).



Graph F6
Hunter River EC Results 2020 – 2022

Appendix G

Annual Groundwater Monitoring Report 2021



Australasian
Groundwater
& Environmental
Consultants

Report on

Bengalla Mine Annual Groundwater Monitoring Report for 2022

Prepared for
Bengalla Mining Company

Project No. BEN5009.001
March 2023

ageconsultants.com.au

ABN 64 080 238 642

Document details and history



Document details

Project number	BEN5009.001
Document title	Bengalla Mine – Annual Groundwater Monitoring Report for 2022
Site address	Muswellbrook NSW
File name	BEN5009.001.Bengalla_Mine_Groundwater_Annual_Report_2022_v02.01

Document status and review

Edition	Comments	Author	Authorised by	Date
v01.01	Draft	EH	BM	28/02/2023
v02.01	Final	EH	BM	10/03/2023

This document is and remains the property of AGE and may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

Australasian Groundwater and Environmental Consultants Pty Ltd

Brisbane Head Office
Level 2
15 Mallon Street
Bowen Hills QLD 4006
t: (07) 3257 2055

Newcastle
4 Hudson Street
Hamilton NSW 2303
t: (02) 4962 2091

Perth
Suite 10, Level 1
50 Angove Street
North Perth WA 6006
t: (08) 6383 9970

Townsville
Unit 1
60 Ingham Road
West End QLD 4810
t: (07) 4413 2020

Table of contents

1	Introduction and scope of works.....	1
2	Climate	2
3	Groundwater regime.....	4
4	Bengalla groundwater monitoring network.....	5
5	Water management plan	9
6	Water levels assessment	12
6.1	Alluvium aquifer water levels	12
6.1.1	Wantana Extension Bores	12
6.1.2	Regional Hunter River alluvial bores.....	13
6.1.3	Alluvial groundwater level contours	14
6.2	Coal seam/interburden water levels.....	16
6.2.1	Permian monitoring bore hydrographs	16
6.2.2	Nested monitoring bore hydrographs.....	19
6.2.3	Permian groundwater level contours	28
6.3	Permian groundwater level – northwest of active mining	32
6.4	Groundwater level assessment against baseline data	38
6.4.1	Baseline assessment	39
6.4.2	Trigger level assessment	39
7	Groundwater quality and monitoring	41
7.1	Quality monitoring overview.....	41
7.2	Alluvial water quality	41
7.2.1	pH	41
7.2.2	EC	45
7.3	Coal seam and interburden water quality	48
7.3.1	pH	48
7.3.2	EC	49
7.4	Permian groundwater quality – northwest of active mining	53
7.5	Water quality trigger events	55
7.5.1	pH	55
7.5.2	EC	55
8	Comparison to ANZECC guidelines	57
9	Summary	58
9.1	Groundwater levels	58
9.2	Groundwater quality	59
10	Recommendations.....	61
11	References	62

Table of contents

List of figures

Figure 2.1	Cumulative rainfall departure (1995 to 2022) for Bengalla weather monitoring station.....	3
Figure 4.1	Monitoring bore network	8
Figure 6.1	Hydrographs of alluvial bores - Wantana extension area	13
Figure 6.2	Hydrographs of Regional alluvial bores	14
Figure 6.3	Alluvial groundwater levels (July 2022)	15
Figure 6.4	Hydrographs of coal seam/interburden bores – Wantana extension area	17
Figure 6.5	Hydrographs of deep Permian monitoring bores	18
Figure 6.6	Hydrograph of shallow Permian monitoring bores.....	19
Figure 6.7	Alluvium and coal seam hydrographs – WAN1	20
Figure 6.8	Alluvium and coal seam hydrographs – WAN2	21
Figure 6.9	Alluvium and interburden hydrographs – WAN4.....	22
Figure 6.10	Alluvium and interburden hydrographs – WAN5.....	23
Figure 6.11	Alluvium and interburden hydrographs – WAN6.....	24
Figure 6.12	Alluvium and coal seam hydrographs – WAN7	25
Figure 6.13	Alluvium and coal seam hydrographs – WAN8	26
Figure 6.14	Alluvium and coal seam hydrographs – WAN9	27
Figure 6.15	Alluvium and coal seam hydrographs – WAN10	28
Figure 6.16	Shallow Permian groundwater levels (July 2022).....	30
Figure 6.17	Deep Permian groundwater levels (July 2022).....	31
Figure 6.18	Northwest Permian monitoring bore groundwater levels	33
Figure 6.19	Northwest Permian VWP potentiometric heads – BE1	34
Figure 6.20	Northwest Permian VWP potentiometric heads – BE2.....	35
Figure 6.21	Northwest Permian VWP potentiometric heads – BE3.....	36
Figure 6.22	Northwest Permian VWP potentiometric heads – BE4.....	37
Figure 6.23	Northwest Permian VWP potentiometric heads – BE5.....	38
Figure 6.24	Hydrograph of bores with groundwater levels near maximum predicted drawdown	40
Figure 7.1	pH trends – Hunter River alluvial bores	42
Figure 7.2	pH trends – other alluvial bores	43
Figure 7.3	pH trends – regional alluvial bores.....	44
Figure 7.4	EC trends – Hunter River Alluvium (Wantana Extension)	46
Figure 7.5	EC trends – Hunter River Alluvium (Regional)	47
Figure 7.6	pH trends – coal seam aquifers	48
Figure 7.7	pH trends – coal seam aquifers (Wantana Area).....	49
Figure 7.8	Electrical conductivity trends – Coal seam aquifers (Wantana Area).....	51
Figure 7.9	Electrical conductivity trends – Deep Permian bores	52
Figure 7.10	Electrical conductivity of Permian bores to the northwest of active mining	53
Figure 7.11	pH of Permian bores to the northwest of active mining	54

Table of contents

List of tables

Table 2.1	Rainfall data 2022 – Bengalla weather station	2
Table 3.1	Coal seams and interburden at Bengalla Mine	4
Table 4.1	Current Bengalla groundwater monitoring network	6
Table 5.1	Bengalla WMP water quality triggers (Version 7 – February 2019).....	9
Table 5.2	Bengalla WMP water level triggers (February 2019)	10
Table 7.1	Summary of EC trigger exceedances for 2022	56
Table 8.1	2022 ANZECC Exceedances.....	57

List of appendices

Appendix A	Monitoring bore summary data
------------	------------------------------

Bengalla Mine

Annual Groundwater Monitoring Report for 2022

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.

This report is a review of groundwater monitoring data collected during the one-year monitoring period 1 January 2022 to 31 December 2022. Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) were commissioned by BMC to undertake 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 trend analyses;
- identify any changes/observations made during the past 12 months;
- assess the adequacy of the existing monitoring bore network and monitoring program; and
- provide recommendations if 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.”*

AGE will report on the above with regards to groundwater issues, for all items except item (a).

2 Climate

The climate at Bengalla is temperate and is characterised by hot, wet summers and mild, dry winters. Temperature data for 2022 were sourced from the Bureau of Meteorology weather station at Scone (061363), 25 km from Bengalla. The maximum monthly mean temperature for the year was recorded in January 2022 (31.8°C), whilst a minimum monthly mean temperature of 17°C was recorded in July 2022.

Long-term rainfall data covering the period 1992 to 2022 were obtained from the onsite Bengalla weather station and are summarised in Table 2.1.

The total annual rainfall recorded at the Bengalla meteorological station for 2022 was 849 mm. March was the wettest month, with 237.5 mm of recorded rain, and June the driest with 12 mm of rain recorded. A comparison of the total annual 2022 rainfall (849 mm) at Bengalla with the longer-term 1992 to 2022 average (602.5 mm) illustrates an above average rainfall trend for the year (Table 2.1).

Table 2.1 Rainfall data 2022 – Bengalla weather station

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Bengalla Monthly Total Rainfall (mm) 2022	64	45	237.5	39.5	38.5	12	57.5	87.5	54.5	137	60.5	15.5	849
Bengalla long term monthly average rainfall (mm) 1992 - 2022	54.9	69.4	67.5	36.3	34.3	44.3	35	34.3	36.7	47.7	70.6	71.6	602.5

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 (210002), which is located approximately 5 km up-stream of Bengalla.

The CRD (Figure 2.1) has displayed an increasing trend throughout 2021 and 2022, following drought conditions from early 2017 to late 2019. 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.

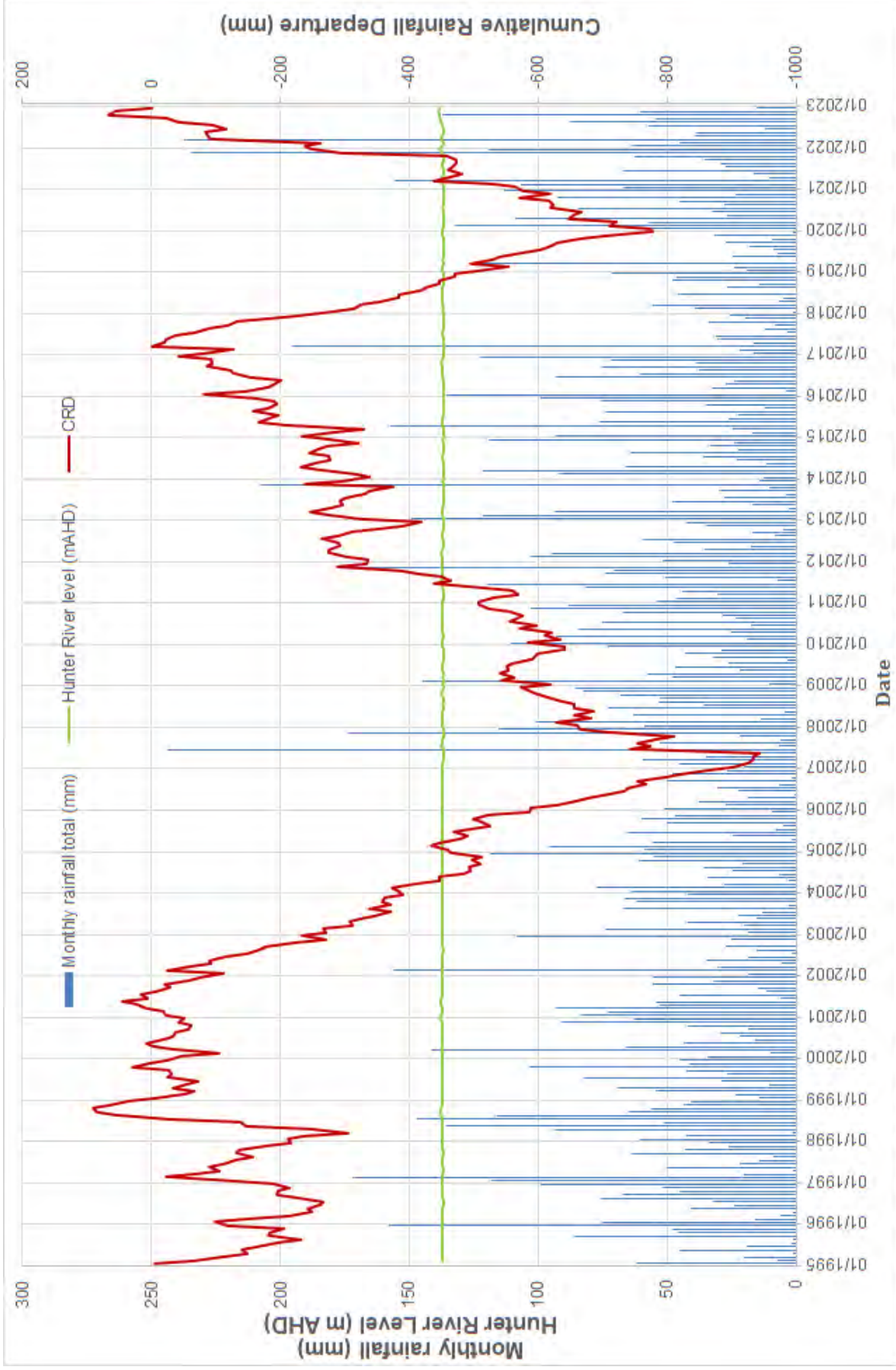


Figure 2.1 Cumulative rainfall departure (1995 to 2022) for Bengalla weather monitoring station

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 strike in a generally north-south direction, and dip westward at approximately 5 degrees. The coal 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	35
	Mount Arthur	4.5	5
	Piercefield	2.3	12
	Vaux	4	35
	Broonie	1.3	13
	Bayswater	2.5	10
	Wynn	2.5	5
Not mined at Bengalla	Edderton	2	10
	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 to the Hunter River alluvium. Depressurisation of the coal seams by open cut mining has the following potential impacts on the Hunter River alluvial aquifer:

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

Generally, the Hunter River level is above the water table in the Hunter River alluvium, and near Bengalla the river is losing water to the alluvium. 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). A bedrock bore (REPI7) was installed to replace bore I7. Two alluvial monitoring bores – SMB1 and SMB2 – 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 an absence of 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. Note these updated construction details for WAN8A/B differ from those shown in the WMP. The locations WAN5A and WAN5B have historically been mistakenly interchanged. Following the downhole investigation, it was found that WAN5A targets the deep Permian and WAN5B targets the alluvium (now rectified in Table 4.1).

In late 2018 BMC commenced drilling 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 record completeness however do not form part of this compliance review.

As the neighbouring Mount Pleasant Project progresses, 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 in 2022. Monitoring bore E12 was mined through in May 2017. VWP BE4 was removed 27 October 2021 due to blasting operations.

In December 2021, BMC commenced drilling a nested monitoring site that target both alluvial (211GW001) and shallow Permian (211GW002) strata south of Bengalla, along strike to the actively mined seams in the region nearby to BG3 (approximately 1 km), as 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. The monitoring bores were installed in a 'nested' configuration (i.e., in proximity at a single site), with one shallow monitoring bore targeting shallow strata (211GW002) and another deeper bore installed into subcropping Permian strata (211GW001). 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	148.0	148.0	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	204.22	205.38	1.16	45-48	48	156.22	Permian Sandstone
BE3 (bore)	292977	6427587	175.21	176.39	1.18	48-54	54	121.21	Permian Sandstone
BG1 _b	296656	6426003	138.2	138.78	0.58	-	-	-	Alluvium
BG3 _b	294731	6424413	133.60	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
SMB1	296955	6426391	141.2	142.47	1.27	13-19	19	122.2	Alluvium
SMB2	297124	6426549	141.69	142.61	0.92	15-21	21	120.69	Alluvium
WAN10A	295828	6425571	135.07	136.13	1.06	10-13	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
WAN5B _{bc}	296019	6425360	135.9	136.74	0.84	10.5-13.5	15.57	121.17	Alluvium

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
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
WAN9A _{2c}	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
BE3 (VWP)	292977	6427587	175.21	-	-	80.6	80.6	94.61	Warkworth/Mt Arthur
BE3 (VWP)	292977	6427587	175.21	-	-	154.6	154.6	20.61	Edderton Seam
BE4 (VWP)	294313	6428784	191.4	-	-	82	228.2	-36.8	Mt Arthur
BE4 (VWP)	294313	6428784	191.4	-	-	213	228.2	-36.8	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	9-12	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	9-12	12	123.4	Alluvium
WAN11B _c	296645	6424876	135.5	136.45	0.95	24-27	27	108.5	Shallow Permian
WAN12A _{b,c}	295491	6424725	135.3	136.06	0.76	11-14	14	121.3	Alluvium
211GW001 _{c,d}	294301	6424930	138.33	139.20	0.87	49.4-55.4	55.4	83.8	Shallow Permian
211GW002 _{c,d}	294294	6424927	138.30	139.20	0.90	14.8-20.8	20.8	118.4	Alluvium

- Notes:**
- a no access or mined through for 2022 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

- Monitoring bore network
- Drainage
- Roads
- 2022 Void boundary

Bengalla annual review 2022 (BEN5009.001)

Monitoring bore network

NOTE:
 Aerial Image Capture Date : September 2021
 Source: BMC



DATE
06/03/2023

FIGURE No:
4.1

5 Water management plan

Bengalla manages its water resources as per the Bengalla Water Management Plan (WMP) version 7, which was approved February 2019.

The current WMP (i.e. version 7) groundwater quality triggers are summarised in Table 5.1 and the water level triggers are summarised in Table 5.2. The 2022 monitoring data are compared to these triggers.

Table 5.1 Bengalla WMP water quality triggers (Version 7 – February 2019)

Site	Easting	Northing	Min pH trigger	Max pH trigger	Stage 1 EC Trigger – 95 th Percentile (µS/cm)	Stage 2 EC Trigger – Maximum EC (µS/cm)	Target aquifer
11953	298192	6428693	6	8.5	7,121	8,540	Deep Permian
18298	294375	6423521	6	8.5	1,484	1,990	Alluvium
19116	296078	6425589	6	8.5	2,297	2,650	Alluvium
28510	298649	6429105	6	8.5	1,479	1,480	Deep Permian
37774	298488	6428998	6	8.5	2,901	3,060	Deep Permian
42701	298586	6428632	6	8.5	1,232	1,340	Deep Permian
42927	298843	6428570	6	8.5	1,260	1,380	Alluvium
46737	291862	6427143	6	8.5	9,092	9,290	Shallow Permian
47277	299145	6428643	6	8.5	1,325	1,340	Alluvium
53007	298720	6428857	6	8.5	1,240	1,350	Deep Permian
BE1	293469	6429033	6	8.5	7,186	7,190	Permian Sandstone
BE2	293375	6425866	6	8.5	8,335	8,370	Permian Sandstone
BE3	292977	6427587	6	8.5	8,738	8,740	Permian Sandstone
BG1	296656	6426003	6	8.5	1,021	1,580	Alluvium
BG3	294731	6424413	6	8.5	3,540	4,850	Alluvium
BG5	298609	6427874	6	8.5	1,330	1,670	Alluvium
REPI7	295575	6425832	6	8.5	4,280	4,310	Vaux Seam
SMB1	296955	6426392	6	8.5	2,159	2,790	Alluvium
SMB2	297125	6426550	6	8.5	2,439	2,460	Alluvium
WAN1A	296519	6426099	6	8.5	2,099	2,280	Alluvium
WAN1B	296519	6426099	6	8.5	1,909	3,790	Shallow Permian
WAN2A	296217	6425824	6	8.5	1,389	1,780	Alluvium
WAN2B	296217	6425824	6	8.5	3,856	3,930	Edderton Seam
WAN2C	296217	6425824	6	8.5	3,619	3,840	Edderton Seam
WAN3	295772	6425713	6	8.5	4,365	4,550	Deep Permian
WAN4A	295442	6425690	6	8.5	3,965	4,170	Alluvium

Site	Easting	Northing	Min pH trigger	Max pH trigger	Stage 1 EC Trigger – 95 th Percentile (µS/cm)	Stage 2 EC Trigger – Maximum EC (µS/cm)	Target aquifer
WAN4B	295442	6425690	6	8.5	3,507	3,570	Deep Permian
WAN5A	296019	6425360	6	8.5	6,001	6,180	Alluvium
WAN5B	296019	6425360	6	8.5	1,641	1,900	Deep Permian
WAN6A	296553	6425634	6	8.5	1,055	1,280	Alluvium
WAN6B	296553	6425634	6	8.5	1,297	1,461	Edderton Seam
WAN7A	296856	6426254	6	8.5	2,258	2,300	Alluvium
WAN7B	296856	6426254	6	8.5	3,160	3,220	Edinglassie Seam
WAN8A	296457	6425855	6	8.5	-	7,720	Alluvium
WAN8B	296450	6425855	6	8.5	2,780	2,820	Wynn Seam
WAN9A2	296320	6425583	6	8.5	936	937	Alluvium
WAN9B	296328	6425576	6	8.5	1,915	1,930	Wynn Seam
WAN10A	295828	6425571	6	8.5	1,253	1,367	Alluvium
WAN10B	295825	6425578	6	8.5	5,068	5,090	Vaux Seam

Note: - Indicates insufficient data for statistical analysis.

Table 5.2 Bengalla WMP water level triggers (February 2019)

Bore ID	Geology / Target Seam	Max. drawdown (m)	Trigger water level (mAHD)
SMB1	Alluvium	1.5	127.2
SMB2	Alluvium	1.6	127.3
WAN1A	Alluvium	4.2	117.5
WAN2A	Alluvium	6.8	118.5
WAN4A	Alluvium	5.5	121.2
WAN5A	Alluvium	2.4	124.3
WAN6A	Alluvium	1.1	126.9
WAN7A	Alluvium	1.4	125.4
WAN8A	Alluvium	2.4	123.3
WAN9A	Alluvium	2.6	123.7
WAN10A	Alluvium	4.6	122.2
18298	Alluvium	0.3	123.2
19116	Alluvium	4.2	123.2
42927	Alluvium	1.2	131.1
47277	Alluvium	0.8	132.8
BG1	Alluvium	1.4	126.8

Bore ID	Geology / Target Seam	Max. drawdown (m)	Trigger water level (mAHD)
BG3	Alluvium	0.2	126.3
BG5	Alluvium	0.9	132.4
37774	Deep Permian	5.4	128.7
42701	Deep Permian	1.9	131.3
46737	Shallow Permian	0.7	185.3
53007	Deep Permian	1.8	131.9
BE1	Permian Sandstone	15.5	156.8
BE2	Permian Sandstone	148.9	18.8
BE3	Permian Sandstone	32.5	113.2
WAN2B	Wynn Seam	25.4	86.4
11953	Deep Permian	7.1	129.3
28510	Deep Permian	3.3	129
REPI7	Vaux Seam	39	63.1
WAN1B	Edderton Seam	15.8	100.1
WAN2C	Edderton Seam	25.4	75
WAN3	Deep Permian	26.3	100.3
WAN9B	Wynn Seam	8.1	111.4
WAN10B	Vaux Seam	20.9	98.3
WAN4B	Deep Permian	26.3	98.2
WAN5B	Deep Permian	10.7	116
WAN6B	Edderton Seam	4.1	123.8
WAN7B	Edinglassie Seam	2.3	126.4
WAN8B	Wynn Seam	9.5	108.5

6 Water levels assessment

6.1 Alluvium aquifer water levels

The hydrographs for the bores monitoring groundwater levels 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 here-in 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; referred to as Regional Hunter River alluvial bores.

6.1.1 Wantana Extension Bores

No Wantana Extension bore water levels were recorded below their respective trigger levels in 2022 (Appendix A).

Figure 6.1 shows the alluvial groundwater level trends in the Wantana Extension area overlain with the CRD trend and Hunter River level. The water level trends for the Wantana Extension bores increased during 2022, coincident with above average rainfall and an increasing CRD.

The increasing trends in groundwater levels in Figure 6.1 show a strong correlation between the CRD and Hunter River level (at Station 210002, Muswellbrook Bridge).

The exception to this correlation is WAN8A, which displays a variable groundwater level response when compared to Hunter River level, the CRD, or the other Wantana Extension bores. 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.

Groundwater monitoring bores WAN4A, WAN4B, WAN8A, WAN10A and WAN10B could not be accessed on multiple occasions in 2022 due to ponded surface water from recent rainfall events. Remaining data collection from the Wantana Extension bores indicated increases in groundwater levels during 2022, coincident with significant rainfall events and an increasing CRD.

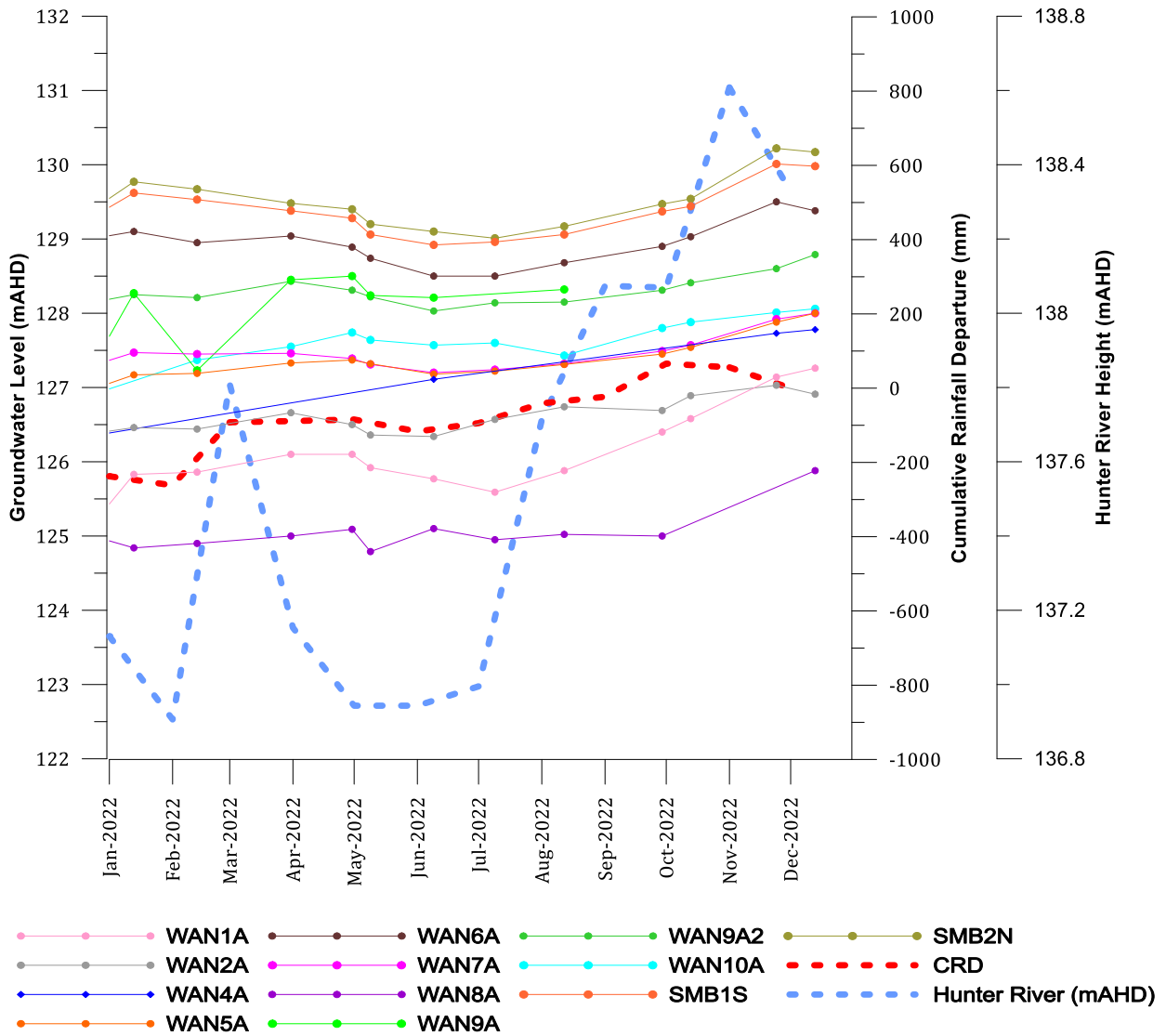


Figure 6.1 Hydrographs of alluvial bores - Wantana extension area

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 2022. Groundwater levels in BG5 have remained above the trigger value since April 2018.

Groundwater levels in BG3 were higher than those recorded in 2021 largely due to significant rainfall recharge, and have remained above the prescribed trigger level for the entirety of 2022.

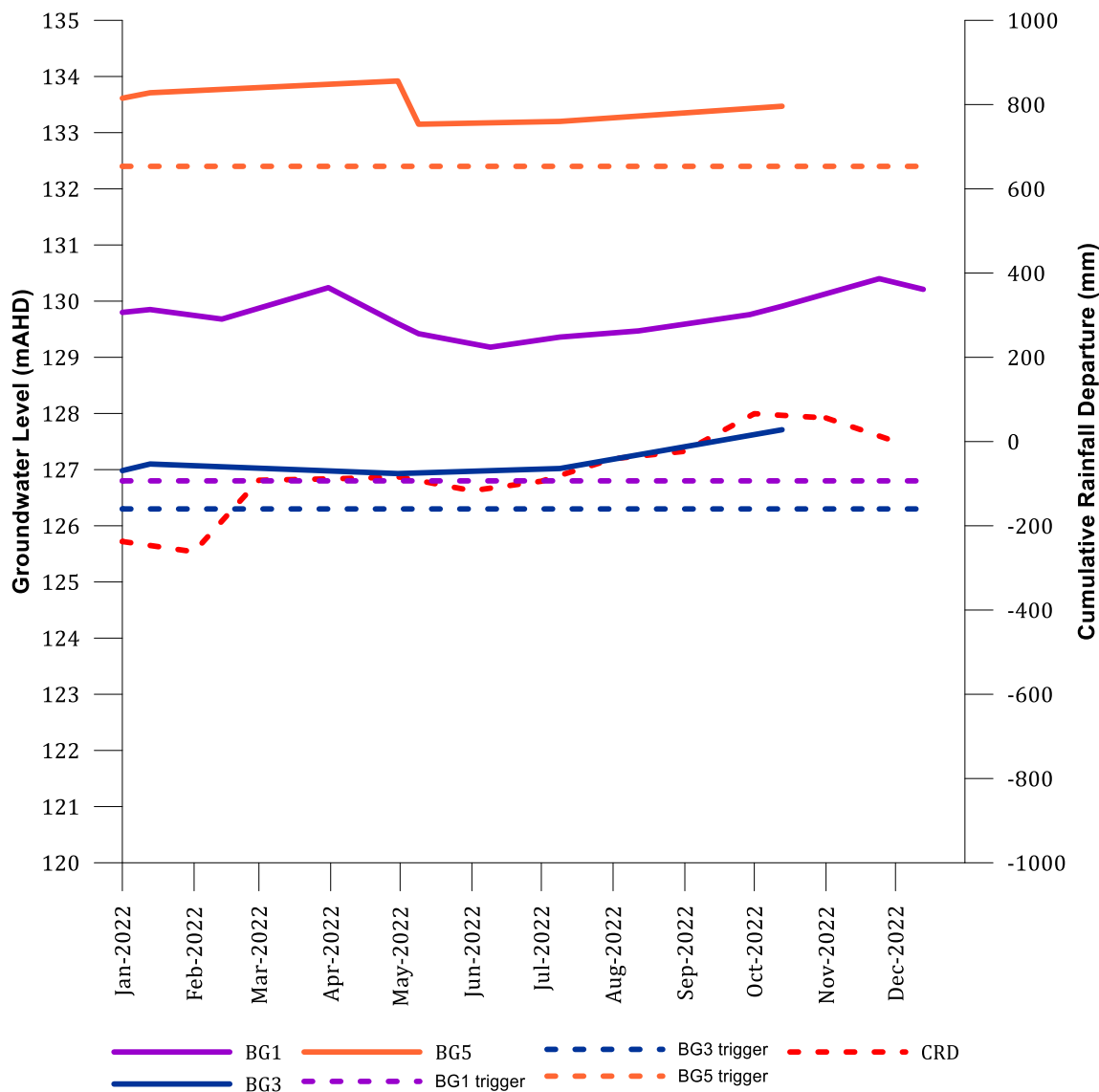


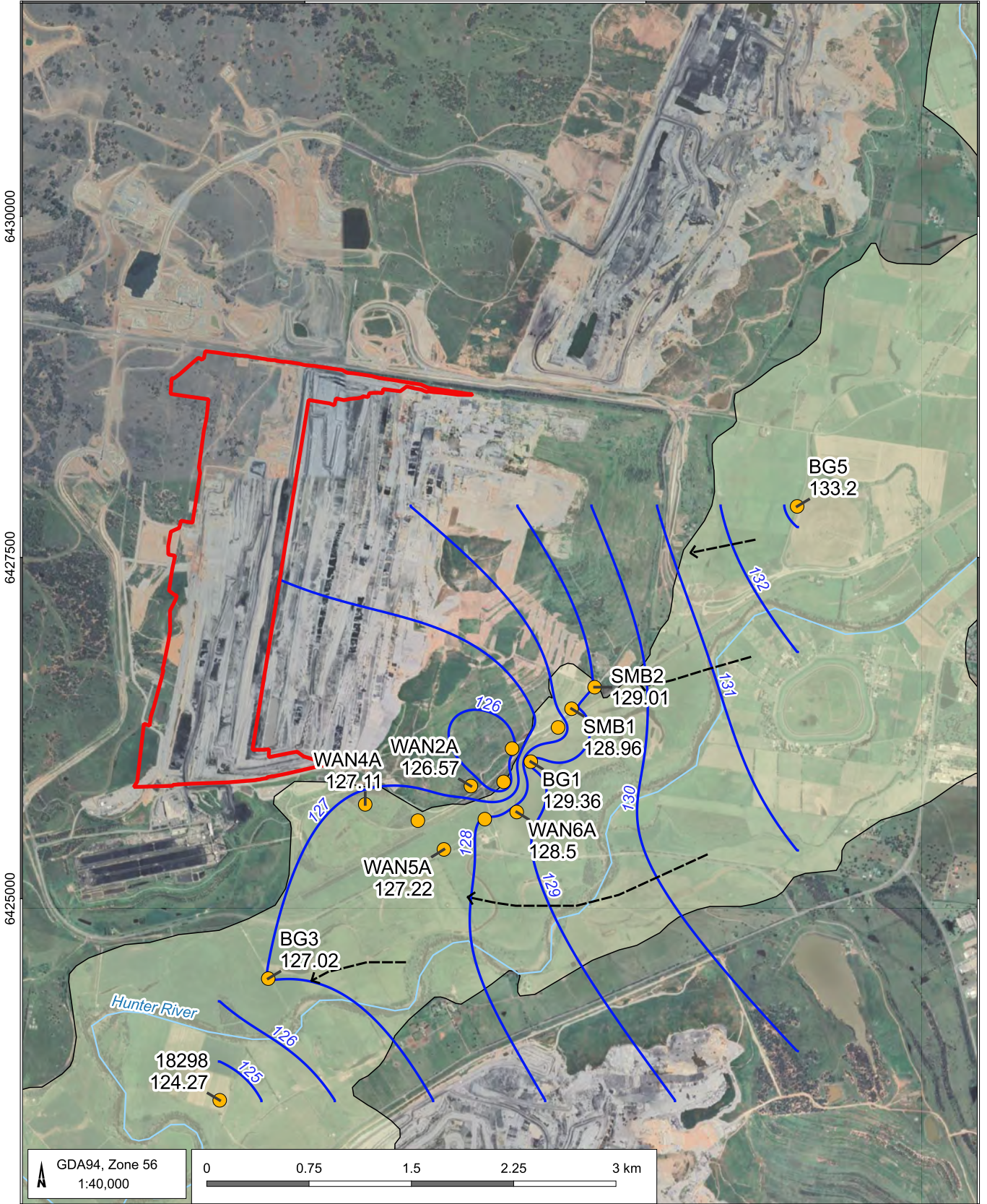
Figure 6.2 Hydrographs of Regional alluvial bores

6.1.3 Alluvial groundwater level contours

Figure 6.3 shows the water table within the Hunter River alluvium interpolated from water elevation measurements observed during July 2022. 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 Mine. This would explain 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, the groundwater level in WAN8A is also very close to the base of the bore, and it may be stagnant water in the bore sump. The latest 2022 groundwater elevation in WAN8A was 124.95 mAHd, whereas the base of the screened interval is 124.51 mAHd (ground level minus 11.9 m; Appendix A). Therefore, there was only 0.44 m of screened casing below the water level; a decrease of 0.23 m from the previous year. Regardless of the degree of saturation at 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 at this point).





LEGEND

- Alluvium monitoring bores
- Drainage
- - -> Groundwater flow direction
- Alluvium groundwater contours (1m)
- Alluvium boundary
- 2022 Void Boundary

NOTE:
 Aerial Image Capture Date : September 2021
 Source: BMC

Bengalla annual review 2022 (BEN5009.001)

Alluvial groundwater levels (July 2022)



AGE

DATE
06/03/2023

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 2022. 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 a varying extent, depending on their stratigraphic position and the proximity of the bore to the pit.
- Pressure head in a number of seams is recovering as the pit progresses westward and a prolonged period of above average rainfall recharges groundwater in shallower strata (WAN1A, WAN1B, WAN2A, WAN5A, WAN6B and WAN7B).
- The Edinglassie Seam is not mined at Bengalla and therefore the water elevation 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. Groundwater elevation in WAN7B increased approximately 0.5 m in 2022 (~131.2 mAHD groundwater elevation).
- 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.
- Groundwater levels in bore WAN1A (screened in the Wynn Coal seam) increased gradually throughout 2022 after being relatively static since 2007. After being recorded as almost dry in April 2020, the observed water level at WAN1A is now 5.86 m above the base of the casing.
- WAN3 was found to be dry throughout 2022. The last recorded groundwater measurement was taken in December 2021, which was one of only three measurements recorded at this bore in six years.
- Monitoring bore WAN2C was blocked prior to October 2019. Measurements for 2022 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 have increased in 2022, commensurate with above average rainfall and an increasing CRD;
- Figure 6.6 shows a coal seam (Edderton Seam) monitoring bore (WAN1B) plotted against the CRD. Groundwater levels have risen by almost 2 m in 2022; a similar increase to that recorded in 2021. Groundwater level recovery in WAN1B is likely due to the westward progression of mining operations (i.e. away from WAN1B) and above average rainfall over the course of the year; and
- WAN4B, WAN5A, and WAN1B remained above established triggers throughout 2022.

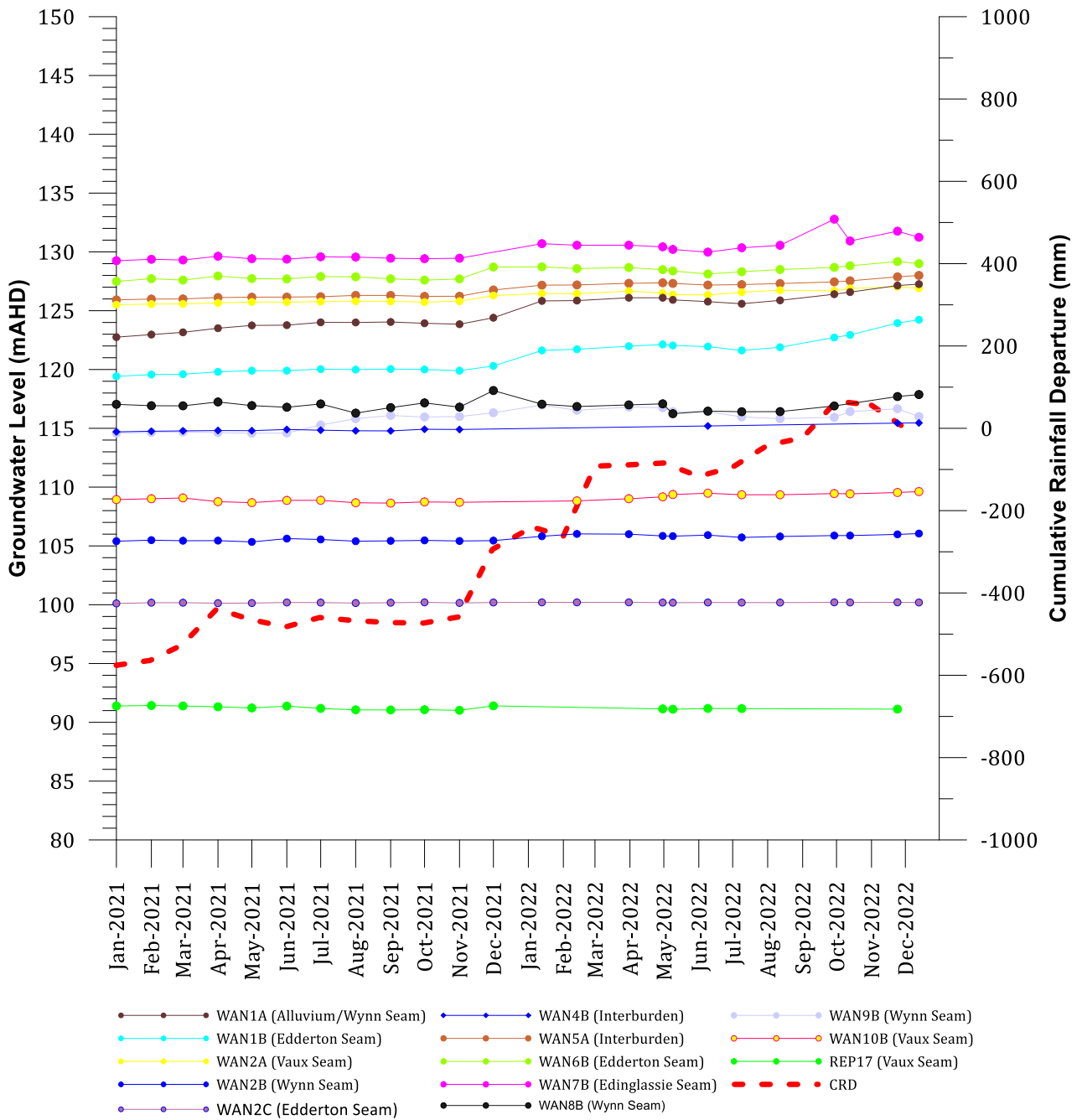


Figure 6.4 Hydrographs of coal seam/interburden bores – Wantana extension area

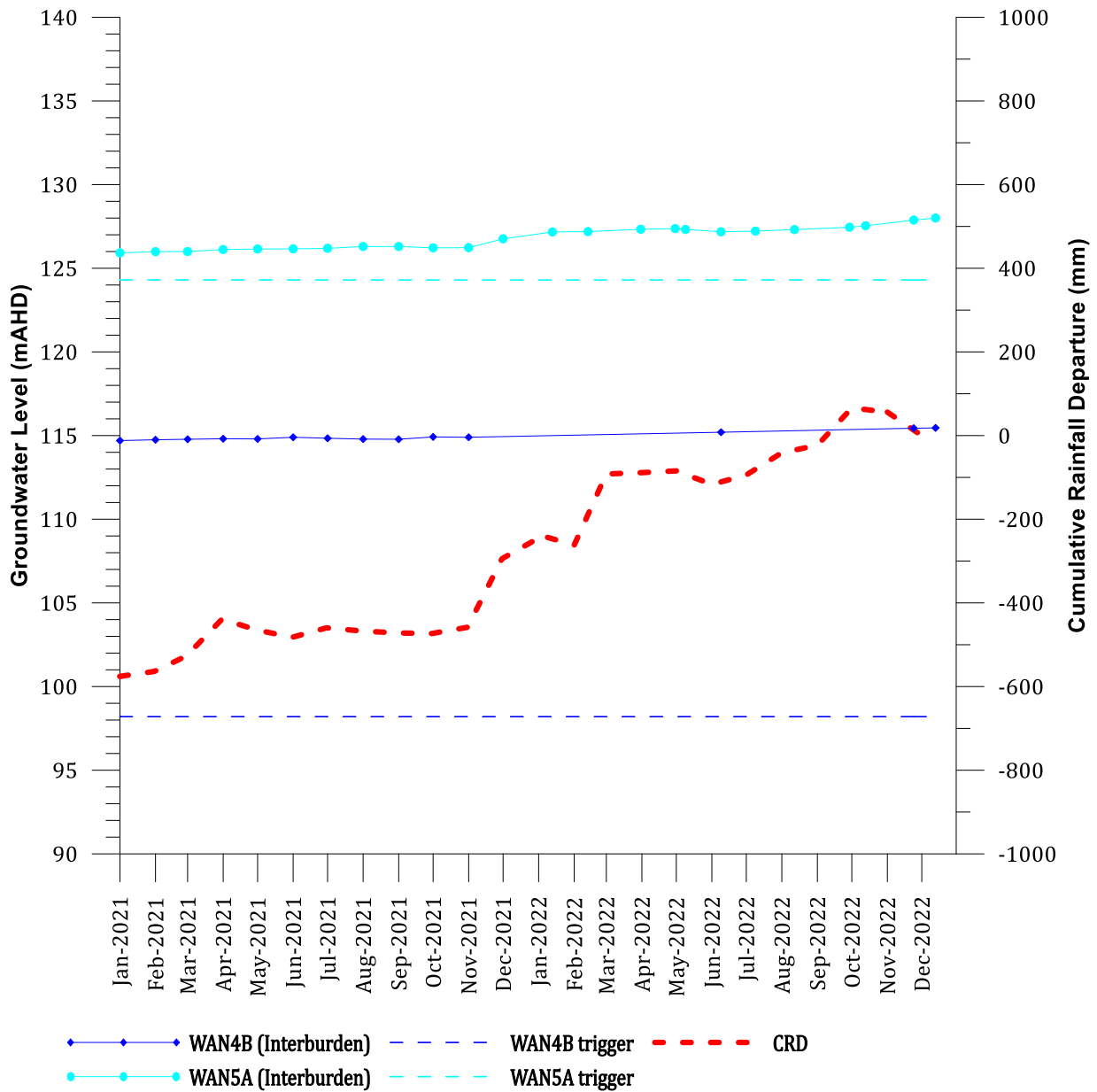


Figure 6.5 Hydrographs of deep Permian monitoring bores

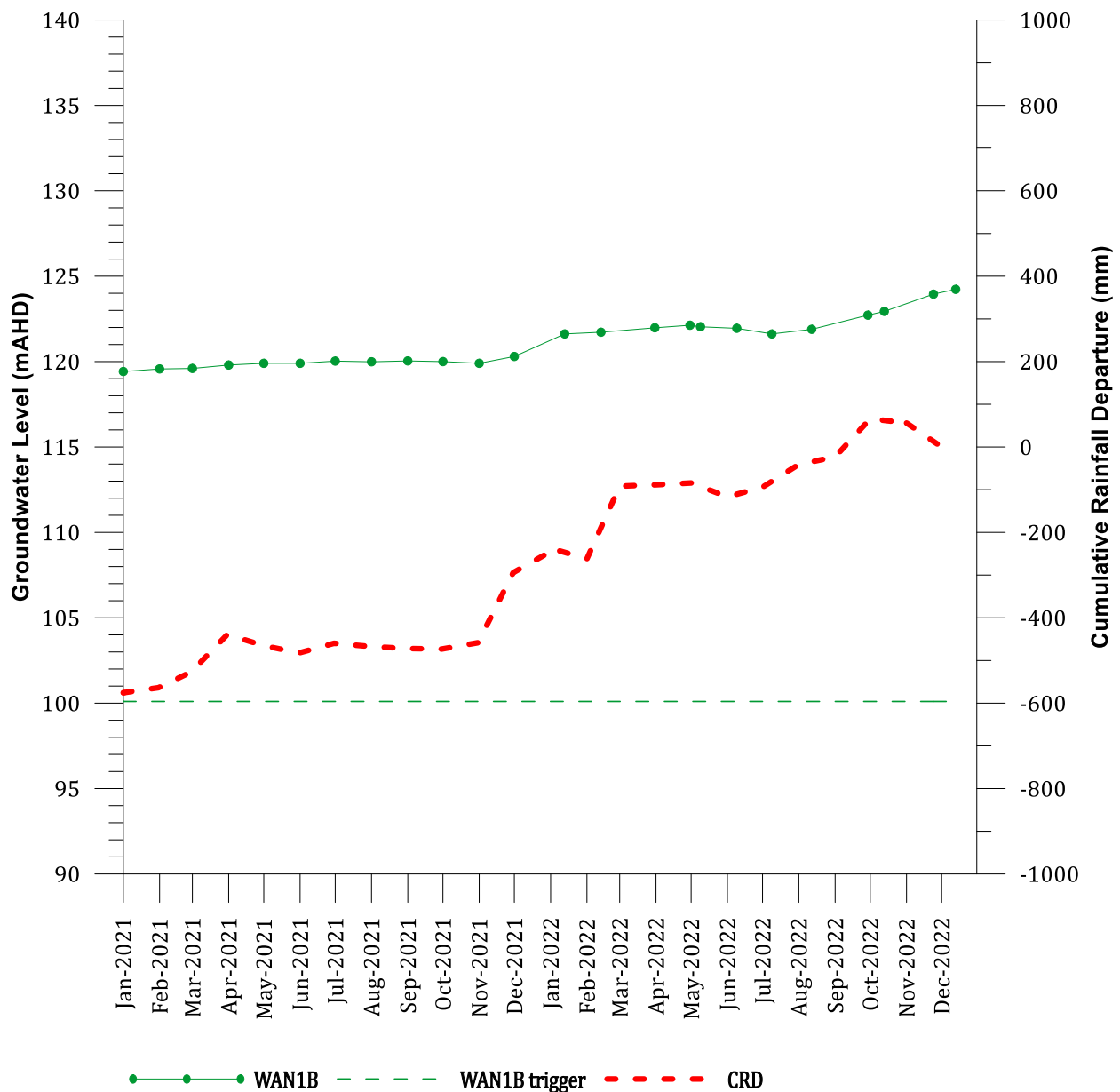


Figure 6.6 Hydrograph of shallow Permian monitoring bores

6.2.2 Nested monitoring bore hydrographs

Nested/clustered monitoring bore installations in the Wantana Extension are used to monitor water levels in several aquifers at the one location. Each nested installation generally comprises one alluvium bore, and one (or more) coal seam bore(s). Groundwater levels in all nested monitoring bores remained above the trigger level for 2022. 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 – G1505). 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 2022. WAN1A is screened in the Wynn seam and possibly also over part of the alluvium. At this location, the Wynn seam subcrops close to the base of the alluvium. WAN1A recorded a significant yet gradual increase in water level throughout the year, increasing from 125.83 mAHD to 127.26 mAHD (1.43 m increase). WAN1B (Edderton seam) also recorded ongoing water level recovery in 2022 (2.6 m increase in pressure head), following mining induced depressurisation from mid-2010 to late-2011. The water level of 124.23 mAHD (December 2022) has recovered to above the pre-mining level of 115.87 mAHD, demonstrating that water levels in depressurised coal seams can recover in a post-mining phase.

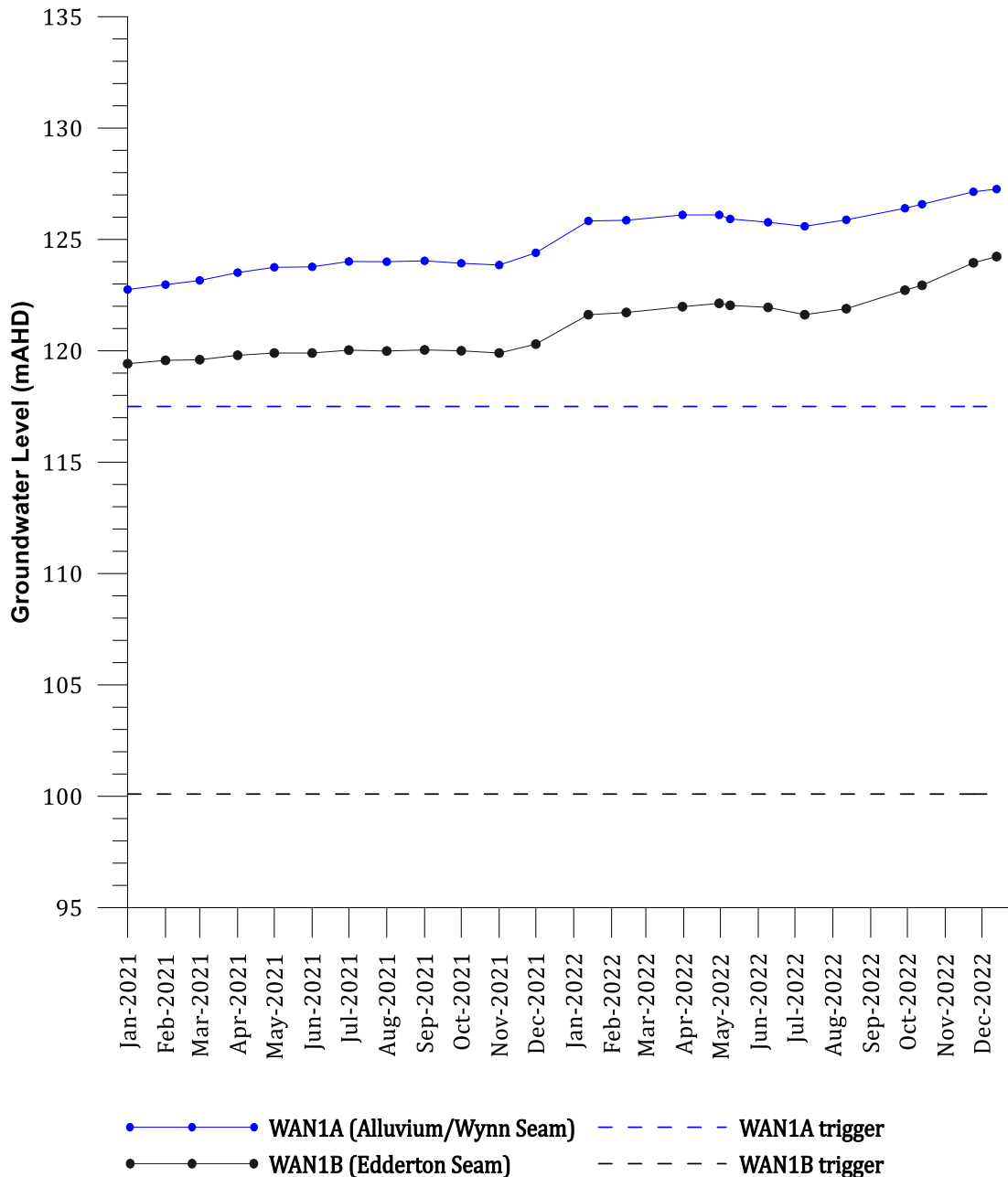


Figure 6.7 Alluvium and coal seam hydrographs – WAN1

Figure 6.8 shows the WAN2 nested site water levels. All WAN2 bores retained levels above the trigger levels throughout 2022. Water levels in WAN2A (Vaux Seam) increased slightly during the 2022 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 2022). Monitoring bore WAN2C recorded a steady water level throughout 2022.

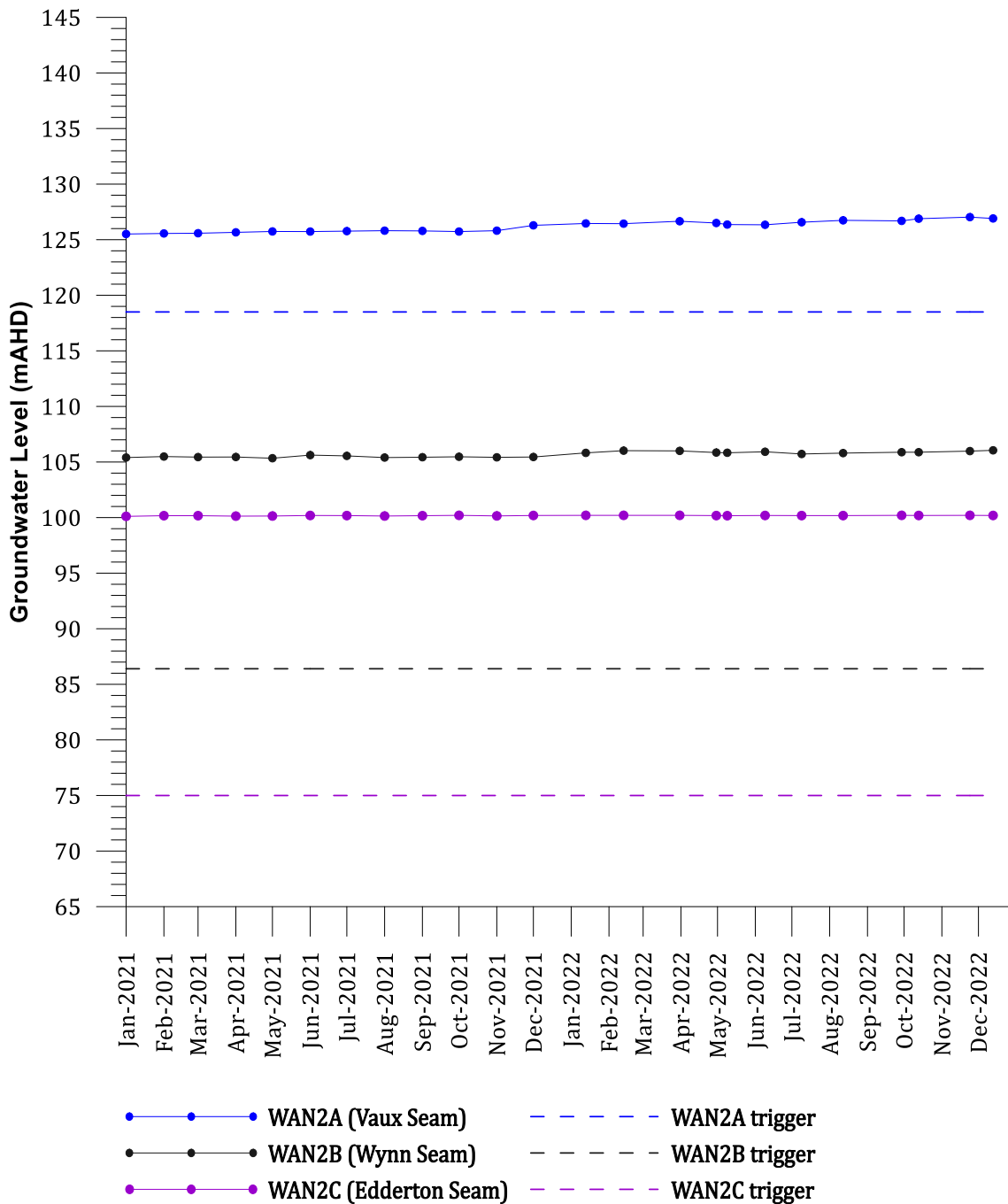


Figure 6.8 Alluvium and coal seam hydrographs – WAN2

WAN4 bores retained groundwater levels above the trigger values throughout 2022 (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 to an elevation approximately 115.5 mAHD (115.46 mAHD - December 2022). WAN4A water level in the alluvium gradually increased throughout 2022, with the groundwater level increasing by 1.67 m. This coincides with above average rainfall; however, 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. Access to WAN4 bores was impeded by rainfall on multiple occasions in 2022, leading to gaps in the data.

WAN4A/B is located closer to the pit than WAN5A/B and WAN6A/B (Figure 4.1). WAN5A/B and WAN6A/B have coal seam/interburden and alluvium water levels at similar elevations to each other (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. In December 2021, WAN5A and WAN6A/B groundwater levels increased significantly in response to rainfall recharge. WAN5B was unblocked in October 2022 and sampling resumed after being damaged by cattle in September 2020.

Data from 2022 (Figure 6.12) show the groundwater level in the Edinglassie Seam is approximately 2 m above the groundwater level in the alluvium, indicating that the Edinglassie Seam is pressurised. The Edinglassie Seam is not mined at Bengalla and hence has not been impacted by mining related drawdown. The water level in WAN7A increased during 2022. WAN7A and WAN7B were above established trigger levels throughout the entirety of 2022 (Figure 6.12).

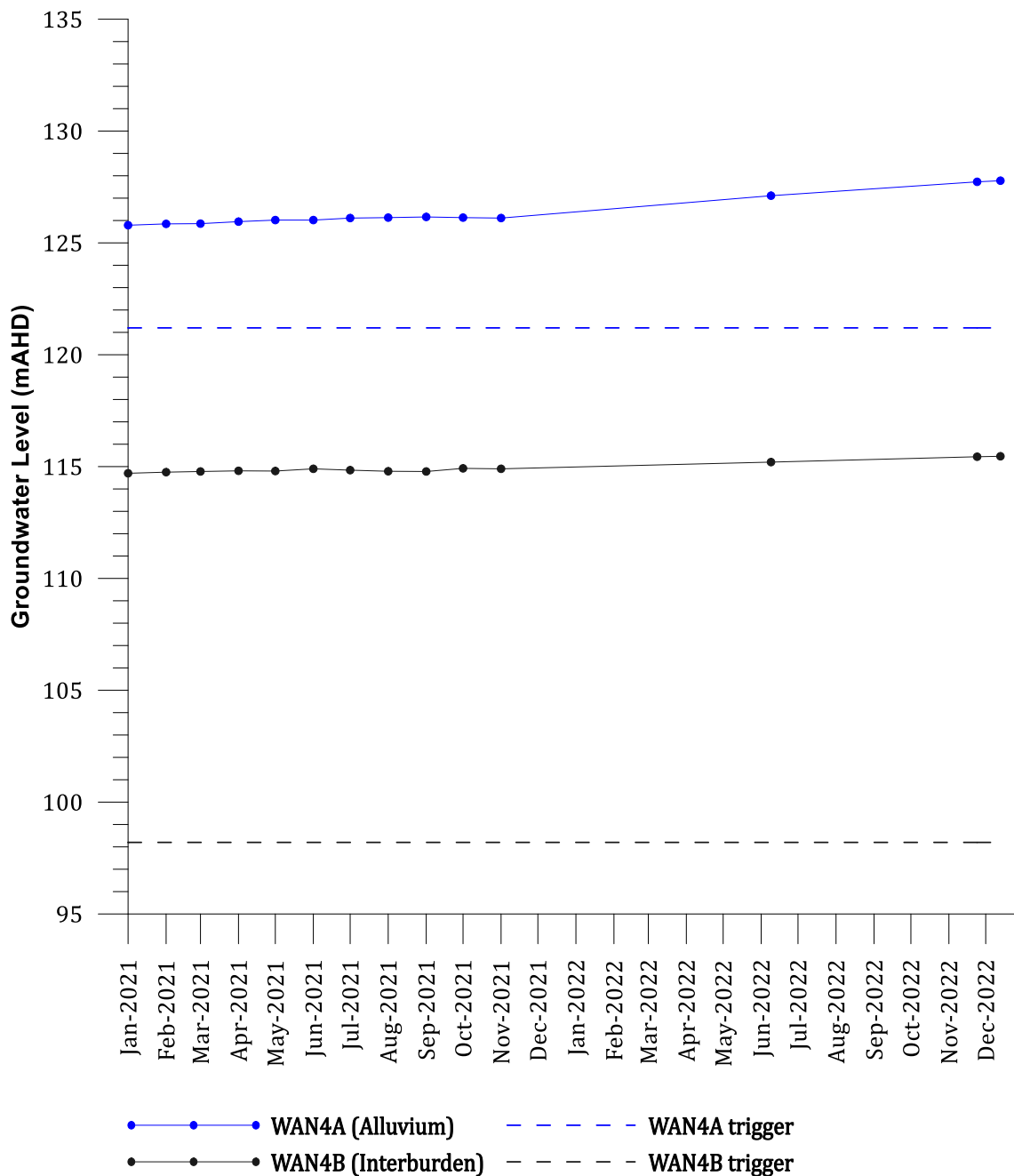


Figure 6.9 Alluvium and interburden hydrographs – WAN4

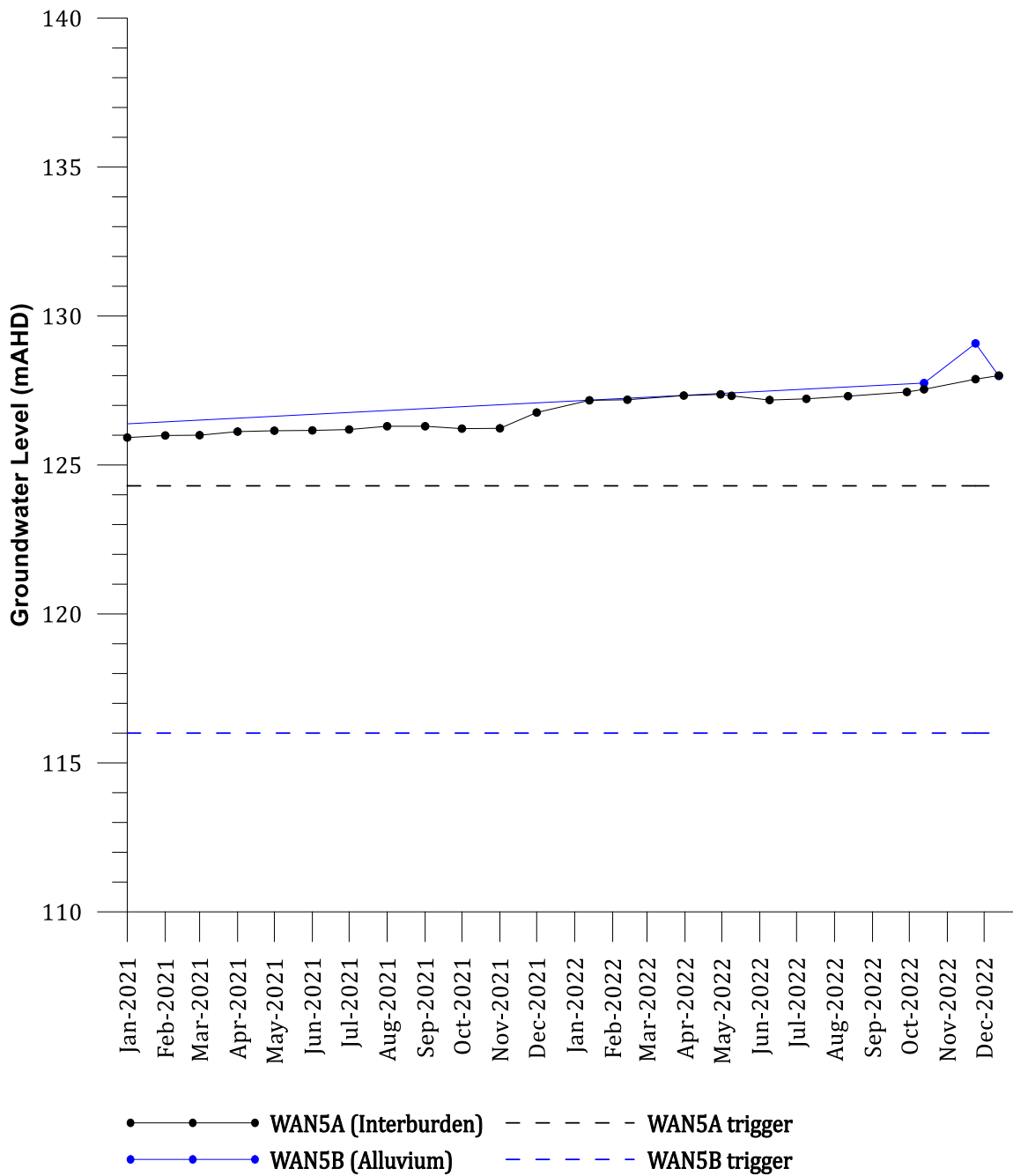


Figure 6.10 Alluvium and interburden hydrographs – WAN5

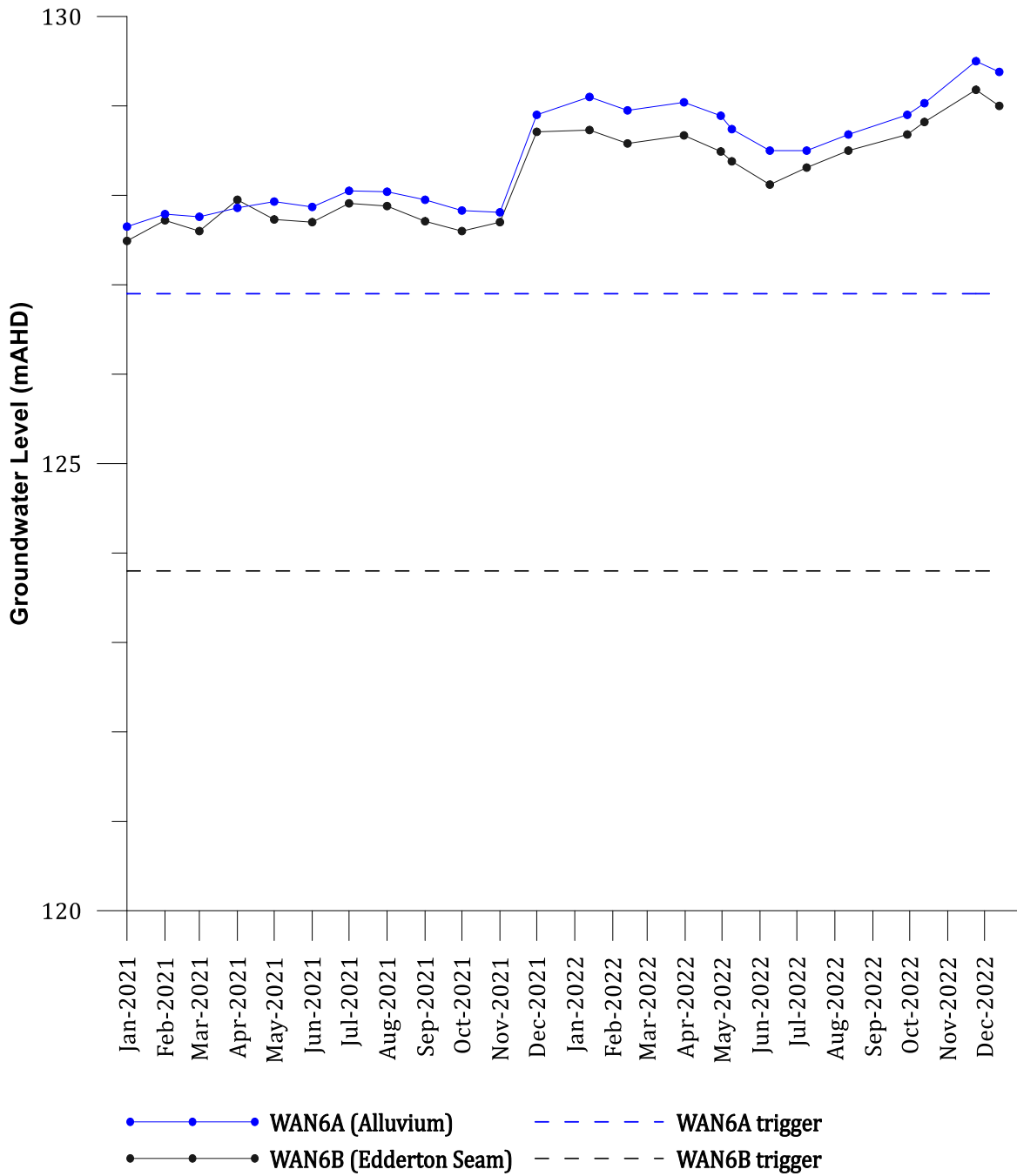


Figure 6.11 Alluvium and interburden hydrographs – WAN6

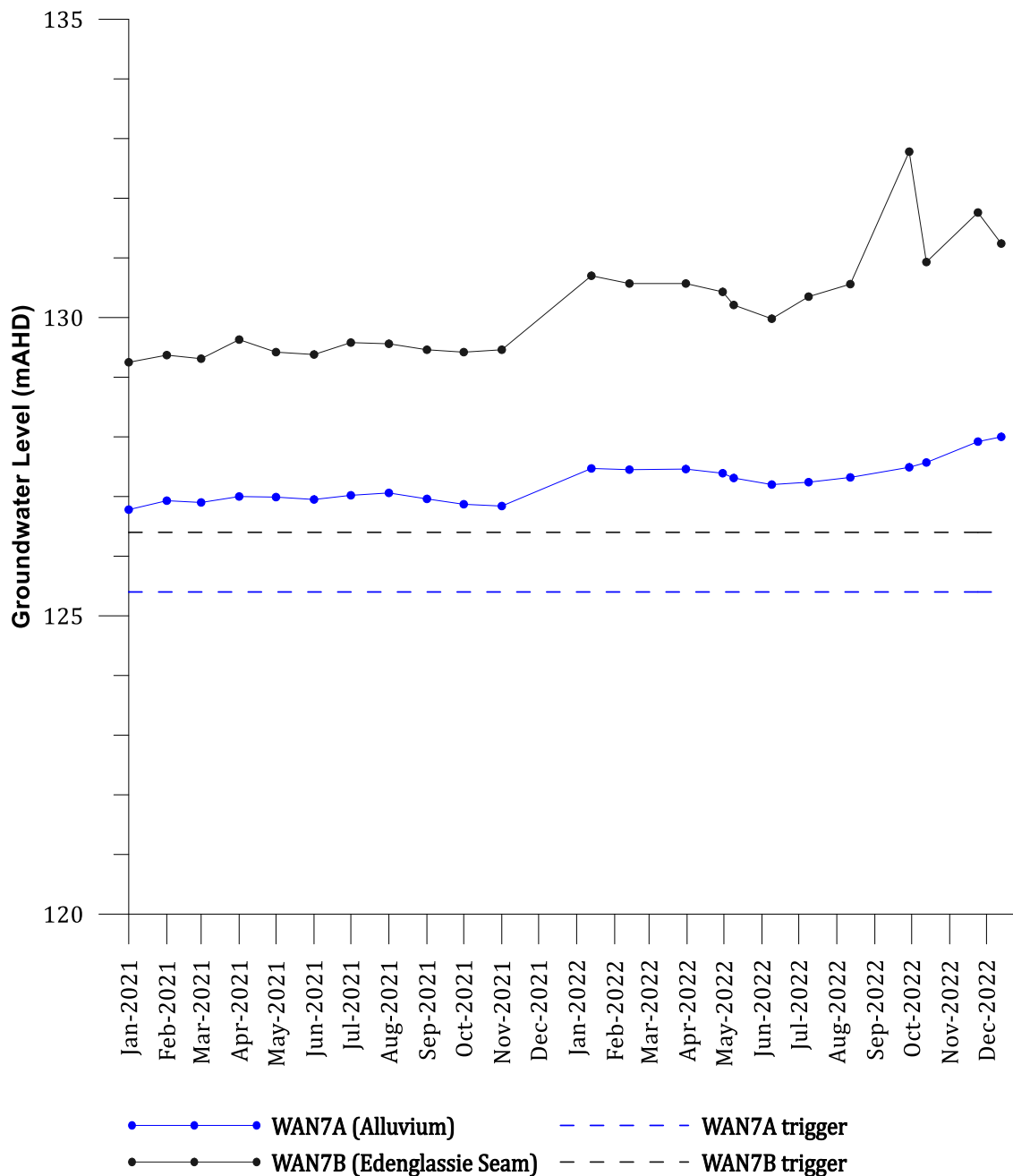


Figure 6.12 Alluvium and coal seam hydrographs – WAN7

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 117 mAHD for the alluvium and the Wynn seam, respectively. The alluvium is approximately 8 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 2022. WAN8 groundwater levels were above established triggers in 2022.

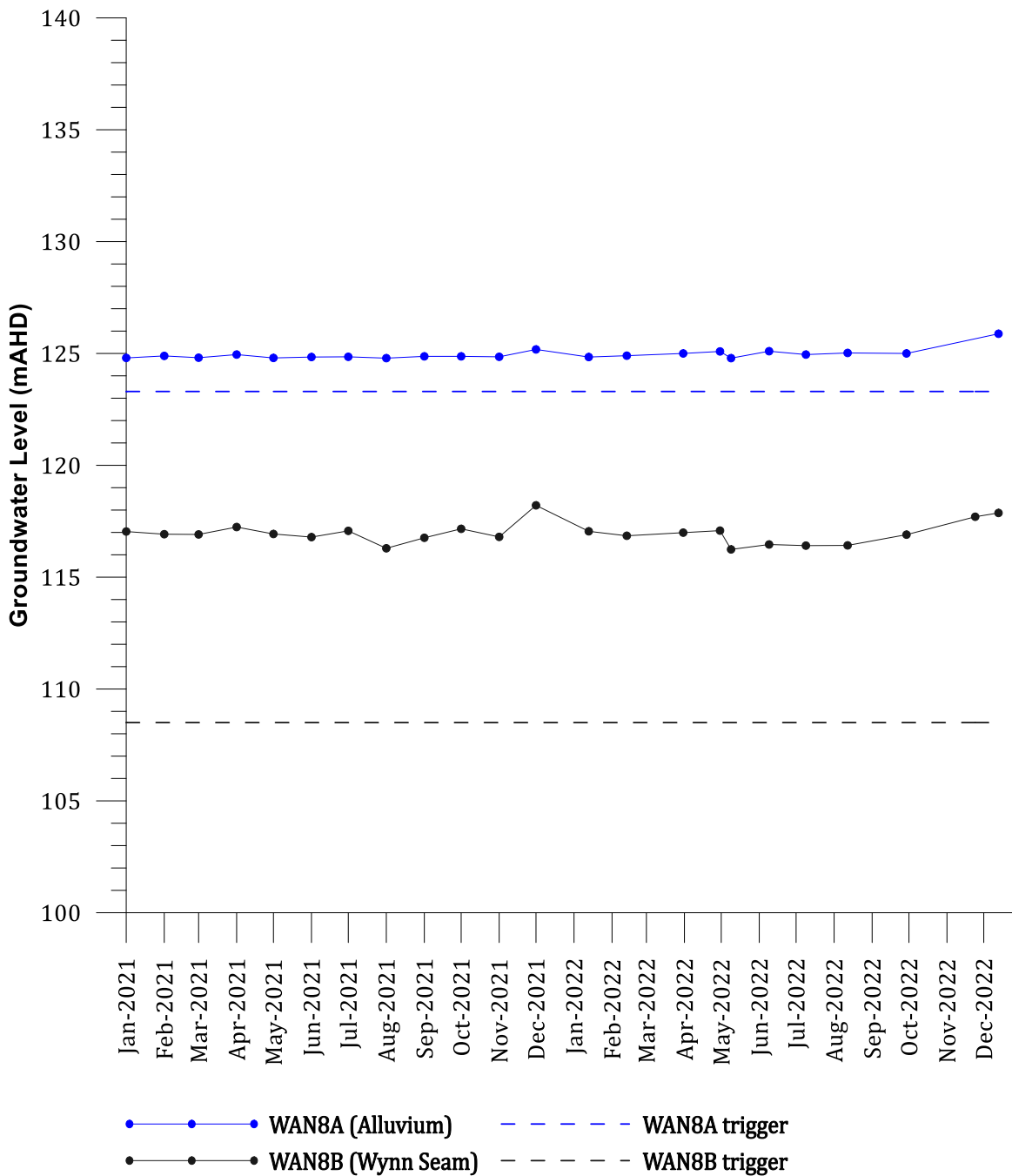


Figure 6.13 Alluvium and coal seam hydrographs – WAN8

Groundwater levels in WAN9A2 (refer Figure 6.14) increased during the monitoring period. The groundwater level in WAN9B was stable throughout 2022. The final recorded groundwater level at WAN9B in 2022 was 116.0 mAHD (December 2022), 1 m lower than the groundwater level recorded at this bore in January 2022. All WAN9 monitoring bores continued to remain above established trigger values.

WAN10 monitoring bores (Figure 6.15) remained above trigger values for 2022. WAN10B shows the groundwater level in the Vaux Seam increasing by 0.8 m during 2022, whilst WAN10A alluvial water levels remained stable. Since September 2012, the water level in the Vaux Seam (WAN10B) has been steadily declining. The head differential between the bores at WAN10 has now increased to approximately 18.4 m, indicating 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 to 109.62 mAHD by December 2022 (a change of 9.58 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. Access to WAN10 bores was impeded by rainfall in January 2022.

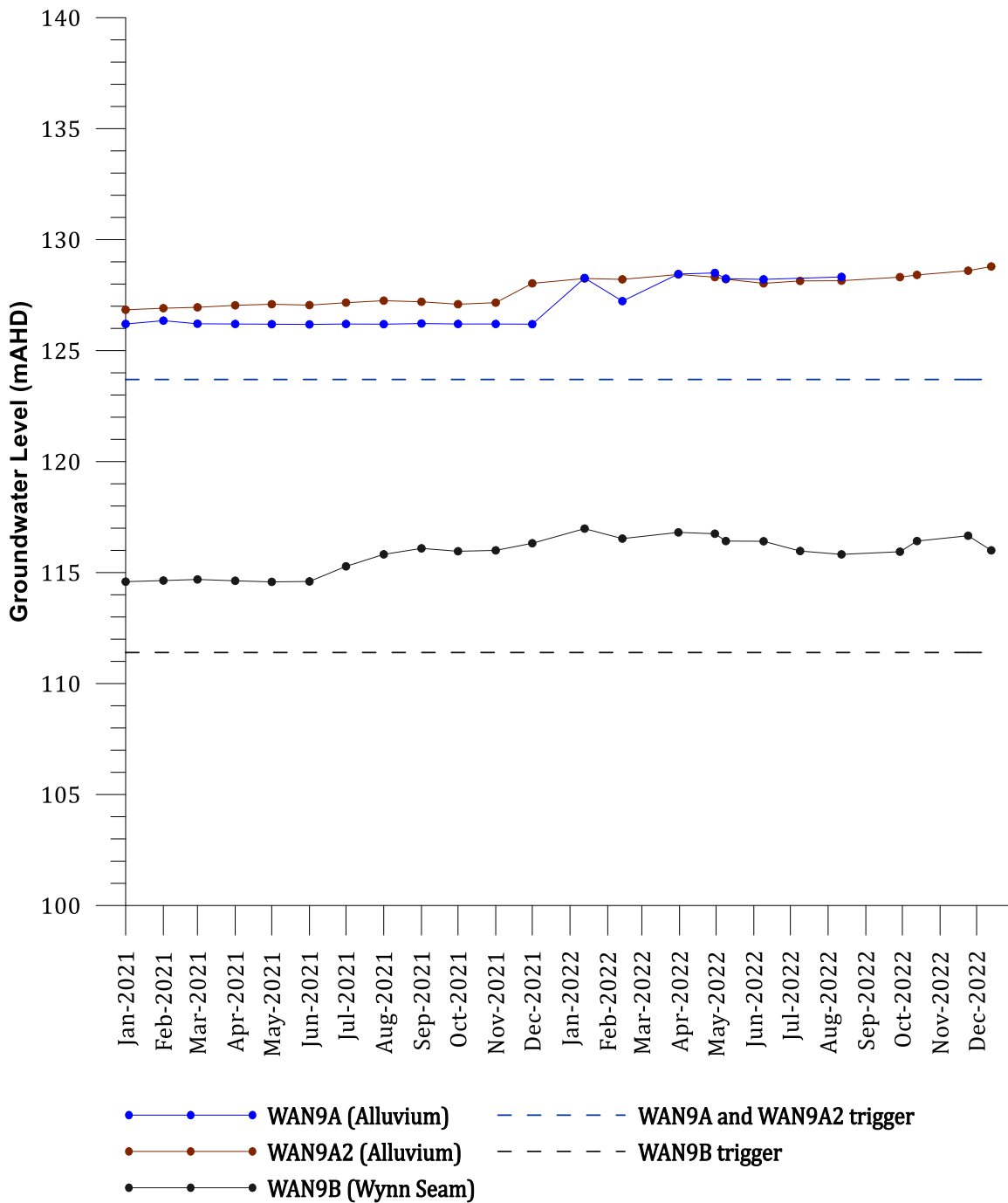


Figure 6.14 Alluvium and coal seam hydrographs – WAN9

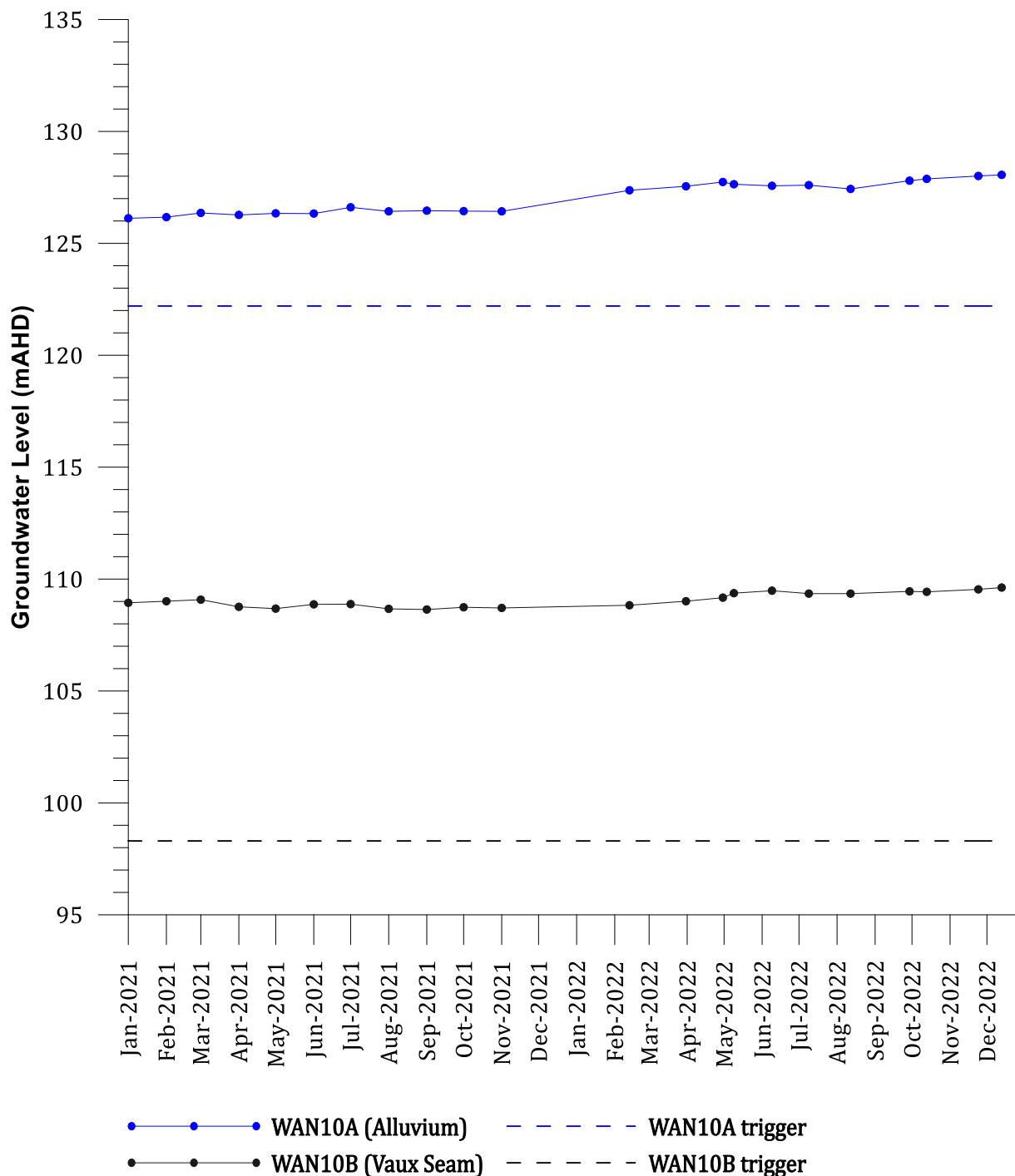


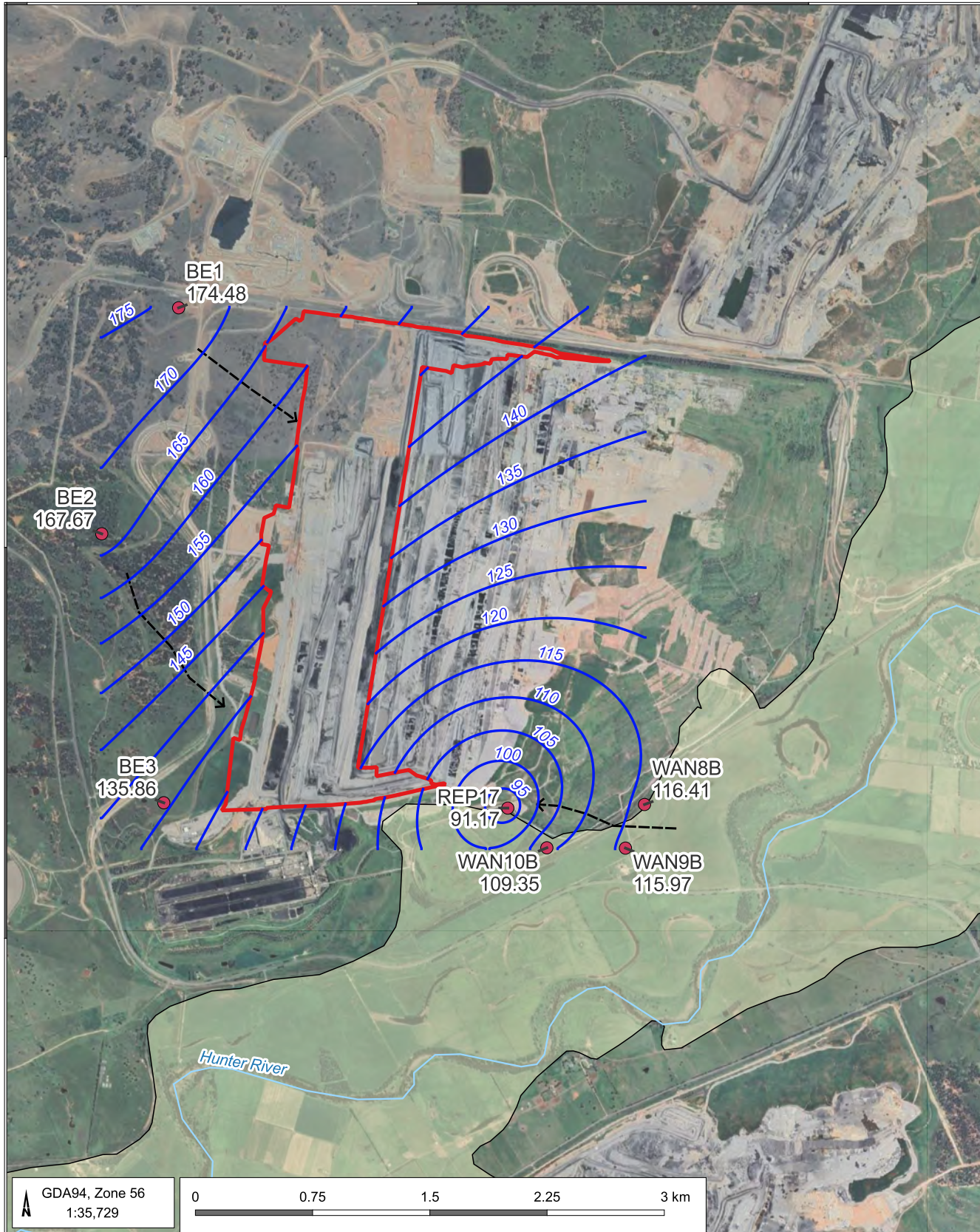
Figure 6.15 Alluvium and coal seam hydrographs – WAN10

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 2021, shallow Permian groundwater levels as monitored to the west (BE1, BE2, BE3) can be seen to be relatively stable (BE1, BE2) to slightly depressurised (BE3) 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 higher 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 bores
- Drainage
- Shallow permian groundwater contours (5m)
- Groundwater flow direction
- Alluvium boundary
- 2022 Void Boundary

NOTE:
 Aerial Image Capture Date : September 2021
 Source: BMC

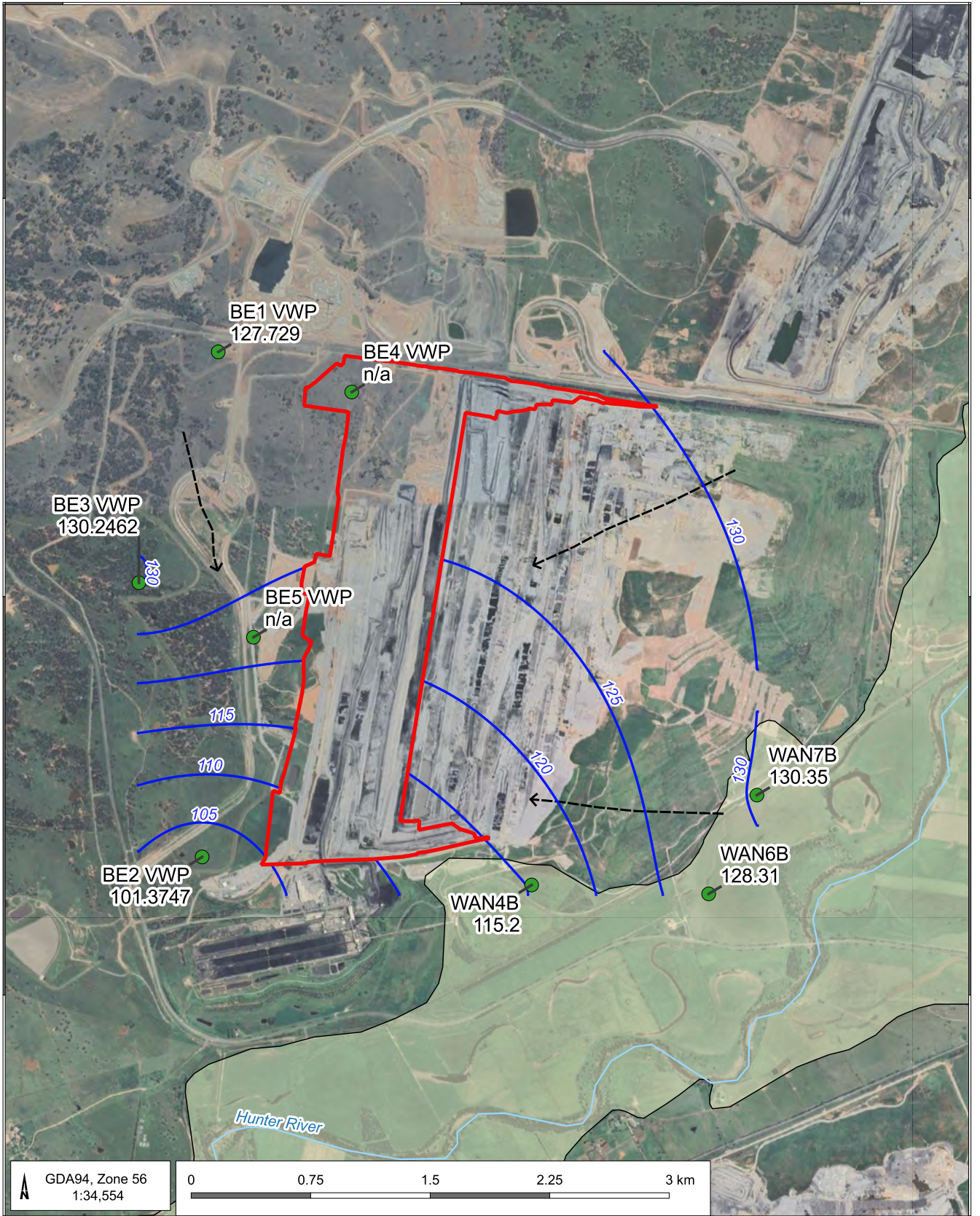
Bengalla annual review 2022 (BEN5009.001)

Shallow Permian groundwater levels (July 2022)



DATE
06/03/2023

FIGURE No:
6.16



LEGEND

- Deep Permian groundwater monitoring bores
- Drainage
- Deep Permian groundwater contours (5m)
- > Groundwater flow direction
- Alluvium boundary
- 2022 Void Boundary

NOTE:
 Aerial Image Capture Date : September 2021
 Source: BMC

Bengalla annual review 2022 (BEN5009.001)

Deep Permian groundwater levels (July 2022)



AGE

DATE
06/03/2023

FIGURE No:
6.17

6.3 Permian groundwater level – northwest of active mining

Figure 6.18 to Figure 6.23 below show the groundwater level hydrographs for those bores and VWPs 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 level in the monitoring bore sites to the northwest of the active mining area over 2022 (BE1, BE2 and BE3). Groundwater level in 46737 increased in response to enhance rainfall recharge. These bores are all above their relative water level triggers.

Figure 6.19 to Figure 6.23 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. BE4 was removed 27 October 2021 due to blasting operations. The water levels from monitoring bores BE1 through BE3 have also been plotted for comparison. Observations include:

- VWPs and bore at BE1 (Figure 6.19):
 - head pressure in both the Mt Arthur Seam and the Edderton Seam have continued trends from 2021, gradually declining throughout 2022.
- VWPs and bore at BE2 (Figure 6.20):
 - the Mt Arthur Seam VWP sensor registered a gradual rate of decline throughout 2022
 - the head in the Edderton Seam VWP is declining at a greater rate than that of the Mt Arthur Seam VWP.
- VWPs and bore at BE3 (Figure 6.21):
 - the Mt Arthur Seam VWP sensor recorded an overall decrease in 2022;
 - the Edderton Seam VWP recorded a stable pressure head in 2022. Overall pressure head is expected to decline in this seam as the pit approaches.
- VWPs at BE4 (Figure 6.22):
 - BE4 was removed in October 2021 due to blasting operations. It is recommended that a replacement VWP be installed to continue monitoring in the area.
- VWPs at BE5 (Figure 6.23):
 - Mt Arthur VWP sensor recorded a decline in pressure head in 2022. A sudden decline in pressure head was recorded in March 2021 in the Edderton Seam.
 - Erroneous data has been recorded in sensor one since September 2021. To continue monitoring pressure head in the Edderton seam a replacement VWP installation should be installed.

The declining water levels are most likely attributable to the advancing mine and coal seams are expected to depressurise ahead of the mine highwall.

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, as they are more permeable than 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.

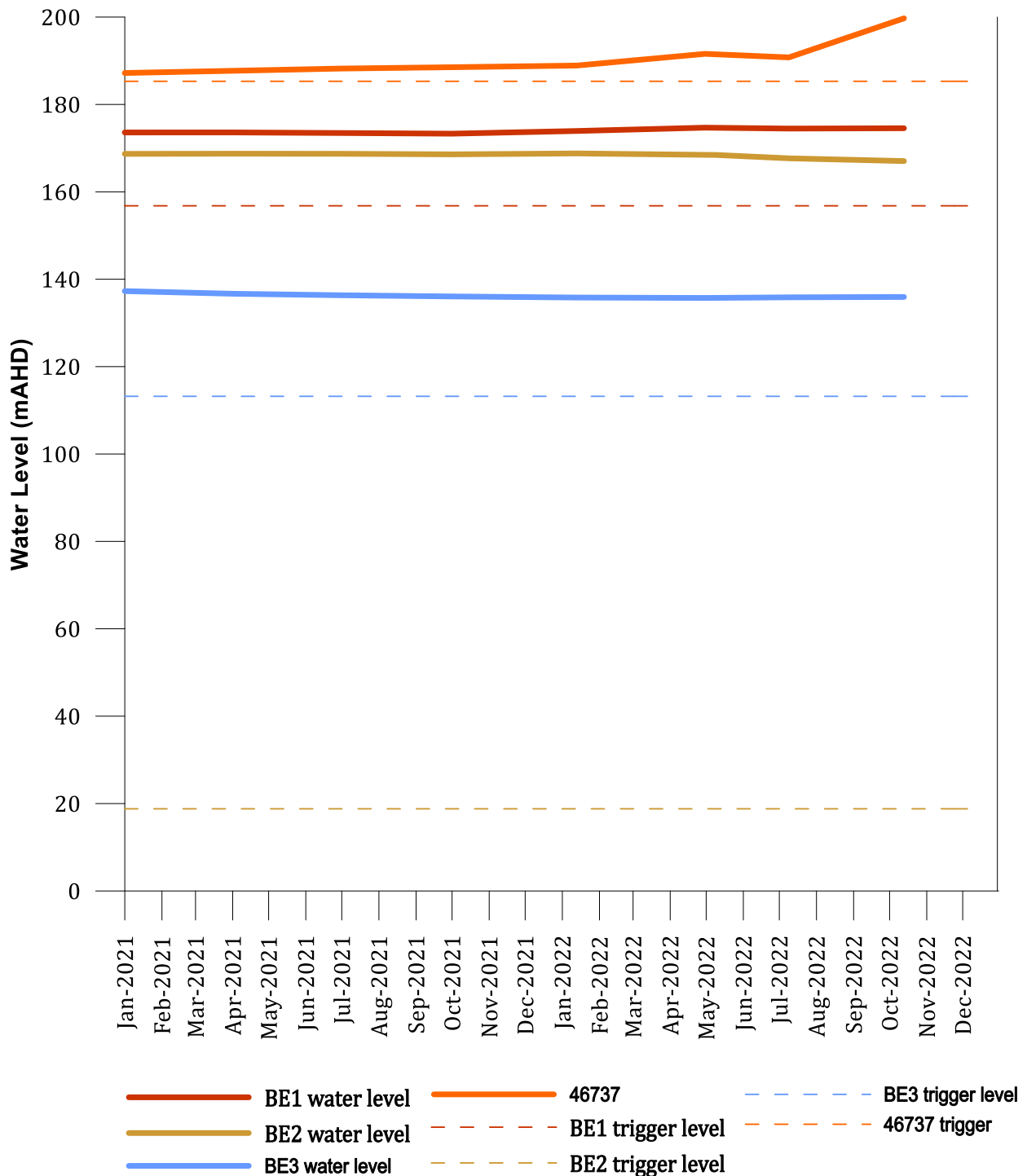


Figure 6.18 Northwest Permian monitoring bore groundwater levels

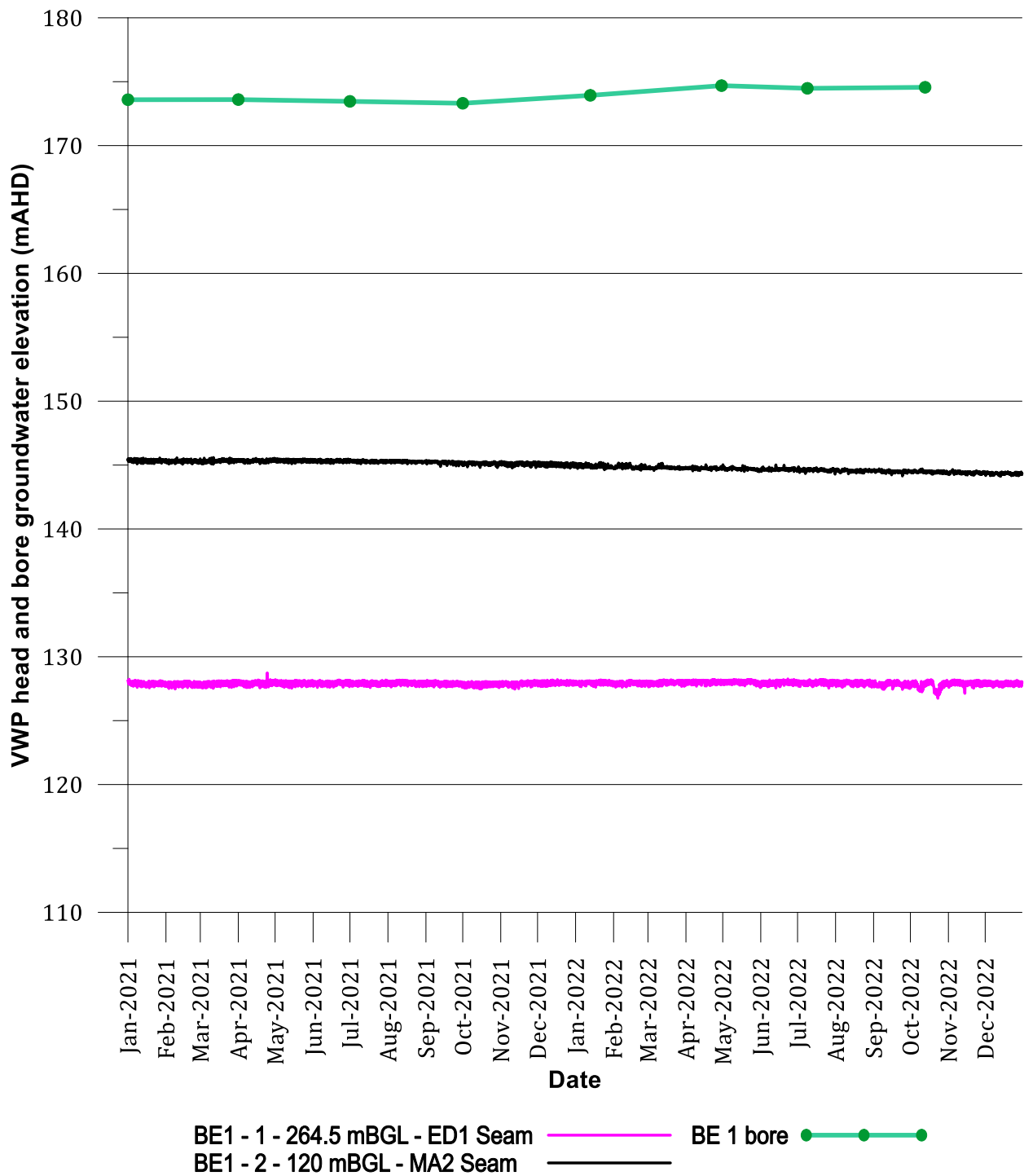


Figure 6.19 Northwest Permian VWP potentiometric heads – BE1

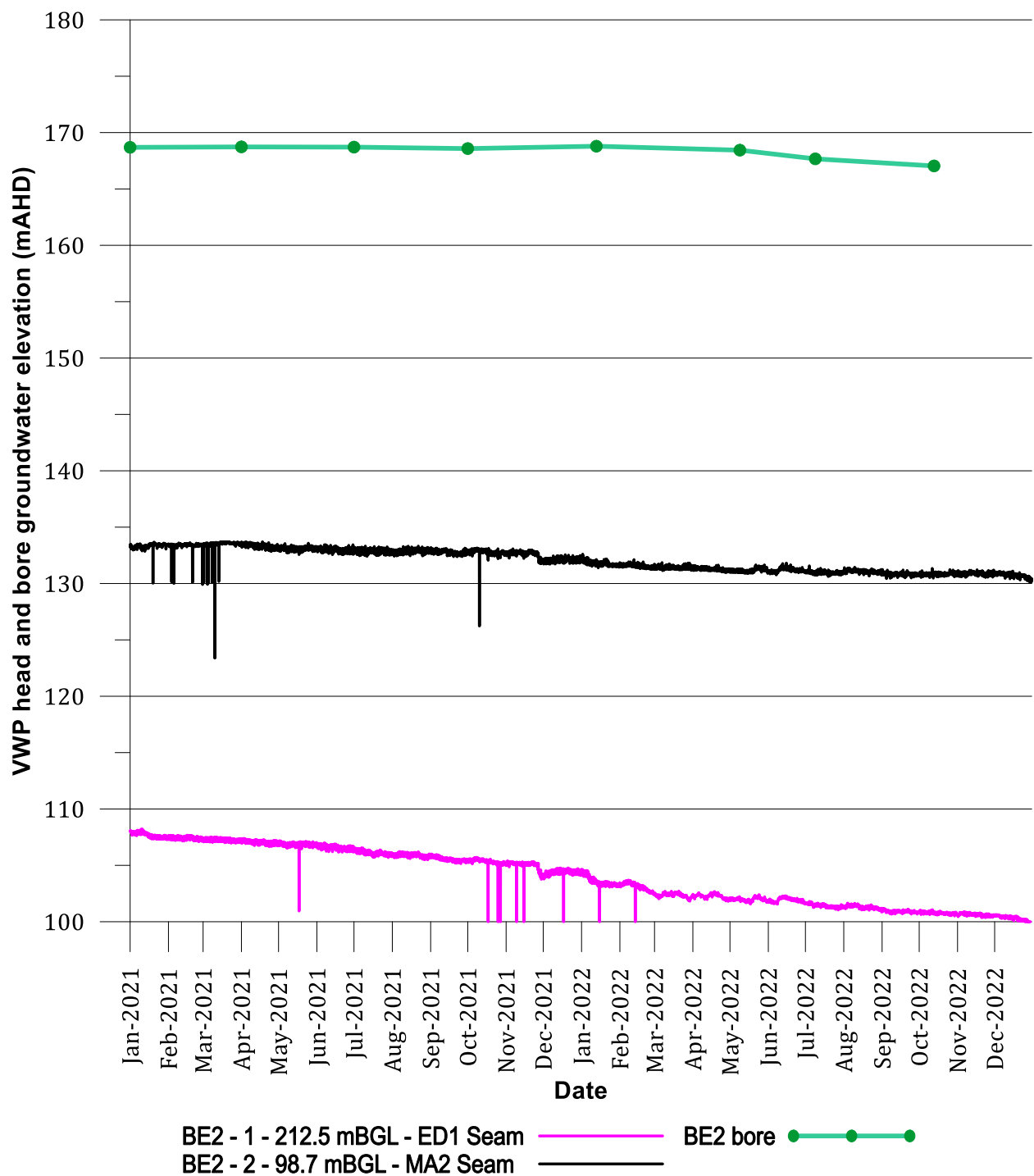


Figure 6.20 Northwest Permian VWP potentiometric heads – BE2

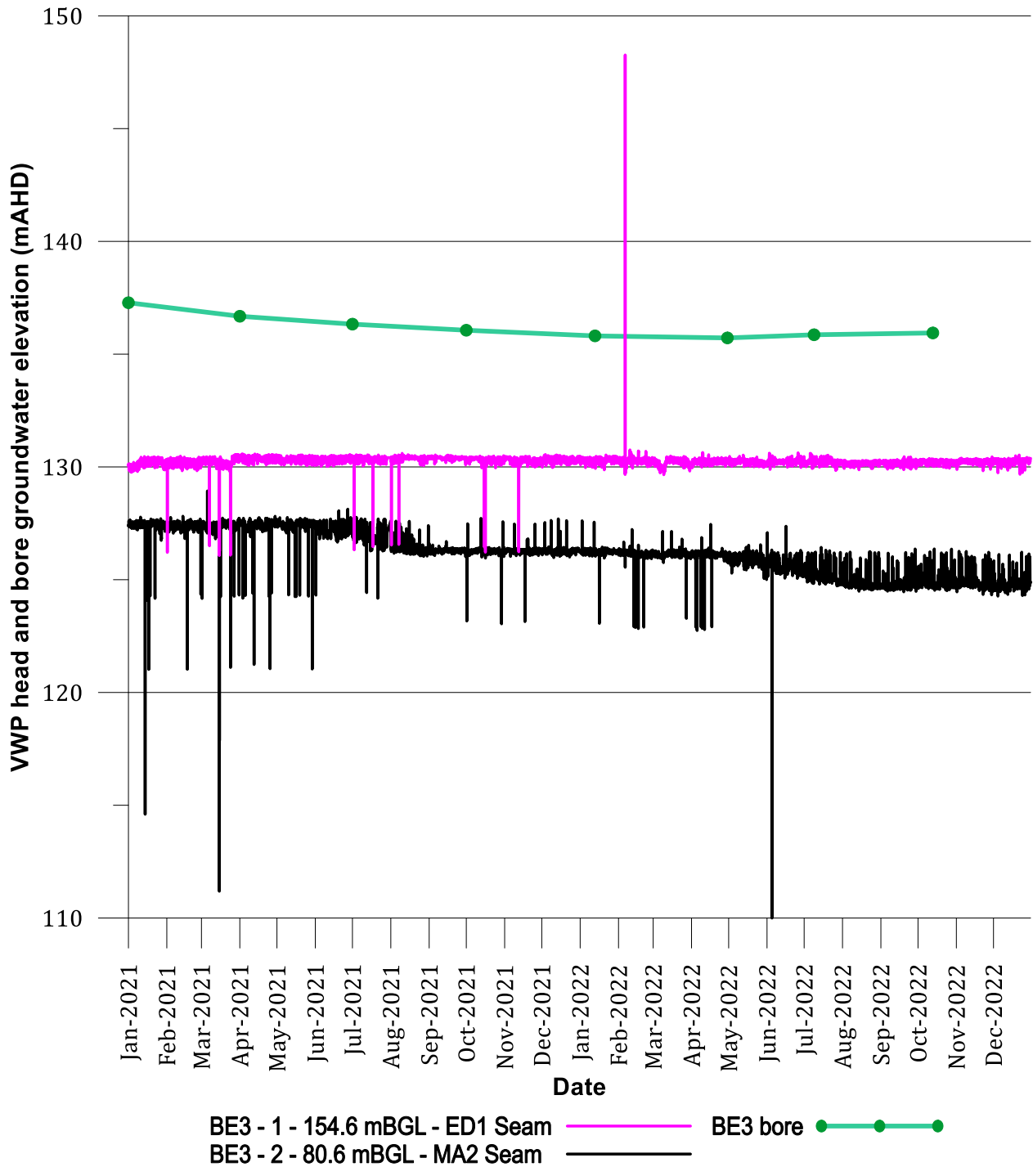


Figure 6.21 Northwest Permian VWP potentiometric heads – BE3

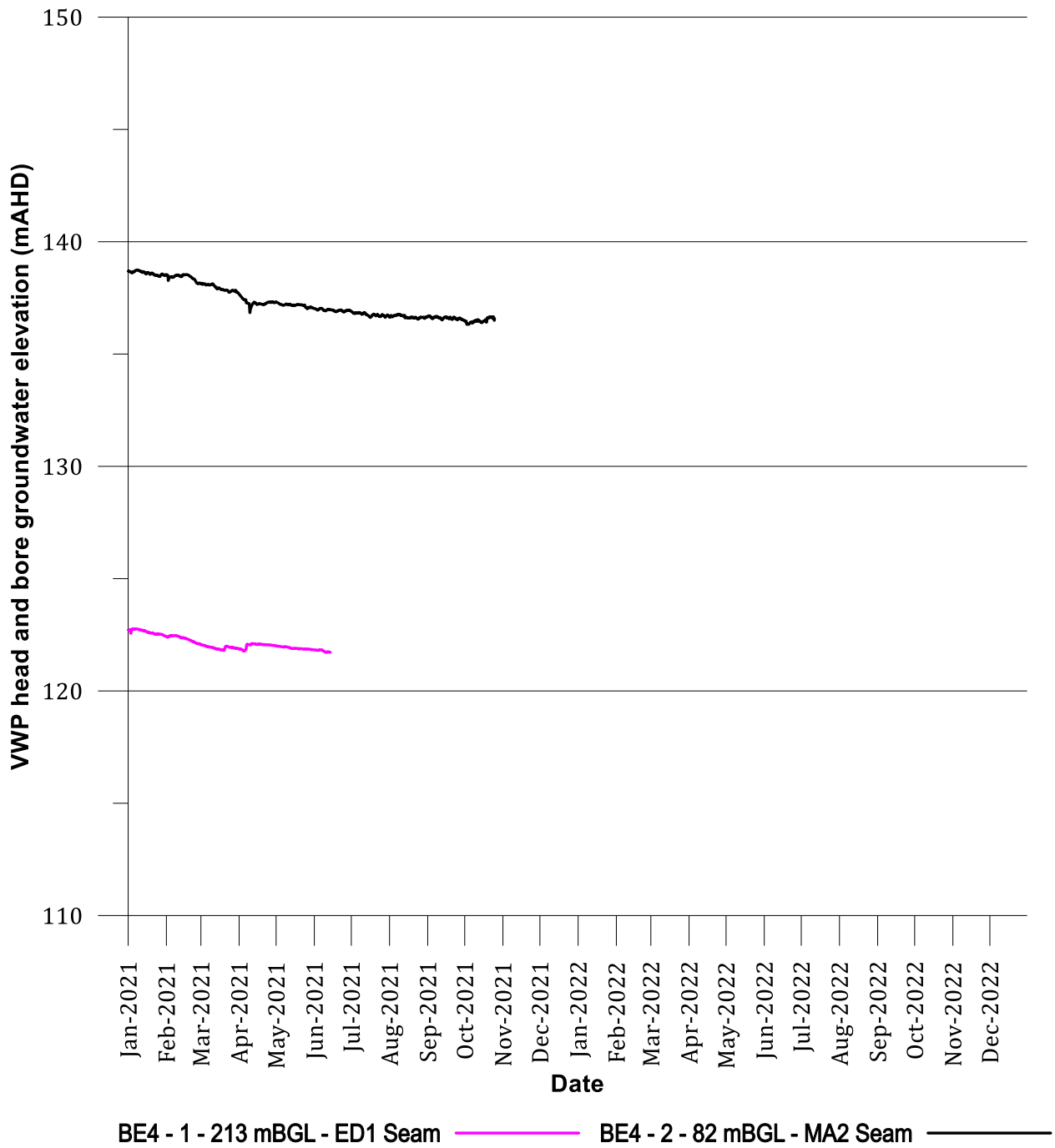


Figure 6.22 Northwest Permian VWP potentiometric heads – BE4

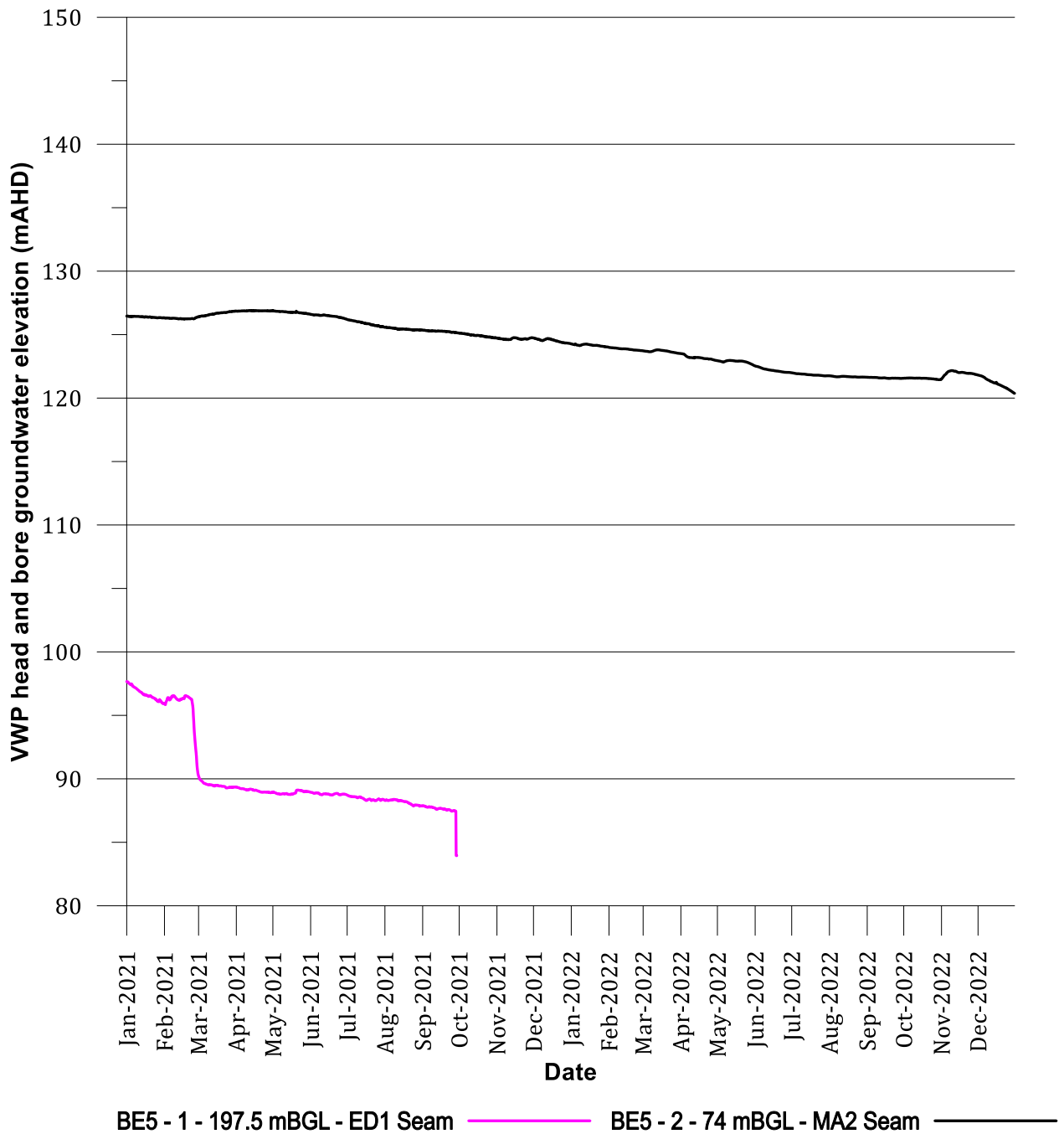


Figure 6.23 Northwest Permian VWP potentiometric heads – BE5

6.4 Groundwater level assessment against baseline data

Groundwater level data recorded over the 2022 reporting period has been compared against baseline data. Maximum predicted drawdown (trigger level) data is also reviewed, as set out in the Bengalla WMP (February 2019). 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 2022 reporting period and the baseline data for each monitoring bore.

During the 2022 reporting period, monitoring bores 47277, BE2, BE3, REP17, WAN10B, WAN2C, WAN4B, WAN8B and WAN9B had groundwater levels below their respective baseline water levels, see Appendix A – column 'Difference baseline vs. 2022 groundwater level'. Of the bores with groundwater levels below their respective baselines; BE3, REP17, WAN10B, WAN2B, WAN4B and WAN9B had groundwater levels of more than one metre below their respective baseline water level, due to drawdown from the mine. Monitoring bore REPI7 showed the greatest negative difference (-10.97 m) compared to its baseline, whereas 46737 showed the greatest positive difference (13.66 m).

6.4.2 Trigger level assessment

Groundwater trigger levels have been developed based on the maximum drawdown 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 last measured groundwater level for the 2022 reporting period and the trigger level for each monitoring bore. There were no bores with a groundwater level below the maximum expected drawdown in 2022.

Water level triggers are considered to have triggered a response when:

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

Groundwater elevation in bore BG3 no longer exceeded its trigger level in 2022, following four consecutive quarterly exceedances in 2021. The groundwater level for bore BG5 has also fluctuated around its trigger level and had water level trigger exceedances in 2018 (Figure 6.24). However, there were no exceedances for this bore in 2022. Similarly, bore 18298 is encroaching on the established trigger value but did not exceed this value in 2022.

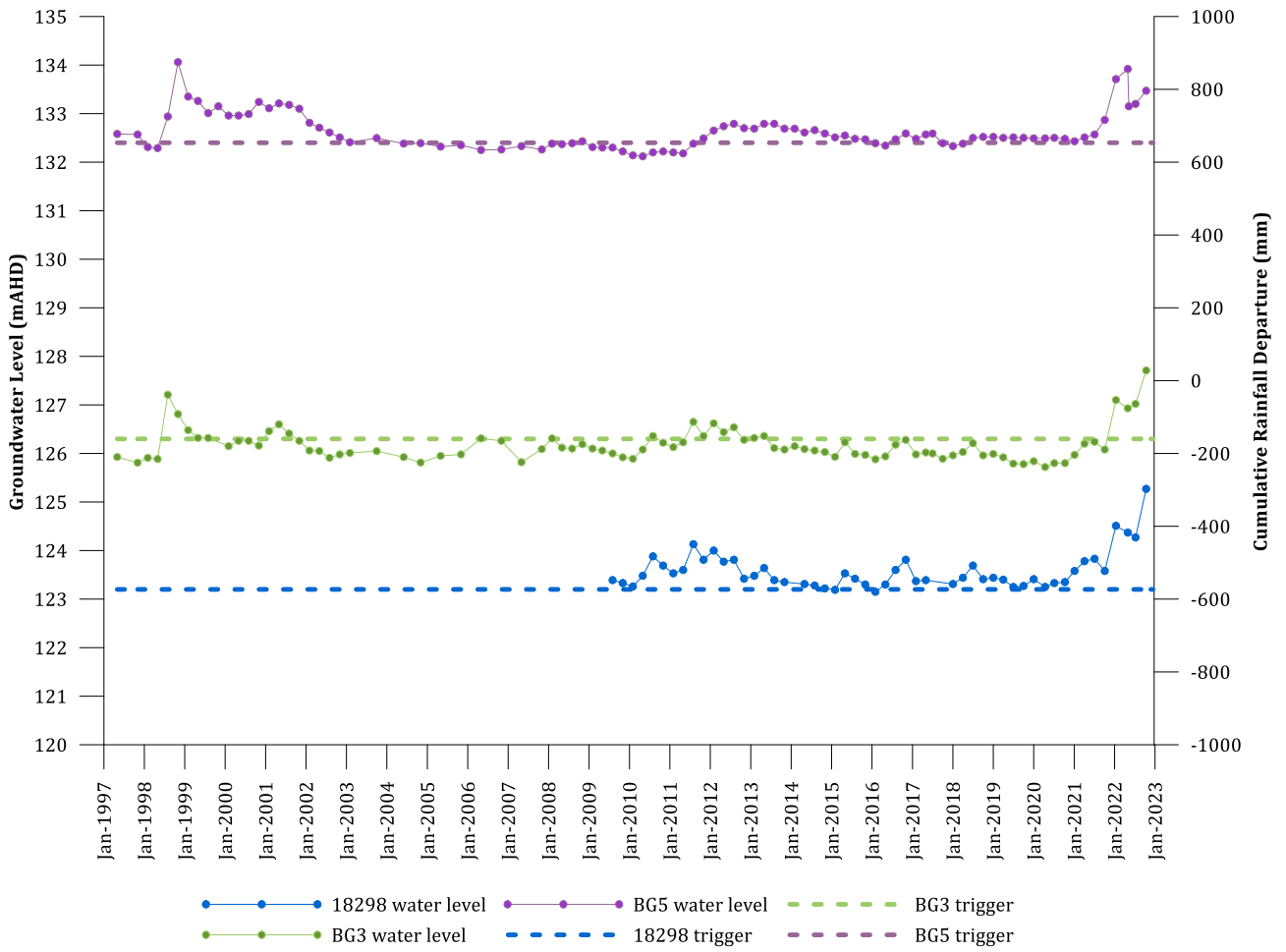


Figure 6.24 Hydrograph of bores with groundwater levels near maximum predicted drawdown

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. SMB1 and SMB2 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 2022 with some minor fluctuations evident.

Groundwater pH in WAN8A remained anomalously high. The bore has historically contained insufficient water to sample. Excepting December 2022, there was less than 0.6 m of water in the bore for both pH readings from WAN8A, 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. The high pH values at this site do not pose an environmental risk.

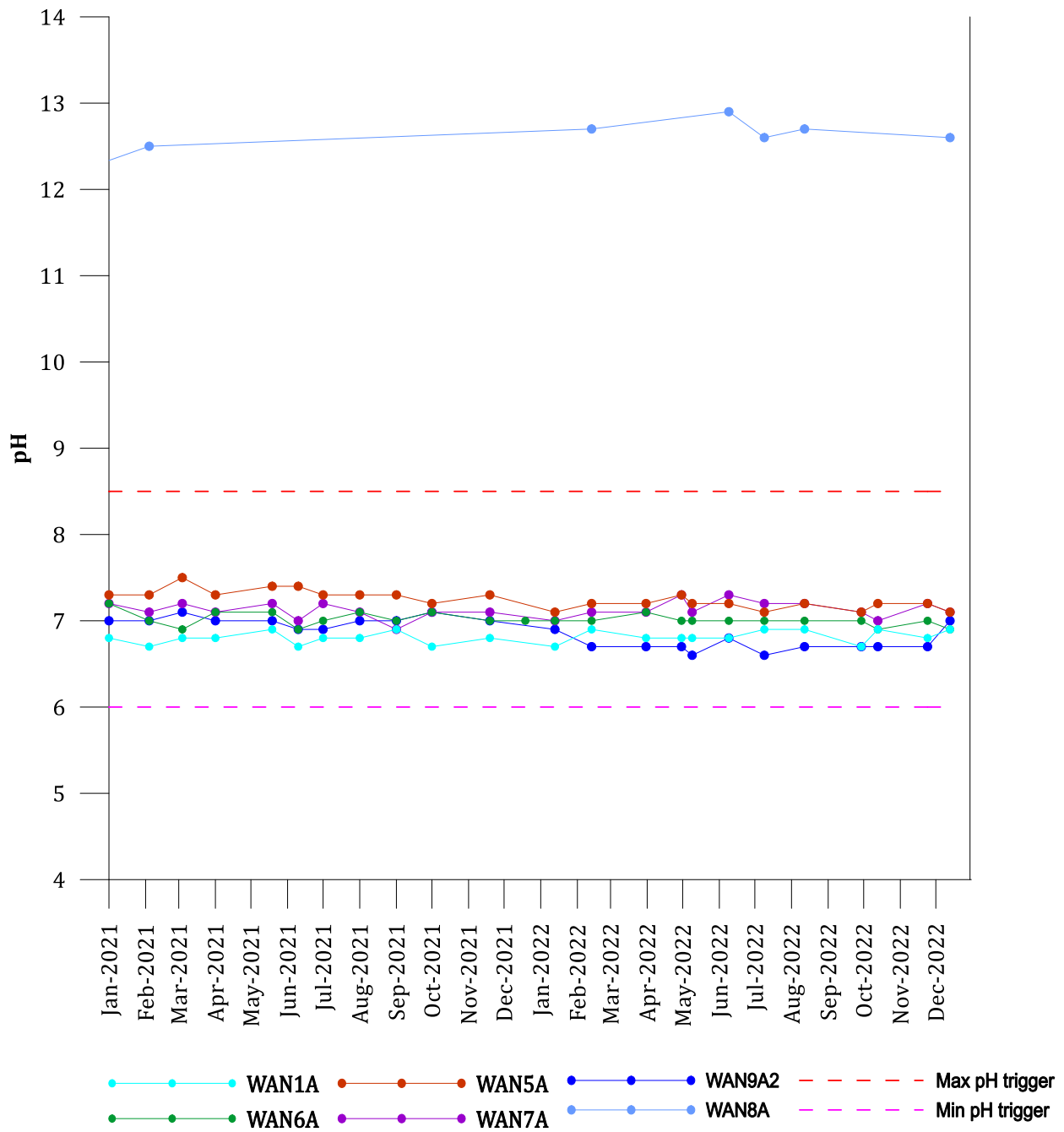


Figure 7.1 pH trends – Hunter River alluvial bores

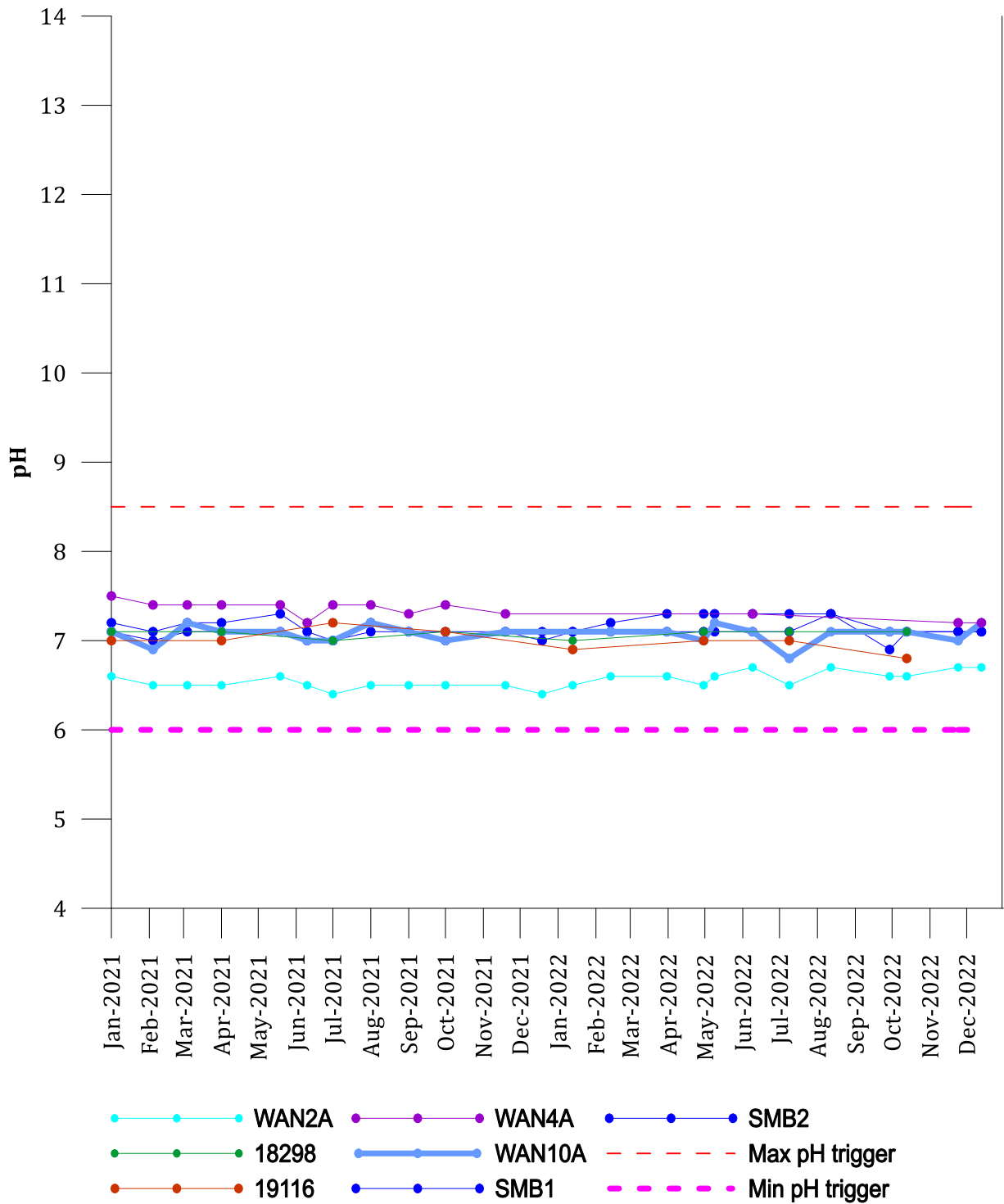


Figure 7.2 pH trends – other alluvial bores

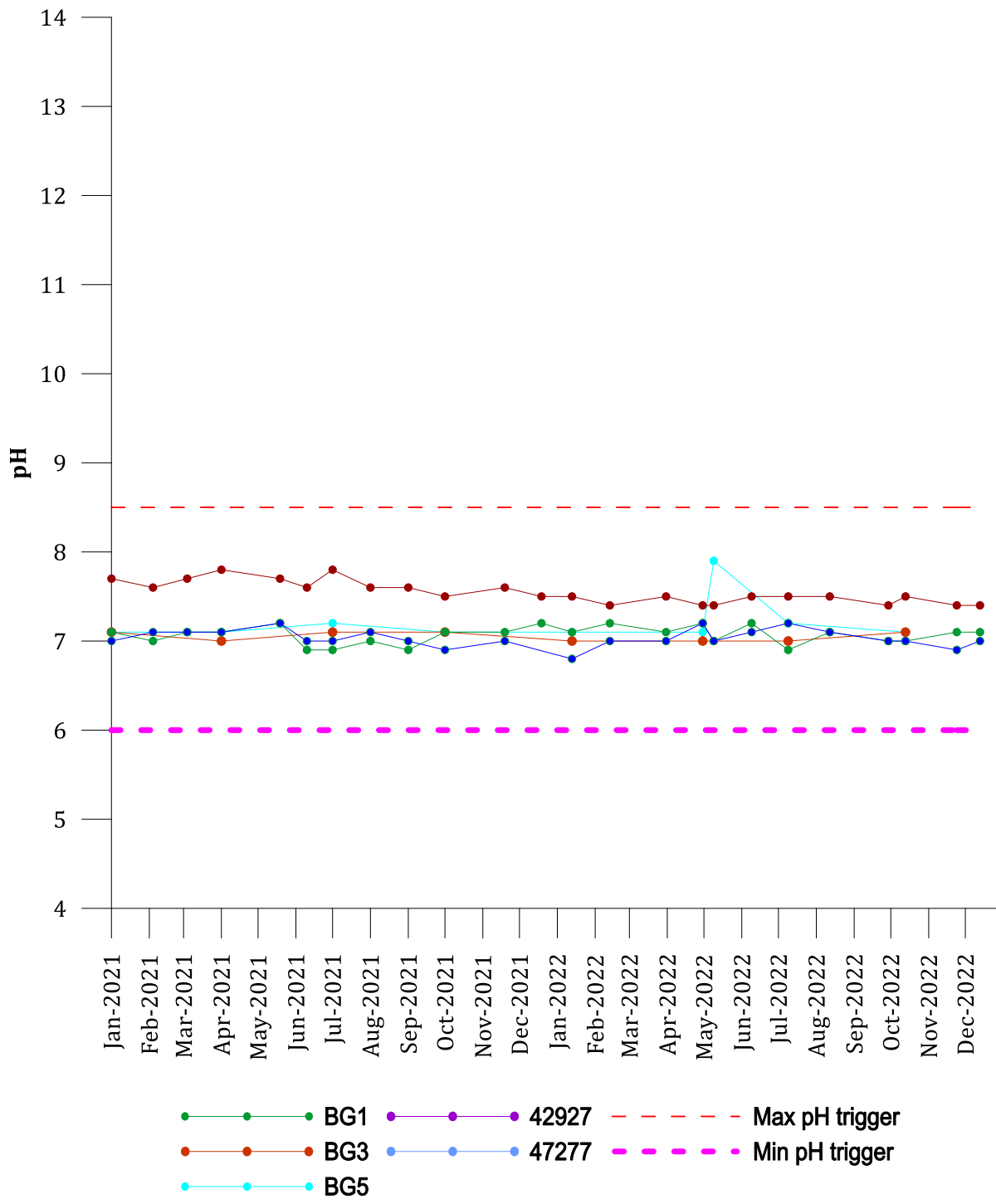


Figure 7.3 pH trends – regional alluvial bores

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. Four bores are shown to have EC exceeding 1,500 $\mu\text{S}/\text{cm}$, including:

- WAN7A;
- WAN8A;
- SMB1; and
- SMB2.

Water quality trigger events in 2022 are described in Section 7.5.

WAN4A has been recording a gentle decline in EC since early 2015 with the last recorded value 1,164 $\mu\text{S}/\text{cm}$ (December 2022). WAN4A is on a “spur” of alluvium to the south of Bengalla’s southern endwall. The coal seams in this area have 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. 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 2022 continue to be elevated, likely 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.

Throughout 2022, monitoring bores WAN7A, SMB1 and SMB2 presented EC values between 1,500 $\mu\text{S}/\text{cm}$ and 2,500 $\mu\text{S}/\text{cm}$. Although these results are above 1,500 $\mu\text{S}/\text{cm}$, these bores have generally remained consistent throughout 2022 and are comparable to historical values (Figure 7.4). Monitoring bore WAN10A recorded anomalously high EC values above 1,422 $\mu\text{S}/\text{cm}$ from November 2021 to June 2022, however all other values ranged between 820 $\mu\text{S}/\text{cm}$ and 1,045 $\mu\text{S}/\text{cm}$, consistent with historic values. No values were recorded for December 2021 and January 2022 as the access to site was flooded.

Regional monitoring bore BG3 is situated along strike to seams currently being mined at Bengalla (and north of Mt Arthur where the same geological profile is mined), and has historically shown significant variation in EC, following a generally decreasing trend since 2015. EC values have slightly increased in 2022, recording an average EC of 813 $\mu\text{S}/\text{cm}$ in 2021 and an average of 1017 $\mu\text{S}/\text{cm}$ in 2022 (Figure 7.5).

EC values in alluvial bores generally remained stable between 2021 and 2022, with fluctuations coincident with increased rainfall over 2022. It does not appear that there are mine related impacts on groundwater EC within these bores.

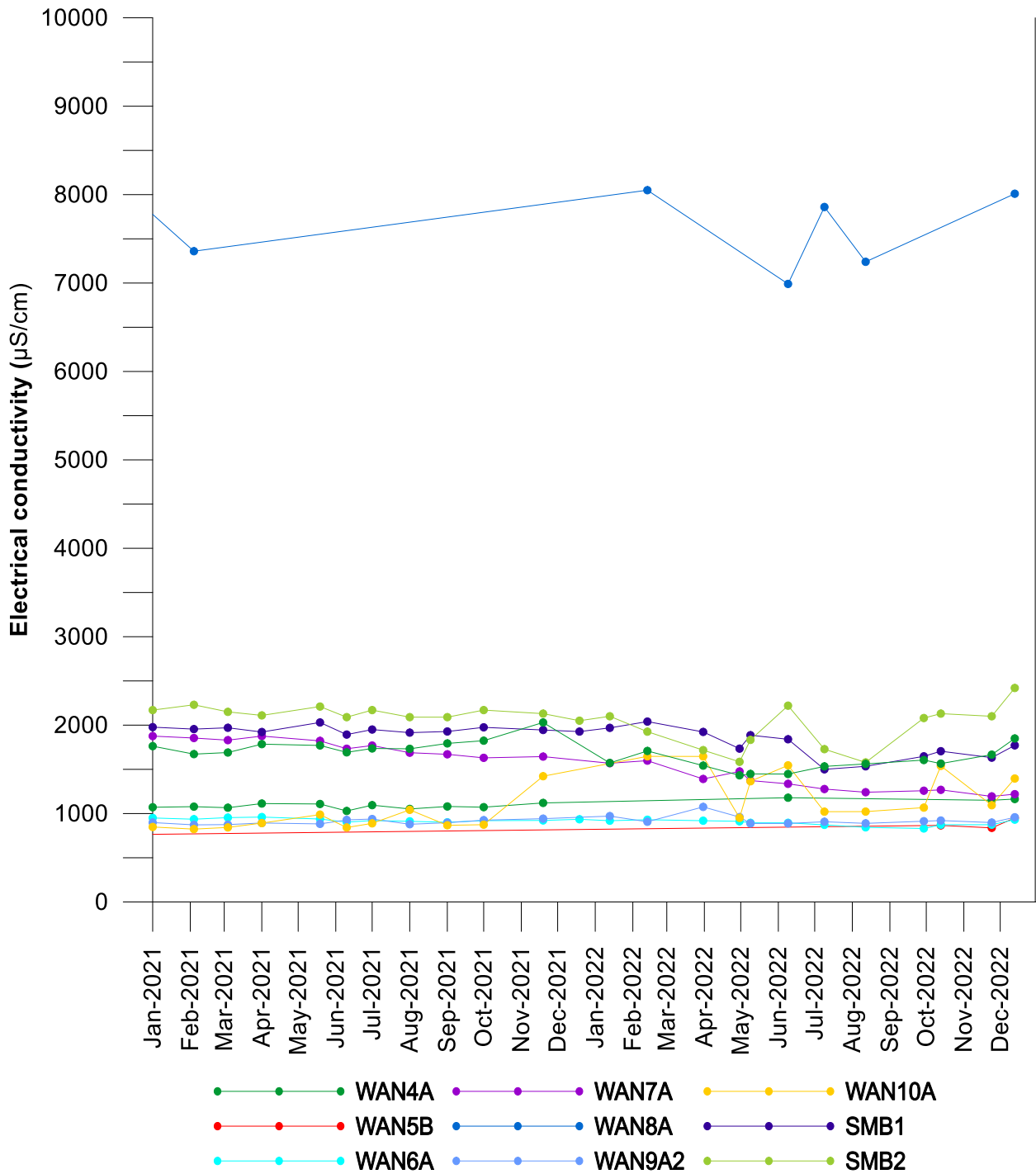


Figure 7.4 EC trends – Hunter River Alluvium (Wantana Extension)

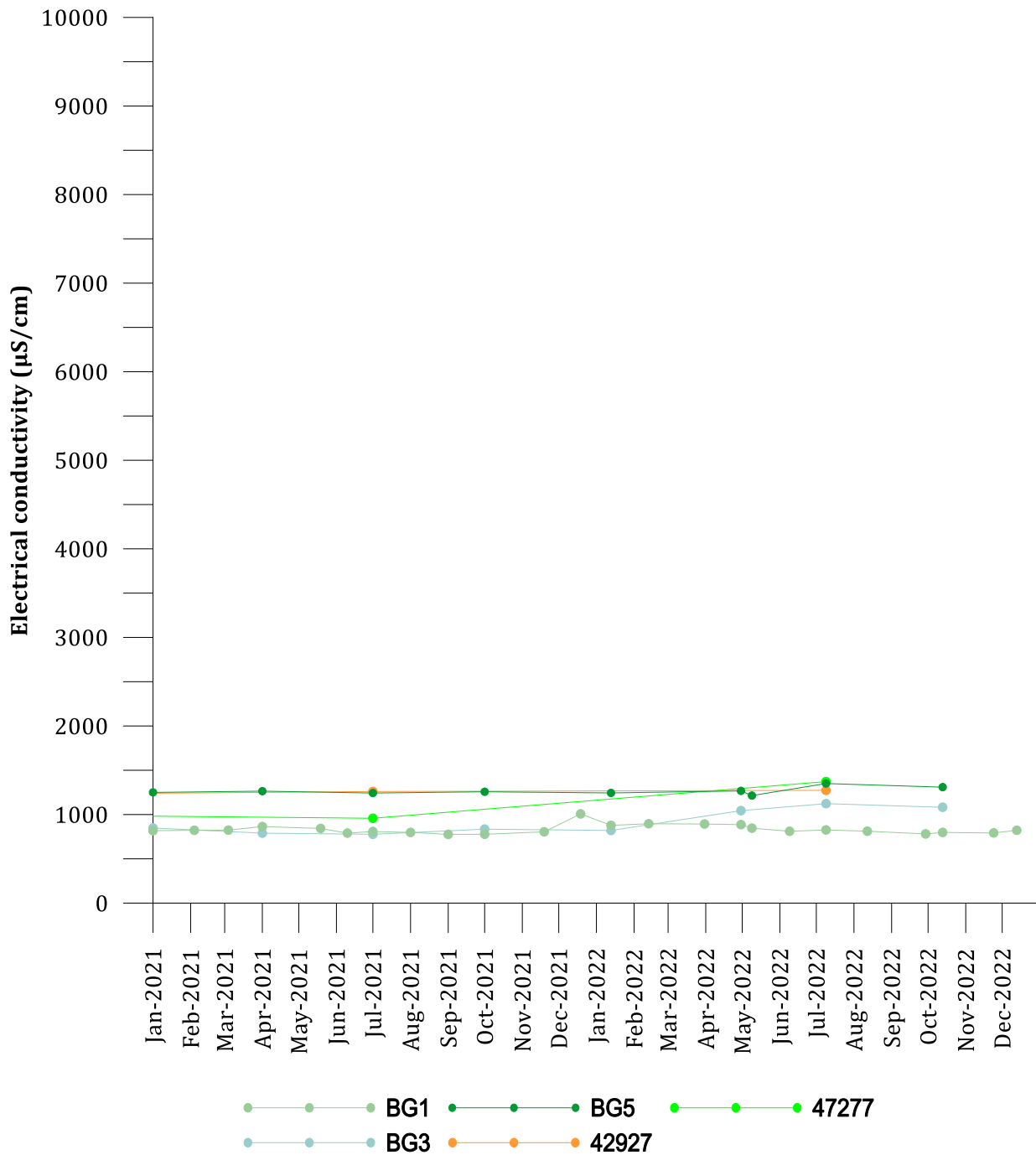


Figure 7.5 EC trends – Hunter River Alluvium (Regional)

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 2022. No coal seam/interburden bores have exceeded pH trigger values throughout 2022.

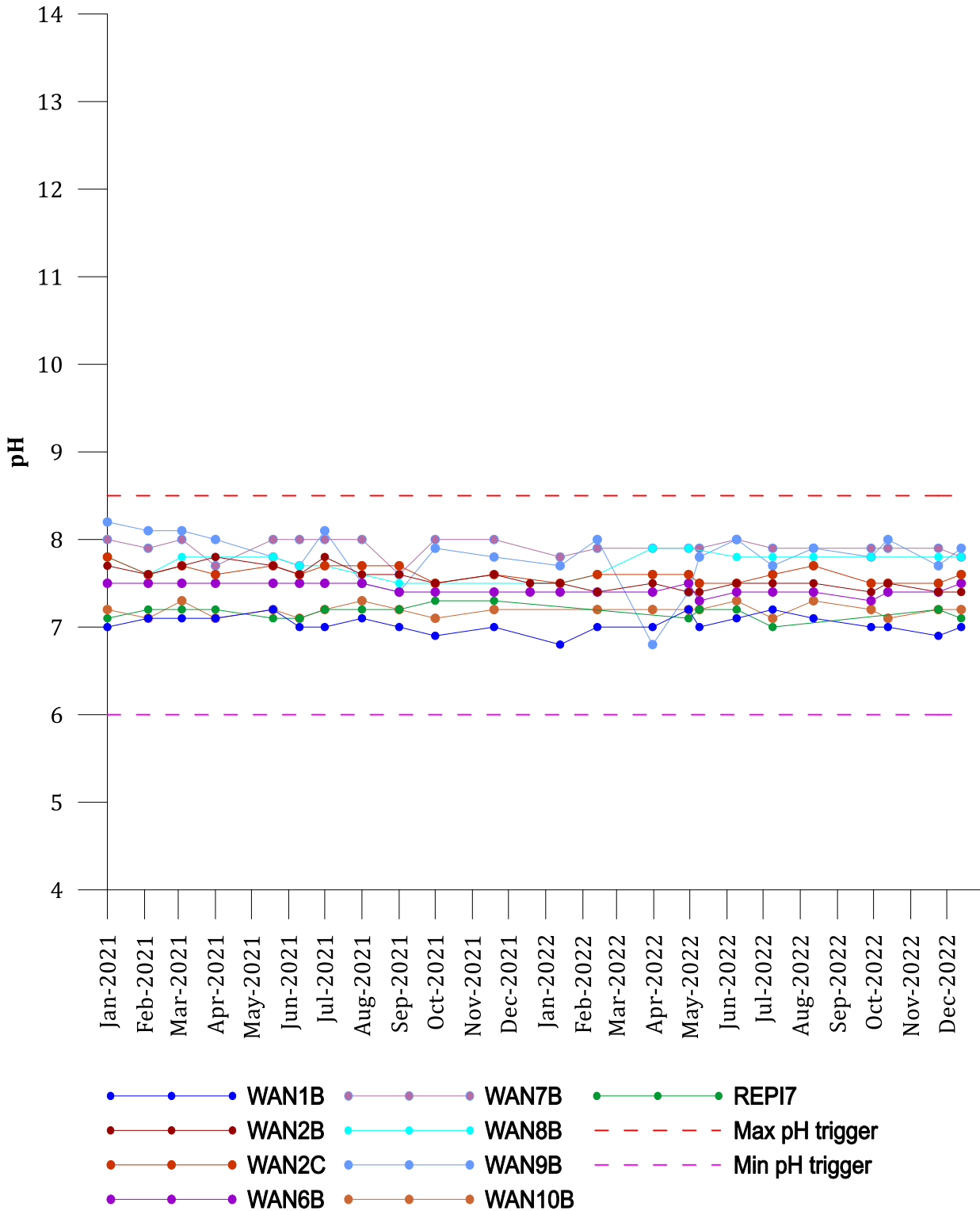


Figure 7.6 pH trends – coal seam aquifers

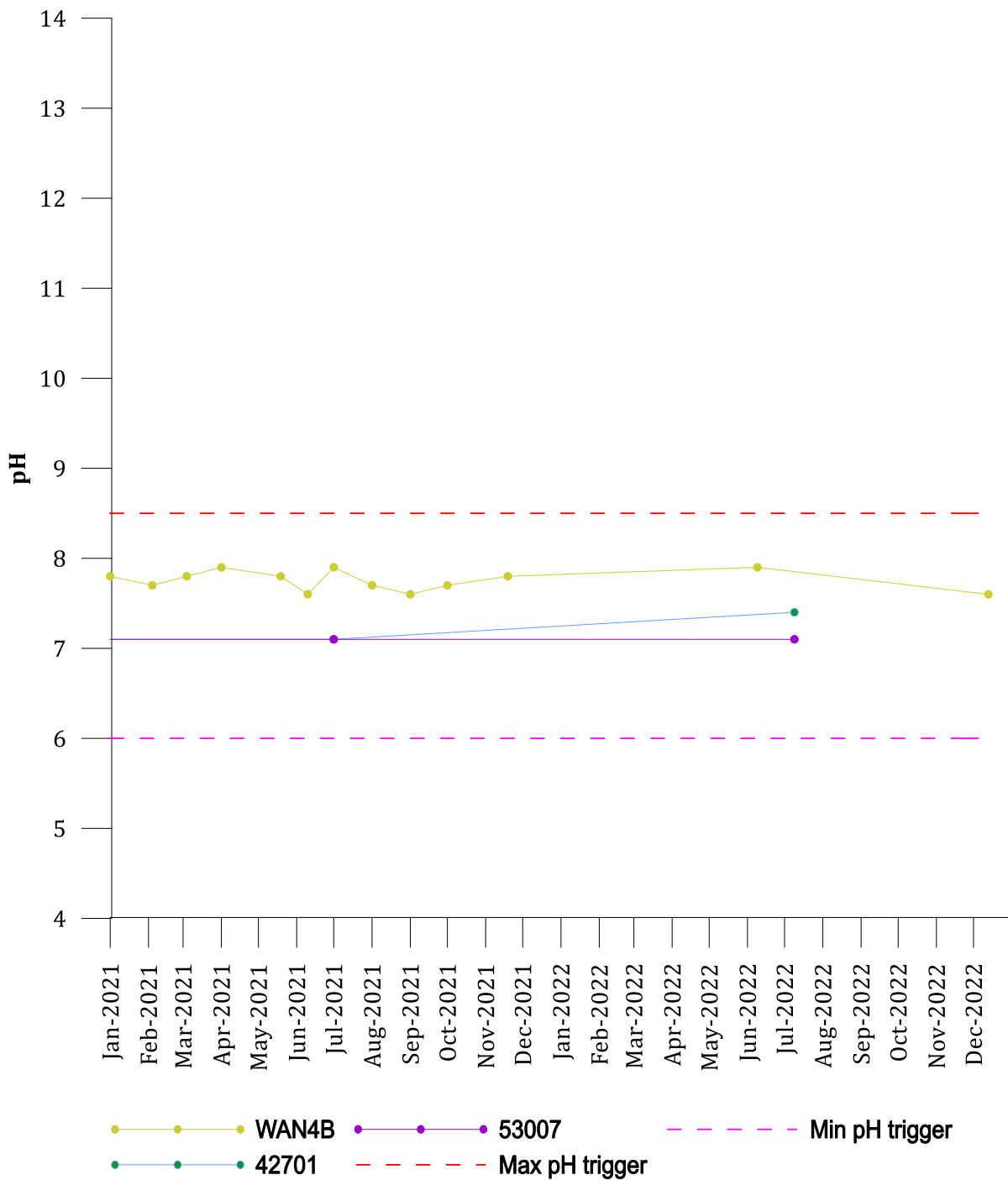


Figure 7.7 pH trends – coal seam aquifers (Wantana Area)

7.3.2 EC

Figure 7.8 and Figure 7.9 show EC trends for coal seam units and interburden bores in the Wantana area and regional monitoring bores, respectively. Water quality trigger events in 2022 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, WAN6B, and REP17 (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 WAN2A, WAN2B, WAN2C, WAN4B, WAN7B and WAN8B; and
- bores that have EC measurements between 3,000 $\mu\text{S}/\text{cm}$ and 9,000 $\mu\text{S}/\text{cm}$, including WAN5B, WAN9B 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 seven coal seam monitoring bores exceeded their derived triggers in 2022 (Table 7.1):

- REP17;
- WAN1B;
- WAN2A;
- WAN2C;
- WAN6B;
- WAN8B; and
- WAN10.

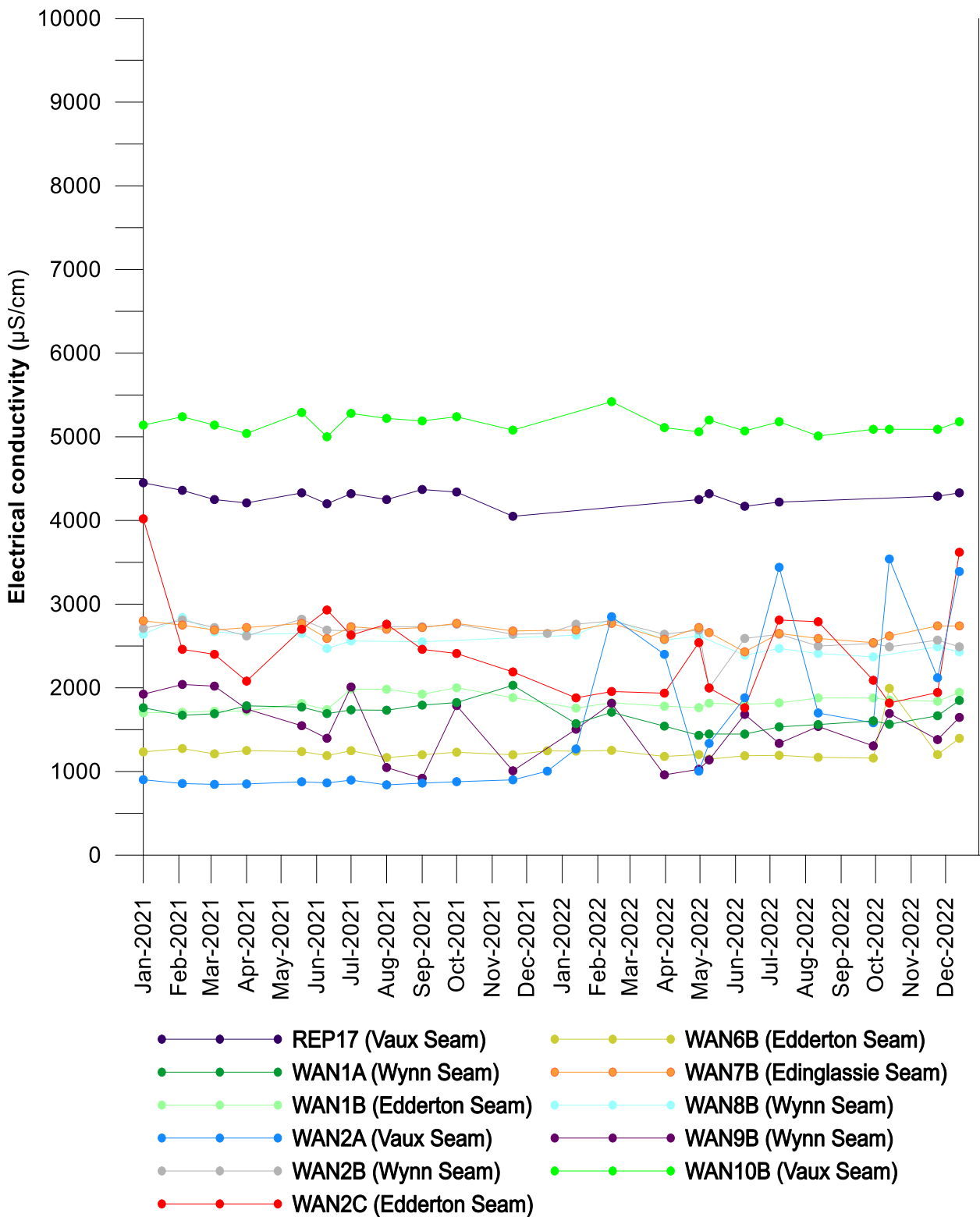


Figure 7.8 Electrical conductivity trends – Coal seam aquifers (Wantana Area)

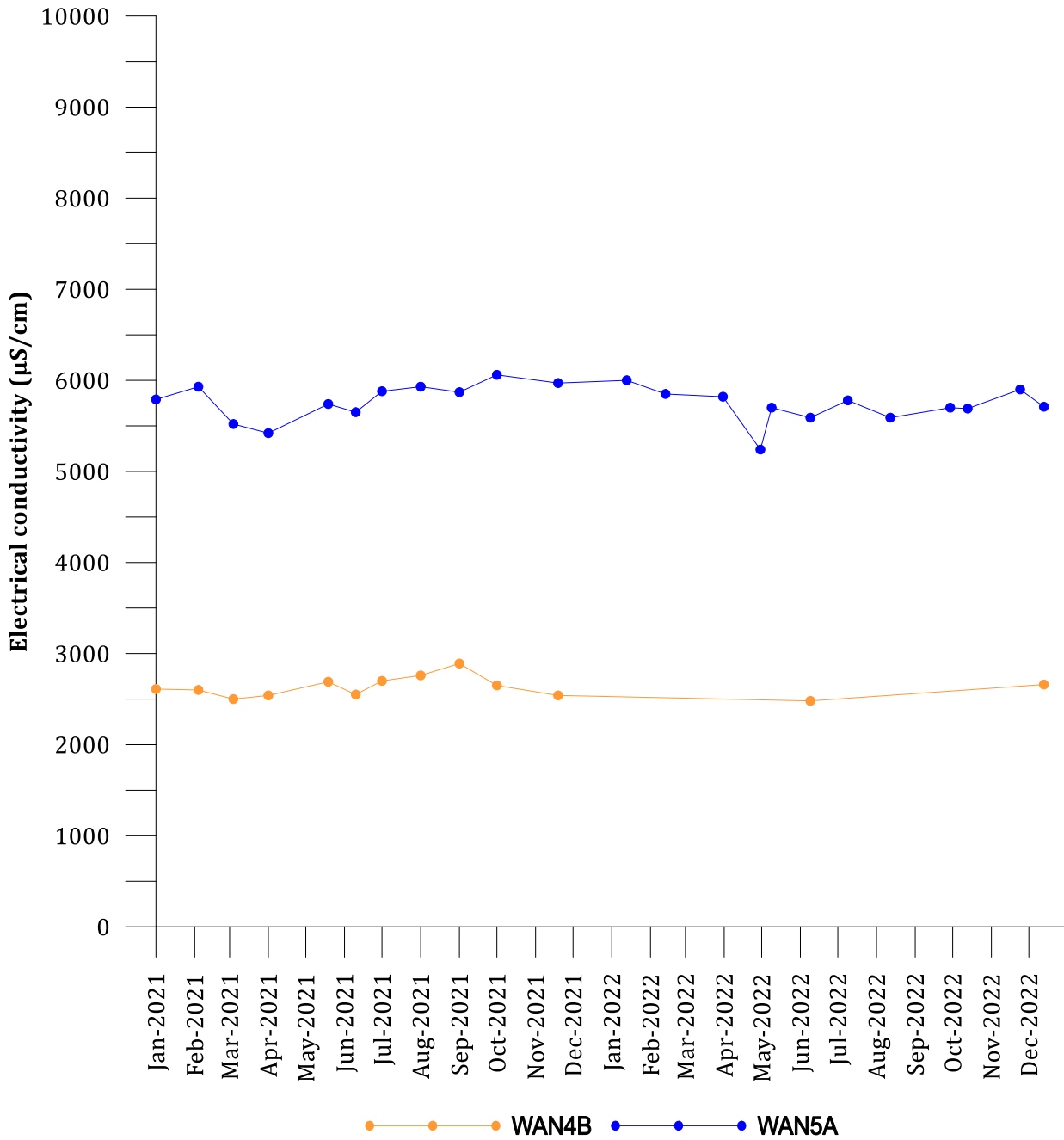


Figure 7.9 Electrical conductivity trends – Deep Permian bores

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 showed similar trends for bores BE2 and BE3, wherein EC remained stable between January 2021 and January 2022, then decreased throughout 2022. BE1 remained stable throughout 2021, then increased from January 2022 onward. These bores are ahead of the mine highwall and there is no apparent depressurisation. The changes in EC, which is naturally elevated, are likely due to natural variation.

Figure 7.11 shows pH values have remained circum-neutral and stable in 2022. Groundwater pH values for all monitoring bores are within historic ranges.

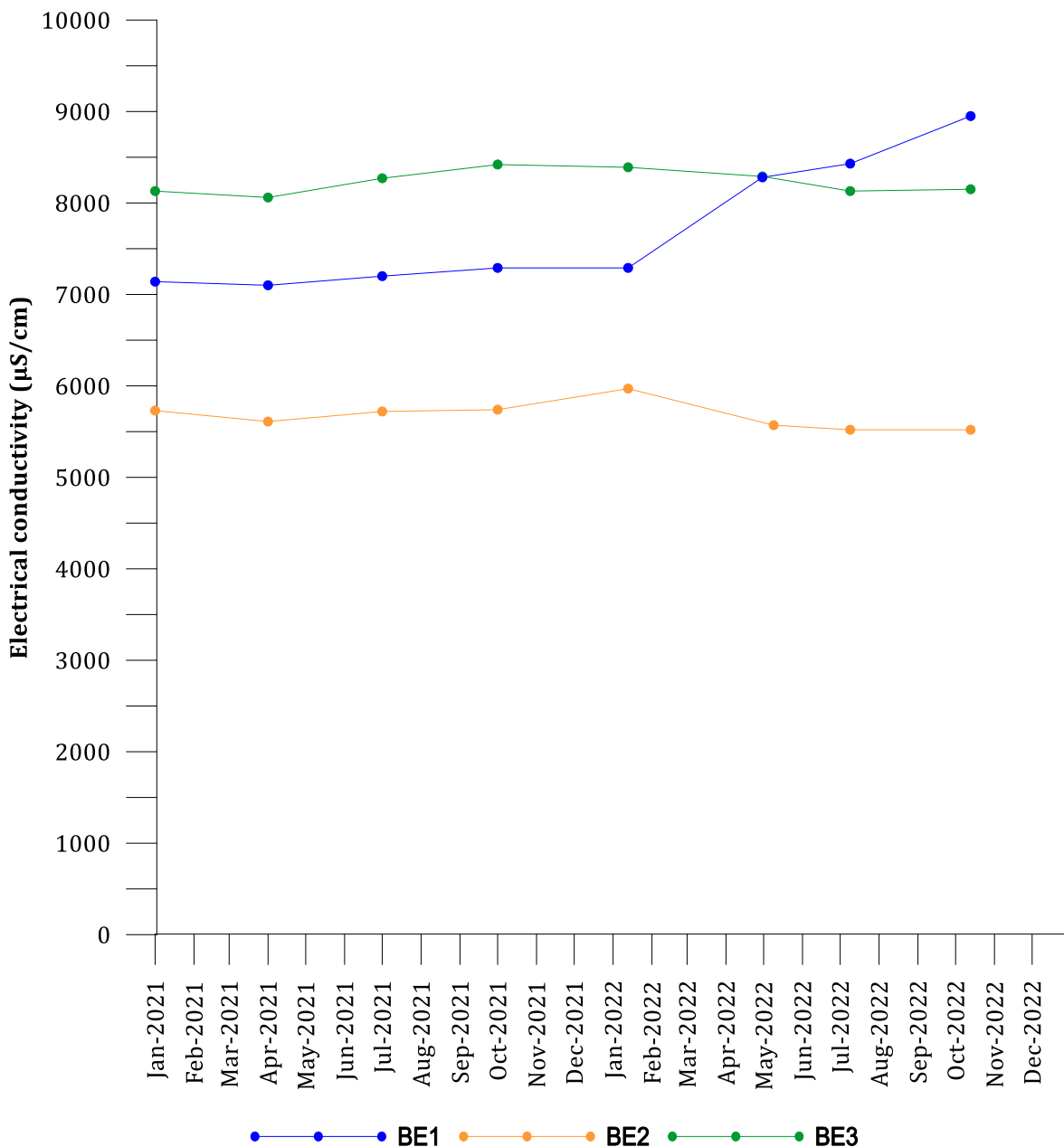


Figure 7.10 Electrical conductivity of Permian bores to the northwest of active mining

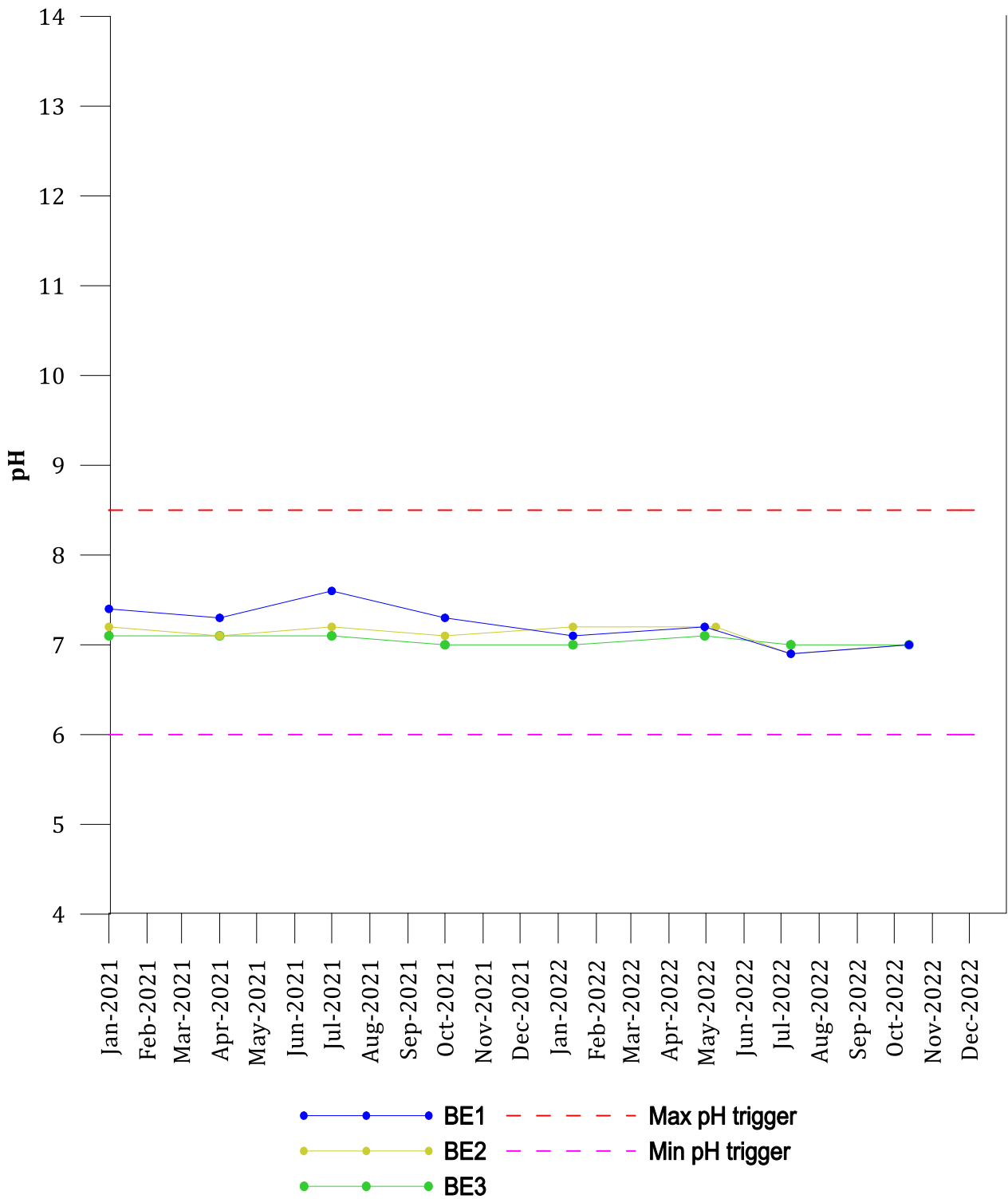


Figure 7.11 pH of Permian bores to the northwest of active mining

7.5 Water quality trigger events

Water quality monitoring data was compared to trigger values in the current WMP (Version 7, February 2019). Thirteen sites had groundwater quality trigger events in 2022.

7.5.1 pH

With the exception of WAN8A, which recorded four consecutive exceedances for pH in 2022, 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). Results from this reporting period 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 thirteen monitoring bores exceeded their respective EC triggers during the monitoring period (refer Table 5.1). Nine of these exceedances trigger the response protocol as outlined in the WMP. The relevant monitoring data and trigger events are summarised in Table 7.1.

Of the six alluvial bores that exceeded EC criteria, three bores (WAN2A, WAN9A2 and WAN10A) trigger the response protocol as outlined in the WMP. 42927, 47277 and WAN8A recorded a single Stage 1 EC exceedance in 2022, which does not trigger the response protocol (two consecutive readings required).

Permian sandstone bore BE1 exceeded its derived trigger for EC throughout 2022. While historically the groundwater in this bore has been stable at or above the trigger threshold, a comparison of trends in 2022 to 2021 and prior suggest the EC is increasing. BE1 should be closely monitored for and further changes to EC at this site. As of December 2022, no risk of environmental harm has been identified.

WAN10A and WAN10B have a history of exceeding trigger values for EC and again recorded multiple exceedances throughout 2022. Excepting August, WAN10B exceeded the trigger value during every month in 2022. REP17, screened in the Vaux seam, recorded multiple trigger exceedances throughout 2022.

Table 7.1 Summary of EC trigger exceedances for 2022

Site	42927	47277	BE1	REP17	WAN1B	WAN2A	WAN2C	WAN6B	WAN8A	WAN8B	WAN9A2	WAN10A	WAN10B
Lithology	Alluvium	Alluvium	Permian Sandstone	Vaux Seam	Edderton Seam	Alluvium/Vaux Seam	Edderton Seam	Edderton Seam	Alluvium	Wynn Seam	Alluvium	Alluvium	Vaux Seam
Stage 1 EC Trigger - 95th Percentile (µS/cm)	1260	1,325	7,186	4280	1,909	1,389	3,619	1,297	-	2,780	936	1,253	5,068
Stage 2 EC Trigger - Maximum EC (µS/cm)	1380	1,340	7,190	4310	3,790	1,780	3,840	1,461	7,720	2,820	937	1,367	5,090
Jan-22	-	-	<u>7,290</u>	-	1,758	1,269	1,880	1,243	-	2,630	<u>971</u>	-	-
Feb-22	-	-	-	-	1,822	<u>2,850</u>	1,956	1,252	<u>8,050</u>	<u>2,830</u>	907	<u>1647</u>	<u>5420</u>
Mar-22	-	-	-	-	1,781	<u>2,400</u>	1,936	1,180	-	2,570	<u>1,075</u>	<u>1646</u>	<u>5110</u>
Apr-22	-	-	<u>8,280</u>	4250	1,763	1,004	2,540	1,202	-	2,620	<u>960</u>	951	<u>5060</u>
May-22	-	-	-	<u>4320</u>	1,816	1,336	1,998	1,148	-	-	888	<u>1365</u>	<u>5200</u>
Jun-22	-	-	-	4170	1,803	<u>1,881</u>	1,762	1,188	6,990	2,390	888	<u>1545</u>	<u>5070</u>
Jul-22	<u>1273</u>	<u>1,372</u>	<u>8,430</u>	4220	1,820	<u>3,440</u>	2,810	1,193	<u>7,860</u>	2,470	907	1,021	<u>5,180</u>
Aug-22	-	-	-	-	1,879	<u>1699</u>	2,790	1,169	7,240	2,410	889	1,022	5010
Sep-22	-	-	-	-	1,878	<u>1,582</u>	2,090	1,160	-	2,370	913	1,067	<u>5090</u>
Oct-22	-	-	<u>8,950</u>	-	1,855	<u>3540</u>	1,818	1,993	-	-	921	<u>1,539</u>	<u>5090</u>
Nov-22	-	-	-	<u>4290</u>	1,839	<u>2120</u>	1,944	1,202	-	2,490	898	1,094	<u>5090</u>
Dec-22	-	-	-	<u>4330</u>	<u>1946</u>	<u>3,390</u>	<u>3,620</u>	<u>1,396</u>	<u>8,010</u>	2,430	<u>958</u>	<u>1,396</u>	<u>5180</u>

Notes: - indicates that no data was taken as the site was inaccessible
underscore signifies that notification should be undertaken.

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. No data is available from bores 64092, A10 and E12 as these bores have been mined through. Bores A5, WAN3, WAN8A, and WAN8B were dry or had insufficient water to sample. Bore WAN5B was blocked/damaged. Exceedances of guideline values in 2022 were recorded for iron, fluoride, TDS, and Sodium (Table 8.1).

Table 8.1 2022 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
37774	-	-	-	-	233
46737	-	-	-	4460	909
BE1	2.34	2.7	-	4400	1790
BE2	1.66	-	3450	-	1170
BE3	2.05	2.3	-	4780	1610
REP17	1.9	-	-	-	727
SMB1	-	-	-	-	135
SMB2	0.62	-	-	-	208
WAN1A	2.3	-	-	-	186
WAN1B	0.52	-	-	-	283
WAN2A	-	-	-	-	374
WAN2B	0.81	3.5	-	-	618
WAN2C	0.77	2.7	-	-	557
WAN5A	2.25	-	3390	-	1170
WAN6B	-	-	-	-	189
WAN7A	-	-	-	-	126
WAN7B	-	-	-	-	626
WAN9A2	-	-	-	-	-
WAN9B	-	4.4	-	-	325
WAN10B	0.23	-	-	-	863

9 Summary

9.1 Groundwater levels

A review of groundwater level trends indicates the following:

- Alluvium groundwater levels have increased in comparison to recent years. Water level contours and flow directions are generally consistent with previous years.
- Similarly to 2021, groundwater levels in the Hunter River Alluvium are higher due to above average rainfall recharge over an extended period of time.
- 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.*”
- A number of bores/sites could not be accessed on multiple occasions in 2022 due to flooding (WAN4A, WAN4B, WAN8A, WAN10A and WAN10B).
- The coal seams and interburden in the Wantana Extension appear to have been depressurised because of mining, and there is potential in this area for leakage 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 2022, as compared to 2021, this increased differential is largely a result of increased alluvial water levels rather than a continued decline in coal seam pressure head. 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 nearby to 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 in this location.
- Regional alluvium bore, BG3, did not trigger the Trigger Event Response Protocol in 2022, following low water levels in 2021.
- Excepting an increase in groundwater level in 46737 from August 2022 onward, 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. This is in line 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. Pressure head in BE1 was relatively stable throughout 2022; however, it is expected pressure head at this location will continue to decline as the pit progresses westward. Erroneous pressure head data in Edderton seam sensor was recorded in BE5 during 2022.
- The Mt Arthur Seam at VWP installations BE1, BE2, BE3 and BE5 also shows signs of seam depressurisation. Pressure heads in BE1 remained stable or slightly decreased in 2022. It is expected pressure head at these locations will continue to decline as the pit progresses westward.

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.
- WAN8A has historically presented elevated pH measurements and exceeded the trigger value in August 2017. Four consecutive exceedances for pH were recorded in 2022 at this bore; however for seven months out of 2022 (January, March to May, September to November), 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.

A review of EC monitoring data indicates the following:

- EC values in alluvium monitoring bores are less than 1,500 $\mu\text{S}/\text{cm}$, except for WAN7A, WAN8A, SMB1 and SMB2. 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 continued to decline throughout 2022, recording a measurement of 1,164 $\mu\text{S}/\text{cm}$ in December 2022. The bore is likely impacted by underlying coal seam depressurisation due to mining. The decrease in pressure has 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.
- The EC values for WAN8A have historically ranged between 1,282 $\mu\text{S}/\text{cm}$ (Nov 2007) and 8,870 $\mu\text{S}/\text{cm}$ (May 2010). Three exceedances were recorded in 2022 for this bore. This bore is suspected to contain stagnant water contained in a sump below the screened interval. Variable EC is likely due to this bore's location on the alluvial fringe.
- Monitoring bore WAN2C exceeded EC trigger values in December 2022. No other exceedances were recorded in this bore in 2022.
- SMB1-South and SMB2-North present EC values that have generally remained consistent throughout 2022 and recent years. It is unlikely that these bores have been impacted by mining.
- BG3 displayed an increase in EC during 2022, with average EC values increasing from 813 $\mu\text{S}/\text{cm}$ in 2021 to 1017 $\mu\text{S}/\text{cm}$ in 2022. Whilst this increase is not consistent with previous years' trends, this incline in EC is only small, and is likely representative of a larger pattern of declining EC in this bore spanning a number of years. 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. Similar to the case with WAN4A, a decrease in pressure head may have allowed for localised infiltration of less saline alluvial water.
- 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 REP17) 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 increased in 2022, with the latest recorded measurement in December being 1,646 $\mu\text{S}/\text{cm}$. 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.*"
- WAN10B has historically presented elevated EC values between 3,790 $\mu\text{S}/\text{cm}$ and 5,440 $\mu\text{S}/\text{cm}$, and generally above the Stage 2 EC trigger. The EC trigger events in 2018 (to month ending October 2018) were investigated as per the Trigger Event Response Protocol. The investigation found that changes in rainfall/recharge are likely to be the main influencing factor in these trigger events (AGE, 2018). Except for August 2022, WAN10B continued to record EC values exceeding the trigger value for each month, despite above average rainfall and an increasing CRD. Further investigation is required to determine the cause of EC exceedances in WAN10B. An attempt to purge and sample WAN10B in December 2021 was affected by onsite flooding. WAN10B site visit is planned following flood waters receding around the bore. Trigger values will be reviewed in 2023.

- Monitoring bore REP17, screening the Vaux Seam, recorded EC trigger exceedances for May, November and December 2022. EC values in 2022 remained consistent with values from the previous year, which are generally recorded at or above the Stage 2 EC trigger. The water quality in this bore should continue to be monitored to establish the cause of increasing EC.
- Groundwater quality within the bores to the northwest of the active mining area (BE1, BE2 and BE3 - future mining area) showed little change in pH (7.0 – 7.6) and moderate change in EC (range: 5,970 $\mu\text{S}/\text{cm}$ – 8,950 $\mu\text{S}/\text{cm}$) over the reporting period. BE1 recorded four EC exceedances (7,290 $\mu\text{S}/\text{cm}$ in January, 8,280 $\mu\text{S}/\text{cm}$ in April, 8,430 $\mu\text{S}/\text{cm}$ in July, and 8,950 $\mu\text{S}/\text{cm}$ in October 2022). Comparison of trends in 2022 to 2021 and prior suggest the EC is increasing. The water quality in this bore should continue to be monitored to establish the cause of increasing EC.
- When speciation results are compared to the ANZECC guidelines, certain 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:

- 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.
- Continue to monitor the water levels and water quality in bores WAN8A and WAN8B, with an awareness that very low water levels (< 0.5 m water column) are likely not representative of the aquifer.
- Update the WMP to include nested monitoring bores installed in December 2021 (211GW001 and 211GW002).
- Continue to monitor groundwater level at WAN3 to determine if the December 2021 measurement was erroneous.
- Install new VWP array to replace the decommissioned BE4.
- Install new VWP array to replace BE5 following the failure of the Edderton seam sensor.

11 References

- Australasian Groundwater and Environmental Consultants Pty Ltd (2013a), "Continuation of Bengalla Mine Groundwater Impact Assessment", prepared for Hansen Bailey Pty Ltd, June 2013 (G1505).
- Australasian Groundwater and Environmental Consultants Pty Ltd (2013b), "Continuation of Bengalla Mine Groundwater Impact Assessment – Appendix K Groundwater Impact Assessment", June 2013.
- Australasian Groundwater and Environmental Consultants Pty Ltd (2017), "Bengalla Groundwater Trigger Review", July 2017 (G1543L).
- Australasian Groundwater and Environmental Consultants Pty Ltd (2018), "Bengalla Groundwater Trigger Review", November 2018 (G1543S).
- Australasian Groundwater and Environmental Consultants Pty Ltd (2021), "Bengalla Mine Annual Groundwater Report", March 2021 (G1543Y).
- Australasian Groundwater and Environmental Consultants Pty Ltd (2021), "Bengalla Exceedance Review WAN10B", Draft report, October 2021 (BEN5003.001).
- BMC (2019), "Bengalla Mine. Water Management Plan. Version 7" Bengalla Mining Company. August 2017.

Appendix A

Monitoring bore summary data

Bore ID	Existing MGA94 z56	Northing MGA94 z56	Ground level (mAHD)	Top of casing (mAHD)	Stick-up (m)	Screen Interval/Screen 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)	2022 GWL (mAHD)	Measured date	Difference baseline vs. 2022 GWL (m)	Max drawdown vs. 2022 GWL (m) [Available drawdown]	Trigger vs. 2022 GWL (m)	
11953 ^a	298192	6428693	147	147.97	0.97	-	-	-	Deep Permian	Quarterly	Jan-97	Annually	Oct-03	136.46	1-Feb-00	129.33	7.13	Yes	129.3	-	-	-	-	-	
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	125.27	Oct-22	1.74	2.08	2.07	
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	127.9	Oct-22	0.44	4.66	4.7	
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	133.17	Jul-22	0.95	4.2	4.17	
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	135.05	Jul-22	0.91	6.31	6.35	
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	134.22	Jul-22	1.04	2.96	2.92	
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	135.2	Jul-22	2.91	4.09	4.1	
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	199.71	Oct-22	13.66	14.4	14.41	
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	133.5	Jul-22	-0.15	0.69	0.7	
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	134.32	Jul-22	0.65	2.41	2.42	
64092 ^b	297762	6428813	151.27	151.35	0.09	-	-	-	Shallow Permian	Quarterly	Jan-97	Annually	Oct-03	143.98	1-Feb-99	124.96	19.02	Yes	125	-	-	-	-	-	-
A10 ^b	295445	6428834	199.33	199.33	0	-	-	-	Shallow Permian	Quarterly	Jan-97	Annually	Oct-03	184.45	1-Feb-99	151.94	32.51	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	174.56	Oct-22	2.52	17.73	17.76	
BE2 (bore)	293374	6425866	204.22	205.38	1.16	45-48	48	156.22	Permian Sandstone	Quarterly	Jun-12	Annually	Jun-12	167.67	1-Sep-12	18.81	148.86	Yes	18.8	167.04	Oct-22	-0.63	148.23	148.24	
BE3 (bore)	292977	6427587	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	135.94	Oct-22	-9.75	22.76	22.74	
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	130.21	Dec-22	1.97	3.37	3.41	
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	127.71	Oct-22	1.23	1.46	1.41	
BG45 ^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	-	133.47	Oct-22	0.12	1.07	-	
E12 ^b	294808	6427576	197.06	197.17	0.11	-	-	-	Shallow Permian	Quarterly	Jan-97	Annually	Oct-03	157.4	1-Feb-99	-6.57	163.97	Yes	-	-	-	-	-	-	
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	91.12	Nov-22	-10.97	28.05	28.02	
SMB1	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	129.98	Dec-22	1.32	2.81	2.78	
SMB2	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	130.17	Dec-22	1.34	2.89	12.67	
WAN10A	295828	6425571	135.07	136.13	1.06	8-13	13.83	121.24	Alluvium	Monthly	May-09	Biannually	Apr-09	126.74	1-May-09	122.16	4.58	Yes	122.2	128.06	Dec-22	1.32	5.9	5.86	
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	109.62	Dec-22	-9.58	11.3	11.32	
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	127.26	Dec-22	5.54	9.73	9.76	
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	124.23	Dec-22	8.36	24.14	24.13	

Bore ID	Existing MGA94 z56	Nothing 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)	2022 GWL (mAHD)	Measured date	Difference baseline vs. 2022 GWL (m)	Max drawdown vs. 2022 GWL (m) [Available]	Trigger vs. 2022 GWL (m)
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	126.91	Dec-22	1.68	8.44	8.41
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	106.05	Dec-22	-5.75	19.67	19.65
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	100.19	Dec-22	-0.25	25.17	25.19
WAN3 d	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	100.32	26.32	Yes	100.3	-	-	-	-	-
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	127.78	Dec-22	1.14	6.62	6.58
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	115.46	Dec-22	-9.05	17.27	17.26
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	128	Dec-22	1.26	3.69	3.7
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	127.99	Dec-22	-	-	-
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	129.38	Dec-22	1.38	2.48	2.48
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	129	Dec-22	1.08	5.18	5.2
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	128	Dec-22	1.2	2.6	2.6
WAN7B	296856	6426254	138.1	138.89	0.79	80-93	83	55.1	Edinglassie Seam	Monthly	Sep-05	Annually	Aug-09	128.7	1-Feb-08	126.41	2.29	Yes	126.4	131.24	Dec-22	2.54	4.83	4.84
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	125.88	Dec-22	0.24	2.59	2.58
WAN8B	296450	6425855	136.33	137.42	1.09	15-18.6	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	117.87	Dec-22	-0.16	9.36	9.37
WAN9A2	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	128.79	Dec-22	2.54	5.11	5.09
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	116	Dec-22	-3.44	4.61	4.6
BE1 (VWP)	293475	6429036	241.48	-	-	120	121.48	121.48	Warkworth /Mt Arthur	Quarterly	Oct-11	NA	2011	-	-	-	-	-	-	-	-	-	-	-
BE1 (VWP)	293475	6429036	241.48	-	-	264.5	-23.02	-23.02	Edderton Seam	Quarterly	Nov-11	NA	2011	-	-	-	-	-	-	-	-	-	-	-
BE2 (VWP)	293374	6425866	204.22	-	-	97.8	106.42	106.42	Warkworth /Mt Arthur	Quarterly	Dec-11	NA	2011	-	-	-	-	-	-	-	-	-	-	-
BE2 (VWP)	293374	6425866	204.22	-	-	212.5	-8.28	-8.28	Edderton Seam	Quarterly	Jan-12	NA	2011	-	-	-	-	-	-	-	-	-	-	-
BE3 (VWP)	292977	6427587	175.21	-	-	80.6	94.61	94.61	Warkworth /Mt Arthur	Quarterly	Feb-12	NA	2011	-	-	-	-	-	-	-	-	-	-	-
BE3 (VWP)	292977	6427587	175.21	-	-	154.6	20.61	20.61	Edderton Seam	Quarterly	Mar-12	NA	2011	-	-	-	-	-	-	-	-	-	-	-
BE4 (VWP)	294313	6428784	191.4	-	-	82	-36.8	-36.8	Mt Arthur	Quarterly	Mar-17	NA	2017	-	-	-	-	-	-	-	-	-	-	-
BE4 (VWP)	294313	6428784	191.4	-	-	213	-36.8	-36.8	Edderton Seam	Quarterly	Mar-17	NA	2017	-	-	-	-	-	-	-	-	-	-	-
BE5 (VWP)	293696	6427245	181.3	-	-	74	-28.85	-28.85	Mt Arthur	Quarterly	Apr-17	NA	2017	-	-	-	-	-	-	-	-	-	-	-
BE5 (VWP)	293696	6427245	181.3	-	-	197.5	-28.85	-28.85	Edderton Seam	Quarterly	Apr-17	NA	2017	-	-	-	-	-	-	-	-	-	-	-
GW01A	298190	6428409	TBC	TBC	TBC	9-12	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	-	-	-	-	No	-	-	-	-	-	-

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)	2022 GWL (mAHD)	Measured date	Difference baseline vs. 2022 GWL (m)	Max drawdown vs. 2022 GWL (m) [Available drawdown]	Trigger vs. 2022 GWL (m)
WAN11A	296649	6424875	135.4	136.44	1.05	9-12	123.4	12	Alluvium	Monthly	Jan-19	Annually	Feb-19	-	-	-	-	No	-	-	-	-	-	-
WAN11B	296645	6424876	135.5	136.45	0.95	24-27	108.5	27	Shallow Permian	Monthly	Jan-19	Annually	Feb-19	-	-	-	-	No	-	-	-	-	-	-
WAN12	295491	6424725	135.3	136.06	0.76	11-14	121.3	14	Alluvium	Monthly	Feb-19	Annually	Feb-19	-	-	-	-	No	-	-	-	-	-	-
211GW001 ^d	294301	6424930	139.2	140.07	0.87	49.4-55.4	55.4	83.8	Permian	TBC	Nov-21	-	-	-	-	-	-	No	-	-	-	-	-	-
211GW002 ^d	294294	6424927	139.2	140.1	0.9	15.8-21.8	20.8	118.4	Alluvium	TBC	Nov-21	-	-	-	-	-	-	No	-	-	-	-	-	-

Notes: ^a no access or mined through for 2022 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.

Appendix H

Rehabilitation Monitoring Findings

Table H1
Summary of Rehabilitation Monitoring Observations and Actions

Type	Details	Actions	Action Priority*
Erosion	Very severe channel erosion (to 2.5m deep in places) is impacting the main rock-lined drainage channel in the southern Zone 6 in the area of natural undulating landform. The drain is considered as failed and will require significant repairs.	To be actioned in 2023	1
Erosion	Five locations were observed with fully breached/failed contour banks, compromising the integrity and functioning of the drainage structures. These included one contour breach in Zone 5 and three contour breaches in Zone 1. The structures should be repaired.	To be actioned in 2023	2
Slope erosion – Gullying	A total of 11 gully channels were recorded ranging in severity from 30-90cm in depth and which may exceed 'allowable' limits for safe and stable landform. These included 2 channels in Zone 1, 2 channels in Zone 2, 3 channels in Zone 6 and 4 channels in Zone 7. The gullies should be closely monitored and remediation requirements considered on a case-by-case basis (e.g. channels of lower severity which are assessed as fully stabilised and occur in areas of good vegetative performance may not necessarily need to be repaired).	Monitoring to continue in 2023 and repairs undertaken where possible	2
Weeds – Galenia	Galenia remains prevalent and widely distributed across the entire site (and by far the greatest threat to the rehabilitation), including severe infestations and localised patches scattered throughout. The species is known to be problematic at the site, and a systematic and ongoing management strategy will be required to manage population levels in the long term.	Ongoing control to continue in 2023	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 remain, and many small patches / scattered individuals occur throughout the slopes.	Ongoing control to continue in 2023	2

Source –Koru Environmental Pty Limited Rehabilitation Monitoring and Audit 2021 Bengalla Mine

*Note: Only priority 1 and 2 actions are shown in Table H1.



Appendix I
***Summary of Cumulative Elevated PM₁₀ Monitoring Results
and Bengalla Increment***

Summary of Cumulative Elevated PM₁₀ Dust Monitoring Results and Bengalla Increment

Date of elevated result	Result (µg/m ³)	Monitor	Description
24 HOUR EXCEEDANCES			
28/01/2022	52.6	PM ₁₀₋₄	BMC engaged Todoroski Air Sciences (TAS) to investigate the elevated PM ₁₀ levels recorded at PM ₁₀₋₄ . Based on the prevailing wind directions it was estimated that Bengalla's operations contributed 28.3 µg/m ³ to the elevated reading at PM ₁₀₋₄ . BMC provided DPIE with the investigation report and a summary of operations undertaken at Bengalla on the day on 16/02/2022.
15/02/2022	55.0	PM ₁₀₋₄	BMC engaged TAS to investigate the elevated PM ₁₀ levels recorded at PM ₁₀₋₄ . Based on the prevailing wind directions it is estimated that Bengalla's operations contributed 27.7 µg/m ³ to the elevated reading at PM ₁₀₋₄ . BMC provided DPE with the investigation report and a summary of operations undertaken at Bengalla on the day on 31/03/2022.
13/09/2022	56.1	PM ₁₀₋₄	BMC engaged TAS to investigate the elevated PM ₁₀ levels recorded at PM ₁₀₋₄ . Based on the prevailing wind directions it is estimated that Bengalla's operations contributed 9.7 µg/m ³ to the elevated reading at PM ₁₀₋₄ . BMC provided DPIE with the investigation report and a summary of operations undertaken at Bengalla on the day on 21/10/2022.
30/11/2022	58.5	PM ₁₀₋₄	BMC engaged TAS to investigate the elevated PM ₁₀ levels recorded at PM ₁₀₋₄ . Based on the prevailing wind directions it is estimated that Bengalla's operations contributed 35.3 µg/m ³ to the elevated readings at PM ₁₀₋₄ . BMC provided DPIE with the investigation report and a summary of operations undertaken at Bengalla on the day on 23/12/2022.

Appendix J

Non- Aboriginal Heritage Sites

Bengalla Mining Company Non Aboriginal Heritage Sites

Keys Family Cemetery



General Overview of the Keys Cemetery



Gravestones in Keys Cemetery

Stockyards



Stockyards

Old Bengalla



Old Bengalla Homestead site



Old Bengalla Homestead site



Old Bengalla Stockyards

House Site 1



Signage erected at House Site 1



House Site 1

House Site 2



Signage erected at House Site 2

Blunts Butter Factory



Blunts Butter Factory

Bengalla Homestead



Main Bengalla Homestead 2022



Main homestead, northern aspect



Garden Shed



Workshop shed



Out building



Book Keepers Cottage – renovated throughout.

Overdene Homestead



'Overdene', typical southern elevation



'Overdene', eastern elevation



'Overdene', northern elevation



'Overdene', western elevation



Overdene fireplace



'Overdene', Internal Passage

Appendix K

2019 Independent Environmental Audit Actions

Independent Environmental Audit 2019 - Bengalla Mining Company Response to Non-compliances and Recommendations to Independent Environmental Audit Final 30 Report November 2020.

Table 1: Non-compliances and conditions not verified

Bengalla Mining Company Pty Limited (BMC) Response : In blue.

CoA	Compliance Status	Summary of Findings	Recommendation
SSD-5170			
S2-2 Terms of Consent	Non-Compliant (Low Risk)	<p>(a) Appendix A.1 comprises a checklist considering the EIS & SEE commitments. Reference is made to this checklist for a detailed assessment of compliance with the EIS and SEE commitments. Not all aspects of each of the documents was assessed, with a focus of the compliance assessment on the items covered in the checklist defined in Appendix A1. BMC were considered Non-compliant with some commitments as detailed in the checklist.</p> <p>(b) This SSD-5170 checklist (outlined below) comprises a compliance assessment with the conditions of the Development Consent. Conditions considered Non-Compliant or Not Verified are noted and colour coded. Observations were raised for a number of conditions generally considered to be compliant.</p> <p>Based on there being some Non-Compliant conditions, BMC were considered to be Non-Compliant with the condition. The Non compliances are detailed below.</p>	Refer to below recommendations
S2-15 Updating and Staging submission of strategies, plans or programs.	Admin Non-Compliant	<p>BMC was found to be non-compliant with this condition as they had not ensured that the existing operations on site (approved by Mod 3 and 4) were covered by all the Management Plans. Some management plans excluded either Mod 4 requirements or both Mod 3 & Mod 4 requirements.</p>	<p>Timing: Each Day.</p> <p>Rec-2019-01: Update Management Plans and strategies (including the BMP, AQMP, ACHMP, BOMP, RMP and the EMS) so they cover all of the operations and activities described in all Modifications.</p>
		<p>Response: This condition is overarching. BMC seeks to maintain compliance with this condition by establishing compliance with the other development consent conditions.</p>	

CoA	Compliance Status	Summary of Findings	Recommendation
S3-16 Air Quality Criteria	Not Verified	<p>Response: BMC determined that management plans that required updating were updated according to the relevant SSD – 5170 Modification 3 and Modification 4 Schedule 5 Condition 5. For example, the ACHMP was not updated as all known aboriginal artefacts have been salvaged on site. BMC will undertake a further review of the management plans and commence updating the relevant management plans where it is determined that changes are required for SSD-5170 Modification 4 Schedule 5 Condition 5.</p> <p>There have been exceedances of the criteria, however on each occasion BMC have engaged experts (ERM and Todoroski Air Sciences) to assess the BMC contribution to these exceedances. These assessments have reported that the Bengalla Mine contribution to the dust levels are below the criteria. On this basis BMC argue that they are compliant with the criteria. This audit has not assessed this position on technical grounds as Auditors are not technical specialists in air quality. It is noted that air quality in the region and mine contribution to dust in air are being assessed under the Independent Review required by Schedule 4, Condition 4. Further, Notices have been issued by DPIE in February 2020 for BMC to provide information to DPIE as part of ongoing investigations into compliance with this condition. This study and investigations are expected to contribute further to the assessment of this issue. Given the above, Auditors were not able to confirm compliance or non-compliance with the approach used; consider the Independent Review and DPIE Investigation will cover relevant issues; and have determined the condition as Not Verified.</p>	<p>Air Quality Management Plan was approved in December 2022. Rehabilitation Management Plan was updated in 2022 and placed on BMC website.</p> <p>Rec-2019-02: DPIE to further consider the argument by BMC that they are compliant with the criteria of this condition.</p> <p>Rec-2019-03: PM_{2.5} is required to be measured as detailed in the AQMP and reported in future Annual Reviews.</p> <p>Rec-2019-04: It is recommended that BMC be pro-active and undertake PM_{2.5} monitoring prior to the AQMP being approved by the DPIE to ensure compliance with the condition.</p> <p>Rec-2019-05: Ensure that all recommendations of the Independent Review as required of Schedule 4, Condition 4 are implemented appropriately once completed.</p> <p>Rec-2019-06: Ensure information requests relating to air quality as issued by DPIE are compiled with.</p> <p>Rec-2019-07: Ensure that all reasonable and feasible avoidance and mitigation measures are</p>

CoA	Compliance Status	Summary of Findings	Recommendation
			<p>employed so that the particulate emissions generated by the development are minimised.</p>
<p>S3-19 Air Quality – Operating Conditions</p>	<p>Non-Compliant (Low Risk)</p>	<p>Response: BMC have relodged the amended Air Quality Management Plan (AQMP) at the Department of Planning Industry and Environment (DPIE). Following approval of the AQMP the new air quality monitoring network (which will include a component to monitor PM_{2.5}) will be installed.</p> <p>Condition 19a) is considered not to have been complied with based on PIN No: 3121150616 on 16/06/2017 stating "Bengalla failed to implement all reasonable and feasible measures to minimise dust emissions of the development and failed to minimise any visible air pollution generated by the development". Site inspections identified observations where BMC could improve dust management practices. It is noted that further comments on dust management may be an outcome of the Independent Review as required under Condition Schedule 4, Condition 4. It is further noted that DPIE has issued BMC with Notices in February 2020 to provide information in respect of an investigation into compliance with this condition.</p>	<p>Completed. AQMP was approved in December 2022 with the new air quality monitoring network to be implemented during 2023.</p> <p>Rec-2019-08: During wind levels marginally below the trigger criteria of 10m/s, BMC conduct further mitigation to improve dust management. This could include increased frequency of visual monitoring of dust levels and increased re-assignment/shut-down of trucks and equipment when significant dust is observed; as well as re-assignment of water carts (essentially more frequent and responsive implementation of existing controls).</p>
<p>S3-20 Air Quality Management Plan</p>	<p>Not Verified</p>	<p>Response: BMC to continue to implement the Air Quality Management Plan and respond to regulatory Notices.</p> <p>Many aspects of the mitigation measures defined in the AQMP plan were being implemented. As per discussion for Condition 19, it was considered that on day 2 of the site inspections, some measures could have been implemented more rapidly to minimise dust generation in some areas of the operation. It is noted that DPIE has issued Notices that require BMC to provide information to DPIE as part of an investigation into BMC's compliance with the AQMP (February 2020). It is understood BMC are preparing these documents for issue. As this matter is being investigated by DPIE, it is considered inappropriate to pre-empt the investigation by determining compliance for this condition. As such, the condition compliance status is deemed "Not Verified".</p> <p>Response: Noted.</p>	<p>AQMP was approved in December 2022 and is to be implemented during 2023.</p> <p>Rec-2019-08: As Above</p>

CoA		Compliance Status	Summary of Findings	Recommendation
S3-25	Water Management Plan	Non-Compliant (Low Risk)	BMC are considered Non-Compliant with the condition on the basis that groundwater inflows to the Bengalla mine open cut exceeded the annual entitlement under 20BL 169798.	<p>Rec-2019-09: Continue to work with the Natural Resources Access Regulator (NRAR) to increase the annual entitlement under 20BL 169798.</p> <p>Timing: Complete.</p>
S3-29	Biodiversity Management Plan	Non-Compliant (Low Risk)	<p>Response: BMC applied to the NSW Office of Water (now the Natural Resources Access Regulator) 22 December 2015 for additional entitlements under 20BL 169798 to account for groundwater inflows to the site predicted in the 2013 Bengalla EIS. Natural Resources Access Regulator granted volumetric increase to 365 units to WAL41547 14 September 2020.</p> <p>On two occasions it was reported that BMC had not fully implemented the Bengalla Biodiversity Management Plan, with the Ground Disturbance Permit (GDP) process not implemented twice in 2017 and seed not harvested during the audit period. On this basis BMC are considered Non-Compliant with the condition.</p>	<p>Rec-2019-10: Ensure full implementation of the Ground Disturbance Permit process in the future.</p> <p>Rec-2019-11: Collect seed from site, to be used in future revegetation works, as required in the Biodiversity Management Plan.</p> <p>Timing: Each time a GDP is issued.</p>
S3-30	Conservation Bond	Admin Non-Compliant	<p>Response: BMC to follow Ground Disturbance Permit (GDP).</p> <p>BMC did not lodge a conservation bond with DPIE within 6 months of the approval of the Biodiversity Management Plan, as required of the condition.</p>	<p>Rec-2019-12: Lodge a conservation bond with DPIE as required of the condition.</p> <p>Timing: Complete.</p>
S4-3	Notification of Landowners/Tenants	Not Verified	<p>Response: BMC delivered the bank guarantees to what is now the DPIE 1 June 2018.</p> <p>When air quality criteria exceedances occurred, BMC conducted assessments and received specialist feedback from Todoroski and ERM, which determined that the Bengalla mine's contribution to levels of particulates monitored was below the relevant criterion. On this basis BMC considered that there were no exceedances attributable to the Bengalla Mine, and hence did not advise landowners of the exceedances or follow through with the requirements of this condition. Air Quality criteria</p>	-

CoA	Compliance Status	Summary of Findings	Recommendation
		<p>exceedances and BMC's response is further discussed under Condition 16, Schedule 3.</p> <p>This audit has not assessed BMC's position on technical grounds as Auditors are not technical specialists in air quality. It is noted that air quality in the region and mine contribution to dust in air are being assessed under the Independent Review required by Schedule 4, Condition 4. Further, Notices have been issued by DPIE in February 2020 for BMC to provide information to DPIE as part of ongoing investigations into compliance with conditions relating to air quality. This study and investigations are expected to contribute further to the assessment of this issue. Given the above, Auditors consider the Independent Review and DPIE Investigation will cover relevant issues; and have determined the condition as Not Verified.</p>	
S4-4	Admin Non-Compliant	<p>A suitably qualified, experienced and independent person was not commissioned to undertake the Independent Dust Review within 2 months of the DPIE agreeing with landowners to undertake the review.</p>	<p>Rec-2019-13: Engage a suitably qualified, experienced and independent person to undertake the Independent Dust Review.</p>
		<p>Response: Noted.</p>	
		<p>Response: An independent expert was engaged by BMC on 5 November 2019 to undertake the review.</p>	<p>Complete. Engagement of suitably qualified and independent person completed, and draft report was completed and forwarded to DPIE in December 2020. Response from DPIE received 31 August 2021. Bengalla Mine deemed compliant.</p>
EIS & SEE Commitments			
Install TEOMs to largely replace HVAS	Not Verified	<p>According to site communications TEOMs will be installed once revised Air Quality Management Plan (AQMP) is approved by DPIE.</p>	<p>-</p>
		<p>Response: Noted.</p>	<p>AQMP was approved in December 2022 and is to be implemented during 2023.</p>

CoA	Compliance Status	Summary of Findings	Recommendation
Adjustment of the monitoring network as the site proceeds west.	Not Verified	According to site communications monitoring network to be adjusted once the revised AQMP is approved by DPIE.	-
6.1.2	Not Verified	During the audit inspection it was observed that the Dry Creek East Dam had been installed, but the liner of the dam was not inspected as it was full of water.	AQMP was approved in December 2022 and is to be implemented during 2023.
		Response: Noted.	
		Response: Noted.	
6.5	Non-Compliant (Low Risk)	BMC has not continued to manage all ecological matters on-site in accordance with the Bengalla Biodiversity Management Plan (BMC, 2016c), with the GDC process not implemented twice in 2017 and seed not harvested during the audit period.	<p>Rec-2019-14: Undertake weed management work at the site to control outbreaks of <i>Galeria pubescens</i>.</p> <p>Rec-2019-11:</p>
		Response: Seed was not harvested during the audit period due to drought. BMC to follow Ground Disturbance Permit (GDP).	Timing: Seed harvesting where identified and possible. Assessment included as each GDP is issued.
EPL 6538			
O1.1	Non Compliant	<p>During site inspections the Auditors observed:</p> <ul style="list-style-type: none"> * Sprinklers in use at coal stockpiles to reduce coal dust; * Water trucks watering down roads to minimise dust; and * Covered coal conveyors. <p>* BMC has procedures to ensure work is carried out in a competent manner:</p> <ul style="list-style-type: none"> - PRO-0069 'Tipping and Dumping of Materials'; - PRO-0263 'Drillpipe Operation'; - PRO-0266 'Watercart Operation'; - PRO-0273 'Excavation Operation'; and - PRO-0576 'Loading of Reject in Haul Trucks'. 	Prevent hydrocarbon spills

CoA	Compliance Status	Summary of Findings	Recommendation
		<p>a) Non-compliant: During the site inspection noted a hydrocarbon spill at the re-fuelling area near to the workshop (PHOTO 26). BMC has been found non-compliant with condition O1.1 a), with substance(s) (hydrocarbons) not stored in a competent manner, with a hydrocarbon spill at the re-fuelling area near to the workshop, noted during the site inspection.</p>	<p>Timing: Ongoing.</p>
O3.2, O3.3 Dust	Not Verified	<p>Response: BMC has procedures and infrastructure in place to minimise and contain hydrocarbon spills. If hydrocarbon spills occur, remedial action is taken as required.</p> <p>Refer to Conditions 16, 19 and 20 (Schedule 3) of the Development Consent, which discusses dust management.</p>	<p>Rec-2019-02 Rec-2019-03 Rec-2019-04 Rec-2019-05 Rec-2019-06 Rec-2019-07 Rec-2019-08</p>
M9.4 Monitoring	Non-Compliant (Low Risk)	<p>Response: Noted.</p> <p>Monitoring point 26 is incorrectly marked as point 1.</p>	<p>Rec-2019-15: Mark monitoring point 26 as required of the EPL.</p> <p>Timing: New sign installed July 2020.</p>
ML1397 (2018) 2	Not Verified	<p>Response: Noted.</p> <p>On the basis that the Notices have been issued and are responses have not been considered as part of this IEA, compliance with this condition (specifically the satisfaction of the Minister) could not be verified.</p>	<p>Response: Noted.</p>

CoA	Compliance Status	Summary of Findings	Recommendation
ML1397			
8	Not Verified	<p>On the basis that the Notices have been issued and are responses have not been considered as part of this IEA, compliance with this condition (specifically the satisfaction of the Minister) could not be verified.</p>	-
		<p>Response: Noted.</p>	
13	Non-Compliant (Low Risk)	<p>Mine disturbance included in the MOP.</p> <p>The Bengalla pre-clearing and clearing procedures are referred to in the MOP.</p> <p>As reported in the 2017 Annual Review, an area of approximately 1.4 ha area was cleared in October 2017 without the approval of a Ground Disturbance Permit (GDP), and an area of 0.09 ha was also cleared in June 2017 without a GDP.</p>	No action specified
		<p>Response: Noted.</p>	<p>Timing: Each time a GDP is issued.</p>
ML1450			
8	Not Verified	<p>On the basis that the Notices have been issued and are responses have not been considered as part of this IEA, compliance with this condition (specifically the satisfaction of the Minister) could not be verified.</p>	-
		<p>Response: Noted.</p>	
ML1469			
19	Not Verified	<p>On the basis that the Notices have been issued and are responses have not been considered as part of this IEA, compliance with this condition (specifically the satisfaction of the Minister) could not be verified.</p>	-
		<p>Response: Noted.</p>	

Table 2: Recommendations and Opportunities for Improvement

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
SSD-5170	S2-15	Where relevant, update Management Plans to incorporate measures to improve the environmental performance of the development and reflect current best practice in the mining industry.
		Response: Noted Timing: Ongoing according to SSD – 5170 Modification 4 Schedule 5 Condition 5.
S2-17	Rec-2019-17	Update Appendix A 'Regulatory Correspondence' in the Water Management Plan (WMP) to include consultation letter from NRAR. Response: Noted. Water Management Plan (WMP) to be reviewed according to SSD-5170 Modification 4 Schedule 5 Condition 5. If the review determines that a new version of the WMP is required to be approved the document will be prepared according to SSD – 5170 Modification 4 Schedule 3 Condition 25. Timing: Ongoing. After review.
	Rec-2019-18	Update the Biodiversity Management Plan to include the consultation letter from NRAR. Response: Noted. Biodiversity Management Plan to be reviewed according to SSD-5170 Modification 4 Schedule 5 Condition 5. If the review determines that a new version of the Biodiversity Management Plan is required to be approved the document will be prepared according to SSD – 5170 Modification 4 Schedule 3 – Condition 29. Timing: Ongoing. After review. Biodiversity Management Plan circulated to regulators to for consultation 24 December 2020. Biodiversity Management Plan to be reviewed after consultation with the Biodiversity Conservation Trust regarding the approach relevant to the security likely during 2021/2022. Ongoing communication is occurring with the relevant departments. The DPE has indicated a Biodiversity Stewardship Agreement approach is recommended. BMC is pursuing the establishment of the BSA's for each offset property.
S3-15	Rec-2019-19	Update Figure 3 in the BMP such that the 'SDD' & 'CW1' blast monitors in one location (near Bengalla Homestead) are shown as an inset, so they are not overlapping.

		<p>Response: Noted. Blast Management Plan (BMP) to be reviewed according to SSD-5170 Modification 4 Schedule 5 Condition 5. If the review determines that a new version of the BMP is required to be approved the document will be prepared according to SSD – 5170 Modification 4 Schedule 3 – Condition 15.</p> <p>Timing: Ongoing. After review. BMP provided to Environment Protection Authority and Muswellbrook Shire Council for consultation 29 December 2020. The BMP to be reviewed likely during 2021/2022. BMP will be further reviewed during 2023 after determination of Mod 5.</p>
	Rec-2019-20	<p>When plans are updated for other requirements, ensure Management Plans reference current regulator names, including the Department of Planning, Infrastructure and Environment (DPIE).</p> <p>Response: Noted.</p>
S3-16, S5-4	Rec-2019-21	<p>Ensure future Annual Reviews refer to the correct PM₁₀ criteria.</p> <p>Response: Noted.</p>
S3-19	Rec-2019-22	<p>It is suggested that an air quality specialist review and confirm that the wind speed trigger (detailed in the AQMP) based over a 1-hour period is appropriate.</p> <p>Response: AQMP approved in December 2022 and is to be implemented during 2023.</p>
	Rec-2019-23	<p>It is suggested that a suitable specialist review the location of the wind monitor referred to in Table 11 of the AQMP and determine if it is providing data that is representative, given it is not near operational areas of the mine. As required, update the relevant sections of the AQMP following this review to address the discrepancy in the AQMP Table 11 which states 10m/s wind speed on site, versus actual gauge which is near the racecourse rather than at the mine.</p> <p>Response: AQMP approved in December 2022 and is to be implemented during 2023.</p>
	Rec-2019-24	<p>Include the CER allocated emissions baseline of 443,494 t CO₂-e, that is used as an upper limit for GHG management, in the GHG section of the AQMP.</p> <p>Response: Noted. The Clean Energy Regulator is a Commonwealth regulator. Not relevant to SSD-5170 Modification 4 where Schedule 3 Condition 19 requires minimisation of greenhouse gas emissions from site.</p>
S3-20	Rec-2019-25	<p>Keep progressing the approval of the revised AQMP in cooperation with DPIE.</p> <p>Response: AQMP approved in December 2022 and is to be implemented during 2023.</p>

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
S3-24 S3-25	Rec-2019-26	Investigate repairing the scouring in the creek bank adjacent to the intersection of Bengalla Road and Old Bengalla Road. Response: Mount Pleasant Operation completed demolition of the rail infrastructure near the creek bank in 2022. The creek bank was remediated at that time.
	Rec-2019-27	Ensure all hydrocarbon products are stored in bunded areas in accordance with the relevant Australian Standards. Response: Noted. Timing: Each day.
	Rec-2019-28	Develop site specific in-stream water quality objectives in accordance with ANZECC 2000 and Using the ANZECC Guidelines and Water Quality Objectives in NSW procedures (DECC 2006), or its latest version, when Dry Creek is re-instated. Response: Noted. Timing: Towards end of mine life being 2039.
	Rec-2019-29	Implement recommendations from the 2019 Stream and Riparian Vegetation Assessment to address bank stability issues identified. Response: Noted. The Hunter River and its management likely involves government agencies. Any works for the northern bank stability will require review and possible further approvals and works allocation dependent upon ownership of the northern bank. Liaison with relevant stakeholders to commence. These works will be further reviewed when the current La Nina subsides. Timing: Ongoing.
S3-25	Rec-2019-30	Continue to undertake groundwater monitoring at the site and undertake investigations (using third party technical specialists as appropriate) if groundwater level and groundwater quality criteria are triggered. Respond as appropriate to any triggers. Response: Noted. Groundwater monitoring and trigger responses are undertaken according to the WMP. Timing: Ongoing.
S3-32	Rec-2019-31	Investigate ways in which historic items in the Bengalla homestead could be better conserved/preserved or passed on to a local historic society.

	<p>Response: BMC will review any historic items that are not required by BMC and investigate ways to provide those identified items to relevant third parties, subject to their approval.</p> <p>Remediation works continuing at Bengalla Homestead. This recommendation will be considered when remediation works are complete. Ongoing.</p>
S3-40	<p>Rec-2019-32</p> <p>Determine how many trees have been lost from the Roxburgh tree screen and replant missing trees.</p> <p>Response: BMC will inspect the site to determine missing trees and then replant.</p> <p>Timing: Annual inspections are undertaken in May each year with any replanting as soon as reasonable and feasible. No replanting's were undertaken in 2022.</p>
S3-45	<p>Rec-2019-33</p> <p>It is recommended that BMC consider a staged approach to be undertaken to achieve High Density Woody Vegetation (HDWV), with 'patches' of HDWV applied each year over the 10+ years. BMC should aim to establish approximately 40 ha of HDWV each year. This would provide for small manageable areas for maintenance purposes (weed control and watering), especially in the first critical few years of establishment of each patch. Noted this approach may require DPIE/Resources Regulator approval.</p> <p>Response: BMC will plant HDWV according to the Mining Operations Plan (Amendment B) (MOP) now Amendment D.</p> <p>Timing: Ongoing per Forward Work Program and Rehabilitation Management Plan (formerly MOP).</p>
	<p>Rec-2019-34</p> <p>Trials should be established in the first years of rehabilitating to HDWV to assess the best establishment techniques including: supplemental tree planting, spraying out pasture, re-ripping and direct tree seeding, ripping directly into pasture and seeding. It is understood Bengalla have already engaged a suitably qualified expert to prepare these trials.</p> <p>Response: Noted. Trial approach not accepted by Resources Regulator as proposed method to establish HDWV is known to be successful.</p> <p>Timing: Not applicable.</p>
	<p>Rec-2019-35</p> <p>The unrehabilitated area on the northern face that remains disturbed should be shaped and rehabilitated promptly. Recent rainfall has provided reasonable and feasible conditions for both temporary and permanent rehabilitation efforts in this area. These conditions were not present during most of the audit period. If the area requires additional overburden material for permanent rehabilitation, then dump scheduling should prioritise the additional material needed in this area for final volumes and levels, so final shaping can commence, and permanent rehabilitation established. If scheduling does not prioritise this area for additional material, then temporary rehabilitation must be undertaken immediately to provide some surface cover to reduce dust and stabilise the surface material, as required by this condition. Any future modifications to an Authority must prioritise this area for rehabilitation.</p>

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
		<p>Response: Rehabilitation at Bengalla Mine is undertaken according to the Forward Work Program (formerly MOP) and the Rehabilitation Management Plan. These documents are developed according to operational requirements, the relevant guideline and requires approval by Regulators.</p> <p>Timing: Ongoing.</p>
S3-46	Rec-2019-36	<p>The MOP should be amended to reflect the rehabilitation staged approach (once agreed) and submitted for approval.</p> <p>Response: The approved MOP currently includes a staged rehabilitation approach. MOP has since been replaced by the Forward Work Program and the Rehabilitation Management Plan in 2022.</p>
	Rec-2019-37	<p>Undertake temporary rehabilitation on areas that have been left disturbed for years or areas that may not be scheduled for permanent rehabilitation and are not in the forecasted dump schedule.</p> <p>Response: Temporary rehabilitation of approved long term unrehabilitated areas will only be undertaken if the environmental benefits of the rehabilitation method is greater than the environmental costs of the rehabilitation method.</p> <p>Timing: Ongoing.</p>
	Rec-2019-38	<p>That the management recommendations and practices for soil and rehabilitation contained in the approved management plans must continue to be implemented in accordance with the approved plans.</p> <p>Response: Noted.</p> <p>Timing: Ongoing.</p>
S5-3	Rec-2019-39	<p>In future revisions of management plans, check the accuracy of section references in management plan requirements tables of the BMC management plans.</p> <p>Response: Noted.</p> <p>Timing: Ongoing.</p>
	Rec-2019-40	<p>Include an all "Management Plans Requirement" table in the ACHMP, VIMP and HHMP, with references to sections of each management plan where each condition is addressed.</p>

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
S5-4	<p>Rec-2019-41</p>	<p>Response: Noted. Section references will be included when the management plans identified require review according to SSD-5170 Modification 4 Schedule 5 Condition 5.</p> <p>Timing: Ongoing. Management Plans ACHMP, VIMP and HHMP reviewed in 2022 however no changes were required.</p> <p>Include monitoring results of previous years for noise, blast and surface water in future Annual Reviews.</p> <p>Response: Noted. Annual Reviews will be compiled according to the requirements of SSD – 5170 Modification 4 Schedule 5 Condition 4 and the DPIE Annual Review Guideline.</p> <p>Completed and presented in relevant sections of the Bengalla Annual Review.</p>
S5-4	<p>Rec-2019-42</p>	<p>Include a comparison of noise, blast, GHG and surface water results against relevant predictions in the EIS in future Annual Reviews</p> <p>Response: Noted. Annual Review's will be compiled according to the requirements of SSD – 5170 Modification 4 Schedule 5 Condition 4 and the DPIE Annual Review Guideline.</p> <p>Completed and presented in relevant sections of the Bengalla Annual Review.</p>
S5-4	<p>Rec-2019-43</p>	<p>Describe in future Annual Reviews what actions were (or are being) taken to ensure non-compliance/incidents do not occur again.</p> <p>Response: Noted. Annual Reviews will be compiled according to the requirements of SSD - 5170 Modification 4 Schedule 5 Condition 4 and the DPIE Annual Review Guideline.</p> <p>Completed and presented in relevant sections of the Bengalla Annual Review.</p>
S5-4	<p>Rec-2019-44</p>	<p>Include a discussion for trends for air quality, blast, noise and surface water monitoring data in future Annual Reviews.</p> <p>Include in Section 6 Environmental Management & Performance and Section 7 Water Management of future Annual Reviews what measures will be implemented over the next year to improve the environmental performance of the development.</p> <p>Response: Noted. Annual Reviews will be compiled according to the requirements of SSD - 5170 Modification 4 Schedule 5 Condition 4 and the DPIE Annual Review Guideline.</p> <p>Completed and presented in relevant sections of the Bengalla Annual Review.</p>
	<p>EIS & SEE Commitments</p>	

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
8.2.4	Rec-2019-45	<p>Monitor the fuel efficiency of diesel equipment.</p> <p>Response: Noted. BMC seeks to purchase fuel efficient equipment.</p> <p>Timing: Ongoing.</p>
8.19.4	Rec-2019-46	<p>Continue current practices regarding GDP, soil testing and management.</p> <p>Response: Noted.</p> <p>Timing: Ongoing.</p>
8.21.9	Rec-2019-38	<p>(As above) That the management recommendations and practices for soil and rehabilitation contained in the approved management plans must continue to be implemented in accordance with the approved plans.</p> <p>Response: Noted.</p> <p>Timing: Ongoing.</p>
8.21.9	Rec-2019-47	<p>The change of vegetation type in much of the rehabilitation to HDWV means trials on agricultural land rehabilitation will be pushed back several years. There are learnings from current research trials which should be reviewed and adopted in pasture rehabilitation intended for future grazing.</p> <p>Response: Noted.</p> <p>Timing: Later years of mine life.</p>
	Rec-2019-48	<p>Continue monitoring rehabilitation to ensure it is tracking towards final completion criteria.</p> <p>Response: Noted. Monitoring will be undertaken according to the MOP.</p> <p>Timing: Ongoing.</p>
	Rec-2019-50	<p>Conduct in-fill tree planting along Wybong Road.</p> <p>Response: Trees or (similar visual screen) will be planted where reasonable and feasible E.g. when ML 1645 south of the Wybong Road reserve is part transferred to BMC for BMC's use.</p>

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
EPL 3538		Timing: Ongoing likely during 2023.
P1.3	Rec-2019-51	Update "EPL Monitoring Points -Water" figure such that it excludes EPA point 1 and includes EPA points 25 and 26. Response: Current EPL 6538 being varied (Variation due early 2023). Updated Figures for Monitoring Water and Effluent have been included. Timing: Complete.
	Rec-2019-52	Update Water Management Plan (WMP) Figure 4 figure such that it excludes EPA point 1 and includes EPA points 25 and 26. Response: WMP plan will be reviewed according to SSD - 5170 Modification 4 Schedule 5 Condition 5. Timing: Ongoing. WMP to be reviewed where required likely during 2023.
	Mining Leases	
1397 Condition 14	Rec-2019-54	Repair erosion on the south-eastern face of the waste dump. Response: Erosion will be repaired as required according to the MOP. Timing: Ongoing.
ML 1397 & ML 1450, Condition 22, ML 1469, Condition 47	Rec-2019-55	Ensure that Notices are responded to within the required timeframes. Response: BMC will respond to Notices by the agreed time with the Resources Regulator. Timing: Specific to each Notice.

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
ML 1397 (2018), Condition 3	<p>Rec-2019-36</p>	<p>(As above) The MOP should be amended to reflect the rehabilitation staged approach (once agreed) and submitted for approval.</p>
ML 1469, Condition 2,		
ML 1728, Condition 3,		
ML 1711, Condition 3,		
ML 1729, Condition 3.		
ML 1469, Condition 2,	<p>Rec-2019-50</p>	<p>Response: Rehabilitation at Bengalla Mine is undertaken according to the MOP. The MOP is developed according to operational requirements, the relevant guideline and requires approval by Regulators.</p> <p>Timing: Ongoing. Rehabilitation at Bengalla Mine is now undertaken according to the Forward Work Program and the Rehabilitation Management Plan. These documents were prepared in accordance with operational requirements, the relevant guideline and requires approval by Regulators.</p>
ML 1469, Condition 2,		
		<p>Response: Trees or (similar visual screen) will be planted where reasonable and feasible E.g. when ML 1645 south of the Wybong Road reserve is part transferred to BMC for BMC's use.</p> <p>Timing: Ongoing. Likely during 2023.</p>