BENGALLA MINE
ANNUAL REVIEW 2020

BENGALLA

Prepared by:
BENGALLA MINING COMPANY PTY LIMITED
LOCKED BAG 5
MUSWELLBROOK NSW 2333

APRIL 2020

Annual Review Title Block

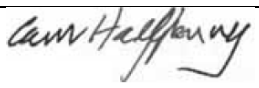
Name of operation	Bengalla Mine
Name of operator	Bengalla Mining Company Pty Limited
Development consent	SSD-5170 (as modified)
Name of holder of development consent	Bengalla Mining Company Pty Limited
Mining Leases	See **Table 6**
Name of holder of mining leases	Bengalla Mining Company Pty Limited
Water licences	See **Table 6**
Name of holder of water licences	Bengalla Mining Company Pty Limited and the Bengalla Joint Venture (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	31 December 2021
Annual Review start date	1 January 2020
Annual Review end date	31 December 2020

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 2020 to 31 December 2020 (as described in Section 1 of this report) and that I am authorised to make this statement on behalf of Bengalla Mining Company Pty Limited.

Note:

a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.

b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications / information/documents—maximum penalty 2 years imprisonment or $22,000, or both).

Name of authorised reporting officer	Cam Halfpenny
Title of authorised reporting officer	General Manager
Date	30/04/2021
Signature of authorised reporting officer	

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ACRONYMS

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
bcm	Bank Cubic Meter
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
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DoEE	Department of Environment and Energy
DoI - Water	NSW Department of Primary Industries – Lands and Water
DPIE	NSW Department of Planning, Industry and Environment
DPIE-RR	NSW Department of Planning, Industry and Environment Resources Regulator
EC	Electrical Conductivity
ED1	Staged Discharge Dam (Approved 2018)
EIS	Environmental impact statement titled *Continuation of Bengalla Mine, Environmental Impact Statement* (6 volumes), dated September 2013, as modified by the *Response to Submissions* dated March 2014
EMS	Environment Management Strategy
EPA	NSW Environment Protection Authority
EPBC	Environment Protection Biodiversity Conservation Approval
EPL 6538	Environment Protection Licence 6538
ERM	Environment Management Resource Pty Limited
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
HHMP	Historic Heritage Management Plan
HRSTS	Hunter River Salinity Trading Scheme
HVAS	High Volume Air Sampler
IEA	Independent Environmental Audit
INP	Industrial Noise Policy (EPA,2000)
LLS	NSW Local Land Services
MAC	Mt Arthur Coal
MACH Energy	MACH Energy Australia Pty Limited
Mbcm	Million Bank Cubic Meters
MEG	Regional NSW, Mining Exploration and Geoscience
ML	Mining Lease (Followed by Number)
ML	Mega Litres (Preceded by Number)
MOD4	SSD-5170 Modification 4
MOP	Bengalla Mine Mining Operations Plan 2017 - 2021
MSC	Muswellbrook Shire Council
Mt	Mega Tonnes
NGER	National Greenhouse and Energy Reporting
NGER Act	National Greenhouse and Energy Reporting Act 2007
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
OEH	NSW Office of Environment and Heritage
Orica	Orica Australia Pty Limited
PE	Pacific Environment Pty Limited
PIN	Penalty Infringement Notice
PIRMP	Pollution Incident Response Management Plan
PM_{10}	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
Regional NSW	Department of Regional NSW
Reporting Period	1 January 2019 - 31 December 2019
RFS	Rural Fire Service
RL	Relative Level
RMP	Rehabilitation Management Plan
RMS	NSW Roads and Maritime Services
ROM	Run of Mine

RTEMS	Real Time Environment Management System
SDD	Stage Discharge Dam (Existing)
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	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
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 performance of Bengalla Mine (Bengalla) over the period 1 January 2020 – 31 December 2020 (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
Environment Protection Licence (EPL) 6538	Yes
Mining Lease (ML) 1397	Yes
ML 1469	Yes
ML 1450	Yes
ML 1711	Yes
ML 1728	No
ML 1729	Yes
Mining Operations Plan 2017-2021 (Amendment A)*	No
Mining Operations Plan 2017-2021 (Amendment B)**	Yes
EPBC Approval 2012/6378	Yes

** Compliance with an approved MOP is a condition of mining leases.*

*** MOP Amendment B approved 28 October 2020 and addendum approved 22 December 2020.*

Table 2: Non-Compliance Risk Matrix

Risk Level	Risk Level	Description
High	**High**	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	**Medium**	Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur

Low	**Low**	Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur
Administrative non-compliance	**Administrative non-compliance**	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions).

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

Table 3: Non- Compliances in the Reporting Period

Approval	Cond. #	Condition Description (Summary)	Non-compliance Status*	Comment	Section described in this Annual Review
SSD-5170	Schedule 3, Condition 20	Requirement to implement an approved Air Quality Management Plan (AQMP)	Non-compliant (Low Risk)	During 2020, DPIE issued an Official Caution and Warning Letter regarding an alleged failure to comply with the AQMP on the following dates and times: • 12 May 2018 at 14:17 • 7 August 2018 at 12:01 and 12:17 • 30 March 2019 at 16:19	See **Section 11.1.1** for further comments
SSD-5170	Schedule 3, Condition 12	Requirement to commission property investigation within 2 months of receiving claim by an owner of privately-owned land that buildings and/or structures have been damaged as a result of blasting on site	Administrative non-compliance	On 22 October 2020, DPIE issued a Warning Letter regarding an alleged failure to respond within 2 months to a claim by an owner of privately-owned land about blasting damage.	See **Section 11.1.2** for further comments
MLs 1450, 1469, 1397, 1711, 1728 and 1729	Condition 2 of MLs 1450 and 1469 and Condition 3 of MLs 1397, 1711,	Requirement to comply with an approved Mining Operations Plan (MOP)	Non-compliant (Low Risk)	On 15 May 2020, the Resources Regulator issued an Official Caution regarding an alleged failure to comply with MOP Amendment A regarding topsoil management procedure	See **Section 11.1.3** for further comments

Approval	Cond. #	Condition Description (Summary)	Non-compliance Status*	Comment	Section described in this Annual Review
	1728 and 1729			and progressive rehabilitation schedule for 2017 and 2018.	
ML1728	Schedule 1	Mining lease is for mining purposes and has a depth restriction of 20 metres	Non-compliant (Low Risk)	On 24 September 2020, the Resources Regulator issued an Official Caution regarding an exploration open chip drill hole drilled on ML 1728 (which is from surface to depth of 20m and for mining purposes only).	See **Section 11.1.4** 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 Ltd (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 1A**.

On 7 August 1995, BMC was 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. DA 211/93 was surrendered to DPIE in December 2016.

On 3 March 2015, the Secretary of what is now the Department of Planning Industry and Environment (DPIE), as delegate for the Minister for Planning, granted State significant development consent 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, four modifications to SSD-5170 have been approved.

The approved Bengalla layout is shown on **Figure 2**, mining leases held by BMC are shown on **Figure 2A** and an overview of the Bengalla environmental monitoring network is shown on **Figure 3**.

2.2 DOCUMENT PURPOSE

This Annual Review summarises the environmental performance of Bengalla for the Reporting Period. 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 requirements of the '*Annual Review Guideline, Post-Approval requirements for State significant mining developments'* (NSW Government, 2015).

On 26 March and 30 March 2021 respectively, the DPIE and Resources Regulator granted an extension of time in which to submit this Annual Review until 30 April 2021.

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 shall review the environmental performance of the development for the previous calendar year to the satisfaction of the Secretary. This review must:	This document
a) describe the development (including any rehabilitation) that was carried out in the past calendar year, and the development that is proposed to be carried out over the current calendar year;	**Section 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: • 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)	
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: 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**

Document	Where Addressed
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)	
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**
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**
ML1711, 1728 and 1729 (Condition 3(f))	
The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must: 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 at www.resources.nsw.gov.au/environment. *Note: The Rehabilitation Report replaces the Annual Environmental Management Report.*	**Section 8**
ML1397 (Condition 3(f))	
The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must: 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 at	**Section 8**

Document	Where Addressed
www.resourcesandenergy.nsw.gov.au/miners-andexplorers/rules-and-forms/pgf/environmental-guidelines	

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 1A: Muswellbrook Locality

Figure 2: Approved Site Layout

Figure 2A: Bengalla Mine Mining Leases

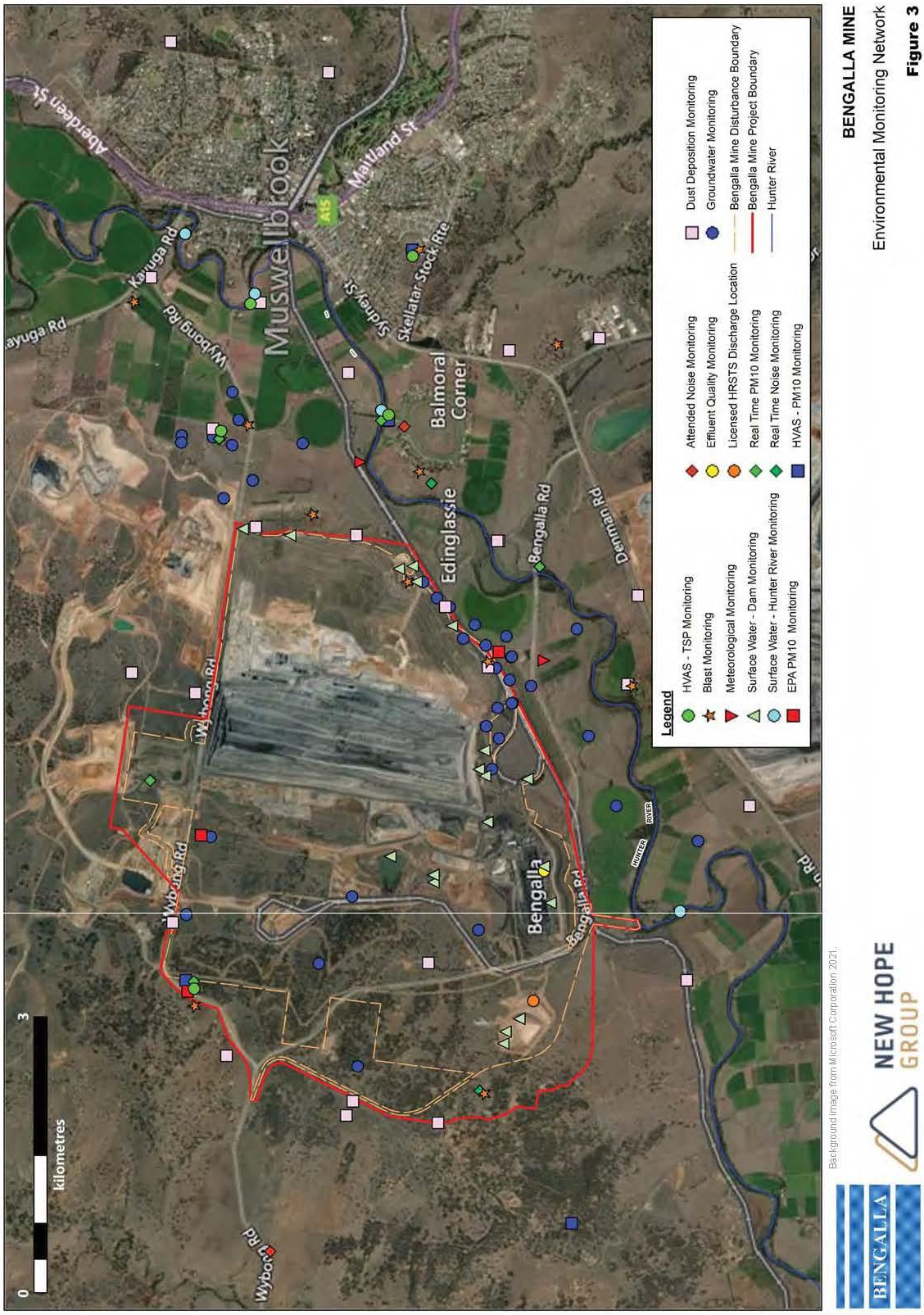


Figure 3: Environmental Monitoring Network

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*	DPIE
Development Consent SSD-5170 MOD 1 – approved 16 December 2015	03/03/2015 – 28/02/2039	DPIE
Development Consent SSD-5170 MOD 2 – approved 1 July 2016	03/03/2015 – 28/02/2039	DPIE
Development Consent SSD-5170 MOD 3 – approved 23 December 2016	03/03/2015 – 28/02/2039	DPIE
Development Consent SSD-5170 MOD 4 – approved 19 December 2018	03/03/2015 – 28/02/2039	DPIE
DA 273/2006 – Explosives Facility	06/09/2006 – Perpetuity	MSC
Environment Protection and Biodiversity Conservation (EPBC) Act 1999 Cth Approval 2012/6378	27/05/2015 – 31/12/2050	DAWE
ML 1397	27/06/1996 – 27/06/2038	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
EPL 6538	Anniversary Date 11 September	EPA
Mining Operations Plan (MOP) 2017 – 2021 Amendment A	08/11/2017 – 28/10/2020	RR
Mining Operations Plan (MOP) 2017 – 2021 Amendment B	28/10/2020 – 31/12/2021 (MOP Amendment B addendum approved 22/12/20)	RR
WAL 1106**	Tenure Continuing	Water NSW
WAL 41547 (formerly 20BL169798)**	Tenure Continuing	Water NSW
20PE001354 (Hunter Pump River Permit)	01/05/1997 – Annual Renewal	Water NSW

Document	Approval Period(s)	Authority
XSTR100151 (Licence to Store Explosives)	Expiry date: 10/01/2023	SafeWork NSW
5061036 (Radiation Management Licence)	Expiry date: 08/08/2021	EPA

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

*** WAL 1106 is for the Hunter Regulated River Water Source (High Security with 1,449 units). WAL 41547 is for the Sydney Basin-North Coast Groundwater Source (category aquifer with 365 units) authorising extraction of groundwater from the pit. These are the main WALs used in connection with take of water for mining operations at Bengalla. The Bengalla Joint Venturers and BMC also hold other WALs for various water sources.*

3.2 PENDING APPLICATIONS AT END OF REPORTING PERIOD

There are no pending applications to modify SSD-5170.

An application for an amendment to MOP Amendment B was submitted to the Resources Regulator on 2 December 2020.

3.3 VARIATIONS

Following application by BMC, the Environment Protection Authority (EPA) issued a Notice of Variation of Environment Protection Licence (EPL) 6538 on 12 August 2020. The variation included amendment of the premises boundary due to changes in property management and property ownership between Bengalla and Mt Pleasant Mine.

Following application by BMC, the Natural Resources Access Regulator issued an amendment to Water Access Licence (WAL) 41547 on 14 September 2020 which increased the volumetric entitlement from 125 units to 365 units.

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
Environmental Management Strategy ^	3 April 2020
Air Quality Management Plan ^	18 August 2017
Noise Management Plan ^	27 May 2019
Water Management Plan	1 February 2019
Blast Management Plan	18 August 2017
Biodiversity Management Plan	18 August 2017
Biodiversity Offset Management Plan	18 August 2017
MOP 2017-2021 Amendment B	28 October 2020 (addendum to MOP Amendment B approved 22 December 2020)

Management Strategy / Plan	Regulatory Approval
Aboriginal Cultural Heritage Management Plan	18 August 2017
Historic Heritage Management Plan	18 August 2017
Visual Impact Mitigation Plan	14 June 2016

^ *Currently under review by DPIE*

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

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 2021.

4.1 MINING OPERATIONS

During 2020, 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 2019 and 2020 and forecast volumes for 2021.

Table 8: Production and Waste Summary

Material	Unit	Approved Limit	Previous Reporting Period (2019 Actual)	This Reporting Period (2020 Actual)	Next Reporting Period (2021 Plan)
Waste Rock / Overburden [1.]	Mbcm	-	55.1	50	50.67
ROM Coal	Mt	15	12.5	11.96	12.90
Reject Material [2.]	Mt	-	2.6	2.51	2.51
Saleable Product	Mt	-	10.0	9.68	10.11

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

4.2 OTHER OPERATIONS

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

Other operations at Bengalla during the Reporting Period included:

- ***Exploration***: BMC drilled a total of 71 boreholes in 2020. Eight boreholes were fully cored (4 were tested for coal quality, 4 were cored for geotechnical investigations), with the remaining boreholes open hole chipped. 70 holes were drilled within ML1397, ML1729 and ML1645.

  The majority of the boreholes were drilled to the base of the Edderton coal seam, with 2 holes drilled to the base of the Edinglassie coal seam and 4 drilled shallow for

geotechnical investigations. The pre-production drilling program was suspended in November 2020 due to business requirements, and will likely resume in H2 of 2021, with initial planning targeting a mixture of core and chip holes in ML1397, ML1645 (now ML 1796) and ML1729.

During 2020, an exploration open chip drill hole was erroneously drilled 13 metres outside of ML 1397 within ML 1728 (a mining lease for mining purposes). Further information is provided in **Section 11.1.4**.

- ***Coal Transport***: During the Reporting Period 9,655,629 t of product coal was generally transported via rail to the Port of Newcastle.

  The total number of train movements during the Reporting Period was 1,110 with a maximum of 8 train movements per day.

- ***Infrastructure, Construction and Management***: The following projects were commenced, progressed or completed during the Reporting Period:
  - Construction of a new maintenance pad.
  - Decommissioning of Bengalla's old Staged Discharge Dam (SDD)

4.3 NEXT REPORTING PERIOD

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

- Continued mining westward.
- Relocation of various infrastructure to facilitate the progression of mining.
- Pre-production drilling program may continue dependent upon COVID-19 restrictions.
- Rehabilitation according to the Mining Operations Plan.

A summary of key environmental approval and management activities proposed for 2021 is provided in **Section 12**.

5 ACTION REQUIRED FROM PREVIOUS ANNUAL REVIEW

BMC received correspondence from the DPIE on 27 May 2020, requesting additional information to be supplied to support the 2019 Annual Review.

These actions are summarised in **Table 9**.

Table 9: Response to DPIE Request for Information (2019 Annual Review)

Action Required from Previous Annual Review	Requested By	Action Taken	Location in Annual Review
Include train movements consistent with Coal Transport Report 2019	DPIE	2019 Annual Review updated and resubmitted	Section 4.2
Include an analysis of the effectiveness of waste minimisation and management	DPIE	2019 Annual Review updated and	Section 6.7

Action Required from Previous Annual Review	Requested By	Action Taken	Location in Annual Review
measures implemented during the reporting period		resubmitted	
Include a presentation and commentary on biodiversity offset monitoring results	DPIE	2019 Annual Review updated and resubmitted	Section 6.12
Provide additional information on weed management undertaken in the Biodiversity Offset Areas	DPIE	2019 Annual Review updated and resubmitted	Section 6.13
Include the outcomes of pig baiting program on site near Bengalla train loadout facility	DPIE	2019 Annual Review updated and resubmitted	Section 6.13
Include a summary of all management actions undertaken for the heritage sites identified in the Historic Heritage management Plan (i.e. not only Bengalla and Overdone Homesteads)	DPIE	2019 Annual Review updated and resubmitted	Section 6.11
Include outcomes from the annual independent dilapidation survey reports for Bengalla and Overdene Homesteads	DPIE	2019 Annual Review updated and resubmitted	Section 6.11
Include outcomes of annual inspections conducted for all historic heritage sites	DPIE	2019 Annual Review updated and resubmitted	Section 6.11
Include updates on the status of all ongoing short term management actions identified in the Conservation Management Plans for Overdene and Bengalla Homesteads	DPIE	2019 Annual Review updated and resubmitted	Section 6.11
Include an outline of key issues identified during the year that may affect successful rehabilitation	DPIE	2019 Annual Review updated and resubmitted	Section 8
Include a summary of rehabilitation activities proposed for the next reporting period	DPIE	2019 Annual Review updated and resubmitted	Section 8
Include a brief summary of any actions undertaken or proposed as an outcome of the complaints received	DPIE	2019 Annual Review updated and resubmitted	Section 9.3

A response was supplied to the DPIE Portal on 28 July 2020.

The 2019 Annual Review (Table 24) identified various actions for 2020. Information about those actions and current status is in **Table 10** below.

Table 10: Actions Required from 2019 Annual Review

Action Required from 2019 Annual Review	Requested By	Action Taken	Location in Annual Review
Implementation of updated Air Quality monitoring network (subject to approval of submitted Air Quality Management Plan)	Operator	Awaiting approval from DPIE to revised Air Quality Management	Section 6.4.3

Action Required from 2019 Annual Review	Requested By	Action Taken	Location in Annual Review
		Plan before implementing updated monitoring network	
Decommission Stage Discharge Dam	Operator	The old Stage Discharge Dam was decommissioned in June 2020.	Section 4.2
Responses to regulatory notices	DPIE RR	Notices were responded to by BMC.	Section 11
Response to 2019 Independent Environmental Audit (IEA) (Schedule 5, Condition 9 of SSD-5170)	DPIE	BMC provided the IEA Report to DPIE for review. Following the DPIE review a further IEA Report was provided to DPIE in November 2020.	Section 10 and Appendix K
Undertake reviews of management plans in response to 2019 IEA and scheduled review periods as required	DPIE	Management Plans were reviewed according to SSD-5170 Schedule 5 Condition 5	Section 3.4
Progress Denman Road tree screening (Schedule 3, Condition 40 of SSD-5170)	DPIE	Replacement tree planting occurred along Roxburgh Road	Section 6.14.2
Progress long-term security of biodiversity offset areas (Schedule, Condition 28 of SSD-5170)	DPIE	Discussions have been held with National Parks and Wildlife Service regarding the offset properties being added to the National Estate. A result of those discussions is that the Biodiversity Offset Management Plan is to be separated on a geographic property basis. Draft separated plans have been developed.	Table 10

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 2021 are also described.

Surface water and groundwater environmental management and performance are discussed in ***Section 7.2*** *and* ***Section 7.3****, respectively. Rehabilitation performance 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 13/02/2020, 4/5/2020, 10/9/2020, 21/11/2020, 1/12/2020 and 3/12/2020.

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 the 2020 meteorological data is included as **Appendix A**.

6.1.3 Further Actions

There are no additional actions planned for 2021 regarding meteorological monitoring.

6.2 NOISE

6.2.1 Environmental Management

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

Three methods of noise monitoring are utilised at Bengalla, including:

- Compliance attended noise monitoring;
- Supplementary attended monitoring; and
- Unattended (Real-time) Monitoring.

As described in the NMP, BMC focuses its assessment of noise during the night period (i.e. 9pm to 7am).

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 4**).

The NMP outlines the applicable criterion for the three monitoring locations. Operational noise (Bengalla alone and cumulatively with other sources) 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 for night periods. Measurements are recorded by trained BMC personnel at the same locations as for compliance attended monitoring.

Note: 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 shown **Figure 4**.

Note: 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 2020 compliance criteria and compliance attended noise monitoring results is provided in **Appendix B**.

Ten complaints relating to noise were received during the Reporting Period (see **Section 9.3**).

Trend over Life of Project

Average noise levels at AN01 and AN03 remain within the noise compliance criterion. Noise levels indicate no substantial changes have occurred and no significant trends have occurred from 2018. A slight increase was recorded at AN04 however the noise levels at this monitoring location remained within the compliance criterion see **Table 11**.

Table 11: 2018-2020 Noise Trends

Location	Noise Criteria dBA	BMC Only LAeq dBA		
		2020	2019	2018
AN01	35	27	27	26
AN03	40	30	27	30
AN04	35	34	29	28

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, Conditions 1, 2 and 3 of SSD-5170, BMC is required to implement reasonable and feasible noise mitigation measures upon receiving written request

by the owner of relevant residences listed in SSD-5170. No requests were received under SSD-5170 during the Reporting Period.

6.2.3 Further Actions

BMC will continue to review the NMP in accordance with MOD 4. Should amendments to the NMP be required, BMC will then lodge the revised NMP with relevant regulatory agencies for comment.

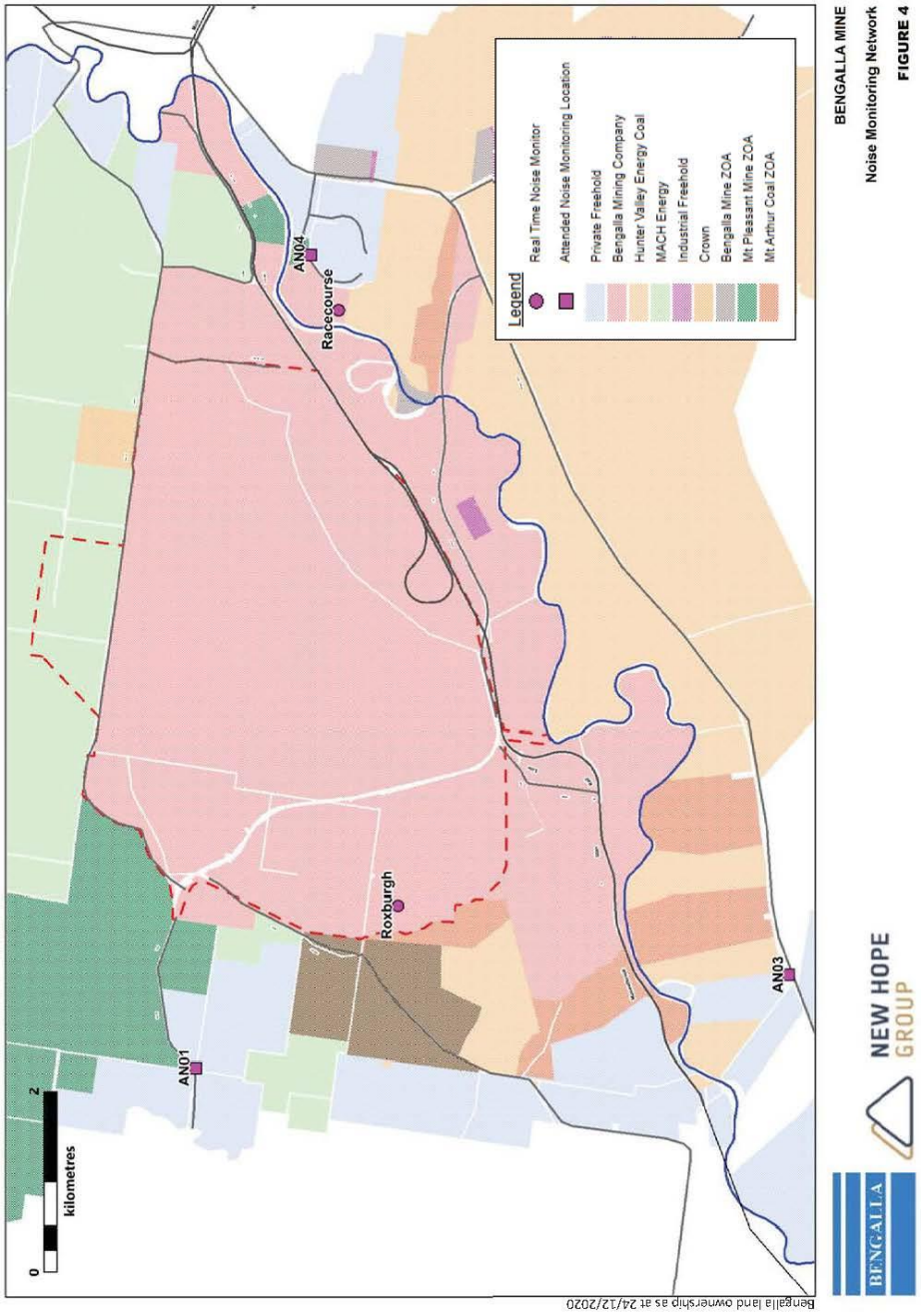


Figure 4: Noise Monitoring Locations

6.3 BLASTING

6.3.1 Environmental Management

BMC has developed and implements the approved Blast Management Plan (BMP), which sets out procedures for blast monitoring and management at Bengalla. Fume generation is managed in accordance with BMC's Post Blast Fume Generation Mitigation and Management Plan.

6.3.2 Environmental Performance

Blast Monitoring Program

Schedule 3, Condition 10 of SSD-5170 allows a maximum of 2 blasts per day and 6 blasts per week, averaged over a calendar year (except in certain circumstances). A blast refers to a single blast event, which may contain a number of individual blasts. A total of 164 blast events comprising 195 individual blasts occurred during the Reporting Period averaging 3.15 blast events per week. Blast overpressure and vibration criteria are presented in **Table 12**, with monitoring locations shown on **Figure 5**.

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 (see **Table 12**)**.**

Blast Monitoring Results

A summary of blast performance for the Reporting Period is provided in **Table 13** with monitoring results for locations representative of private receivers included in **Appendix C**. During the Reporting Period, results from the blast monitors on non-mine owned land did not exceed relevant criteria for overpressure or ground vibration.

Two fume events occurred at Bengalla during the Reporting Period, categorised as Level 3 events. There were no significant fume events (i.e. over level 3C against the AEISG fume rating system) during the Reporting Period. One complaint was received regarding a fume event. This blast was classified as a localised event in accordance with the Post Blast Fume Generation Mitigation and Management Plan and was not a reportable incident.

Trend and Comparison to Assessment Predictions

Table 13 details the 2020 blast performance as compared to 2019 and 2018. A review of blast monitoring measurements over the period 2018 – 2020 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 over pressure criteria. The blasting results in Appendix C show no exceedances of the blast criteria for compliance monitors.

6.3.3 Further Actions

No additional blasting actions are planned for implementation in 2021.

Table 12: 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		
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	-

**Mine owned locations used as an internal management tool.*

Table 13: Blast Performance Summary 2018-2020

	2020		2019		2018	
Blast Summary	**Number of Blasts**	**% of Blasts**	**Number of Blasts**	**% of Blasts**	**Number of Blasts**	**% of Blasts**
Total blasts	195		199		182	
Average number of blasts per week	3.75		3.6		2.7	-
Days with 2 blast events	4	2	4	2	29	21
Number of road closures – Wybong Road	30	15	45	24	35	25
Number of road closures – Bengalla Road	0	0	0	0	0	0
Number of rail loop closures	7	3	0	0	2	1
Number of blast events within SDD Notification Area (1)	49	25	74	39		

	2020		2019		2018	
Blast Summary	**Number of Blasts**	**% of Blasts**	**Number of Blasts**	**% of Blasts**	**Number of Blasts**	**% of Blasts**
Number of blast events within CW1 Notification Area	66	34	67	36		
Number of blast events within ED3 Notification Area [(2)]	55	35	N/A	N/A	N/A	N/A
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 % ≥5mm/sec))	1	<0.01	1	<0.5	1	<1
• Private Receivers Monitoring Locations Overpressure (120dB)	0	0	0	0	0	0
• Private Receivers Monitoring Locations Overpressure (5% ≥115dB)	3	0.02	0	0	4	3
• 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 Overpressure (120 dB)	0	0	0	0	0	0
• Historic Heritage Site Monitoring Locations Overpressure (5% ≥115dB)	2	0.01	3	1	0	0
• ARTC Infrastructure (100 mm/sec)	0	0	0	0	0	0
Blast result capture rate, all non-mine owned monitors	195	100	199	100	182	100

	2020		2019		2018	
Blast Summary	**Number of Blasts**	**% of Blasts**	**Number of Blasts**	**% of Blasts**	**Number of Blasts**	**% of Blasts**
Fume events (≥ Rating 3)	2	0.01	1	<0.5	1	<1

(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 is 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.

6.4 AIR QUALITY

6.4.1 Environmental Management

BMC has developed and implements the approved Air Quality Management Plan (AQMP), which sets out procedures for the management of odour, fume, 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 (PM_{10}), 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. As described further below, EPL 6538 also requires air quality monitoring for PM_{10} at certain locations.

Bengalla's air quality monitoring network is shown in **Figure 6** and comprises:

- One meteorological station and an inversion tower;
- Eight real-time air quality monitors (four E-Bam monitors and four DustTrak monitors), six of which are linked to the RTEMS;
- Nine High Volume Air Samplers (HVAS) with five measuring TSP and four measuring PM_{10}; and
- 27 Depositional Dust Gauges of which 14 are compliance gauges.

A meteorological forecast is received daily to assist in the planning of mine operations.

BMC is required to monitor PM_{10} at EPA22, EPA23 and EPA24 in accordance with EPL 6538.

BMC operates nine HVAS, one of which (PM10-3) is located on land owned by Hunter Valley Energy Coal Pty Limited, the operator of Mt Arthur Coal (MAC). Monitoring of TSP and PM_{10} via the HVAS is a measure of compliance against the criteria in SSD-5170. Measurements are sampled every six days for a continuous 24-hour period.

PM2.5 is monitored through the Upper Hunter Air Quality Monitoring Network – Muswellbrook monitor.

Of the 27 dust deposition gauges monitored by BMC, 14 are situated on land representative of the closest private residences and are used to measure compliance against the criteria in SSD-5170.

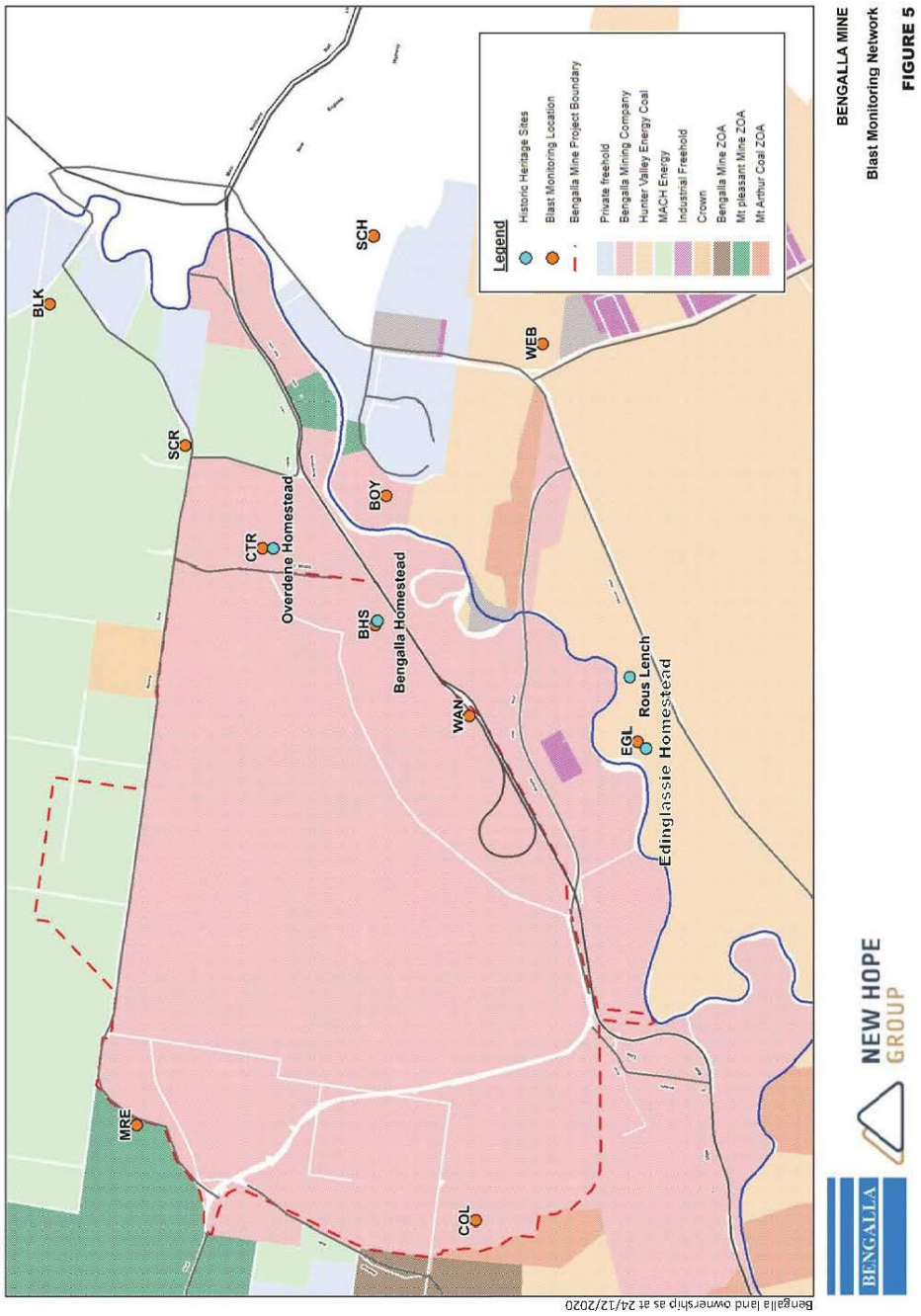


Figure 5: Blast Monitoring Locations

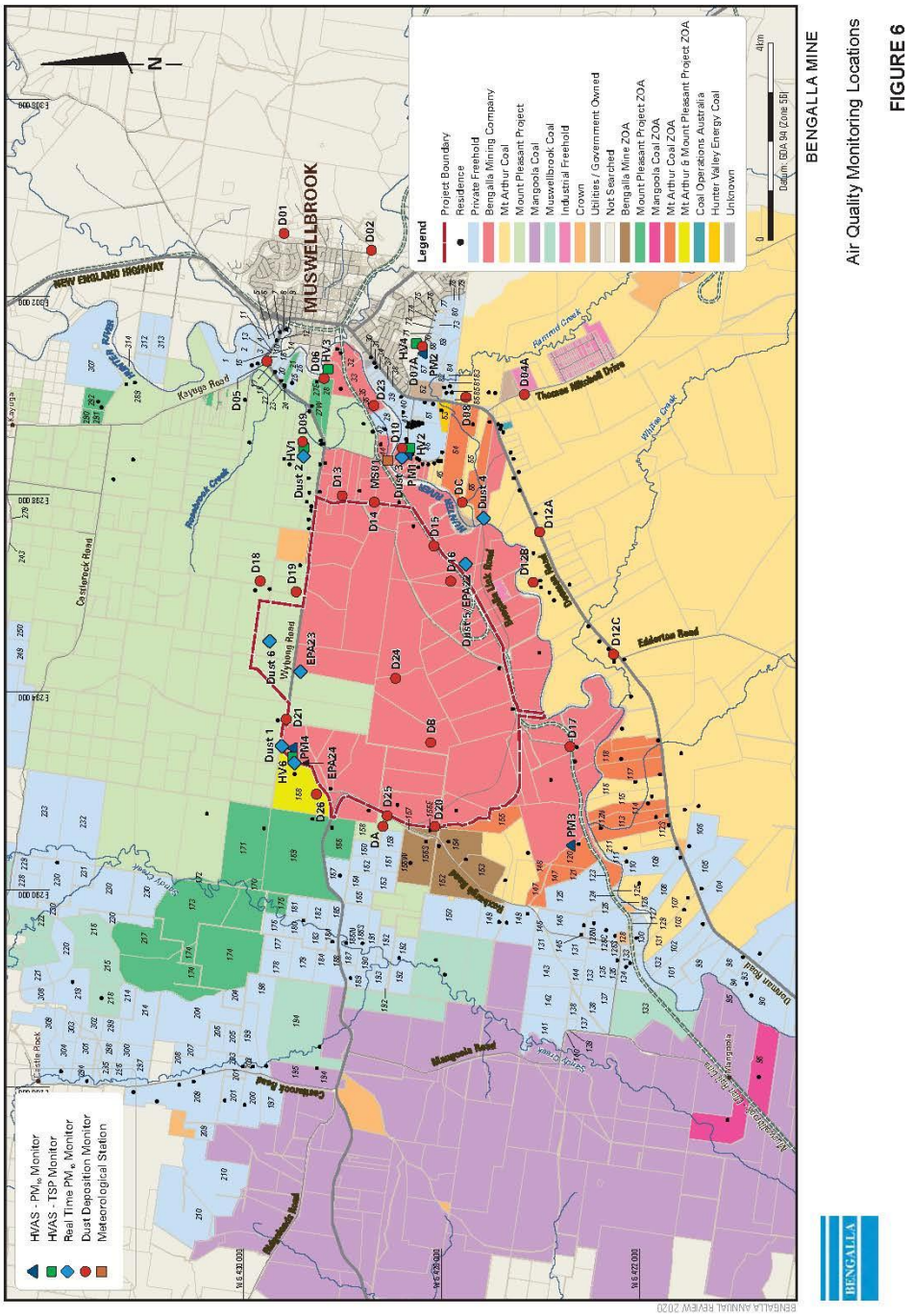


Figure 6: Air Quality Monitoring Locations

Air Quality Monitoring Results

Elevated annual average air quality measurements were recorded at various monitors for 2020. DPIE was notified and an independent air quality expert was engaged to prepare an investigation report. The expert analysed monitoring and other relevant data to determine Bengalla's compliance with the annual average air quality criteria in Schedule 3 Condition 16 of SSD-5170 for 2020. Further comments on the annual average air quality monitoring results for deposited dust, TSP, PM10 and PM2.5 and the independent expert's conclusions are set out below. In all cases, the expert concluded that BMC had complied with Schedule 3 Condition 16.

Elevated PM10 24 hour measurements were also recorded at various monitors on various dates during the Reporting Period. DPIE was notified on each occasion and an independent 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** and **Appendix I**.

Detailed air quality monitoring results for 2020 are included in **Appendix D**.

- Deposited Dust

Table 14 details annual average deposited dust results for the Reporting Period (and for the previous two years) for the 14 compliance dust deposition gauges representative of the closest private residences. At the end of the Reporting Period, the annual average deposited dust level recorded at one location (D20) was above the cumulative criterion (4g/m2/month) but was within the maximum incremental criterion (2g/m2/month).

The independent expert estimated that Bengalla's contribution to the 2020 annual average deposited dust level at D20 would have been approximately 0.3g/m²/month or 8% of the total level of 4.5g/m²/month and was below the relevant incremental deposited dust criterion.

The independent expert concluded that Bengalla was unlikely to have had a significant contribution to the annual average deposited level as D20 was not down wind of the mine for any appreciable time during high wind conditions. The report concluded that localised sources of dust, such as nearby areas of little ground cover around the monitor, primarily contributed to the elevated deposited dust level measured at this location during 2020.

Table 14: Summary of Deposited Dust Annual Average Monitoring Results

Site	Annual Average Deposited Dust Criteria (g/m²/month)	2020 Annual Average Deposited Dust (g/m²/month)	2019 Annual Average Deposited Dust (g/m²/month)	2018 Annual Average Deposited Dust (g/m²/month)
D01	4.0	1.2	1.6	1.3
D02	4.0	2.4	1.9	1.9
D04A	4.0	3.0	2.7	2.9
D05	4.0	2.5	2.6	2.2
D06	4.0	2.7	3.8	2.8

Site	Annual Average Deposited Dust Criteria (g/m²/month)	2020 Annual Average Deposited Dust (g/m²/month)	2019 Annual Average Deposited Dust (g/m²/month)	2018 Annual Average Deposited Dust (g/m²/month)
D07A	4.0	2.6	2.2	2.2
D08	4.0	1.8	2.1	2.0
D09	4.0	3.0	3.7	2.6
D10	4.0	3.5	3.8	3.0
D20	4.0	4.5*2	<1.5*1	4.6
D23B	4.0	2.0	2.0	1.8
D25	4.0	3.2	3.1	3.2
D26	4.0	3.2	2.5	2.5
DA	4.0	3.7	2.5	2.7

(1) Bengalla's estimated maximum potential contribution to the annual average deposited dust as determined by Todoroski Air Sciences (2020). The total measurement for this monitor in 2019 was 4.4/g/m2/month.

(2) As notified to DPIE by BMC on 14/1/2021 after receipt of air quality monitoring results for the 2020 calendar year.

- Total Suspended Particulates

Table 15 details annual average TSP monitoring results for the Reporting Period (and for the previous two years). At the end of the Reporting Period, the annual average TSP level recorded at one location (HV6) was above the cumulative criterion (90 µg/m³).

The relevant criterion excludes extraordinary events. The independent expert identified that 5 HVAS run days in 2020 occurred during extraordinary events. When extraordinary event days are excluded, the TSP level at HV6 was below the annual average criterion of 90µg/m³ (it was 87.7 µg/m³ for 2020). Accordingly, Schedule 3 Condition 16 of SSD-5170 was complied with.

Table 15: Summary of Annual Average TSP Monitoring Results

The applicable annual average criterion for TSP is 90 µg/m$^{3.}$

Site	Period	2020 Annual Average TSP (µg/m³)	2019 Annual Average TSP (µg/m³)*	2018 Annual Average TSP (µg/m³)
HV1	All run days	74.0	123.5	94.3
	Excluding extraordinary events	69.1	102.2	
HV2	All run days	70.2	112.5	91.4
	Excluding extraordinary events	62.6	87.0	
HV3	All run days	50.9	85.2	69.7
	Excluding extraordinary events	45.1	65.3	
HV4	All run days	58.8	95.1	71.5
	Excluding extraordinary events	53.2	72.9	

Site	Period	2020 Annual Average TSP (µg/m³)	2019 Annual Average TSP (µg/m³)*	2018 Annual Average TSP (µg/m³)
HV6	All run days	96.5**	142.6	112
	Excluding extraordinary events	87.7	117.6	

(1) * 2019 annual average air quality results for TSP are reported on in the 2019 Annual Review.

(2) ** As notified to DPIE 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 91.7ug/m3.

- Particulate Matter <10 Microns (PM10) and <2.5 Microns (PM2.5)

Table 16 presents PM_{10} annual average monitoring results for the Reporting Period and the previous two years.

The cumulative annual average PM_{10} concentration for the Reporting Period was below the annual average criterion (25µg/m³) at PM10-2.

The cumulative annual average PM_{10} concentrations for the Reporting Period were above the annual average criterion at PM10-1, PM10-3 and PM10-4. The relevant criterion excludes extraordinary events. The independent expert determined that when extraordinary events are excluded the annual average PM_{10} concentrations at PM10-1 and PM10-3 are below the criterion.

The annual average PM_{10} concentration at PM10-4 remained above the criterion when extraordinary events are excluded. The annual average PM_{10} concentration at the nearest private receiver to PM10-4 was determined to be below the criterion.

Particulate matter less than 2.5 microns ($PM_{2.5}$) monitoring commenced at the Muswellbrook Racecourse area in June 2020, however there is insufficient data to calculate the annual average for 2020.

As detailed in the approved AQMP, 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 9.3 µg/m³ (above the criterion of 8 µg/m³). The independent expert identified that the measurement excluding extraordinary events was 8.6 µg/m³. The expert concluded that the measurement was primarily impacted by smoke and would have exceeded the criterion regardless of Bengalla's contribution. Bengalla's estimated contribution was small (0.4 µg/m³) and consistent with the approved modelling for MOD 4.

Table 16: Summary of Annual Average PM10 Monitoring Results

The applicable annual average criterion for PM10 is 25 µg/m$^{3.}$

Site	Period	2020 Annual Average PM_{10} (µg/m^3)	2019 Annual Average PM_{10} (µg/m^3)*	2018 Annual Average PM_{10} (µg/m^3)
PM_{10}-1	All Run days	25.7	49.3	33.3
	Excluding extraordinary events	21.9	33.6	
PM_{10}-2	All Run days	22.7	37.9	27.1
	Excluding extraordinary events	20.0	26.6	
PM_{10}-3	All Run days	26.5	38.7	27.5
	Excluding extraordinary events	23.8	26.1	
PM_{10}-4	All Run days	32.0**	48.9	38.2
	Excluding extraordinary events	27.3	37.0	

(1) * 2019 annual average air quality results for PM10 are reported on in the 2019 Annual Review.

(2) ** As notified to DPIE 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 PM10-4 was 29.3 ug/m3.

Trend and Comparison to Assessment Predictions

Table 15 and **Table 16** present the annual average air quality monitoring results for TSP and PM10 respectively against the criteria over the 2018 – 2020 period. The cumulative measurements have generally decreased over the three year period. The decrease may be attributed to increased rainfall in 2020 compared to drought conditions which were experienced throughout the previous two years.

The air quality expert's report concluded that the results from the Bengalla air quality monitoring network are generally consistent with the air quality modelling for MOD 4 Year 4.

Private Residence Mitigation

During the Reporting Period, there were no written requests for the installation of additional air quality mitigation received from any owner of privately-owned residences the subject of mitigation rights in SSD-5170.

6.4.3 Further Actions

BMC reviewed the current AQMP during 2019/2020 with each amendment being submitted to DPIE for review. BMC will continue to seek approval of the AQMP.

6.5 SPONTANEOUS COMBUSTION

Occurrences of spontaneous combustion are 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 CHPP 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 reportable spontaneous combustion incidents were recorded at Bengalla during the Reporting Period.

6.5.3 Further Actions

There are no additional actions planned for 2021 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 17**).

Table 17: 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

In the 2019 – 2020 FY reporting period BMC's NPI report included 31 substances.

The NPI reporting threshold for emissions and transfers was triggered for 27 of the 31 reportable substances.

National Greenhouse and Energy Reporting

During the 2019 - 2020 financial year (FY) reporting period Bengalla emitted 600,786 t CO_2-e (Scope 1 and Scope 2).

The results for FYs 2018 – 2020 are presented in **Table 18** and **Table 19**.

Table 18: Energy Consumed and Produced FY 2018 to 2020

Energy	2020	2019	2018
Consumed (GJ)	2,819,739	2,652,682	2,504,231
Produced (GJ)	279,633,222	246,485,436	248,063,567

Table 19: Greenhouse Gas Emissions FY 2018 to 2020

Greenhouse Gas Emissions	2020	2019	2018
Scope 1 (tCO_2-e)	538,857	465,015	425,713
Scope 2 (tCO_2-e)	61,929	60,108	61,274
Total (tCO_2-e)	**600,786**	**525,123**	**486,987**

Comparison to Predictions

Appendix G of the EIS contains summaries of the estimated annual CO_2-e emissions. During the 2019-2020 FY greenhouse gas emissions were below that predicted for each of Years 4 and 5 of the Project (Bengalla) in Table 17-4 for both Scope 1 and Scope 2 emissions.

6.6.3 Further Actions

BMC will review its emissions against its calculated 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 2020 was 1,834 tonnes. A total of 1,408 tonnes was recycled, representing 77% of the total waste. These figures remained generally consistent with 2018 and 2019. **Table 20** details non-mineral waste tonnes for the period 2018 to 2020.

Table 20: Non-mineral Waste Management

	2020	2019	2018
Total (T)	1,834	1,875	1,653
Recycled (T)	1,408	1,458	1,295

6.7.2 Environmental Performance

A total of 1,834 t of non-mineral waste was disposed of in 2020 being predominantly general waste, pallecons, oily rags and oily water.

The major waste streams recycled at Bengalla in 2020 were 506 t waste oil, 17 t grease, 17 t batteries, 27 t oil filters, 700 t scrap metal and 62 t timber. This volume represents approximately 77% of the non-mineral waste generated at Bengalla during 2020.

Several waste streams are re-used where practicable such as IBC's. 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. The total volume of the waste streams reported above for 2020 is generally below the EIS predictions.

The trend for the period 2018 – 2020 was generally consistent.

6.7.3 Further Actions

There are no anticipated additional actions to normal waste management practice planned for 2021 regarding the management of non-mineral waste.

6.8 MINERAL WASTE

6.8.1 Environmental Management

Management of mineral waste at Bengalla in 2020 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 2020 (and the previous two years) are summarised in **Table 8**.

Comparisons to Assessment Predictions and Trends

The trends for waste rock from 2018 to 2020 are heavily influenced by operational decisions. For example, the Dragline was shut for approximately 3 months during 2020 which impacted waste rock movement. It is anticipated that similar volumes will occur for 2021 relative to 2020.

The EIS predicted at Year 4 overburden removal of 55 Mbcm.

The waste volume referenced in Table 8 is below what was predicted in the EIS due to operational decisions and constraints.

6.8.3 Further Actions

There are no additional actions planned for 2021 regarding the management of mineral waste.

6.9 CONTAMINATED LAND

6.9.1 Environmental Management

Land contamination may occur as a result of hydrocarbon or other chemical spills. BMC implements controls for hydrocarbon and chemical management and has a Pollution Incident Response Management Plan in place.

6.9.2 Environmental Performance

During the Reporting Period, there were no non-compliances relating to the management of hazardous materials and contaminated land.

6.9.3 Further Actions

There are no additional actions planned for 2021 regarding the management of contaminated land.

6.10 ABORIGINAL ARCHAEOLOGY AND CULTURAL HERITAGE

6.10.1 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).

6.10.2 Environmental Performance

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

Activities involving ground disturbance in 2020 were subject to prior assessment for potential impacts to Aboriginal archaeology as part of Bengalla's Ground Disturbance Permit (GDP) process.

During the Reporting Period one Aboriginal artefact was discovered. The site was investigated by a suitably qualified professional and was managed in accordance with the procedure for previously unrecorded Aboriginal objects detailed in the ACHMP.

6.10.3 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 DPIE.

6.11 NON-ABORIGINAL HERITAGE

6.11.1 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. Five sites are located within the Project Boundary and four are located adjacent to the Project Boundary. Photos of the sites are presented in **Appendix J**.

6.11.2 Environmental Performance

Annual inspections are undertaken at each site. Annual dilapidation surveys are conducted at the two most significant heritage sites, Bengalla Homestead and Overdene Homestead. These were conducted on 8 December 2020. The results of the inspections and surveys are summarised below.

Bengalla Homestead

The 2020 dilapidation survey of Bengalla Homestead and associated buildings concluded that there appeared to be no further major degradation since the 2019 survey.

Externally the condition of the homestead and service wing remained stable and the building was generally in good repair. There was some minor cracking of the brickwork mortar joints under the western windows of the service wing however these have not changed significantly since the 2019 inspection. Full renovation of the interior of the book-keepers' cottage continues to be required and externally the building was generally in a good state of repair.

The renovated cottage service building and garden shed were in a good state of repair. The condition of the other structures remains consistent with the 2019 inspection including the hayshed, tool shed, steel water tower and stable.

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

Overdene Homestead

The 2020 dilapidation survey of Overdene Homestead concluded that there appeared to be no further major degradation since the 2019 inspection.

Historic works including the replacement of the roof sheeting and diversion of stormwater away from the building appeared to be successful 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. Internally, the condition of the cottage appeared to be stable. The veranda flooring and roof framing, sheeting and flashings continue to require reinstatement. Installation of a new floor system, restoration of windows, doors and internal walls remains to be completed.

A summary of the 2020 maintenance and preservation works completed by BMC at the Bengalla and Overdene Homesteads is presented in **Table 21**.

Keys Family Private Cemetery

An annual inspection was undertaken on the Keys Family Private cemetery in June 2020. The cemetery was in good condition with headstones remaining in good condition with no evidence of vandalism or deterioration.

Appendix J contains photos from the inspection.

Stockyards

An annual inspection was undertaken of the Stockyards in June 2020. The area was fenced and signage was erected. The area was also slashed. The stockyards remain in good condition.

Appendix J contains photos from the inspection.

Old Bengalla

An annual inspection was undertaken of Old Bengalla in July 2020. The existing sandstone wall remains in good condition. The area was fenced and signage erected.

Appendix J contains photos from the inspection.

House Site 1

An annual inspection was undertaken of House Site 1 in July 2020. The site was fenced and signage was erected. Weed control was also undertaken.

Appendix J contains photos from the inspection.

House Site 2

An annual inspection was undertaken of House Site 2 in July 2020. The site was fenced and signage was erected. No further work was required.

Appendix J contains photos from the inspection.

House Site 3

An annual inspection was undertaken of House Site 3 in July 2020. The site was fenced and signage was erected. Weed control was also undertaken.

Appendix J contains photos from the inspection.

Blunts Butter Factory

An annual inspection was undertaken of Blunts Butter Factory in July 2020. Fencing around the site remained in good condition. Signage was erected. No further works were required.

Appendix J contains photos from the inspection.

Table 21: Short Term Maintenance of the Bengalla and Overdene Homesteads 2020

Reference	Maintenance	Response	Status
BENGALLA HOMESTEAD			
Whole Complex			
HHMP Appendix C, Section 7.3	3 monthly termite inspections	Termite inspections and bait stations were monitored and repaired during 2020.	Ongoing
Building 1 – Homestead and Service Wing			
HHMP Appendix C, Section 7.3	Quarterly testing of fire management system	The Bengalla Homestead has been fitted with a mains smoke detection alarming system, which notifies BMC of any potential incidents allowing for response to be initiated from BMC. These systems are checked monthly. 2 CCT cameras have been fitted to the Homestead to monitor the area. The Service wing has had interior changes to allow the building to be used as accommodation. Rooms 17 and 18 are being used as a master bedroom and a sitting room. Rooms 21 and 22 are being used as a master bedroom and sitting room. Room 20 has been divided by a false wall to allow 2 ensuites to be installed for each space. The fabric of the building has been preserved by using false walls to house the services and keep the original architraves and windows in place.	Complete
Building 3 – Underground Cistern			
HHMP Appendix C, Section 7.3	Maintain to prevent further deterioration.	No maintenance works were undertaken during 2020. Building inspections were carried out in accordance with the HHMP.	Ongoing

Reference	Maintenance	Response	Status
Building 5 – Toilet/Shower			
HHMP Appendix C, Section 7.3	Undertake minimal maintenance to ensure stability of building	No maintenance was undertaken in 2020. Weed control and gutter clean was undertaken as required. Building inspections were carried out in accordance with the HHMP.	Ongoing
Building 6 – Gazebo			
HHMP Appendix C, Section 7.3	Quarterly inspection to ensure guttering is functioning and draining adequately	No maintenance was undertaken in 2020. Weed control and gutter clean was undertaken as required. Building inspections were carried out in accordance with the HHMP.	Ongoing
Building 7 – Laundry			
HHMP Appendix C, Section 7.3	Retain any salvageable materials, including the laundry sink and bricks, for reuse elsewhere on site or for reconstruction. Materials to be stored in a suitable location with protection from the elements.	No maintenance was undertaken in 2020. Weed control and gutter clean was undertaken as required. Building inspections were carried out in accordance with the HHMP.	Complete
Building 8 – Book-keeper's Cottage			
HHMP Appendix C, Section 7.3	Stabilise footing defects.	No maintenance was undertaken in 2020. Weed control and gutter clean was undertaken as required. Building inspections were carried out in accordance with the HHMP.	Complete
Building 9 – Tennis Court			
HHMP Appendix C, Section 7.3	Maintain in current condition.	Lawn and grounds maintenance undertaken as required. New fencing has been installed near the main entry to the homestead and between the homestead and cottage.	Ongoing
Building 12 – Modern Water-Tower			
HHMP Appendix C, Section 7.3	Maintain to prevent further deterioration	No maintenance was undertaken in 2020. Weed control and inspection was undertaken as required.	Ongoing
Building 13 – Stockyards			
HHMP Appendix C, Section 7.3	Maintain in current condition.	No maintenance was undertaken in 2020. Weed control was undertaken as required.	Ongoing

Reference	Maintenance	Response	Status
OVERDENE HOMESTEAD			
External			
HHMP Appendix D, Section 6.4	Treat termites and/or other pests appropriately.	Termite inspections and bait stations were inspected and serviced throughout 2020.	Ongoing
HHMP Appendix D, Section 6.4	Repair damage caused by termites, where integral to structural integrity.	No maintenance was undertaken in 2020. Building inspections were carried out in accordance with the HHMP.	Ongoing
HHMP Appendix D, Section 6.4	Check and repair/replace, if necessary, the roof, all downpipes, guttering and drainage gullies for leaks and to ensure free-flowing drainage.	No maintenance was undertaken in 2020. Building inspections were carried out in accordance with the HHMP.	Ongoing
HHMP Appendix D, Section 6.4	Repair mortar where necessary, internally and externally.	No maintenance was undertaken in 2020. Building inspections were carried out in accordance with the HHMP.	Ongoing
Internal			
HHMP Appendix D, Section 6.4	Undertake a detailed inspection of the foundations and rectify/repair, including hall archway and fireplace in Room 3.	No maintenance was undertaken in 2020. Building inspections were carried out in accordance with the HHMP.	Ongoing

6.11.3 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 DPIE for approval.

Under the HMMP, structural inspections of Bengalla Homestead and Overdene Homestead are required every 5 years. Those inspections are due during 2021.

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

6.12 FLORA & FAUNA

6.12.1 Environmental Management

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

6.12.2 Environmental Performance

Onsite Biodiversity Management and Mitigation

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

Appendix E includes a summary of commitments from the BDMP against activities undertaken during the Reporting Period and an annual compliance report against the conditions of EPBC Approval 2012/6378 (EPBC Compliance Report). No non-compliances were identified.

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

Offsite Biodiversity Management and Mitigation

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

Appendix E includes a summary of commitments from the BOMP against activities undertaken during the Reporting Period and an EPBC Compliance Report. No non-compliances were identified.

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 7**.

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;
- Fire trail maintenance across Kenalea, Echo, Kenalput and Black Mountain BOAs; and

- Summer and Winter ecological surveys.

BMC attended various meetings with stakeholders including adjoining private neighbours, National Parks and Wildlife Services, Local Land Services, various Wild Dog Associations and the Rural Fire Service.

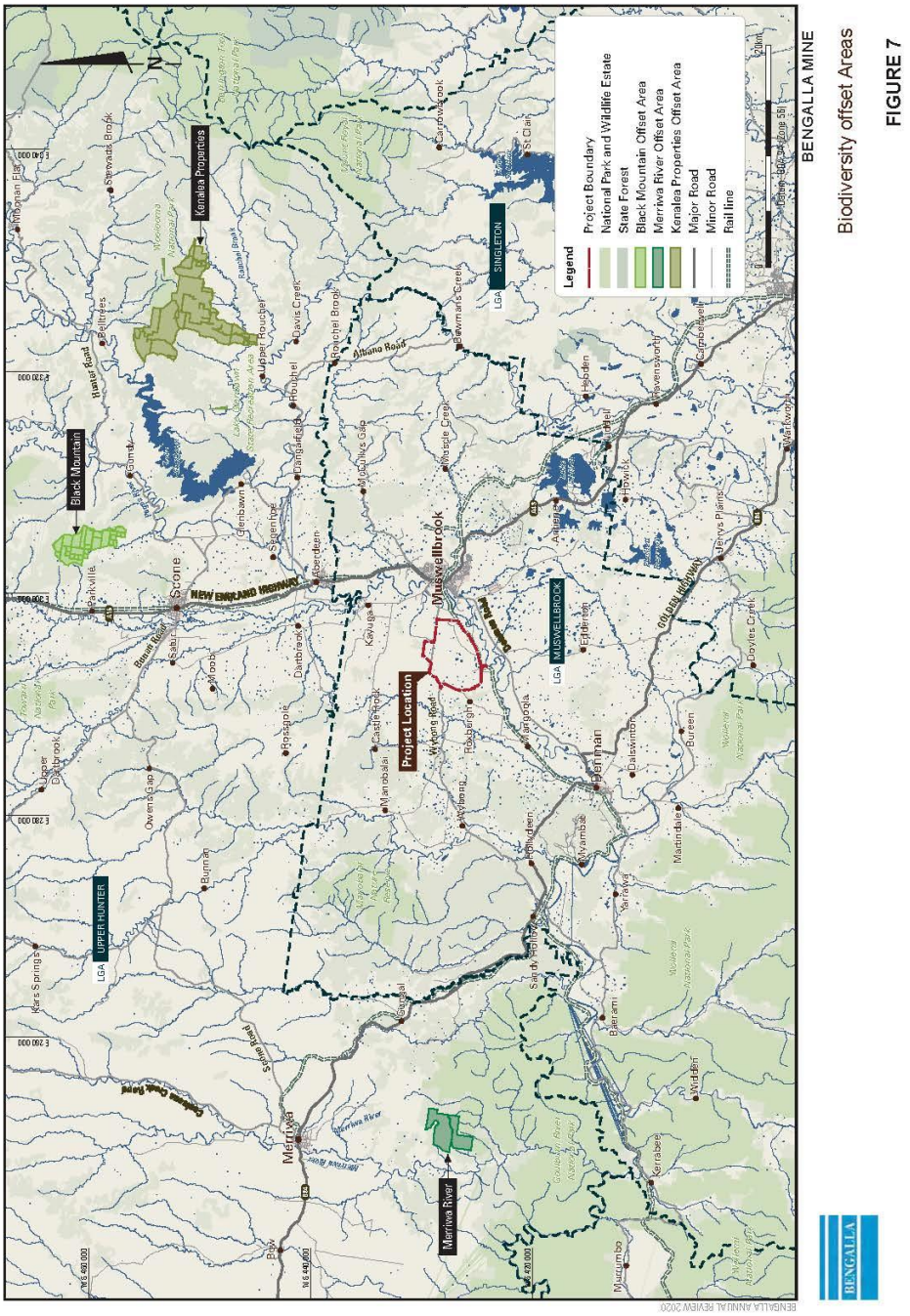


Figure 7: Biodiversity Offset Areas

Biodiversity Offset Area Ecological Surveys

The ecological monitoring program of the BOAs commenced in 2016 following the grant of SSD-5170. A total of 28 permanent flora monitoring sites were established and 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. **Table 22** compares the measurable indicators and performance criteria for Year 5 against the results of Year 4 (2020) annual monitoring.

Given that the monitoring program is still in its early stages, few measurable changes in survey results were detected in Year 4 annual monitoring. The majority of woodland sites are within or above benchmark for most values and the majority of the Year 5 performance criteria have consistently been met at many of the monitoring sites.

Table 22: Assessment Against Performance Criteria

KPI / Measurable Indicators	Year 5 Performance Criteria	Results of Year 4 (2020) 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	Ten of 19 monitoring sites recorded an equal or greater native plant species richness compared to baseline. Of the nine sites where native species richness was below baseline numbers, only one is below benchmark values.
% Native over-store cover (NOS)	Maintenance of current cover	Thirteen of 19 monitoring sites recorded an equal or greater native over storey cover compared to baseline. Of the six sites where native over storey was below baseline numbers, five are also below benchmark values.
% Native mid-storey cover (NMS)	Maintenance of current cover	Sixteen of 19 monitoring sites recorded an equal or greater native mid-storey cover compared to baseline. Of the three sites where native mid-storey cover was below baseline numbers, all three are also below benchmark values.
% Native ground cover (grasses) (NGCG)	Maintenance of cover above lower benchmark	One of 19 monitoring sites recorded an equal or greater native ground cover (grasses) compared to baseline. However, all of the 19 monitoring sites are above lower benchmark for native ground cover (grasses).
% Native ground cover (shrubs) (NGCS)	Maintenance of current cover	Five of 19 monitoring sites recorded an equal or greater native ground cover (shrubs) compared to baseline. Of the 14 sites where native ground cover (shrubs) was below baseline numbers, eight are also below benchmark values.
% Native ground cover (other natives) (NGCO)	Maintenance of current cover above lower benchmark	Fourteen 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).

KPI / Measurable Indicators	Year 5 Performance Criteria	Results of Year 4 (2020) Monitoring
% Exotic plant cover	Weed cover not increased above baseline	Ten of 19 monitoring sites recorded an equal or lower exotic plant cover compared to baseline.
% overstorey regeneration (OR)	100%	Seven of 19 monitoring sites have 100% regeneration of all canopy species present, and eleven 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 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	Ten of 19 monitoring sites recorded an equal or greater length of fallen logs compared to baseline. Of the nine sites where length of fallen logs was below baseline numbers, all are also below benchmark values.
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 50% of lower benchmark	All six monitoring sites recorded native species richness at least 50% of lower benchmark.
% Native over-storey cover (NOS)	No change expected in 5 years	Native over-storey cover absent from monitoring sites. Changes expected over a longer timeframe.
% Native mid-storey cover (NMS)	Increase to at least 50% of lower benchmark	Native mid-storey cover absent from monitoring sites. Changes expected over a longer timeframe.
% Native ground cover (grasses) (NGCG)	Maintenance of cover within benchmark range	Five of six monitoring sites within benchmark range for native ground cover (grasses), four of which exceed the upper benchmark.
% Native ground cover (shrubs) (NGCS)	Increase to at least 50% of lower benchmark	One of six monitoring sites with native ground cover (shrubs) at least 50% of lower benchmark. Changes expected over a longer timeframe.
% Native ground cover (other natives) (NGCO)	Increase to at least 50% of lower benchmark	All six monitoring sites with native ground cover (other natives) at least 50% of lower benchmark, all six sites exceed upper benchmark.
% Exotic plant cover	Weed cover not increased above baseline	Two of six monitoring sites recorded an equal or decreased weed cover compared to baseline, which may be the result of wet conditions preceding surveys.
% overstorey regeneration (OR)	No change expected in 5 years	No significant change observed. Changes expected over a longer timeframe.
Number of trees with hollows (NTH)	No change expected in 5 years. Maintenance of trees with hollows.	No significant change observed. Changes expected over a longer timeframe.
Total length (m) of fallen logs (FL)	No change expected in 5 years	Four of six monitoring sites recorded a greater or equal length of fallen logs compared to baseline.

KPI / Measurable Indicators	Year 5 Performance Criteria	Results of Year 4 (2020) Monitoring
Zone 3 – Riparian (Rebuild/improve riparian corridors; protect waterways. Aim to increase to benchmark condition)		
Total native species richness (NPS)	Increase to at least 50% of lower benchmark	All monitoring sites at least 50% of lower benchmark for native species richness.
% Native over-storey cover (NOS)	No change expected in 5 years	All monitoring sites within benchmark range for native overstorey cover.
% Native mid-storey cover (NMS)	Increase to at least 50% of lower benchmark	Zero of three monitoring sites at least 50% of lower benchmark for native mid-storey cover. Changes expected over a longer timeframe.
% Native ground cover (grasses) (NGCG)	Increase to at least 50% of lower benchmark	All monitoring sites at least 50% of lower benchmark for native ground cover (grasses), two of three monitoring sites exceed upper benchmark.
% Native ground cover (shrubs) (NGCS)	Increase to at least 50% of lower benchmark	One monitoring site at least 50% of lower benchmark for native ground cover (shrubs).
% Native ground cover (other natives) (NGCO)	Increase to at least 50% of lower benchmark	All monitoring sites at least 50% of lower benchmark for native ground cover (other natives).
% Exotic plant cover	Weed cover not increased above baseline	Two of three monitoring sites recorded an equal or decreased weed cover compared to baseline.
% overstorey regeneration (OR)	No change expected in 5 years	No significant change observed. Changes expected over a longer timeframe.
Number of trees with hollows (NTH)	No change expected in 5 years. Maintenance of trees with hollows.	Two of three monitoring sites exceed benchmark for number of trees with hollows.
Total length (m) of fallen logs (FL)	No change expected in 5 years	All 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	No change predicted.	No significant change observed. Changes expected over a longer timeframe.
Increase in site context value	No change predicted.	No significant change observed. Changes expected over a longer timeframe.
Derived Native Grassland		
Increase in site condition value	Native species richness to increase to at least 50% of lower benchmark.	All monitoring sites with native species richness at least 50% of lower benchmark.
	Native ground cover (shrubs) to increase to	Ten monitoring sites with native ground cover (shrubs) at least 50% of lower benchmark. Changes expected over a longer timeframe.

KPI / Measurable Indicators	Year 5 Performance Criteria	Results of Year 4 (2020) Monitoring
	at least 50% of lower benchmark.	
	Native ground cover (other natives) to increase to at least 50% of lower benchmark.	All monitoring sites with native ground cover (other natives) at least 50% of lower benchmark.
Increase in site context value	No change predicted.	No significant change observed. Changes expected over a longer timeframe.
Threatened Species		
Tiger Orchid: - Maintenance of resident species populations and existing habitat for species. - Increase in suitable habitat and increase in species populations and area of occupancy.	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.
Squirrel Glider: - Maintenance of resident species populations and existing habitat for species. - Increase in suitable habitat and increase in species populations and area of occupancy.	- Increase in the extent and condition of habitat - Continued detection of the species	Species detected during surveys, likely due to an increased arboreal survey period for one IR camera. No obvious increase in area and condition. Changes expected over a longer timeframe.
Spotted-tailed Quoll: - Maintenance of resident species populations and existing habitat for species. - Increase in suitable habitat and increase in species populations and area of occupancy.	- Increase in the extent and condition of habitat - Continued detection of the species	Species recorded at one location within the Kenalea Properties. No obvious increase in area and condition. Changes expected over a longer timeframe.
Threatened Microbats: - Maintenance of resident species populations and existing habitat for species. - Increase in suitable habitat and increase in species populations and area of occupancy.	- Increase in the extent and condition of habitat - Continued detection of the species	Several species recorded at several locations within the Biodiversity Offset Areas. No obvious increase in area and condition. Changes expected over a longer timeframe.
Woodland Birds:	- Increase in the extent and condition of habitat	Six threatened woodland birds recorded within Black Mountain and Merriwa River.

KPI / Measurable Indicators	Year 5 Performance Criteria	Results of Year 4 (2020) Monitoring
- Maintenance of resident species populations and existing habitat for species. - Increase in suitable habitat and increase in species populations and area of occupancy.	- Continued detection of the species	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.
Regent Honeyeater and Swift Parrot: - Maintenance of resident species populations and existing habitat for species. - Increase in suitable habitat and increase in species populations and area of occupancy.	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.
Weeds		
Weed density and distribution	Weed cover not increased above baseline	Changes to exotic species richness variable across the Biodiversity Offset Areas. Primarily a decrease in weed density was observed compared to baseline, however it is likely the wet weather during and following the survey period will lead to an increased weed density in the short-term.
Weed diversity	Weed diversity not increased above baseline	No significant changes to weed species diversity observed.
Significant target weed infestations	Significant target weed infestations not increased above baseline	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	No increase from the baseline feral animal abundances	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.
Habitat disturbance by feral animals	No increase from the baseline feral animal disturbance levels	No significant disturbance observed at the monitoring sites.

There were no proposed measures recommended as a result of the 2020 annual monitoring program to improve the performance of rehabilitation and restoration activities within the Biodiversity Offset Areas.

Bushfire Hazard Reduction Burns

No hazard reduction burns occurred in the Reporting Period.

6.12.3 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 DPIE and DAWE.

6.13 WEEDS AND PEST MANAGEMENT

6.13.1 Environmental Management

Weed and pest management at Bengalla and its 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.

6.13.2 Environmental Performance

Weed Management

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

- ***Bengalla***

During 2020, approximately 106 ha was treated for the management of weeds. Target weed species included African boxthorn, galenia, prickly pear and other weeds. Priority areas for treatment included the rehabilitation areas and topsoil stockpiles.

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 11**.

- ***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 daily work records of site attendance are submitted which detail the sites treated, area (ha) treated, techniques and chemicals utilised and rates of application. **Figure 8, Figure 9** and **Figure 10** show locations of weed control in each of the offset areas.

The chemicals to be utilised are based on their effectiveness depending on the type of weeds present. Chemicals used during 2020 include Grazon Extra, MCPA 750 and Garlon 600.

The weeds controlled included prickly pear, Paterson's curse, blue heliotrope, African boxthorn and several environmental weeds were sprayed across each offset area. Riparian zone weeds were also treated in Kenalea and Echo including noogoora burr and thorn apple. Lantana was on Echo and was addressed. St John's Wort was also addressed in Kenalea, Echo 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 above the long-term average for 2020 which contributed to the increase of several weed populations and the ensuing level of control required.

An inspection was also undertaken on Kenalea, Echo and Black Mountain offsets in December 2020 by an Upper Hunter Weeds Authority Weeds Inspector, assessing St John's Wort control and other weed controls in place. The subsequent report delivered to BMC indicated control methods used were effective with good results being achieved. It was recommended the current controls be continued.

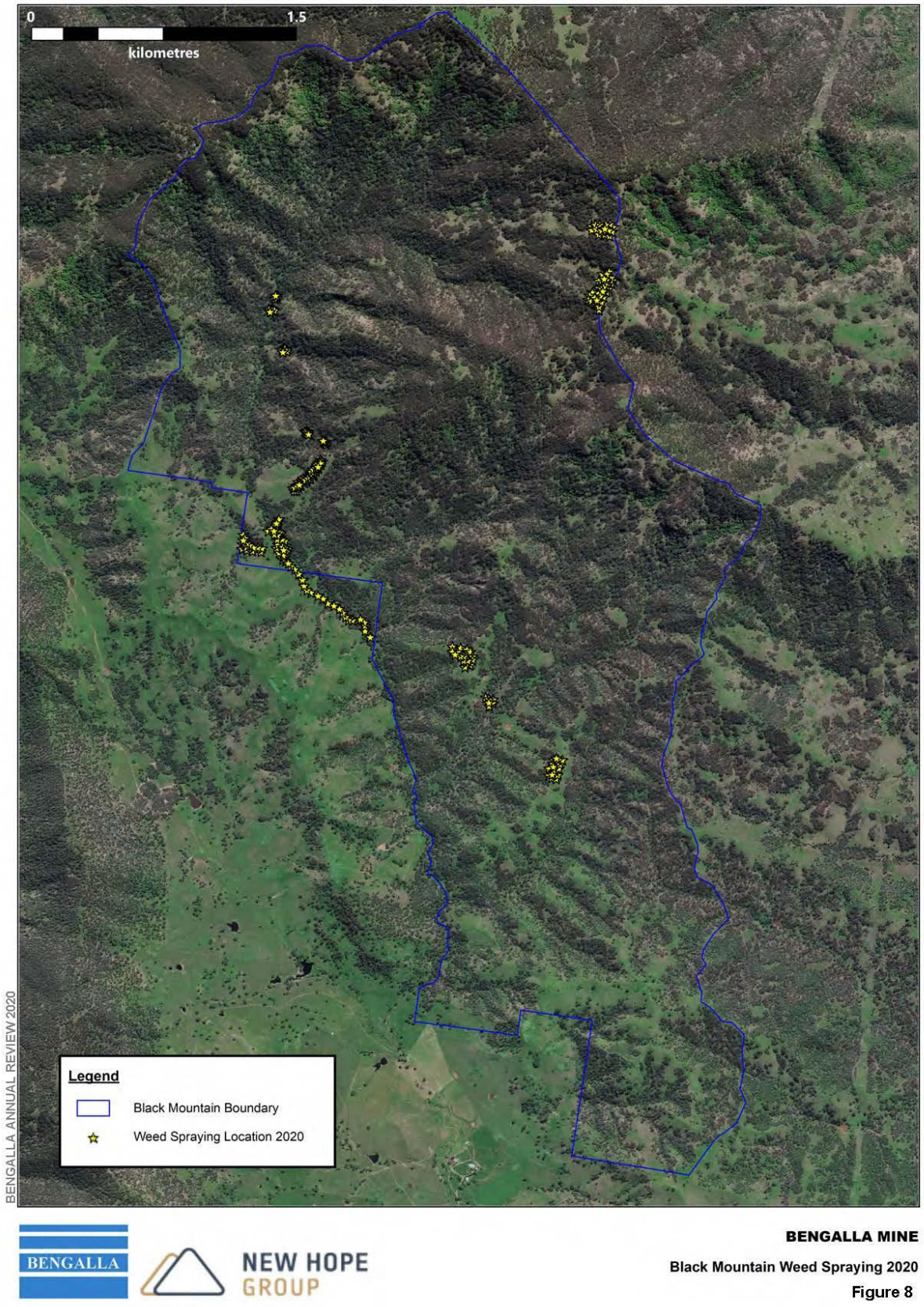


Figure 8: Black Mountain Weed Management Locations 2020

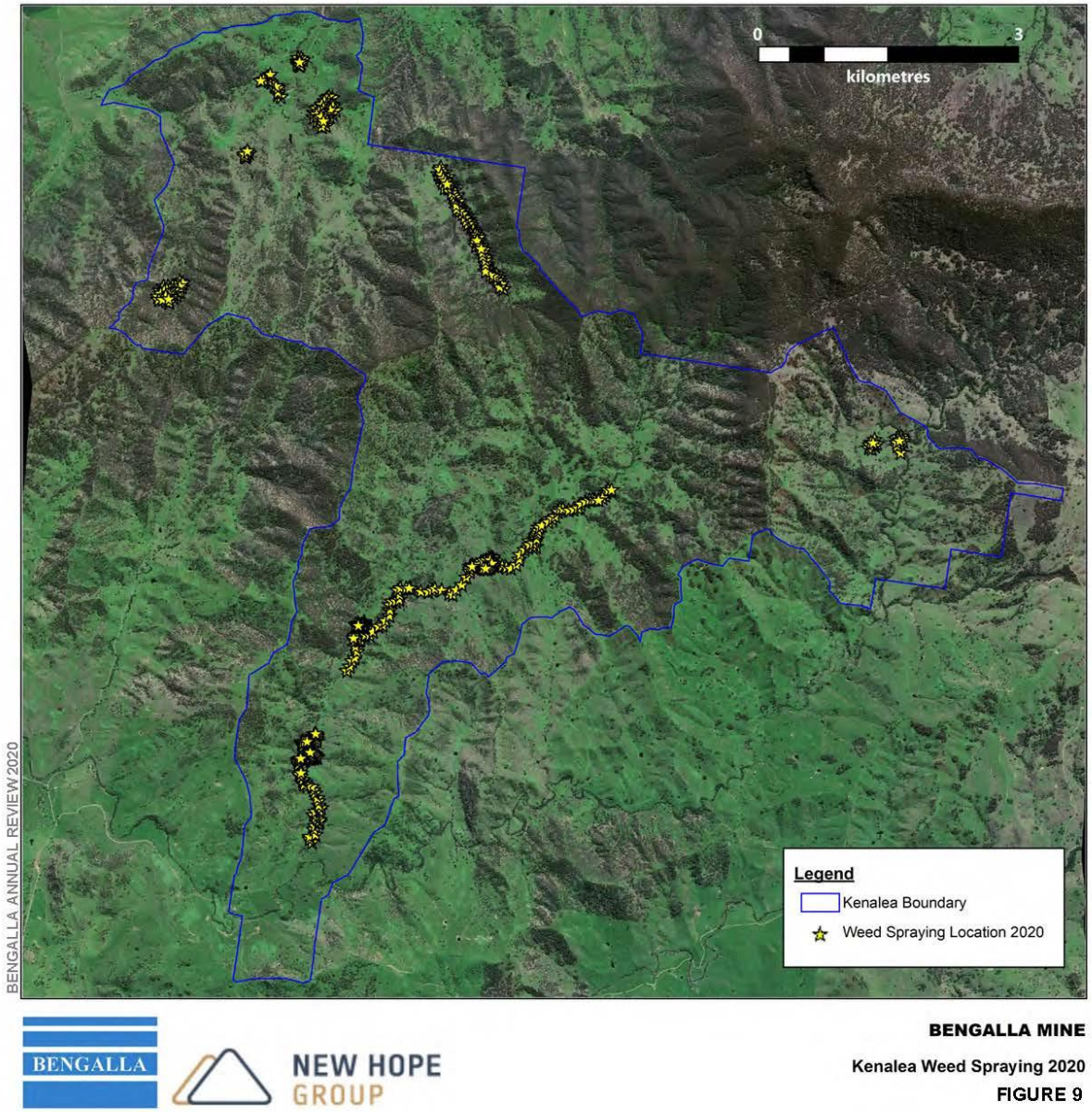


Figure 9: Kenalea Weed Management Locations 2020

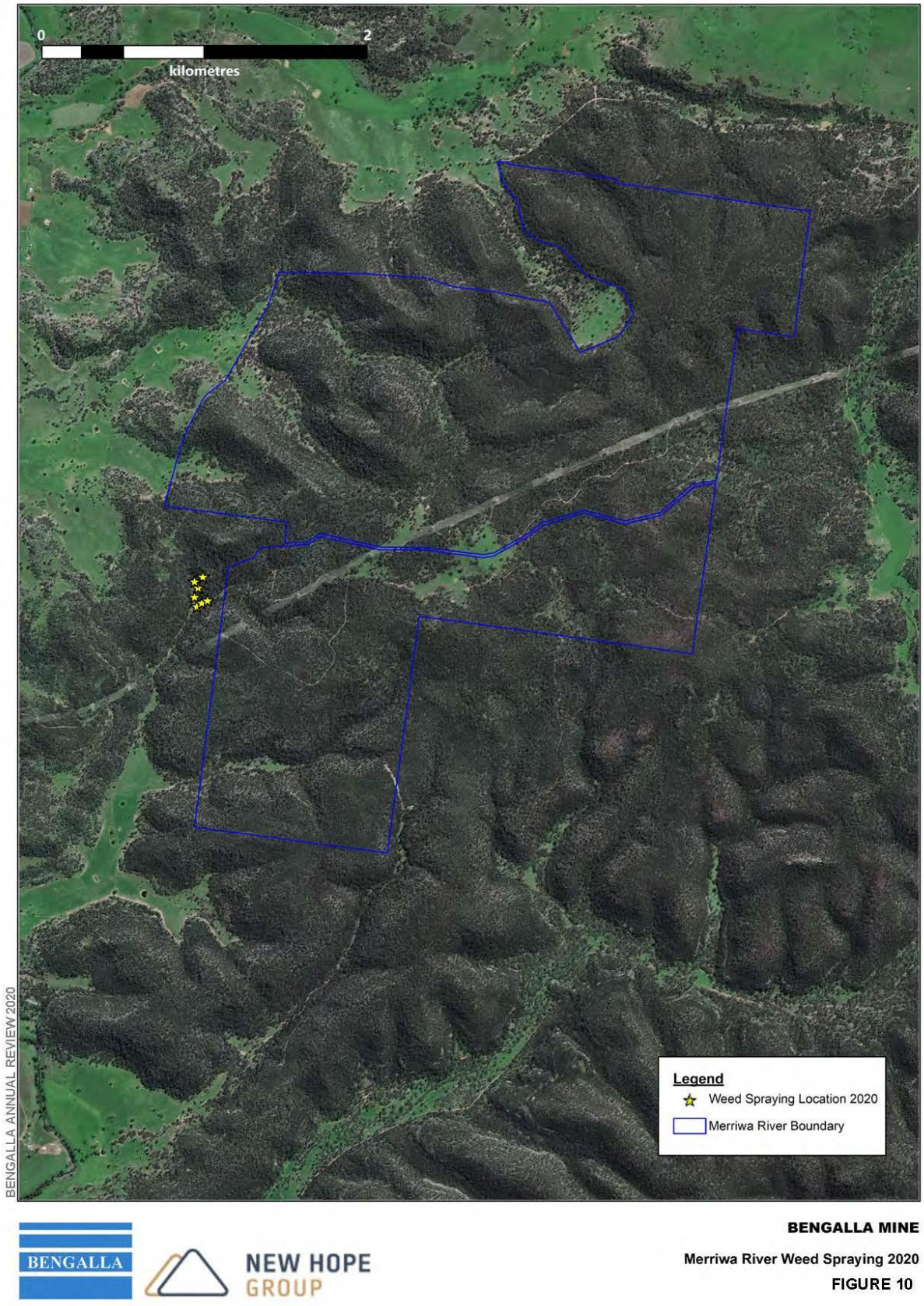


Figure 10: Merriwa River Weed Management Locations 2020

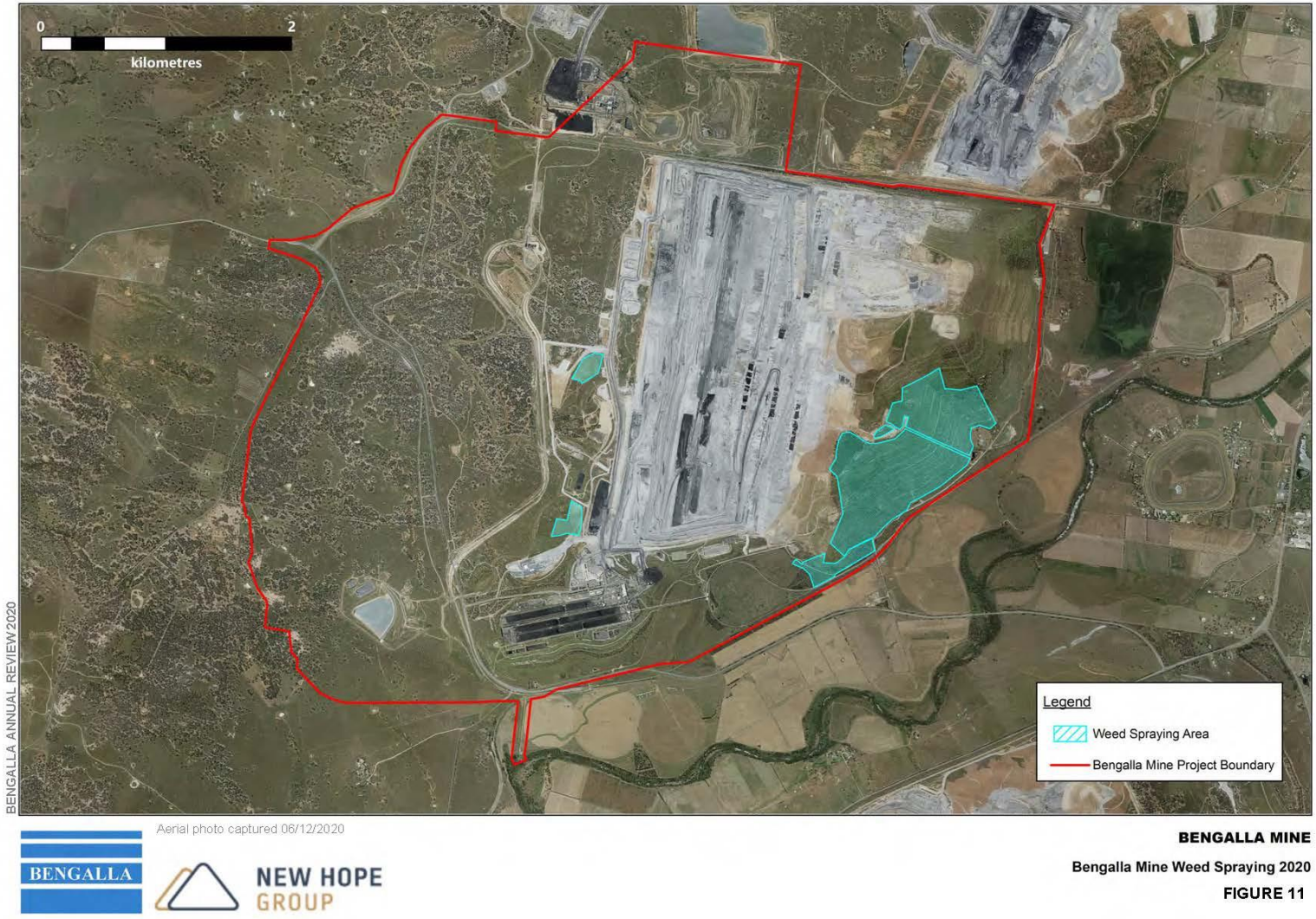


Figure 11: Weed Management Areas

Pest Management

- ***Bengalla***

A pig control program was conducted throughout 2020 at various locations across Bengalla. A total of 18 pigs were culled in January and five pigs were culled in December. One sow was carrying 9 piglets.

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

This culling program will continue into 2021 across Bengalla.

- ***Offset Properties***

During the Reporting Period, BMC undertook a 4-week dog ground baiting program across all offset properties including aerial dog baiting in Autumn. A total of 84 1080 bait stations were established targeting foxes and wild dogs. A total of 282 baits were placed during the program. Results indicated that 25% of baits were taken of which 40% were taken by wild dogs and 60% 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 and 29 in 2020. This suggests that dog numbers are generally slowly declining in the offset areas. One aerial dog baiting program was undertaken in 2020 in conjunction with Local Land Services.

BMC also undertook a pig trapping program that included a total of 13 traps during Autumn 2020. A total of 12 pigs were caught during this period across both Echo / Kenalea and Black Mountain offset areas. The pig trapping program undertaken represented an equivalent of 130 trapping days completed.

Further Actions

Ongoing management of weeds and feral animals at Bengalla and the offset properties will continue during 2021.

6.14 VISUAL AMENITY AND LIGHTING

6.14.1 Environmental Management

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

6.14.2 Environmental Performance

Tree Screening Along Public Roads

Schedule 3, Condition 40 of SSD-5170 requires BMC to plant trees along sections of Denman Road, Roxburgh Road and Wybong Road that will have direct views of Bengalla. The screening when occurring on road reserves must be planted in consultation with the MSC and, where required, the NSW Roads and Maritime Services (RMS). The Secretary of DPIE has granted an extension to complete tree screening or equivalent until 31 July 2021.

Tree screen planting completed in 2019 on Roxburgh Road required ongoing maintenance with approximately 150 trees replanted during 2020. Ongoing maintenance work on the trees will consist of replacement of failed plantings where significant, watering and replacement of guards.

6.14.3 Further Actions

Plantings in road reserves or adjacent areas that have views of Bengalla will be progressed as required.

6.15 EMERGENCY RESPONSE PREPAREDNESS

BMC has an Emergency Response Team (ERT) which is trained to respond to emergencies and conducts simulated emergency exercises. A Pollution Incident Response Management Plan is also in place 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 17 December 2020. The simulated scenario was a B-double fuel tanker unloading fuel into the site fuel storage tanks adjacent to the store. During the fuel delivery, the line from the B trailer disengages from the tanker, resulting in fuel being pumped onto the ground and entering the drain west of the fuel station. Approximately 30,000L of diesel has been released into the Bengalla drainage system prior to fuel pumping being stopped.

The exercise confirmed that the response procedure included in the Pollution Incident Response Management Plan 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 2020

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) *Water Sharing Plan for the Hunter Regulated River Water Source 2016* NSW	1449 units[1]	-	1,147	1,147
WAL41547 (Aquifer)	Sydney Basin-North Coast Groundwater Source *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016* NSW	365 units[2]	113[4]	-	113
Harvestable Rights	Muswellbrook Water Source *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* NSW	109 ML[3]	0	-	0
Total					**1,260**

[1] Entitlement per water year (1 July to 30 June). Does not include allocation assignments. BMC secured 700 ML from allocation assignments to WAL1106 during the Reporting Period.
[2] Approval received from Natural Resources Access Regulator on 14 September 2020 to increase entitlement from 125 units to 365 units.
[3] Harvestable rights entitlement calculation (EIS).
[4] Groundwater inflow to open cut pit lower limit estimated by WSP Report dated 21 January 2021.

BMC and the Bengalla Joint Venture also hold other Water Access Licences (WALs) for various water sources, however the above WALs are those used in connection with take of water for mining operations.

Table 24: Site Water Balance 2020

Aspect	Volume (ML)
Water Inputs	
Raw water sourced from Hunter River (ML/yr)	1,147
Rainfall and catchment runoff (ML/yr)	1,362
Groundwater inflow to open cut pits (ML/yr)	113
Water entrained in ROM coal processed (ML/yr)	1,085
Total Inputs	***3,708***
Outputs	
Water entrained in product coal	1,933
Other CHPP plant losses	88
Dust suppression (stockpiles and haul roads)	774
Vehicle wash-down losses	212

Aspect	Volume (ML)
Hunter River Salinity Trading Scheme (HRSTS) discharge	95
Other offsite discharges from mine water management system	0
Evaporation from dams	290
Total outputs	**3,391**
Water Balance for 2020	**+317 ML**

During the Reporting Period, BMC discharged a total of 95 ML of saline water to the Hunter River (from two discharge events) under the Hunter River Salinity Trading Scheme (HRSTS). The discharge events were undertaken from 29/07/2020 to 30/07/2020 and 30/07/2020 to 31/07/2020.

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 1,147 ML from the Hunter River. The Bengalla site water balance for 2020 is provided in **Section 7.1**.

Surface Water Monitoring Program

Bengalla's surface water monitoring is undertaken in accordance with the approved WMP. Surface water monitoring locations are shown on **Figure 12.**

Surface Water Monitoring Results

A comparison of the 2020 surface water monitoring results with the results for previous years is presented in **Table 25**.

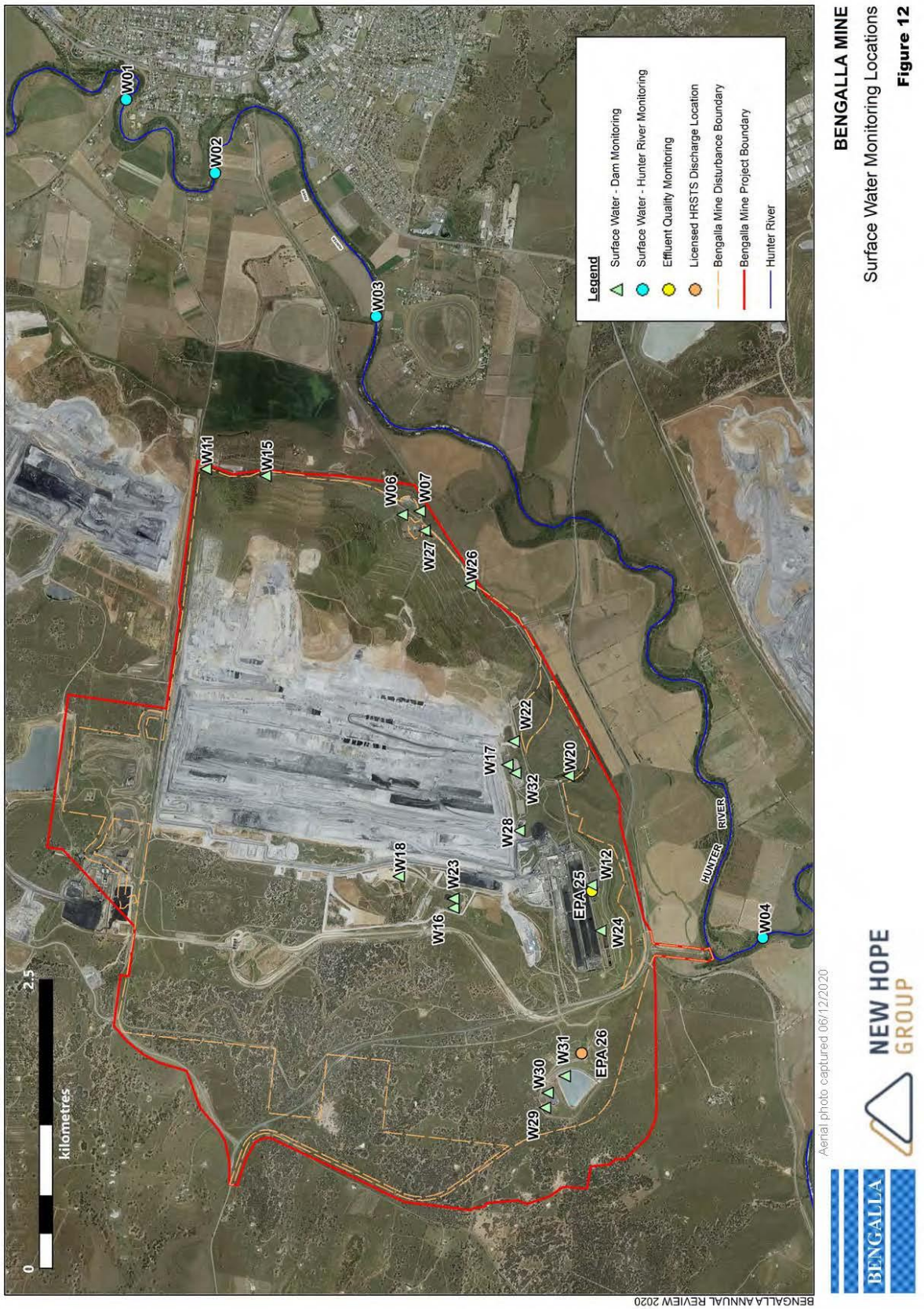


Figure 12: Surface Water Monitoring Locations

Table 25: Summary of surface water monitoring results (2018 – 2020)

Year	Site W01 Average			Site W02 Average			Site W03 Average			Site W04 Average		
	pH	TSS	EC	pH	TSS	EC	pH	TSS	EC	pH	TSS	EC
2018	8.1	10	371	8.0	11	384	8.0	11	390	7.9	13	411
2019	7.9	46	403	7.9	28	398	8.0	11.5	395	8.0	13	425
2020	7.9	177.6	474	7.9	193.4	454	7.9	203	490	7.9	168	536

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 are:

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

A rain event in February 2020 resulted in elevated TSS in the Hunter River which significantly impacted the annual average at all Hunter River sites. Saline water was not discharged from Bengalla during this event, therefore the surface water quality triggers did not apply (see **Appendix F**). No exceedances were recorded in pH or electrical conductivity 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 Hunter River Salinity Trading Scheme.

Surface water monitoring of pH, TSS and EC at the four Hunter River water monitoring sites in 2020 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 2020 is provided in **Section 7.1**. In comparing the 2020 water balance results to the EIS, Year 4 average results were selected as the most appropriate. It should be noted that the Year 4 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 128 ML for Year 4 however a surplus of approximately 317 ML occurred in 2020. The discrepancy between the EIS prediction and the measured and modelled 2020 water balance may be attributed 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 DPIE for approval.

7.3 GROUNDWATER

7.3.1 Environmental Management

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

Groundwater Monitoring

BMC has a groundwater monitoring network in place targeting two aquifers being an alluvial aquifer associated with the Hunter River floodplain and a Permian aquifer system. The current groundwater monitoring network consists of a total of 47 groundwater monitoring locations which are shown in **Figure 13**.

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

Monitoring Results for Groundwater Levels and Quality

Appendix G discusses the 2020 groundwater monitoring results, trends and comparison with EIS predictions including a summary of any key findings.

Comparison to Assessment Predictions

Close to the Wantana Extension alluvial groundwater flows toward the pit, possibly due to the depressurisation of coal seams subcropping beneath the alluvium. This is consistent with the 2013 EIS (AGE, 2013a) which relevantly 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.*"

Further evidence of depressurisation is seen in groundwater quality of some Wantana Extension bores which show EC less than 2,000 µS/cm. The EIS predicted that "*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*."

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.

Further groundwater monitoring results for the Reporting Period have been compared against relevant predictions from the EIS and are presented in Section 9 and Appendix A of **Appendix G**.

Comparison to ANZECC Guidelines

Groundwater is used for livestock watering on properties in the region as well as for irrigation purposes. Annual speciation results as required by the WMP have been compared to the ANZECC Guidelines and are shown in Section 8 of **Appendix G**.

7.3.2 Further Actions

BMC will consider the groundwater monitoring and management recommendations identified in **Appendix G** and if reasonable and feasible implement the relevant 2021 actions.

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

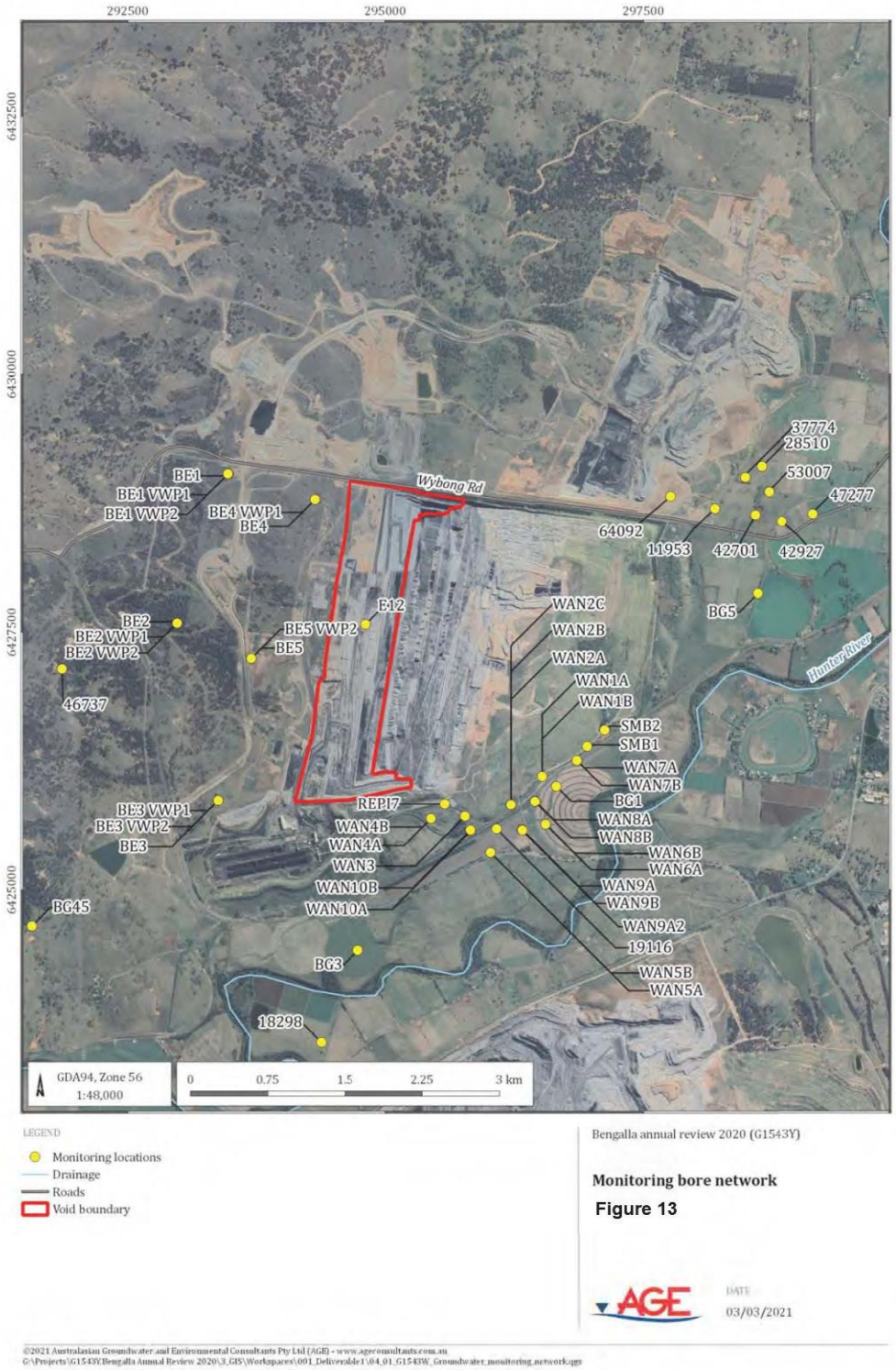


Figure 13: Groundwater Monitoring Locations

8 REHABILITATION

This section describes the Bengalla rehabilitation objectives and performance during 2020. 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 26**.

8.2 REHABILITATION MANAGEMENT

Rehabilitation at Bengalla is undertaken in accordance with SSD-5170 as described in the current MOP Amendment B, subject to operational progress.

The current MOP proposed to undertake 21 ha of rehabilitation during 2020, focused on the southern face of the Overburden Emplacement Area (OEA).

During the Reporting Period, 21 ha of new rehabilitation was completed consisting of 5.7 Ha of improved pasture and 15.3 Ha of High Density Woody Vegetation (HDWV) via direct seeding.

During the Reporting Period, BMC commenced installation of HDWV over previously rehabilitated lands by both the planting of tubestock and direct seeding.

An area of rehabilitation (15.3 ha) on the southern face of the OEA completed in 2019 and shown as a pink polygon on **Figure 14** had HDWV installed via direct seeding.

Additionally, an existing rehabilitation area on part of the eastern face of the OEA had HDWV installed (shown as a pink polygon on **Figure 14**). The HDWV installation consisted of:

- A tubestock area being 13 ha shown as pink hatching that was planted with HDWV tubestocks.
- The remaining part of the pink polygon being 31.8 Ha was direct seeded with HDWV.

The rehabilitation completed in the last two Reporting Periods and the predicted rehabilitation activities for 2021 is summarised in **Table 27**.

Table 26: Bengalla Rehabilitation Objectives (from SSD-5170)

Feature	Objective	Status
Mine site (as a whole)	• Safe, stable and non-polluting	• Ongoing. See **Section 6.8.1** for a description of Bengalla mineral waste management during 2020.
	• Final landforms designed to incorporate natural micro-relief and natural drainage lines, which, where reasonable and feasible, further avoid straight run drainage drop structures, to integrate with surrounding landforms	• Overburden emplacement and rehabilitation activities are undertaken with the objective of achieving the conceptual final landform approved under SSD-5170 and the Mining Operations Plan.

Feature	Objective	Status
Overburden Emplacement Area – exposed to Muswellbrook and Denman	• Rehabilitate the entire face with high density woody vegetation as soon as practicable following the completion of mining operations	• Ongoing. MOP Amendment B describes implementation of HDWV.
Final void	• Designed as a long-term groundwater sink and to maximise groundwater flows across back-filled pits to the final void • Minimise to the greatest extent practicable: o the size and depth of the final void; o the drainage catchment of the final void; o any high wall instability risk; and o 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	• Final void designs approved under SSD-5170 to be reviewed at least five years from closure of Bengalla.
Agricultural land	• Restore or maintain land capability generally as described in the EIS and shown conceptually in Appendix 9 of SSD-5170	• Ongoing. Rehabilitation activities are undertaken with the objective of achieving the land capability approved under SSD-5170.
Revegetation areas	• Restore a minimum 10% treed coverage at the mine site • Higher density planting along the riparian zone of the Dry Creek reinstatement, and around the final void	• Noted per Appendix 9 of SSD-5170. • The rehabilitation of riparian areas along Dry Creek and the final void are not within the current MOP period.
Dry Creek reinstatement	• No net loss of creek length; • Restore, maintain and/or improve hydrological and ecological function, quality and geomorphic stability; • Incorporate erosion control measures based on vegetation and engineering revetments; and • Revegetate with suitable native species	• Dry Creek reinstatement planned to commence from around 2030 subject to operational progress.
Surface infrastructure	• To be decommissioned and removed, unless RR agrees otherwise	• No decommissioning undertaken outside of active mining areas during 2020.
Community	• Ensure public safety;	• Areas restricted to BMC personnel and contractors;

Feature	Objective	Status
	• Minimise the adverse socio-economic effects associated with mine closure	• Socio-economic impacts to be reviewed at least five years from closure of Bengalla.

Table 27: Bengalla Rehabilitation Status Summary

Mine Area Type	Previous Reporting Period 2019 (ha)	This Reporting Period 2020 (ha)	Next Reporting Period 2021 [6] (ha)
A. Total mine footprint[1]	1,202	1,214	1,171
B. Total Active Disturbance[2]	955	946	864
C. Land being prepared for rehabilitation[3]	0	0	0
D. Land Under Active Rehabilitation[4]	247	268	307
E. Completed Rehabilitation[5]	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 (as defined in the RR's MOP Guidelines).

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 2021" is consistent with Bengalla Mine Mining Operations Plan 2017 – 2021 Amendment B. A new MOP application has been submitted during December 2020 to reflect BMC's current mining operational requirements.

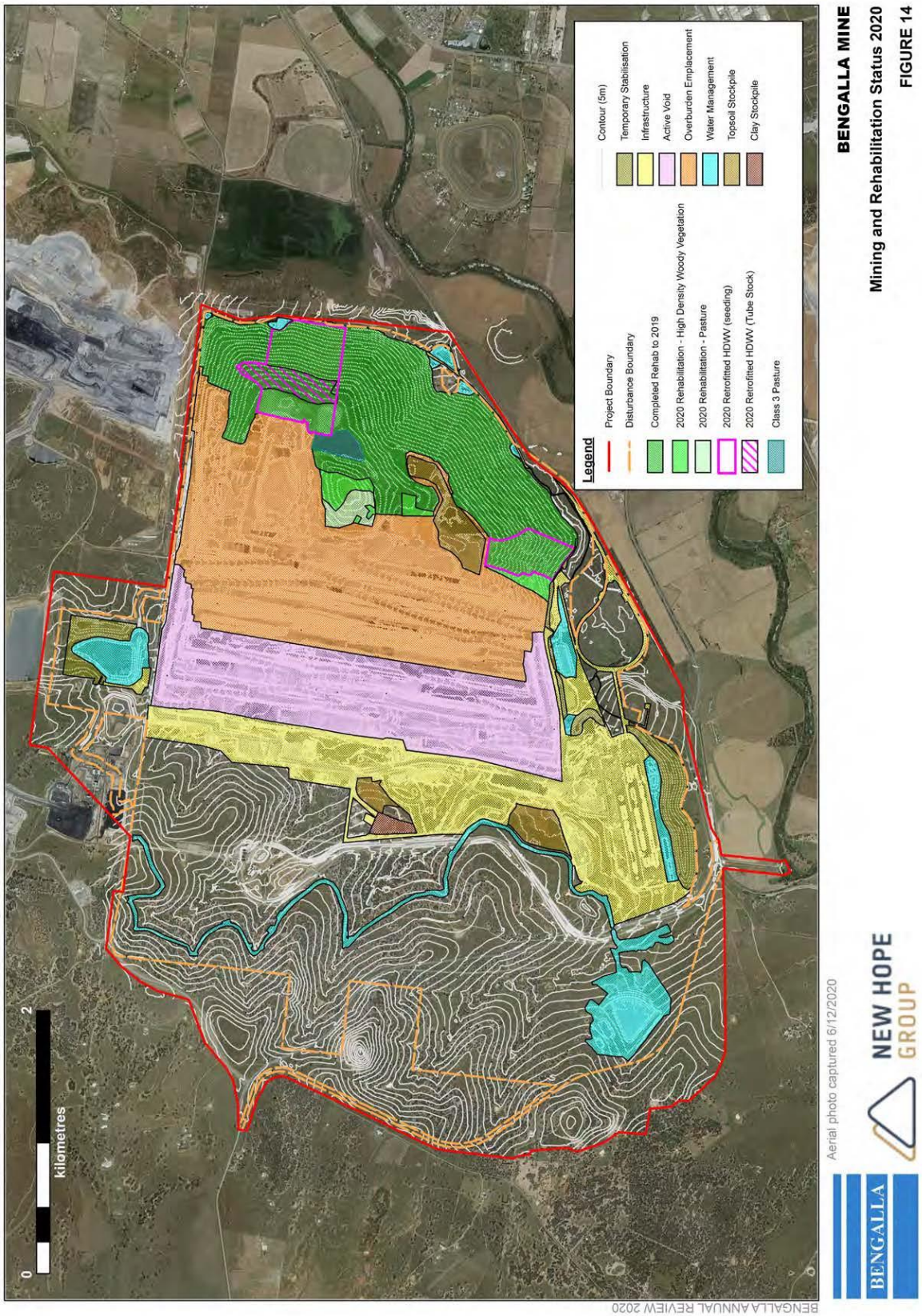


Figure: 14: Mining and Rehabilitation Status 2020

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 November 2020 and assessed 16 rehabilitation sites.

The transect based monitoring conducted during 2020 is presented in **Table 28**, with the locations of each transect shown on Figure 2 of **Appendix H**. Sites HDWV 14, 15, 16, 19, 20 and 21 were established and monitored following installation of HDWV during the Reporting Period.

Table 28: Bengalla Rehabilitation Monitoring Program Transects (2020)

Transect Name	Description	Rehabilitation Established	Transect Established
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
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

Source: Koru Environmental Pty Limited, 2020

8.3.1 Rehabilitation Monitoring Results

Following three years of severe drought between 2016-2019, the conditions eased off during 2020 and the locality received above average rainfall, which alleviated the impacts on vegetation and biophysical systems in the region. This was noted as having positively influenced the rehabilitation condition recorded in 2020, particularly in relation to vegetative ground cover levels and species diversity in the lower stratum which increased in most surveyed locations.

Despite a protective ground cover not yet being fully established, all areas of recently established rehabilitation were assessed as stable. Areas that were direct-seeded showed no sign of native shrubs/trees germination at the time of inspection, however seeding activities were only completed shortly prior to the monitoring, and germination is expected to occur over subsequent weeks/months and should be captured in next year's monitoring. Areas that were planted with native tubestock showed excellent densities of native shrubs/trees consisting of species well aligned with local native communities.

Areas of historic rehabilitation displayed good shrub/tree growth but little improvement in terms of tree stems densities (a key objective and requirement of the HDWV final land use). Particularly, the density of canopy eucalypts species remained unsatisfactory and will need to be increased as part of the rehabilitation improvement works in these locations.

With some localised exceptions, the ground layer throughout all rehabilitation areas remained largely dominated by exotic pasture species – with Megathyrsus maximus (Guinea grass) being particularly prevalent. Consistently with previous years the incidence of native ground cover species was overall limited. This however conforms with the final land use defined for areas of HDWV which are intended to include a component of grazing and therefore need to include productive and palatable species.

Weed incursion remained a key issue inhibiting rehabilitation progress across the site, with most problematic species including Galenia, Golden wreath wattle and African boxthorn. Galenia in particular responded rapidly to the rainfall received in 2020 with an increased abundance recorded at many locations, including several severe infestations. For all these species ongoing management inputs and control will continue to achieve the defined rehabilitation objectives.

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 2021 will be carried out generally in accordance with MOP Amendment B subject to operational progress and approval of a new MOP.

Weed control measures will be implemented prior to HDWV establishment in previously rehabilitated land.

Weed management will continue over the remaining areas of previous rehabilitation in accordance with the annual Weed Action Plan.

BMC will undertake the recommended actions detailed in **Appendix H** for 2021 where reasonable and feasible identified as part of the 2020 rehabilitation monitoring program.

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 2020:

- Bengalla Community Consultative Committee (CCC) meetings. The meetings were held in February, May, August and December 2020. Minutes of each of these meetings are available at the Muswellbrook Library, Denman Library and on the Bengalla 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.

Unfortunately, due to the COVID-19 pandemic during the Reporting Period, a number of other events such as school mines tours with the Upper Hunter Mining Dialogue (UHMD) were unable to be held.

9.2 COMMUNITY CONTRIBUTION

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 small 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 2020, 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 2021, and a full scholarship for a student 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 2021. In addition, each year in partnership with MIGAS, BMC takes on four (4) local apprentices so that at any one time there are 16 apprentices employed by BMC.

The work experience program with Muswellbrook High School students continued in 2020, offering 10 placements to local students and the opportunity to experience the various careers

in the mining industry. The impacts of the COVID-19 pandemic during 2020 meant a reduction in the places available for students to attend Bengalla, however BMC will work with the schools to increase this work placement opportunity in 2021.

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 2020 included:

- The Polly Farmer Foundation- Muswellbrook Follow the Dream Program;
- Hunter Life Education;
- The Great Cattle Dog Muster;
- Scone Charity Rodeo; and
- Upgrade to the Rouchel Tennis Courts and recreation area.

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 2020, Bengalla sponsored and partnered with community groups including:

- Muswellbrook Shire Council Open Art prize and the Easter Family Fun Day;
- the Upper Hunter Show;
- Muswellbrook Race Club Race Day;
- Muswellbrook PCYC Fitness Resource;
- Upper Hunter Education Fund; and
- Group 21 Rugby League Competition Naming Rights.

BMC retained an active partnership program with the following Muswellbrook organisations in 2020:

- Muswellbrook Netball Association 2020 Season Naming Rights Sponsor;
- Muswellbrook Touch Football Association;
- Upper Hunter Eisteddfod Naming Rights Sponsorship;
- Aberdeen Junior Rugby League;
- Upper Hunter Show Beef Cattle Competition; and
- Sponsorship of School Presentation Days in Muswellbrook, Aberdeen, Scone, Denman and Sandy Hollow.

Some of these events were postponed during 2020 and BMC looks forward to these being planned for 2021.

BMC provides funds to Muswellbrook Shire Council (MSC) according to the Voluntary Planning Agreement (VPA). A total of $1,308,842 was provided under the VPA to MSC during the Reporting Period.

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

- Community Development Fund: $135,451
- Scholarships: $74,000
- Community Support Team and Sponsorships: $240,570

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 51 complaints during the 2020 Reporting Period, a decrease compared to the 67 complaints received in 2019 and 77 complaints in 2018.

During the Reporting Period, the most common environmental complaint raised by complainants was related to blasting, noise and air quality. A summary of complaints received during the Reporting Period by issue is provided in **Figure 15**.

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 Bengalla website.

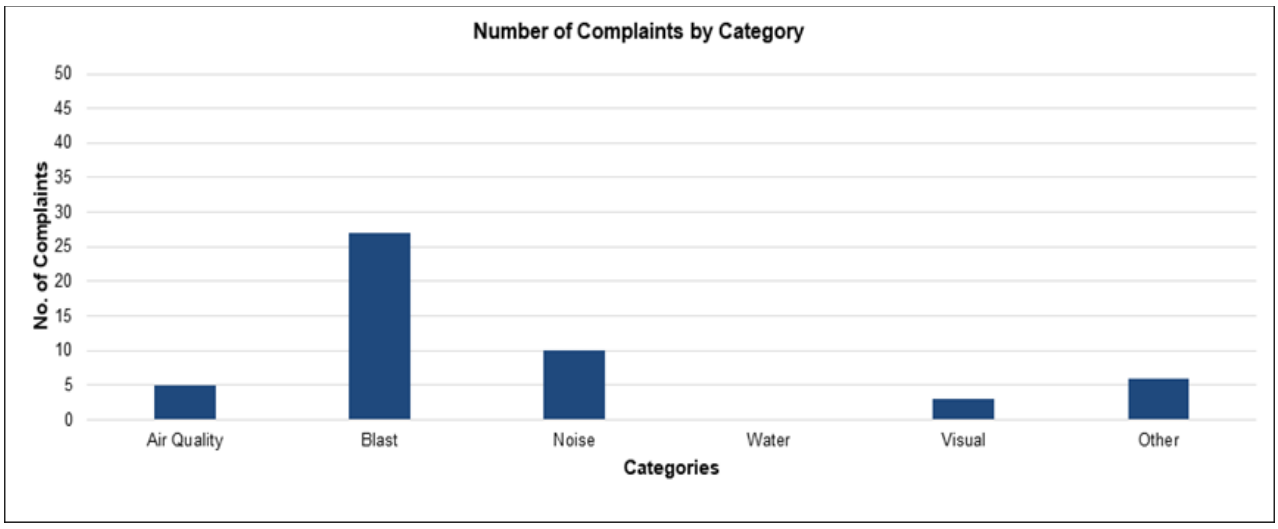


Figure 15: Environmental Complaints Received 2020

10 INDEPENDENT ENVIRONMENTAL AUDIT

This section discusses the SSD-5170 requirement for an Independent Environmental Audit of Bengalla operations.

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

An Independent Environmental Audit was conducted in December 2019, in accordance with Schedule 5, Condition 9. Actions arising from this audit are being addressed and are detailed in **Appendix K**.

The next Independent Environmental Audit is scheduled to be commissioned by 1 October 2022.

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 Implementation of AQMP

- Summary

Official Caution dated 24 September 2020 and Warning Letter dated 26 October 2020 issued by DPIE regarding an alleged breach of section 4.2 of the EPA Act involving failure to comply with Schedule 3, Condition 20 of SSD-5170. This condition relevantly requires the approved AQMP to be implemented.

- Details

DPIE determined that BMC failed to implement the approved AQMP (by failing to respond to high risk wind alarms) on the following dates and times:

(a) 12 May 2018 at 14:17;

(b) 7 August 2018 at 12:01 and 12:17; and

(c) 30 March 2019 at 16:19.

These were the only breaches identified by DPIE over the course of 2018 and 2019 (in response to various reports submitted by BMC to DPIE regarding annual average air quality measurements and air quality management in 2018 and 2019). In the Warning Letter related to the event on 30 March 2019, DPIE noted that "*any impact on the surrounding community as a result of the identified single breach would have been minimal as equipment logs indicated that BMC were operating at a substantially reduced capacity at the time of the alarm*".

A report was completed by a suitably qualified independent air quality expert for each of the 2018 and 2019 reporting periods (annual average air quality criteria). The reports concluded that BMC had complied with that criteria.

- Actions taken to ensure compliance

Dust mitigation measures in the AQMP appropriate to environmental conditions are generally implemented at Bengalla as part of day to day mining operations. The purpose of these measures is to ensure compliance with the air quality criteria and operating conditions of the development consent. BMC has submitted a revised version of the AQMP to DPIE for approval.

11.1.2 Commissioning of Property Investigation (Blasting)

- Summary

Warning Letter dated 22 October 2020 issued by DPIE regarding an alleged breach of section 4.2 of the EPA Act involving failure to comply with Schedule 3, Condition 12 of SSD-5170. This condition relevantly requires a property investigation to be commissioned within 2 months of receiving a claim by the owner of privately-owned land that buildings and/or structures have been damaged as a result of blasting on site.

- Details

On 3 June 2020, an owner of privately-owned land in the vicinity of Bengalla Mine requested a property investigation. DPIE determined that the required response was provided after the 2 month timeframe (on 14 August 2020). In the Warning Letter, DPIE noted various relevant factors including that:

(a) The breach was not ongoing and occurred for a short duration.

(b) Blasting at Bengalla Mine during the 2018 and 2019 reporting years was within the blast criteria in SSD-5170.

(c) A property inspection in 2018 had found the damage to built structures was not attributable to blasting at Bengalla Mine.

(d) A suitably qualified, experienced and independent person was appointed to undertake the property investigation and it was progressing at that time.

- Actions taken to ensure compliance

A suitably qualified, experienced and independent expert was commissioned to complete the property investigation. The report concluded that damage to buildings and/or structures was not attributable to blasting at Bengalla Mine.

11.1.3 Topsoil Management and Rehabilitation under MOP

- Summary

Official Caution dated 15 May 2020 issued by the Resources Regulator regarding an alleged failure to comply with mining lease conditions requiring compliance with an approved MOP (topsoil management procedure and progressive rehabilitation schedule for 2017 and 2018).

- Details

Following a site inspection on 29 August 2019, the Resources Regulator determined that BMC did not comply with the MOP as follows:

1. *Failure to fulfil commitments with respect to topsoil management procedure as referenced in Section 2.3.3.6 (Topsoil Stockpiles) of the approved MOP (including topsoil stockpile size, inactive stockpile management, prevention of sediment water runoff leaving site, weed control management for topsoil stockpiles, topsoil storage processes and maintaining an inventory of available topsoil).*
2. *Failure to comply with the progressive rehabilitation schedule for 2017 and 2018 in line with commitments made in Table 27 of the approved MOP.*

- Actions taken to ensure compliance

BMC has taken corrective action regarding the identified matters in accordance with the requirements of notices issued by the Resources Regulator under section 240 of the Mining Act (NTCE0003914, NTCE0003917 and NTCE0003919).

A Topsoil Audit Report, Rehabilitation Risk Assessment and Rehabilitation Report were prepared and submitted to the Resources Regulator in response to the section 240 notices.

The Rehabilitation Risk Assessment identifies and evaluates all potential risks to achieving the final land use and the specific measures to be implemented to mitigate those risks. The Rehabilitation Report assesses progressive rehabilitation planning and implementation at Bengalla. It sets out a timeline and schedule for proposed rehabilitation works and measures that are recommended to improve rehabilitation performance.

In December 2020, BMC submitted a MOP amendment application which included rehabilitation works (consistent with the Rehabilitation Risk Assessment and Rehabilitation Report) for the remainder of the MOP term (until the end of 2021). BMC has also made material progress since January 2020 in the installation of High Density Woody Vegetation as described at **Section 8** of this Annual Review.

As a related matter, BMC notes that on 27 October 2020 the Resources Regulator issued an Official Caution regarding an alleged failure to comply with the requirements of NTCE0003919 (notice under section 240 of the Mining Act). The Official Caution states that the Resources Regulator considers that the requirements of the notice have been met by the Rehab Report.

11.1.4 Exploration Drill Hole on ML 1728

- Summary

On 17 July 2020, BMC notified the Resources Regulator of a non-compliance with the Mining Act in connection with ML 1728 held by BMC. The non-compliance arose from the drilling of an open chip drill hole in a location which was approximately 13 metres outside the boundary of ML 1397 (mining lease for coal). The hole was within ML 1728 which is from the surface to a depth of 20 metres and is for mining purposes only. The hole was fully grouted and rehabilitated and there was no environmental impact.

The Resources Regulator issued an Official Caution dated 24 September 2020 for breach of section 5 of the Mining Act (undertaking prospecting activities without an authorisation).

- Details

In the Official Caution, the Resources Regulator noted the following relevant factors:

(a) ML 1397 and ML 1728 are held by Bengalla;

(b) ML 1728 is for mining purposes only from the surface to a depth of 20 metres;

(c) BMC notified the Resources Regulator on 19 August 2020 that it had drilled the hole to a depth of 197.4 metres and furthermore, the hole had been fully rehabilitated;

(d) the hole was drilled on land owned by Bengalla and within its development consent boundary; and

(e) BMC's approved Mining Operations Plan permitted exploration activities across its tenements.

- Actions taken to ensure compliance

BMC has reviewed its internal Ground Disturbance Permit procedure and implemented changes to ensure compliance with relevant exploration drilling requirements including location of drilling in mining leases for coal with sufficient depth.

11.2 REPORTABLE INCIDENTS OR EXCEEDANCES

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

Table 29 provides details of matters or exceedances during the Reporting Period that were reported by BMC to regulatory authorities, with the majority of these being air quality related. Further details about the notification and investigation of potential air quality exceedances during the Reporting Period are provided in **Appendix I.**

Table 29: Reportable Matters or Exceedances 2020

AIR QUALITY						
No	**Date**	**Reported To**	**Nature**	**Details**	**Action Taken**	**Matter Status**
1.	Jan 2020	DPIE	Air Quality	Potential exceedance of 24-hour air quality criteria (PM10-1, PM10-2 and PM10-3 on 3/1/20 and 9/1/20, PM10-3 and PM10-4 on 15/1/20, PM10-1, PM10-2 and PM10-4 on 21/1/20, PM10-3 on 22/1/20 and PM10-4 on 27/1/20)	Independent expert report (concluding BMC did not exceed criteria) supplied to DPIE. BMC also supplied operations summary for relevant dates to DPIE.	No further action required. Completed and closed.

AIR QUALITY						
No	**Date**	**Reported To**	**Nature**	**Details**	**Action Taken**	**Matter Status**
2.	Feb 2020	DPIE	Air Quality	Potential exceedance of 24-hour air quality criteria (PM10-1, PM10-3 and PM10-4 on 2/2/20)	Independent expert report (concluding BMC did not exceed criteria) supplied to DPIE. BMC also supplied operations summary for relevant dates to DPIE.	No further action required. Completed and closed.
3.	March 2020	DPIE	Air Quality	Potential exceedance of 24-hour air quality criteria (PM10-4 on 21/3/20)	Independent expert report (concluding BMC did not exceed criteria) supplied to DPIE. BMC also supplied operations summary for relevant dates to DPIE.	No further action required. Completed and closed.
4.	May 2020	DPIE	Air Quality	Potential exceedance of 24-hour air quality criteria (PM10-4 on 14/5/20)	Independent expert report (concluding BMC did not exceed criteria) supplied to DPIE. BMC also supplied operations summary for relevant dates to DPIE.	No further action required. Completed and closed.
5.	June 2020	DPIE	Air Quality	Potential exceedance of 24-hour air quality criteria (PM10-4 on 7/6/20)	Independent expert report (concluding BMC did not exceed criteria) supplied to DPIE.	No further action required. Completed and closed.

AIR QUALITY						
No	**Date**	**Reported To**	**Nature**	**Details**	**Action Taken**	**Matter Status**
					BMC also supplied operations summary for relevant dates to DPIE.	
6.	July 2020	DPIE	Air Quality	Potential exceedance of 24-hour air quality criteria (PM10-4 on 7/7/20)	Independent expert report (concluding BMC did not exceed criteria) supplied to DPIE. BMC also supplied operations summary for relevant dates to DPIE.	No further action required. Completed and closed.
7.	Nov 2020	DPIE	Air Quality	Potential exceedance of 24-hour air quality criteria (PM10-4 on 10/11/20 and PM10-1 and PM10-3 on 28/11/20)	Independent expert report (concluding BMC did not exceed criteria) supplied to DPIE. BMC also supplied operations summary for relevant dates to DPIE.	BMC responded to Request for Information from DPIE. As far as BMC is aware, no further action required. Completed and closed.
8.	Nov 2020	DPIE	Air Quality	Independent Air Quality Review completed regarding 2 near residents	Interim report submitted to DPIE.	Awaiting response from DPIE.
9.	Dec 2020	DPIE	Air Quality	Potential exceedance of 24-hour air quality criteria (PM10-3 and PM10-4 on 10/12/2020)	Independent expert report (concluding BMC did not exceed criteria) supplied to DPIE.	No further action required. Completed and closed.

AIR QUALITY						
No	**Date**	**Reported To**	**Nature**	**Details**	**Action Taken**	**Matter Status**
					BMC also supplied operations summary for relevant dates to DPIE.	
10.	2020	DPIE	Air Quality	Potential exceedance of annual air quality criteria for 2020 (PM10 at PM10-1, PM10-3 and PM10-4, TSP at HV6, PM2.5 at the UHAQMN Muswellbrook monitor and deposited dust at D20)	Independent expert report (concluding BMC did not exceed any of the criteria) supplied to DPIE. BMC also supplied accompanying information to DPIE.	Awaiting response from DPIE.
OTHER						
No	**Date**	**Reported To**	**Nature**	**Details**	**Action Taken**	**Matter Status**
11.	Mar 2020	DPIE and MSC	Wybong Road	Cracking developed in the pavement of Wybong Road (Council road) adjacent and to the north of Bengalla Mine.	Report completed and supplied to MSC. Repairs to Wybong Road completed.	Completed and closed.
12.	Aug 2020	RR	Exploration drill hole on ML1728	Open chip drill hole drilled on ML1728 (mining lease for mining purposes)	Investigated and notification made to RR. RR issued a warning letter (see section 11.1.4 for details).	Completed and closed.

11.3 ACTIONS TO BE TAKEN TO PREVENT ENVIRONMENTAL INCIDENTS

BMC seek 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 2021.

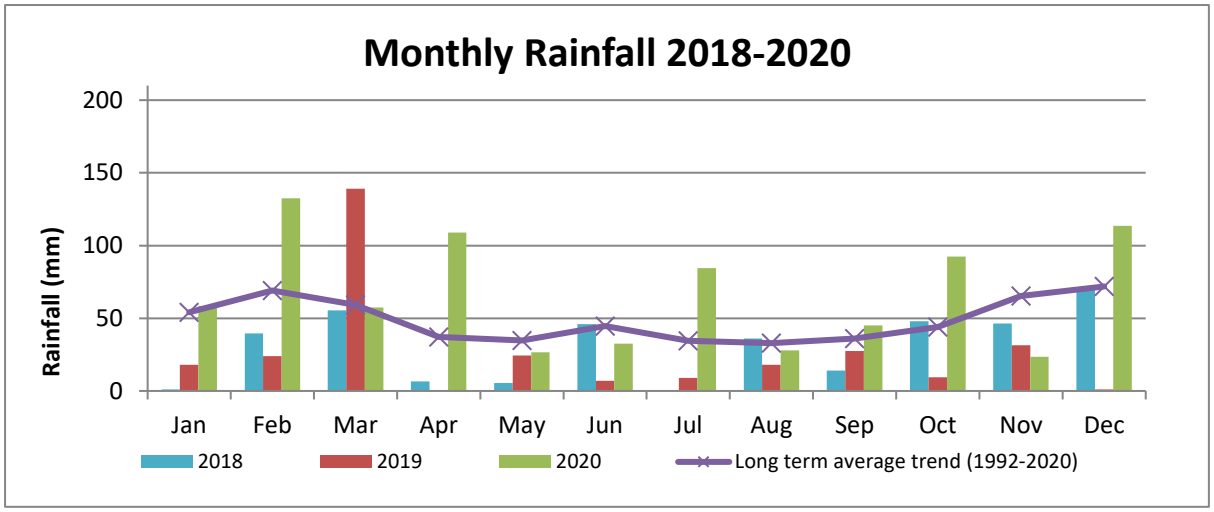
A summary of key environmental management activities proposed for 2021 is presented in **Table 30**. Progress against these activities will be reported in the 2021 Annual Review.

Table 30: Environmental Management Activities Proposed for 2021

Area / Issue	Actions Proposed	Timeline for Implementation
Air quality	Implementation of updated Air Quality monitoring network (subject to approval of submitted Air Quality Management Plan)	After revised AQMP has been approved by DPIE
Regulatory	Lodgement of an Exploration Licence for Operational Allocation Purposes	BMC lodged an Exploration Licence application with MEG on 23 February 2021
	Lodgement of new Mining Operations Plan (current term of MOP expires at end of 2021)	New MOP application to be lodged during 2021
	Lodgement of SSD-5170 Modification Application	Anticipated around June 2021
Audit	Continue to address the findings and actions of the 2019 IEA	To be progressed during 2021
Management Plans	Undertake reviews of management plans in accordance with SSD-5170	Likely after SSD-5170 Modification 5 approval, if successful
Tree Screening	Progress Denman Road tree screening (Schedule 3, Condition 40 of SSD-5170)	To be progressed during 2021 (DPIE has granted an extension to 31 July 2021)
Offsets	Progress long-term security of biodiversity offset areas (Schedule 3, Condition 28 of SSD-5170)	To be progressed during 2021 (DPIE has granted an extension to 30 June 2021)
Rehabilitation	Undertake new rehabilitation and installation of HDWV into existing rehabilitation according to the MOP	To be progressed during 2021
Groundwater Bores	Installation of groundwater bores	Anticipated to be completed during 2021

Appendix A

Meteorological Monitoring Summary



Graph A1
Bengalla Monthly Rainfall 2018 to 2020

Table A1
Monthly Temperatures 2020

Month	Minimum Daily Temperature (°C)	Maximum Daily Temperature (°C)
January	16.3	44.2
February	14.7	42.6
March	7.8	35.0
April	2.7	28.1
May	-2.3	25.4
June	-0.9	21.5
July	-2.0	22.1
August	-3.0	24.1
September	-0.1	29.5
October	2.7	32.7
November	6.0	40.9
December	7.6	40.5

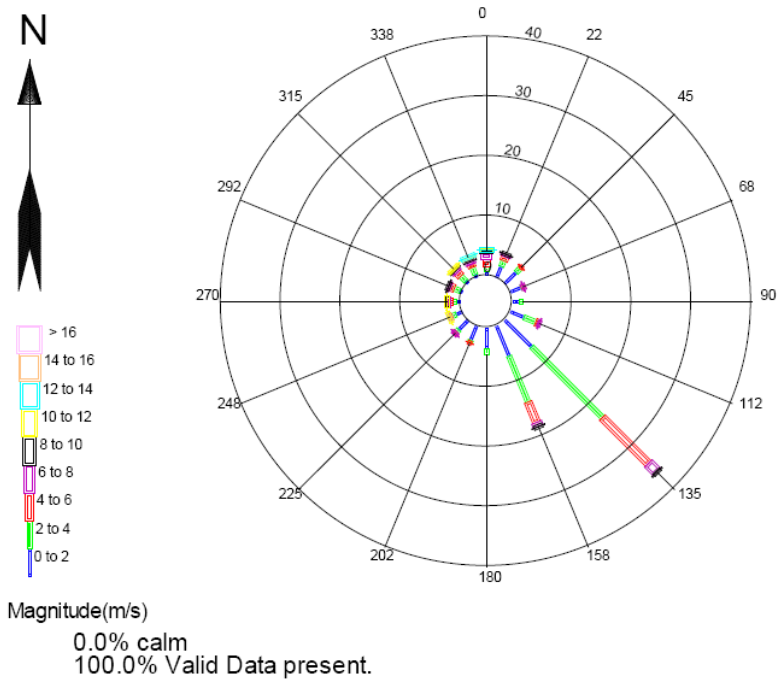


Figure A1
Bengalla January 2020 Windrose

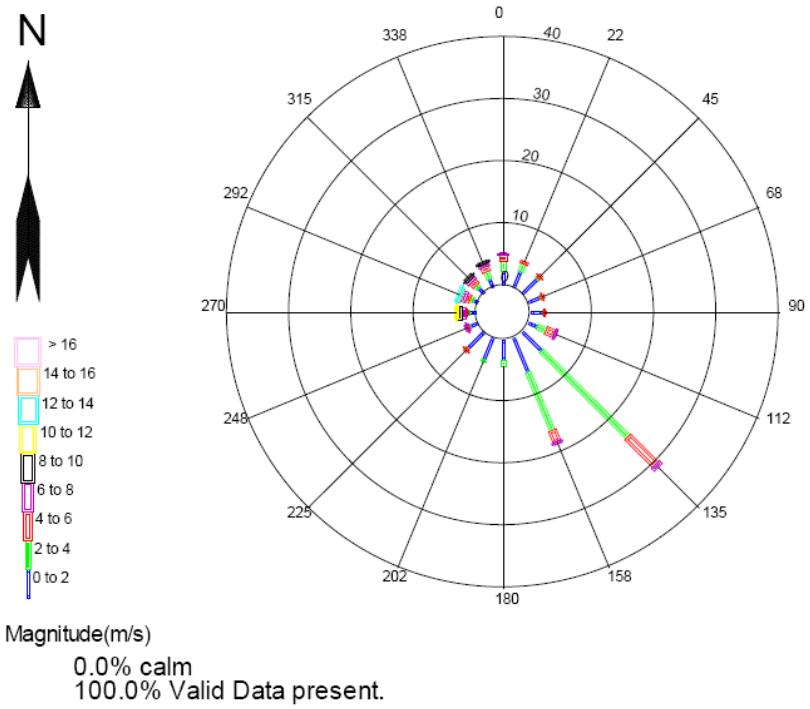


Figure A2
Bengalla February 2020 Windrose

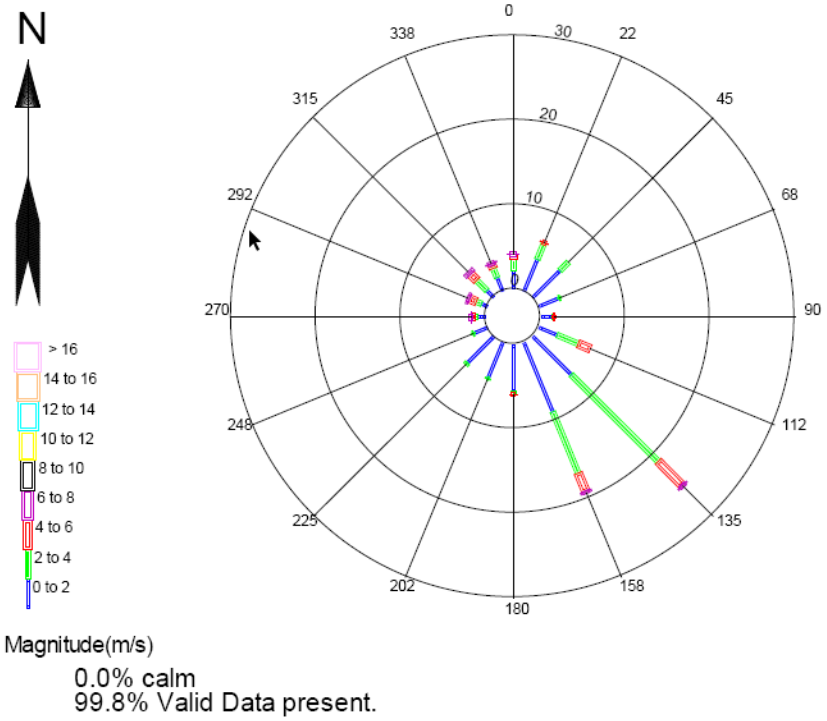


Figure A3
Bengalla March 2020 Windrose

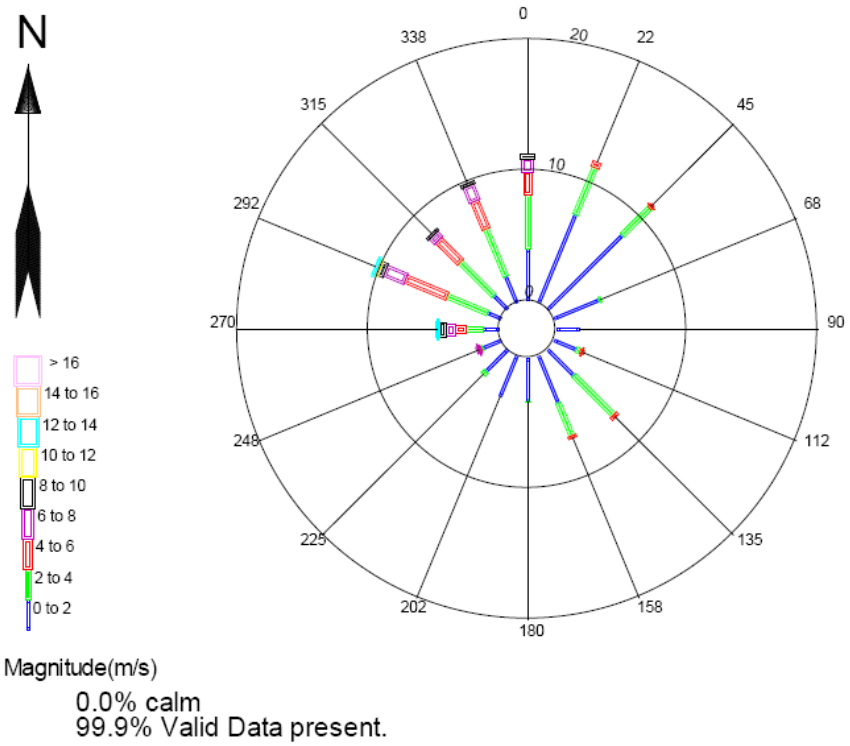


Figure A4
Bengalla April 2020 Windrose

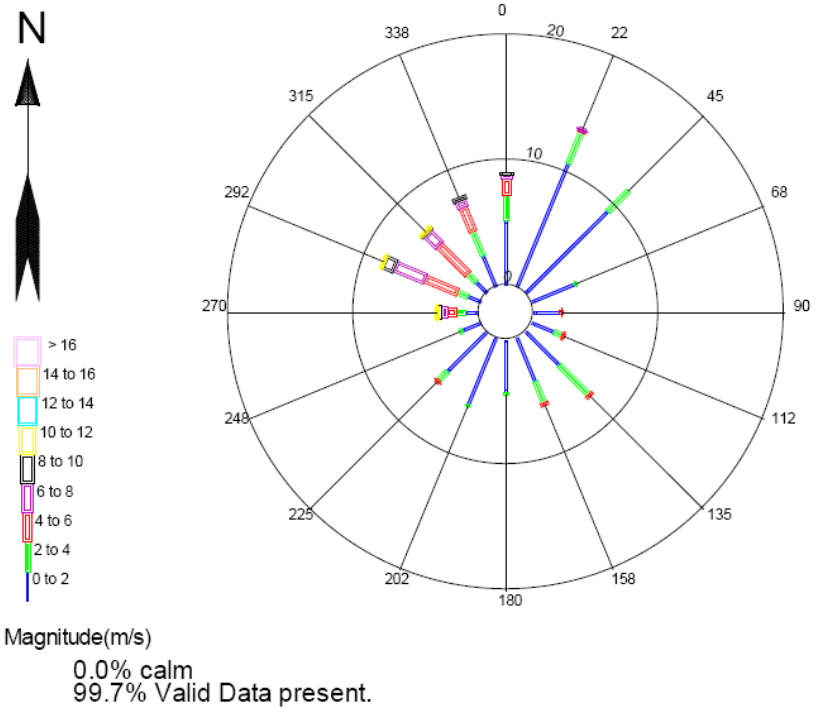


Figure A5
Bengalla May 2020 Windrose

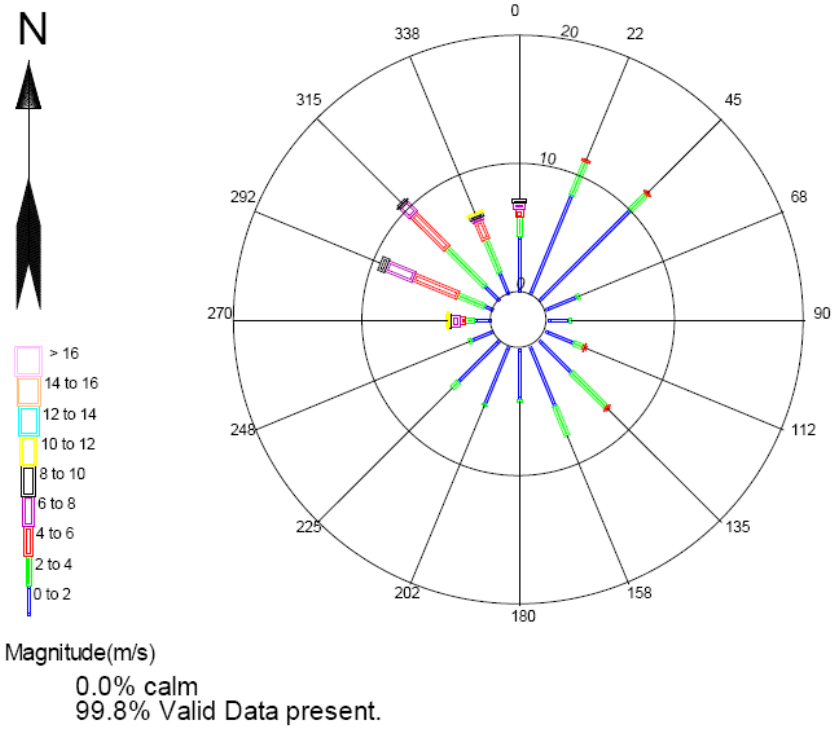


Figure A6
Bengalla June 2020 Windrose

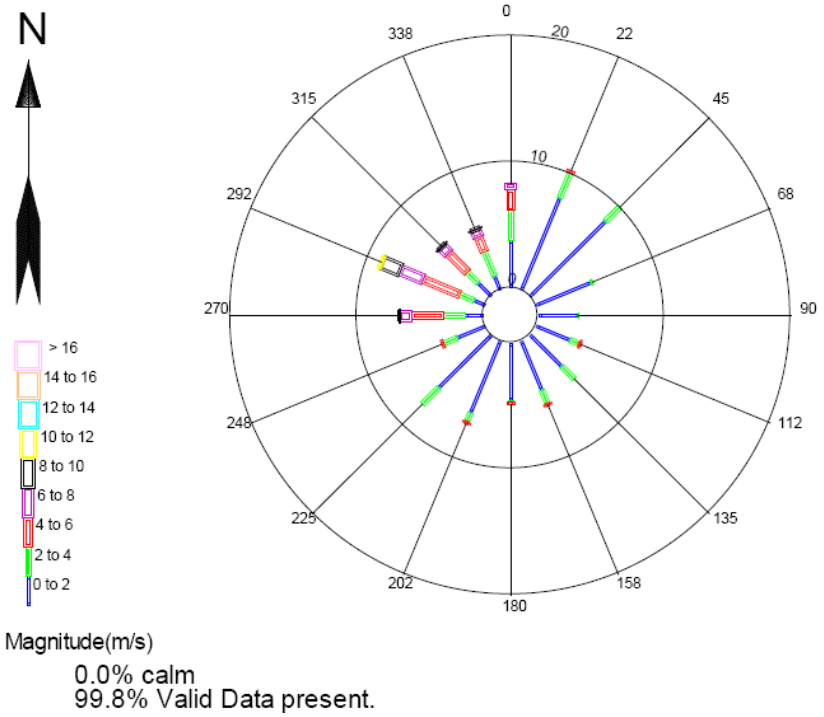


Figure A7
Bengalla July 2020 Windrose

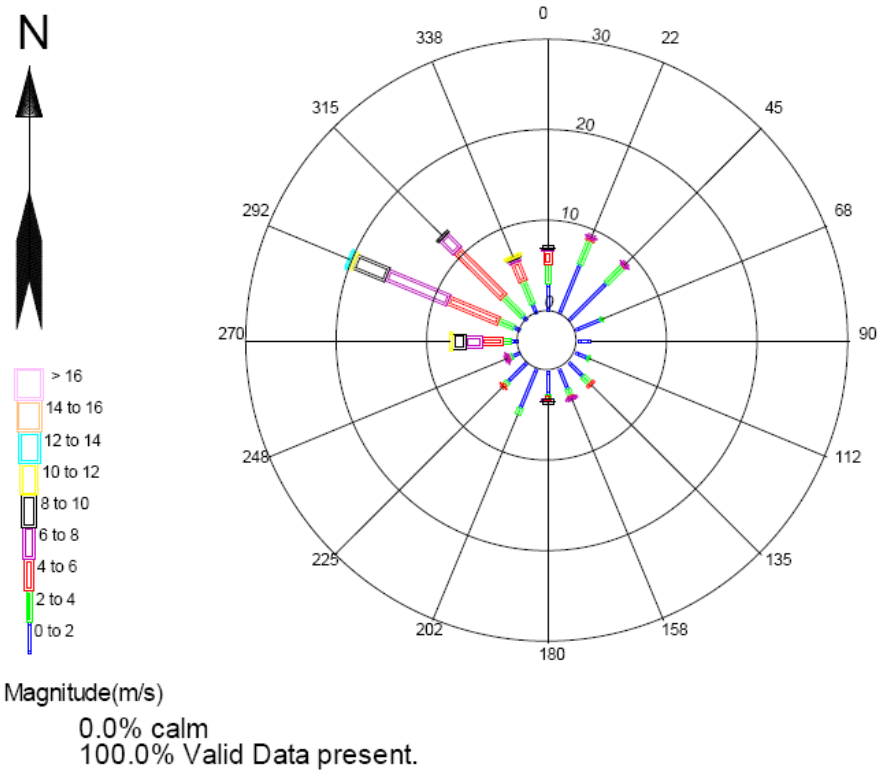


Figure A8
Bengalla August 2020 Windrose

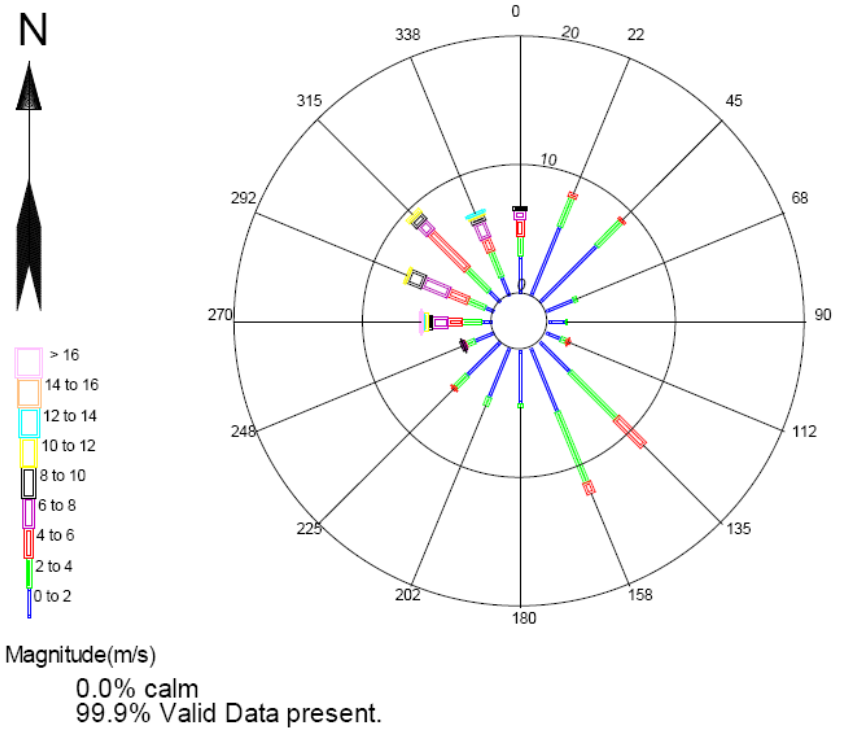


Figure A9
Bengalla September 2020 Windrose

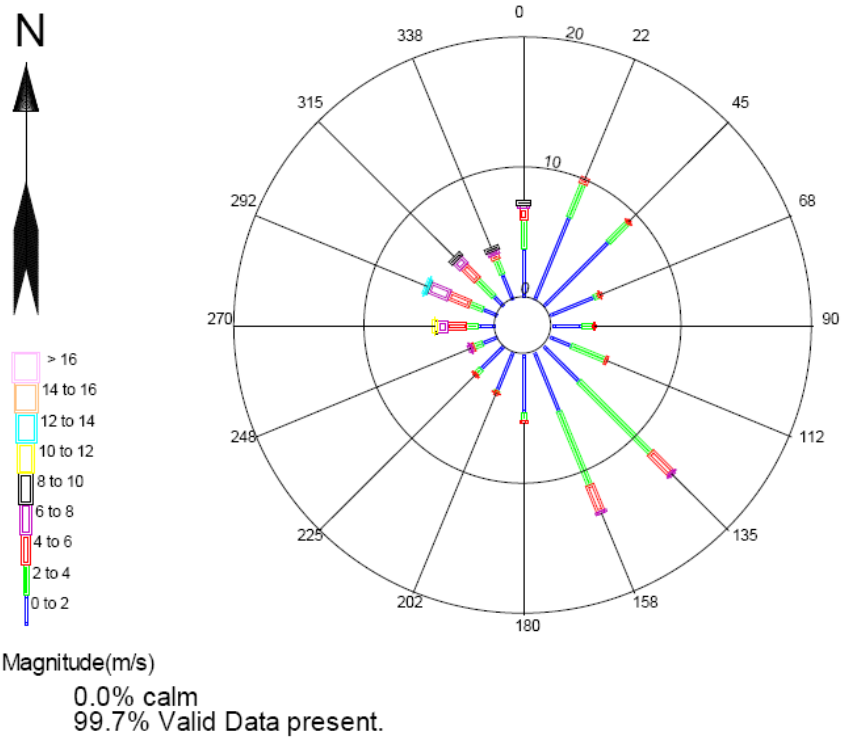


Figure A10
Bengalla October 2020 Windrose

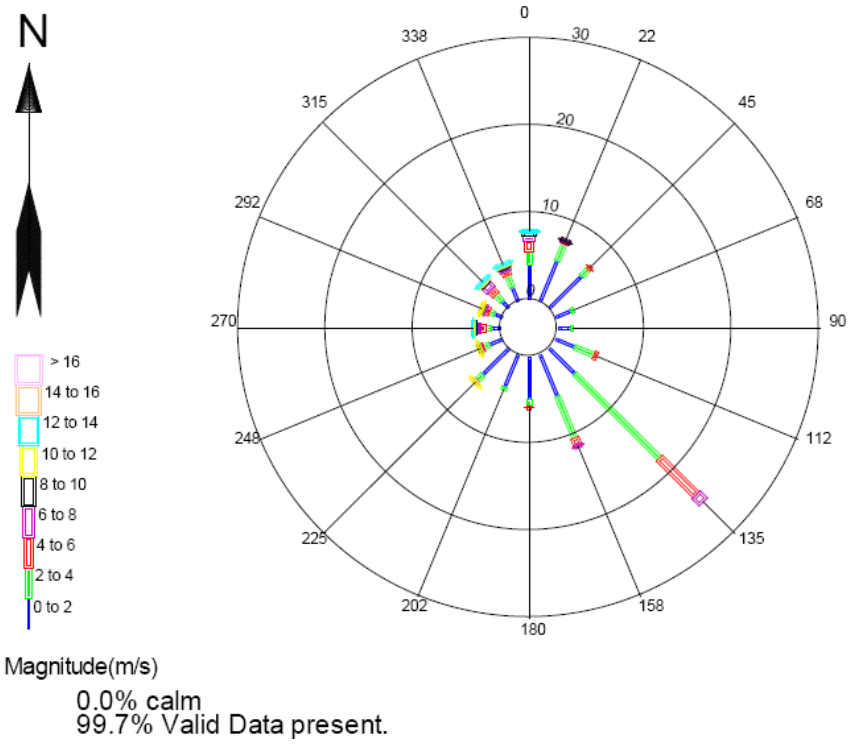


Figure A11
Bengalla November 2020 Windrose

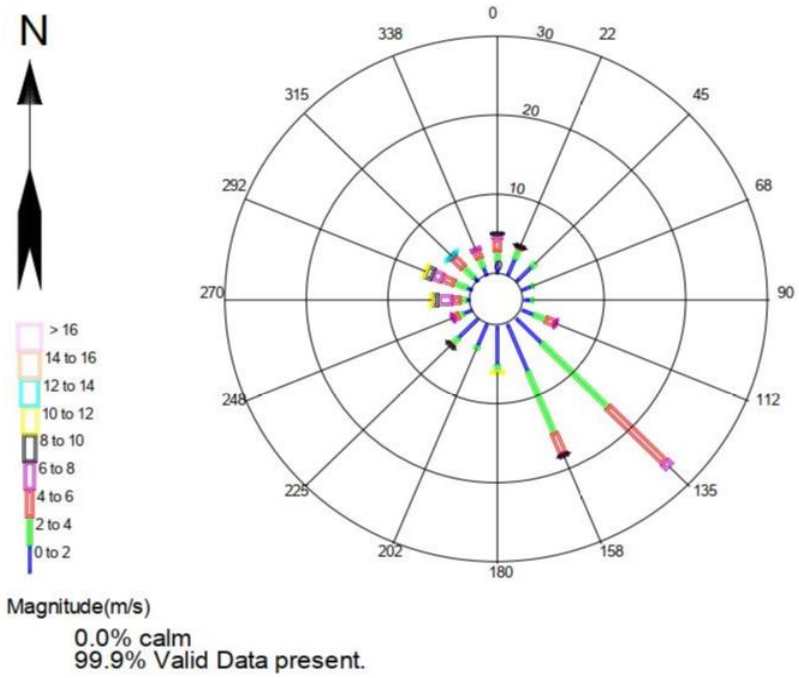


Figure A12
Bengalla December 2020 Windrose

Notes:
Sourced from Benchmark Monitoring Bengalla Mine Monthly Meteorology Reports – January to December 2020.

Appendix B

Noise Monitoring Summary

Table B1
Summary of Compliance Attended Noise Monitoring Results 2020

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-20	Yes	29	35	50	60	36	45	No
	Feb-20	Yes	27	35	50	60	30	45	No
	Mar-20	No	26	35	53	60	30	45	No
	Apr-20	No	IA	35	IA	60	IA	45	No
	May-20	Yes	27	35	53	60	34	45	No
	Jun-20	Yes	16	35	54	60	23	45	No
	Jul-20	No	31	35	56	60	34	45	No
	Aug-20	No	26	35	54	60	28	45	No
	Sep-20	Yes	31	35	52	60	43	45	No
	Oct-20	Yes	31	35	49	60	39	45	No
	Nov-20	Yes	28	35	49	60	34	45	No
	Dec-20	Yes	29	35	52	60	35	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-20	Yes	IA	40	IA	60	IA	45	No
	Feb-20	Yes	29	40	50	60	33	45	No
	Mar-20	No	29	40	53	60	35	45	No
	Apr-20	No	30	40	55	60	34	45	No
	May-20	Yes	Est 25	40	Est 50	60	Est 28	45	No
	Jun-20	Yes	IA	40	53	60	IA	45	No
	Jul-20	No	<32	40	NM	60	Est 32	45	No
	Aug-20	No	35	40	59	60	37	45	No
	Sep-20	No	36	40	57	60	41	45	No
	Oct-20	Yes	Est 30	40	Est 54	60	30	45	No
	Nov-20	Yes	Est 30	40	Est 54	60	Est 33	45	No
	Dec-20	Yes	32	40	54	60	35	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-20	Yes	IA	35	IA	60	IA	45	No
	Feb-20	Yes	IA	35	IA	60	IA	45	No
	Mar-20	No	<30	35	<55	60	Est 35	45	No
	Apr-20	No	35	35	54	60	45	45	No
	May-20	Yes	35	35	56	60	37	45	No
	Jun-20	No	38	35	57	60	53	45	No
	Jul-20	No	Est 34	35	NM	60	Est 43	45	No
	Aug-20	No	<35	35	53	60	37	45	No
	Sep-20	No	33	35	56	60	35	45	No
	Oct-20	Yes	IA	35	54	60	IA	45	No
	Nov-20	Yes	IA	35	IA	60	30	45	No
	Dec-20	Yes	IA	35	IA	60	IA	45	No

Source: Bridges Acoustics (2020)

***Notes** (modified from Bridges Acoustics, 2020)*

1. LAeq,15minute operational noise levels for BMC in the absence of all other noise sources;

2. LCeq,15minute operational noise levels for BMC in the absence of all other noise sources.

3. 'Yes' denotes meteorological conditions result in relevant criteria being applicable. 'No' denotes meteorological conditions are outside those specified in NSW Industrial Noise Policy;

4. From SSD-5170 (as modified) and EPL 6538. Monitoring locations AN02 and AN03 are closer to mining operations than the nearest private receiver. A correction factor has been applied based on noise modelling for the continuation of Bengalla Mine EIS (Hanson Bailey, 2013) as outlined in the approved NMP;

5.LA1,1minute operational noise levels for BMC in the absence of all other noise source;

IA = inaudible

NM = not measurable

Est = estimated

Appendix C

Blast Monitoring Summary

Table C1

Blast Monitoring Summary – 2020

BLAST DETAILS				GROUND VIBRATION (mm/s)			OVERPRESSURE (dBL)		
Event No.	Date	Time of Blast	Blast Code	Blake	Moore	School	Blake	Moore	School
1	02/01/20	11:31:37 AM	S34-17-IB-BR1 & S34-19-PS-BRWN	0.22	0.67	0.12	105.10	100.10	89.90
2	04/01/20	10:56:40 AM	S35-13-Cl-MAPF	0.07	0.63	0.03	92.90	101.70	90.80
3	06/01/20	3:03:33 PM	S34-19-IB-BR1	0.02	0.06	0.01	112.20	105.80	85.90
4	06/01/20	3:07:21 PM	S37-18-IB-RL139	0.08	0.65	0.06	104.20	106.60	98.50
5	08/01/20	3:07:01 PM	S34-25-IB-BR2A	0.04	0.41	0.03	101.20	96.70	90.90
6	08/01/20	3:04:48 PM	S35-20-IB-PF3	0.04	0.18	0.05	89.80	100.20	92.50
7	11/01/20	2:54:18 PM	S34-09-IB-BR1	0.34	2.13	0.09	102.20	106.60	105.30
8	13/01/20	10:56:43 AM	S37-28-IB-PF1	0.07	0.05	0.03	104.90	97.80	97.00
9	14/01/20	3:00:17 PM	S34-06-IB-BR1	0.14	0.81	0.05	86.00	106.20	90.30
10	16/01/20	11:47:10 AM	S35-16-IB-PF2	0.03	0.27	0.03	88.10	97.40	92.60
11	21/01/20	1:39:29 PM	S33-03-IB-ED	0.03	0.04	0.03	111.80	104.10	105.20
12	21/01/20	1:39:58 PM	S35-03-IB-WW4	0.08	0.55	0.03	112.10	100.40	103.30
13	24/01/20	3:50:00 PM	S36-29-IB-RL110 & S36-31-PS-MA2	0.05	0.29	0.05	112.80	104.30	109.00
14	29/01/20	12:38:49 PM	S34-20-IB-BR2A	0.07	0.22	0.03	99.70	104.00	91.30
15	29/01/20	12:39:49 PM	S35-25-IB-VA1	0.38	1.59	0.32	101.60	106.20	86.20
16	30/01/20	11:35:15 AM	S34-02-PS-BR2	0.18	0.20	0.05	93.70	99.60	81.90
17	01/02/20	3:53:08 PM	S34-02-IB-BR1	0.24	2.04	0.07	101.10	100.90	89.40
18	05/02/20	11:22:45 AM	S34-15-PS-BRWN	0.22	0.84	0.14	89.50	98.70	85.00
19	05/02/20	11:23:45 AM	S35-23-IB-VA1	0.17	0.92	0.15	94.90	93.90	82.50
20	07/02/20	3:28:12 PM	S35-21-IB-VA1	0.26	1.21	0.14	100.00	102.00	92.50
21	10/02/20	1:55:15 PM	S35-12-PS-BYWN	0.06	0.40	0.04	89.00	85.90	84.20
22	10/02/20	1:56:53 PM	S37-09-IB-WW3	0.07	0.74	0.03	88.00	104.30	91.20
23	11/02/20	4:36:11 PM	S35-21-IB-VA1	0.13	0.80	0.09	84.30	101.50	88.10
24	13/02/20	10:54:50 AM	S35-11-IB-MA1	0.03	0.27	0.01	97.40	104.60	89.30
25	18/02/20	11:38:34 AM	S36-26-IB-PF2	0.22	1.48	0.18	90.80	105.80	100.20

BLAST DETAILS				GROUND VIBRATION (mm/s)			OVERPRESSURE (dBL)		
Event No.	Date	Time of Blast	Blast Code	Blake	Moore	School	Blake	Moore	School
26	20/02/20	3:02:23 PM	S34-03-PS-BYWN	0.24	1.40	0.17	88.20	98.10	93.40
27	20/02/20	3:04:09 PM	S35-08-IB-MA1	0.31	2.25	0.07	92.80	103.60	96.40
28	24/02/20	11:27:36 AM	S34-16-IB-BY1	0.11	0.87	0.05	93.80	101.10	94.20
29	26/02/20	12:02:18 PM	S34-17-IB-BY1	0.13	0.69	0.07	95.30	94.10	94.20
30	28/02/20	4:34:58 PM	S35-29-IB-VA1	0.09	0.27	0.04	98.40	94.90	84.80
31	28/02/20	4:33:56 PM	S36-28-IB-PF2	0.09	0.79	0.09	91.20	99.70	86.20
32	28/02/20	4:32:39 PM	S34-19-IB-BY1	0.15	1.09	0.08	93.60	105.60	90.10
33	02/03/20	11:25:50 AM	S34-21-IB-BY1	0.11	0.91	0.08	82.10	92.20	90.70
34	02/03/20	11:26:50 AM	S36-25-IB-PF2	0.08	0.89	0.06	92.10	93.50	88.80
35	03/03/20	11:19:25 AM	S34-07-PS-BYWN	0.51	2.10	0.20	95.10	105.00	95.90
36	04/03/20	10:58:48	S35-02-IB-WW3	0.08	0.72	0.02	87.50	103.60	92.20
37	05/03/20	1:13:59 PM	S34-16-IB-PF2 & S34-10-PS-BYWN	0.39	1.88	0.22	77.00	99.20	88.20
38	07/03/20	2:35:23 PM	S35-11-IB-PF1	0.07	0.78	0.03	107.90	109.50	104.00
39	09/03/20	11:07:16 AM	S35-05-IB-MA1	0.12	1.33	0.03	103.30	106.10	92.40
40	11/03/20	3:30:21 PM	S36-15-IB-WW4	0.32	5.40	0.11	109.80	109.80	103.20
41	14/03/20	2:55:34 PM	S35-26-IB-VA1	0.18	0.61	0.11	95.70	106.70	89.40
42	16/03/20	3:32:39 PM	S34-11-IB-BY1	0.19	1.27	0.10	101.10	109.40	91.40
43	20/03/20	11:10:10 AM	S35-18-IB-VA1 & S35-14-IB-PF2	0.22	1.55	0.16	99.00	100.00	96.00
44	21/03/20	2:43:00 PM	S34-09-IB-BY1	0.21	1.51	0.09	96.20	102.10	89.50
45	23/03/20	11:07:41 AM	S34-01-IB-WW4	0.22	1.28	0.04	103.00	104.70	89.10
46	24/03/20	2:59:57 PM	S35-08-Cl-MAPF & S35-11-IB-PF2	0.09	0.77	0.04	88.10	102.90	88.50
47	26/03/20	2:12:41 PM	S35-22-IB-VA1	0.09	0.52	0.11	104.00	102.30	92.20
48	28/03/20	9:59:04 AM	S35-06-Cl-MAPF	0.10	0.41	0.03	86.10	103.20	84.00
49	30/03/20	3:40:01 PM	S36-29-IB-WW4	0.10	0.54	0.09	93.80	101.60	97.30
50	02/04/20	3:41:00 PM	S34-22-IB-BY1	0.20	0.77	0.14	89.10	92.80	96.80
51	03/04/20	3:39:00 PM	S34-12-IB-WN	0.03	0.19	0.02	80.90	92.90	87.00
52	07/04/20	2:31:30 PM	S35-16-IB-VARL	0.30	1.13	0.12	95.70	104.40	98.70
53	07/04/20	2:32:58 PM	S35-11-IB-PF1	0.03	0.32	0.02	102.30	102.30	101.40

BLAST DETAILS				GROUND VIBRATION (mm/s)			OVERPRESSURE (dBL)		
Event No.	Date	Time of Blast	Blast Code	Blake	Moore	School	Blake	Moore	School
54	09/04/20	2:32:37 PM	S35-01-IB-MA1	0.16	1.45	0.05	93.20	109.30	93.50
55	14/04/20	11:24:33 AM	S34-12-IB-ED	0.09	0.36	0.04	84.90	95.70	93.20
56	14/04/20	11:25:55 AM	S36-13-IB-WW4	0.27	4.65	0.14	87.60	103.80	92.20
57	15/04/20	2:50:00 PM	S35-1-IB-MA1	0.07	0.55	0.02	90.50	102.00	93.40
58	17/04/20	3:06:11 PM	S34-06-IB-BY1	0.40	2.26	0.10	102.00	96.70	98.20
59	20/04/20	2:51:32 PM	S35-14-IB-VA1	0.31	2.45	0.16	93.30	98.60	94.00
60	23/04/20	3:29:49 PM	S35-03-IB-BY1	0.36	1.87	0.12	97.60	103.70	98.30
61	24/04/20	2:51:05 PM	S35-19-IB-VA1	0.11	0.77	0.09	96.40	91.30	92.30
62	27/04/20	2:12:19 PM	S35-09-IB-PF2	0.26	1.38	0.07	97.20	103.80	100.20
63	28/04/20	3:00:00 PM	S35-02-CI-MAPF	0.13	0.67	0.05	94.30	102.50	87.90
64	01/05/20	9:39:34 AM	S35-12-IB-VA1	0.37	2.70	0.12	97.10	98.70	99.30
65	05/05/20	3:21:56 PM	S36-26-IB-VARL & S36-30-IB-PF1	0.20	0.96	0.15	94.50	102.70	90.40
66	07/05/20	10:57:46 AM	S34-25-IB-WN	0.17	0.58	0.06	97.40	100.10	100.40
67	07/05/20	10:58:37 AM	S35-26-IB-BR2	0.01	0.03	0.01	86.40	88.60	93.90
68	07/05/20	3:19:00 PM	S35-26-IB-BR2-Misfire	0.01	0.01	0.00	98.70	94.30	95.20
69	09/05/20	2:51:43 PM	S36-05-IB-WW3	0.19	1.58	0.05	101.50	108.90	102.20
70	11/05/20	3:25:00 PM	S34-21-IB-WN	0.09	0.30	0.05	95.00	103.50	93.20
71	13/05/20	4:15:23 PM	S36-03-IB-WW3	0.11	0.54	0.03	100.30	101.50	97.30
72	13/05/20	4:16:06 PM	S39-03-IB-RL181	0.14	1.09	0.05	103.10	107.90	99.80
73	16/05/20	11:10:48 AM	S35-10-IB-VA1 & S37-14-IB-WW3	0.07	0.57	0.03	98.90	112.40	91.70
74	16/05/20	4:39:03 PM	S35-10-IB-VA1 -Misfire	0.15	0.99	0.04	89.30	99.70	82.60
75	19/05/20	11:00:05 AM	S35-17-IB-VA1	0.09	0.49	0.05	87.30	91.40	88.70
76	20/05/20	1:53:10 PM	S39-01-IB-RL181 & S39-01-IB-RL193	0.13	1.34	0.05	100.90	104.50	116.40
77	23/05/20	3:28:46 PM	S36-11-IB-WW4 & S35-16-IB-VA1	0.29	2.56	0.10	96.90	95.40	99.40
78	26/05/20	11:30:26 AM	S34-17-IB-WN	0.05	0.30	0.05	98.00	106.00	97.00
79	27/05/20	3:52:22 PM	S34-10-IB-WN	0.03	0.17	0.02	85.90	91.90	81.70
80	29/05/20	4:17:28 PM	S35-02-IB-PF2	0.22	1.18	0.06	90.70	103.60	88.00
81	02/06/20	2:57:41 PM	S34-14-IB-WN	0.04	0.21	0.03	104.80	110.50	106.10

BLAST DETAILS				GROUND VIBRATION (mm/s)			OVERPRESSURE (dBL)		
Event No.	Date	Time of Blast	Blast Code	Blake	Moore	School	Blake	Moore	School
82	02/06/20	2:58:18 PM	S35-08-IB-PF2	0.18	1.31	0.07	111.40	112.20	100.30
83	04/06/20	2:55:06 PM	S34-07-IB-WN	0.05	0.26	0.02	95.80	98.10	98.90
84	05/06/20	10:57:27 AM	S39-01-IB-RL181	0.06	0.37	0.02	85.50	95.10	85.90
85	06/06/20	3:30:46 PM	S36-16-CI-MAPF	0.07	0.55	0.05	95.80	108.50	93.70
86	09/06/20	4:28:13 PM	S34-03-IB-WN	0.06	0.26	0.03	97.90	106.10	94.40
87	09/06/20	4:28:52 PM	S35-15-IB-VA1	0.04	0.30	0.02	89.50	97.80	82.80
88	11/06/20	4:19:08 PM	S36-10-IB-VA1	0.06	0.26	0.03	97.90	106.10	94.40
89	13/06/20	10:44:51 AM	S37-16-IB-WW4 East	0.21	2.46	0.10	93.40	107.70	91.30
90	16/06/20	3:31:39 PM	S37-16-IB-WW4 West & S37-19-IB-RL139	0.28	2.70	0.13	95.90	104.00	97.10
91	18/06/20	1:29:02 PM	S39-01-IB-WW1	0.09	0.72	0.04	101.20	112.20	97.70
92	19/06/20	2:40:04 PM	S36-29-IB-PF2	0.08	0.39	0.07	88.30	96.80	87.80
93	22/06/20	10:52:59 AM	S36-22-IB-PF2	0.21	1.04	0.11	98.10	103.30	95.30
94	24/06/20	11:33:20 AM	S35-07-IB-VA1	0.23	2.87	0.09	98.70	112.60	102.40
95	25/06/20	4:11:31 PM	S35-05-IB-VA1	0.33	3.21	0.12	97.10	99.90	96.50
96	26/06/20	2:55:04 PM	S36-05-IB-WW4	0.10	0.73	0.03	93.10	104.40	87.20
97	29/06/20	3:03:43 PM	S37-18-IB-WW4 & S37-14-IB-WW4	0.28	3.26	0.14	95.00	108.00	94.00
98	30/06/20	12:25:00 PM	S35-24-IB-BR2	0.02	0.07	0.02	96.80	105.00	95.00
99	03/07/20	11:30:47 AM	S37-23-IB-WW4	0.13	1.07	0.08	98.90	102.40	99.80
100	04/07/20	11:34:26 AM	S36-20-IB-PF2	0.11	0.62	0.08	97.60	103.40	95.60
101	09/07/20	2:59:53 PM	S37-03-IB-WW3	0.52	1.91	0.11	98.10	113.30	94.80
102	09/07/20	3:03:31 PM	S36-30-IB-PF1	0.03	0.09	0.02	83.00	92.50	81.40
103	13/07/20	11:00:36 AM	S37-22-IB-WW4	0.07	0.87	0.06	96.00	105.60	99.40
104	14/07/20	3:33:04 PM	S35-17-IB-BR1	0.02	0.16	0.02	93.00	103.10	92.10
105	14/07/20	3:35:08 PM	S35-02-PS-VA1	0.07	0.39	0.03	94.50	108.90	100.60
106	18/07/20	2:53:20 PM	S35-02-IB-VA1	0.45	2.92	0.12	93.50	103.30	93.00
107	18/07/20	2:53:58 PM	S37-04-IB-WW3	0.13	1.40	0.04	97.10	109.40	98.00
108	20/07/20	3:24:26 PM	S36-15-IB-PF1	0.06	0.65	0.02	93.80	100.00	95.70

BLAST DETAILS				GROUND VIBRATION (mm/s)			OVERPRESSURE (dBL)		
Event No.	Date	Time of Blast	Blast Code	Blake	Moore	School	Blake	Moore	School
109	20/07/20	3:26:52 PM	S35-14-PS-BRWN	0.24	1.67	0.15	91.00	104.10	93.70
110	22/07/20	3:24:21 PM	S37-20-IB-WW4	0.16	1.76	0.11	94.30	106.50	95.00
111	27/07/20	4:01:18 PM	S36-27-IB-VARL	0.26	1.18	0.16	102.60	110.90	106.60
112	30/07/20	3:30:21 PM	S36-11-IB-MA1	0.02	0.11	0.01	83.70	100.20	81.90
113	04/08/20	10:53:43 AM	S36-02-IB-WW3	0.15	0.96	0.04	101.50	103.50	101.00
114	05/08/20	10:58:39 AM	S36-25-IB-VARL & S36-28-IB-VARL	0.27	1.50	0.19	100.80	101.80	95.00
115	08/08/20	4:19:53 PM	S35-25-IB-BR2A & S35-25-PS-BYWN	0.18	0.80	0.16	98.70	95.00	94.90
116	10/08/20	12:02:48 PM	S36-12-CI-MAPF	0.10	0.55	0.04	100.90	112.50	92.70
117	10/08/20	4:40:13 PM	S35-25-PS-BYWN Misfire	0.00	0.01	0.00	103.80	101.10	80.40
118	12/08/20	3:24:58 PM	S36-16-IB-PF2	0.04	0.32	0.04	97.60	97.30	94.10
119	13/08/20	3:56:32 PM	S35-24-PS-BRWN	0.16	0.72	0.20	88.30	95.50	94.30
120	13/08/20	3:58:51 PM	S37-18-CI-MAPF	0.06	0.38	0.03	94.60	100.90	100.20
121	15/08/20	10:45:25 AM	S35-22-IB-BR2A	0.08	0.42	0.05	97.50	106.20	97.80
122	17/08/20	3:54:42 PM	S36-14-IB-PF1	0.05	0.45	0.02	103.20	111.20	98.10
123	17/08/20	3:55:53 PM	S36-09-IB-MA1	0.15	1.97	0.06	101.00	106.90	98.00
124	20/08/20	3:58:00 PM	S36-17-IB-PF2	0.00	0.02	0.01	99.20	107.20	98.40
125	20/08/20	4:00:19 PM	S36-06-IB-MA1	0.27	1.56	0.07	102.60	105.10	100.40
126	24/08/20	10:56:10 AM	S36-24-IB-VARL	0.30	1.34	0.24	94.20	103.00	108.20
127	25/08/20	10:50:36 AM	S36-01-IB-WW3 & S36-01-PS-MA2	0.39	0.94	0.07	95.50	100.90	93.90
128	26/08/20	3:57:15 PM	S35-25-IB-BY1	0.16	0.66	0.12	94.10	99.60	93.30
129	29/08/20	11:05:46 AM	S36-22-IB-VARL & S36-29-IB-VARL	0.43	1.66	0.28	83.00	94.10	84.50
130	01/09/20	10:58:13 AM	S35-11-IB-BR1	0.30	1.94	0.09	100.10	104.60	95.10
131	01/09/20	11:00:02 AM	S36-04-IB-WW4	0.10	0.51	0.03	102.40	112.10	92.70
132	03/09/20	10:46:00 AM	S36-21-IB-VARL	0.26	1.50	0.23	110.40	104.40	95.80
133	05/09/20	9:26:41 AM	S36-10-CI-MAPF	0.08	0.76	0.03	92.80	98.70	88.60
134	07/09/20	3:55:37 PM	S37-29-IB-WW3	0.06	0.34	0.05	106.70	103.90	90.00
135	09/09/20	11:23:22 AM	S36-01-IB-WW4	0.15	1.08	0.04	95.10	107.80	94.70
136	11/09/20	11:15:10 AM	S37-23-CI-MAPF	0.06	0.45	0.06	97.80	104.90	102.70

BLAST DETAILS				GROUND VIBRATION (mm/s)			OVERPRESSURE (dBL)		
Event No.	Date	Time of Blast	Blast Code	Blake	Moore	School	Blake	Moore	School
137	14/09/20	3:58:18 PM	S37-13-IB-WW4	0.25	1.56	0.08	94.30	106.40	94.00
138	16/09/20	4:27:26 PM	S35-19-PS-BYWN	0.15	0.44	0.08	87.90	91.40	97.10
139	16/09/20	4:29:16 PM	S36-12-IB-PF2	0.09	0.82	0.04	89.90	100.00	94.10
140	16/09/20	4:30:32 PM	S37-21-CI-MAPF	0.06	0.25	0.03	90.80	100.00	91.20
141	17/09/20	3:53:57 PM	S35-12-PS-BYWN	0.20	1.44	0.17	84.70	92.50	88.50
142	19/09/20	11:03:49 AM	S36-20-IB-VARL	0.29	1.36	0.24	83.20	94.90	84.80
143	21/09/20	10:56:29 AM	S35-22-IB-BY1	0.27	0.70	0.13	105.00	95.50	92.70
144	22/09/20	10:52:43 AM	S35-09-IB-BR1	0.18	1.59	0.07	105.90	109.60	103.80
145	24/09/20	10:31:17 AM	S35-09-IB-BR2	0.20	1.39	0.11	104.10	97.10	95.10
146	28/09/20	3:28:25 PM	S35-07-IB-BR1 & S35-02-PS-BR2	0.20	1.20	0.08	93.10	98.30	91.90
147	28/09/20	3:29:04 PM	S36-01-IB-MA1	0.21	1.57	0.04	98.40	109.00	97.40
148	01/10/20	11:14:56 AM	S35-02-IB-BR1	0.30	1.56	0.10	99.20	98.50	94.80
149	03/10/20	3:50:04 PM	S35-19-IB-BR2A	0.01	0.01	0.00	72.60	73.80	85.60
150	03/10/20	3:56:43 PM	S36-07-CI-MAPF	0.11	0.57	0.03	85.50	100.10	81.40
151	07/10/20	3:23:54 PM	S36-25-IB-VA1	0.21	1.07	0.18	100.80	110.90	101.00
152	09/10/20	11:06:12 AM	S36-16-IB-VARL	0.32	1.65	0.14	97.00	109.30	93.80
153	10/10/20	2:27:56 PM	S36-11-IB-PF2	0.07	0.77	0.03	91.80	106.60	88.70
154	12/10/20	3:33:40 PM	S35-20_IB-BY1	0.11	0.59	0.06	92.70	99.50	93.80
155	12/10/20	3:34:12 PM	S36-14-IB-VARL	0.39	2.19	0.11	95.30	102.20	90.60
156	16/10/20	3:56:23 PM	S37-29-IB-RL113 & S37-29-PS-MA2	0.10	0.29	0.08	98.00	103.50	89.10
157	17/10/20	10:57:02 AM	S35-12-RA-BY1	0.14	2.11	0.08	93.30	99.30	94.50
158	19/10/20	3:04:45 PM	S36-02-IB-MAPF & S36-02-PS-PF2	0.13	0.81	0.05	95.90	103.60	91.30
159	20/10/20	4:30:15 PM	S36-09-IB-PF2	0.01	1.18	0.04	100.60	101.10	92.10
160	23/10/20	3:24:26 PM	S36-22-IB-VA1	0.18	0.97	0.13	89.10	95.00	91.10
161	27/10/20	3:58:25 PM	S35-14-IB-BY1	0.11	1.04	0.12	93.50	98.90	82.80
162	31/10/20	3:59:40 PM	S36-13-IB-VA1	0.21	2.40	0.08	114.30	95.90	108.50
163	02/11/20	11:36:22 AM	S35-17-IB-BY1	0.11	0.50	0.06	94.00	113.20	84.10
164	02/11/20	11:38:24 AM	S37-27-IB-PF2	0.19	1.16	0.14	108.50	106.80	93.90

BLAST DETAILS				GROUND VIBRATION (mm/s)			OVERPRESSURE (dBL)		
Event No.	Date	Time of Blast	Blast Code	Blake	Moore	School	Blake	Moore	School
165	04/11/20	3:23:09 PM	S36-11-IB-VA1	0.23	2.06	0.09	90.60	96.50	92.40
166	07/11/20	10:56:06 AM	S37-26-IB-PF2	0.14	1.10	0.11	93.50	99.80	90.50
167	09/11/20	3:58:50 PM	S37-19-CI-MAPF	0.13	1.49	0.06	101.60	111.00	90.40
168	09/11/20	4:00:48 PM	S37-08-IB-WW3	0.04	0.34	0.04	101.10	106.10	89.10
169	12/11/20	11:09:09 AM	S37-06-IB-WW3	0.18	0.95	0.06	96.30	101.00	98.00
170	14/11/20	3:52:32 PM	S36-19-IB-VA1	0.13	0.79	0.08	97.90	97.60	99.10
171	16/11/20	11:23:31 AM	S35-22-IB-WN	0.14	0.31	0.05	107.60	110.20	107.70
172	16/11/20	11:24:31 PM	S36-25-PS-BYWN	0.28	0.95	0.17	101.10	89.70	99.50
173	17/11/20	2:25:04 PM	S35-03-PS-BYWN	0.41	1.98	0.21	103.20	100.80	93.20
174	20/11/20	2:36:35 PM	S36-02-IB-PF2	0.31	1.78	0.06	95.20	99.70	95.40
175	23/11/20	9:58:41 AM	S35-25-IB-WN	0.06	0.42	0.05	95.50	101.30	101.00
176	24/11/20	3:57:10 PM	S35-07-PS-BYWN	0.45	2.16	0.23	96.60	107.10	92.10
177	24/11/20	3:58:18 PM	S37-10-IB-VA1	0.21	1.71	0.05	100.80	104.60	91.60
178	26/11/20	3:20:12 PM	S36-05-IB-PF2	0.16	1.66	0.05	95.30	97.80	92.30
179	28/11/20	1:58:09 PM	S37-01-IB-WW2	0.23	1.18	0.05	102.80	108.00	101.20
180	30/11/20	3:55:05 PM	S37-29-IB-WW4	0.07	0.41	0.04	106.20	114.80	101.90
181	02/12/20	10:55:58 AM	S37-12-IB-WW4	0.26	3.23	0.08	111.30	110.60	99.30
182	03/12/20	3:30:25 PM	S37-10-IB-WW4	0.20	1.86	0.07	96.50	106.10	95.00
183	04/12/20	3:20:46 PM	S37-20-IB-PF1	0.07	0.34	0.05	99.10	109.70	93.00
184	08/12/20	10:49:43 AM	S35-11-IB-BY1	0.26	2.20	0.09	96.40	106.00	95.80
185	08/12/20	10:51:24 AM	S37-11-IB-WW4	0.19	2.64	0.07	115.30	107.30	94.30
186	10/12/20	2:49:16 PM	S35-08-IB-BY1	0.41	2.12	0.09	94.80	103.40	87.00
187	11/12/20	3:33:26 PM	S36-26-IB-BR2C	0.02	0.08	0.02	108.50	110.90	97.50
188	14/12/20	10:55:28 AM	S36-15-IB-VA1	0.09	0.70	0.05	105.10	117.50	97.40
189	15/12/20	8:54:42 AM	S36-15-IB-VA1 Misfire	0.05	0.27	0.02	101.10	102.80	80.40
190	15/12/20	2:53:31 PM	S35-03-IB-BR2	0.05	0.25	0.02	107.40	105.40	95.00
191	15/12/20	2:53:56 PM	S37-01-IB-WW3 & S37-01-PS-MA2	0.19	1.11	0.06	104.90	113.50	90.40
192	16/12/20	3:08:51 PM	S36-20-PS-BYWN	0.21	1.34	0.17	96.80	95.10	92.70

BLAST DETAILS				GROUND VIBRATION (mm/s)			OVERPRESSURE (dBL)		
Event No.	Date	Time of Blast	Blast Code	Blake	Moore	School	Blake	Moore	School
193	21/12/20	11:55:51 AM	S35-05-IB-BY1	0.47	2.06	0.13	96.00	99.40	90.50
194	24/12/20	10:54:53 AM	S36-08-IB-VA1	0.46	3.03	0.12	89.60	102.20	87.50
195	30/12/20	10:55:44 AM	S36-06-IB-VA1	0.36	3.20	0.10	95.50	100.80	89.20

Appendix D

Air Quality Monitoring Summary

Table D1
Particulate Matter <10µm (PM_{10}) 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)		
03/01/2020	102	50.0	70	38.3	85	38.8	162[#1]	50.4	*50*	*25*
09/01/2020	53	50.2	60	38.5	61	39.3	41	50.5	*50*	*25*
15/01/2020	44	50.3	34	38.6	59	39.4	69	50.8	*50*	*25*
21/01/2020	74	51.0	60	39.3	73[#2]	40.0	65	51.3	*50*	*25*
27/01/2020	42	50.8	38	39.1	50	39.9	70	51.7	*50*	*25*
02/02/2020	69	51.3	42	39.4	57	40.5	54	52.0	*50*	*25*
08/02/2020	14	51.1	12	39.2	25	40.5	22	51.6	*50*	*25*
14/02/2020	25	49.3	29	38.0	33	39.8	41	50.6	*50*	*25*
20/02/2020	30	48.0	27	37.4	30	39.9	33	49.9	*50*	*25*
26/02/2020	16	47.7	10	37.2	10	39.8	11	49.3	*50*	*25*
03/03/2020	33	47.7	31	37.3	38	40.0	39	49.0	*50*	*25*
09/03/2020	20	47.4	15	37.1	31	40.2	33	49.0	*50*	*25*
15/03/2020	20	47.1	20	36.9	13	40.2	26	48.6	*50*	*25*
21/03/2020	38	47.3	35	37.1	46	40.7	54	49.0	*50*	*25*
27/03/2020	16	47.1	10	36.9	22	40.5	33	48.7	*50*	*25*
02/04/2020	22	47.3	22	37.1	22	40.6	21	48.7	*50*	*25*
08/04/2020	20	46.9	17	36.7	19	40.5	27	48.7	*50*	*25*
14/04/2020	23	46.8	22	36.6	20	40.2	27	48.0	*50*	*25*
20/04/2020	21	46.8	17	36.6	18	40.0	13	47.6	*50*	*25*
26/04/2020	45	46.5	35	36.4	22	39.9	22	47.6	*50*	*25*
02/05/2020	13	45.9	9	36.0	5	39.4	5	46.8	*50*	*25*
08/05/2020	15	45.7	15	35.8	9	39.3	10	46.8	*50*	*25*
14/05/2020	20	45.8	20	35.8	20	39.4	63	47.4	*50*	*25*
20/05/2020	19	45.7	22	35.8	12	39.3	13	47.4	*50*	*25*
26/05/2020	8	45.3	12	35.4	6	39.1	7	47.3	*50*	*25*

Run Date	PM_{10}-1		PM_{10}-2		PM_{10}-3		PM_{10}-4		24-hour Assessment Criteria ($\mu g/m^3$)	Annual Assessment Criteria ($\mu g/m^3$)
	Run Date Reading ($\mu g/m^3$)	Annual Rolling Average ($\mu g/m^3$)	Run Date Reading ($\mu g/m^3$)	Annual Rolling Average ($\mu g/m^3$)	Run Date Reading ($\mu g/m^3$)	Annual Rolling Average ($\mu g/m^3$)	Run Date Reading ($\mu g/m^3$)	Annual Rolling Average ($\mu g/m^3$)		
01/06/2020	17	45.0	15	35.2	11	38.8	11	46.5	*50*	*25*
07/06/2020	24	44.8	27	35.2	29	38.7	62	46.2	*50*	*25*
13/06/2020	15	44.6	24	35.2	38	39.1	30	46.6	*50*	*25*
19/06/2020	16	44.5	20	35.2	24	39.1	39	46.8	*50*	*25*
25/06/2020	5	44.4	4	35.1	17	39.3	<1	47.5	*50*	*25*
01/07/2020	18	43.9	16	34.9	2	38.9	13	46.4	*50*	*25*
07/07/2020	26	44.1	18	35.0	21	38.9	64	46.9	*50*	*25*
13/07/2020	4	43.7	4	34.7	3	38.8	4	46.9	*50*	*25*
19/07/2020	8	43.4	10	34.5	8	38.7	8	46.9	*50*	*25*
25/07/2020	19	43.2	19	34.4	24	38.7	30	46.3	*50*	*25*
31/07/2020	15	43.0	19	34.4	22	38.8	34	46.2	*50*	*25*
06/08/2020	16	42.6	14	34.2	12	38.7	23	45.9	*50*	*25*
12/08/2020	13	42.6	17	34.3	13	38.8	31	46.4	*50*	*25*
18/08/2020	17	42.3	4	34.0	3	38.3	4	45.6	*50*	*25*
24/08/2020	13	41.8	9	33.5	2	37.8	2	45.0	*50*	*25*
30/08/2020	28	42.0	24	33.9	20	38.1	24	45.3	*50*	*25*
05/09/2020	23	42.0	17	33.7	11	37.6	14	44.4	*50*	*25*
11/09/2020	14	41.7	16	33.5	34	37.5	19	43.7	*50*	*25*
17/09/2020	28	42.0	22	33.7	25	37.7	21	43.9	*50*	*25*
23/09/2020	33	42.0	25	33.7	14	37.7	14	43.9	*50*	*25*
29/09/2020	16	41.7	14	33.4	35	37.8	42	43.9	*50*	*25*
05/10/2020	22	41.6	16	33.3	27	37.7	31	43.8	*50*	*25*
11/10/2020	19	41.5	17	33.2	29	37.8	27	43.7	*50*	*25*
17/10/2020	38	40.0	45	32.8	31	37.2	28	43.1	*50*	*25*
23/10/2020	16	39.5	17	32.3	43	37.1	47	42.9	*50*	*25*
29/10/2020	11	38.5	12	31.3	10	36.3	10	41.8	*50*	*25*
04/11/2020	21	38.6	23	31.4	23	36.5	20	42.0	*50*	*25*
10/11/2020	15	38.1	18	31.3	40	36.9	52	42.4	*50*	*25*
16/11/2020	29	37.4	23	30.4	42	37.4	34	41.9	*50*	*25*

Run Date	PM_{10}-1		PM_{10}-2		PM_{10}-3		PM_{10}-4		24-hour Assessment Criteria ($\mu g/m^3$)	Annual Assessment Criteria ($\mu g/m^3$)
	Run Date Reading ($\mu g/m^3$)	Annual Rolling Average ($\mu g/m^3$)	Run Date Reading ($\mu g/m^3$)	Annual Rolling Average ($\mu g/m^3$)	Run Date Reading ($\mu g/m^3$)	Annual Rolling Average ($\mu g/m^3$)	Run Date Reading ($\mu g/m^3$)	Annual Rolling Average ($\mu g/m^3$)		
22/11/2020	40	35.4	40	28.8	36	36.1	37	40.9	*50*	*25*
28/11/2020	53	34.8	32	27.9	66	34.7	28	39.2	*50*	*25*
04/12/2020	41	33.7	41	27.2	34	34.2	45	39.3	*50*	*25*
10/12/2020	40	31.6	41	26.0	56	32.3	71	37.8	*50*	*25*
16/12/2020	11	28.7	13	24.6	7	30.5	23	35.8	*50*	*25*
22/12/2020	14	26.4	10	23.4	5	28.0	8	34.1	*50*	*25*
28/12/2020	26	25.7	17	22.7	13	26.5	8	32.0	*50*	*25*

Source: AECOM (2020)
#1 Invalid due to corrected volume anomaly
#2 Monitor did not run on scheduled run day. Result recorded by make-up run completed 22/01/2020

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/m3)	Annual Rolling Average (µg/m3)	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)	
03/01/2020	151	124	219	114.1	161	86.3	146	95.9	382[#1]	146	*90*
09/01/2020	101	125	143	114.9	105	87.0	103	95.0	136	147	*90*
15/01/2020	112	125	152	115.9	105	87.4	111	95.7	214	147	*90*
21/01/2020	132	126	142	116.9	122	88.5	133	97.0	129	148	*90*
27/01/2020	114	126	106	116.4	92	88.6	93	96.7	170	148	*90*
02/02/2020	148	127	124	116.6	86	88.7	114	97.3	115	148	*90*
08/02/2020	36	127	47	116.2	24	88.1	31	96.8	82	147	*90*
14/02/2020	59	124	61	111.9	53	85.2	56	93.1	138	145	*90*
20/02/2020	69	122	81	109.9	62	84.2	79	92.1	109	143	*90*
26/02/2020	34	122	86	110.0	17	83.3	25	91.7	20	142	*90*
03/03/2020	73	122	66	109.3	57	83.0	61	91.5	93	139	*90*
09/03/2020	52	121	36	108.2	33	82.3	29	91.1	112	139	*90*
15/03/2020	68	121	58	107.6	57	82.0	48	90.7	94	137	*90*
21/03/2020	102	121	90	108.1	69	82.3	95	91.3	168	138	*90*
27/03/2020	32	121	39	107.8	32	81.9	31	90.8	134	138	*90*
02/04/2020	37	121	36	107.8	38	82.0	39	91.0	68	138	*90*
08/04/2020	45	119	43	106.3	43	80.8	38	89.6	93	138	*90*
14/04/2020	52	118	50	106.0	35	80.4	46	89.3	56	135	*90*
20/04/2020	91	119	67	106.1	37	80.3	50	89.4	28	133	*90*
26/04/2020	191	118	123	105.2	99	79.7	85	88.3	60	133	*90*
02/05/2020	38	116	39	104.2	25	78.7	32	87.1	14	130	*90*
08/05/2020	100	116	56	103.9	32	78.4	38	87.0	29	130	*90*
14/05/2020	48	115	51	103.7	42	78.4	53	87.2	173	132	*90*
20/05/2020	73	115	48	103.4	33	78.1	51	87.1	39	131	*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/m3)	Annual Rolling Average (µg/m3)	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)	
26/05/2020	40	113	29	102.3	32	77.2	30	86.1	11	131	*90*
01/06/2020	95	112	61	101.8	54	76.9	50	85.7	29	129	*90*
07/06/2020	22	111	51	101.1	52	76.7	56	85.5	150	128	*90*
13/06/2020	42	109	24	99.6	24	75.8	36	84.7	104	129	*90*
19/06/2020	36	108	33	99.1	24	75.5	38	84.4	110	130	*90*
25/06/2020	46	109	34	99.3	26	75.7	25	84.5	3	129	*90*
01/07/2020	94	108	50	98.1	30	74.9	39	84.1	44	127	*90*
07/07/2020	42	108	57	98.6	38	75.1	52	84.6	232	128	*90*
13/07/2020	40	107	19	97.5	13	74.4	19	83.7	16	128	*90*
19/07/2020	43	106	32	96.8	29	74.0	39	83.4	20	128	*90*
25/07/2020	38	104	37	96.1	31	73.6	39	83.0	88	127	*90*
31/07/2020	36	103	31	95.3	29	73.1	47	82.9	110	126	*90*
06/08/2020	63	103	54	94.7	38	72.9	55	82.8	69	126	*90*
12/08/2020	42	102	29	94.4	23	72.6	33	82.6	70	127	*90*
18/08/2020	42	101	82	94.5	23	72.2	27	81.9	15	125	*90*
24/08/2020	103	100	80	93.9	49	71.7	52	80.9	13	124	*90*
30/08/2020	84	100	60	94.0	39	71.7	60	81.4	47	124	*90*
05/09/2020	77	100	67	94.0	44	71.5	61	81.4	53	122	*90*
11/09/2020	36	100	36	93.1	32	70.4	38	80.5	62	119	*90*
17/09/2020	70	98.5	83	93.8	47	70.6	58	81.0	79	120	*90*
23/09/2020	133	98.6	122	94.3	71	70.7	86	81.0	28	119	*90*
29/09/2020	48	98.0	50	93.3	41	69.9	49	80.1	147	119	*90*
05/10/2020	85	98.7	74	93.2	57	69.8	43	79.8	71	118	*90*
11/10/2020	72	95.8	72	93.0	50	70.1	54	79.4	87	117	*90*
17/10/2020	182	97.0	132	91.9	103	69.6	117	78.3	116	116	*90*
23/10/2020	55	93.2	86	91.5	41	69.0	46	77.6	206	117	*90*
29/10/2020	40	92.6	34	89.8	25	67.0	27	75.4	36	114	*90*
04/11/2020	69	91.5	64	90.2	41	67.1	49	75.5	71	114	*90*
10/11/2020	40	89.0	39	89.0	43	66.3	50	74.4	199	116	*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/m3)	Annual Rolling Average (µg/m3)	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)	
16/11/2020	96	86.1	83	87.4	58	64.7	76	72.4	205	117	*90*
22/11/2020	132	85.4	107	85.2	98	62.6	100	69.4	105	114	*90*
28/11/2020	157	83.8	123	84.1	75	61.0	77	67.6	110	111	*90*
04/12/2020	131	81.8	126	82.4	76	59.9	166	67.4	145	112	*90*
10/12/2020	106	79.0	101	79.2	88	57.9	103	65.3	210	109	*90*
16/12/2020	60	76.6	38	75.4	35	54.5	22	62.2	125	106	*90*
22/12/2020	28	74.7	44	71.5	24	52.0	28	59.8	15	102	*90*
28/12/2020	28	74.0	77	70.2	40	50.9	52	58.8	29	96.5	*90*

Source: AECOM (2020)
#1 Invalid due to corrected volume anomaly

Table D3
Total Deposited Dust Summary

Total Deposited Dust (g/m2/month)														
Month	**D01**	**D02**	**D04A**	**D05**	**D06**	**D07A**	**D08**	**D09**	**D10**	**D20**	**D23B**	**D25**	**D26**	**DA**
January	1.3	3.8	6.3	3.8	6.2	4.3	2.9	3.3	8.2	7.3	2.8	4.7	6.1	2.6
February	3.5	6.1	5.0	6.3	4.5	5.9	3.4	5.5	6.3	7.3	3.9	5.2	6.5	5.7
March	1.0	1.7	4.1	2.4	1.9	7.9	1.7	2.6	2.3	5.3	7.8c	3.8	5.9	7.3c
April	0.7	1.1	1.9	1.6	1.6	1.7	2.4	1.5	1.7	4.2	1.6	3.0	2.4	3.2
May	0.9	1.2	2.5	1.6	4.4	1.3	1.6	3.7	3.4	3.0	0.1c	2.6	1.8	2.6
June	0.6	1.1	1.7	1.8	1.3	1.1	0.7	1.7	2.2	2.5	0.8	2.1	1.7	7.8c
July	0.5	2.0	1.7	1.8	2.3	0.8	1.4	2.2	4.3	2.7	1.1	3.6	3.1	5.1
August	0.5	0.6	1.2	1.8	0.9	1.2	0.9	1.8	1.5	2.0	0.9	1.5	2.1	3.0
September	0.9	6.5c	2.3	2.3	2.1	1.8	1.4	2.8	3.4	2.2	2.1	2.0	1.3	2.5
October	1.6	6.0 c	2.2	2.6	2.1	1.7	1.4	3.9	2.9	4.7	2.1	3.2	2.7	2.9
November	1.1	4.0	2.8	2.0	1.0	1.9	2.1	3.2	3.2	4.2	2.5	2.5	3.3	5.2
December	1.8	2.6	4.3	1.8	3.9	1.4	2.2	3.2	2.5	8.4	2.4	3.7	1.4	3.7
Annual Average	**1.2**	**2.4**	**3.0**	**2.5**	**2.7**	**2.6**	**1.8**	**3.0**	**3.5**	**4.5**	**2.0**	**3.2**	**3.2**	**3.7**
Criteria (g/m^2/month)	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**

c = contaminated sample

Table D4
Increase in Deposited Dust

Increase in Deposited Dust (g/m2/month)														
Month	**D01**	**D02**	**D04A**	**D05**	**D06**	**D07A**	**D08**	**D09**	**D10**	**D20**	**D23B**	**D25**	**D26**	**DA**
January	0.1	0.1	0.3	0.5	0.9	0.2	0.3	1.1	1.3	0.2	0.4	0.2	0.5	0
February	0.3	0.5	0.7	0.8	0.7	0.6	0.4	1.5	1.6	0.4	0.4	0.5	0.6	0.2
March	0.2	0.5	0.5	0.8	0.7	1.0	0.4	1.3	1.4	0.1	0.3	0.1	0.9	0.2
April	0.1	0.6	0.7	0.9	0.7	1.0	0.4	1.3	1.5	0.5	0.3	0.3	0.7	0.4
May	0.1	0.5	0.5	0.8	0.7	0.8	0.4	1.3	1.3	0.1	0.0	0.0	0.7	0.0
June	0.1	0.5	0.6	0.7	0.7	0.8	0.3	0.8	1.1	0.2	0.3	0.1	0.8	0.3
July	-0.1	0.5	0.4	0.7	0.3	0.8	0.3	0.8	1.1	0.2	0.2	0.1	0.8	0.5
August	-0.1	0.3	0.3	0.7	0.2	0.8	0.2	0.5	1.1	0.1	0.2	0.3	0.6	0.7
September	-0.2	0.4	0.3	0.6	-0.1	0.9	0.3	0.1	0.9	0.3	0.4	0.4	0.7	1.0
October	-0.2	0.5	0.2	0.6	-0.1	0.9	0.1	0.0	0.6	0.1	0.3	0.3	0.7	1.0
November	-0.3	0.6	0.3	0.3	-0.7	0.7	0.1	-0.3	0.4	0.2	0.1	0.2	1.0	1.4
December	-0.4	0.5	0.3	-0.1	-1.1	0.4	-0.3	-0.7	-0.3	0.1	0.0	0.1	0.7	1.2
Annual Increase	**-0.4**	**0.5**	**0.3**	**-0.1**	**-1.1**	**0.4**	**-0.3**	**-0.7**	**-0.3**	**0.1**	**0**	**0.1**	**0.7**	**1.2**
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

$PM_{2.5}$ ($\mu g/m^3$)		
Monitor	**Annual Assessment Criteria**	**Result**
DPIE Upper hunter Air Quality Monitoring Network "Muswellbrook" Monitor	8	9.3

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 PM_{10} Monitoring (EPA22, EPA23 and EPA24) 24 Hour Average Summary

Date	EPA-22 PM10 Avg (ug/m3)	EPA-23 PM10 Avg (ug/m3)	EPA-24 PM10 Avg (ug/m3)
1/01/2020	89.8	64.3	-
2/01/2020	89.4	91.6	-
3/01/2020	100	99.6	-
4/01/2020	57.7	64.5	-
5/01/2020	32.7	35	-
6/01/2020	134.1	137.3	-
7/01/2020	35.4	38.9	36.3
8/01/2020	45.7	47.6	53.5
9/01/2020	86.4	86.6	94
10/01/2020	83	85.2	98.1
11/01/2020	40.3	42.3	46.3
12/01/2020	61.7	69.5	84.3
13/01/2020	100.8	103.3	115.1
14/01/2020	32.9	35.5	39.4
15/01/2020	22	24.2	28.5
16/01/2020	23	26.2	26.8
17/01/2020	15.1	15.7	15.5
18/01/2020	60.1	59.4	56.5
19/01/2020	41.2	43.5	42.8
20/01/2020	35.7	38.2	36.2
21/01/2020	23.3	24.4	21.3
22/01/2020	19.9	15.8	13.6
23/01/2020	16.3	17.4	16.8
24/01/2020	11.3	13.2	11.7
25/01/2020	34.3	33.2	32.3
26/01/2020	27.1	34	31.7
27/01/2020	10.7	11.1	10.7
28/01/2020	33.7	35.5	-
29/01/2020	13.8	17.2	-
30/01/2020	43.6	46	-
31/01/2020	38.8	41.3	-
1/02/2020	23.3	24.7	-
2/02/2020	15	16.1	-
3/02/2020	23.5	21.7	-
4/02/2020	30.5	26.4	-
5/02/2020	53.9	55.1	-
6/02/2020	7.4	11.8	-
7/02/2020	3.1	6.1	-
8/02/2020	2.5	4.5	-
9/02/2020	2.7	4.8	-
10/02/2020	2	2.9	-
11/02/2020	11.7	11.3	-
12/02/2020	8.7	13.8	-
13/02/2020	8.8	11.3	-
14/02/2020	5.2	9.1	-
15/02/2020	8.1	14.5	-
16/02/2020	10.1	12.2	-
17/02/2020	10.8	14.8	-
18/02/2020	6.6	7.3	-
19/02/2020	10.7	10.2	-
20/02/2020	9.6	6.6	-
21/02/2020	5.1	4.7	-
22/02/2020	6.9	10.5	-
23/02/2020	5.9	8.9	-
24/02/2020	4.5	8.9	-
25/02/2020	5.1	8.5	-
26/02/2020	11.6	15.2	-
27/02/2020	5.1	5.1	-
28/02/2020	17.3	22.6	-
29/02/2020	9	29.1	-
1/03/2020	7.8	12.9	-
2/03/2020	18.5	-	-
3/03/2020	14.7	-	-
4/03/2020	17.1	16.4	-
5/03/2020	13.8	15.8	-
6/03/2020	10.7	-	9
7/03/2020	10.2	7.5	2
8/03/2020	8.8	11.4	2
9/03/2020	6.6	8.7	2
10/03/2020	5.2	6.6	2
11/03/2020	3.5	6.9	2
12/03/2020	4.4	7.4	2
13/03/2020	4.3	7.6	2
14/03/2020	5.5	13.8	5.7
15/03/2020	4.9	10.5	6
16/03/2020	4	8.3	6.9
17/03/2020	2.7	4.5	3.1
18/03/2020	3.9	7.3	5.3
19/03/2020	9	15.3	11
20/03/2020	7	12	4.7
21/03/2020	9.7	17.1	7.1
22/03/2020	10.4	20	13.3
23/03/2020	18.3	20.1	18.5
24/03/2020	6.6	10.6	8.7
25/03/2020	5.5	9.6	8.4

Date	EPA-22 PM10 Avg (ug/m3)	EPA-23 PM10 Avg (ug/m3)	EPA-24 PM10 Avg (ug/m3)
26/03/2020	9.4	14	9.6
27/03/2020	8.3	11.1	9.9
28/03/2020	8.2	12	11
29/03/2020	10.4	15.3	12.4
30/03/2020	12.1	14.6	14.6
31/03/2020	7.2	9	4.9
1/04/2020	6.7	13	5.6
2/04/2020	17.6	21.8	20.6
3/04/2020	23.8	23	21.5
4/04/2020	10.1	5.6	5.1
5/04/2020	5.6	2.9	2.6
6/04/2020	9.7	4.2	3.7
7/04/2020	5.6	10.5	4.7
8/04/2020	4.5	9.1	7.3
9/04/2020	5.9	9.6	8.3
10/04/2020	7.7	12.4	10.6
11/04/2020	8.6	10.2	8.3
12/04/2020	8.4	4.8	4.3
13/04/2020	8.1	8.7	5.6
14/04/2020	11.7	25.7	20.1
15/04/2020	11	26.3	10.8
16/04/2020	15.1	21.2	9.4
17/04/2020	11.1	8.5	5.8
18/04/2020	9.9	5.2	5
19/04/2020	7.6	9.4	6.1
20/04/2020	11	25.1	7
21/04/2020	10.9	10.6	5.4
22/04/2020	8.8	11.5	5.2
23/04/2020	9.5	9.8	5.9
24/04/2020	9.8	17.4	8.6
25/04/2020	10	8.3	6.3
26/04/2020	10.4	23	8.9
27/04/2020	13.4	15.7	6
28/04/2020	6.3	11.9	10.4
29/04/2020	13.8	17.7	17.3
30/04/2020	18	10.9	9
1/05/2020	3.2	2.3	1.8
2/05/2020	3.9	2.1	1.9
3/05/2020	4	1.3	1
4/05/2020	5.2	2	1.7
5/05/2020	7.7	16.3	7.1
6/05/2020	8.5	20.1	8.3
7/05/2020	14.4	19.2	9
8/05/2020	7.7	31.3	5.6
9/05/2020	6.3	11.2	5.2
10/05/2020	5.3	5.1	3.3

Date	EPA-22 PM10 Avg (ug/m3)	EPA-23 PM10 Avg (ug/m3)	EPA-24 PM10 Avg (ug/m3)
11/05/2020	7.4	2.5	1.5
12/05/2020	8.5	19.9	13.5
13/05/2020	9.5	29.2	12.5
14/05/2020	11.7	36.5	12.8
15/05/2020	9.5	37.4	24.5
16/05/2020	4.8	11.3	9.1
17/05/2020	5.4	12.4	9.9
18/05/2020	8.8	25.6	19.7
19/05/2020	6.9	10.4	9.8
20/05/2020	19.6	21.6	17.8
21/05/2020	14.4	26.2	8.7
22/05/2020	6.1	3.1	1.9
23/05/2020	4.3	1.8	1.8
24/05/2020	6.4	4.6	4.2
25/05/2020	7.6	6.3	6.5
26/05/2020	4.6	7.7	1.3
27/05/2020	3.3	4.8	4.3
28/05/2020	17.3	37.7	14.8
29/05/2020	22.5	30.2	29.5
30/05/2020	14.9	34.7	21.7
31/05/2020	16.5	26.4	21.1
1/06/2020	16.8	30	7.5
2/06/2020	4.7	6.8	4
3/06/2020	3.4	2	1.7
4/06/2020	3.5	4.2	3
5/06/2020	9	18.8	10.9
6/06/2020	11.7	29.5	14.9
7/06/2020	12.3	34.8	20.8
8/06/2020	22.9	60.4	39.9
9/06/2020	18.4	27.3	15.8
10/06/2020	9.1	12.7	8.7
11/06/2020	10.6	17.1	13.3
12/06/2020	15.6	14.8	15.3
13/06/2020	9.6	15	12.5
14/06/2020	39.3	32.8	31.9
15/06/2020	19	13.7	8.5
16/06/2020	6.6	4.5	3.4
17/06/2020	6.3	5.4	2.3
18/06/2020	5.7	17	9.2
19/06/2020	5.4	8.6	6.8
20/06/2020	12.3	20.3	16.7
21/06/2020	21	44	19
22/06/2020	12	11.1	5.1
23/06/2020	3.6	1	0.3
24/06/2020	2.9	0.7	0.3
25/06/2020	2.8	0.9	0.7

Date	EPA-22 PM10 Avg (ug/m3)	EPA-23 PM10 Avg (ug/m3)	EPA-24 PM10 Avg (ug/m3)
26/06/2020	5.7	1.8	1.4
27/06/2020	12	17.9	15.6
28/06/2020	11.1	29.1	20.9
29/06/2020	11.6	15.5	12.2
30/06/2020	11.6	27.9	19.2
1/07/2020	16.7	32.7	13.2
2/07/2020	13.4	32.1	6.5
3/07/2020	7.5	29.4	6.5
4/07/2020	12.9	2.8	2.7
5/07/2020	5.6	1.4	1
6/07/2020	4.2	1.7	0.5
7/07/2020	11.1	27.7	6.8
8/07/2020	12.2	41.7	28.2
9/07/2020	6.6	12.8	6.5
10/07/2020	20.8	24.2	15
11/07/2020	18.1	31	14.3
12/07/2020	14.6	9.8	8.7
13/07/2020	8	5.4	1.5
14/07/2020	3.4	13.2	3.9
15/07/2020	5.1	5.8	1.8
16/07/2020	4.5	7.8	1.1
17/07/2020	7.4	12.7	2.3
18/07/2020	8.1	28	3.8
19/07/2020	6.3	10.1	7.1
20/07/2020	12.8	30.9	9.7
21/07/2020	5.1	2	2
22/07/2020	5.6	13.8	8.8
23/07/2020	21.7	37.2	17.2
24/07/2020	12.3	29.2	15.9
25/07/2020	23.5	48.2	32.1
26/07/2020	24.7	31.3	27.4
27/07/2020	6.5	7.7	7.5
28/07/2020	2.1	0.8	1
29/07/2020	1.2	0.3	0.1
30/07/2020	3.5	1.3	0.9
31/07/2020	3.7	20.2	6.7
1/08/2020	6.4	15.9	14.3
2/08/2020	11.8	36.8	15.3
3/08/2020	11.7	37.3	13.3
4/08/2020	9.7	41	13.2
5/08/2020	9.4	20.1	6.8
6/08/2020	6.2	2.1	1.7
7/08/2020	3.9	8.1	5.6
8/08/2020	6.8	12.4	10.8
9/08/2020	16	-	8
10/08/2020	2.5	-	0

Date	EPA-22 PM10 Avg (ug/m3)	EPA-23 PM10 Avg (ug/m3)	EPA-24 PM10 Avg (ug/m3)
11/08/2020	3.6	-	3.5
12/08/2020	8.2	9.9	7.1
13/08/2020	16.1	15	19.5
14/08/2020	11.5	-	6.7
15/08/2020	10	-	12
16/08/2020	6	0.3	2.9
17/08/2020	4.9	0.7	0.4
18/08/2020	5.1	-	0.6
19/08/2020	4.2	1.7	1.4
20/08/2020	9.7	-	6
21/08/2020	6.8	0.8	4.5
22/08/2020	6.1	1.8	1.2
23/08/2020	3	0.7	0.7
24/08/2020	4.2	0.9	1
25/08/2020	7.2	0.9	0.8
26/08/2020	6.4	3	1.1
27/08/2020	10.8	24.8	10.5
28/08/2020	12.6	26.2	4.6
29/08/2020	5.1	3.5	2.8
30/08/2020	12.6	36.4	17.3
31/08/2020	16.5	51.9	12.1
1/09/2020	12.8	22.9	8.2
2/09/2020	7.7	12.2	7.2
3/09/2020	14.8	27.1	11.7
4/09/2020	18.4	25	14.5
5/09/2020	13.7	12.5	10.8
6/09/2020	7.3	8.5	5
7/09/2020	7.1	19.9	10.3
8/09/2020	5.7	14	9.6
9/09/2020	11	23.2	14.5
10/09/2020	6.9	21.2	11
11/09/2020	4.1	5.9	8.5
12/09/2020	4.8	8.5	6.7
13/09/2020	7.5	6.2	5.4
14/09/2020	7.5	22.3	5.9
15/09/2020	7	24	8.8
16/09/2020	15.2	15.2	15.9
17/09/2020	12.4	16.7	10.5
18/09/2020	11.3	23	9.3
19/09/2020	14.5	18.6	17.3
20/09/2020	15.4	16.7	17
21/09/2020	9.1	10.7	10.7
22/09/2020	7.6	13.6	5.9
23/09/2020	6.4	3.1	3.6
24/09/2020	8.4	2.7	2.8
25/09/2020	10.3	2	1.2

Date	EPA-22 PM10 Avg (ug/m3)	EPA-23 PM10 Avg (ug/m3)	EPA-24 PM10 Avg (ug/m3)
26/09/2020	3.4	6.3	0
27/09/2020	4.5	0.7	0.7
28/09/2020	3.5	4.2	3
29/09/2020	6.2	14.6	12.2
30/09/2020	7.5	13.7	10.9
1/10/2020	13.7	19.7	17.9
2/10/2020	9.3	10	4.1
3/10/2020	10.4	21.2	13.3
4/10/2020	16.7	40.9	22.8
5/10/2020	19.7	22.8	15.9
6/10/2020	13.7	17.8	13.6
7/10/2020	16.8	1	18.4
8/10/2020	19.7	6.8	21.6
9/10/2020	20.8	14.1	2.5
10/10/2020	7.9	-	0.8
11/10/2020	4.6	-	2
12/10/2020	4.6	-	6.6
13/10/2020	9.9	15.2	14.6
14/10/2020	11.7	21.3	13.5
15/10/2020	16.3	20.1	19.4
16/10/2020	22.7	14.5	14.8
17/10/2020	13.1	23.7	10
18/10/2020	15.3	17.3	13
19/10/2020	5.4	17.2	2.1
20/10/2020	7	28.1	9.2
21/10/2020	9.2	33.1	12.4
22/10/2020	9.8	32.1	13.6
23/10/2020	8.7	29.8	6.6
24/10/2020	8.8	26.2	13
25/10/2020	7.4	46.5	5.6
26/10/2020	4.8	35	5.7
27/10/2020	2.1	26.6	2.1
28/10/2020	3.6	31	4.5
29/10/2020	6.2	36.6	8.3
30/10/2020	14.4	45.3	11.5
31/10/2020	7.8	55.6	15
1/11/2020	8.8	38.1	6.3
2/11/2020	3.9	39.9	3.3
3/11/2020	5.7	32.7	7.1
4/11/2020	7.1	36.3	14.8
5/11/2020	8.8	28.9	7.7
6/11/2020	6.1	38.7	3.7
7/11/2020	4	32.1	4.5
8/11/2020	8	40.9	11.7
9/11/2020	3.8	36.5	-
10/11/2020	2.7	31.6	-

Date	EPA-22 PM10 Avg (ug/m3)	EPA-23 PM10 Avg (ug/m3)	EPA-24 PM10 Avg (ug/m3)
11/11/2020	4.7	24.5	6.8
12/11/2020	12.7	13.9	11.1
13/11/2020	19.3	26.9	15.9
14/11/2020	18.7	23.6	16
15/11/2020	9.9	17.7	7.7
16/11/2020	6.7	22.3	12.8
17/11/2020	12.3	18.8	11.8
18/11/2020	15.5	23.3	18
19/11/2020	9.2	14.5	12.5
20/11/2020	8.7	14.8	14.4
21/11/2020	13.8	17.7	14.8
22/11/2020	25	29.6	26.4
23/11/2020	36.1	35.4	30.8
24/11/2020	18.8	13	5.1
25/11/2020	9	12.9	10.2
26/11/2020	6.4	12.2	9.1
27/11/2020	10.4	15	11.5
28/11/2020	24.4	30.8	28.5
29/11/2020	17.2	23.3	14.5
30/11/2020	15.2	15.3	13.1
1/12/2020	15.2	22.2	19.2
2/12/2020	15.9	21.7	18.3
3/12/2020	24.1	28.3	25.4
4/12/2020	9.8	13.2	12.8
5/12/2020	13.1	14.6	13.9
6/12/2020	17.5	19.6	17.8
7/12/2020	13.2	7.5	7.3
8/12/2020	11.4	6.3	5.6
9/12/2020	2.7	3.6	2.8
10/12/2020	6.1	15.8	11.8
11/12/2020	10.1	14.6	12.4
12/12/2020	4	7.5	7.5
13/12/2020	2.6	7.1	6.4
14/12/2020	2.6	5.2	5.4
15/12/2020	4.9	7.1	6.8
16/12/2020	3.6	6.5	5.5
17/12/2020	9.5	16.6	13.6
18/12/2020	7.4	13.4	9.1
19/12/2020	10.6	18.5	9.2
20/12/2020	13.2	16	12.3
21/12/2020	13.5	19.1	15
22/12/2020	9.9	17.1	14.3
23/12/2020	9.2	3	2.5
24/12/2020	7.1	10.1	4.4
25/12/2020	8.7	10.9	8.7
26/12/2020	12.9	10.9	10.3

Date	EPA-22 PM10 Avg (ug/m3)	EPA-23 PM10 Avg (ug/m3)	EPA-24 PM10 Avg (ug/m3)
27/12/2020	7.6	8.2	7.3
28/12/2020	11.2	13.3	6.4
29/12/2020	10	10.9	3.6
30/12/2020	17.7	19.2	14.6

Source: AECOM (2020)

EPA24 utilised solar power for operation. At approximately 4:00 AM on 29/12/2019 monitoring ceased. The cause of the failure was theft of the batteries powering EPA24. On 6/01/2020 replacement batteries were installed and monitoring restored. On 27/01/2020 monitoring ceased again at approximately 2:00 AM. The cause of the failure again was theft of the batteries and solar panels powering EPA24. A decision was made by BMC to supply EPA24 with mains power to avoid further infrastructure and financial losses. On 13/03/2020 EPA24 recommenced operating with mains power. EPA24 is collocated with Dust Monitor 1 (E-Bam) which continued monitoring while EPA24 was inoperational.

Appendix E

Annual Compliance Report for EPBC Approval 2012/6378

BENGALLA

Bengalla Mine (EPBC APPROVAL 2012/6378)

2020 ANNUAL COMPLIANCE REPORT

Prepared by:
BENGALLA MINING COMPANY PTY LIMITED
Locked Bag 5
MUSWELLBROOK NSW 2333
March 2021

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BENGALLA MINE

ANNUAL COMPLIANCE REPORT FOR EPBC APPROVAL 2012/6378

1 INTRODUCTION

1.1 Background

Bengalla Mining Company Pty Limited (BMC) operates the Bengalla Mine (Bengalla) on behalf of the Bengalla Joint Venture (comprising New Hope Bengalla Pty Limited 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, BMC was granted State Significant Development Consent (SSD-5170) by the Secretary of what was then the NSW Department of Planning and Environment (DPE) under the *Environmental Planning & Assessment Act 1979* NSW (EP&A Act).

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

Both of the EPBC Approval and SSD-5170 (as originally granted) are supported by 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 the Commonwealth Department of Environment and Energy (DoEE) 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 2020 to 31 December 2020 (Reporting Period).

This report is published as a stand-alone report and will also form an Appendix to the 2020 Annual Review for Bengalla required under SSD-5170 Schedule 5 Condition 4.

1.3 Activities undertaken in 2020

Clearing works in 2020 were undertaken in relation to, but not limited to the:

- Relocation and development of surface infrastructure (including the dragline shutdown maintenance pad and relocated Orica reload facility); and
- Pre-clearances in advancement of approved mining operations.

The Clearing Report attached as **Appendix C** summarises the 2020 pre-clearance and clearance surveys, which included:

- Identification of 17 hollow-bearing trees and 12 habitat trees, which were felled;
- Nine animals were relocated or captured during pre-clearance and clearance surveys;
- Observation of four animals that evaded capture during clearing;
- No animals were killed or euthanised as a result of clearing operations;
- No injured or immature animals were taken to either the local veterinary centre or directly to Wildlife Aid; and
- No *Cymbidium canaliculatum* (listed as endangered under the EPBC Act) were recorded during 2020 clearing operations.

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.

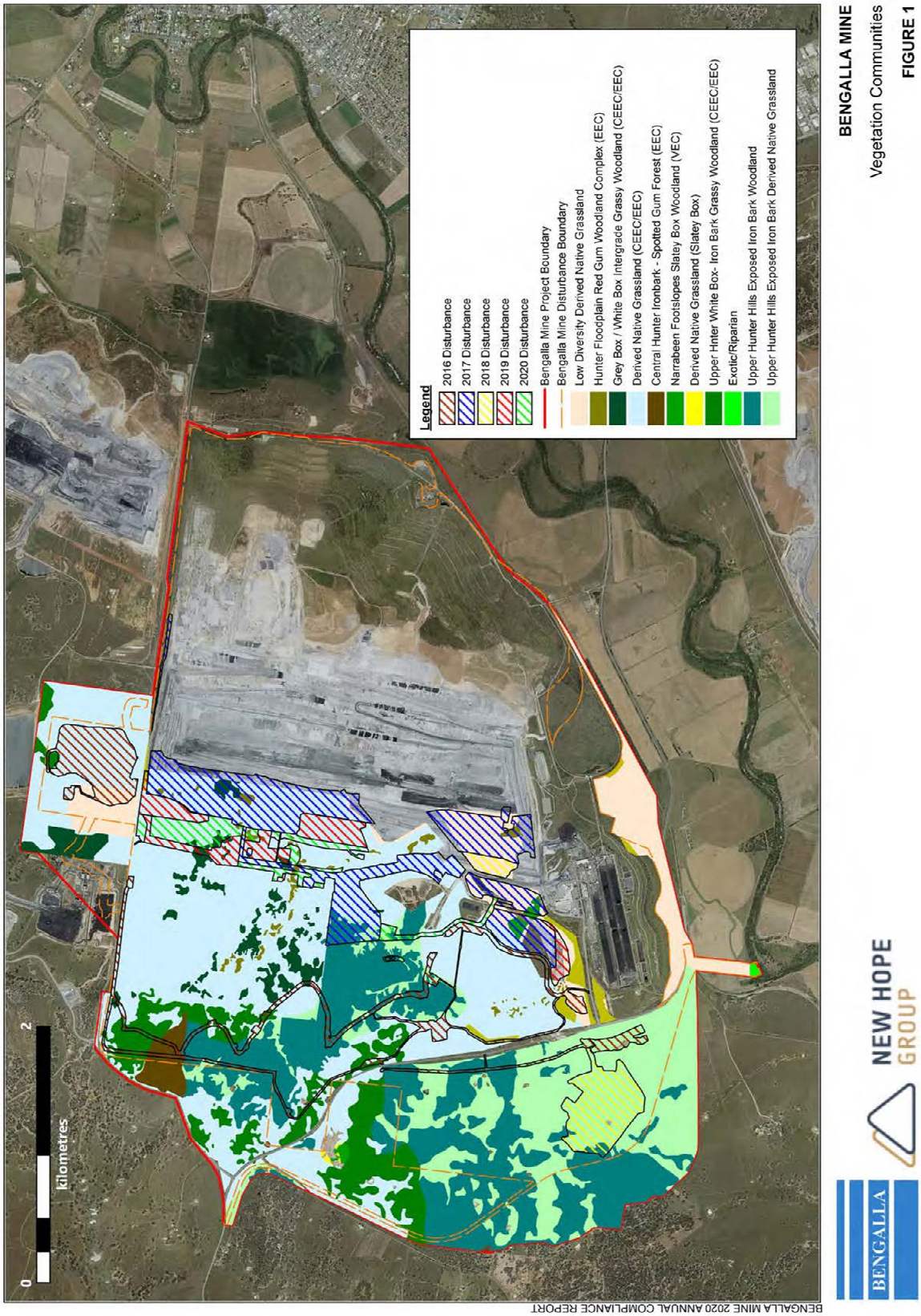

Figure 1 - Vegetation Communities

1.4 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.

The Bengalla Mine Annual Clearing Report for 2020 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.

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

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

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

In summary, this report demonstrates that BMC has complied with the conditions of the EPBC approval and the commitments made in the approved BDMP and BOMP during the Reporting Period.

Table 1
Staged Clearing Approach

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

Table 2
BMC Compliance Status against Conditions of EPBC Approval 2012/6378

Ref	Condition	Status	Comment
1	The approval holder must not clear more than 535 hectares of *White Box-Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland* ecological community (Box Gum Woodland) and must limit clearing to within the project disturbance boundary defined at Schedule 1.	Compliant	In 2020 clearing was undertaken within the Project Disturbance Boundary defined at Schedule 1 of the EPBC Approval. BMC has not cleared more than 535 hectares of Box Gum Woodland (see **Figure 1**).
2	To mitigate impacts of the action on Box Gum Woodland, the Grey Headed Flying Fox, Large-eared Pied Bat, South-eastern Long-eared Bat, Regent Honeyeater, Swift Parrot and Spotted-tail Quoll, the approval holder must prepare and submit, prior to the proposed date of commencement of the action, a mine site Vegetation Clearance Protocol and Landscape Management Plan (VCPLMP) for the Minister's written approval. The VCPLMP must: a. Delineate areas to be cleared, describe pre-clearance survey methods, specify actions to minimise fauna impacts and detail vegetation clearance procedures b. Require collection and stockpiling of habitat features important to threatened fauna species for reinstatement in rehabilitation areas c. Require use of native, locally sourced seed for propagation for rehabilitation activities d. Include measures to avoid, suppress and control the spread of plant pathogens (such as *Phytophthora cinnamomi*) e. Specify a two stage clearing protocol where non-habitat trees are cleared 24 hours prior to any habitat trees being cleared, to encourage fauna to move out of an area. The approval holder must not commence the action until the VCPLMP is approved by the Minister. The approved VCPLMP must be implemented. 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.	Compliant	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. The original version of the BDMP was approved by each of the DPE and DoEE on 14 August 2015. BMC commenced implementation of the BDMP from that date (before operations commenced under SSD-5170). The current (revised) version of the BDMP was approved by DPE on 18 August 2017 and DoEE on 20 September 2017. The BDMP addresses each of the requirements in Condition 2(a)-(e) of the EPBC Approval (refer to Section 1.3 of the BDMP).
3	To compensate for the loss of 535 hectares of Box Gum Woodland ecological community and 272 hectares of habitat for the Grey Headed Flying Fox, Large-eared Pied Bat, South-eastern Long-eared Bat, Regent Honeyeater, Swift	Compliant	A BOMP was developed to meet this requirement and is implemented at Bengalla. **Appendix B** sets out the commitments from the BOMP and the compliance status of each for the Reporting Period.

Ref	Condition	Status	Comment
	Parrot and the Spotted-tail Quoll, the approval holder must prepare and submit, by 3 September 2015, a Biodiversity Offset Management Plan (BOMP) for the Minister's written approval. The BOMP must: 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: (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 against the performance and completion criteria; (iv) a description of potential risks to the successful implementation of the plan, a description of the measures that will be implemented to mitigate against these risks and a description of the contingency measures that will be implemented if defined triggers arise; and (v) details of who would be responsible for monitoring,		The draft BOMP was submitted to DoEE and DPE on 2 September 2015. Following an extensive consultation process (see Appendix A of the BOMP), the BOMP was approved by DoEE on 8 March 2017 and by DPE on 18 August 2017. The BOMP addresses each of the requirements in Condition 3(a)-(c) of the EPBC Approval (refer to Table 1 of the BOMP). The approved BOMP was published on Bengalla's website within 1 month after being approved and continues to be available on the website. The BOMP was reviewed in 2020 and has since been amended by creating three separate BOMP's (one for each Biodiversity Offset Area). These draft documents have been forwarded to the NSW Office of Environment and Heritage for comment, prior to being submitted to DoEE and DPE for approval (anticipated to occur in 2021).

Ref	Condition	Status	Comment
	reviewing, and implementing the plan. The approved BOMP must be implemented. The approved BOMP must be published on the approval holder's internet web site within 1 month of being approved. The most recently approved version of the BOMP must be published on the approval holder's internet web site for a period of 5 years after it is approved. Note: The Biodiversity Management Plan required under NSW Approval condition 29 may be used to satisfy this condition if it meets the above content and submission requirements.		
4	The approval holder must secure the lands identified as the *Offset Areas* at Schedule 2 (Figures 1- 6) of this notice as a biodiversity offset, in accordance with NSW Approval condition 28.	Compliant	All Biodiversity Offset Areas identified in Schedule 2 (Figures 1-6) of the EPBC Approval are under the ownership of the Bengalla Joint Venture and management of BMC. All Biodiversity Offset Areas are managed in accordance with the BOMP. Discussions with the relevant NSW regulators (Office of Environment and Heritage, NSW National Parks and Wildlife Service and Department of Planning, Industry and Environment) continued throughout 2020 in relation to determining the appropriate long-term mechanism for securing the Biodiversity Offset Areas in accordance with Condition 28 of SSD-5170. In the meantime, these areas remain vested in the Bengalla Joint Venture and are managed by BMC in accordance with the BOMP. The Secretary agreed to grant further extension to 30 June 2021 to secure the Biodiversity Offset Areas by letter dated 6 October 2020. As mentioned at Condition 3 above, the BOMP has been revised to create three separate BOMP's (one for each Biodiversity Offset Area). The drafts have been provided to the NSW Office of Environment and Heritage for comment prior to being submitted to DoEE and DPE for approval. The currently approved BOMP continues to be implemented in the meantime.
5	In order to protect listed threatened species and listed threatened ecological communities, the approval holder must undertake rehabilitation activities in accordance with NSW approval conditions 44, 45 and 46.	Compliant	**Condition 44** • <u>Requirement</u> Schedule 3 Condition 44 of SSD-5170 requires BMC to rehabilitate the site to the satisfaction of what is now the Department of Regional NSW – Resources Regulator. The rehabilitation must comply with the objectives in Table 15 of SSD-5170 and be consistent with the conceptual final landform shown in Appendix 9 of SSD-5170. • <u>Status</u>

Ref	Condition	Status	Comment
			Rehabilitation at Bengalla is ongoing. It is undertaken in accordance with SSD-5170 (as modified) and the current Mining Operations Plan 2017-2021 Amendment B (MOP), subject to operational progress. The current MOP proposed to undertake 21 hectares of rehabilitation in 2020. During the Reporting Period, 21 hectares was rehabilitated as new rehabilitation being made up of 5.7 hectares of improved pasture and 15.3 hectares of High Density Woody Vegetation via direct seeding. During the Reporting Period, rehabilitation monitoring was undertaken in November 2020 and assessed 18 rehabilitation sites. The monitoring showed that significant rehabilitation works had been undertaken during 2020 and sites are generally developing in accordance with the relevant MOP criteria. The Resources Regulator regularly inspected progress of rehabilitation at Bengalla during the Reporting Period and a Rehabilitation Report was prepared to address the requirements of a notice issued by the Resources Regulator under section 240 of the *Mining Act 1992* NSW. An independent review conducted by a suitably qualified expert concluded that all rehabilitation areas were established in accordance with methods described in the MOP and the Rehabilitation Report. The rehabilitation objectives in Table 15 of SSD-5170 are being met as appropriate and rehabilitation is progressing to be consistent with the conceptual final landform in Appendix 9 of SSD-5170 (noting that some requirements are ongoing or not yet applicable). Further detail about the rehabilitation carried out at Bengalla during the Reporting Period will be available in the Annual Review for 2020. **Condition 45** • <u>Requirement</u> Schedule 3 Condition 45 of SSD-5170 requires BMC to carry out progressive rehabilitation. Interim stabilisation measures are to be used in disturbed areas that are not active but not ready for final rehabilitation. • <u>Status</u> Rehabilitation is carried out progressively at Bengalla, as soon as reasonably practicable following disturbance. Refer to comments at

Ref	Condition	Status	Comment
			Condition 44 above regarding rehabilitation carried out during the Reporting Period. **Condition 46** • Requirement Schedule 3 Condition 46 of SSD-5170 requires BMC to prepare a Rehabilitation Management Plan to the satisfaction of what is now the Resources Regulator. The plan must incorporate the elements specified in Condition 46. BMC must implement the plan as approved by the Secretary. • Status The MOP was developed to meet this requirement and functions as the approved Rehabilitation Management Plan. It is implemented at Bengalla as part of mining operations. The current MOP (Amendment B) was approved by the Secretary on 28 October 2020. An addendum to MOP (Amendment B) was approved 22 December 2020. The MOP has been prepared in accordance with the applicable guidelines and addresses each of the requirements of Schedule 3 Condition 46 of SSD-5170. The required stakeholder consultation is undertaken as part of any MOP application or amendment process. A further MOP amendment application (Amendment C) was submitted to the Resources Regulator in December 2020 to reflect BMC's mining operational requirements. The application remains under assessment.
6	The approval holder must undertake management and monitoring of water resources in accordance with NSW approval conditions 23 to 25.	Compliant	**Condition 23** • Requirement Schedule 3 Condition 23 of SSD-5170 requires BMC to comply with section 120 of the *Protection of the Environment Operations Act 1990* NSW and the *Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002* NSW (unless an EPL or the EPA authorises otherwise). • Status There were no non-compliances with Condition 23 during the Reporting Period. During the Reporting Period, BMC discharged a total of 95 ML of saline water (from two discharge events in July 2020) to the Hunter River in accordance with the *Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002* NSW. **Condition 24**

Ref	Condition	Status	Comment
			• Requirement 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. • Status 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 each of the performance measures (see Table 1 of the WMP). Further detail about the site water balance and results of surface water monitoring and groundwater monitoring during the Reporting Period will be available in the Annual Review for 2020. **Condition 25** • Requirement Schedule 3 Condition 25 of SSD-5170 requires BMC to prepare a Water Management Plan to the satisfaction of the Secretary. The plan must incorporate the elements specified in Condition 25. BMC must implement the plan as approved by the Secretary. • Status The WMP was developed to meet this requirement and is implemented at Bengalla. 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).
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	No request was made during the Reporting Period. In accordance with Schedule 5 Condition 11 of SSD-5170 and BMC's approved WMP, groundwater monitoring results are published as part of the Annual Review on Bengalla's website each year.
9	The approval holder must make available to the Minister on request, all plans or programs and any review of plans or programs required under the Project Approval issued for the project	Not Triggered	No request was made during the Reporting Period.

Ref	Condition	Status	Comment
	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.		Approved Bengalla management plans are available on Bengalla's website. BMC's approved Water Management Plan includes a Site Water Balance, Surface Water Management Plan and Groundwater Management Plan.
10	Within 30 days after the commencement of the action, the approval holder must advise the Department in writing of the actual date of commencement.	Compliant	In an email dated 30 October 2015, BMC advised DoEE that the action the subject of the EPBC Approval commenced 1 October 2015.
11	The approval holder must maintain accurate records substantiating all activities associated with or relevant to these conditions of approval, including measures taken to implement the BOMP and VCPLMP, and make them available upon request to the Department. Such records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the Department's website. The results of audits may also be publicised through the general media.	Not Triggered	BMC maintains accurate records substantiating all activities associated with or relevant to the EPBC Approval conditions, including measures to implement the BOMP and the BDMP (which incorporates the VCPLMP). No request was made during the Reporting Period to make any records available to DoEE. Appendix A describes the commitments made in the approved BDMP and how each has been addressed in the Reporting Period. **Appendix B** describes the commitments made in the approved BOMP and how each has been addressed in the Reporting Period. **Appendix C** describes pre-clearing and clearing activities implemented in accordance with the BDMP during the Reporting Period.
12	By the end of March each year, the approval holder must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of the BOMP and VCPLMP as specified in the conditions. Documentary evidence providing proof of the date of publication must be provided to the Department at the same time as the compliance report is published. Note: The Annual Review required under NSW Approval condition 4 (of Schedule 5) may be used to satisfy this condition if it meets the above content and submission requirements.	Compliant	This report addresses compliance with each of the conditions of the EPBC Approval for the Reporting Period. Appendix A describes the commitments made in the approved BDMP and how each has been addressed in the Reporting Period. **Appendix B** describes the commitments made in the approved BOMP and how each has been addressed in the Reporting Period. **Appendix C** describes pre-clearing and clearing activities implemented in accordance with the BDMP during the Reporting Period. This report will be uploaded to Bengalla's website by the end of March 2021 and documentary evidence of publication will be provided to the DoEE at the same time.
13	Non-compliance with any of the conditions of this approval must be reported to the Department within 2 business days of the approval holder becoming aware of the non-compliance.	Compliant	No non-compliances occurred during the Reporting Period.
14	Upon the direction of the Minister, the approval holder must ensure that an independent audit	Not Triggered	No request was made during the Reporting Period.

Ref	Condition	Status	Comment
	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 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 activities other than those described in the BDMP or BOMP have been required during the Reporting Period. As described at Conditions 3 and 4 above, the BOMP has been revised to create three separate BOMP's (one for each Biodiversity Offset Area). The drafts have been provided to the NSW Office of Environment and Heritage for comment prior to being submitted to DoEE and DPE for approval. The currently approved BOMP continues to be implemented in the meantime.
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	In an email dated 30 October 2015, BMC advised DoEE that the action the subject of the EPBC Approval commenced on 1 October 2015.

1.5 Conclusion

This report demonstrates that BMC has complied with each of the EPBC Approval conditions for the Reporting Period.

BMC will continue to review and document all relevant activities at Bengalla during the 2021 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 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 2.2.1 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**.
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 in Offset Familiarization Course.

BDMP Section	Control / Action	Timing / Trigger	Responsibility	Monitoring	Reporting	Status	Comment
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 2020. 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 in Weed Control Zones including rehabilitation areas	Results to be reported in Annual Review.	Compliant	Refer **Appendix D.**
5.0	Ecological Monitoring and Inspections	Ongoing over life of mine	Ecologist	N/A	Results to be reported in Annual Review.	Compliant	For weed and feral animal monitoring programs for Bengalla and associated BOS Areas refer to **Appendix D.** Rehabilitation monitoring completed between 9th and 13th November 2020. Details of results will be presented in Section 8 of the 2020 Annual Review. As stated in the BDMP no immediate management actions are required for the management of plant pathogens at Bengalla. However, signs of pathogens outbreaks may require measures to be taken in the future.

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 2020. Fencing maintenance work and the replacement of a gate were undertaken at Kenalea during 2020.
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 2020 at Kenalea properties 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 2020. One gate was replaced on Kenalea.
8.1	BMC will install signage at the entrances to the BOS Area to inform the public of restricted access to properties.	Compliant	Restricted access signage at the entrances to the BOS Areas has been installed.
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 polices which require all staff, stakeholders and visitors working at Bengalla (or offsets) to be inducted prior to undertaking specified work. The BOS Areas induction identifies meeting compliance obligations for example Development Consent SSD-5170 and by inference EPBC 2012/6378 and relevant management plans.

BOMP Section	Commitment	Status	Comment
Control Grazing			
8.3	Controlled grazing will only be permitted in Zone 1 and Zone 2 management areas.	Not Triggered	No controlled grazing was undertaken during 2020.
8.3	Best practice for control grazing will be implemented wherever control grazing is employed, including: • Providing adequate rest periods and adjusting rest periods to suit the recovery needs and growth rates of the desirable plants; • Targeting defined areas with high fuel loads or weed infestations; • Cattle stocking numbers kept below 4 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 controlled grazing was undertaken during 2020.
8.3	Control grazing will be monitored against Trigger and Performance Criteria	Not Triggered	Noted
8.3	Should monitoring results indicate that regeneration is not occurring naturally after Year 5, assisted revegetation will take pace in areas that require this management action.	Not Triggered	Noted
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 2020.
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 2020
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 all BOS Areas in 2020. No fires occurred on offsets in 2020.

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	HLM and Enright Land Management undertook a weed monitoring and control program in BOS Areas during the Reporting Period. Records of the location of weed control are detailed in **Appendix D**. An inspection was also undertaken on Kenalea, Echo and Black Mountain offsets in December 2020 by an Upper Hunter Weeds Authority Inspector, assessing St John's Wort control and other weed controls in place. The subsequent report back to BMC indicated control methods used were effective with good results being achieved and recommended the current controls be continued.
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 on BOS Areas 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 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 in BOS Areas 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 2020. This was undertaken in line with neighbouring properties and the Local Land Services baiting program and is presented in **Appendix D**.

BOMP Section	Commitment	Status	Comment
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 2020 feral animal control program.
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 2020 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 2020.
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 properties, Merriwa and Black Mountain were assessed and regraded where required in 2020.
8.7	BMC will record and store all relevant GIS information related to the improvement or installation of additional infrastructure.	Compliant	BMC has recorded and stored GIS information for all improvements and installation of additional infrastructure on the BMC GIS database.
8.7	BMC will undertake routine inspections and maintenance of BOS infrastructure (eg tracks, fence lines, gates)	Compliant	Inspection and maintenance of certain tracks was undertaken in 2020. Certain fence lines and gates were also inspected. Fencing maintenance work and the replacement of a gate were undertaken at Kenalea during 2020.
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 2020

BENGALLA MINING COMPANY PTY LTD

MARCH 2021

BENGALLA MINE

2020 ANNUAL CLEARING REPORT

Question today
Imagine tomorrow
Create for the future

Bengalla Mine
2020 Annual Clearing Report

Bengalla Mining Company Pty Ltd

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REV	DATE	DETAILS
A	16/02/2021	Draft
B	17/03/2021	Final

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Reviewed by:	Nathan Cooper	17/03/2021	
Approved by:	Nathan Cooper	17/03/2021	

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ABBREVIATIONS

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

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 2020 (reporting period). These works were in relation to:

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

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 17 hollow-bearing/habitat trees were identified within GDP areas, 12 of which were felled in 2020. Salvaged habitat items were stockpiled, with the intention to relocate them to rehabilitation areas as areas become available.

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 2020 clearing activities, nine animals were relocated, four were observed but dispersed to nearby vegetation and no animals died or were euthanised. No injured or immature animals were taken to either the local veterinary centre or directly to the wildlife care group Wildlife Aid, for treatment and/or rehabilitation.

Clearing activities undertaken throughout 2021 will continue to follow the methodology outlined within the BMP.

1 INTRODUCTION

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, and exploration drilling 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 2020, 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
Troy Jennings	B. Bio&Cons M. Wildlife Management	Ecologist – pre-clearing surveys, spotter catcher and reporting
Allan Richardson	B.Env Sc (Hons)	Senior Ecologist – pre-clearing surveys, spotter catcher and reporting
Debbie Landenberger	B.Sc. (Hons)	Principal Ecologist – pre-clearing surveys
Nathan Cooper	B.Env.Sc. Grad Dip Ornithology	Senior Ecologist – spotter catcher and technical review
Alex Cockerill	B.Sc. (Hons)	Ecology National Team Executive – project manager

All pre-clearing and clearing works were carried out under the appropriate licences, including a Scientific Licence as required under Clause 22 of the *National Parks and Wildlife Regulations 2002* and Section 132C of the *National Parks and Wildlife Act 1974*, and *Animal Research Authority* issued by the *Department of Primary Industries* as supplied in 2020.

2.2 PRE-CLEARING SURVEY PROCEDURE

The ecology pre-clearance surveys were conducted throughout 2020 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*, were clearly marked prior to the commencement of clearing activities. The number of habitats, hollow-bearing or significant trees were recorded on field proforma.

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 *Biodiversity Conservation Act 2016* (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 and Figure 3.2.

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 2020, there was a lack of seed availability and as such no seed was collected for use in rehabilitation.

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 2020 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. uvenile and injured fauna will be passed on to the Muswellbrook Veterinary Hospital, local Wildlife Aid carers or euthanized in accordance with the Animal Research Authority Code of Practice.

3 RESULTS

3.1 ECOLOGY PRE-CLEARANCE SURVEYS

Pre-clearing surveys completed by or on behalf of BMC in 2020 are summarised in Table 3.1 and illustrated in Figure 3.1. It should be noted that throughout 2020, some GDP areas were 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.

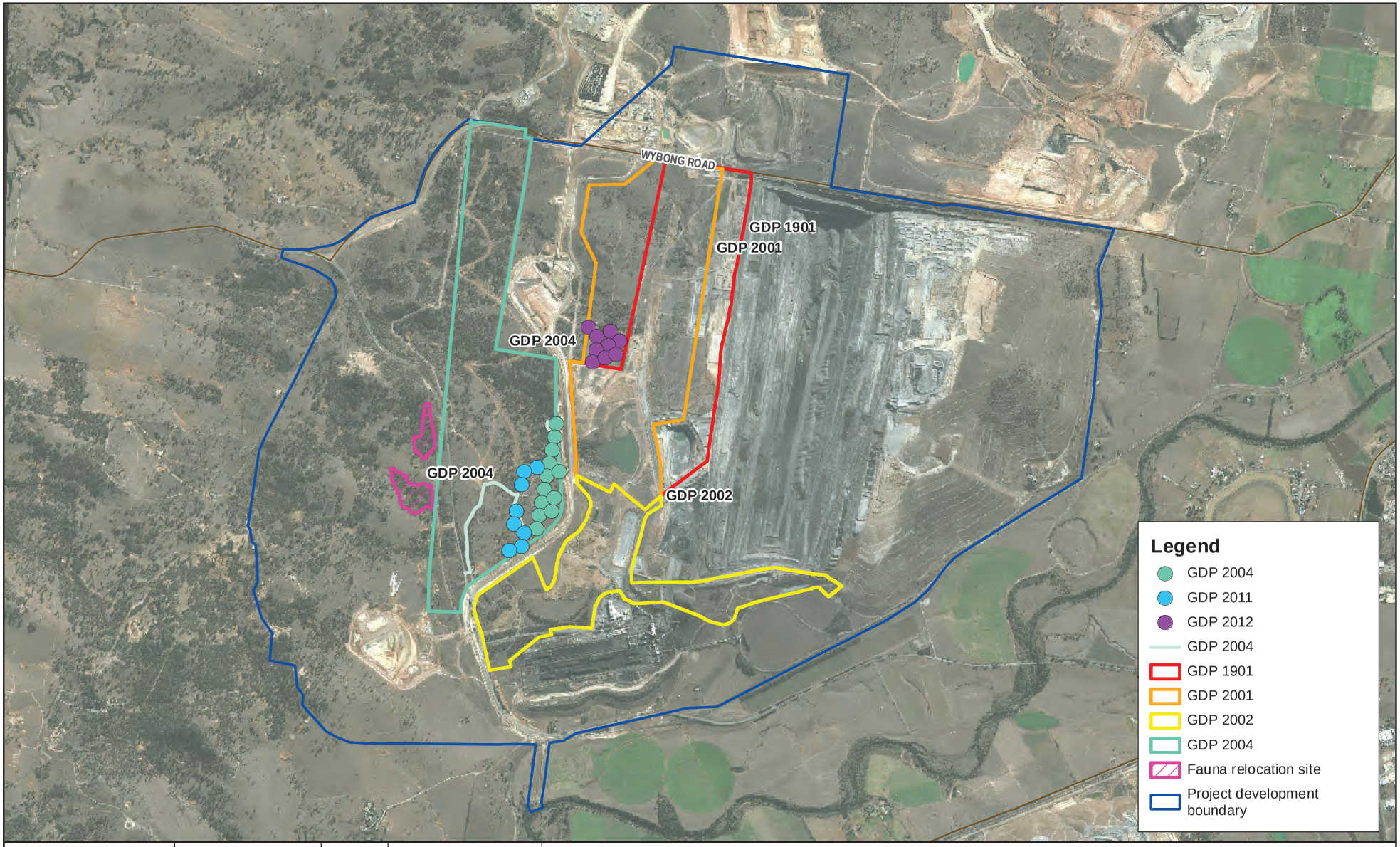
Table 3.1 Pre-clearing surveys completed in 2020

GROUND DISTURBANCE PERMIT AREA (GDP)	DATE PRE-CLEARANCE UNDERTAKEN	VEGETATION COMMUNITY
GDP 1901	15/01/2020	GDP 1901 – Derived native and exotic grassland with isolated pockets of *Eucalyptus crebra*
GDP 2004	05/02/2020	Central Hunter *Corymbia maculata*, *Eucalyptus crebra, Eucalyptus mollucana* derivative
GDP 2002	20/03/2020	Derived native grassland
GDP 2001 & GDP 2002	03/04/2020	GDP 2001 – Derived native and exotic grassland with *Eucalyptus crebra, Eucalyptus mollucana* and *Allocasuarina luehmannii* open forest GDP 2002 – Derived native and exotic grassland with planted *Corymbia maculata*, *Eucalyptus crebra*, *Eucalyptus mollucana* and *Allocasuarina luehmannii*
GDP 2002	17/04/2020	Derived native grassland
GDP 2004	3/07/2020	Derived native grassland
GDP 2011	4/08/2020	Derived native grassland
GDP 2012	29/10/2020	Derived native grassland
GDP 2001 & GDP 2002	03/11/2020	GDP 2001 and GDP 2002 – *Eucalyptus crebra, Eucalyptus mollucana* and *Allocasuarina luehmannii* shrub open forest

3.1.1 VEGETATION COMMUNITY STRUCTURE

The following vegetation communities were identified in the areas pre-cleared in 2020:

- 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 mollucana* and *Allocasuarina luehmannii* open forest
- derived native and exotic grassland with planted *Corymbia maculata, Eucalyptus crebra, Eucalyptus mollucana* and *Allocasuarina luehmannii*
- *Eucalyptus crebra, Eucalyptus mollucana* and *Allocasuarina luehmannii* shrub open forest.



Map: PS118424_ENV_001_A2	Author: AUVL502876	
Date: 16/02/2021	Approved by: N.Cooper	

Source: Bengalla Mine Satellite Orthophoto July 2018

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Coordinate system:
WGS 1984 Web Mercator Auxiliary Sphere
Scale ratio correct when printed at A4

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Figure 3.1
Ground disturbance permit areas subject to pre-clearing in 2020

3.1.2 HABITAT, HOLLOW-BEARING AND SIGNIFICANT TREES

A total of 12 hollow-bearing/ habitat trees were identified within GDP areas subject to pre-clearing surveys. An additional five habitat trees were marked outside of clearing areas as a precautionary measure.

3.1.3 SPECIES INVENTORY

3.1.3.1 FLORA

A total of 47 flora species were recorded in 2020 during pre-clearing surveys. Of these, 21 were introduced species (Appendix A).

3.1.3.2 FAUNA

A total of 44 fauna species were recorded in 2020 during pre-clearing surveys. Of these, four were introduced species (Appendix C). The Grey-crowned Babbler, which is listed as Vulnerable under the BC Act, was also recorded during pre-clearing surveys.

3.1.4 CYMBIDIUM CANALICULATUM SURVEYS

No *Cymbidium canaliculatum* were identified during pre-clearing surveys in 2020.

3.1.5 PHYTOPHTHORA CINNAMOMI SURVEYS

No evidence of disease or plant die-back was identified within GDP areas subject to pre-clearing surveys in 2020.

3.1.6 COLLECTION OF SEEDS FOR REHABILITATION PURPOSES

During pre-clearing surveys throughout 2020, no seed was identified within survey areas to be collected for use in rehabilitation. The lack of seed may be possibly due to dry conditions throughout the majority of 2020. Due to the lack of seeding from native flora species, no seed collection was conducted.

3.1.7 WEED SPECIES

Table 3.2 Noxious weeds recorded during pre-clearance surveys

SPECIES	CLASS	LEGAL REQUIREMENTS
Lycium ferocissimum (African Boxthorn)	3	This plant must be continually suppressed and destroyed, and the plant must not be sold propagated or knowingly distributed.
Olea europaea subsp. cuspidata (African Olive)	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.
Opuntia stricta (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.

3.1.8 SALVAGEABLE MATERIAL

A total of 12 habitat trees were felled during Stage 2 tree clearing operations, all of which were identified as potentially suitable for salvage. In addition, 50 lineal metres of hollow ground logs were identified for salvage in 2020.

3.2 STAGE 1 AND STAGE 2 CLEARING

The GDP areas cleared in full or in part in 2020 are summarised in Table 3.3 and illustrated on Figure 3.2. 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 several periods in 2020, with a total of 12 habitat trees felled.

Table 3.3 Stage 2 clearing completed in 2020

GROUND DISTURBANCE PERMIT AREA (GDP)	DATE STAGE 2 CLEARANCE UNDERTAKEN	VEGETATION COMMUNITY
GDP 2001	8/4/2020	Derived Native and Exotic Grassland with *Eucalyptus crebra, Eucalyptus mollucana* and *Allocasuarina luehmannii* open forest (EEC BC Act)
GDP 2002	5/5/2020[1]	Derived Native and Exotic Grassland with planted *Corymbia maculata, Eucalyptus crebra,* and *Allocasuarina luehmannii.*
GDP 2001	13/11/2020	*Eucalyptus crebra, Eucalyptus mollucana* and *Allocasuarina luehmannii* shrub open Forest (EEC BC Act)
GDP 2002	13/11/2020	*Eucalyptus crebra, Eucalyptus mollucana* and *Allocasuarina luehmannii* shrub open Forest (EEC BC Act)

(1) Please refer to Section 3.2.3.

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 utilisation in rehabilitation areas.

Photo 3.1 Stage 2 – clearing – GDP 2001

Photo 3.2 Stage 2 – clearing – post felling

3.2.1 FAUNA RECORDED AND RELOCATED

Fauna were handled in accordance with the Animal Research Authority Code of Practice. Details on fauna encountered during 2020 clearing activities are outlined below and are presented in Appendix B. A total of 44 species of fauna were observed whilst onsite at Bengalla. Of these 44 species, two species of skink and species of gecko were recorded using habitat trees and woody debris to be removed/impacted within the GDP areas (Table 3.4). The remaining species observed within the GDP areas were birds. During the 2020 clearing operations:

- nine animals required relocation
  - Robust Velvet Gecko (*Nebulifera robusta*) (three)
  - Tree Skink (*Egernia striolata*) (two)
  - Copper-tailed Skink (*Ctenotus taeniolatus*) (one)
  - Noisy Friarbird (*Philemon corniculatus*) (three nestlings)
- no animals were killed
- no animals were euthanised
- no animals required veterinarian treatment or rehabilitation.

Table 3.4 Fauna recorded during Stage 2 clearing operations in 2020

GUILD	NUMBER OF INDIVIDUALS RECORDED				
	Relocated	Observed	Injured	Dead/ Euthanised	Taken to Wildlife carer
Reptiles	6	2	0	0	0
Microchiropteran bats/mammals	0	4	0	0	0
Amphibians	0	0	0	0	0
Birds	3	21	0	0	0
Total	**9**	**27**	**0**	**0**	**0**

Whilst reptiles were released at designated relocation areas, the Noisy Friar nest containing three nestlings was relocated to remnant vegetation immediately adjacent to the clearing area; approximately 20 m from the nest tree location. The nest was safely removed from the outer branches of an *Allocasuarina leuhmanii* and repositioned within a fork of an adjacent *Allocasuarina leuhmanii* and fixed securely whilst the parents were still present. As far as practicable, the nests aspect was replicated to reduce the effects of exposure to afternoon sun in the west.

3.2.2 SALVAGE OF HABITAT RESOURCES

Stage 2 clearing operations identified approximately 165 lineal metres of salvageable material potentially suitable for reuse in rehabilitation works. Salvaged habitat items have been stockpiled, with the intention to relocate within rehabilitation areas as work progresses.

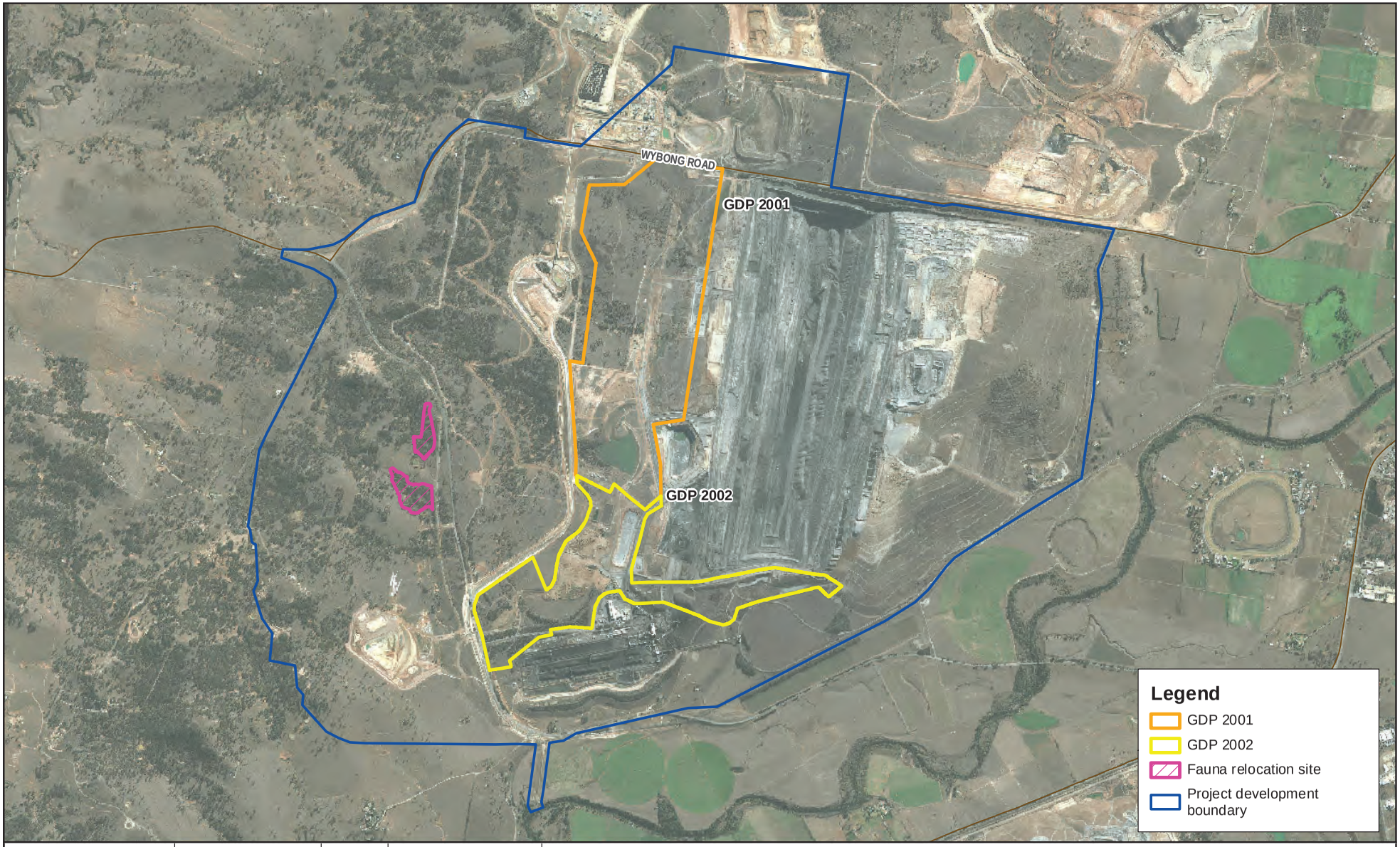
3.2.3 STAGE 2 CLEARING WORKS COMPLETED OUTSIDE APPROVED CLEARING TIME

The Bengalla Mine BMP stipulates that clearing of woodland habitats will be avoided during May to November, unless a written assessment by a suitably qualified ecologist justifying the activities is provided. Bengalla was progressing with critical mine infrastructure maintenance in April 2020, which included the installation of a new electrical easement. A Stage 1 Pre-clearance Survey was completed on 3 April 2020 and identified that the proposed easement was, as far as practicable, positioned to minimise disturbance to extant vegetation. Vegetation likely to be impacted was observed to be consistent with a previously rehabilitated/ planted area adjacent to the main mine access road and comprised of a relatively young age-cohort of canopy tree species. Within the proposed easement, one *Allocasuarina luehmannii* was observed with one hollow (~10 cm in diameter) positioned approximately 2.5 m above ground.

An additional ecological site inspection was completed on 5 May 2020 to gauge the efficacy of undertaking clearing activities in the first week of May. From an ecological view, it was determined that clearing works could proceed based on:

- the siting of the proposed easement to minimise impact to extant vegetation
- the relatively young age-cohort of planted canopy tree species
- the limited ecological value associated with the rehabilitated/planted area; particularly for terrestrial vertebrate species, including microchiropteran bats
- the absence of threatened flora species
- the general isolation of the rehabilitated/planted area from larger patches of remnant native vegetation
- the position of the rehabilitated/planted area adjacent to existing mine infrastructure, including mine access road, large laydown area and coal handling stockpiles.

Clearing activities were completed in accordance with methodologies presented in the Bengalla Mine BMP. The small *Allocasuarina luehmannii* containing a medium-sized hollow was felled carefully and without incident. At the time of clearing, the hollow was observed not to be in use. No vertebrate fauna was observed, injured, or required relocation during the clearing works.



Map: PS118424_ENV_002_A2	Author: AUVL502876
Date: 16/02/2021	Approved by: N.Cooper

Source: Bengalla Mine Satellite Orthophoto July 2018

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BENGALLA MINE ANNUAL CLEARING REPORT 2020

Figure 3.2
Ground Disturbance Permit areas subject to clearing activities in 2020

4 CONCLUSIONS

This report documents the pre-clearing and clearing activities completed at Bengalla Mine in 2020. 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.

During Stage 2 clearing operations, nine animals required relocation, none were killed or euthanised, or required veterinarian treatment or rehabilitation. Two skinks were observed using habitat trees but evaded capture once the tree was felled.

A total of 17 hollow-bearing/ habitat trees were identified within GDP areas, 12 of which were felled in 2020. In total, approximately 165 lineal metres of salvageable material potentially suitable for reuse in rehabilitation programs has been stockpiled, with the intention to relocate within rehabilitation areas as work progresses.

Clearing activities undertaken in 2021 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 13 January 2020 and agreement with the Client dated 15 January 2020 (*Agreement*).

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BIBLIOGRAPHY

- Butcher, G. A. (1992, August 25). Ambient Water Quality Objectives for the Lower Columbia River: Hugh Keenleyside Dam to Birchbank. Retrieved December 4, 2013, from Environmental Protection Division: http://www.env.gov.bc.ca/wat/wq/objectives/birchbank/birchbank.html.
- Columbia Basin Trust. (2012, September). Climate Change, Impacts and Adaptation in the Canadian Columbia Basin: From Dialogue to Action. British Columbia, Canada.
- Holms, G. B., Pommen, L. W., & Cf, P. (1999, September). State of Water Quality of Columbia River at Birchbank. Retrieved December 4, 2013, from State of Water Quality of Columbia River at Birchbank: http://www.env.gov.bc.ca/wat/wq/quality/birchbank/index.htm.
- Ministry of Forests. (1996). Community Watershed Guidebook. Retrieved December 4, 2013, from Community Watershed Guidebook: http://www.for.gov.bc.ca/TASB/LEGSREGS/FPC/FPCGUIDE/WATRSHED/Watertoc.htm.

APPENDIX A

RECORDED FLORA

Table A.1 Recorded flora

SCIENTIFIC NAME	COMMON NAME	INTRODUCED	EPBC ACT[1]	BC ACT[2]
Acacia sp.	Wattle			
Allocasuarina luehmannii	Bulloak			
Angophora floribunda	Rough-barked Apple			
Bidens pilosa	Cobblers Pegs	*		
Brachychiton populneus	Kurrajong			
Bursaria spinosa	Blackthorn			
Carthamus lanatus	Saffron Thistle	*		
Cheilanthes distans	Bristly Cloak Fern			
Chloris gayana	Rhodes Grass	*		
Chrysocephalum apiculatum	Golden Buttons			
Conyza sp.	Fleabane	*		
Cymbopogon refractus	Barbed-wire Grass			
Cynodon sp.	Couch	*		
Dichondra repens	Kidney Weed			
Digitaria sp.	–			
Eragrostis curvula	African Lovegrass	*		
Eucalyptus camaldulensis	River Red-Gum			
Eucalyptus crebra	Narrow-leaved Ironbark			
Eucalyptus moluccana	Grey Box			
Eucalyptus tereticornis	Forest Red Gum			
Glycene sp.	-			
Gomphocarpus fruticosus	Balloon Cotton	*		
Hypochaeris radicata	Catsear	*		
Lomandra sp.	-			
Lycium ferocissimum	African Boxthorn	*		
Magenta sp.	Geranium			
Medicago sp.	-			
Melinis repens	Red-natail Grass	*		
Onopordum acanthium	Scotch Thistle	*		
Opuntia stricta	Prickly Pear	*		
Panicum sp.	Panic Grass			
Paspalum sp.	Paspalum	*		

SCIENTIFIC NAME	COMMON NAME	INTRODUCED	EPBC ACT[1]	BC ACT[2]
Plantago sp.	Plantain	*		
Ricinus communis	Castor Oil	*		
Rumex sp.	-	*		
Rytidosperma caespitosum	Wallaby Grass			
Salsola australis	Soft Roly-poly			
Schinus sp.	Peppercorn			
Sclerolaena birchii	Galvanised Burr			
Senecio madagascariensis	Fireweed	*		
Sida rhombifolia	Paddys Lucerne	*		
Sisymbrium officinale	Mustard Weed	*		
Solanum sp.	–			
Taraxacum officinale	Common Dandelion	*		
Themeda triandra	Kangaroo Grass			
Verbena rigida		*		
Wahlenbergia sp.	Blue Bells			

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

(2) *Biodiversity Conservation Act 2016.*

APPENDIX B

RECORDED FAUNA

Table B.1 Recorded fauna

SCIENTIFIC NAME	COMMON NAME	INTRODUCED	EPBC ACT[1]	BC ACT[2]
Amphibians (1)				
Limnodynastes tasmaniensis	Spotted Marsh Frog			
Birds (33)				
Acanthiza chrysorrhoa	Yellow-rumped Thornbill			
Acridotheres tristis	Common Myna	*		
Aquila audax	Wedge-tailed Eagle			
Corcorax melanorhamphos	White-winged Chough			
Cormobates leucophaeus	White-throated Treecreeper			
Corvus coronoides	Australian Raven			
Cracticus tibicen	Australian Magpie			
Cracticus nigrogularis	Pied Butcherbird			
Dicaeum hirundinaceum	Mistletoebird			
Egretta novaehollandiae	White-faced Heron			
Elanus axillaris	Black-shouldered Kite			
Eolophus roseicapilla	Galah			
Falco berigora	Brown Falcon			
Grallina cyanoleuca	Magpie Lark			
Hirundo neoxena	Welcome Swallow			
Malurus cyaneus	Superb Fairywren			
Manorina melanocephala	Noisy Miner			
Ocyphaps lophotes	Crested Pigeon			
Pardalotus punctatus	Spotted Pardalote			
Pardalotus striatus	Striated Pardalote			
Pelecanus conspicillatus	Australian Pelican			
Petrochelidon ariel	Fairy Martin			
Philemon corniculatus	Noisy Friarbird			
Platycerus eximius	Eastern Rosella			
Pomatostomus temporalis temporalis	Grey-crowned Babbler			V
Psephotus haematonotus	Red-rumped Parrot			
Rhipidura leucophrys	Willie Wagtail			
Sturnus vulgaris	Common Starling	*		

SCIENTIFIC NAME	COMMON NAME	INTRODUCED	EPBC ACT[1]	BC ACT[2]
Streptopelia chinensis	Spotted Dove			
Taeniopygia bichenovii	Doubled-barred Finch			
Taeniopygia guttata	Zebra Finch			
Threskiornis spinicollis	Straw-necked Ibis			
Vanellus miles	Masked Lapwing			
Mammals (6)				
Macropus giganteus	Eastern-grey Kangaroo			
Macropus robustus	Common Wallaroo			
Macropus rufogriseus	Red-necked Wallaby			
Oryctolagus cuniculus	Rabbit	*		
Vulpes vulpes	Fox	*		
Wallabia bicolor	Swamp Wallaby			
Reptiles (4)				
Cryptoblepharus virgartus	Wall Skink			
Ctenotus taeniiolatus	Copper-tailed Skink			
Ergernia striolata	Tree Skink			
Nebulifera robusta	Robust Velvet Gecko			

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

(2) *Biodiversity Conservation Act 2016.*

APPENDIX C

SCIENTIFIC LICENCES

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	

Your licence number is: SL100630

This licence is valid from: 01 June 2020

This licence will expire on: 31 May 2021

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, temporarily possess and liberate protected and threatened animals for survey and identification purposes; Pick and possess protected and threatened plants for identification.

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

Date: 10 July 2020

.....

Signature of Principal Licensee*

Date: 30/7/2020

* 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.

LICENCE CONDITIONS

Specific

a) Please see General conditions 18 – 20 for activities undertaken on NPWS managed land.
b) Animals must be managed in accordance with a current Animal Care and Ethics Committee approval and released at the point of capture.
c) Clean, sharp secateurs must be used to sample plants.
d) Activities must be undertaken in accordance with the NPWS Guidelines for the Collection of Voucher Specimens and Plant Material for Identification.
e) The licensee is authorised to collect voucher specimens, to be held at a recognised herbarium.
f) The Department's hygiene guidelines must be followed at all times.

General

1. Only the person/s named on the licence or authorised to operate under the terms and conditions of the licence, may undertake the work. This licence is not transferable except with written confirmation from the Wildlife Team ("WT").
2. The principal licensee may vary the associated parties authorised during the term of the licence only by maintaining a signed and dated register of the associates. A copy of the register must be provided to the WT at renewal or on request by an authorised officer.
3. The licensee must carry this licence at all times whilst work is being undertaken in the field. Where multiple parties are listed, photocopies will suffice provided some other proof of identity can be provided e.g. Driver's licence.
4. The licensee must provide other parties authorised to conduct the specified activities with a copy of this licence.
5. The licensee must obtain the permission of the owner, manager or occupier of lands upon which research is conducted (for persons working on NPWS lands see also conditions 18-20).
6. Specimens or samples taken under this licence must not be sold, bartered, given, lent or promised to others without the prior written approval of the Environment Agency Head or delegate.
7. Collections or research shall, as far as is possible, be carried out away from the view of the public.
8. The licensee shall indemnify and keep indemnified, so far as the law allows, Her Majesty Queen Elizabeth II, the Minister administering the *Biodiversity Conservation Act 2016*, the Government of New South Wales, the Environment Agency Head of the Department of Planning, Industry and Environment, and the National Parks and Wildlife Service (NPWS) and its servants, agents or contractors (herein jointly and severally referred to as "the Department"), FROM AND AGAINST all lawful suits, claims, demands, proceedings, costs, (including solicitor - client costs) and expenses of any nature whatsoever which the Department may suffer or incur in connection with loss of life, personal injury or damage to property from an occurrence in connection with any land, premises, vehicle or other mode of conveyance or other item under the care, control or management of the Department, and arising either directly or indirectly from any negligent or wrongful act or omission of the licensee in the course of an operation or activities pursuant to the licence or otherwise.

Reporting requirements

9. The licensee undertaking survey, research or other biodiversity assessment works must provide a full report of the work carried out under this licence online via BioNet (previously Atlas of NSW Wildlife) using the most recent version of the Atlas data sheet available at http://www.environment.nsw.gov.au/resources/atlas/AtlasDatasheet.xls
10. The licensee must ensure that all coordinates provided as part of the data submitted to BioNet include a measurement of the accuracy of those coordinates. Coordinate accuracy should be greater than zero but no greater than **100m**.
11. The licensee must submit reports online using a secure login acquired from BioNet. Contact bionet@environment.nsw.gov.au for account details and guidelines.
12. Licensees undertaking work that cannot be supplied in the above format must provide a report to the WT specifying:
    a. Title of the project
    b. A precise description of the locality including geographic coordinates where practical
    c. Results of the project
13. The licensee may also be required to complete a metadata proforma for works on NPWS estate.
14. Licensees undertaking permanent/semi-permanent marking, banding or tagging must provide marking details (e.g. tag number, date, location, species) to the WT with any renewal application.
15. The licensee must provide a copy of any final report and/or any scientific papers relating to this work to the Environment Agency Head (marked "attention Wildlife Team") when the study is completed.

Additional reporting requirements for consultants

16. Licences granted to consultants and consulting companies for survey and assessment purposes are required to provide a list of the sites where work was conducted and a list of the reports produced. A copy of these reports may be requested.
17. Reports in accordance with licence conditions 9. to 16. must be provided annually, from the "valid from" date of the licence.

Projects undertaken on NPWS managed land

18. The licensee may only undertake works in NPWS managed lands with the prior written approval of the relevant Area Manager and comply with any imposed restrictions or conditions.
19. The licensee must maintain regular contact with the NPWS Area office throughout the project as park management activities and other events may affect access to research locations. Access to reserves may be restricted during management activities or while the reserve is closed for other reasons.
20. The licensee must only use vehicles on public roads unless otherwise approved by an authorised officer.

It is an offence under the *Biodiversity Conservation Act 2016* to breach any of the conditions of this licence, issue any false receipt, make a false entry in any record, or otherwise keep a false record or provide false or misleading records or information.

Records, notifications and inquiries should be directed to:

Wildlife Team
National Parks and Wildlife Service
Locked Bag 5022
Parramatta NSW 2124

Phone: 02 9585 6406
Fax: 02 9585 6401
Email: scientific.licensing@environment.nsw.gov.au

Additional Information for licence holders

It is the licence holder's responsibility to ensure they are familiar with any other relevant statutory or regulatory provisions relevant to this licence such as the **National Parks and Wildlife Regulation 2019***,* particularly with respect to activities undertaken on NPWS managed lands, the ***Firearms Act 1999,*** any local council, building and health requirements and codes of practice under the ***Prevention of Cruelty to Animals Act 1979***, as well as specific requirements under the ***Animal Research Act 1985***. On the expiration of your licence the onus is on you to renew. While NPWS forwards renewal notices to the principal licensee, it will not be responsible for the non-receipt of such a notice.

It is the licensee's responsibility to inform themselves of any likely hazards and ensure that appropriate risk management and emergency procedures are developed and in place for works undertaken on NPWS managed lands. The risk management and emergency procedures will also extend to cover the Department staff and any other third parties which may be impacted by the licensee's works. The Department accepts no responsibility for any event which results in the licensee suffering any loss. The licensee will be held liable for any damages resulting from their works which have impacted on the Department staff or any other third party.

Attachment A

Other parties

In addition to the principal licensee identified above, the following parties are also authorised under this licence:

Title	Name
Ms	Tanya Bangel
Mr	Nathan Cooper
Mrs	Julia Emerson
Ms	Selga Harrington
Mr	Robert Harrison
Mr	Troy Jennings
Mr	Steve Lyngoln
Mr	Nicholas McCaffrey
Mr	Justin Pegg
Mr	Allan Richardson
Ms	Lauren Smith
Mr	Mark Stables
Ms	Zoe Steven
Ms	Clementine Watson
Mr	Sam Wilson

Attachment B

Licence Class

Class Name	Class Start Date
Ecological survey/consultancy	30/01/2012

Focus of work

This project authorises the licensee to Harm, Pick, collect or otherwise interact with the following species, communities or materials as described on this licence in the listed quantities:

Species Type	Family	Genus	Species	Subspecies	Species Code	Common Name	Target Parts	Units	Qty
FA FL	ALL FAUNA ALL FLORA					ALL FAUNA ALL FLORA	Individuals Individuals		

Attachment C

Project location

This project is authorised in the following areas:

NPWS Estate

Tenure Type	Branch	Region	Area	Park
NPWS Estate				All NPWS estate under contract or with Area Manager approval

Other

Tenure Type	State Forests	LLS Region	LGA	Lot Sec DP	Other Location
Other					All non-NPWS estate

ABOUT US

WSP is one of the world's leading engineering 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, environmental specialists, as well as other design, program and construction management professionals. We design lasting Property & Buildings, Transportation & Infrastructure, Resources (including Mining and Industry), Water, Power and Environmental solutions, as well as provide project delivery and strategic consulting services. With approximately 50,000 talented people globally, we engineer projects that will help societies grow for lifetimes to come.

Appendix D Weeds and Pest Management

WEEDS AND PEST MANAGEMENT

1 Environmental Management

Weed and pest management at Bengalla and its 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 Bengalla 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 2020, approximately 106 ha was treated for the management of weeds. Target weed species included African boxthorn, galenia, prickly pear and other weeds. Priority areas for treatment included the rehabilitation areas and topsoil stockpiles.

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 daily work records of site attendance are submitted which detail the sites treated, area (ha) treated, techniques and chemicals utilised and rates of application. **Figures 3 to 5** below show locations of weed control in each of the Bengalla offset areas.

The chemicals to be utilised are based on their effectiveness depending on the type of weeds present. Chemicals used during 2020 include Grazon Extra, MCPA 750 and Garlon 600.

The weeds controlled included prickly pear, Paterson's curse, blue heliotrope, African boxthorn and several environmental weeds were sprayed across each offset area. Riparian zone weeds were also treated in Kenalea and Echo including noogoora burr and thorn apple. Lantana was discovered on Echo and was immediately addressed. St John's Wort was also addressed in Kenalea, Echo 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 above the long-term average for 2020 which contributed to the increase of several weed populations and the ensuing level of control required.

An inspection was also undertaken on Kenalea, Echo and Black Mountain offsets in December 2020 by an Upper Hunter Weeds Authority Weeds Inspector, assessing St John's Wort control and other

weed controls in place. The subsequent report delivered to BMC indicated control methods used were effective with good results being achieved. It was recommended the current controls be continued.

Pest Management

- *Bengalla*

A pig control program was conducted throughout 2020 at various locations across Bengalla. A total of 18 pigs were culled in January and five pigs were culled in December. One sow was carrying 9 piglets.

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

This culling program will continue into 2021 across Bengalla.

- *Offset Properties*

During the Reporting Period BMC undertook a 4-week dog baiting program across all offset properties, including aerial dog baiting in autumn. A total of 84 1080 bait stations were established targeting foxes and wild dogs. A total of 282 baits were placed during the program. Results indicated that 25% of baits were taken of which 40% were taken by wild dogs and 60% by foxes. Trends over 5 years indicate that wild dog takes have reduced from 67 in 2016, 49 takes in 2017, 33 takes in 2018, 88 takes in 2019 and 29 in 2020. This indicates that dog numbers are generally slowly declining in the offset areas. One aerial dog baiting program was undertaken in 2020 in conjunction with Local Land Services.

BMC also undertook a pig trapping program that included a total of 13 traps during Autumn 2020. A total of 12 pigs were caught during this period across both Echo / Kenalea and Black Mountain offset areas. The pig trapping program undertaken represented an equivalent of 130 trapping days completed.

Further Actions

Ongoing management of weeds and feral animals at Bengalla and offset properties will continue during 2021.

Figure 2 – Bengalla Mine Weed Management Areas 2020

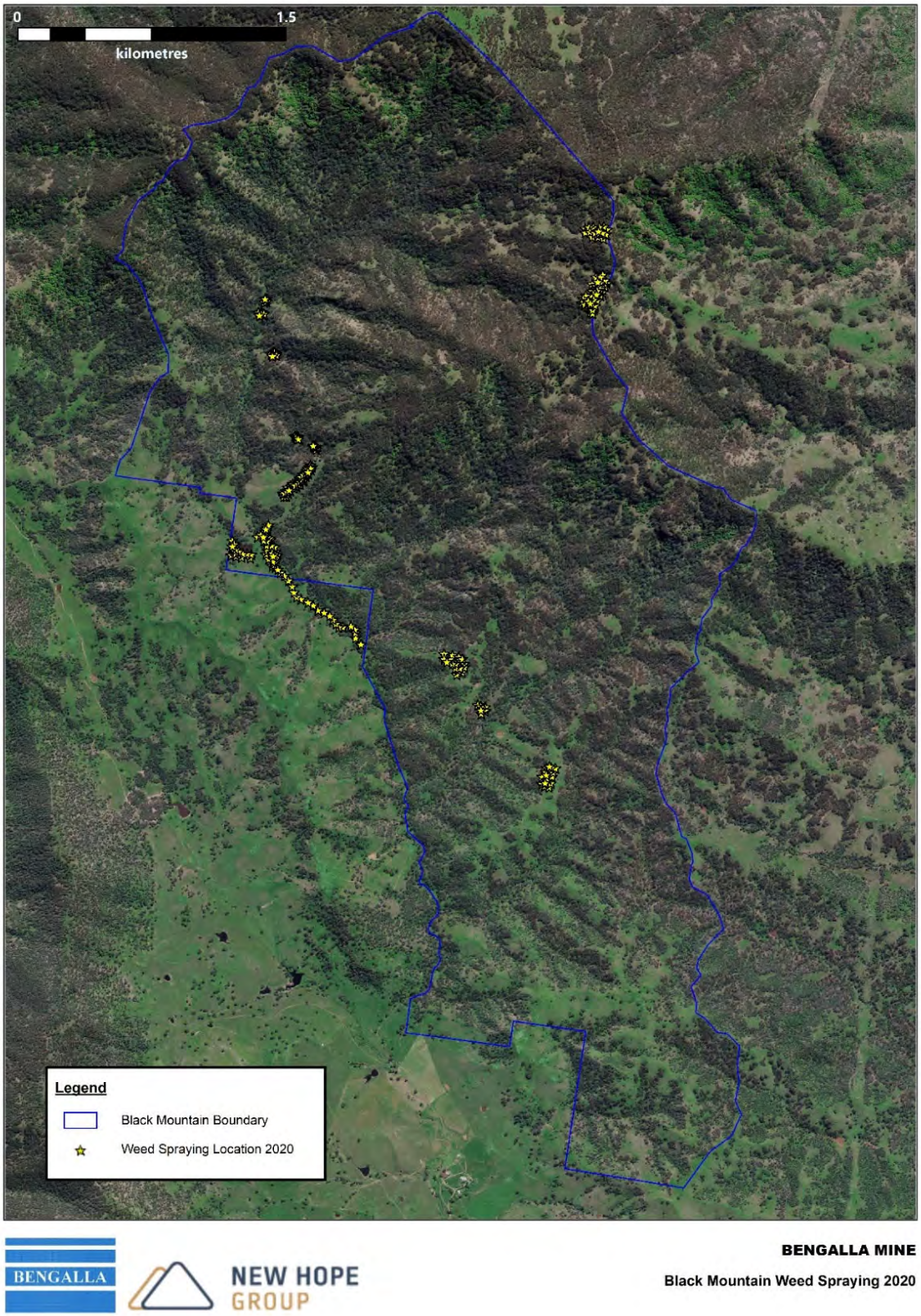


Figure 3 – Black Mountain Weed Management Locations 2020

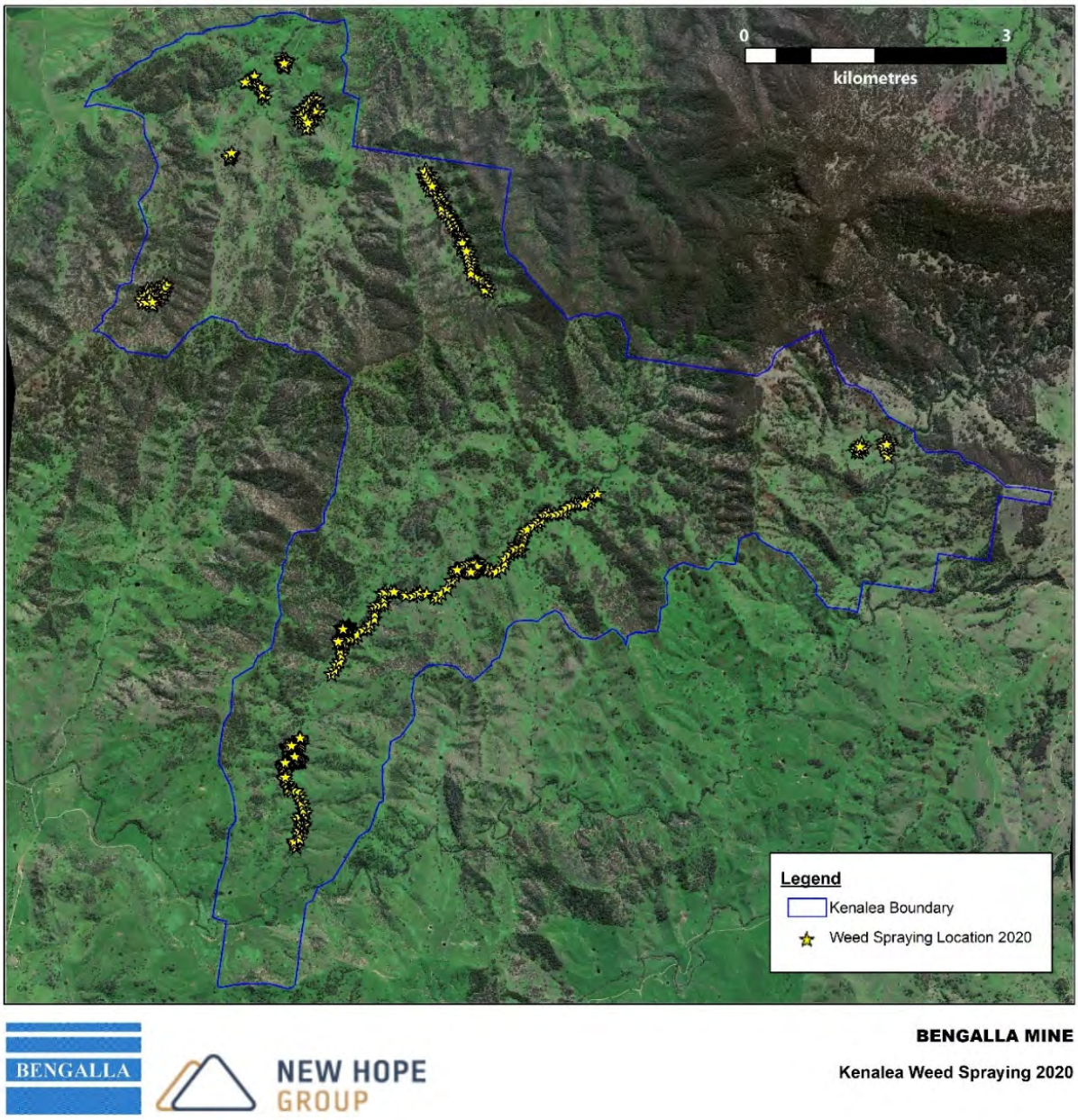


Figure 4 – Kenalea Weed Management Locations 2020

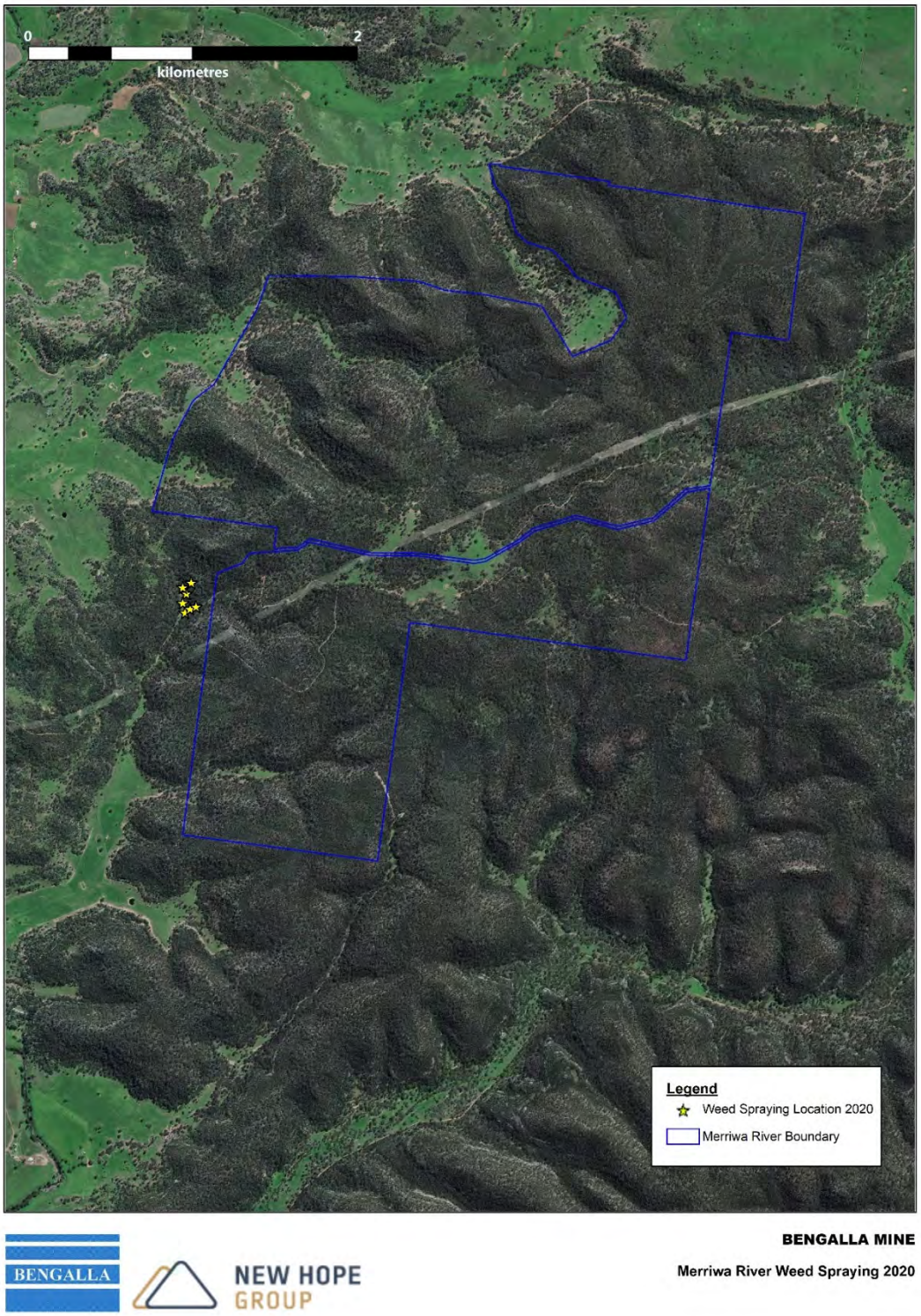


Figure 5 – Merriwa River Weed Management Locations 2020

Appendix F

Surface Water Monitoring Summary

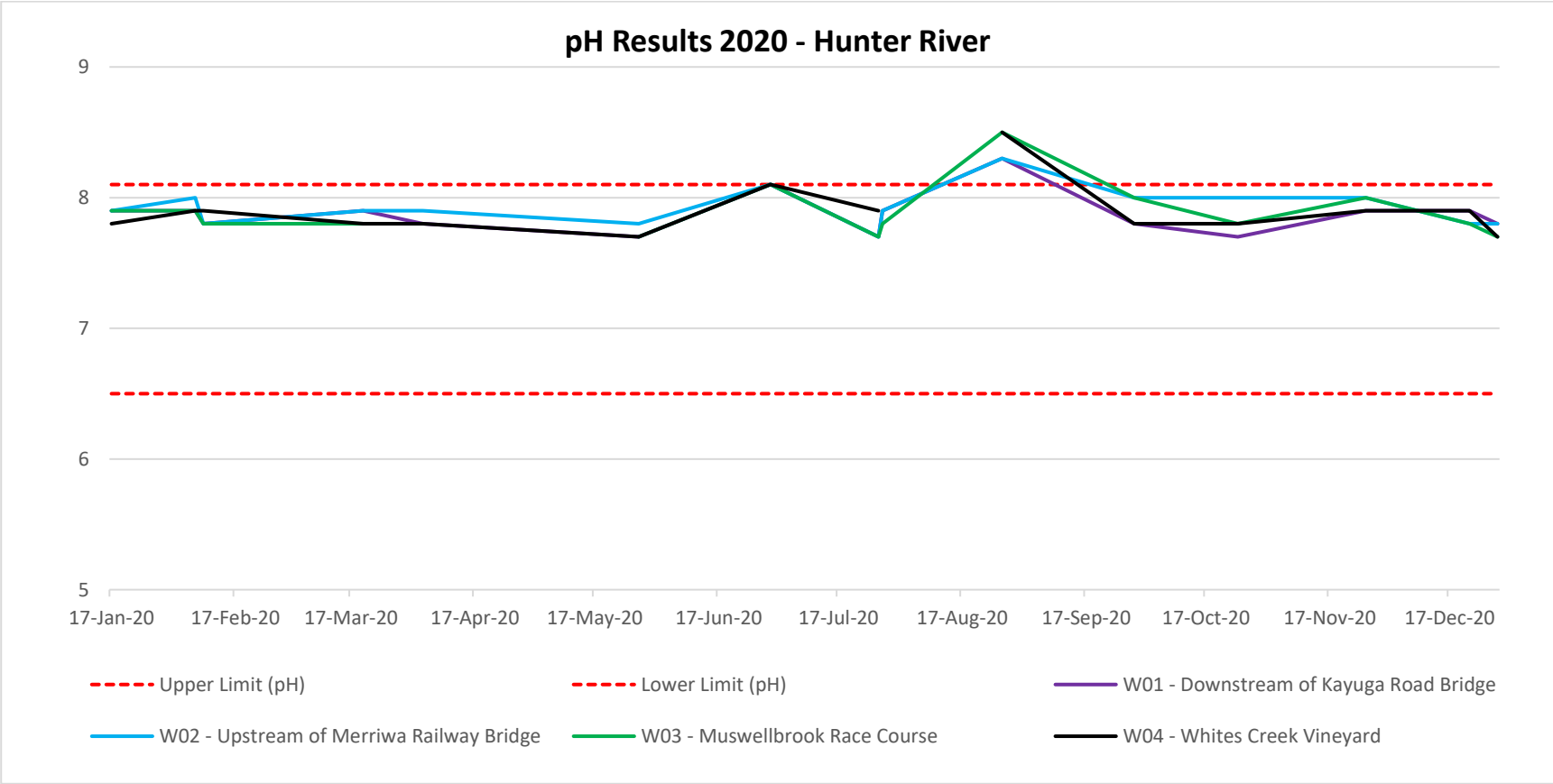
Table F1
Hunter River (W01 – W04) Surface Water Monitoring Results 2020

	Criteria	17-Jan-20	07-Feb-20[1]	09-Feb-20[1]	18-Feb-20 [1]	20-Mar-20	04-Apr-20	28-May-20	30-Jun-20	27-Jul-20[1]	28-Jul-20[1]	27-Aug-20	29-Sep-20	25-Oct-20	26-Nov-20	22-Dec-20[1]	29-Dec-20[1]
W01																	
pH	6.5 – 8.1	7.9	7.9	7.8	7.5	7.9	7.8	7.7	8.1	7.7	7.9	8.3	7.8	7.7	7.9	7.9	7.8
TSS (mg/L)	40	9	7	18	2300	76	87	57	27	25	109	<5	11	26	11	26	48
EC (µS/cm)	650	428	406	387	279	496	596	358	405	662	254	619	660	432	571	533	498
W02																	
pH	6.5 – 8.1	7.9	8.0	7.8	7.5	7.9	7.9	7.8	8.1	7.7	7.9	8.3	8.0	8.0	8.0	7.8	7.8
TSS (mg/L)	40	7	6	8	2500	108	92	52	18	31	130	14	11	23	14	34	47
EC (µS/cm)	650	423	421	325	277	501	370	354	403	580	252	638	648	455	579	534	501
W03																	
pH	6.5 – 8.1	7.9	7.9	7.8	7.4	7.8	Not sampled [2]	7.7	8.1	7.7	7.8	8.5	8.0	7.8	8.0	7.8	7.7
TSS (mg/L)	40	<5	10	31	2450	61	Not sampled [2]	98	12	36	144	8	31	42	23	37	61
EC (µS/cm)	650	440	437	491	297	518	Not sampled [2]	365	412	612	250	649	707	499	618	541	515
W04																	
pH	6.5 – 8.1	7.8	7.9	7.9	7.4	7.8	7.8	7.7	8.1	7.9	Not sampled [2]	8.5	7.8	7.8	7.9	7.9	7.7
TSS (mg/L)	40	11	<5	15	1940	60	91	79	29	65	Not sampled [2]	9	18	39	17	95	48
EC (µS/cm)	650	432	453	477	278	599	505	412	409	603	Not sampled [2]	751	827	544	783	493	467

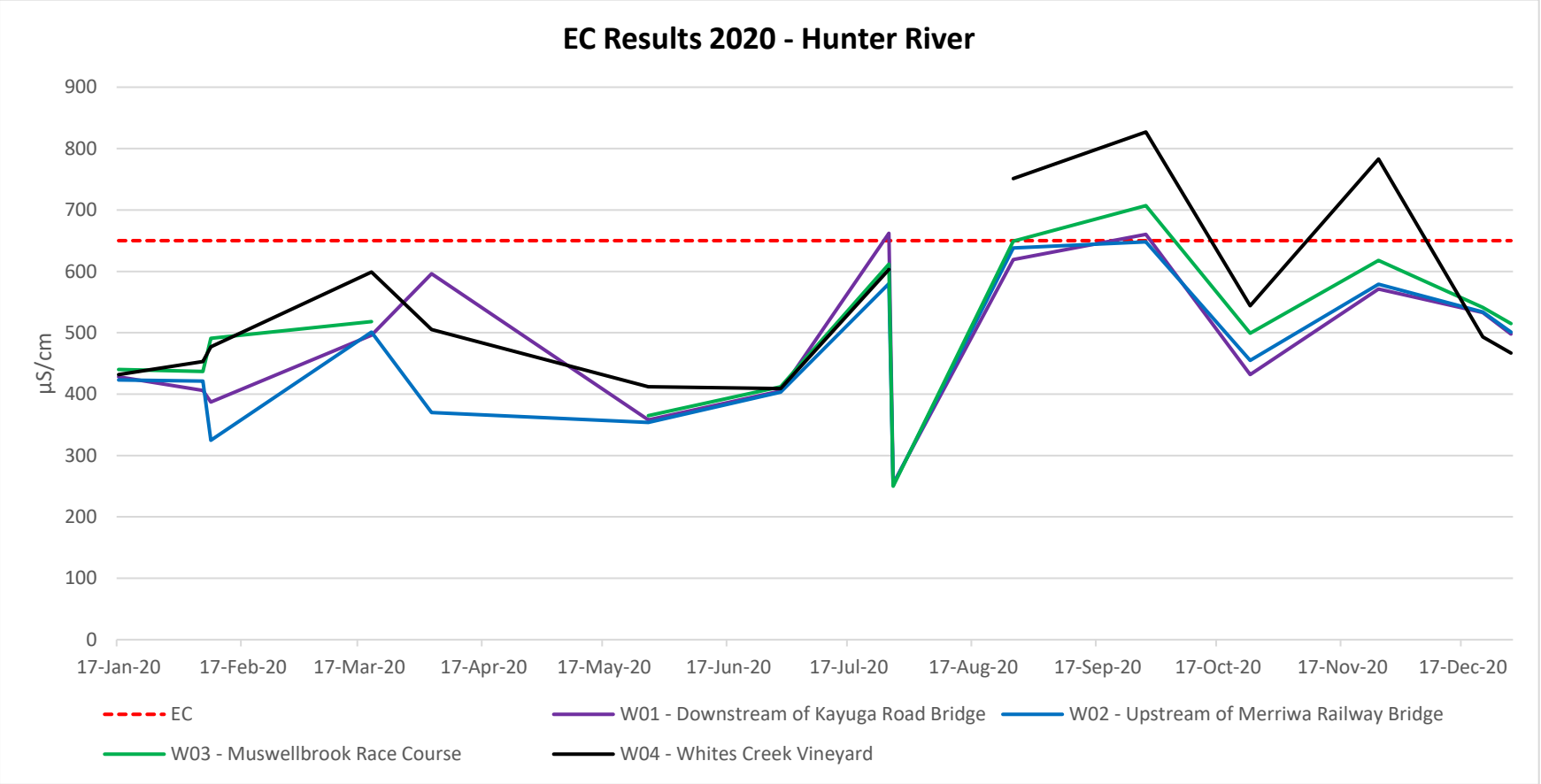
Data sourced from AECOM.

[1]Rain event occurred.

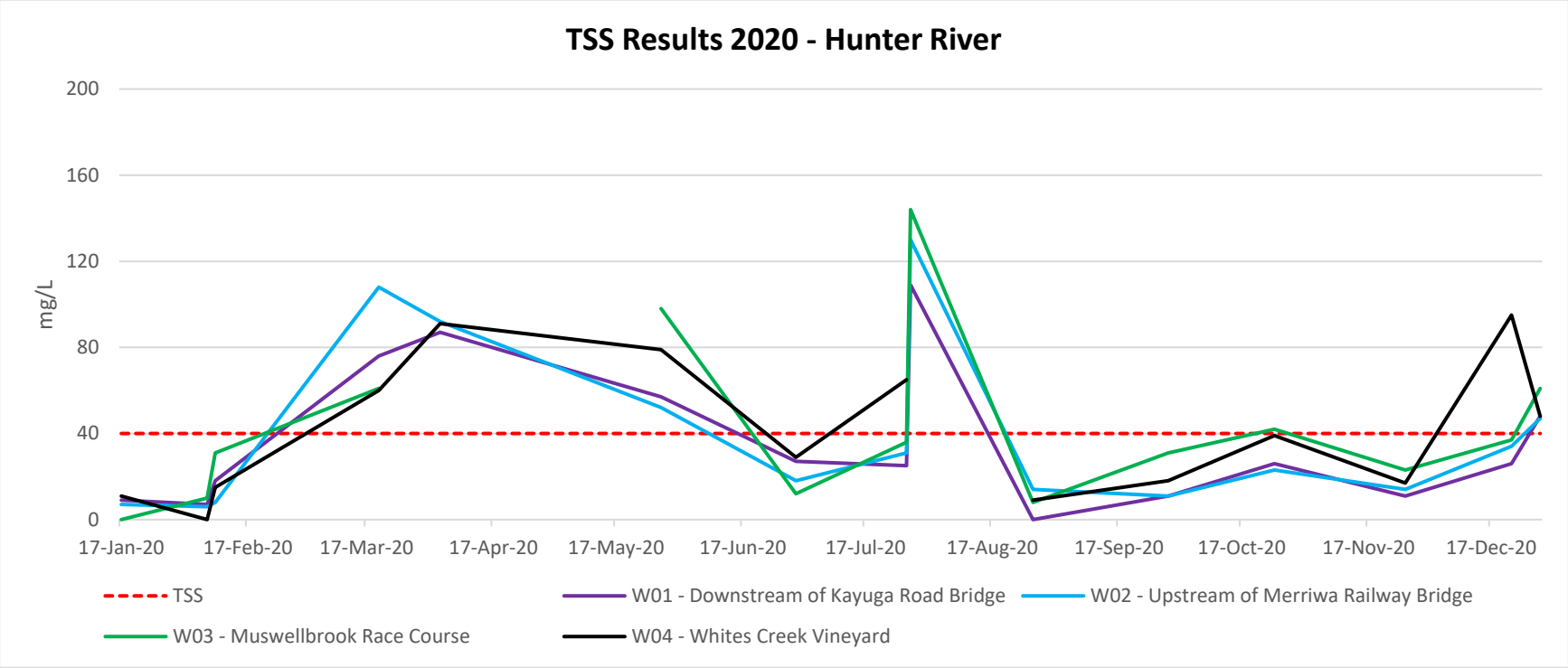
[2] No safe access to sampling point



Graph F1
Hunter River pH Results 2020

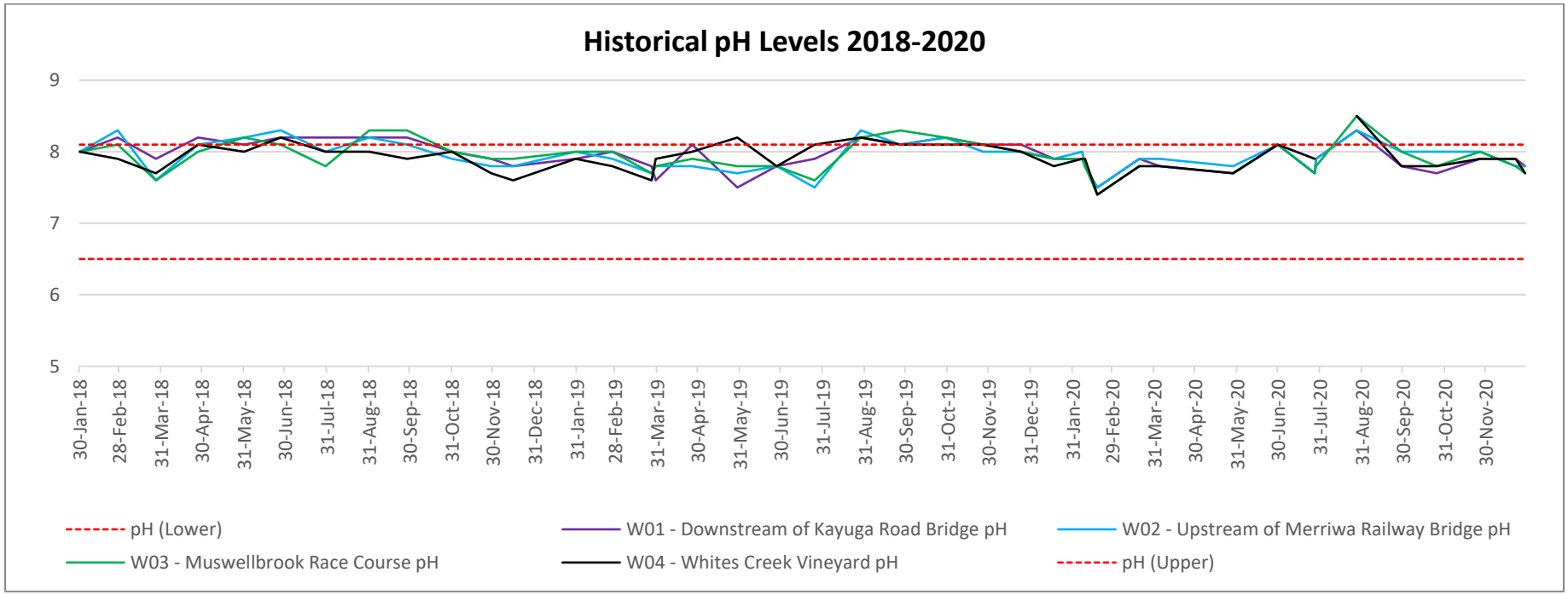


Graph F2
Hunter River EC Results 2020

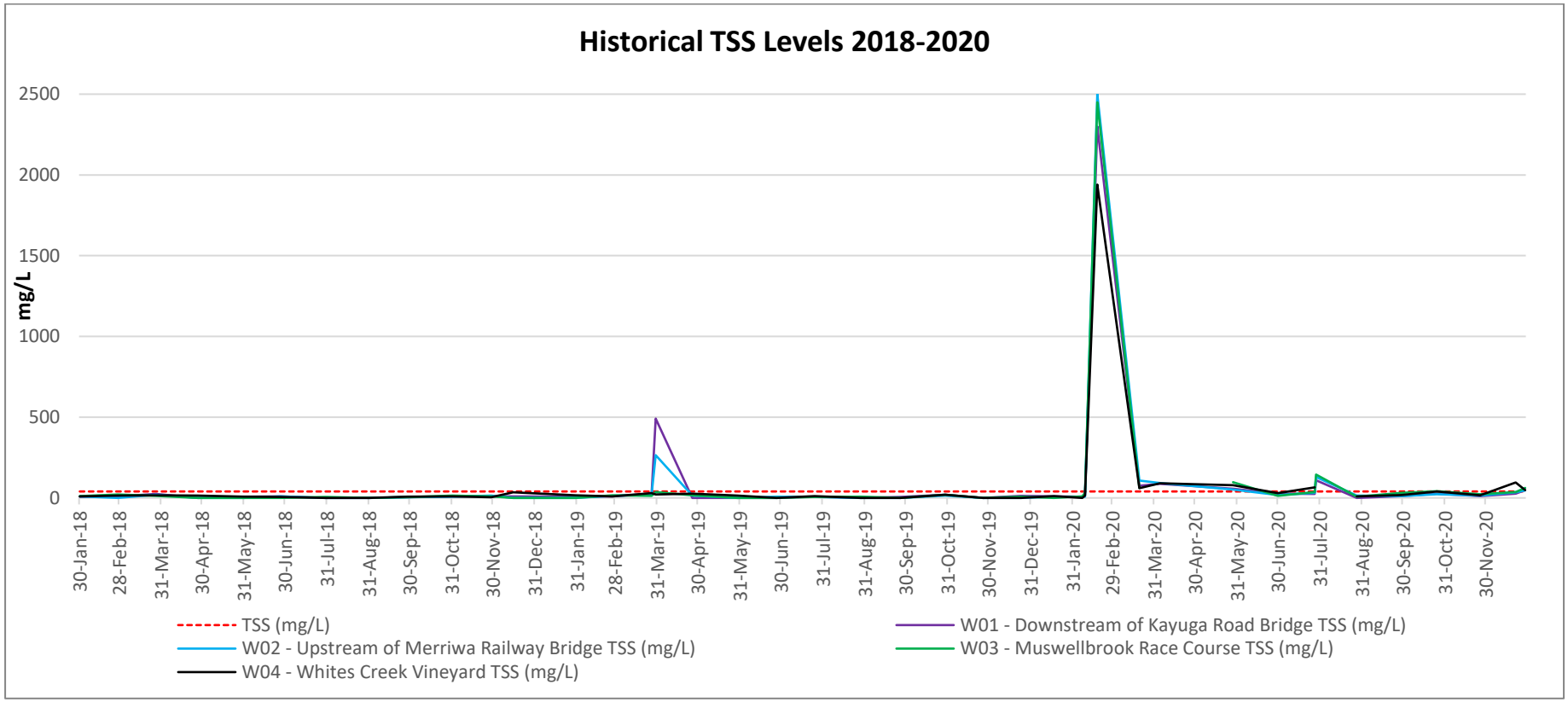


Graph F3
Hunter River TSS Results 2020

(Note TSS for 18 February were elevated due to Hunter River flooding however graph is presented without these values for ease of presentation of data.)

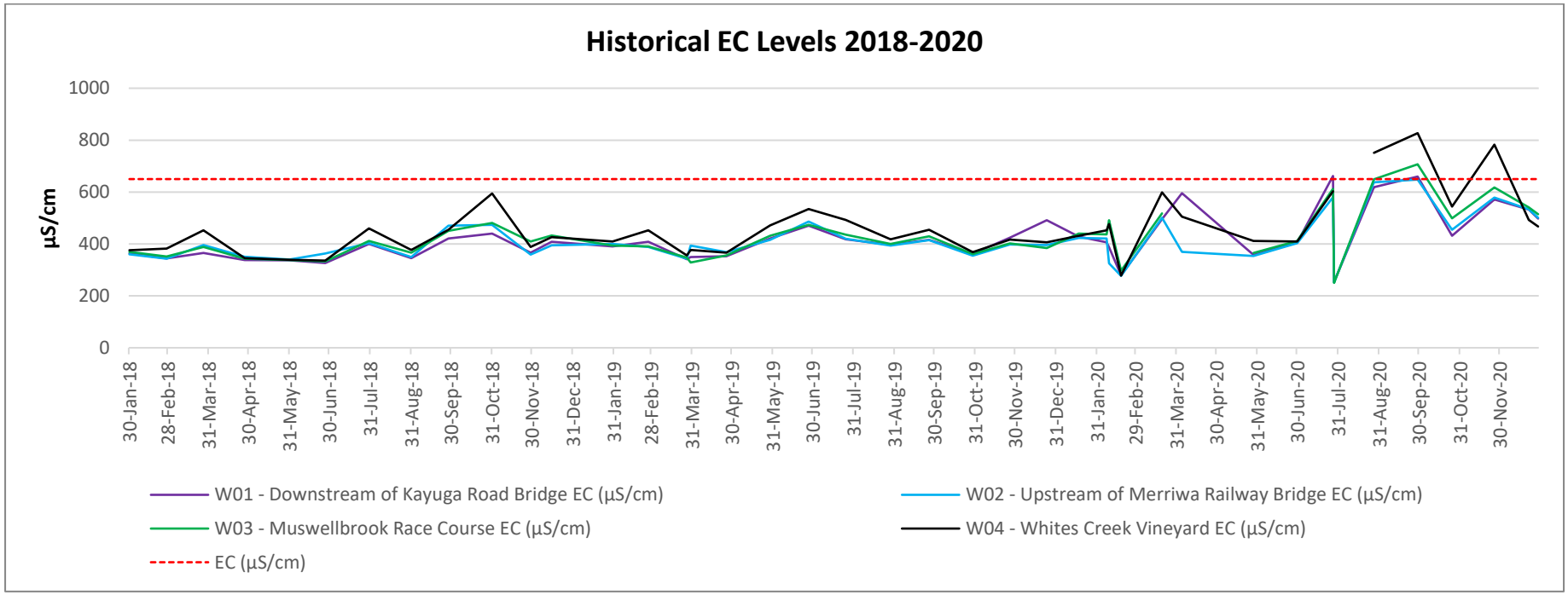


Graph F4
Hunter River pH Results 2018 - 2020



Graph F5
Hunter River TSS Results 2018 – 2020

(Note TSS for March 2019 and February were elevated due to Hunter River flooding. Severe drought impacted flows in the Hunter River until February 2020 where La Nina conditions returned increasing ongoing flows into the Hunter River during 2020.)

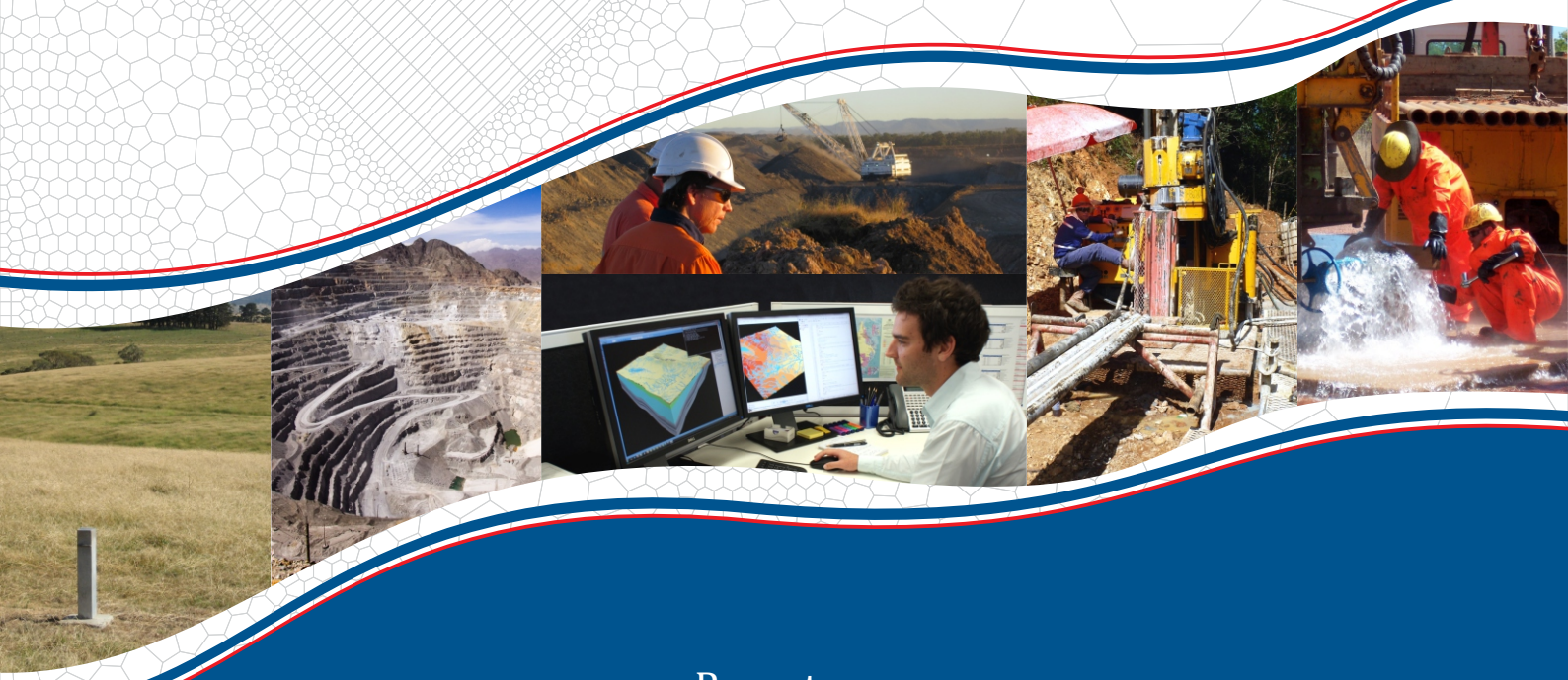


Graph F6
Hunter River EC Results 2018 – 2020

Appendix G

Annual Groundwater Monitoring Report 2020

Australasian Groundwater and
Environmental Consultants Pty Ltd



Report on

Bengalla Mine Annual Groundwater Monitoring Report for 2020

Prepared for
Bengalla Mining Company Pty Ltd (BMC)

Project No. G1543Y March 2021
www.ageconsultants.com.au ABN 64 080 238 642

Document details and history

Document details

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Document status and review

Edition	Comments	Author	Authorised by	Date
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Report on

Bengalla Mine
Annual Groundwater Monitoring Report for 2020

1 Introduction and scope of work

The Bengalla Mining Company Pty Ltd (BMC) operates 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 generally 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 2020 to 31 December 2020. 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 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 of Bengalla is temperate and characterised by hot, wet summers and mild, dry winters. Temperature data for 2020 was sourced from BoM Scone weather station (061363), 25 km from Bengalla. The maximum monthly mean temperature for the year was recorded in January 2020 (35.0°C), whilst a minimum monthly mean temperature of 3.9 C was recorded in July 2020.

Long-term rainfall data covering the period 1992 to 2020 were obtained from the onsite Bengalla weather station and are summarised in Table 2.1.

Bengalla is situated within the Upper Hunter Valley region. The total annual rainfall recorded at the Bengalla met station for 2020 was 803.5 mm, with February being the wettest month, with 132.5 mm of recorded rain, and November being the driest with 23.5 mm of rain recorded. A comparison of the total annual 2020 rainfall (803.5 mm) at Bengalla with the longer-term 1992 to 2020 average (582.5 mm) illustrates an above average rainfall trend for the year (Table 2.1).

Table 2.1 Rainfall data 2020 – Bengalla weather station

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Bengalla Monthly Total Rainfall (mm) 2020	58.5	132.5	57.5	109	26.5	32.5	84.5	28	45	92.5	23.5	113.5	803.5
Bengalla long term monthly average rainfall (mm) 1992 - 2020	54.1	69	58.7	37.1	34.8	44.7	34.5	32.6	36.1	44.1	65.3	71.9	582.5

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 graph for 2020 (Figure 2.1) displays an increasing trend since January 2020, following drought conditions from early 2017 to 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.

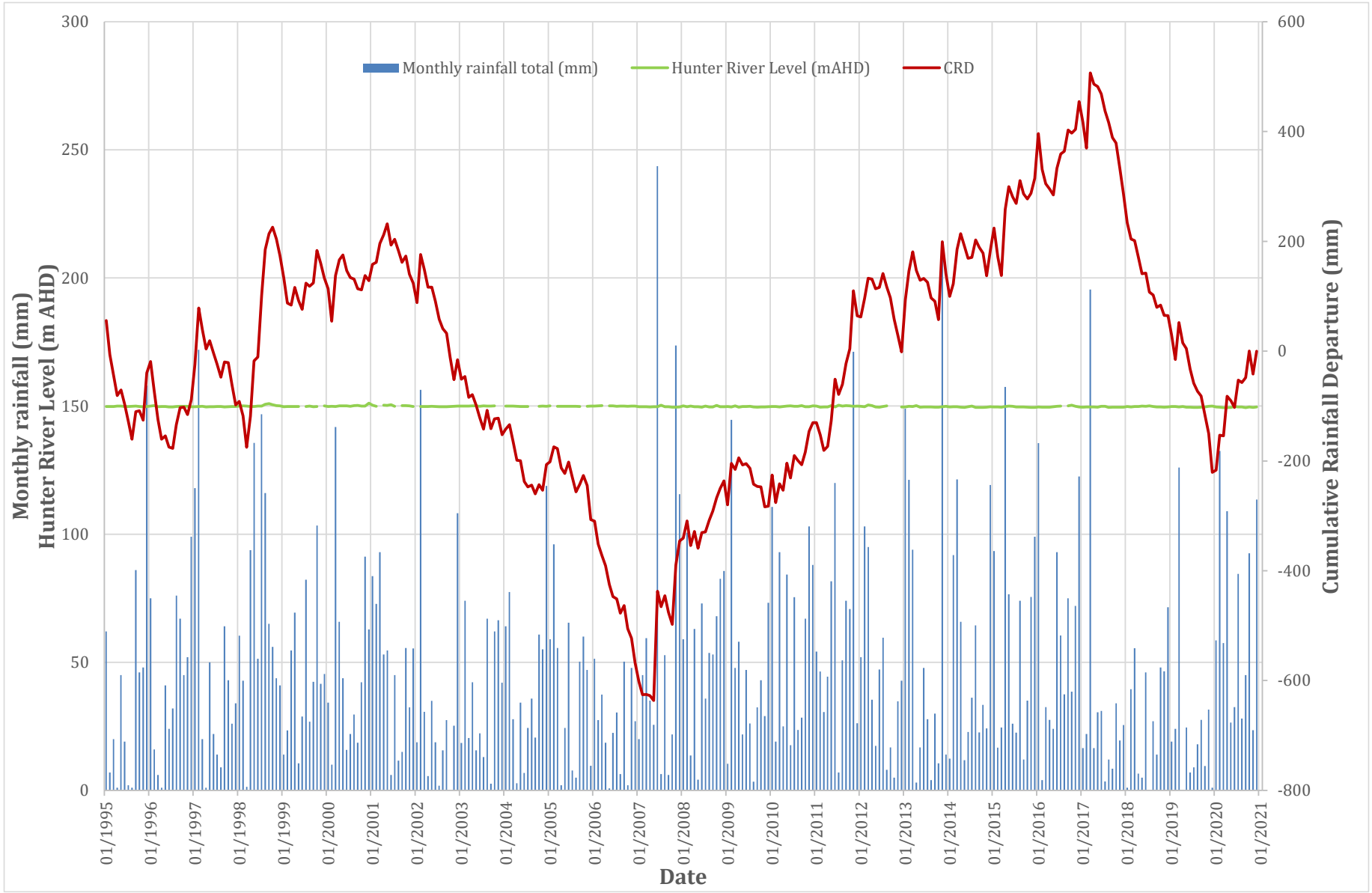


Figure 2.1 Cumulative rainfall departure (1995 to 2020) for Bengalla weather monitoring station

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 seam and interburden units currently mined 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
	Edderton	2	10
Not mined at Bengalla	Clanricard	1.8	10
	Bengalla	2.5	10
	Edinglassie	3.9	30
	Ramrod Creek	6.5	-

Generally, in undisturbed conditions, the potentiometric surface (pressure head) of groundwater in the coal seams is higher than the alluvial water table (i.e. an upward hydraulic gradient). Therefore, in areas where the coal seams subcrop beneath the alluvium, there is potential for groundwater from the coal measures to discharge 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 (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 locations. Figure 4.1 shows the bore and VWP locations.

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 the 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. As a result, the construction details of these bores have been updated in Table 4.1. 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 are not 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 2020. Monitoring bore E12 was mined through in May 2017.

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 (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 [bc]	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 [bc]	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 [d]	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	296019	6425360	135.9	136.78	0.88	26-29	28.98	107.8	Deep Permian
WAN5B [e]	296019	6425360	135.9	136.74	0.84	10.5-13.5	15.57	121.17	Alluvium
WAN6A	296553	6425634	136.9	137.67	0.77	7.5-10.5	10.5	126.4	Alluvium
WAN6B	296553	6425634	136.9	137.66	0.76	30-33	33	103.9	Edderton Seam
WAN7A	296856	6426254	138.1	138.86	0.76	12.0-15.0	15	123.1	Alluvium
WAN7B	296856	6426254	138.1	138.89	0.79	80-83	83	55.1	Edinglassie Seam
WAN8A	296457	6425854	136.41	137.47	1.07	10.7-11.9	12.94	124.53	Alluvium

Bore ID	Easting MGA94 z56	Northing MGA94 z56	Ground level (mAHD)	Top of casing (mAHD)	Stick-up (m)	Screen (mbGL)	Total depth (mBGL)	Bore base elevation (mAHD)	Geology/ Target Seam
WAN8B	296450	6425855	136.33	137.42	1.09	15-18.6	19.6	117.82	Wynn Seam
WAN9A2	296326	6425582	136.88	137.98	1.1	8.5-10.5	10.5	126.38	Alluvium
WAN9B	296328	6425576	136.93	137.88	0.95	21-24	24	112.93	Wynn Seam
BE1 (VWP)	293475	6429036	241.48	-	-	120	120	121.48	Warkworth/Mt Arthur
BE1 (VWP)	293475	6429036	241.48	-	-	264.5	264.5	-23.02	Edderton Seam
BE2 (VWP)	293374	6425866	204.22	-	-	97.8	97.8	106.42	Warkworth/Mt Arthur
BE2 (VWP)	293374	6425866	204.22	-	-	212.5	212.5	-8.28	Edderton Seam
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	298190	6428409	TBC	TBC	TBC	9-12	12	TBC	Alluvium
GW01B	298190	6428409	TBC	TBC	TBC	24-27	27	TBC	Shallow Permian
WAN11A	296649	6424875	135.4	136.44	1.05	9-12	12	123.4	Alluvium
WAN11B	296645	6424876	135.5	136.45	0.95	24-27	27	108.5	Shallow Permian
WAN12	295491	6424725	135.3	136.06	0.76	11-14	14	121.3	Alluvium

Notes:

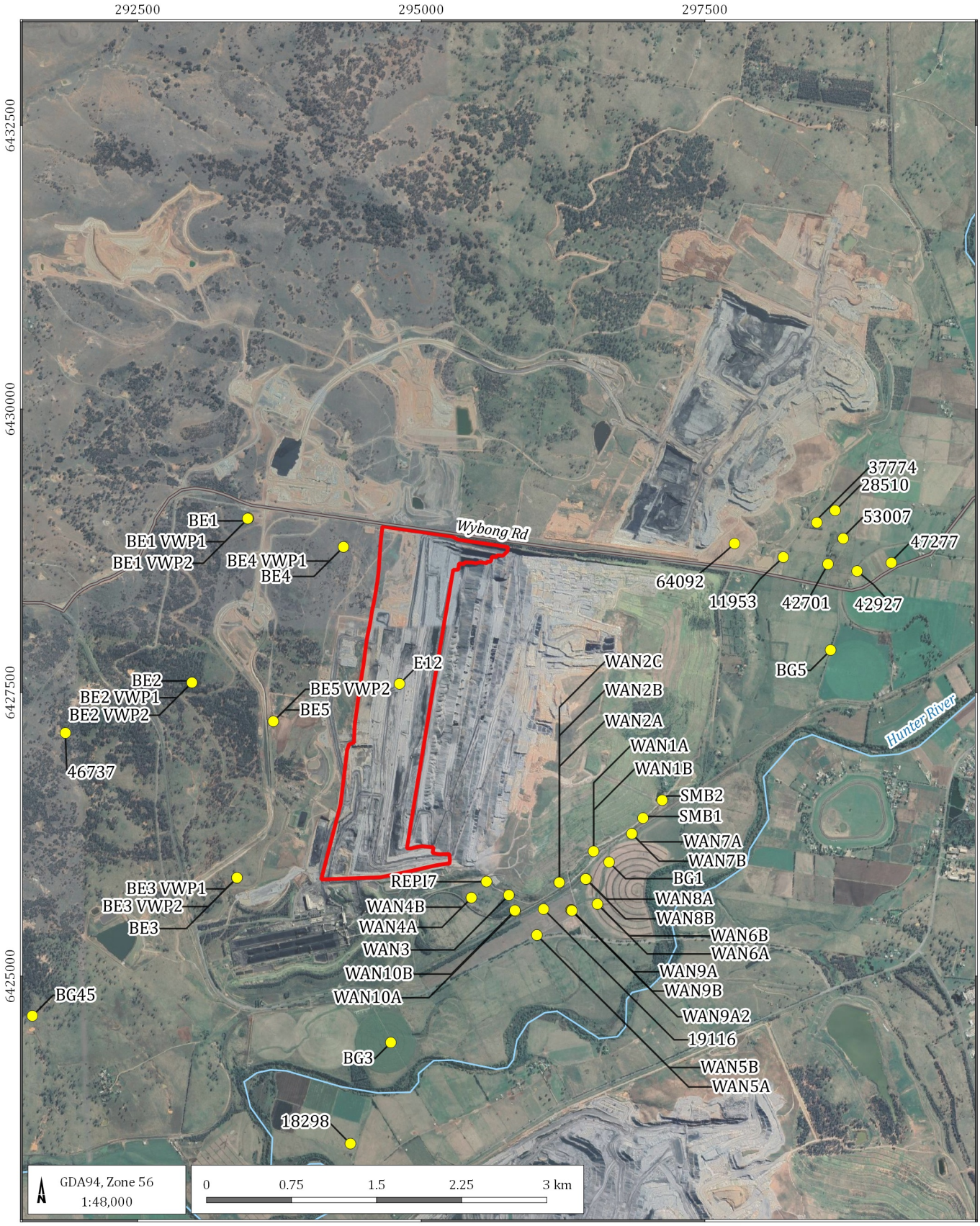
a *no access or mined through for 2020 monitoring.*

b *bore base should be tagged to confirm depth.*

c *resurvey suggested - 47277.*

d *depth to bottom 35.1m - bore may have collapsed – WAN 3.*

e *standpipe damaged in September 2020 – WAN5B.*



LEGEND

- Monitoring locations
- Drainage
- Roads
- Void boundary

Bengalla annual review 2020 (G1543Y)

Monitoring bore network

DATE 03/03/2021

FIGURE No: 4.1

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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 2020 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 - 95th Percentile	Stage 2 EC Trigger - Maximum EC	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
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

Site	Easting	Northing	Min pH trigger	Max pH trigger	Stage 1 EC Trigger - 95th Percentile	Stage 2 EC Trigger - Maximum EC	Target aquifer
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	5068	5090	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
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

Bore ID	Geology/ target Seam	Max. Drawdown (m)	Trigger water level (mAHD)
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 2020 (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 were stable or increased slightly during 2020, coincident with above average rainfall and an increasing CRD.

The stable trends in groundwater levels in Figure 6.1 generally show a correlation between the Hunter River level (at Station 210002, Muswellbrook Bridge) and the water levels in the alluvium bores. (Figure 6.1; note that the river level is reduced by 10 m for presentation on the axis of this chart).

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 WAN1A and WAN7A have single readings that do not show correlation with other alluvial bores, the CRD, or Hunter River water levels. These single measurements are considered anomalous and are likely erroneous due to the large fluctuation in data.

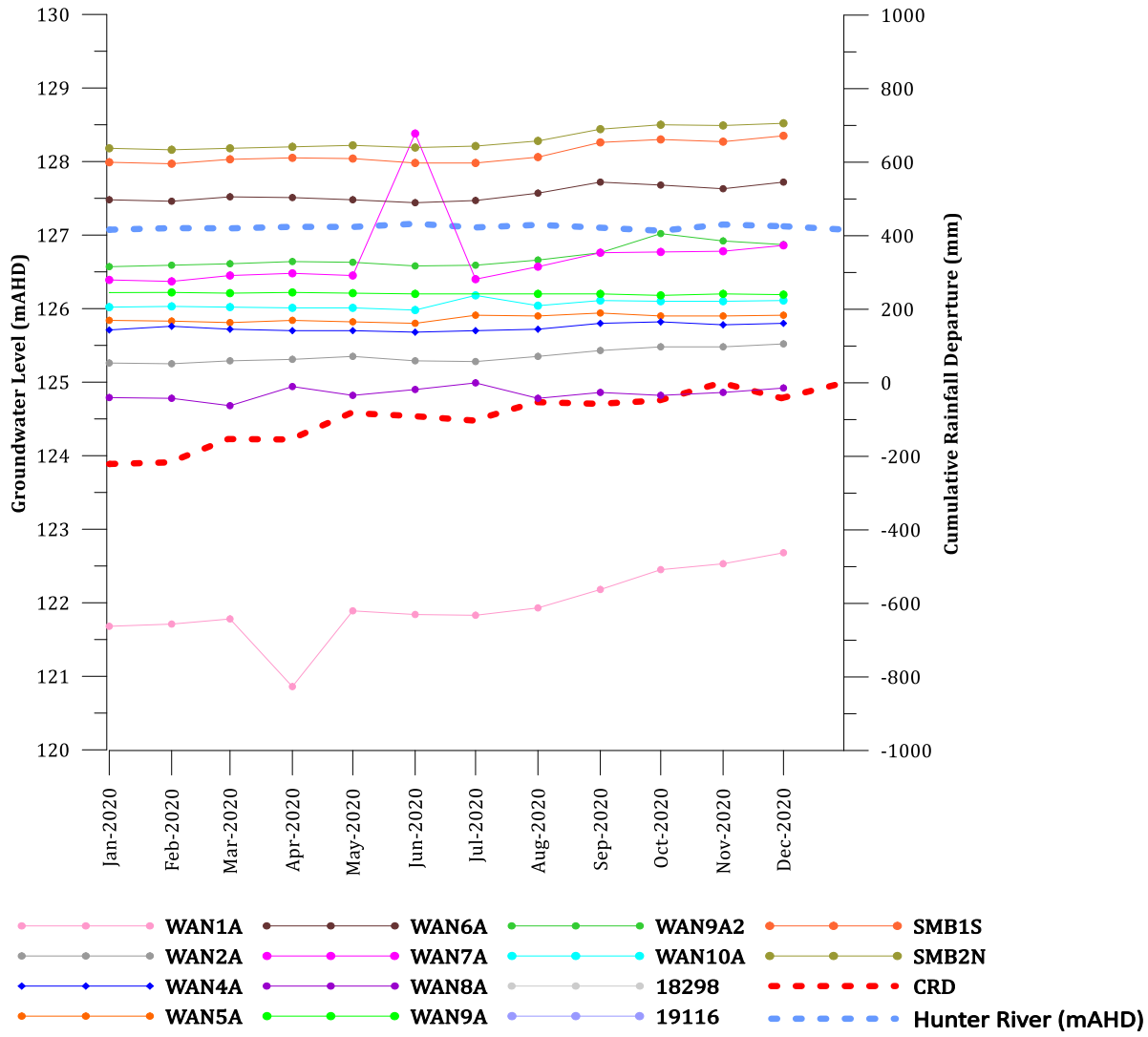


Figure 6.1 Hydrographs of alluvial bores – Wantana extension area

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 2020. Groundwater levels in BG5 have remained above the trigger value since April 2018.

Groundwater levels in BG3 were recorded below the trigger level for the entirety of 2020.

The trend in groundwater levels and trigger events in bore BG3 was assessed in a separate AGE investigation report (AGE 2018 – G1543S). The study identified that the water levels were generally within historic ranges and had oscillated around baseline levels since bore installation. This indicated that there was no evidence of sudden depressurisation and concluded that change in groundwater levels did not appear to pose harm to the environment. Considering the distance between BG3 and Bengalla (> 1.5 km), these trigger events are not likely to be related to mining at Bengalla (AGE, 2018). The report recommended ongoing monitoring. With the water level remaining stable throughout 2020, there is no change to the conclusions of the previous investigation and the groundwater levels measured for 2020 in this bore do not appear to pose harm to the environment.

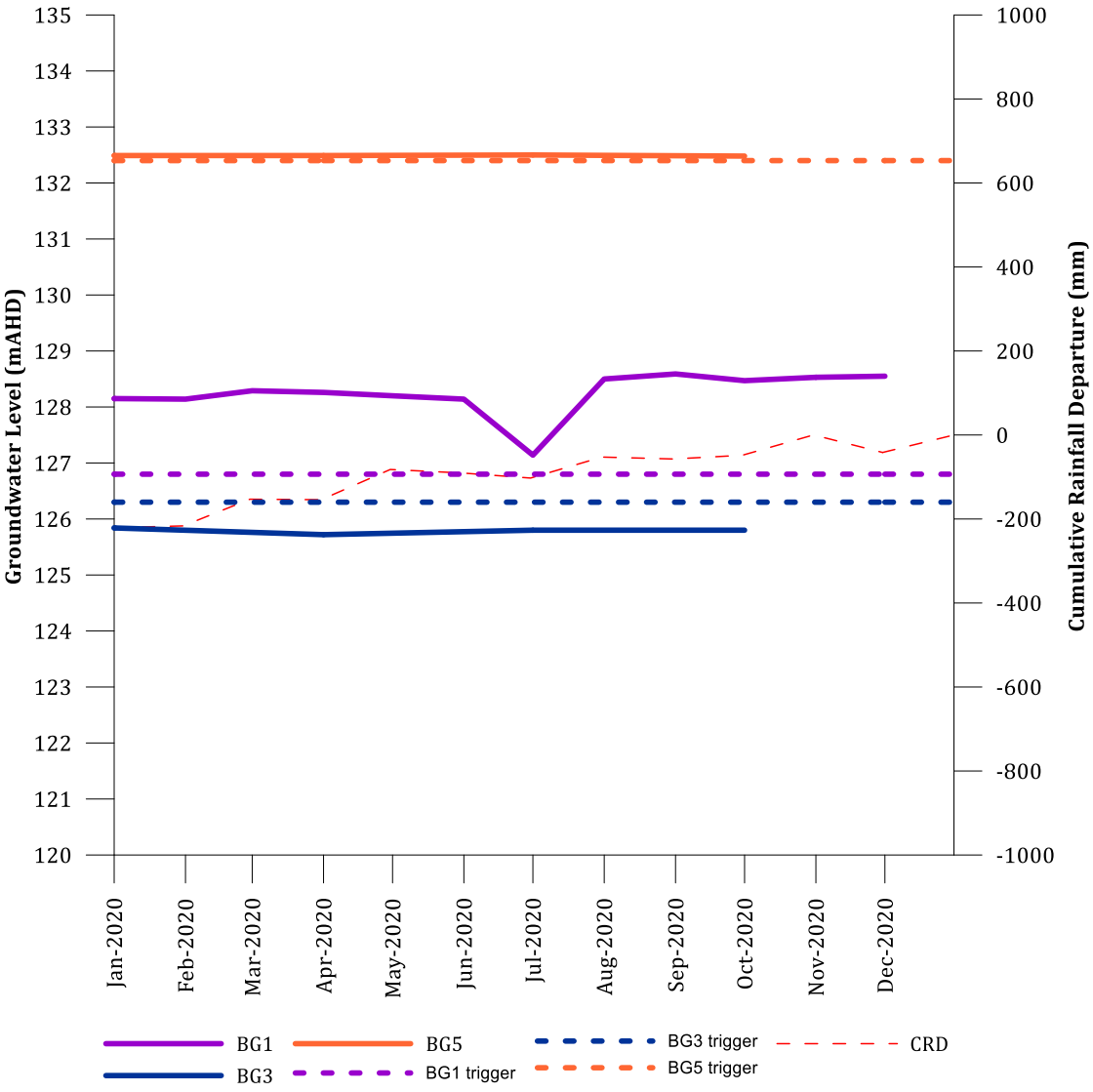
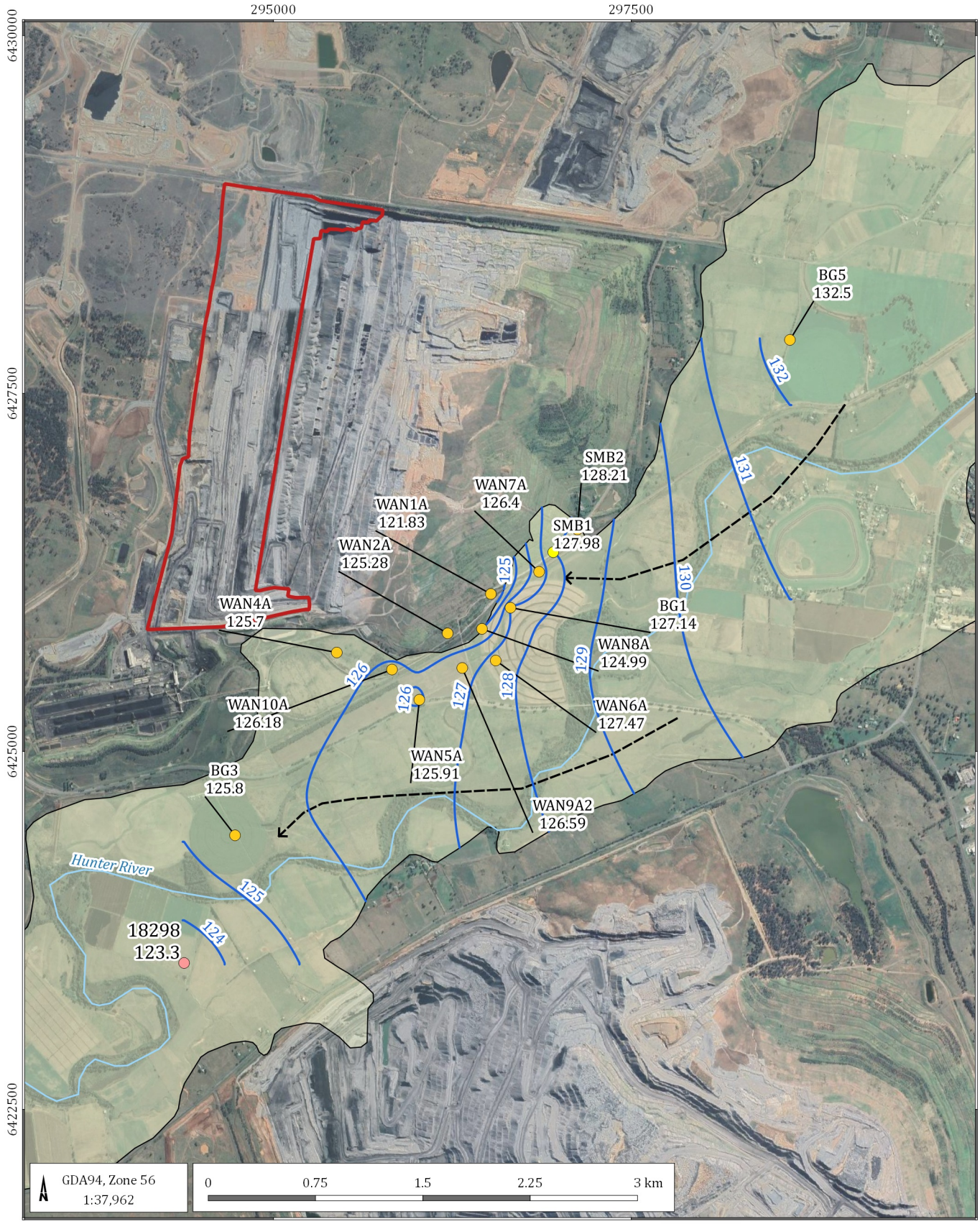


Figure 6.2 Hydrographs of Regional alluvial bores

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 2020. The water level contours and flow directions are consistent with that of previous years.

As was the case in 2019, 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 2020 groundwater elevation in WAN8A was 124.92 mAHD, whereas the base of the screened interval is 124.51 mAHD (ground level minus 11.9 m; Appendix A). Therefore, there was only 0.41 m of screened casing below the water level; an increase of 0.11 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
- Alluvium bore
- Alluvium groundwater contours - July 2020 (mAHD)
- Groundwater flow direction
- Drainage
- Alluvium boundary
- Void boundary

Bengalla annual review 2020 (G1543Y)

Alluvial groundwater levels (July 2020)

DATE
08/03/2021

FIGURE No:
6.3

Source: Hunter Coalfield Regional 1:100 000 Geology Map*
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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 2020. 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.
- 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 area of the Wantana Extension. Monitoring bore WAN7B screens the Edinglassie Seam. Groundwater elevation in WAN7B increased approximately 1 m in 2020 (~129 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 slightly throughout 2020 after being relatively static since 2007. In the case of WAN1A, the observed water level remains at, or close to, the base of the casing.
- Monitoring bore WAN2C was blocked prior to October 2019. Measurements for 2020 show groundwater levels of approximately 100 mAHD.
- Monitoring bore WAN2B has shown a gradual but steady recovery in water level since mid-2013. As with WAN1B, the monitoring bore WAN2B is located adjacent to the pit end wall. The recovery noted in WAN2B may represent a gradual recovery in pressure as mining operations move further away from this bore.
- Monitoring bore REPI7groundwater levels continue to recover, likely due to mining operations progressing 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 slightly in 2020, commensurate with above average rainfall;
- Figure 6.6 shows a coal seam (Edderton Seam) monitoring bore (WAN1B) plotted against the CRD. Groundwater levels have risen slightly in 2020. WAN1B is located adjacent to the pit end wall. 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 2020.

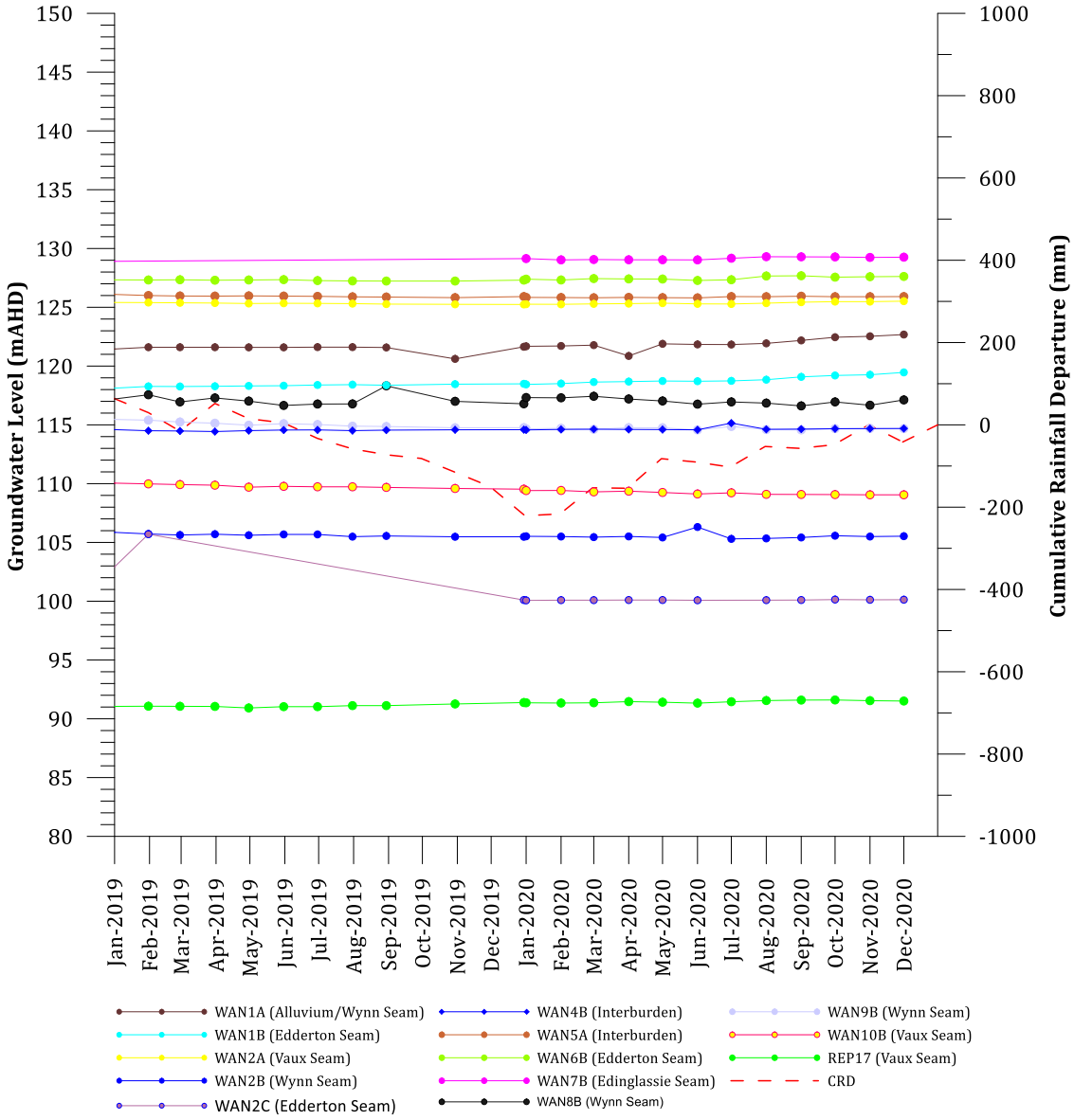


Figure 6.4 Hydrographs of coal seam/interburden bores – Wantana extension area

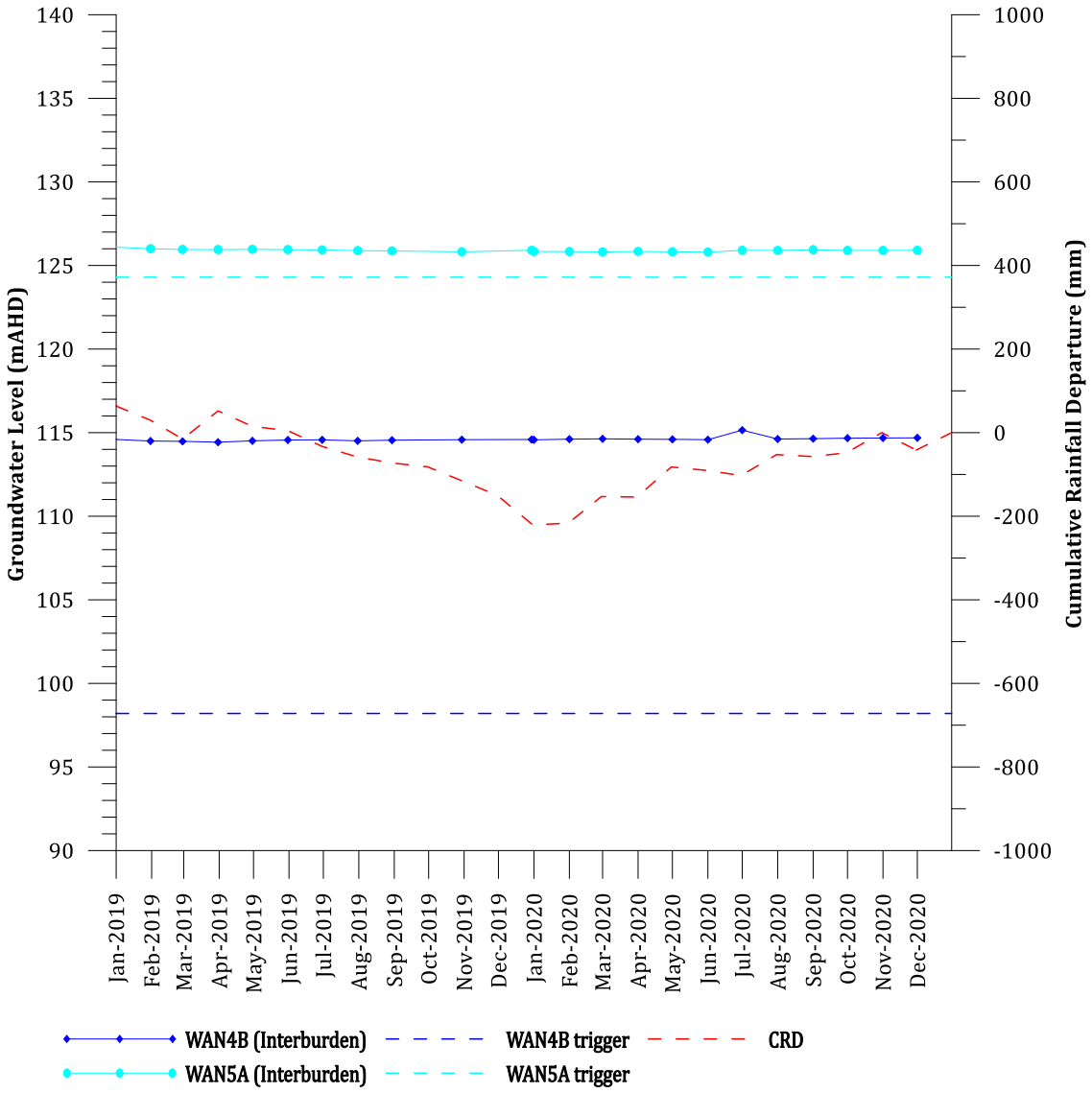


Figure 6.5 Hydrographs of deep Permian monitoring bores

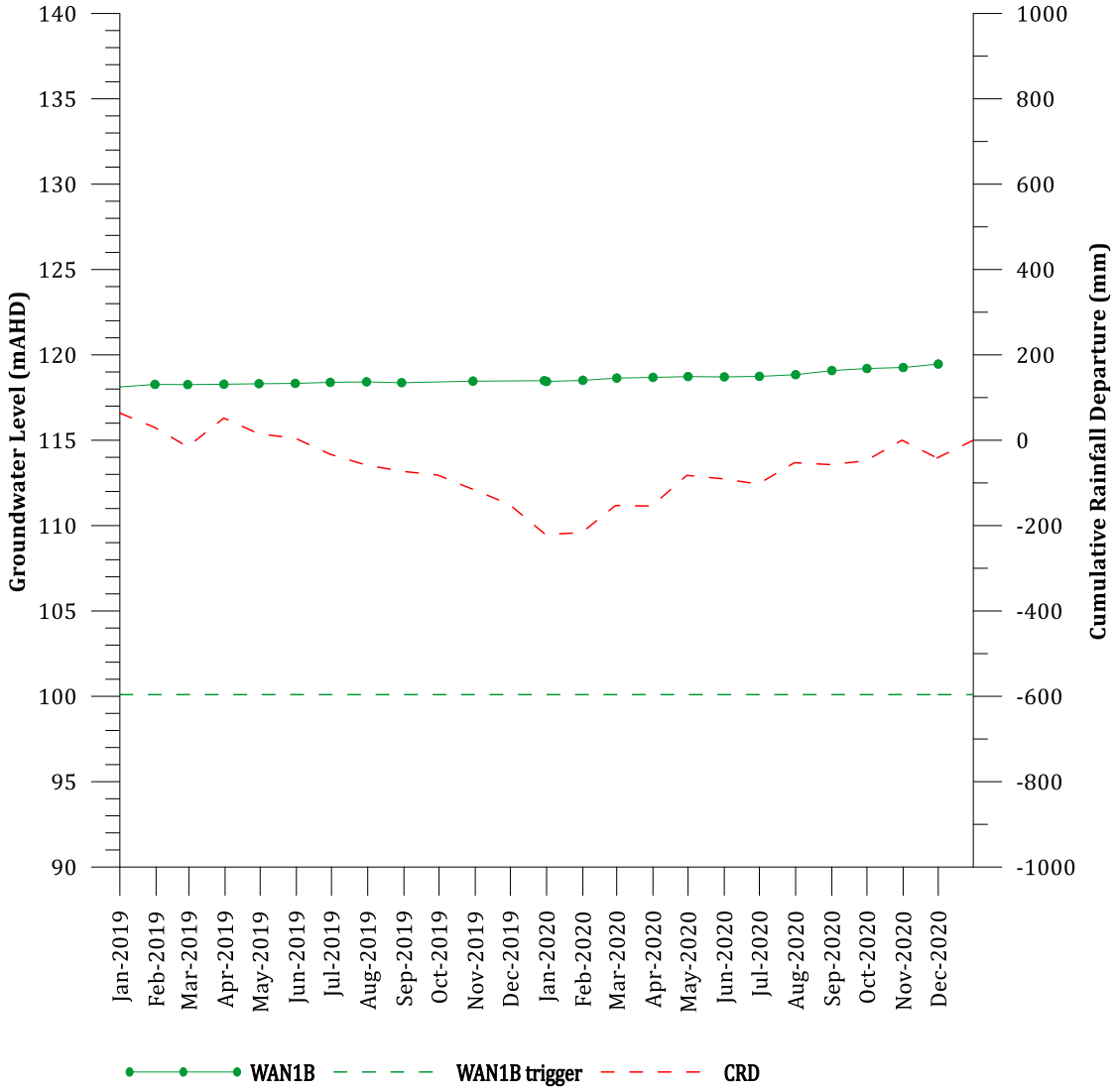


Figure 6.6 Hydrograph of shallow Permian monitoring bores

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 2020. 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 2020. 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 has seen a slight but steady increase in water level throughout the year from 121.68 mAHD to 122.68 mAHD (1 m increase). WAN1B (Edderton seam), on the other hand, has shown mining-induced depressurisation from mid-2010 to late-2011 and subsequent water level recovery is ongoing (1.02 m in 2020). The water level (119.46 mAHD in December 2020) appears to have recovered to above the pre-mining level (115.87 mAHD). This demonstrates that water levels in depressurised coal seams can recover in a post-mining phase.

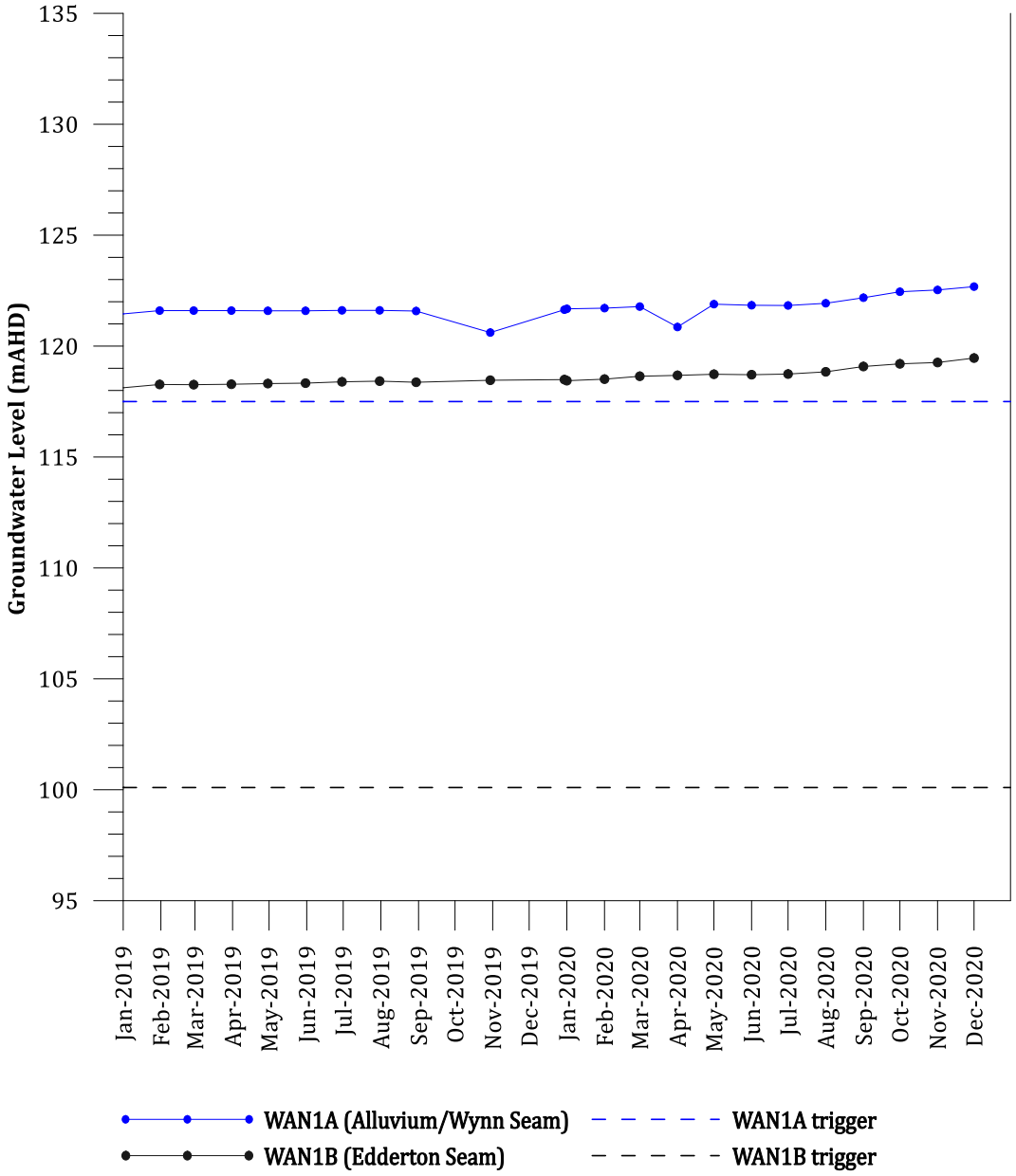


Figure 6.7 Alluvium and coal seam hydrographs – WAN1

Figure 6.8 shows the WAN2 nested site water levels. All WAN2 bores retained levels above the trigger levels throughout 2020. Water levels in WAN2A (Vaux Seam) were stable during the 2020 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 2020). Monitoring bore WAN2C has recorded a steady water level throughout 2020.

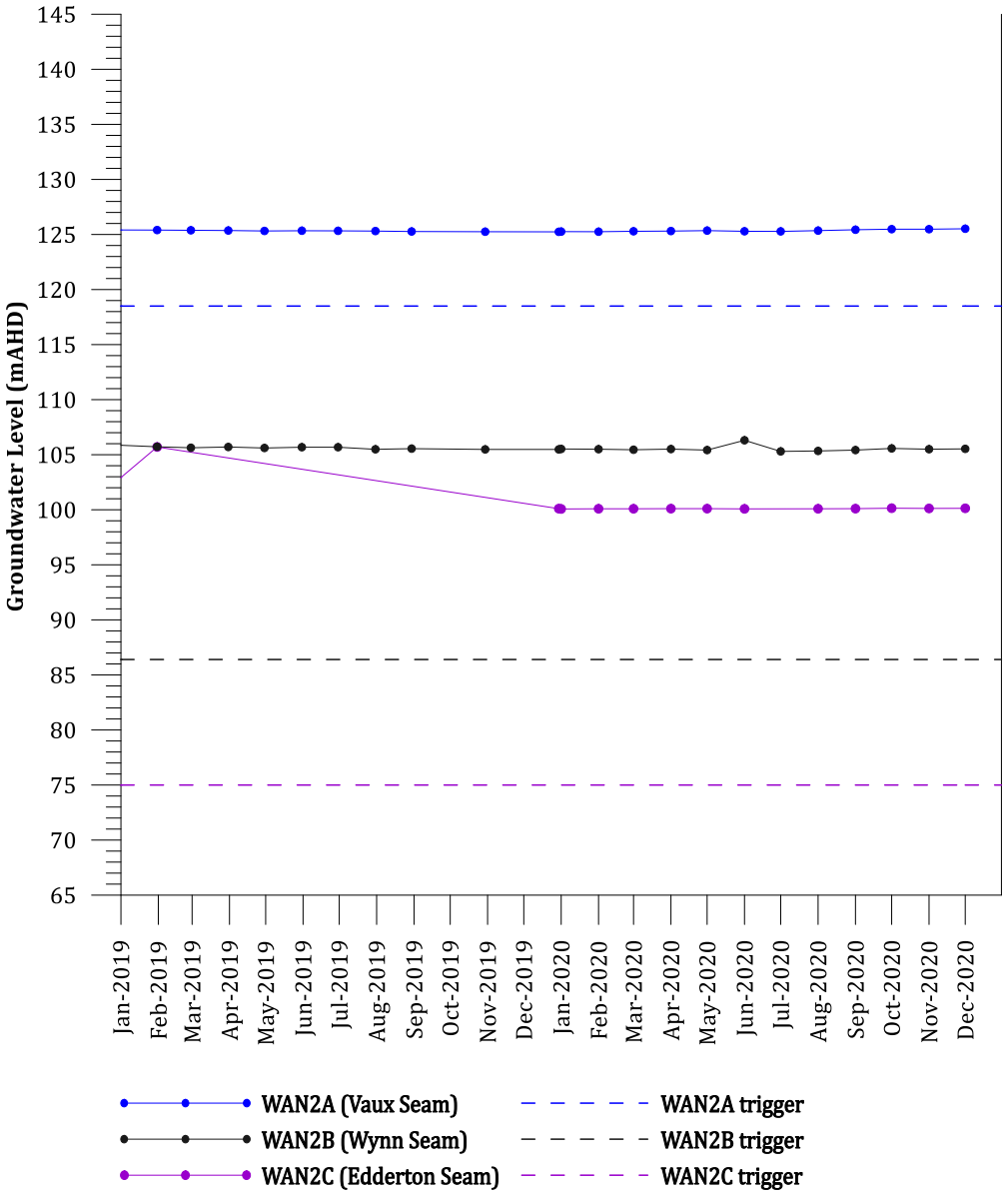


Figure 6.8 Alluvium and coal seam hydrographs – WAN2

WAN4 bores retained groundwater levels above the trigger values throughout 2020 (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 9.11 m. This rate of decline appears to have stabilised to an elevation approximately 114 mAHD (114.69 mAHD - December 2020). WAN4A water level in the alluvium has maintained a relatively consistent level at approximately 126 mAHD (the base of the bore is 120.6 mAHD). This may reflect continued depressurisation in the interburden, with no or little local connection between the alluvium and the interburden, or the alluvium is constantly recharged by the Hunter River.

WAN4A/B is located closer to the pit wall compared to 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.

Data from 2020 (Figure 6.12) shows 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 drawdown related to mining. The water level in WAN7A shows stable trends over the first half of 2020 before increasing in the later part of the year. It should be noted that the June 2020 reading shows a large spike in groundwater level and is likely erroneous. WAN7A and WAN7B were above established trigger levels throughout 2020 (Figure 6.12).

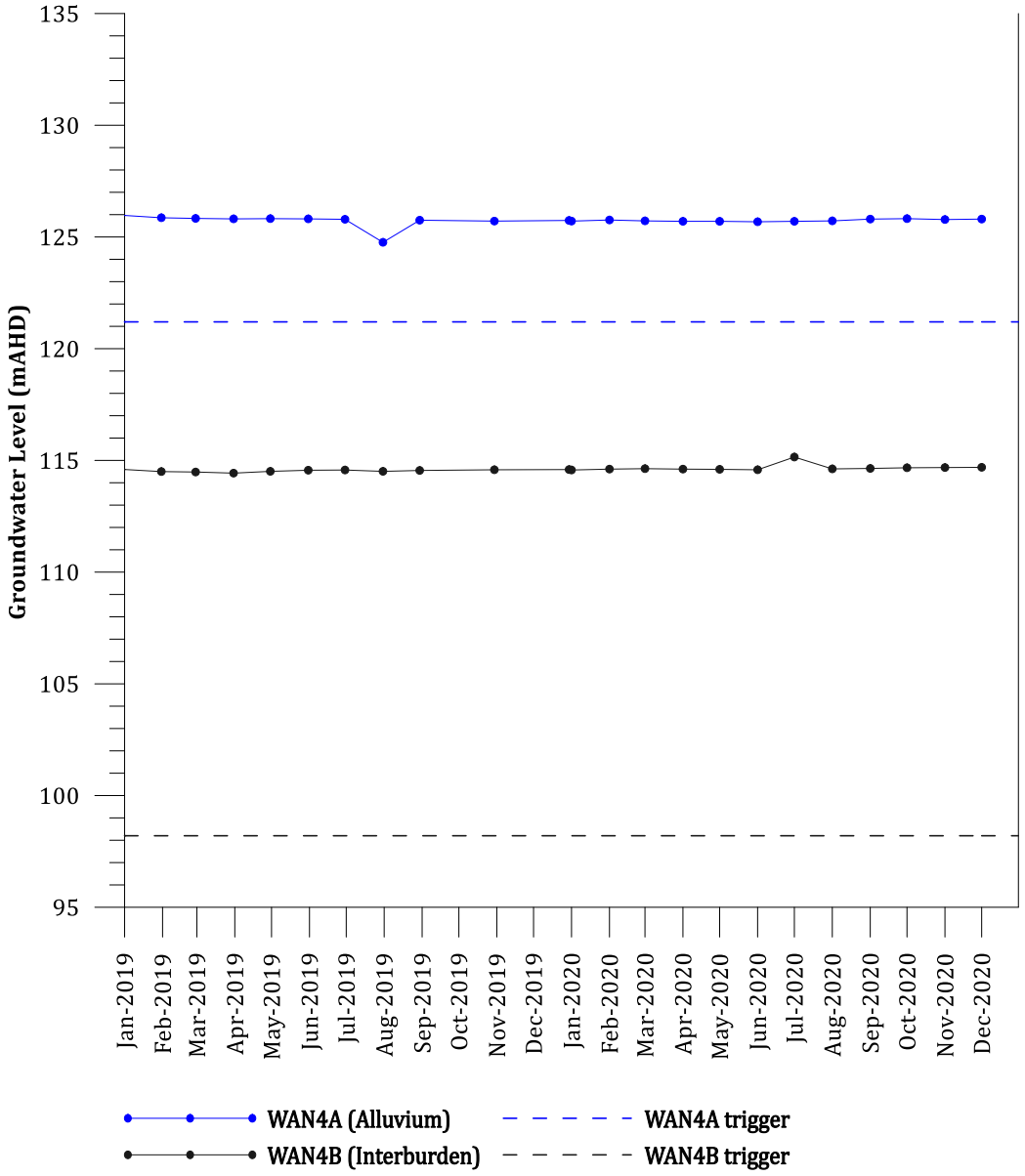


Figure 6.9 Alluvium and interburden hydrographs – WAN4

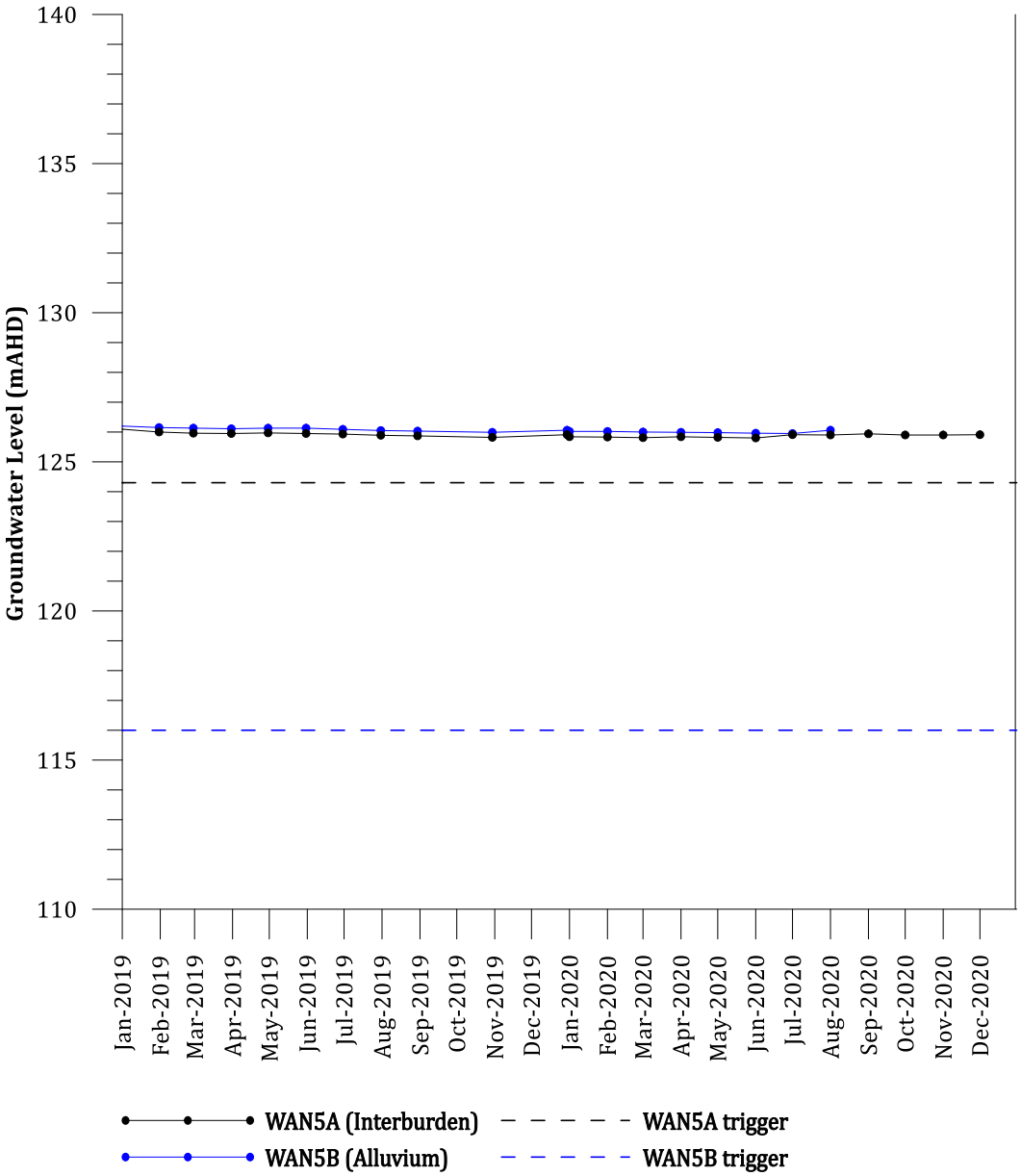


Figure 6.10 Alluvium and interburden hydrographs – WAN5

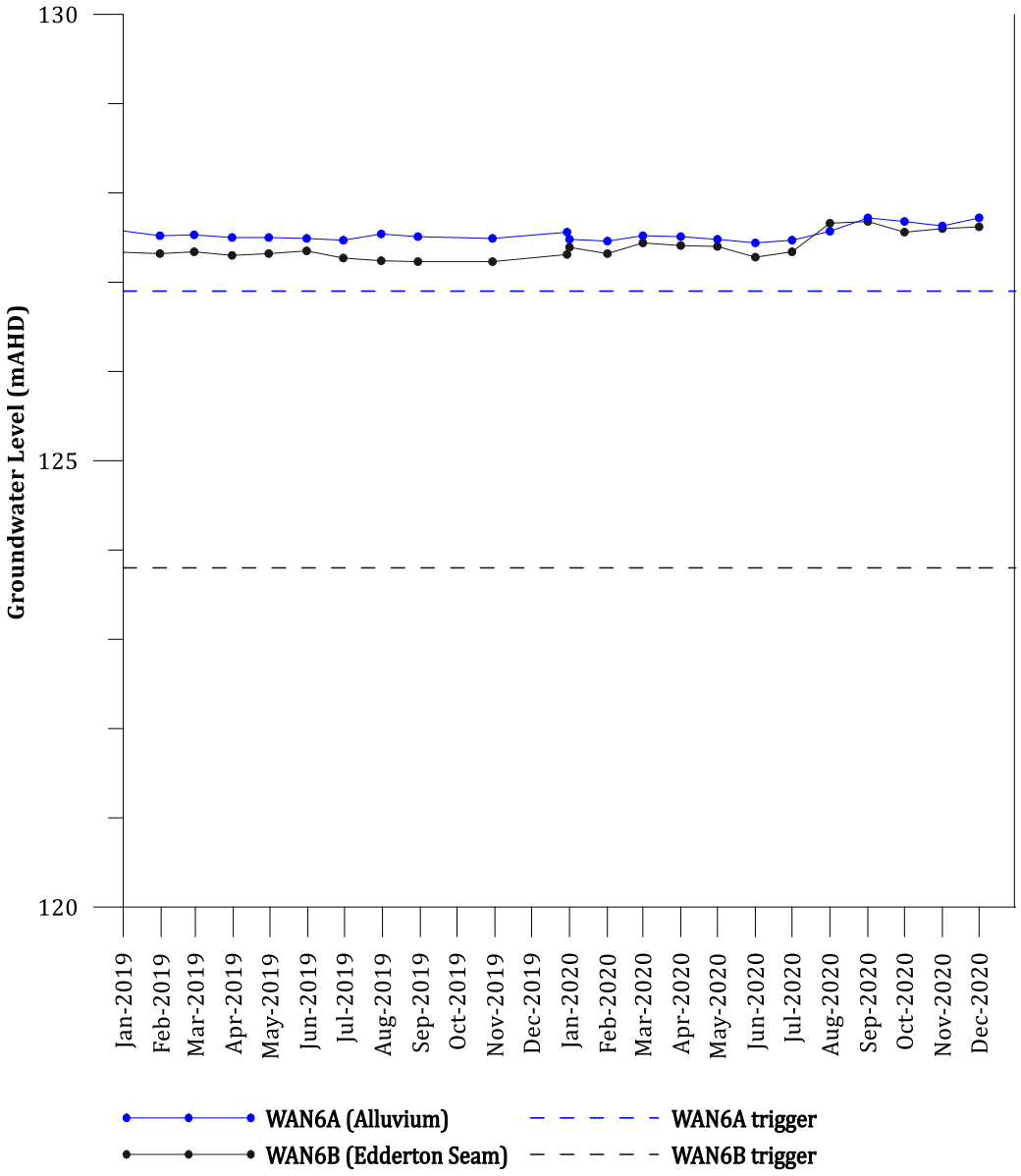


Figure 6.11 Alluvium and coal seam hydrographs – WAN6

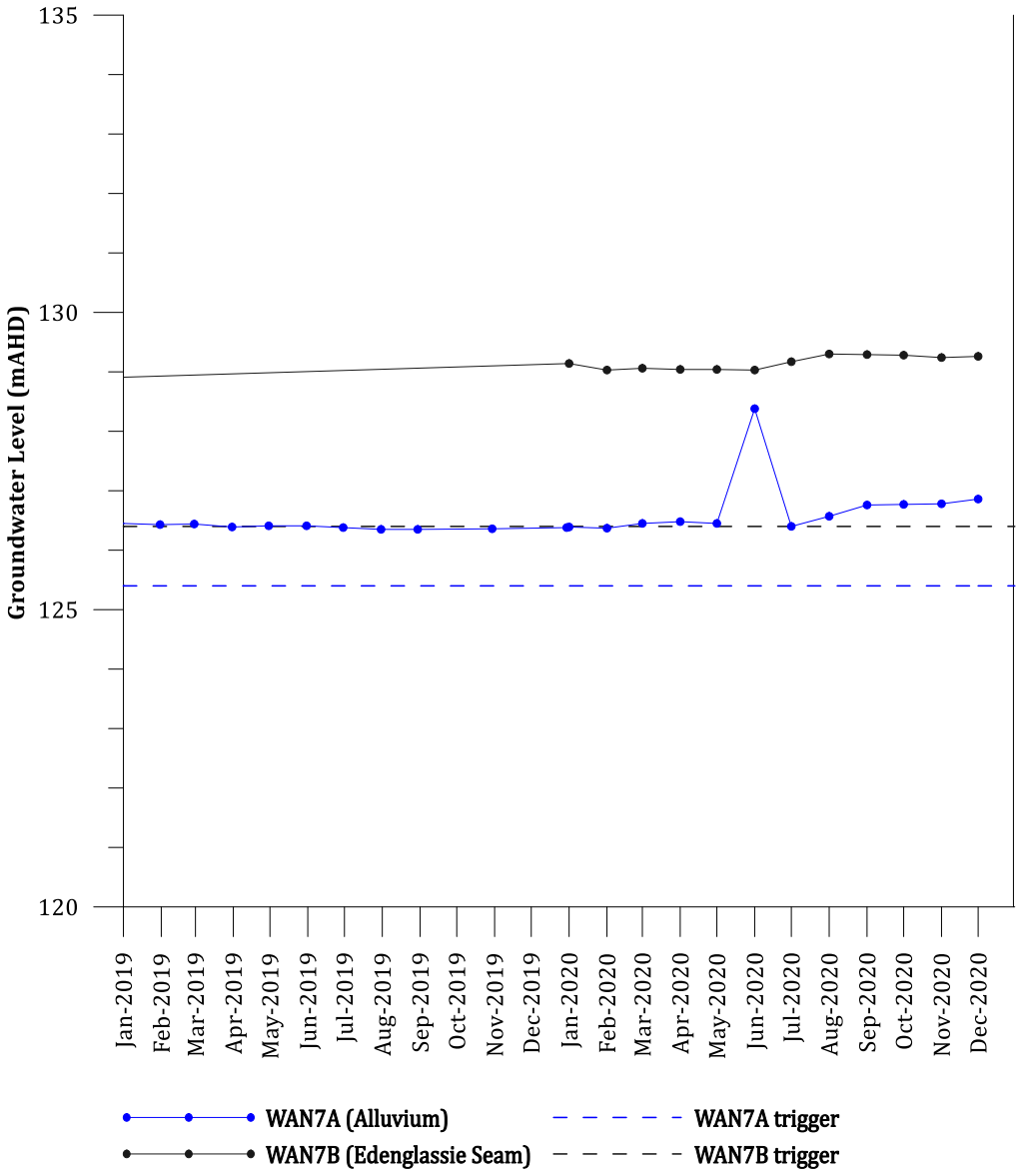


Figure 6.12 Alluvium and coal seam hydrographs – WAN7

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 the water levels through 2020. WAN8 groundwater levels have stayed above established triggers in 2020.

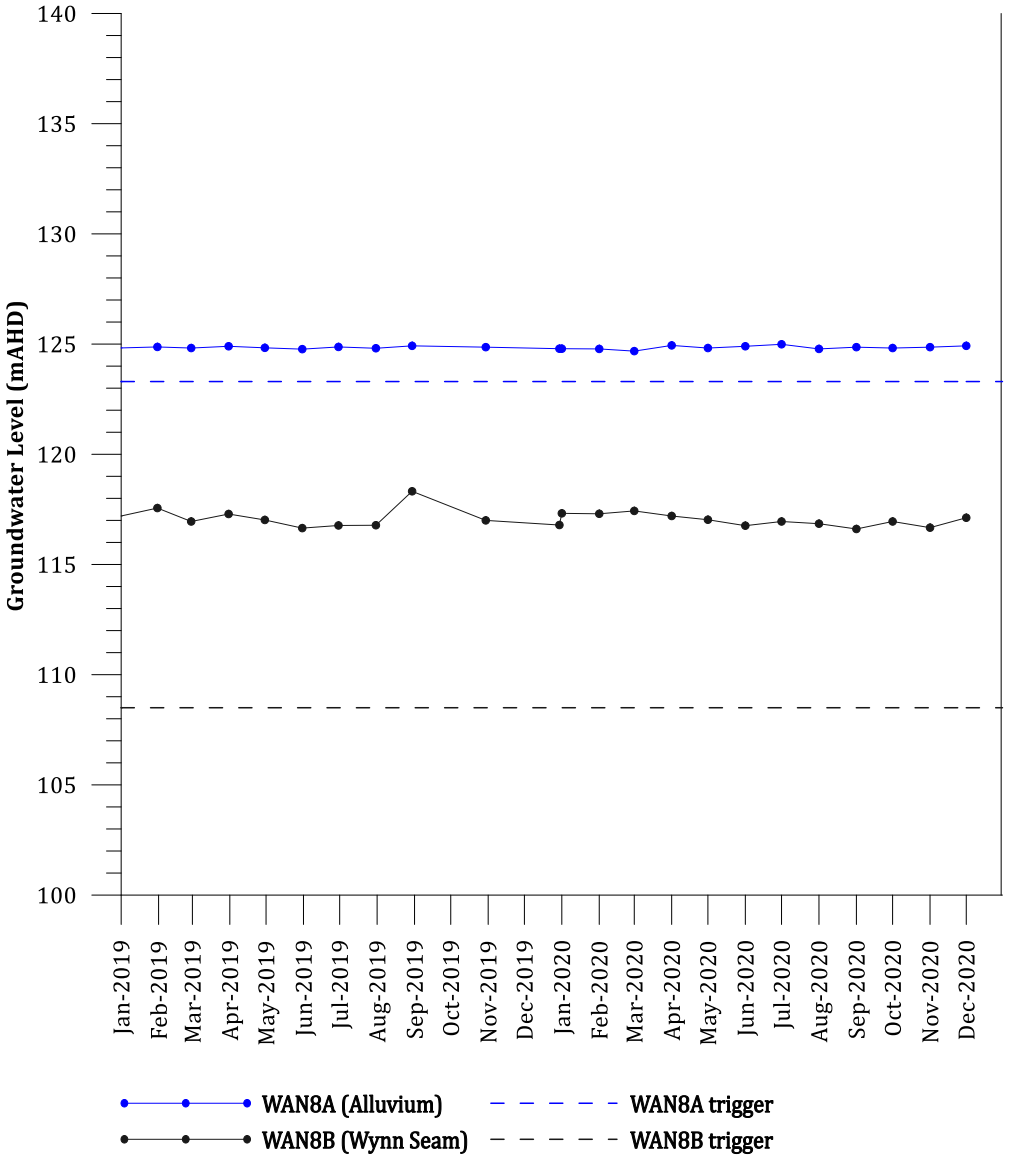


Figure 6.13 Alluvium and coal seam hydrographs – WAN8

Groundwater levels in WAN9A2 (refer Figure 6.14) have been relatively stable during the monitoring period. WAN9A2 recorded a slight increase in groundwater level in October. The groundwater level in WAN9B was stable throughout the 2020 monitoring period. All WAN9 monitoring bores continued to remain above established trigger values.

WAN10 monitoring bores (Figure 6.15) remained above trigger values for 2020. WAN10B shows the groundwater level in the Vaux Seam declining by 0.36 m over 2020, 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 17 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 109.05 mAHD by December 2020 (a change of 10.15 m). This represents a decline in groundwater level of approximately 50% of the range above the adopted trigger level (Figure 6.15). Despite this, the decline is still within the limits of predicted impacts.

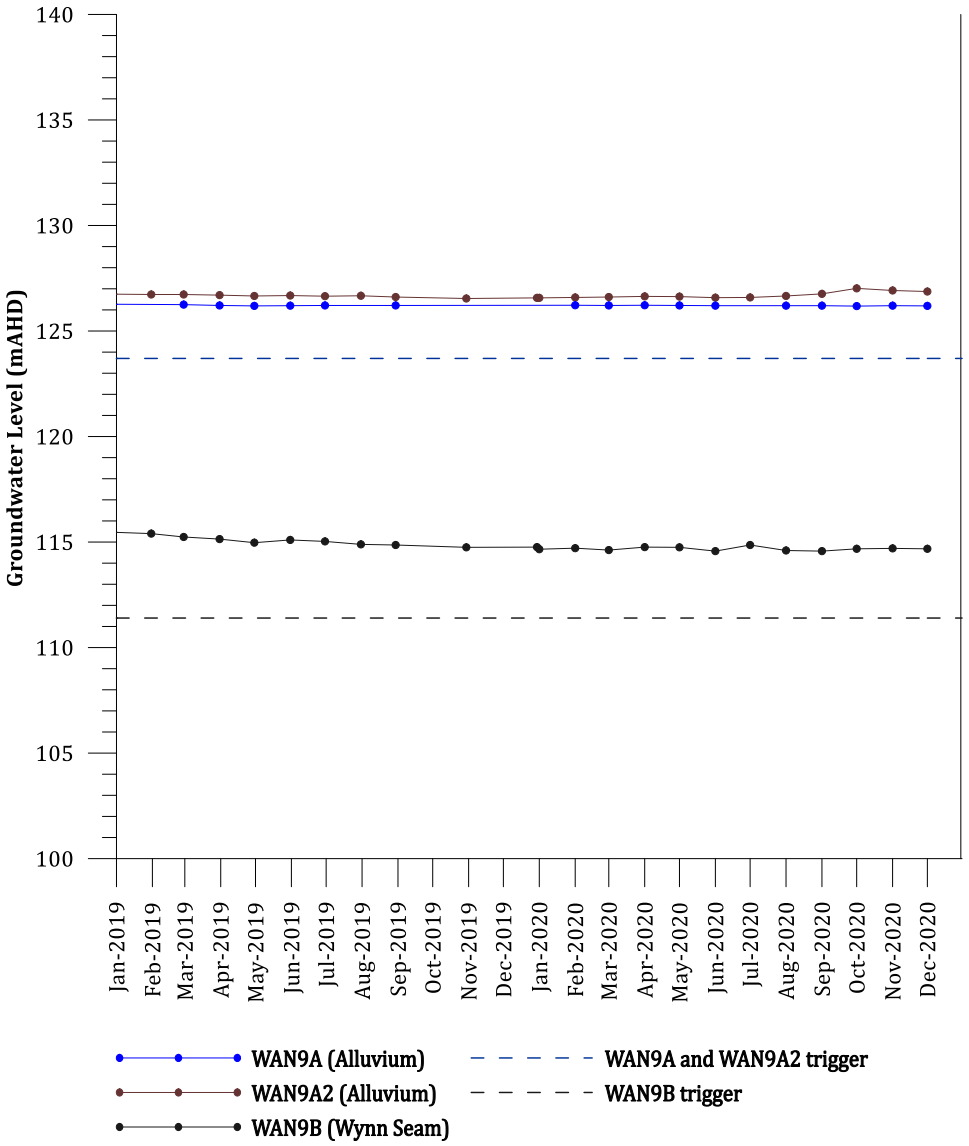


Figure 6.14 Alluvium and coal seam hydrographs – WAN9

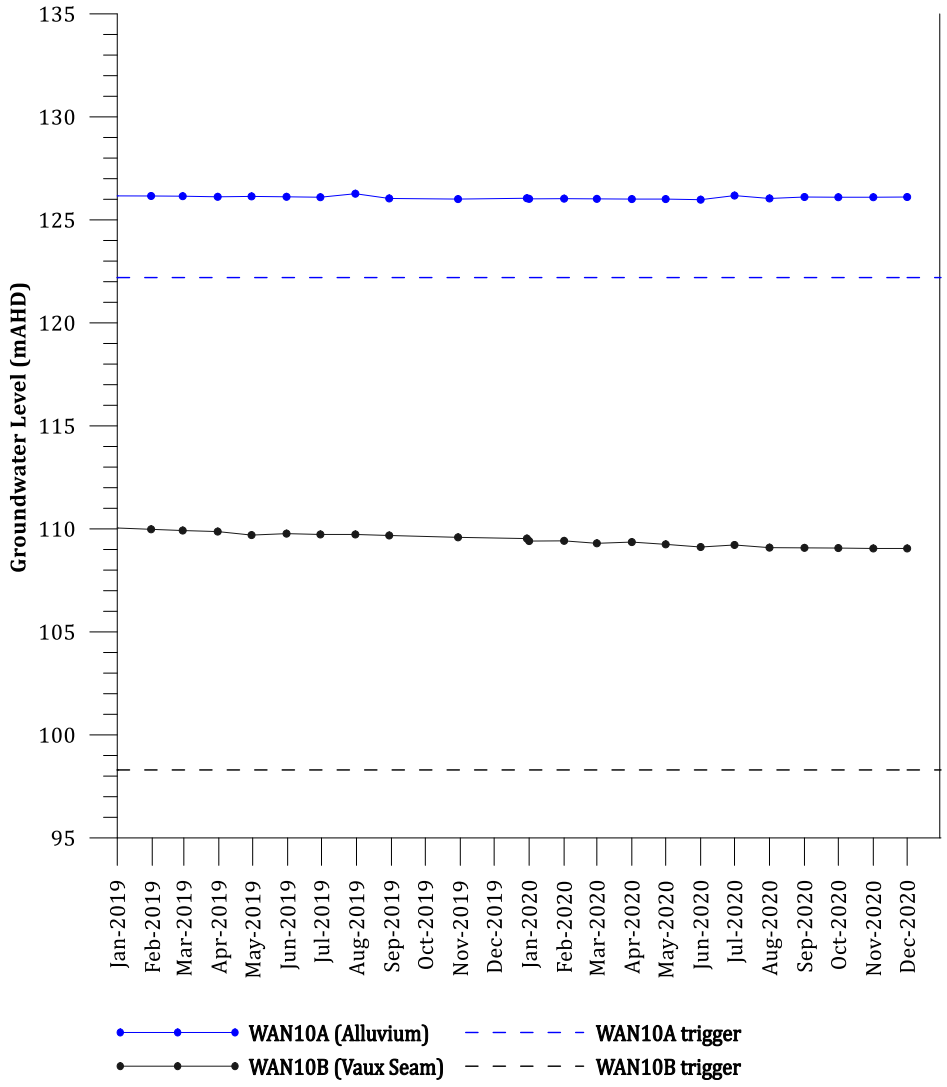
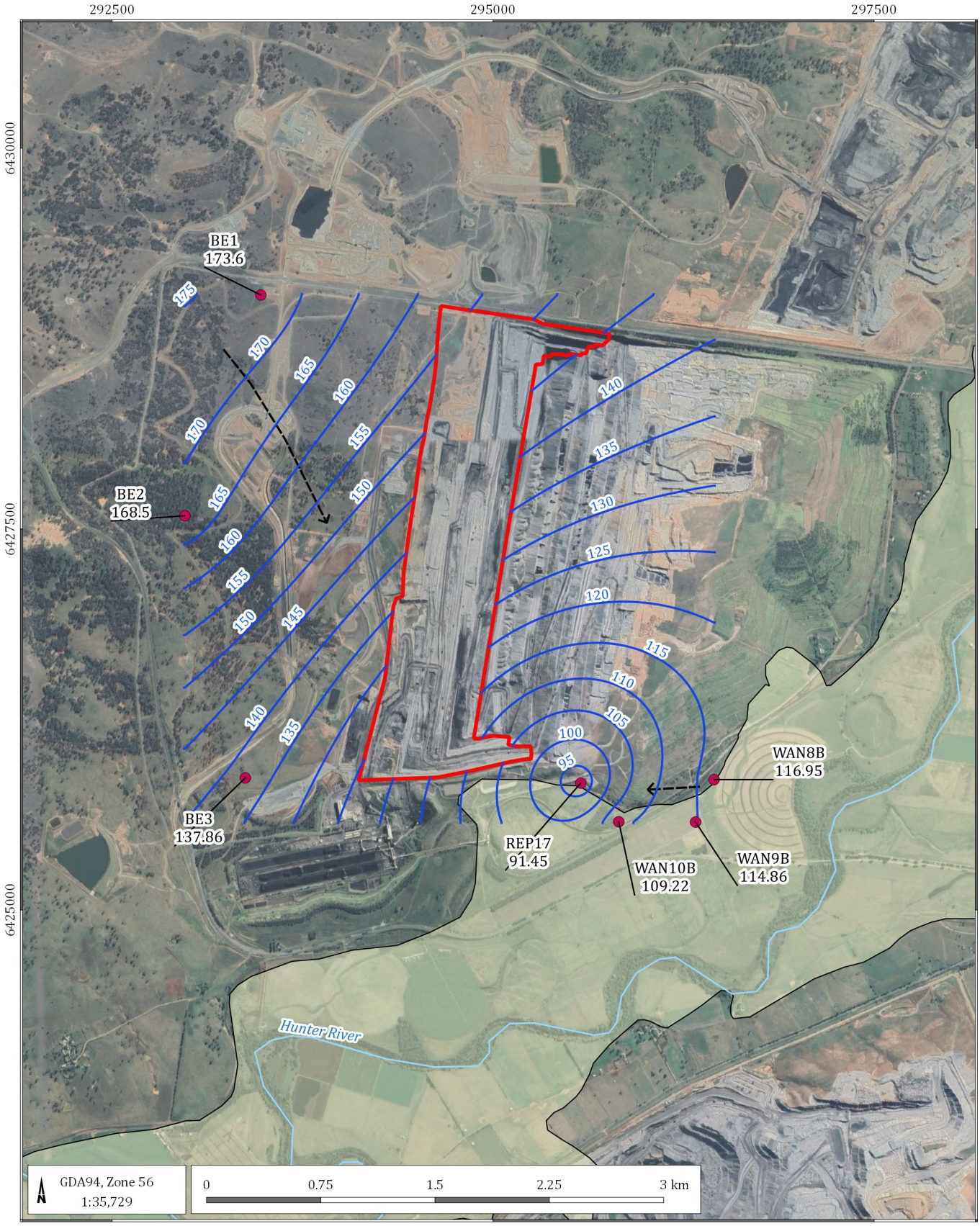


Figure 6.15 Alluvium and coal seam hydrographs – WAN10

6.2.3 Permian groundwater level contours

Figure 6.16 and Figure 6.17 show the interpreted groundwater flow contours for the shallow Permian units (Wynn and Vaux Seams and interburden) and deeper Permian units (Edderton and Edinglassie Seams and interburden), respectively. The depressurisation of the coal seams by the 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). The water level contours and flow directions are consistent with historic data (AGE, 2019) and the drawdown is within predicted and approved ranges.



LEGEND

- Shallow Permian monitoring bores
- Drainage
- Shallow Permian groundwater contours July 2020 (mAHD)
- Estimated groundwater flow direction
- Alluvium boundary
- Void boundary

Bengalla annual review 2020 (G1543Y)

Shallow Permian groundwater levels (July 2020)

DATE 04/03/2021

FIGURE No: 6.16

Source: Hunter Coalfield Regional 1:100 000 Geology Map*
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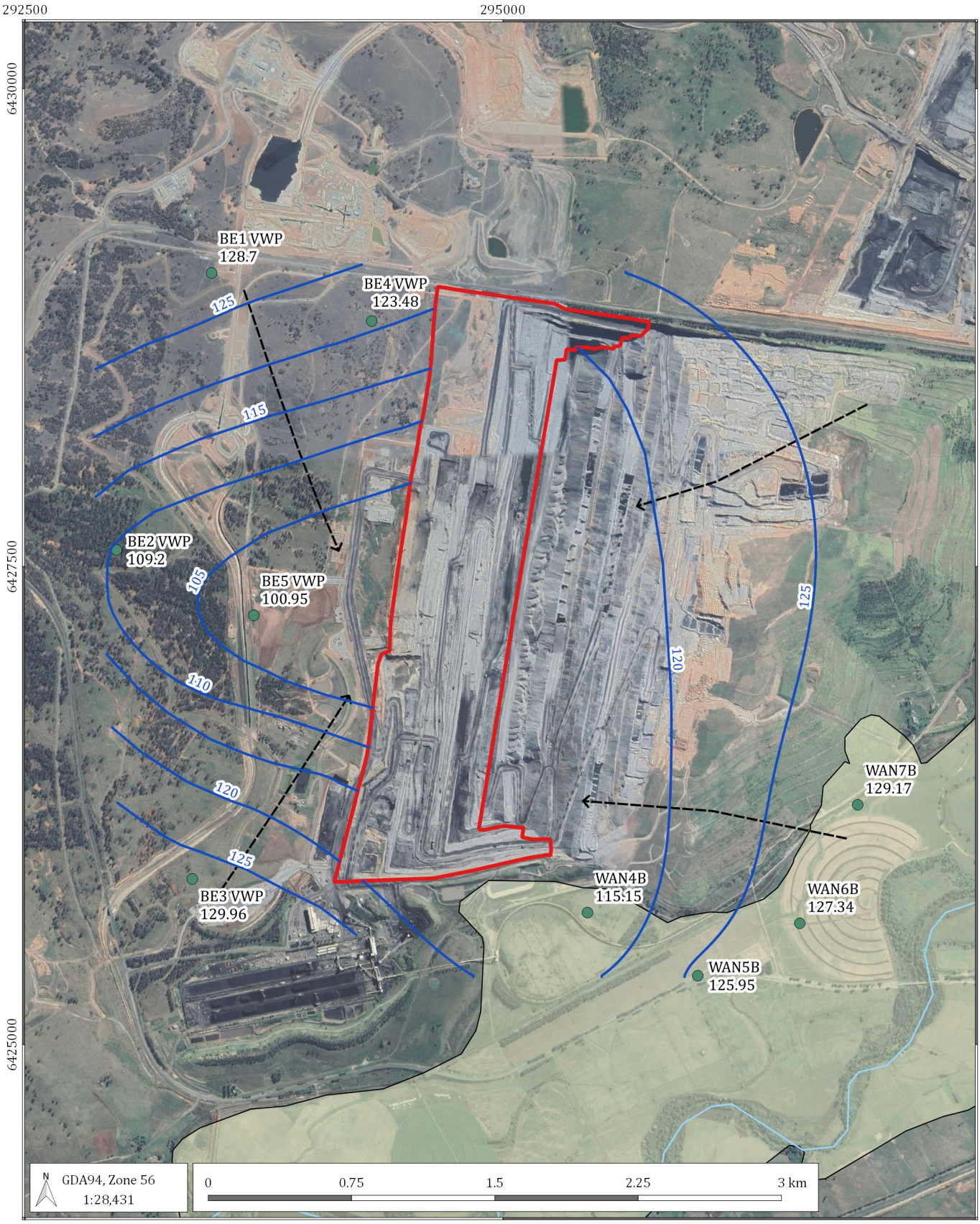


LEGEND

- Deep Permian groundwater monitoring bores
- Deep Permian groundwater contours - July 2020 (mAHD)
- Groundwater flow direction
- Drainage
- Void boundary
- Alluvium boundary

Bengalla annual review 2020 (G1543Y)

Deep Permian groundwater levels (July 2020)

DATE 11/03/2021

FIGURE No: **6.17**

Source: Hunter Coalfield Regional 1:100 000 Geology Map*
G:\Projects\G1543Y.Bengalla Annual Review 2020\3_GIS\Bores\Bores_Monitoring\Deep Permian bores 2020\06.17_G1543Y_Deep Permian groundwater levels (July 2020).qgs

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 sites to the northwest of the active mining area over 2020 (BE1, BE2 and BE3). 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. 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 2019 and declined throughout 2020.
- VWPs and bore at BE2 (Figure 6.20):
    - the Mt Arthur Seam VWP sensor registered a small increase in pressure head from March to June and has stabilised thereafter; and
    - the head in the Edderton Seam VWP has continued to decline throughout the year.
- VWPs and bore at BE3 (Figure 6.21):
    - the Mt Arthur Seam VWP sensor recorded an increase in pressure head in April. This sensor remained stable until July before decreasing throughout the remainder of the year; and
    - the Edderton Seam VWP recorded an increase in pressure head in 2020.
- VWPs at BE4 (Figure 6.22):
    - following an initial increase to groundwater level in the Mt Arthur Seam at the start of 2020, groundwater levels have steadily decreased thereafter; and
    - the Edderton Seam VWP sensor registered a decline in pressure head.
- VWPs at BE5 (Figure 6.23):
    - both the Mt Arthur Seam and Edderton Seam VWP sensors have registered declining pressure head. The largest decline was recorded in the Edderton Seam.

The declining water levels are most likely attributable to the advancing mine highwall 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.

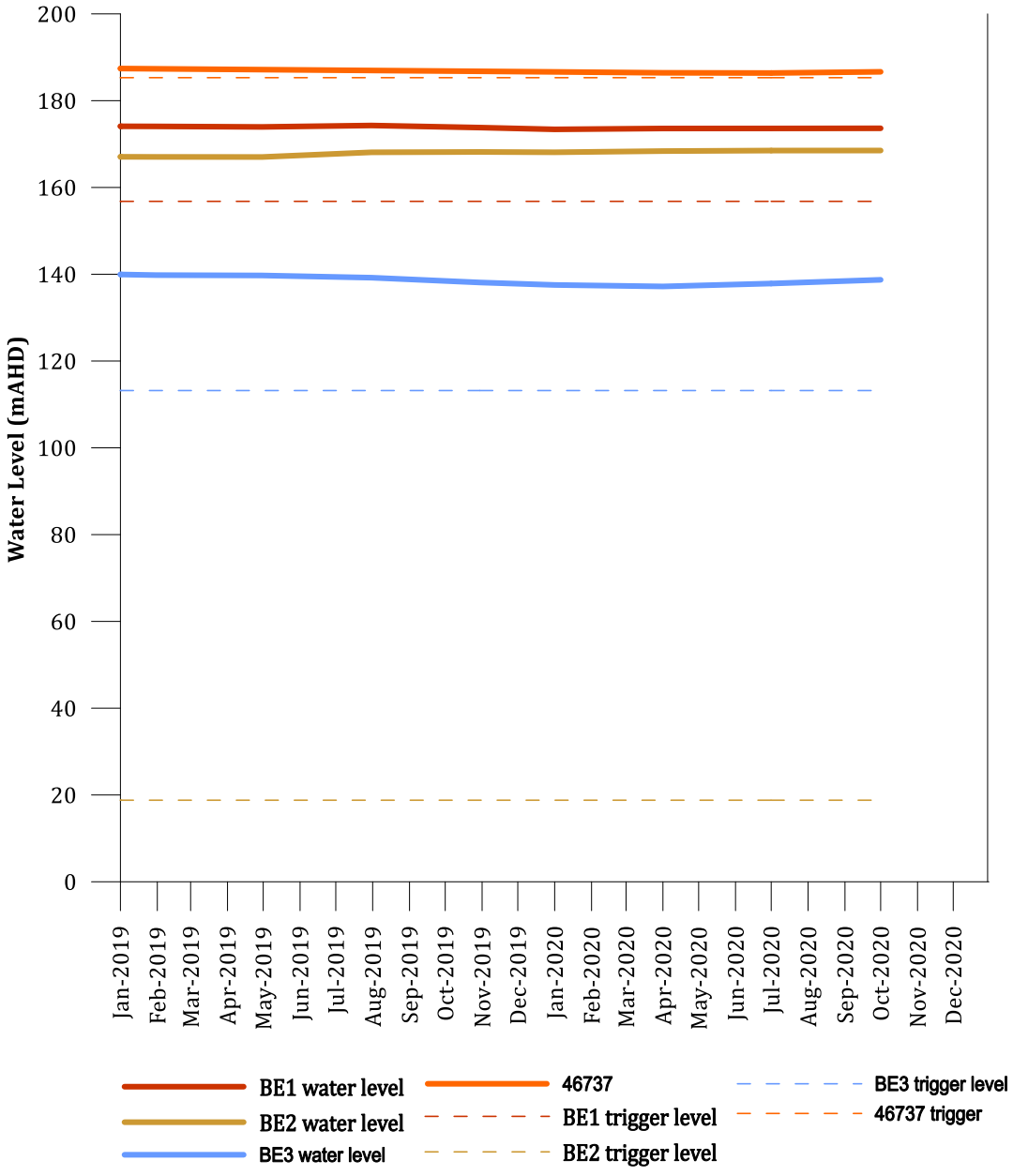


Figure 6.18 Northwest Permian monitoring bore groundwater levels

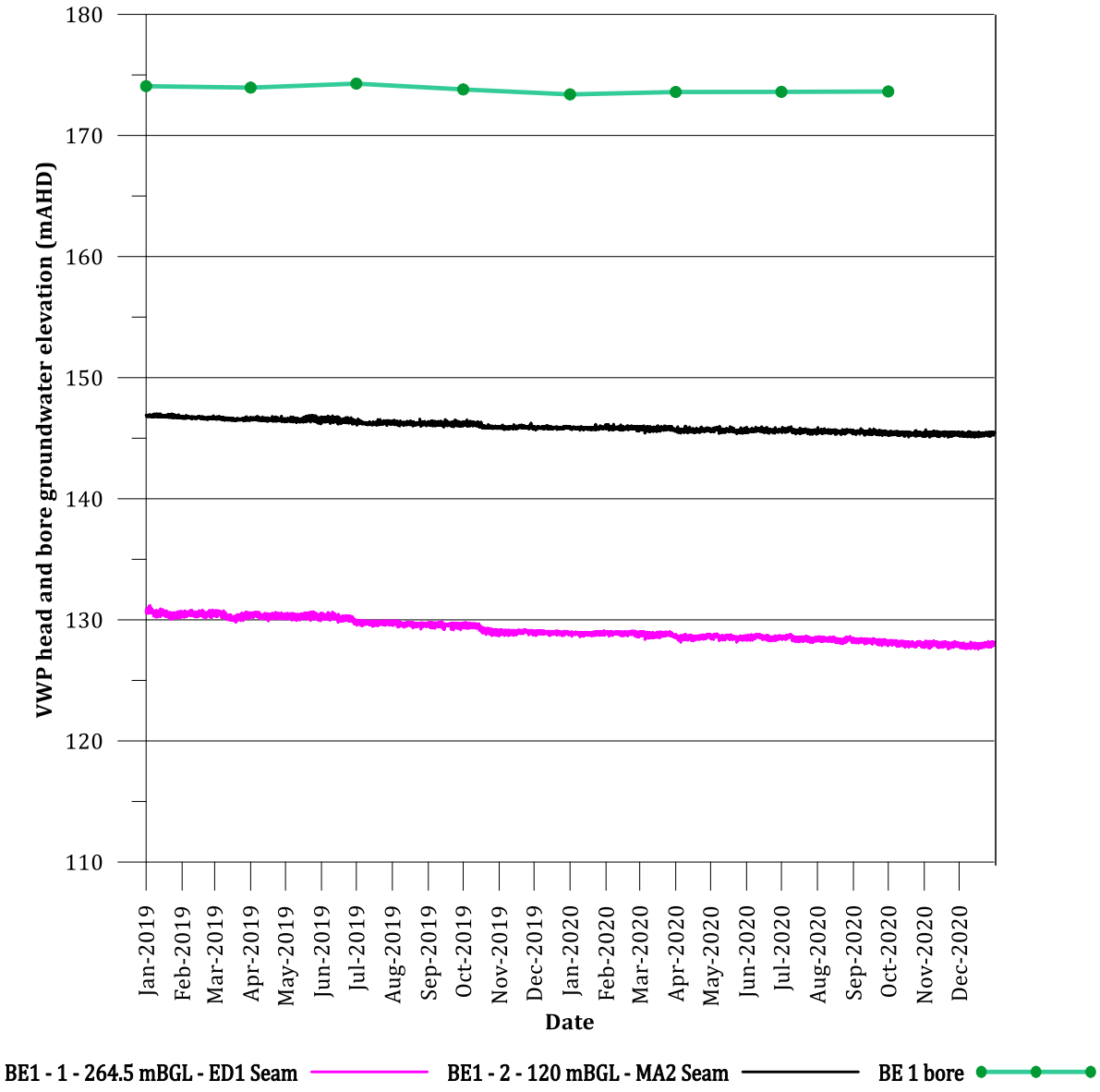


Figure 6.19 Northwest Permian VWP potentiometric heads – BE1

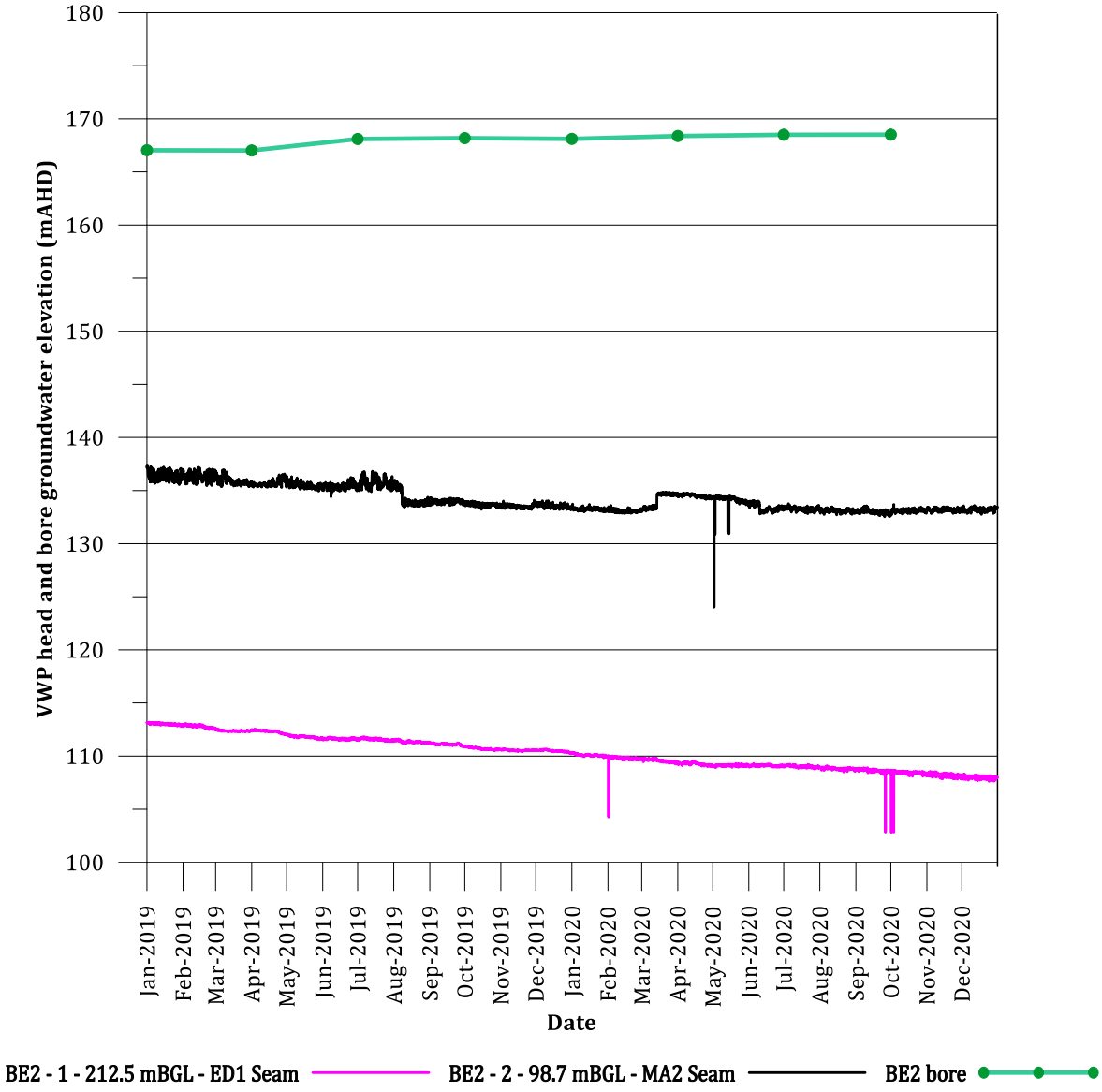


Figure 6.20 Northwest Permian VWP potentiometric heads – BE2

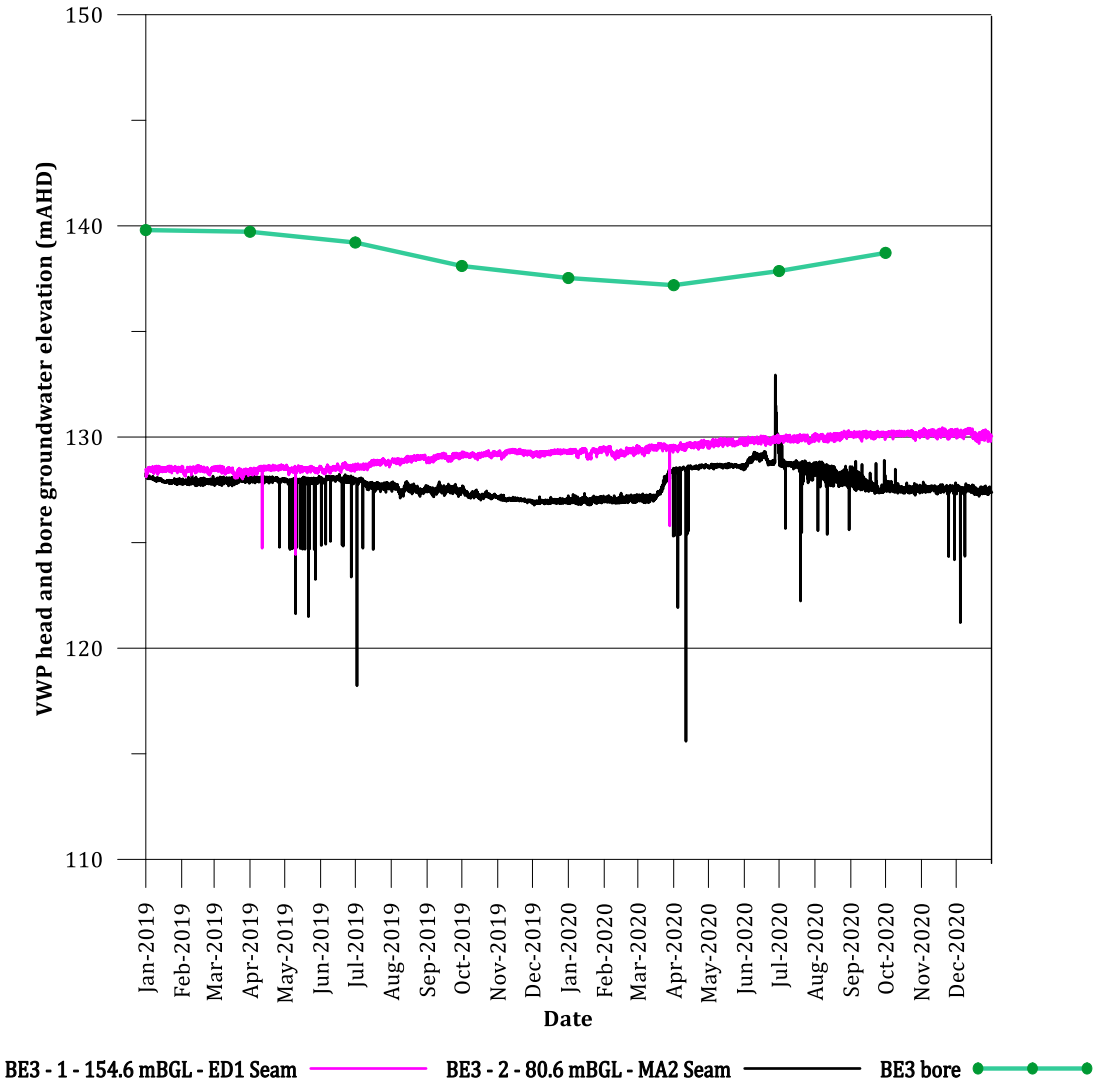


Figure 6.21 Northwest Permian VWP potentiometric heads – BE3

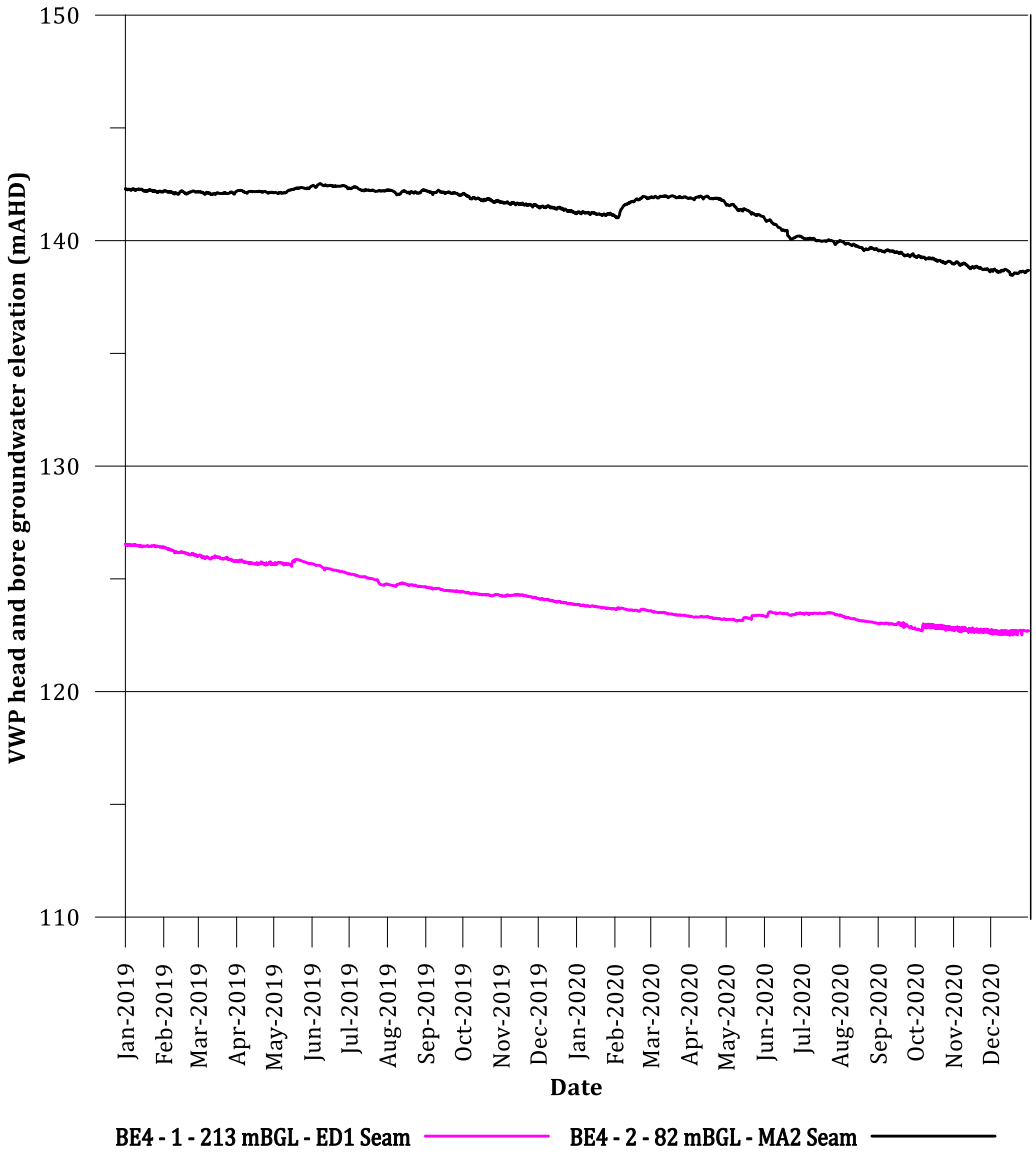


Figure 6.22 Northwest Permian VWP potentiometric heads – BE4

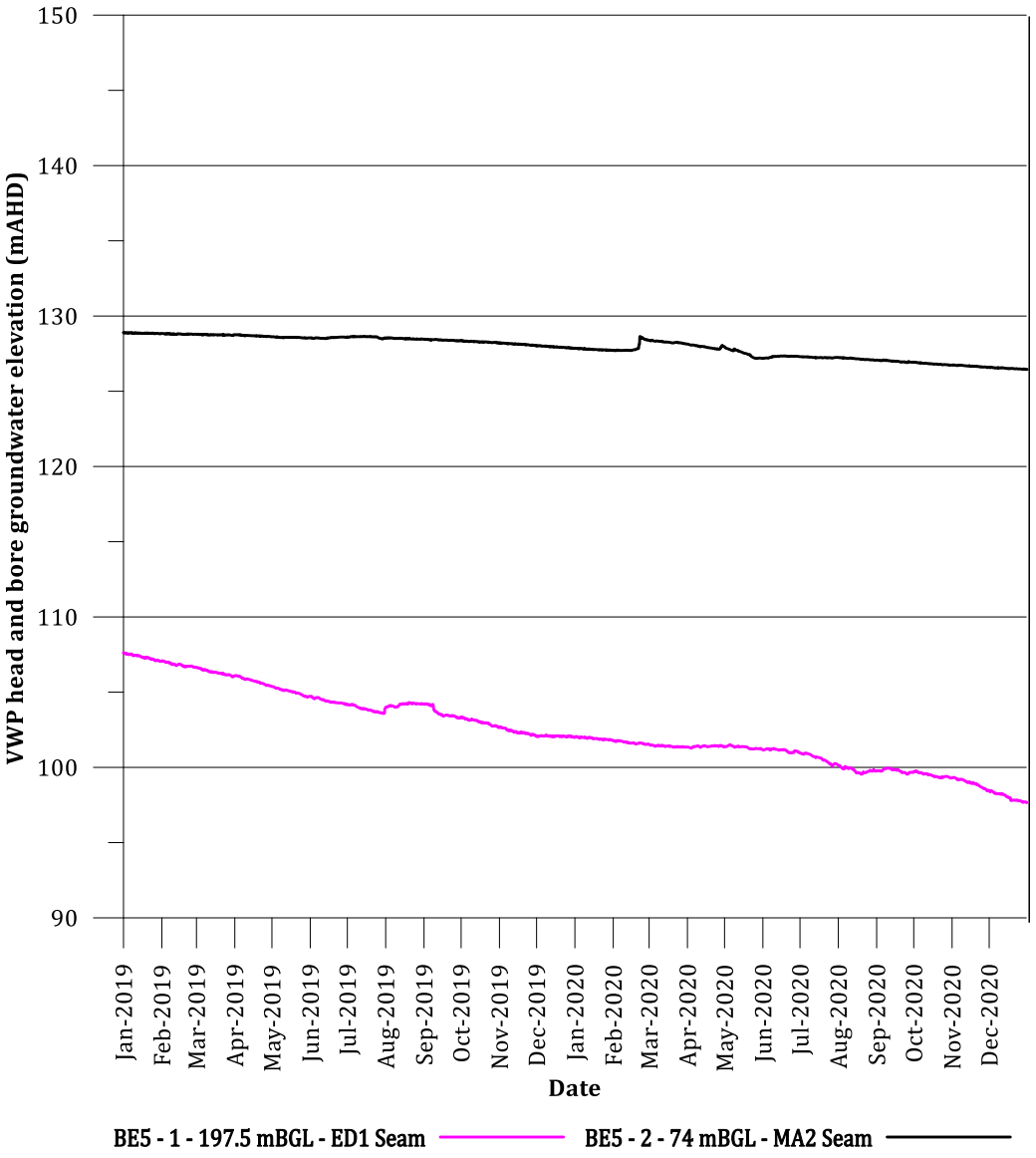


Figure 6.23 Northwest Permian VWP potentiometric heads – BE5

6.4 Groundwater level assessment against baseline data

Groundwater level data recorded over the 2020 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 2020 reporting period and the baseline data for each monitoring bore.

During the 2020 reporting period, monitoring bores 18298, 19116, 28510, 37774, 42701, 42927, 47277, 53007, BE3, BG3, BG5, REPI7, SMB1, SMB2, WAN10A, WAN10B, WAN2B, WAN2C, WAN4A, WAN4B, WAN5A, WAN5B, WAN6A, WAN6B, WAN8A, WAN8B and WAN9B had groundwater levels below their respective baseline water levels, see Appendix A – column 'Difference baseline vs. 2020 groundwater level'. Of the bores with groundwater levels below their respective baselines 19116, BE3, REPI7, WAN10B 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 (-10.58 m) compared to its baseline, whereas WAN1B showed the greatest positive difference (3.59 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 2020 reporting period and the trigger level for each monitoring bore. One bore, BG3, (screened in alluvium and located in the irrigation area) had a groundwater level below the maximum expected drawdown in 2020.

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.

BG3 had 4 groundwater level trigger events in 2020 (see Table 6.1); the trends and latest trigger events are presented graphically in Figure 6.24.

BG3 triggered the response protocol for all four consecutive 2020 measurements; however, it has been below its trigger value since February 2015, and the water levels are within historic ranges (Figure 6.24). The water level in BG3 has oscillated around its baseline level since its installation and the 2020 level is within historic ranges. Considering the distance between BG3 and Bengalla (> 1.5 km), these trigger events are not likely to be related to mining at Bengalla (AGE, 2018). It is concluded that the groundwater levels measured for BG3 in 2020 do not pose harm to the environment.

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 2020. Similarly, bore 18298 is encroaching on the established trigger value but did not exceed it in 2020.

Table 6.1 Water level trigger events against approved WMP

Site	BG3	
	Alluvial aquifer	
Sample Date	Depth to water (mTOC)	Depth (mAHD)
Trigger value	126.3 mAHD	
Jan-20	7.96	**125.84**
Apr-20	8.08	**125.72**
Jul-20	8.00	**125.80**
Oct-20	8.00	**125.80**

Notes: *Red text indicates water elevation exceeds trigger level*
TOC: top of casing

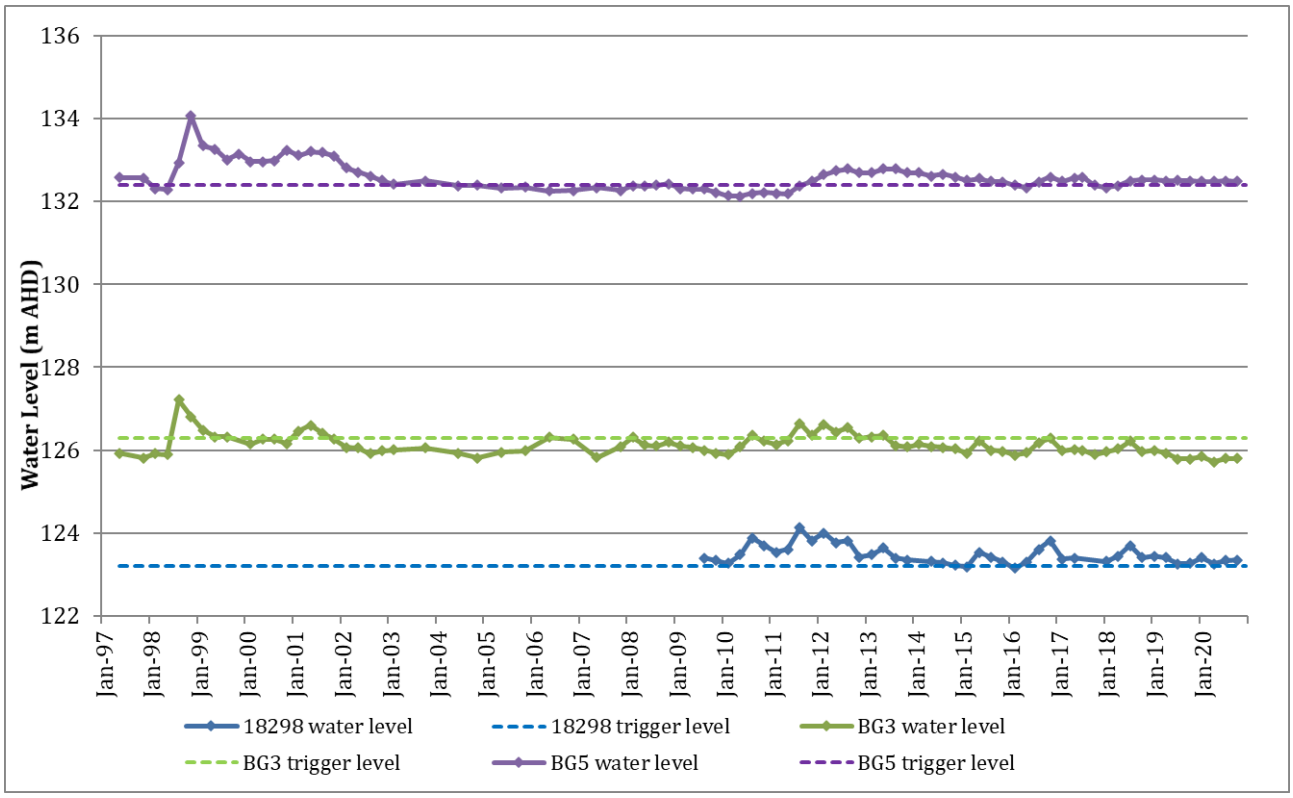


Figure 6.24 Hydrograph of bores with groundwater levels near maximum predicted drawdown

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 2020 with some minor fluctuations evident.

WAN8A had two consecutive pH values above trigger level pH 8.5 in 2020, and the pH values are anomalously high. Only two results are recorded for the year due to the bore containing insufficient water to sample. There was less than half a meter 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.

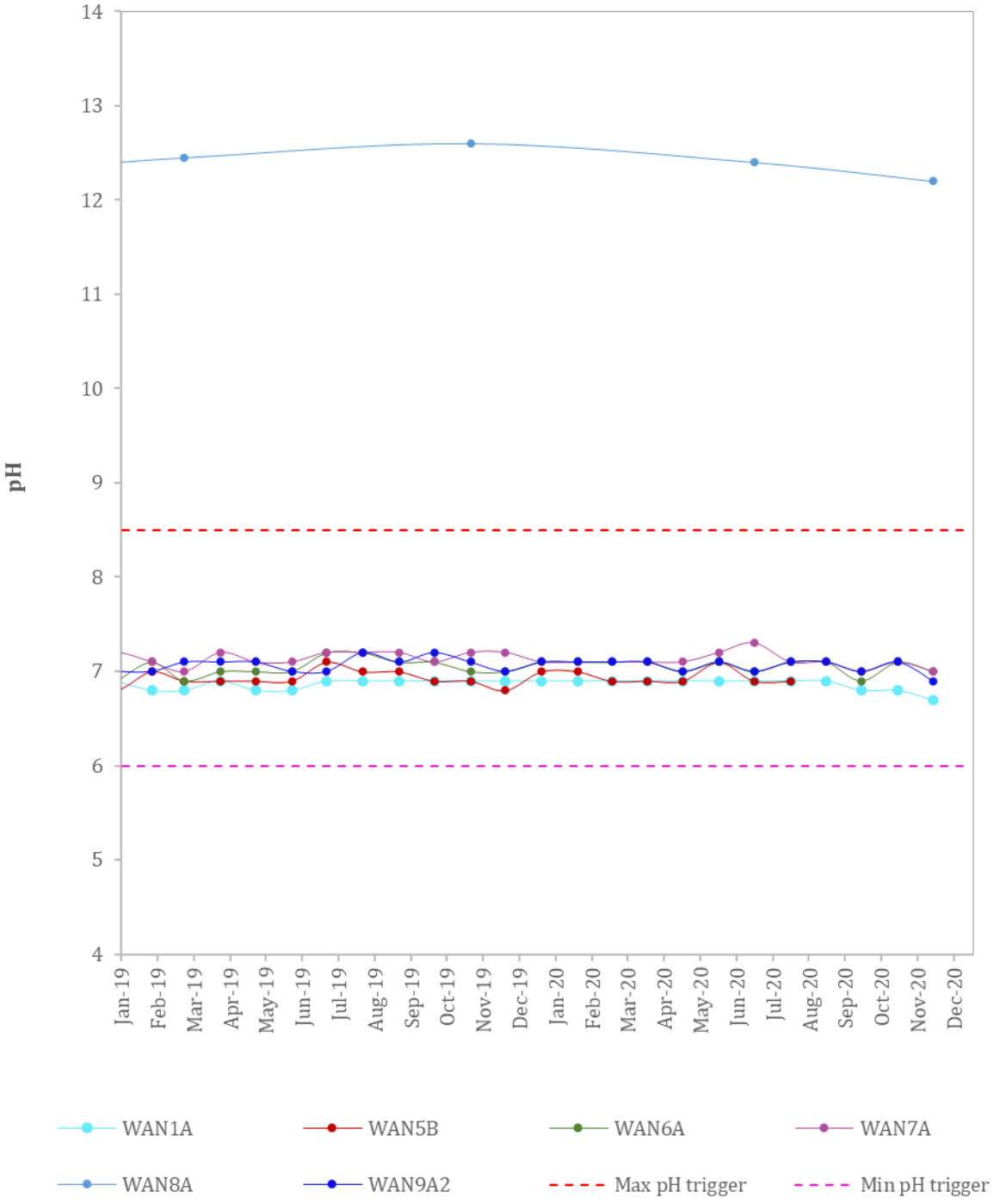


Figure 7.1 pH trends – Hunter River alluvial bores

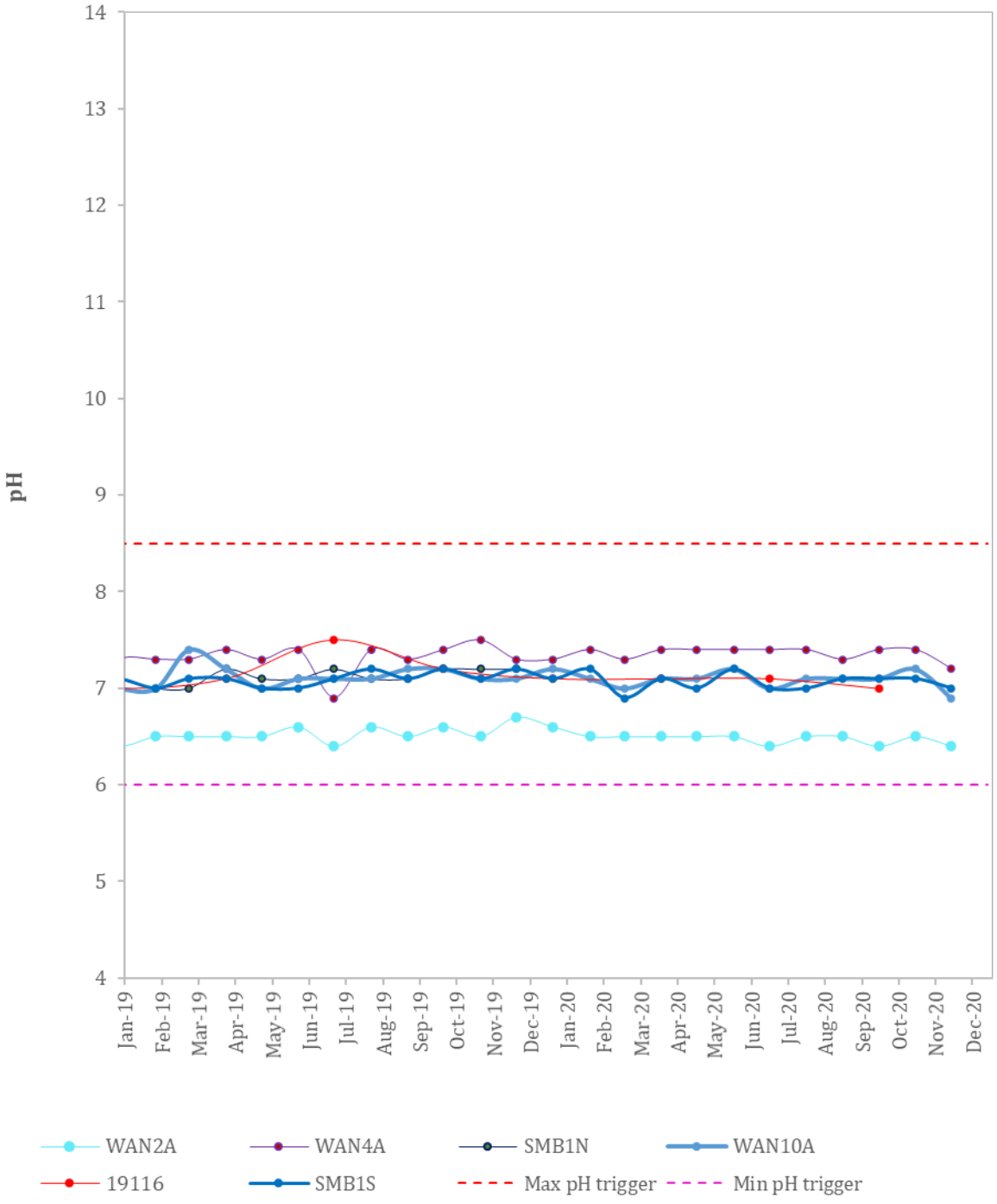


Figure 7.2 pH trends – other alluvial bores

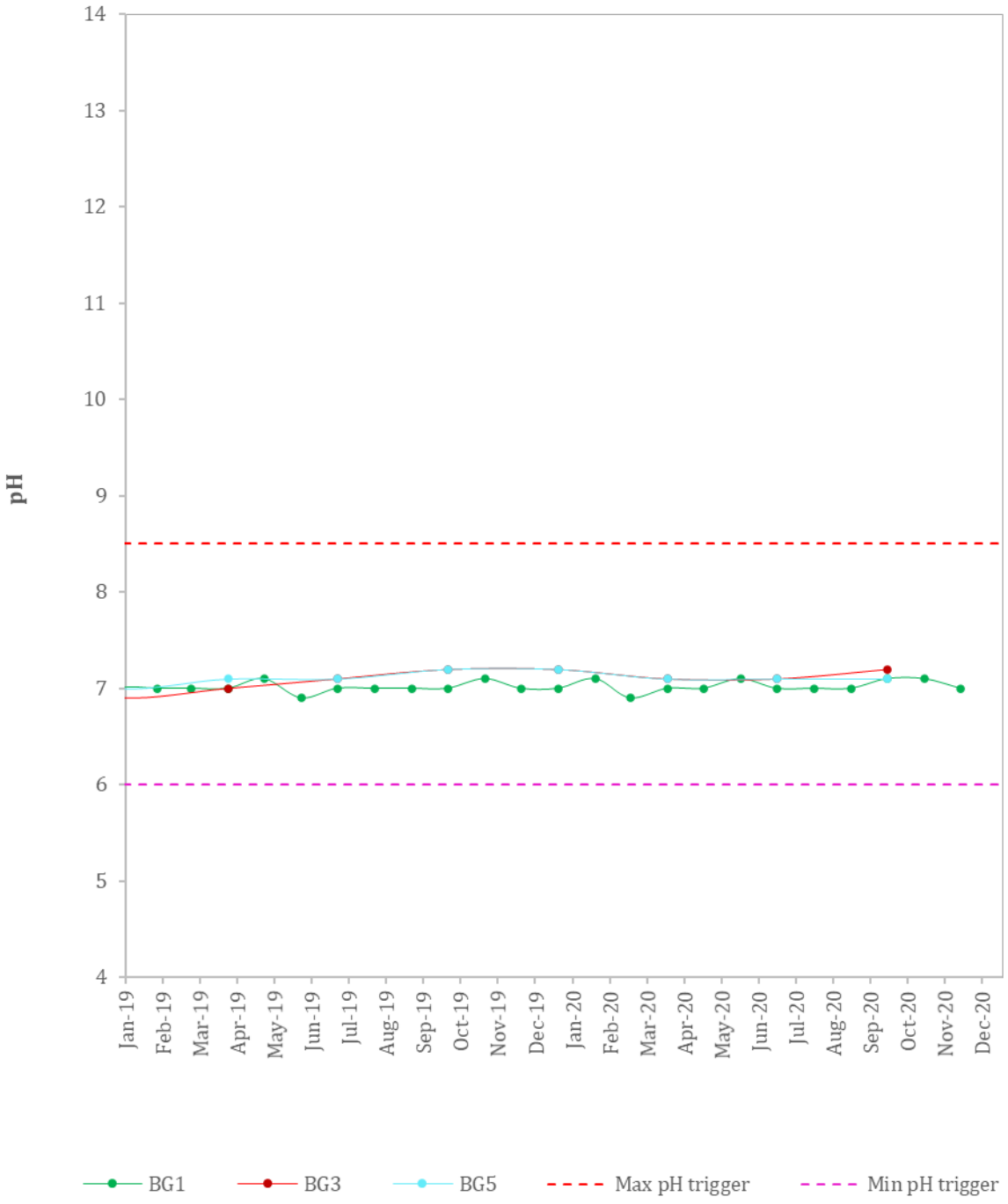


Figure 7.3 pH trends – regional alluvial bores

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 µS/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 µS/cm, including:

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

Water quality trigger events in 2020 are described in Section 7.5.

WAN4A has been recording a gentle decline in EC since early 2015 with the last recorded value 1,099 µS/cm (December 2020). WAN4A is on a "spur" of alluvium to the south of Bengalla's southern endwall. The coal seams in this area are likely depressurising 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 µS/cm (Nov 2007) and 8,870 µS/cm (May 2010). Only two EC measurements were taken in 2020 due to insufficient water within the bore. Measurements from July and December 2020 were 7,630 µS/cm and 8,120 µS/cm, respectively. The high EC currently observed likely represents stagnant water accumulated in the sump of WAN8A, rather than a representative sample of the screened formation. Groundwater levels (6.1.3) and pH (7.2.1) also support this conclusion.

Throughout 2020, monitoring bores, WAN7A, SMB1-South, SMB2-North presented EC values between 1,500 µS/cm and 2,500 µS/cm. Although these results are above 1,500 µS/cm, these bores have generally remained consistent throughout 2020 and are comparable to historical values (Figure 7.4). Monitoring bore WAN10A recorded two anomalously high EC values of 1581 µS/cm and 1472 µS/cm in October and November 2020 respectively, however all other values ranged between 860 µS/cm and 1,020 µS/cm, consistent with historic values.

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 continued to decline, recording an average EC of 1096 µS/cm in 2019 and an average of 873 µS/cm in 2020 (Figure 7.5). It is not clear why this decrease in EC has occurred over this period. Coal seam depressurisation may have allowed for localised infiltration of less saline river water into the alluvium, thereby causing a decrease in EC. Ongoing monitoring will continue and further assessment may establish the possible cause.

EC values in alluvial bores generally declined between 2019 and 2020, coincident with increased rainfall over 2020. It does not appear that there are mine related impacts on groundwater EC within these bores.

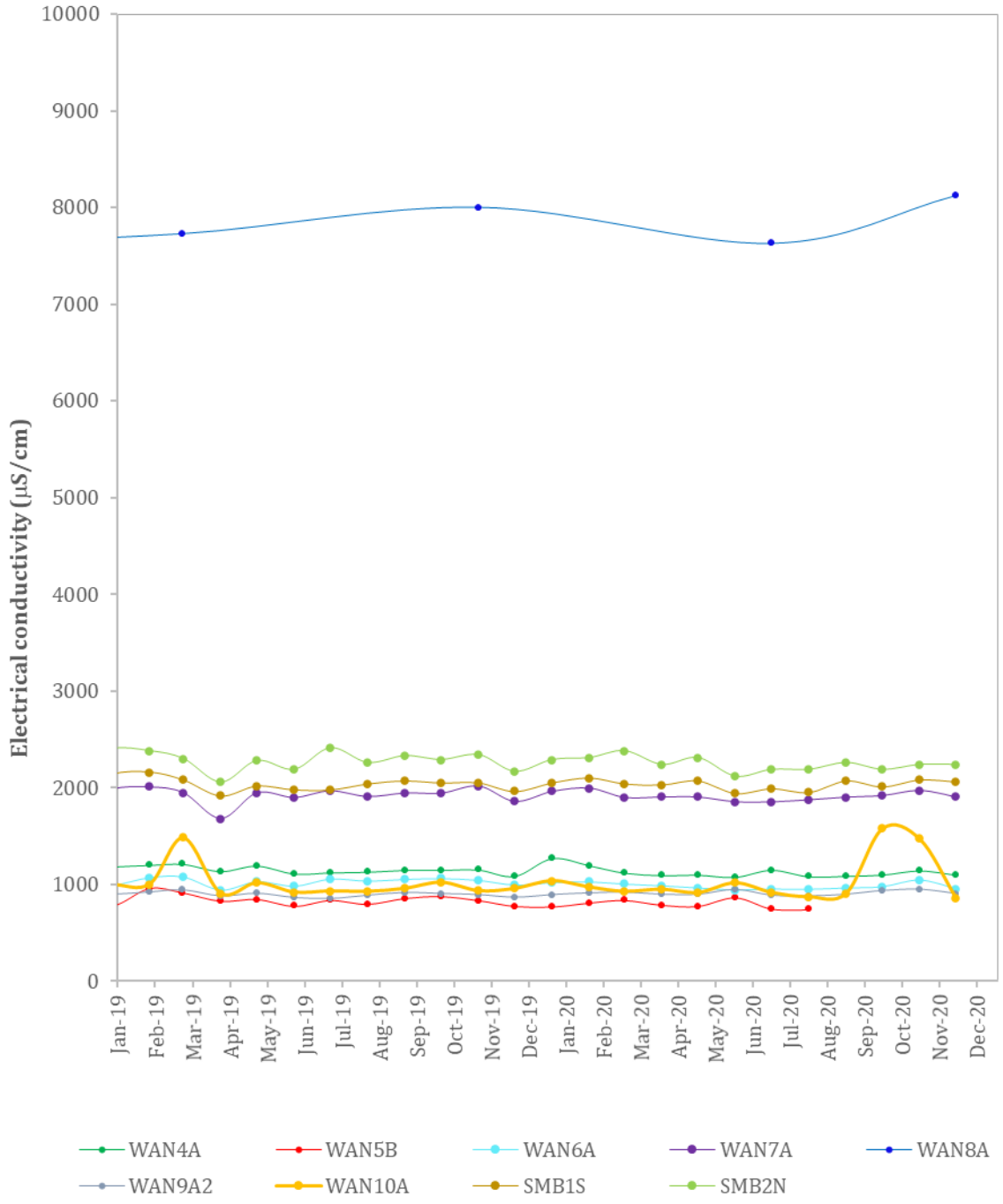


Figure 7.4 EC trends – Hunter River Alluvium (Wantana Extension)

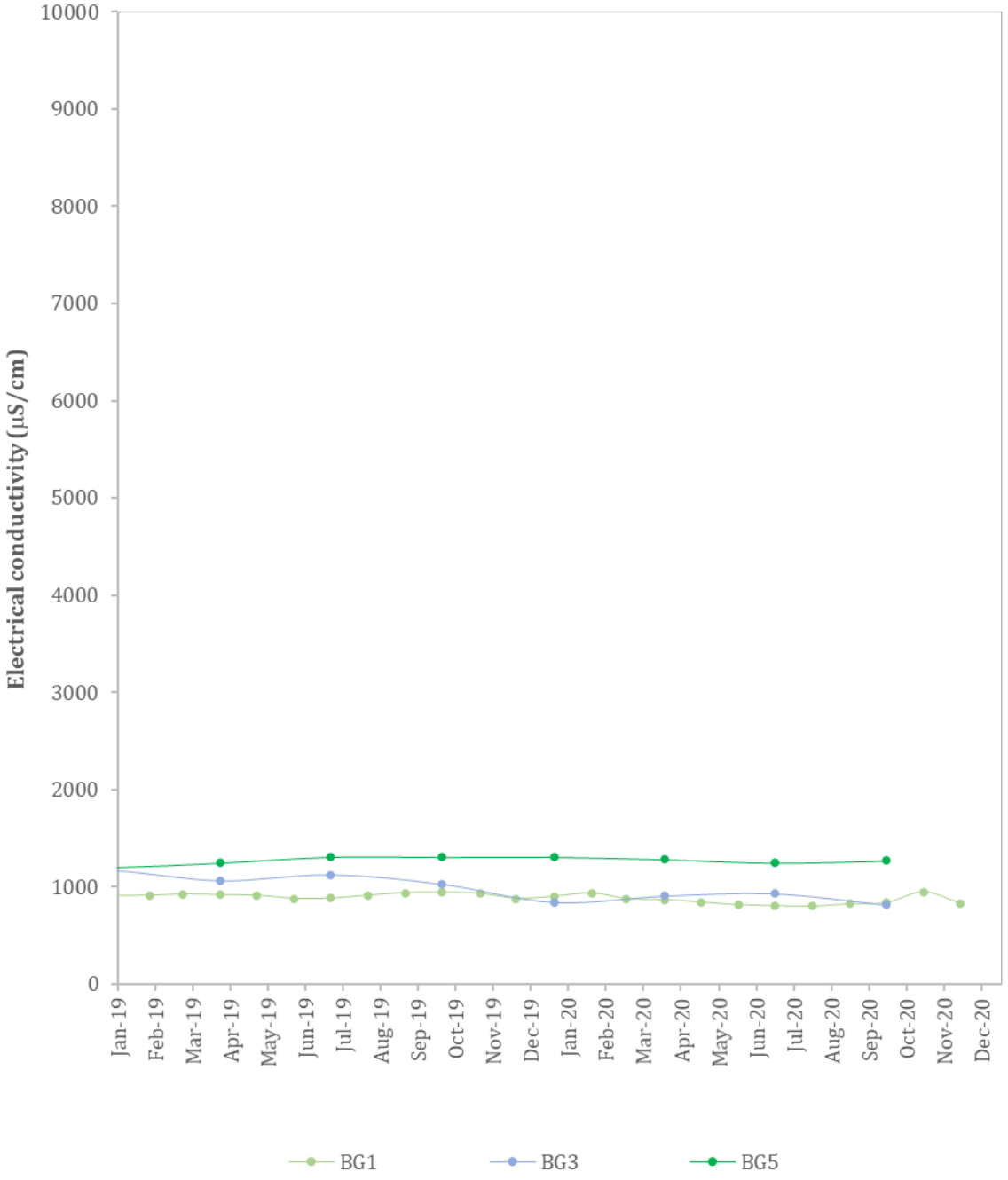


Figure 7.5 EC trends – Hunter River Alluvium (Regional)

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 2020. No coal seam/interburden bores have exceeded pH trigger values throughout 2020.

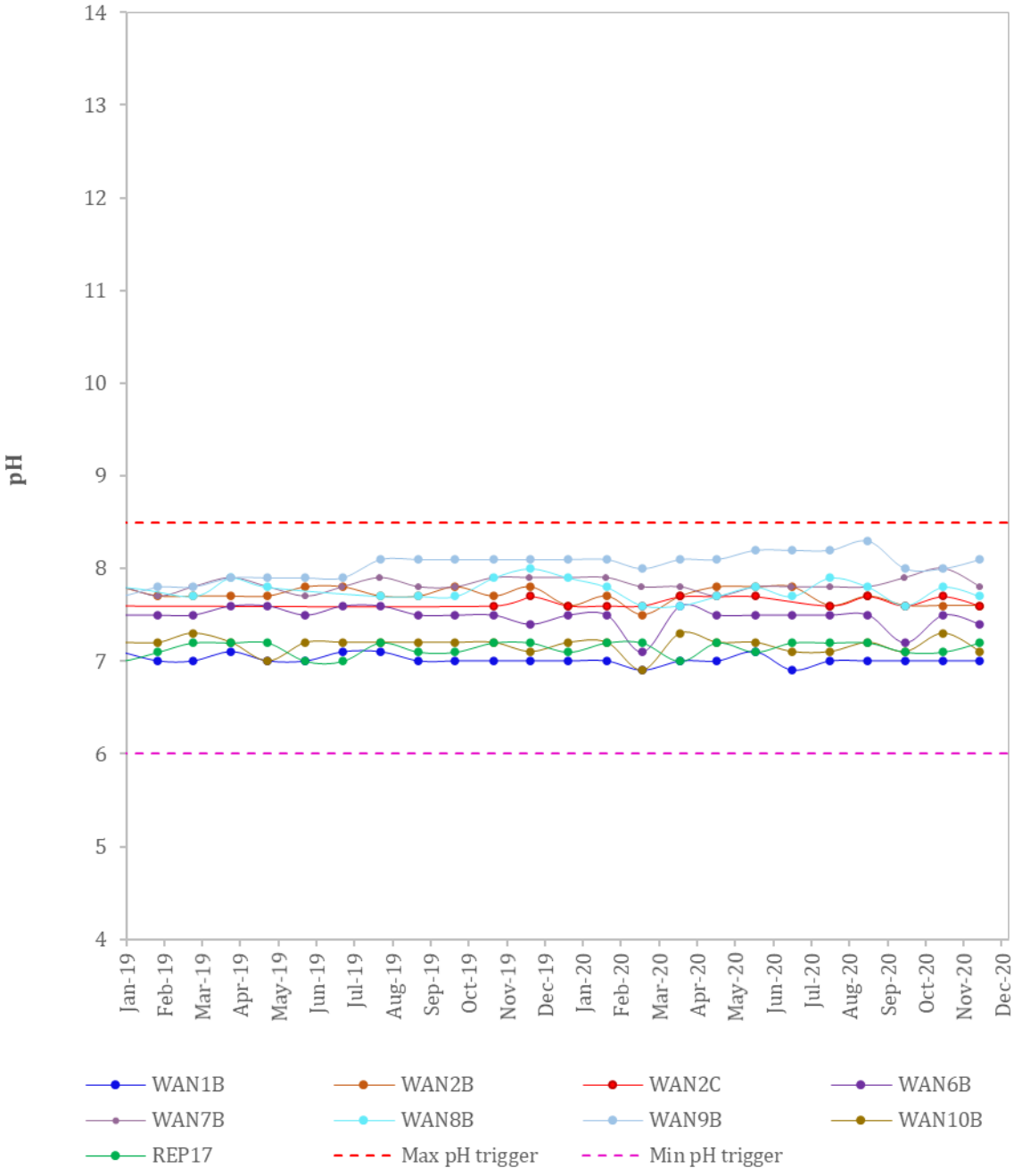


Figure 7.6 pH trends – coal seam aquifers

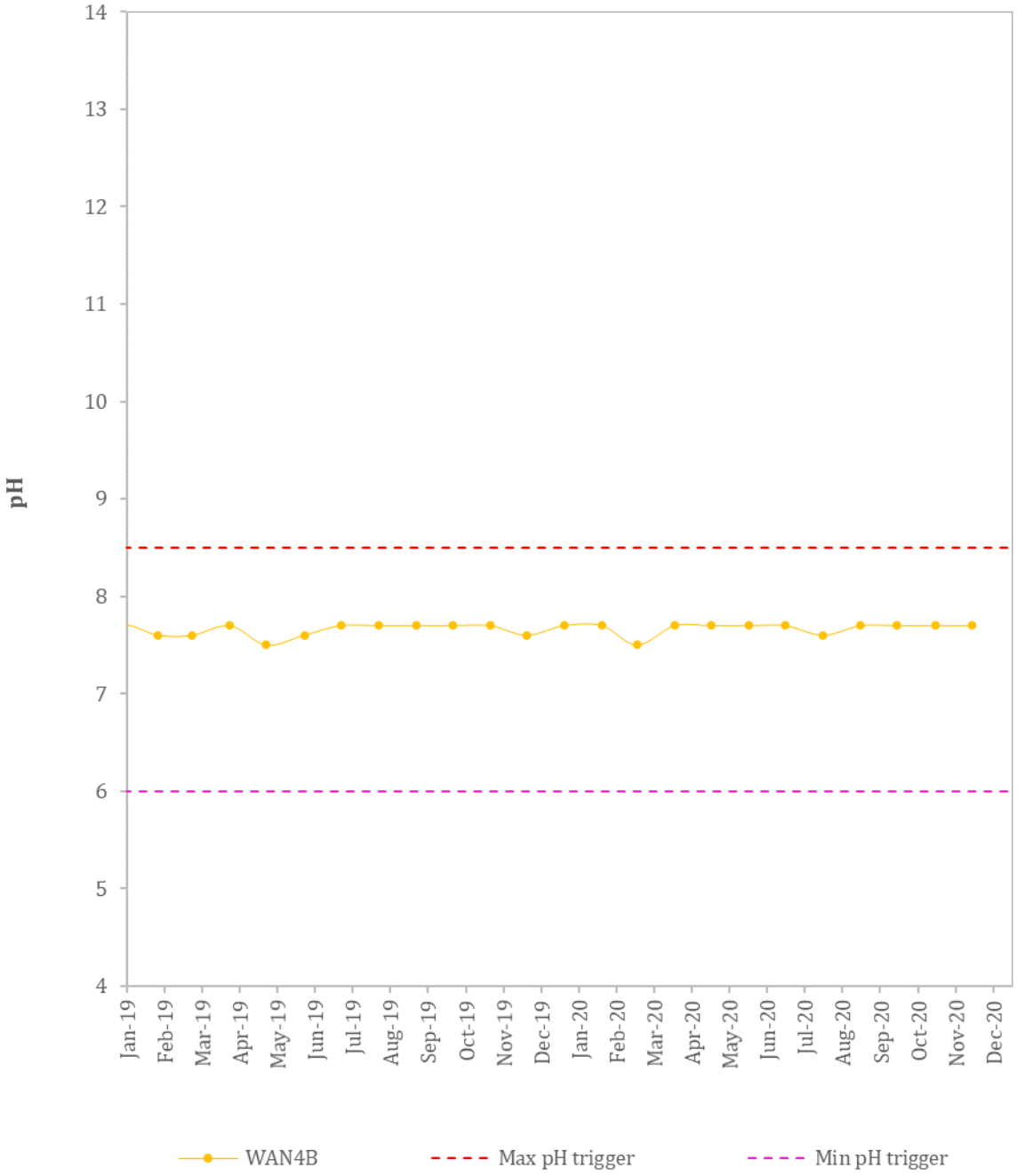


Figure 7.7 pH trends – coal seam aquifers (Wantana Area)

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 2020 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 µS/cm, including WAN1B, WAN2A, WAN6B, and WAN9B (lower EC group; Figure 7.8);
- bores that have EC measurements between 2,000 µS/cm and 3,000 µS/cm, including WAN1A, WAN2B, WAN4B, WAN7B, and; WAN8B; and
- bores that have EC measurements between 3,000 µS/cm and 9,000 µS/cm, including WAN2C, WAN5A, WAN10B and REP17, 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.

Monitoring bore WAN2C was blocked between February and October 2019. Subsequent EC results from November 2019 on are variable but similar to those recorded prior to the blockage in January 2019. EC values in WAN2C displayed a declining trend in 2020.

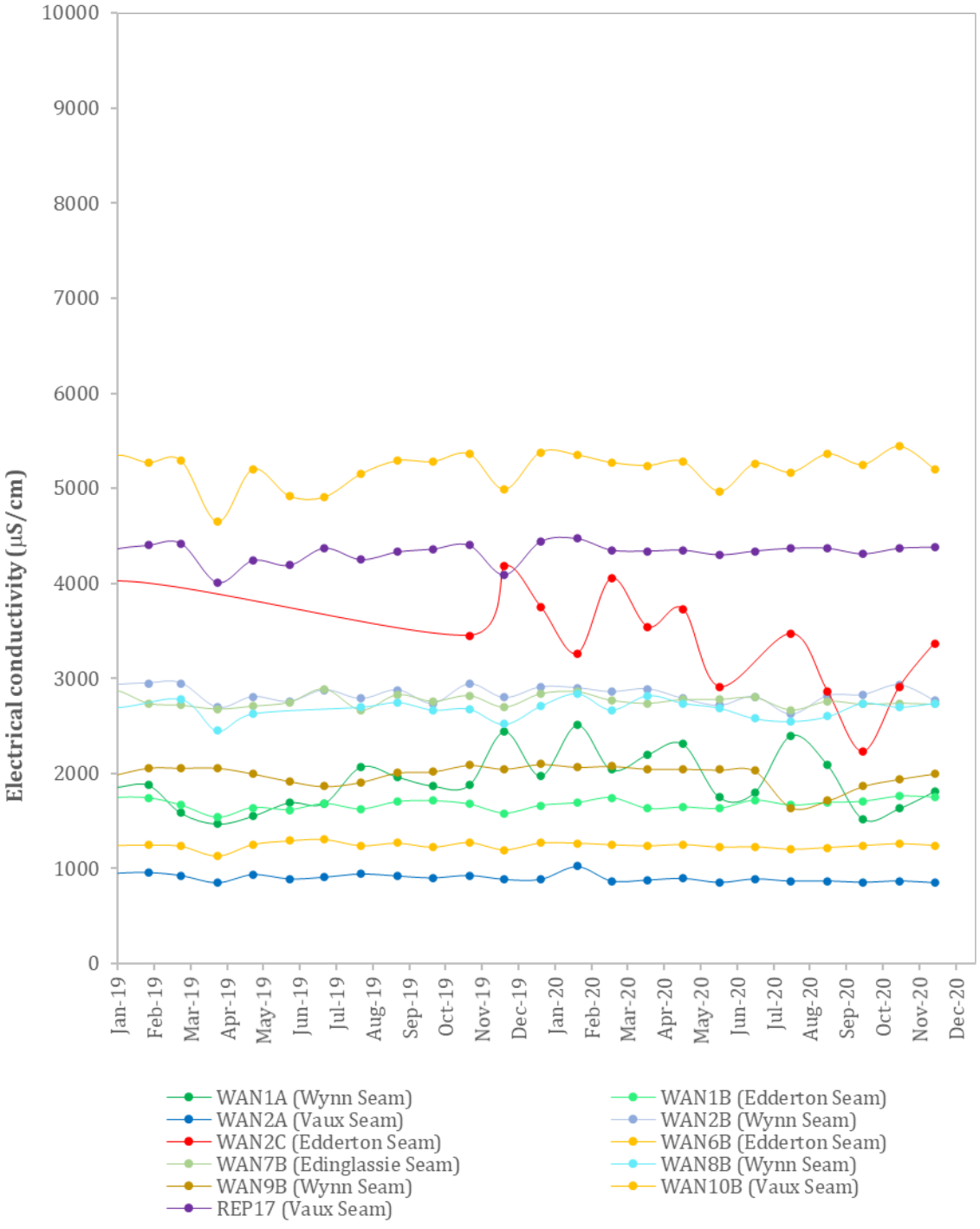


Figure 7.8 Electrical conductivity trends – coal seam aquifers (Wantana Area)

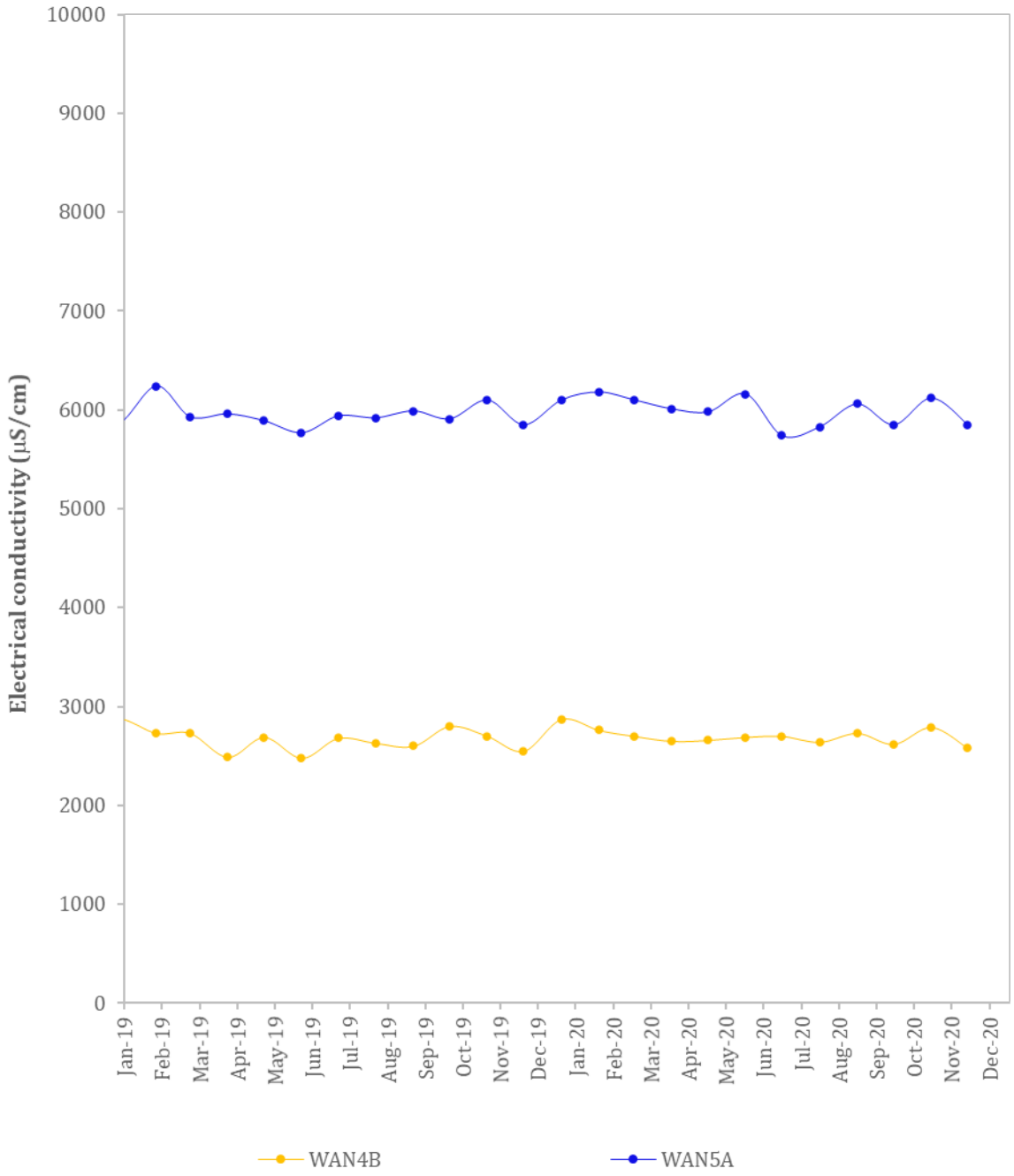


Figure 7.9 Electrical conductivity trends – Deep Permian bores

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 BE1, BE2 and BE3. EC increased between October 2019 and January 2020 and subsequently declined throughout 2020 for each bore. The water levels in these bores have remained stable over the reporting period. 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 changes in recharge.

Figure 7.11 shows pH values have remained circum-neutral and stable in 2020. Groundwater pH values for all monitoring bores are within historic ranges.

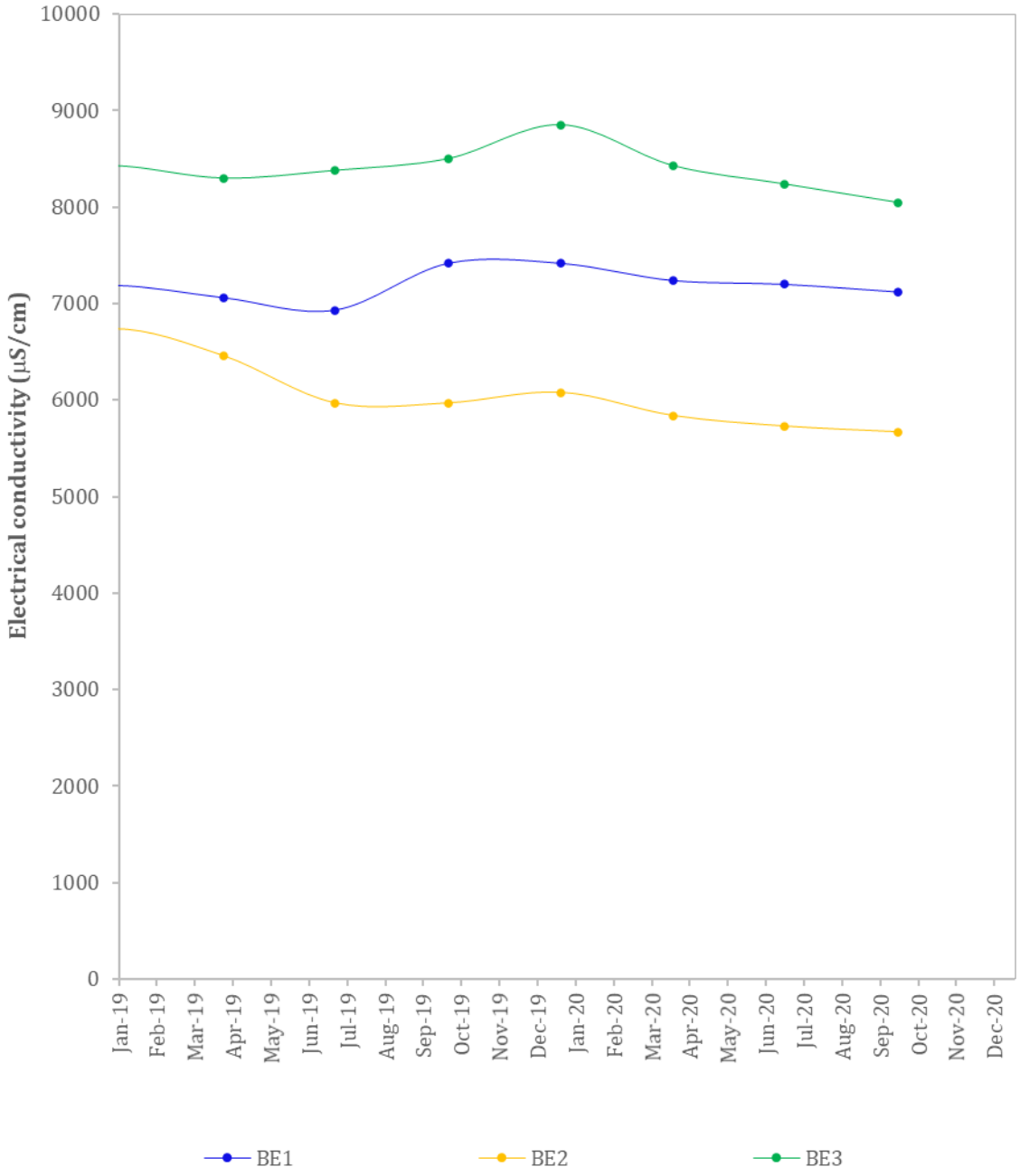


Figure 7.10 Electrical conductivity of Permian bores to the northwest of active mining

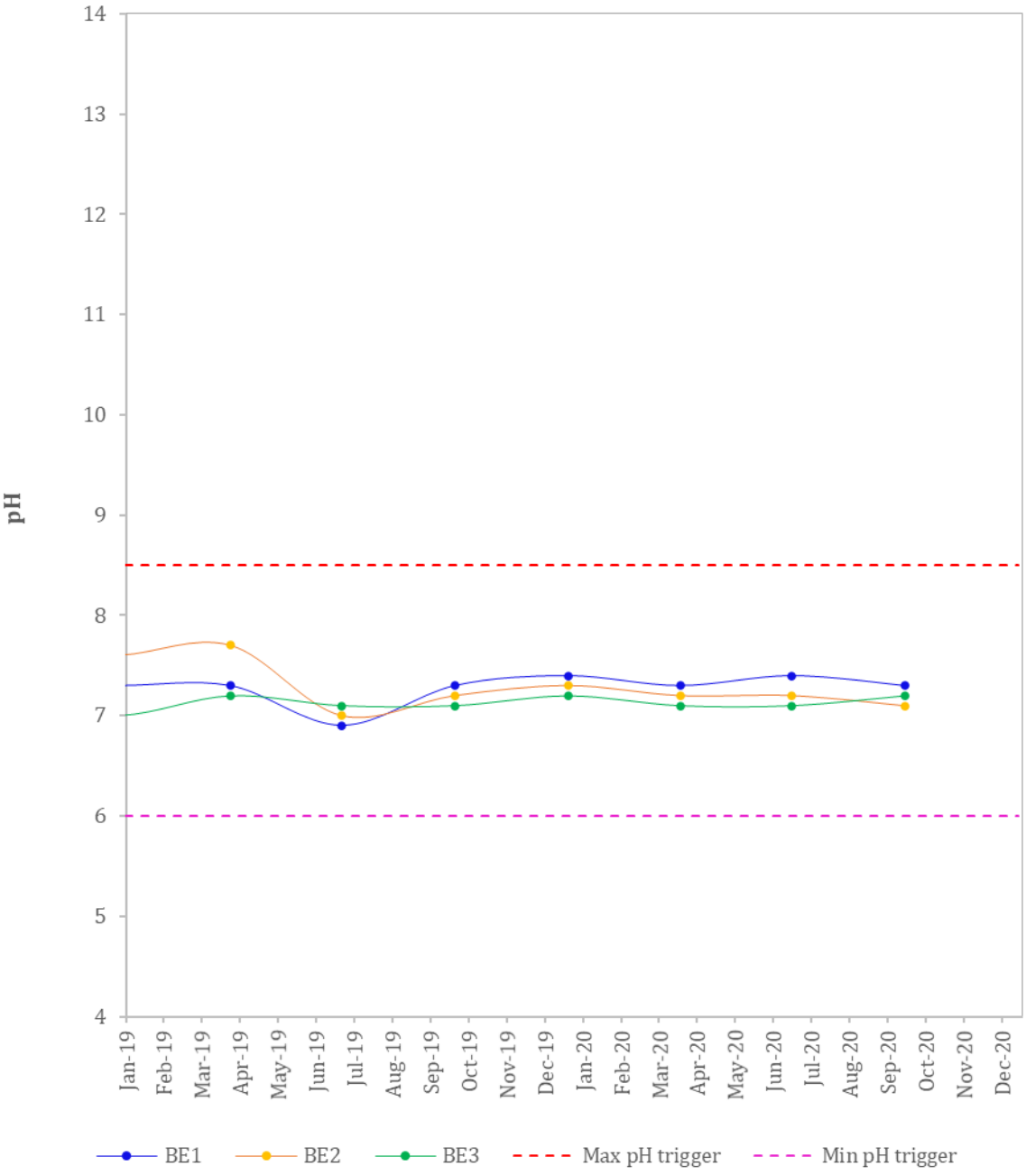


Figure 7.11 pH of Permian bores to the northwest of active mining

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 2020.

7.5.1 pH

With the exception of WAN8A, which recorded four consecutive exceedances for pH in 2019 and 2020, 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 not mining related (refer Section 7.2.1). Results from this reporting period indicate that the water in this bore is stagnant, and not connected to the environment.

7.5.2 EC

A comparison of monitoring results to EC triggers revealed that twelve monitoring bores exceeded their respective EC triggers (Table 5.1) during the monitoring period. The relevant monitoring data and trigger events are summarised in Table 7.1.

Changes in rainfall recharge are likely to be the main influencing factor in the variability of the measured EC values, and therefore influence some of the trigger events. Additionally, depressurisation of coal seams that are subcropping beneath the Hunter River alluvium is also an influencing factor in some bores (as discussed above). This is consistent with the 2013 EIS (AGE, 2013a) prediction that changes to the groundwater quality would be associated with the depressurisation of the Permian units.

WAN9B and WAN10B have a history of exceeding trigger values for EC and recorded multiple exceedances throughout 2020; WAN9B displayed a slight decrease from August 2020. With the exception of June, WAN10B exceeded the trigger value every month in 2020. REP17, screened in the Vaux seam, recorded trigger exceedances throughout 2020. Continued monitoring is required to understand the causes of fluctuating EC in these bores.

Table 7.1 Summary of EC trigger events for 2020

Site	WAN9A2	WAN9B	WAN10A	WAN10B	WAN8B	WAN8A	WAN5A	WAN2C	WAN1A	REP17	BE1	BE3
Lithology	**Alluvium**	**Wynn Seam**	**Alluvium**	**Vaux Seam**	**Wynn Seam**	**Alluvium**	**Alluvium**	**Edderton Seam**	**Alluvium**	**Vaux Seam**	**Permian Sandstone**	**Permian Sandstone**
Stage 1 EC Trigger - 95th Percentile	*936*	*1,915*	*1,253*	*5,068*	*2,780*	*-*	*6,001*	*3,619*	*2,099*	*4,280*	*7,186*	*8,738*
Stage 2 EC Trigger - Maximum EC	**937**	**1,930**	**1,367**	**5,090**	**2,820**	**7,720**	**6,180**	**3,840**	**2,280**	**4,310**	**7,190**	**8,740**
Jan-20	893	2,100	1,039	5,380	2,710	-	6,100	3,750	1,977	4,440	7,420	8,850
Feb-20	911	2,070	973	5,350	2,840	-	6,180	3,260	2,510	4,470	-	-
Mar-20	918	2,080	929	5,270	2,670	-	6,100	4,050	2,040	4,350	-	-
Apr-20	897	2,050	950	5,240	2,820	-	6,010	3,540	2,200	4,340	7,240	8,430
May-20	896	2,050	916	5,280	2,740	-	5,980	3,730	2,310	4,350	-	-
Jun-20	947	2,040	1,017	4,970	2,690	-	6,160	2,910	1,749	4,300	-	-
Jul-20	887	2,030	916	5,260	2,580	7,630	5,740		1,802	4,340	7,200	8,240
Aug-20	879	1,641	871	5,170	2,550	-	5,830	3,470	2,400	4,370	-	-
Sep-20	897	1,712	909	5,360	2,600	-	6,060	2,860	2,090	4,370	-	-
Oct-20	936	1,866	1,581	5,250	2,740	-	5,850	2,230	1,523	4,310	7,120	8,050
Nov-20	949	1,942	1,472	5,440	2,700	-	6,120	2,910	1,633	4,370	-	-
Dec-20	904	2,000	861	5,200	2,740	8,120	5,850	3,370	1,813	4,380	-	-

Note: ***underscore*** *signifies that a trigger investigation 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 though. There was no access to BG45 and 11953 in 2020, and bores A5, WAN3, WAN4B, WAN8A, and WAN8B were dry or had insufficient water to sample. Exceedances of guideline values in 2020 were recorded for iron, fluoride, and TDS (Table 8.1).

Table 8.1 2020 ANZECC Exceedances

Site	Short term irrigation	Long term irrigation	Stock water	Stock water	Stock water - pigs and poultry	Stock water - sheep
Analyte in exceedance	-	Iron (mg/L)	Iron (mg/L)	Fluoride (mg/L)	TDS (mg/L)	TDS (mg/L)
Exceedance value		0.20 mg/L	0.10 mg/L	2.0 mg/L	3,000 mg/L	4,000 mg/L
46737	-	1.06	1.06	-	3,070	-
BE1	-	0.67	0.67	5.5	4,450	4,450
BE2	-	2.67	2.67	2.7	3,280	-
BE3	-	1.78	1.78	3.2	4,820	4,820
WAN1A	-	1.13	1.13	-	-	-
WAN1B	-	0.24	0.24	-	-	-
WAN2A	-	1.29	1.29	-	-	-
WAN2B	-	0.35	0.35	4.5	-	-
WAN2C	-	0.25	0.25	2.7	-	-
WAN5A	-	1.16	1.16	-	3,410	-
WAN6A	-	0.33	0.33	-	-	-
WAN9A2	-	1.86	1.86	-	-	-
WAN9B	-	-	-	5.5	-	-
WAN10B	-	-	0.16	-	-	-
WAN12A	-	-	0.13	-	-	-

9 Summary

9.1 Groundwater levels

A review of groundwater level trends indicates the following:

- Alluvium water level contours and flow directions are consistent with previous years.
- Groundwater levels in the Hunter River Alluvium have increased slightly throughout the year. This increase is attributed to above average rainfall in the region and an increasing CRD.
- 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, possibly due to the depressurisation of coal seams subcropping beneath the alluvium. This is consistent with the 2013 EIS (AGE, 2013a) that states "*The groundwater model predicts that mining associated with the Project will induce flow from the alluvium to the Permian. This is a reversal of the flow direction under pre-mining conditions",* and *"The model predicts mining will continue to depressurise and lower groundwater levels in the Permian sequence, but this will not result in drawdown extending a significant degree into the alluvial aquifer system, with model drawdown calculated to be less than 1 m."*
- The coal seams and interburden in the Wantana Extension appear to have been depressurised as a result 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 16 m (WAN4, WAN9 and WAN10) is evident between the alluvium and the coal seams. This 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. It is likely that the head in the Edderton Seam has dropped below the base of the bore. 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 alluvium, which is recharged via the regulated Hunter River, into the depressurised Wynn Seam in this location.
- One regional alluvium bore, BG3, triggered the Trigger Event Response Protocol due to low water levels in 2020. However, BG3 has remained below its trigger value since February 2015, and no risk of environmental harm is identified.
- 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, BE4 and BE5 shows signs of seam depressurisation. Pressure head in BE3 has increased throughout the year.
- The Mt Arthur Seam at VWP installations BE1, BE4 and BE5 also shows signs of seam depressurisation. Pressure heads in BE2 and BE3 remained stable or slightly increased in 2020.

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. Two exceedances for pH were recorded in 2020 at this bore; however, only two samples were analysed due to the bore containing insufficient water to sample. 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 µS/cm, except for WAN7A, SMB1-South and SMB2-North. 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 2020. The bore may be 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 µS/cm (Nov 2007) and 8,870 µS/cm (May 2010). Measurements from 2020 were within historic ranges and showed one EC trigger exceedance, however this bore is suspected to contain stagnant water.
- SMB1-South and SMB2-North present EC values that have generally remained consistent throughout 2020 and recent years. It is unlikely that these bores have been impacted by mining.
- BG3 displayed a steady decline in EC during 2019 and 2020, falling from 1027 µS/cm to 814 µS/cm in October 2019 and October 2020, respectively. 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, this decrease in pressure may have allowed for localised infiltration of less saline alluvial water.
- EC data within the coal measures and interburden are between 2,500 µS/cm and 9,000 µS/cm, which is the expected EC for coal measures and interburden.
- Four bores in the coal seams (WAN1B, WAN2A, WAN6B, and WAN9B) show EC less than 2,000 µS/cm, suggesting leakage from the alluvium due to depressurisation of the coal seams. 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 µS/cm and 5,140 µS/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). Excepting June 2020, 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.

- Monitoring bore REP17, screening the Vaux Seam, recorded EC trigger exceedances for every month in 2020. While EC values have previously exceeded the trigger value, the average EC in 2020 has increased from previous years. EC values averaged 4,162 µS/cm in 2018, 4,284 µS/cm in 2019 and 4,366 µS/cm in 2020, following a slowly increasing trend. 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 – 7.7) and moderate change in EC (range: 5,670 µS/cm – 8,850 µS/cm) over the reporting period. BE1 recorded EC exceedances each quarter and BE3 recorded one exceedance in January 2020, falling below trigger values in the following quarters.
- When speciation results are compared to the ANZECC guidelines, certain locations exceed the ANZECC guidelines for iron (long term irrigation), fluoride (long term irrigation and stock water) and TDS (stock water).

10 Recommendations

Recommendations based on the information provided in this report 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.
- An additional nested site (i.e. 1 x alluvial and 1 x Permian bore) should be drilled to the south of Bengalla, along strike to the actively mined seams in the region nearby to BG3 (i.e. < 1 km). The purpose of these bores would be to provide a control point that enables a comparison of the two sites.
- 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.
- The EC values of WAN4 nested bores are still declining. The trend should continue to be monitored.

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).

BMC (2019), "Bengalla Mine. Water Management Plan. Version 7" Bengalla Mining Company. August 2017.

Appendix A **Monitoring bore summary data**

Bore ID	Easting MGA94 z56	Northing MGA94 z56	Ground level (mAHD)	Top of casing (mAHD)	Stick-up (m)	Screen (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)	2020 GWL (mAHD)	Measured date	Difference baseline vs. 2020 GWL (m)	Max drawdown vs. 2020 GWL (m) [Available drawdown]	Trigger vs. 2020 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	123.35	Oct-20	-0.18	0.16	0.15
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	129	126.2	Oct-20	-1.26	2.96	-2.8
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	131.71	Jul-20	-0.51	2.74	2.71
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	133.63	Jul-20	-0.51	4.89	4.93
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	132.95	Jul-20	-0.23	1.69	1.65
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	131.7	Jul-20	-0.59	0.59	0.6
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	186.65	Oct-20	0.6	1.34	1.35
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	133.06	Jul-20	-0.59	0.25	0.26
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	125	132.92	Jul-20	-0.75	1.01	7.92
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	173.63	Oct-20	1.59	16.8	16.83
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	168.51	Oct-20	0.84	149.7	149.71
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	138.72	Oct-20	-6.97	25.54	25.52
BG1 [b]	296656	6426003	138.2	138.78	0.58	-	-	-	Alluvium	Quarterly SWL 8hr logger	Jan-97	Annually	Oct-03	128.24	1-Nov-00	126.84	1.4	Yes	126.8	128.55	Dec-20	0.31	1.71	1.75
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	125.8	Oct-20	-0.68	-0.45	-0.5
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	-	132.48	Oct-20	-0.87	0.08	-
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	-	-	-	-	-	-
REPI7	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	91.51	Dec-20	-10.58	28.44	28.41
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	128.35	Dec-20	-0.31	1.18	1.15
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	128.52	Dec-20	-0.31	1.24	11.02
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	126.11	Dec-20	-0.63	3.95	3.91
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	109.05	Dec-20	-10.15	10.73	10.75
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	122.68	Dec-20	0.96	5.15	5.18
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	119.46	Dec-20	3.59	19.37	19.36
WAN2A	296217	6425824	137.7	138.4	0.7	13-16	16	121.7	Alluvium/Vaux seam	Monthly	Sep-05	Annually	Aug-09	125.23	1-Feb-07	118.47	6.76	Yes	118.5	125.52	Dec-20	0.29	7.05	7.02
WAN2B	296217	6425824	137.7	138.44	0.74	36-39	39	98.7	Wynn Seam	Monthly	Sep-05	Annually	Aug-09	111.8	1-Feb-07	86.38	25.42	Yes	86.4	105.53	Dec-20	-6.27	19.15	19.13
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	100.13	Dec-20	-0.31	25.11	25.13
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	125.8	Dec-20	-0.84	4.64	4.6
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	114.69	Dec-20	-9.82	16.5	16.49
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	125.91	Dec-20	-0.83	1.6	1.61
WAN5B [e]	296019	6425360	135.9	136.78	0.88	26-29	28.98	107.8	Deep Permian	Monthly	Sep-05	Annually	Aug-09	126.74	1-Sep-05	116.03	10.71	Yes	116	126.06	Aug-20	-0.68	10.03	10.06
WAN6A	296553	6425634	136.9	137.67	0.77	7.5-10.5	10.5	126.4	Alluvium	Monthly	Sep-05	Annually	Aug-09	128	1-Aug-07	126.9	1.1	Yes	126.9	127.72	Dec-20	-0.28	0.82	0.82
WAN6B	296553	6425634	136.9	137.66	0.76	30-33	33	103.9	Edderton Seam	Monthly	Sep-05	Annually	Aug-09	127.92	1-Aug-07	123.82	4.1	Yes	123.8	127.62	Dec-20	-0.3	3.8	3.82
WAN7A	296856	6426254	138.1	138.86	0.76	12.0-15.0	15	123.1	Alluvium	Monthly	Sep-05	Annually	Aug-09	126.8	1-Feb-09	125.4	1.4	Yes	125.4	126.86	Dec-20	0.06	1.46	1.46
WAN7B	296856	6426254	138.1	138.89	0.79	80-83	83	55.1	Edinglassie Seam	Monthly	Sep-05	Annually	Aug-09	128.7	1-Feb-08	126.41	2.29	Yes	126.4	129.26	Dec-20	0.56	2.85	2.86

Bore ID	Easting MGA94 z56	Northing MGA94 z56	Ground level (mAHD)	Top of casing (mAHD)	Stick-up (m)	Screen (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)	2020 GWL (mAHD)	Measured date	Difference baseline vs. 2020 GWL (m)	Max drawdown vs. 2020 GWL (m) [Available drawdown]	Trigger vs. 2020 GWL (m)
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	124.92	Dec-20	-0.72	1.63	1.62
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	117.12	Dec-20	-0.91	8.61	8.62
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	126.87	Dec-20	0.62	3.19	3.17
WAN9B	296328	6425576	136.93	137.88	0.95	21-24	24	112.93	Wynn Seam	Monthly	May-09	Biannually	Apr-09	119.44	1-Sep-09	111.39	8.05	Yes	111.4	114.68	Dec-20	-4.76	3.29	3.28
BE1 (VWP)	293475	6429036	241.48	-	-	120	120	121.48	Warkworth/Mt Arthur	Quarterly	Oct-11	NA	2011	-	-	-	-	-	-	-	-	-	-	-
BE1 (VWP)	293475	6429036	241.48	-	-	264.5	264.5	-23.02	Edderton Seam	Quarterly	Nov-11	NA	2011	-	-	-	-	-	-	-	-	-	-	-
BE2 (VWP)	293374	6425866	204.22	-	-	97.8	97.8	106.42	Warkworth/Mt Arthur	Quarterly	Dec-11	NA	2011	-	-	-	-	-	-	-	-	-	-	-
BE2 (VWP)	293374	6425866	204.22	-	-	212.5	212.5	-8.28	Edderton Seam	Quarterly	Jan-12	NA	2011	-	-	-	-	-	-	-	-	-	-	-
BE3 (VWP)	292977	6427587	175.21	-	-	80.6	80.6	94.61	Warkworth/Mt Arthur	Quarterly	Feb-12	NA	2011	-	-	-	-	-	-	-	-	-	-	-
BE3 (VWP)	292977	6427587	175.21	-	-	154.6	154.6	20.61	Edderton Seam	Quarterly	Mar-12	NA	2011	-	-	-	-	-	-	-	-	-	-	-
BE4 (VWP)	294313	6428784	191.4	-	-	82	228.2	-36.8	Mt Arthur	Quarterly	Mar-17	NA	2017	-	-	-	-	-	-	-	-	-	-	-
BE4 (VWP)	294313	6428784	191.4	-	-	213	228.2	-36.8	Edderton Seam	Quarterly	Mar-17	NA	2017	-	-	-	-	-	-	-	-	-	-	-
BE5 (VWP)	293696	6427245	181.3	-	-	74	210.15	-28.85	Mt Arthur	Quarterly	Apr-17	NA	2017	-	-	-	-	-	-	-	-	-	-	-
BE5 (VWP)	293696	6427245	181.3	-	-	197.5	210.15	-28.85	Edderton Seam	Quarterly	Apr-17	NA	2017	-	-	-	-	-	-	-	-	-	-	-
GW01A	298190	6428409	TBC	TBC	TBC	9-12	12	TBC	Alluvium	Monthly	Dec-18	Annually	TBC	-	-	-	-	No	-	-	-	-	-	-
GW01B	298190	6428409	TBC	TBC	TBC	24-27	27	TBC	Shallow Permian	Monthly	Dec-18	Annually	TBC	-	-	-	-	No	-	-	-	-	-	-
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	-	-	-	-	-	-

Notes:

[a] *no access or mined through for 2020 monitoring.*

[b] *bore base should be tagged to confirm depth.*

[c] *resurvey suggested – 47277.*

[d] *depth to bottom 35.1m - bore may have collapsed – WAN 3.*

[e] *standpipe damaged in September 2020 – WAN5B.*

Appendix H

Rehabilitation Monitoring Findings

Table H1
Summary of Rehabilitation Monitoring Observations and Actions

Type	Details	Actions	Action Priority *
Drainage	Some channel erosion remains on the southern side of the drop structure in Zone 2. The severity of channelling did not appear increased from last year, however large rocks should be imported to fill and armour the eroding area.	To be reviewed when Zone 2 is being retrofitted with HDWV	2
Drainage	Two instances of breached contour banks and one of tunnelling under a contour bank were identified.	To be repaired when the area is subjected to HDWV installation	2
Erosion	Gully erosion in a partly treed area on the southern dump was observed. Channel needs to be repaired.	To be repaired when the area is subjected to HDWV installation	2
HDWV	Germination of woodland species has failed across most areas of rehabilitation completed in 2016, with minimal to no shrubs and trees establishing.	HDWV installation is occurring over the OEH between 2020 – 2024. These areas will be re-established during this period.	2
HDWV	Germination and woody species establishment has occurred across the upper slopes of the 2014 rehabilitation, however the establishing woody vegetation is nearly entirely dominated by *Acacia ligulata* (out of range native). It is recommended that these should not be retained and the areas fully reworked under an Annual Rehabilitation Plan (ARP) to establish local shrubs/trees representative of the target communities.	ARP will address each zone and site preparation for the installation of HDWV in each Zone	2
Weed Control – African Boxthorn	Despite ongoing control, the species remains common across the site and keeps establishing from soil-borne seedbank. Although no severe infestations occur, several areas were noted with few to many individuals established. The routine weed control program should continue to target the species on an ongoing basis.	Weed inspections are undertaken quarterly and weed control is undertaken across all areas of rehabilitation. Weed control undertaken in 2020 is detailed in Section 6.13 of this review.	2
Weed Control - Galenia	Several areas remain which continue to support localised (to widespread) infestations of the species, ranging from moderate to very high severity and often outcompeting and suppressing other ground cover species. This includes areas where control was implemented in 2019 and where the species was observed as reestablishing.	Weed inspections are undertaken quarterly and weed control is undertaken across all areas of rehabilitation. Weed control undertaken	2

Type	Details	Actions	Action Priority *
	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.	in 2020 is detailed in Section 6.13 of this review.	

Source –Koru Environmental Pty Limited Rehabilitation Monitoring and Audit 2020 Bengalla Mine

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

KORU ENVIRONMENTAL

N W E S

0 95 190 380
metres

1:13,910 (when printed at A4)

MAP SIZE:	A4 Portrait
DATUM:	GDA 1994
PROJECTION:	MGA Zone 56
PROJECT REF:	P2020-022
CREATED BY:	mcatteau
DATE CREATED:	21-Jan-2021

Bengalla project boundary

Agreed final land use type

High density woody vegetation (HDWV)

Class III pasture

PRP Management Zones

Partly treed areas

Monitoring sites locations

Sites monitored in 2020

Sites not monitored in 2020

Bengalla Mine
Rehabilitation Monitoring 2020

FIGURE 2

Rehabilitation Zones and Monitoring Sites Locations

Appendix I

Summary of Cumulative Elevated PM_{10} Monitoring Results and Bengalla Increment

APPENDIX I

Summary of Cumulative Elevated PM_{10} Dust Monitoring Results and Bengalla Increment

Date of elevated result	Result (µg/m^3)	Monitor	Description
24 HOUR EXCEEDANCES			
03/01/2020	102	PM_{10}-1	BMC engaged Todoroski Air Sciences (TAS) to investigate the elevated PM_{10} levels recorded at PM_{10}-1, PM_{10}-2 and PM_{10}-3. Based on the prevailing wind directions it was estimated that Bengalla's operations contributed 0 µg/m^3 to the elevated readings at any monitoring location. BMC provided DPIE with the investigation report and a summary of operations undertaken at Bengalla on the day on 13/03/20.
	70	PM_{10}-2	
	85	PM_{10}-3	
9/01/2020	53	PM_{10}-1	BMC engaged TAS to investigate the elevated PM_{10} levels recorded at PM_{10}-1, PM_{10}-2 and PM_{10}-3. Based on the prevailing wind directions it is estimated that Bengalla's operations contributed 0 µg/m3 to the elevated readings at any monitoring location. BMC provided DPE with the investigation report and a summary of operations undertaken at Bengalla on the day on 13/03/20.
	60	PM_{10}-2	
	61	PM_{10}-3	
15/01/2020	59	PM_{10}-3	BMC engaged TAS to investigate the elevated PM_{10} levels at PM_{10}-3 and PM_{10}-4. Based on the prevailing wind directions it is estimated that Bengalla's operations contributed 0 µg/m^3 to the elevated reading at PM10-3 and 25 µg/m^3 at PM10-4. BMC provided DPIE with the investigation report and a summary of operations undertaken at Bengalla on the day on 13/03/20.
	69	PM_{10}-4	
21/01/2020	74	PM_{10}-1	BMC engaged TAS to investigate the elevated PM_{10} levels at PM_{10}-1, PM_{10}-2 and PM_{10}-4. Based on the prevailing wind directions it is estimated that Bengalla's operations contributed 0 µg/m^3 to the elevated readings at PM10-2 and PM10-4 and 9 µg/m^3 to the reading at PM10-4. BMC provided DPIE with the investigation report and a summary of operations undertaken at Bengalla on the day on 21/01/20.
	60	PM_{10}-2	
	65	PM_{10}-4	
22/01/2020	73	PM_{10}-3	BMC engaged TAS to investigate the elevated PM_{10} levels at PM_{10}-3. Based on the prevailing wind direction it is estimated that Bengalla's operations contributed a maximum of 37.4 µg/m^3 to the elevated reading at PM_{10}-3. BMC provided DPIE with the investigation report and a summary of operations undertaken at Bengalla on the day on 13/03/20.

Date of elevated result	Result (µg/m^3)	Monitor	Description
27/01/20	70	PM_{10}-4	BMC engaged TAS to investigate the elevated PM10 levels at PM_{10}-4. Based on the prevailing wind direction it is estimated that Bengalla's operations contributed a maximum of 28µg/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 13/03/20.
02/02/20	69	PM_{10}-1	BMC engaged TAS to investigate the elevated PM10 levels at PM_{10}-1, PM_{10}-3 and PM_{10}-4. Based on the prevailing wind direction it is estimated that Bengalla's operations contributed a maximum of 15µg/m^3 to the elevated reading at PM_{10}-1, 3µg/m^3 to the elevated reading at PM_{10}-3 and 0µg/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 16/04/20.
	57	PM_{10}-3	
	54	PM_{10}-4	
21/03/2020	54	PM_{10}-4	BMC engaged TAS to investigate the elevated PM10 levels at PM_{10}-4. Based on the prevailing wind direction it is estimated that Bengalla's operations contributed a maximum of 16µg/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 24/04/20.
14/05/2020	63	PM_{10}-4	BMC engaged TAS to investigate the elevated PM10 levels at PM_{10}-4. Based on the prevailing wind direction it is estimated that Bengalla's operations contributed a maximum of 7.6µg/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 09/06/20.
07/06/2020	62	PM_{10}-4	BMC engaged TAS to investigate the elevated PM10 levels at PM_{10}-4. Based on the prevailing wind direction it is estimated that Bengalla's operations contributed a maximum of 17.6µg/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 20/07/20.
07/07/2020	64	PM_{10}-4	BMC engaged TAS to investigate the elevated PM10 levels at PM_{10}-4. Based on the prevailing wind direction it is estimated that Bengalla's operations contributed a maximum of 6.1µg/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 31/08/20.
10/11/2020	52	PM_{10}-4	BMC engaged TAS to investigate the elevated PM10 levels at PM_{10}-4. Based on the prevailing wind direction it is estimated that Bengalla's operations contributed a maximum of 19.4µg/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 14/12/20.
28/11/2020	53	PM_{10}-1	BMC engaged TAS to investigate the elevated PM10 levels at PM_{10}-1 and PM_{10}-3. Based on the prevailing wind direction it is estimated that Bengalla's operations contributed a maximum of 4.9µg/m^3 to the elevated reading at PM_{10}-1 and <4.9µg/m^3 at PM_{10}-3. BMC provided DPIE with the investigation report and a summary of operations undertaken at Bengalla on the day on 14/12/20.
	66	PM_{10}-3	
10/12/2020	56	PM_{10}-3	BMC engaged TAS to investigate the elevated PM10 levels at PM_{10}-1 and PM_{10}-3. Based on the prevailing wind direction it is estimated that Bengalla's operations contributed a maximum of 7.2µg/m^3 to the elevated reading at PM_{10}-4 and <7.2µg/m^3 at PM_{10}-3. BMC provided DPIE with the

Date of elevated result	Result (µg/m^3)	Monitor	Description
	71	PM_{10}-4	investigation report and a summary of operations undertaken at Bengalla on the day on 22/01/2021.
Annual Average Exceedances			
14/01/2021	25.7	PM_{10}-1	BMC engaged TAS to investigate the elevated annual averages for certain $PM_{2.5}$, PM_{10}, TSP and Deposited Dust levels to determine whether there had been any non-compliance with Schedule 3 Condition 16 (SSD 5170). TAS determined that: • With extroadinary event days excluded the PM_{10} concentrations at PM10-1 and PM10-3 were below the criteria (21.9 µg/m^3 and 23.8 µg/m^3, respectively) ; • With extroadinary event days excluded the Bengalla contribution to the nearest private receiver to PM10-4 was below the criteria (23.2 µg/m^3); • With extroadinary event days excluded the TSP concentration at HV6 was below the criteria (87.7 µg/m^3); • Bengalla's estimated contribution to $PM_{2.5}$ concentration measured at the DPIE *Muswellbrook* monitor was below the criteria (0.4 µg/m^3); and • Based on the prevailing wind directions Bengalla's operations contributed approximately 0.3 g/m^2/month of total deposited dust to D20.
	26.5	PM_{10}-3	
	29.3	PM_{10}-4	
	91.7	HV6	
	9.3	$PM_{2.5}$	
	4.5 g/m^2/ month	D20	

Appendix J

Non- Aboriginal Heritage Sites

Bengalla Mining Company Non Aboriginal Heritage Sites

Keys Family Cemetery

Gravestones in Keys Cemetery

Gravestones at Keys Cemetery

Stockyards

Signage erected at Stockyards

Stockyards

Old Bengalla

Old Bengalla Homestead site

Old Bengalla Homestead site

House Site 1

Signage erected at House Site 1

House Site 2

Signage erected at House Site 2

House Site 3

Signage erected at House Site 3

House Site 3

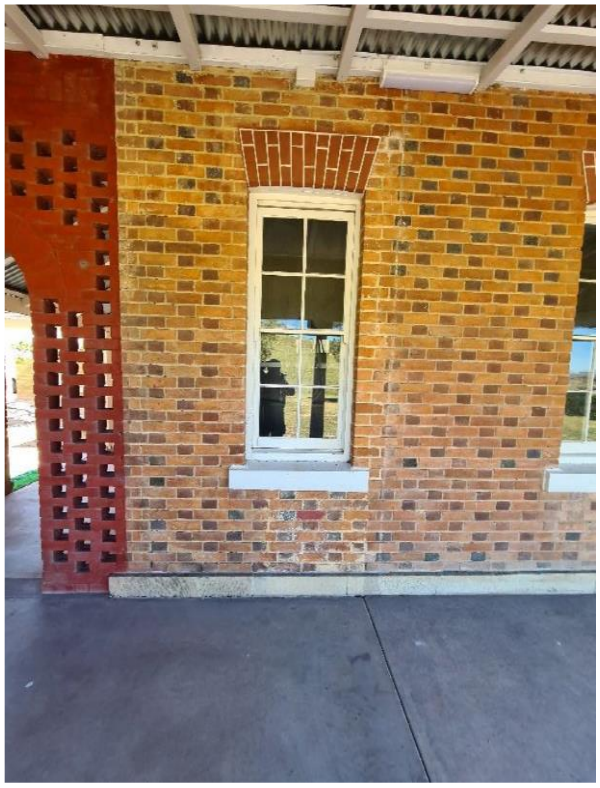
Blunts Butter Factory

Blunts Butter Factory

Signage erected at Blunts Butter Factory

Bengalla Homestead

Main Bengalla Homestead 2020



Main homestead, western veranda condition 2020

Main homestead 2020

Gazebo condition 2020

Reconstructed garden shed - cladding and framing

Reconstructed garden shed internal view of cladding and framing

Cottage service building, South Eastern Elevation

Fencing at entry to property and between cottage and homestead

Out building

Overdene Homestead

'Overdene', typical southern elevation

'Overdene', eastern elevation

‘Overdene’, northern elevation

‘Overdene’, western elevation

'Overdene', room R2

'Overdene', room R3

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)	(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. (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. Based on there being some Non-Compliant conditions, BMC were considered to be Non-Compliant with the condition. The Non compliances are detailed below.	Refer to below recommendations
		Response: This condition is overarching. BMC seeks to maintain compliance with this condition by establishing compliance with the other development consent conditions.	Timing: Each Day.
S2-15 Updating and Staging submission of strategies, plans or programs.	Admin Non-Compliant	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.	**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.

CoA	Compliance Status	Summary of Findings	Recommendation
		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.	Timing: Ongoing. Management Plans to be reviewed where required.
S3-16 Air Quality Criteria	Not Verified	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 condition. 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.	**Rec-2019-02:** DPIE to further consider the argument by BMC that they are compliant with the criteria of this condition. **Rec-2019-03:** $PM_{2.5}$ is required to be measured as detailed in the AQMP and reported in future Annual Reviews. **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. **Rec-2019-05:** Ensure that all recommendations of the Independent Review as required of Schedule 4, Condition 4 are implemented appropriately once completed. **Rec-2019-06:** Ensure information requests relating to air quality as issued by DPIE are complied with. **Rec-2019-07:** Ensure that all reasonable and feasible avoidance and mitigation measures are

CoA	Compliance Status	Summary of Findings	Recommendation
			employed so that the particulate emissions generated by the development are minimised.
		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.	Timing: Amended AQMP lodged at DPIE 24 April 2020 and 13 November 2020.
S3-19 Air Quality – Operating Conditions	Non-Compliant (Low Risk)	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.	**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).
		Response: BMC to continue to implement the Air Quality Management Plan and respond to regulatory Notices.	Timing: Air Quality Management Plan each day. Response to regulatory Notices as required.
S3-20 Air Quality Management Plan	Not Verified	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".	**Rec-2019-08: As Above**
		Response: Noted.	

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.	**Rec-2019-09:** Continue to work with the Natural Resources Access Regulator (NRAR) to increase the annual entitlement under 20BL 169798.
		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.	Timing: Complete.
S3-29 Biodiversity Management Plan	Non-Compliant (Low Risk)	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-Complaint with the condition.	**Rec-2019-10:** Ensure full implementation of the Ground Disturbance Permit process in the future. **Rec-2019-11:** Collect seed from site, to be used in future revegetation works, as required in the Biodiversity Management Plan.
		Response: BMC to follow Ground Disturbance Permit (GDP).	Timing: Each time a GDP is issued.
S3-30 Conservation Bond	Admin Non-Compliant	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.	**Rec-2019-12:** Lodge a conservation bond with DPIE as required of the condition.
		Response: BMC delivered the bank guarantees to what is now the DPIE 1 June 2018.	Timing: Complete.
S4-3 Notification of Landowners/ Tenants	Not Verified	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 exceedences attributable to the Bengalla Mine, and hence did not advise landowners of the exceedences or follow through with the requirements of this condition. Air Quality criteria	-

CoA	Compliance Status	Summary of Findings	Recommendation
		exceedances and BMC's response is further discussed under Condition 16, Schedule 3. 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.	
		Response: Noted.	
S4-4 Independent Review	Admin Non-Compliant	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.	**Rec-2019-13:** Engage a suitably qualified, experienced and independent person to undertake the Independent Dust Review.
		Response: An independent expert was engaged by BMC on 5 November 2019 to undertake the review.	Timing: Engagement complete.
EIS & SEE Commitments			
Install TEOMs to largely replace HVAS	Not Verified	According to site communications TEOMs will be installed once revised Air Quality Management Plan (AQMP) is approved by DPIE.	-
		Response: Noted.	
Adjustment of the monitoring	Not Verified	According to site communications monitoring network to be adjusted once the revised AQMP is approved by DPIE.	-

CoA	Compliance Status	Summary of Findings	Recommendation
network as the site proceeds west.			
		Response: Noted.	
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.	-
		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.	**Rec-2019-14:** Undertake weed management work at the site to control outbreaks of *Galenia pubescens*. **Rec-2019-11:**
		Response: Seed was not harvested during the audit period due to drought. BMC to follow Ground Disturbance Permit (GDP).	Timing: Seed harvesting where possible will be undertaken around May each year. Each time a GDP is issued.
EPL 6538			
O1.1	Non Compliant	During site inspections the Auditors observed: * Sprinklers in use at coal stockpiles to reduce coal dust; * Water trucks watering down roads to minimise dust; and * Covered coal conveyors. * BMC has procedures to ensure work is carried out in a competent manner: - PRO-0069 'Tipping and Dumping of Materials'; - PRO-0263 'Dragline Operation'; - PRO-0266 'Watercart Operation'; - PRO-0273 'Excavation Operation'; and - PRO-0576 'Loading of Reject in Haul Trucks'. a) Non-compliant: During the site inspection noted a hydrocarbon spill at the re-fuelling area near to the workshop (PHOTO 26).	Prevent hydrocarbon spills

CoA	Compliance Status	Summary of Findings	Recommendation
		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.	
		Response: BMC has procedures and infrastructure in place to minimise and contain hydrocarbon spills. If hydrocarbon spills occur, remedial action is taken as required.	Timing: Ongoing.
O3.2, O3.3 Dust	Not Verified	Refer to Conditions 16, 19 and 20 (Schedule 3) of the Development Consent, which discusses dust management.	**Rec-2019-02** **Rec-2019-03** **Rec-2019-04** **Rec-2019-05** **Rec-2019-06** **Rec-2019-07** **Rec-2019-08**
		Response: Noted.	
M9.4 Monitoring	Non-Compliant (Low Risk)	Monitoring point 26 is incorrectly marked as point 1.	**Rec-2019-15:** Mark monitoring point 26 as required of the EPL.
		Response: Noted.	Timing: New sign installed July 2020.
ML1397 (2018)			
2	Not Verified	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.	-
		Response: Noted.	

CoA	Compliance Status	Summary of Findings	Recommendation
ML1397			
8	Not Verified	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.	-
		Response: Noted.	
13	Non-Compliant (Low Risk)	Mine disturbance included in the MOP. The Bengalla pre-clearing and clearing procedures are referred to in the MOP. 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.	No action specified
		Response: Noted.	Timing: Each time a GDP is issued.
ML1450			
8	Not Verified	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.	-
		Response: Noted.	
ML1469			
19	Not Verified	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.	-
		Response: Noted.	

Table 2: Recommendations and Opportunities for Improvement

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
SSD-5170		
S2-15	**Rec-2019-16**	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.
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.
		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. Timing: Ongoing. After review. BMP provided to Environment Protection Authority and Muswellbrook Shire Council for consultation 29 December 2020.

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
	Rec-2019-20	When plans are updated for other requirements, ensure Management Plans reference current regulator names, including the Department of Planning, Infrastructure and Environment (DPIE).
		Response: Noted.
S3-16, S5-4	**Rec-2019-21**	Ensure future Annual Reviews refer to the correct PM_{10} criteria.
		Response: Noted.
S3-19	**Rec-2019-22**	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.
		Response: Noted. Reviews of trigger levels will be undertaken during the year relevant to the updated AQMP monitor locations.
	Rec-2019-23	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.
		Response: Noted. The current AQMP has considered this matter.
	Rec-2019-24	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.
		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.
S3-20	**Rec-2019-25**	Keep progressing the approval of the revised AQMP in cooperation with DPIE.
		Response: Noted. Updated AQMP resubmitted to DPIE 24 April 2020 and 13 November 2020.
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: Noted. Investigation to occur.
	Rec-2019-27	Ensure all hydrocarbon products are stored in bunded areas in accordance with the relevant Australian Standards.
		Response: Noted.

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
		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. 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.
		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. Timing: When Historic Heritage Management Plan remediation works are complete. Ongoing.
S3-40	**Rec-2019-32**	Determine how many trees have been lost from the Roxburgh tree screen and replant missing trees.
		Response: BMC will inspect the site to determine missing trees and then replant. Timing: Inspection around May 2020 with any replanting as soon as reasonable and feasible.

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
S3-45	**Rec-2019-33**	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.
		Response: BMC will plant HDWV according to the Mining Operations Plan (Amendment B) (MOP). Timing: Ongoing per MOP.
	Rec-2019-34	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.
		Response: Noted. Trial approach not accepted by Resources Regulator as proposed method to establish HDWV is known to be successful. Timing: Not applicable.
	Rec-2019-35	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.
		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. Timing: Ongoing.
S3-46	**Rec-2019-36**	The MOP should be amended to reflect the rehabilitation staged approach (once agreed) and submitted for approval.
		Response: The approved MOP currently includes a staged rehabilitation approach. Timing: Ongoing.

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
	Rec-2019-37	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.
		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. Timing: Ongoing.
	Rec-2019-38	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.
		Response: Noted. Timing: Ongoing.
S5-3	**Rec-2019-39**	In future revisions of management plans, check the accuracy of section references in management plan requirements tables of the BMC management plans. Response: Noted. Timing: Ongoing.
	Rec-2019-40	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.
		Response: Noted. Section references will be included when the management plans identified require review according to SSD-5170 Modification 4 Schedule 5 Condition 5. Timing: Ongoing. Management Plans ACHMP, VIMP and HHMP review to be undertaken.
S5-4	**Rec-2019-41**	Include monitoring results of previous years for noise, blast and surface water in future Annual Reviews.
		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. Timing: Annually.

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
	Rec-2019-42	Include a comparison of noise, blast, GHG and surface water results against relevant predictions in the EIS in future Annual Reviews
		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. Timing: Annually.
	Rec-2019-43	Describe in future Annual Reviews what actions were (or are being) taken to ensure non-compliance/incidents do not occur again.
		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. Timing: Annually.
	Rec-2019-44	Include a discussion for trends for air quality, blast, noise and surface water monitoring data in future Annual Reviews. 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.
		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. Timing: Annually.
EIS & SEE Commitments		
8.2.4	**Rec-2019-45**	Monitor the fuel efficiency of diesel equipment.
		Response. Noted. BMC seeks to purchase fuel efficient equipment. Timing: Ongoing.
8.19.4	**Rec-2019-46**	Continue current practices regarding GDP; soil testing and management.
		Response: Noted. Timing: Ongoing.

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
	Rec-2019-38	(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.
		Response: Noted. Timing: Ongoing.
8.21.9	**Rec-2019-47**	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.
		Response: Noted. Timing. Later years of mine life.
	Rec-2019-48	Continue monitoring rehabilitation to ensure it is tracking towards final completion criteria.
		Response: Noted. Monitoring will be undertaken according to the MOP. Timing: Ongoing.
	Rec-2019-50	Conduct in-fill tree planting along Wybong Road.
		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. Timing: Ongoing Likely 2023.
EPL 3538		
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 contains Figures for Monitoring Water and Effluent. BMC will not be amending these plans. 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.

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
		Response: WMP plan will be reviewed according to SSD - 5170 Modification 4 Schedule 5 Condition 5. Timing: Ongoing. WMP to be reviewed where required.
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.
ML 1397 (2018), Condition 3 ML 1469, Condition 2, ML 1728, Condition 3, ML 1711, Condition 3, ML 1729, Condition 3.	**Rec-2019-36**	(As above) The MOP should be amended to reflect the rehabilitation staged approach (once agreed) and submitted for approval.

CoA	Rec / Opportunity	Recommendation / Opportunities for Improvement
		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. Timing: Ongoing.
ML 1469, Condition 29	**Rec-2019-50**	(As above) Conduct in-fill tree planting along Wybong Road.
		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. Timing: Ongoing. Likely 2023.